INTERFACES IN FUNCTIONAL DISCOURSE GRAMMAR

THEORY AND APPLICATIONS

*Edited by Lucia Contreras-García
and Daniel García Velasco*

TRENDS IN LINGUISTICS

Lucía Contreras-García, Daniel García Velasco (Eds.)
Interfaces in Functional Discourse Grammar

Trends in Linguistics
Studies and Monographs

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Interfaces in Functional Discourse Grammar

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Theory and Applications

Edited by
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Contents

Abbreviations

General abbreviations

1	first person
2	second person
3	third person / proximate singular
4	fourth person / obviative
11	first person plural exclusive
12	first person plural inclusive
II	noun class II
VII	noun class VII
A	agent-like argument of canonical transitive verb / actor
AB	absential
ABS	absolutive
ABSS	absolute state
ACSBJ	subject of active verb
AI	animate intransitive
ALL	allative
ANAPH	anaphoric
AN	animate
ACC	accusative
AUX	auxiliary
AI	animate intransitive stem
APPL	applicative
ART	article
ASP	aspect
AU	augmented
BR	bound root
CL	classifier
CAUS	causative
CL:VERT	classifier for vertical
COM	comitative
COMM	common gender
CONTR	contrast
COP	copula
COLL	collective
COMPL	completive
CONT	continuative
CONSEC	consecutive
DAT	dative
DEF	definite
DET	determiner
DEM	demonstrative
DES	desiderative
DISC	discontinuative

DOBJ	direct object
DR	bivalent direct
DIR	directional
DIST	distal
DRCT	direct
DU	dual
DUB	dubitative mood
DUR	durative
ELEV	elevational
EMPH	emphatic
EP	epenthetic sound
ERG	ergative
F	feminine
FAC	factual
FIN	finite
FOC	focus
FUT	future
HAB	habitual
IC	internal change
IMP	imperative
IPFV	imperfective
INACSBJ	subject of inactive verb
INCL	inclusive
INCOMPL	incompletive
IND	indicative
INDF	indefinite
INF	infinitive
INGR	ingressive
INS	instrumental
INTR	intransitive
INT	intention / intentional
INTERR	interrogative mood
INTS	intensive
INTR	intransitive
INVIS	invisible/distal demonstrative
IPFV	imperfective
IRR	irrealis
LK	linker
LOC	locative
LV	linking vowel
M	masculine
MULT	multiple
N	neuter
NEG	negative
NEARFUT	near future
NF	nonfeminine
NFUT	non-future

NOM	nominative
NMLZ	nominalizer/nominalization
NONSBJ	non-Subject
NPST	non-past
NSFX	noun suffix
NSPEC	non-specific (aspect)
NSBJ	non-subject
OBJ	object
OBL	oblique
OBV	obviative
P	patient-like argument of canonical transitive verb
PART	participial mood
PARTV	partitive
PASS	passive
PERF	perfect
PERS	personal
PFV	perfective
PL	plural
PN	proper name
PNCT	punctual
POSS	possessive
PRED	predicate marker
PREF	prefix
PREP	preposition
PRO	pronoun
PROG	progressive
PROX	proximate
PRS	present
PRT	particle
PST	past
PTCP	participle
Q	question particle/marker
QU	qualifier
RE	repetitive
REAL	realis
REC.P.VIS	recent past visual
RECP	reciprocal
REFL	reflexive
REL	relative
RES	resultative
RLS	realis
S	argument of intransitive verb
SBJ	subject
SG	singular
SPEC	specific
STD	standing
SUB	subordinator

TA	transitive animate stem
TAM	tense, aspect, modality
TNS	tense
TC	thematic consonant
TH	thematic prefix
TOP.NON.A/S	topical non-subject
TR	transitive
U	undergoer
UNSP	unspecified
VAI	animate intransitive verb
VTI	transitive inanimate verb
VTA	transitive animate verb
VBLZ	verbalizer/verbalization
X	non-specific

Phonological symbols

|A|	underlying form, lexical representation
/B/	surface form, prosodic representation
[C]	auditory form
#	morphophonemic word boundary
+	morpheme boundary
.	syllable boundary
'	high tone
,	low tone
˘	rising tone

Abbreviations used in FDG representations

A	Actor (RL) / Addressee (IL)
A_1	Discourse Act
$Adpp_1$	Adposition phrase
$Adpw_1$	Adposition word
Aff	Affix
Ag	Agent
C	Communicated Content
Cl	Clause
CxtC	Contextual Component
e	State-of-Affairs
ep	Episode
f	Property
F	Illocution
f^c	Configurational Property

Foc	Focus
Gw	Grammatical word
IL	Interpersonal Level
IP	Intonational Phrase
L	Locative
l	Location
Le	Linguistic Expression
ML	Morphosyntactic Level
Np	Noun phrase
Nw	Noun word
p	Propositional Content
P	Speech-act Participant
Pat	Patient
PhonL	Phonetic Level
PL	Phonological Level
PredPhr	Predicate Phrase
PW	Phonological Word
PP	Phonological phrase
R	Subact of Reference
RefPhr	Referential Phrase
RL	Representational Level
Res	Result
S	Speaker
SL	Structural Level
S	Speaker
T_1	Subact of Ascription
Top	Topic
U	Undergoer
Vp	Verb phrase
Vr	Verb(al) root
Vs	Verb(al) stem
Vw	Verb word
x	Individual
π	Operator
Φ	Function
$\$_1$	Lexeme

Lucía Contreras-García and Daniel García Velasco

Functional Discourse Grammar: Blueprint and interfaces

1 Introduction

The articles in this volume deal with interface relations within the framework of *Functional Discourse Grammar* (henceforth FDG), as presented in Hengeveld and Mackenzie (2008) and Keizer (2015). Interfaces in FDG was the topic of the *International Workshop on Functional Discourse Grammar* which took place at the University of Oviedo in September 2019. The present anthology consists of a selection of the manuscripts which were discussed there. The articles address issues such as grammar design, interfaces between levels of linguistic representation and the mismatches between them, and apply these concepts to FDG from three various perspectives: a theoretical approach; a typological approach; and its application to English linguistics.

There were several reasons to devote the workshop to interfaces. Firstly, for a theory with a strong commitment to psychological adequacy such as FDG (Hengeveld and Mackenzie 2008: 29), understanding how interfaces work is understanding how language works. Although the editors of this volume had dealt with this issue in the past (Contreras-García 2013, 2015, García Velasco 2017) and the theory has been applied to the study of form-meaning transparency from a typological perspective (Hengeveld and Leufkens 2018), the nature of interface relations has not been dealt with extensively within this framework by the FDG community as a whole. It was indeed of the utmost importance for the development of the FDG model that further approaches be provided. Furthermore, the discussion proposed hereby may be applied to any other theory of grammar, since a full understanding of language involves the complex interaction of different levels of representation.

The way in which linguistic levels are connected differs considerably from one model to the other. Thus, formal models of language assume the autonomy of syntax hypothesis (see e.g., Croft 1995; Newmeyer 1998), which roughly entails that the working principles of syntactic construction are independent of the rules and principles operating in semantics – although the existence of correspondences between the two has never been denied. In contrast, functional models of

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language tend to work under the implicit assumption that language structure is functionally motivated and as such, reflects principles of semantic or pragmatic organization. This different conception of the relation between linguistic levels has a huge impact on the architecture of grammars and the type of operations which are allowed in them. As a consequence, the question of which grammar organization is more adequate for the description of linguistic phenomena becomes inescapable for linguists of all theoretical stripes.

Most current research on interfaces focuses on the interaction between two particular levels of representation, generally between two traditionally adjacent levels – e.g. between pragmatics and semantics, semantics and syntax, syntax and morphology, or phonetics and phonology. This book deals, however, with the interaction between any two levels of grammar. Although it discusses interfaces and mismatches in a particular framework, Functional Discourse Grammar, we believe that the topic of this book turns out to be appealing for researchers interested in interfaces in general, regardless of their theoretical adherence. We thus hope this volume will be relevant for scholars interested in theoretical linguistics, in grammar comparison, in Functional Discourse Grammar, in typological linguistics, and in English linguistics.

In order to contextualize the chapters in the present volume, in section 2 we will first deal with the notion of interface from a broad linguistic perspective and present the main differences between derivational and modular models of grammar. Section 3 gives a brief overview of FDG, paying special attention to those properties of the model that are necessary to understand the articles which follow. Section 4 will evaluate the extent to which FDG can be considered a derivational or modular theory of grammar. Finally, in section 5, we will summarize the most relevant aspects of the articles included in the volume.

2 Interfaces and the grammar

An interface consists of a set of rules, principles or constraints that relate different linguistic representations. Any grammatical model, whether derivational or not, contains a description of levels of representation and units, the rules needed for their construction and the mechanisms which relate those levels. That way, a full account of linguistic phenomena can be provided. Interfaces can then alternatively be seen as the grammar itself, rather than as a part thereof – that is, as the mechanisms that serve to combine the different primitives or structures that are built at the different levels of representation and create a well-formed expression.

A broad distinction can be drawn in the architecture of grammars between derivational and modular grammars. Assuming that all models will need levels

dedicated to the main areas of linguistic analysis, the main difference between a modular and a derivational model is that the former contains independent modules of linguistic representation, whereas in the latter the operation of one module is dependent upon another one which works previously in the generation of a given expression. Sadock (2012: 4) defines the fundamental property of a modular grammar architecture with the following principle:

The Modularity of Grammar hypothesis
Grammatical rules of different informational types do not interact.

This hypothesis ensures that all components in the grammar operate in complete isolation from one another. Sadock is well aware, however, that the independence of linguistic modules has to be limited or the system would be bound to overgenerate. In Sadock's (2012: 24) view the "principal mechanism that constrains automodular grammar is the interface" and "[t]he idea behind all interface constraints is that a certain degree of compatibility is required with respect to any pair of autonomous representations". Consequently, the autonomy of levels of representation does not mean that interfaces are entirely irregular or arbitrary. Default associations are indeed to be expected (Yuasa 2005: 23), but since the various levels of representation are independent, they may mismatch, a concept which thus becomes crucial in modular theories. A mismatch then may be seen as a deviation from a canonical association of levels such that form-function mappings are "*incongruent* with respect to more general patterns of correspondence in the language" (Francis and Michaelis 2003: 2). A mismatch then involves a "discrepancy" (cf. Dik 1997: chapter 15) between levels and contributes to a non-transparent relation between them (Hengeveld and Leufkens 2018).

In Sadock's model, for example, the default correspondence between levels is stated in the *Generalized Interface Principle*, according to which the representation of functional and formal features needs to be as close as possible (Sadock and Schiller 1993: 393). This principle does not imply that two independent representations at different modules may not mismatch, but rather that a mismatch is "costly in terms of the lexical and/or grammatical specifications that would be required to override the tendency toward full intermodular matching" (Sadock 2003: 186). Sadock (2012: 28) discusses the simple English example *Sally is a carpenter*. In standard predicate logic this sentence would be rendered as CARPENTER(Sally), which could then be expressed most transparently with the impossible *Sally carpenters. The ungrammaticality of this sentence in English, however, comes at a cost: stipulations in the grammar are necessary to ensure that, unlike languages with flexible part of speech systems (see, e.g, Rijkhoff and van Lier 2013), the predicate *carpenter* cannot be used as the head of a verbal phrase in English.

If mismatches are costly, a theory of language that has autonomous levels needs strong interfaces determining to what extent they may mismatch and still represent the same linguistic element at the various levels (Culicover and Jackendoff 1997: 200–201). Typically, modular approaches go hand in hand with static constraints that apply on structures. Actually, "a constraint-based approach states a set of conditions that a well-formed structure must satisfy, without specifying any alterations performed on the structure to achieve the well-formedness, and without any necessary order in which the constraints apply" (Jackendoff 1997: 12).

A very different case scenario arises for derivational theories of language. According to Jackendoff (1997: 12),

> a derivational approach constructs well-formed structures in a sequence of steps, where each step adds something to a previous structure, deletes from it, or otherwise alters it (say by moving pieces around). Each step is discrete; it has an input, which is the output of the previous step, and an output, which becomes the input to the next step. Steps in the middle of a derivation may or may not be well formed on their own; it is the output that matters.

Consequently, as noted by González Escribano (1992), the key factor to distinguish between modular and non-modular approaches lies in the nature of the interaction between the modules proposed. On the one hand, theories which do not conform to the Modularity Hypothesis typically show a relation between modules which is "destructive", whereas in modular grammars the relation between components is "cooperative". In Government and Binding Theory, for example, different subtheories combine to guarantee the grammaticality of the derivation. This allows one of them to overgenerate as long as the rest of them conspire to eliminate ill-formed representations.

3 Functional Discourse Grammar: Blueprint

Before examining interfaces in FDG and the modular vs. derivational nature of the model, it is necessary to introduce the main properties of the theory's general architecture. This is given in Figure 1 below.[1]

The figure shows four components, which are claimed to be necessary to provide a full account of human verbal interaction. Thus, next to the grammatical component, which can be considered FDG proper, we find a Contextual Component, a Conceptual Component and an Output Component. The Contextual

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1 Hengeveld and Mackenzie (this volume) provide an updated version of this architecture.
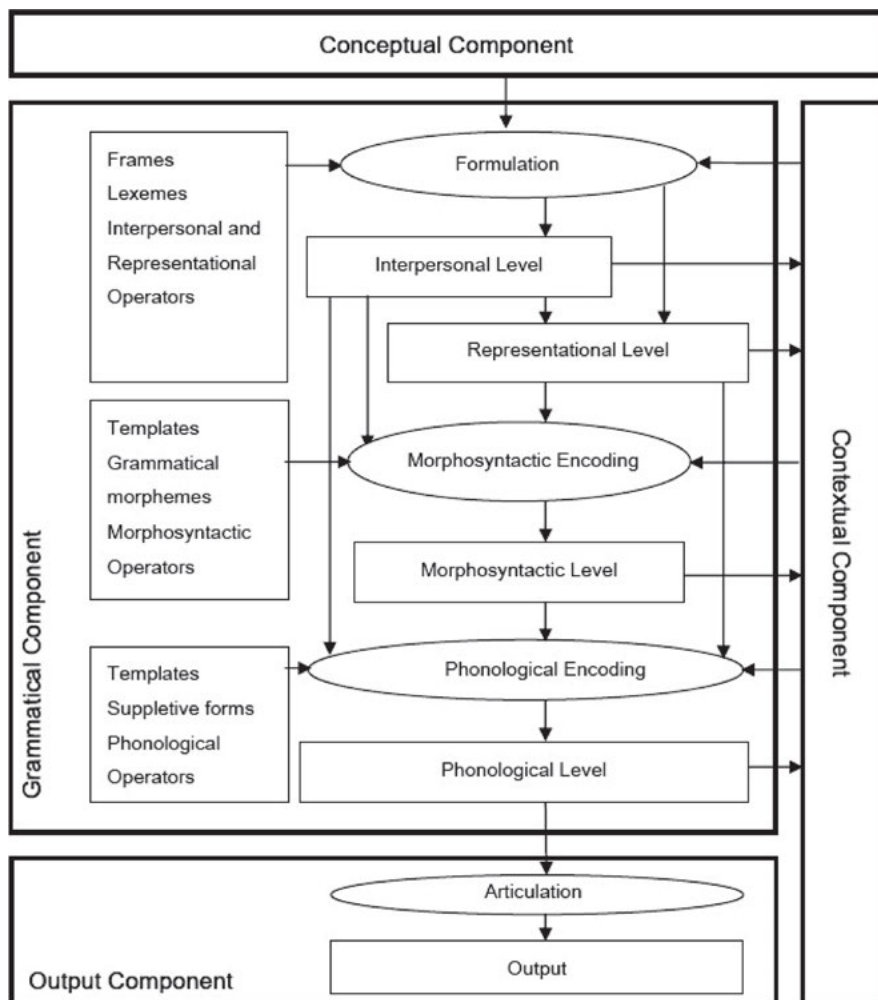
Figure 1: General layout of Functional Discourse Grammar (Hengeveld and Mackenzie 2008: 13).

Component represents the speech situation and includes both linguistic and non-linguistic perceptual information. The Conceptual Component is responsible for the creation of a communicative intention, which will be translated through *Formulation* into relevant representations at the Interpersonal and Representational Levels. *Encoding* is the process responsible for the structural properties of linguistic expressions and operates in two stages by which morphosyntactic and phonological representations are created. Note that, in the figure, ovals indicate linguistic processes whereas rectangles indicate the levels of representation

which are produced by the different processes. Finally, the Output Component is responsible for the actual execution of a linguistic expression through the operation of Articulation, which may be of different kinds (written, signed or spoken), depending on the medium of expression chosen. The boxes on the left of the figure contain the linguistic primitives which are employed by the different operations. Each operation has its own set in the form of *frames*, *templates* and *operators*, among others (for a full description of FDG see Hengeveld and Mackenzie 2008 and Keizer 2015).

The grammar component in Figure 1 thus contains four levels of representation: the Representational Level (RL), the Interpersonal Level (IL), the Morphosyntactic Level (ML) and the Phonological level (PL). These four levels are independently organized but are related to one another, as indicated by the relevant descending arrows. The correspondence between the levels and the main areas of linguistic analysis is given in (1):

(1) Pragmatics   → Interpersonal Level
     Semantics   → Representational Level
     Morphosyntax → Morphosyntactic Level
     Phonology   → Phonological Level

Each level is hierarchically organized in a number of layers which account for the differences in scope among linguistic units. The general format for the hierarchical organization of layers is shown in (2) (Hengeveld and Mackenzie 2008: 14):[2]

(2) $(\pi_1 \, v_1: [\text{head} \, (v_1)_\Phi]: [\sigma \, (v_1)_\Phi])_\Phi$

In this general schema, "v" stands for the relevant variable at each layer, which can be restricted by one head taking that variable as its argument. The head itself may be rather complex, thus giving rise to more elaborate representations. This construction may be modified by operators (π) and satellites (σ), which symbolize grammatical and lexical modifiers respectively. Given the lexical nature of satellites, these can also take an argument, which is typically the variable of the relevant layer. Finally, "Φ" represents the function (syntactic, pragmatic or semantic) which a given unit realizes.

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2 Contreras-García (2013: chapter 4) distinguishes between "intra-level" and "inter-level directionality". The former relates to the hierarchical organization of levels as in (2). In this introduction, however, we will use the term directionality as equivalent to "inter-level" directionality only.

As an illustration of an FDG analysis, consider the following example from Hengeveld and Mackenzie (2008: 23):

(3) (I like) *these bananas*.
  a. IL (+id R$_I$)
  b. RL (prox m x$_i$: [(f$_i$: /bə'na:nə/N(f$_i$)) (x$_i$)])
  c. ML (Np$_i$: [(Gw$_i$: this-pl(Gw$_i$)) (Nw$_i$: /bə'na:nə/-pl (Nw$_i$))] (Np$_i$))
  d. PL (PP$_i$: [(Pw$_i$: /ði:z/ (Pw$_i$)) (Pw$_j$: /bə'na:nəz/ (Pw$_j$))] (PP$_i$))

At the Interpersonal Level (IL), "these bananas" is analysed as a referential unit (R) which is assumed to be identifiable (+id) by the Addressee. The Representational Level (RL) captures the fact that the phrase designates more than one entity (m) of the Individual type (x), which is described as having the property (f). An operator of proximity (prox) indicates the location of the entities with respect to the deictic centre. At the Morphosyntactic Level (ML), the constituent is analysed as a Noun Phrase (Np) consisting of a Grammatical Word (Gw) and a Nominal Word (Nw) as head. At the Phonological Level (PL), the appropriate plural forms of the Words are provided. What seems relevant for current purposes is that those representations seem fully autonomous and thus the theory conforms to Sadock's Modularity Hypothesis as espoused above.

Now, as mentioned earlier, the different levels and processes are related by descending arrows in Figure 1. It could then be said that each one of those arrows identifies an interface (or an interface relation).[3] The fact that all those arrows are descending also indicates the *top-down* directionality of the theory, which might take one to believe that FDG has a derivational rather than a modular architecture and the different levels and processes function as stages or steps in the linguistic derivation. We believe, however, that this is not the case, and the next section will try to show that FDG does not fit within the definition of a derivational theory of language structure.

4 Functional Discourse Grammar: Modularity and interfaces

In their book, Hengeveld and Mackenzie (2008) discuss the similarities between Functional Discourse Grammar and Autolexical Syntax, also referred to as Auto-

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3 Note that Figure 1 shows arrows connecting the Contextual and Conceptual Components with the grammar. This volume will concentrate on grammar-internal interfaces only.

modular Grammar (Sadock 1991, 2012) and conclude that "it shares our rejection of a derivational model, our commitment to multiple orthogonal representations of linguistic phenomena, and our interest in mismatches between the levels" (Hengeveld and Mackenzie 2008: 31).

Indeed, very much like Automodular Grammar and Jackendoff's Parallel Architecture (Jackendoff 1997, 2002), FDG is designed such that levels are autonomous and linked by interfaces, which gives birth to fairly independent representations. As shown in example (3) above, linguistic expressions may have an interpersonal, a representational, a morphosyntactic and a phonological representation providing distinct types of information. Because each level has its own primitives, they may be seen as modules somehow comparable to those in alternative modular theories, and, as such, FDG representations may mismatch.

As mentioned earlier, interfaces in FDG work top-down (see Figure 1 above). This is one significant difference between FDG, on the one hand, and Sadock's Autolexical Syntax and Jackendoff's Parallel Architecture, on the other. The top-down orientation of FDG relates to the concept of "directionality", which, as González Escribano (1992) notes, is a key notion to distinguishing modular from non-modular grammars. If a modular grammar is one in which different modules interact massively (the descending arrows in Figure 1 seem a good example of this), directionality imposes a restriction on those interactions, as it presupposes that one target module cannot operate until its corresponding source module has been constructed. Indeed, in FDG, the operation of Encoding necessarily operates after Formulation processes have taken place, which contrasts with the situation we find in constraint-based models. Consider the following quote from Jackendoff (2002: 198):

> The parallel constrained-based architecture is logically *non*-directional: one can start with any piece of structure in any component and pass along logical pathways provided by the constraints to construct a coherent larger structure around it. (. . .) Because the grammar is logically non-directional, it is not inherently biased toward either perception or production – unlike the syntactocentric architecture, which is inherently biased against both!

The top-down orientation of FDG suggests that encoding levels (Morphosyntax and Phonology) are interpretive in the sense that they require that formulation levels be specified in order to operate. Although this is undoubtedly true, it should be noted that this top-down directionality is motivated by the theory's functional approach to language study, which views syntax as subservient to semantics and semantic as subservient to pragmatics, and to a commitment to psychological adequacy and the assumption that the linguistic generation process begins with the speaker's communicative intention (see Hengeveld and Mackenzie 2008: 25–41, this volume).

The non-derivational character of FDG is further determined by two principles which are relevant in the generation of linguistic expressions: Maximal Depth and Depth-first. According to the Maximal Depth principle, "only those levels of representation that are relevant for the build-up of (a certain aspect of) an utterance are used in the production of that (aspect of the) utterance". Hengeveld and Mackenzie (2008: 25) claim that this "avoids the vacuous specification of levels of representation that are irrelevant to the production of the utterance at hand". Thus, the Maximal Depth principle means that one need not represent all four levels at all times, should any of them not be necessary. An example would be an expressive (e.g. *ouch*!), for which one could argue that an interpersonal structure and a phonological one are more than enough to account for it. This is especially relevant for the interface design of FDG, since it is precisely because levels are independent and the model is not derivational that some of them may be missing from the representation. This contrasts with the tendency of derivational grammars to produce sequences which are later discarded in the derivation.

Additionally, the Depth-first principle implies that it is not necessary to compute one full level in order to go on to the next one (Hengeveld and Mackenzie 2008: 23–24). This means that one can start e.g. constructing the phonological (and morphosyntactic) level as soon as there is enough interpersonal (and representational) information, which is also a consequence of the non-derivational character of FDG. Note that these principles considerably relax the relevance of directionality in the implementation of the grammar. One can obviate levels in the analysis and need not provide a full elaboration of a source level to proceed to the next one in a stepwise orderly fashion.[4]

Finally, FDG shows again its non-derivational character in that it may not only show zero-to-one correspondences when one or more levels are missing (e.g. expressives), but that it may in general show mismatches that infringe upon default inter-level interface transparency. In Hengeveld and Mackenzie's (2008: 288) own words, "there is a preference for one-to-one relations, with for example the phrase at the Morphosyntactic Level corresponding to the phonological phrase, but discrepancies are certainly possible" (see García Velasco 2017 for more arguments on the modular character of FDG and Contreras-García 2013, 2015, and this volume for the hybrid character of FDG).

To conclude, Functional Discourse Grammar is not a derivational model of grammar. In spite of its top-down directionality, which is connected to the theory's

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4 Hengeveld and Mackenzie (this volume) propose that bottom-up processes may also be allowed within the lexicon; Seinhorst and Leufkens (this volume) also defend bottom-up interfaces at the phonetics/phonology interface; Contreras-García (this volume) defends all-directionality within the lexicon and for intra-level construal.

commitment to psychological adequacy, we believe it can be seen as a fairly modular grammar. As such, the constraints on well-formed representations should concentrate on both intra-level construction and inter-level interfaces. It is the latter that has received less attention by theory practitioners so far and which thus justifies the need for this volume.

5 Structure of the book

All chapters contained in this volume deal with Functional Discourse Grammar, mismatches and interfaces. The book is structured as follows. In Part I, "The architecture of grammar and interfaces in FDG", we include three theoretical articles dealing with interfaces between the various levels of the grammar. Part II, "Typology and interfaces in FDG", includes four articles dealing with the application of interfaces to typological linguistics. Finally, in Part III, "The English language and interfaces in FDG", four articles show the application of various interface phenomena to the English language. In what follows, we include a brief summary of each chapter.

The first chapter of Part I "Interfaces, mismatches and the architecture of Functional Discourse Grammar" by Kees Hengeveld and Lachlan Mackenzie functions as a general introduction to the nature and role of interfaces in the model. The authors introduce a revised version of FDG's general architecture by identifying additional interface relations and lexical correspondences between primitives. In line with the typological orientation of the model, they defend that interfaces contain rules which are stated on the basis of typological hierarchies and settings and a principle of "fundal priority" which accounts for the expression of irregular forms. The main section of the chapter is then devoted to providing a comprehensive list of various types of inter-level mismatches on the basis of a newly proposed architecture and a discussion of different linguistic phenomena which illustrate them. This chapter marks a significant advance in FDG, as it gathers relevant recent developments within the model in a single revised architecture.

Two further chapters take a helicopter view and suggest alternative proposals regarding the conception and the modelling of inter-level interfaces in FDG. In her chapter "Grammar in 5D: the interface design of a mismatching grammar", Lucía Contreras-García studies the FDG architecture by means of a series of parameters based on the nature of interface processes. She explores the hybrid design of FDG interfaces as they stand (strongly directional, yet almost fully non-derivational), focusing on syntax-semantics mismatches that pose a challenge for

interface transparency and proposing to eliminate all empty nodes to obtain a fully modular FDG. This chapter also gathers insights from various competing, though to a great extent similar, modular and constraint-based approaches with a strong lexical emphasis such as the Parallel Architecture, Autolexical Syntax, Head-Driven Phrase Structure Grammar or Lexical Functional Grammar and looks into the possibility of implementing some of their features within the FDG framework. In particular, she looks at the possibility of applying a constrained-based grammar and of an interface-based "modular" lexicon for the FDG framework, i.e. a linking algorithm that constrains distinct encapsulated structures within lexical entries.

In their chapter "Phonology and phonetics in Functional Discourse Grammar: interfaces, mismatches, and the direction of processing", Klaas Seinhorst and Sterre Leufkens discuss interfaces involving the Phonological Level. They suggest that functional principles such as articulatory ease and perceptual clarity motivate bottom-up influences from phonetics to phonology (see Hengeveld and Mackenzie's chapter for an alternative view). In order to illustrate this, they explain cases of grammaticalization whereby the predictability of a given phonetic token leads to less careful pronunciation and eventually changes in the phonological representation within the grammar. That is, the authors show how the dynamics of language use imply changes on the strict top-down organization of the FDG framework.

In the second part of the volume, four chapters focus on typological hierarchies and interfaces in FDG. In their chapter "Noun incorporation in Functional Discourse Grammar", Marieke Olthof and Kees Hengeveld discuss the interface conditions and mismatches involved in noun incorporation processes. Following up on the article by Hengeveld and Mackenzie, the authors use typological hierarchies as constraints on possible mappings between the different FDG interfaces in noun incorporation across languages. Crucially for the present volume, the chapter shows that pragmatic, semantic, morphological and phonological aspects are all involved in incorporation processes, thus confirming the adequacy of FDG's modular architecture.

Also from a typological perspective, Riccardo Giomi analyses reflexive constructions in his chapter "A Functional Discourse Grammar typology of reflexives, with some notes on reciprocals". He argues that most previous studies on reflexives have typically assumed a morphosyntactic approach, resulting in a complex classification of reflexivization types. He then identifies three basic strategies of reflexivization across languages and shows how this variation can be nicely captured with FDG's modular architecture. In particular, he shows that languages vary as to whether they allow mismatches between Referential acts at the Interpersonal Level and semantic arguments at the Representational Level, or whether they make use of partially instantiated semantic frames in reflexivization strategies.

In the third chapter of Part II, Thomas Schwaiger discusses function-to-form interfaces in serial verb constructions in his chapter "Serial verb constructions, interface mismatches and Functional Discourse Grammar". He argues that the different properties of serial verb constructions illustrate various mismatches across levels, which goes well beyond the distinction between "nuclear", "core" and "event serialization", which is to be found in other approaches to the topic. He then provides a more comprehensive account of interface mapping possibilities for this construction and shows how external constraints such as iconicity and domain integrity restrict the possible configurations of serial verb constructions at the interfaces.

Part II rounds off with the chapter "A Functional Discourse Grammar account of voice in Plains Algonquian languages", in which Avelino Corral Esteban discusses the mappings and mismatches involved between the pragmatic, semantic and morphosyntactic levels involved in the triggering of voice in Plains Algonquian languages (Arapaho, Blackfoot, Cheyenne, Gros Ventre). He analyses whether the Algonquian direct / inverse distinction ought to be treated in the same manner as the active / passive voice alternation. His analysis reveals a number of interface conditions (e.g. Person Hierarchy or Semantic Role Hierarchy), thus confirming the relevance of typological hierarchies as constraints on interface relations and language type settings.

In Part III, four chapters focus on the English language and interfaces in FDG. In her chapter "The English time-measurement construction as a case of gradience: an FDG approach", Carmen Portero Muñoz analyses the syntax-semantics interface in time-measurement expressions (e.g. *three months (maternity) leave*), which seem to fall between a modifier-head and a pseudo-partitive interpretation. She discusses the subtle distinctions between these constructions and shows how the FDG architecture can account for them on the basis of careful fine-grained distinctions at the interface between the semantic and morphosyntactic levels.

Also focusing on the English language, in her chapter "Inter-level mismatches in English coordinated partitives", Evelien Keizer discusses partitives, coordinated noun phases, and partitives with coordinated embedded noun phrases in relation to the interface between the Conceptual Component and the Grammatical Component, on the one hand, and the pragmatic and the semantic levels within the grammar proper, on the other. Mismatches in partitive construction typically involve ellipsis, and Keizer shows the relevance of FDG's top-down directionality to explain the conceptual operations that lead to mismatches in partitive constructions. She finally discusses the constraints which operate on those mismatches as well as their communicative motivation.

In the third chapter of Part III, "An FDG account of postnominal modification in English", Elnora ten Wolde offers a corpus-based account of possible

well-formedness constraints for post-nominal modification in that language. After examining previous research in the issue, she argues that post-nominal modification cannot be explained on the basis of a single rule, but rather on a range of constraints or options available to the speaker/writer. These include the end-weight principle, the complement-taking properties of the adjective, restrictive modification and pragmatic load. Shen then shows how these constraints can be captured in the architecture of FDG.

Finally, in his chapter "Meaning-to-form mismatches in Functional Discourse Grammar and Systemic Functional Grammar: A case-study of the English discourse connective however", Matthias Klumm looks into the similarities and differences between the interface design of two structural-functional theories, namely Functional Discourse Grammar and Systemic Functional Grammar. In particular, he analyses the meaning-to-form mismatches that arise in the uses of English "however" and shows how its positional mobility and lack of integration in the clause are motivated by the speakers' communicative goals. In line with Seinhorst and Leufkens, the author claims that effective communication may lead to opaque interface relations in the grammar.

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Kees Hengeveld and J. Lachlan Mackenzie

Interfaces, mismatches, and the architecture of Functional Discourse Grammar

Abstract: This chapter describes and delimits the nature of interfaces in FDG. The different interface conditions across languages are defined in terms of well-established typological hierarchies: for each language, a basic setting on these hierarchies predicts the overall working of the interfaces. In addition, the Fund states numerous language-specific settings, such as its alignment system, the permissibility of zero anaphora, the presence of cliticization, etc. It is also argued that within the Fund there are compartments corresponding to each of the Levels in the grammar: for every lexical item and for every construction, its interpersonal, representational, morphosyntactic, and phonological aspects are stored separately. Although the overall model is strongly top-down, some bottom-up processes are proposed, but these are restricted to the Fund and the Contextual Component. On this foundation, the chapter discusses mismatches across FDG's four levels of organization and shows that all possible mismatches may occur. Some mismatches follow from well-established typological hierarchies while others are the result of basic choices a language makes among various typological options. Bottom-up processes in the Fund are needed in order to account for certain types of mismatches, especially, but not exclusively, those involving feedback from the Phonological Level to higher levels.

Keywords: bottom-up, Fund, interface, mismatch, typological hierarchy

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1 Introduction

A distinctive property of Functional Discourse Grammar (FDG) is that in its architecture four different hierarchically ordered levels apply in a top-down fashion: the Interpersonal (pragmatic), Representational (semantic), Morphosyntactic, and Phonological Levels. In so doing, FDG takes "the functional approach to language to its logical extreme: within the top-down organization of the grammar, pragmatics governs semantics, pragmatics and semantics govern morphosyntax, and pragmatics, semantics, and morphosyntax govern phonology" (Hengeveld and Mackenzie 2008: 13). The mapping across the various levels is regulated by the operations of Formulation and Encoding, which thus act as interfaces across these levels. Often the mapping process is one-to-one, as when one Subact of Reference at the Interpersonal Level corresponds to one Individual at the Representational Level, to one Noun Phrase at the Morphosyntactic Level, and to one Phonological Phrase at the Phonological Level. In other cases, however, the mapping is less straightforward. These cases may be called "mismatches", as there is no one-to-one relationship between layers at the various levels. Mismatches are of general interest, as they create a lack of transparency in grammar (Leufkens 2013, 2015; Hengeveld and Leufkens 2018).

In the central Section 3 of this chapter we use the FDG model to provide a systematic inventory of mismatches, applying the top-down approach that is an important characteristic of FDG. But before that, in Section 2, we will need to specify the place, role, and organization of interfaces in FDG. In this section we will also suggest a number of adaptations of the FDG model in general. In Section 4 we will present our conclusions, relating our discussion of mismatches in Section 3 to the place of interfaces in FDG as discussed in Section 2.

2 Interfaces in FDG

2.1 Introduction

In FDG, given that it contains four levels of linguistic organization in its grammatical component, interfaces should play an important role (Contreras García 2013, 2015; García Velasco 2017), though so far most attention has gone into elaborating the internal structure of the levels themselves. The prime candidates for interface status in the model are what are called "operations" in Hengeveld and Mackenzie (2008: 13), represented as ovals in Figure 1. A distinction is made between operations of Formulation, Encoding and Articulation, which play a crucial role in the

top-down architecture of FDG. Another type of operation, Contextualization, connecting the Contextual and Grammatical Components, was added in Hengeveld and Mackenzie (2014). From here on we will use the term "interface" to refer to a mechanism of the grammar that executes a set of operations. We reconsider three aspects of the model as summarized above: the number and nature of interfaces (Section 2.2), the internal organization of the interfaces (Section 2.3), and the top-down organization of the model (Section 2.4).

2.2 Number and nature of interfaces

In this section we reconsider the place of Formulation within FDG. Formulation, in the architecture presented in Hengeveld and Mackenzie (2008: 13) as shown in Figure 1, is actually not an interface between levels, as is the case for all other interfaces, but between a component and a level. Formulation connects the Conceptual Component on the one hand to the Interpersonal and Representational Levels within the Grammatical Component on the other. In the current representation it thus connects units of unlike rank.

At the same time, Formulation in Figure 1 maps onto two distinct levels: the Interpersonal and the Representational Levels. As a result, an interface between these two levels is missing, the idea being that Formulation produces both the Interpersonal and Representational Levels in a coordinated manner. However, given that mismatches may occur between the Interpersonal and Representational Levels as well, as will be shown below, an interface between these two has to be added.

In Figure 2, we adapt Figure 1 in six different ways:

(i)   We incorporate *Contextualization* as an interface between the Contextual and Grammatical Components, as proposed in Hengeveld and Mackenzie (2014), and note that the model proposed there is actually somewhat more complex than is represented in Figure 2, as the Contextualizer forms a complex interface between the different levels within the grammar and corresponding levels, called "strata", within the Contextual Component. This is represented in Figure 3, adapted from Hengeveld and Mackenzie (2014) to the modified architecture given in Figure 2.

(ii) We add a *Conceptual Level* (following Connolly 2013, see also Connolly 2017), produced by an interface called *Conceptualization* within the Conceptual Component. The Conceptual Level corresponds to the preverbal message. We will not develop this part of the theory any further here, but present it for the sake of architectural completeness. We will also remain agnostic as to the elements that form the input for Conceptualization.
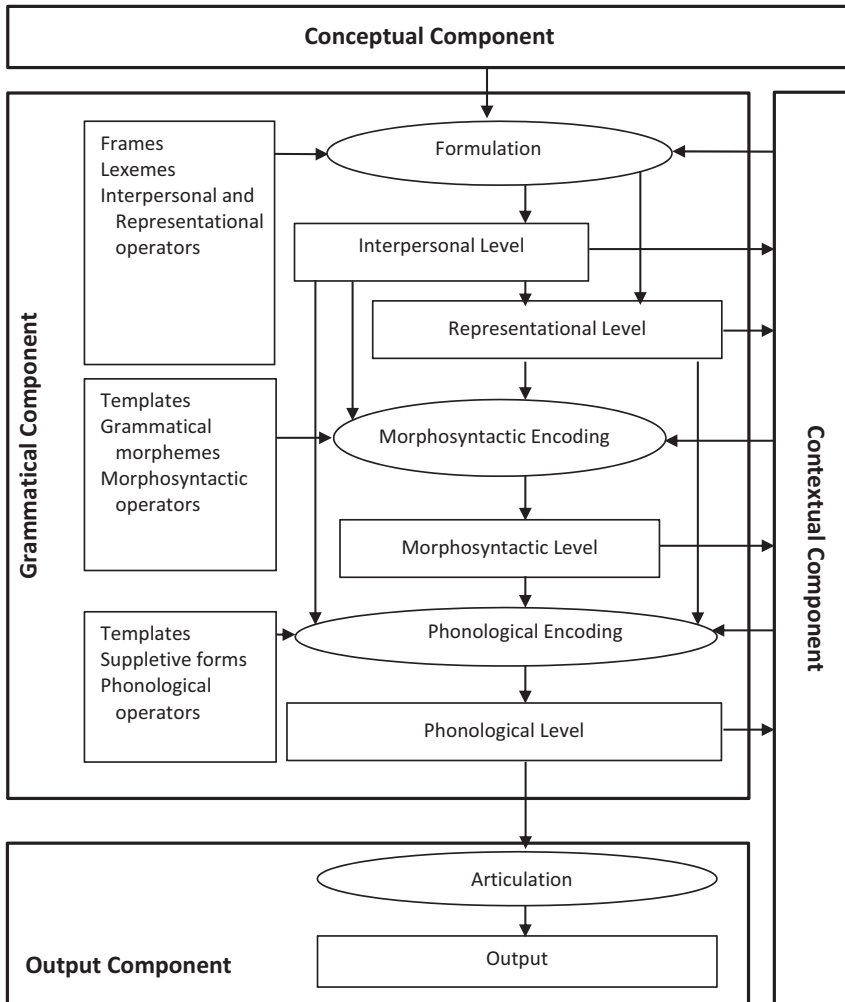
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┌─────────────────────────────────────────────────────────┐
│                   Conceptual Component                    │
└─────────────────────────────────────────────────────────┘
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Figure 1: General layout of FDG (Hengeveld and Mackenzie 2008: 13).

Conceptual Component

Grammatical Component

Frames
Lexemes
Interpersonal and
  Representational
  operators

Formulation

Interpersonal Level

Representational Level

Templates
Grammatical
  morphemes
Morphosyntactic
  operators

Morphosyntactic Encoding

Morphosyntactic Level

Templates
Suppletive forms
Phonological
  operators

Phonological Encoding

Phonological Level

Contextual Component

Output Component

Articulation

Output

Figure 1: General layout of FDG (Hengeveld and Mackenzie 2008: 13).

(iii) Following O'Neill (2012: 122–125), we distinguish between *Interpersonal Formulation* and *Representational Formulation*, which both have the Conceptual Level as their input. As mentioned above, this will allow us to take care of mismatches between the Interpersonal and Representational Levels, to be discussed later in this chapter.

(iv) The Conceptual Level also maps onto the interpersonal and representational parts of the fund, linking conceptual representations to actual lexemes, following Hengeveld and Mackenzie (2016: 1141–1146), who argue that lexemes

Figure 2: General layout of FDG – revised.

do not have abstract conceptual representations, but rather that "there is an abstract conceptual representation . . ., which leads the language user to the use of a lexeme that adequately captures the concept that he/she has in mind" (Hengeveld and Mackenzie 2016: 1142).

(v)   We add connections between the different sets of primitives, covering lexical correspondences across sets of primitives (cf. Culicover and Jackendoff 2005; Sadock 2012; Contreras García 2012, this volume; O'Neill 2012).

Figure 3: Contextualization.

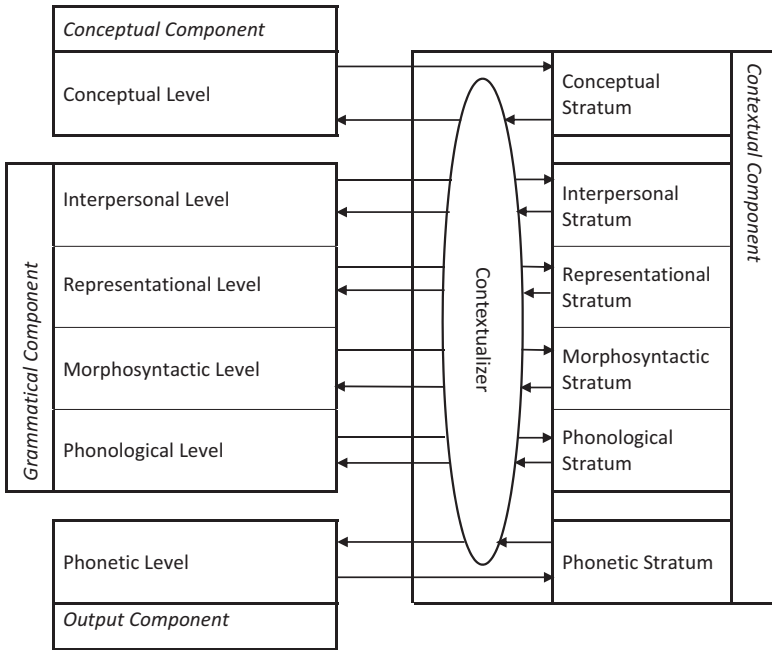The pragmatic, semantic, morphosyntactic, and phonological aspects of a lexical or grammatical element in the Fund are stored in the four corresponding subcomponents of the Fund, but connected across these subcomponents through vertical connections. This leads to a further adaptation of the general architecture of FDG. In Hengeveld and Mackenzie (2008) we took it that lexical and grammatical material would be inserted in its phonological form at all levels. We now take the position that the various aspects of lexical and grammatical elements are spread out over the corresponding subcomponents of the Fund, such that the phonological aspects only become visible at the Phonological Level and its corresponding fundal subcomponent. This adds to the alignment of FDG with prominent psycho- and neurolinguistic models (Levelt, Roelofs, and Meyer 1999; Hagoort 2013; Roelofs and Ferreira 2019), which consistently have found evidence for distinct processing of the conceptual-semantic, morphosyntactic and phonological-phonetic properties of lexical items and have distinguished them in their models of lexical access. The psycholinguistic evidence is chiefly drawn from behavioural phenomena such as speech errors, self-correction arising from self-monitoring, and priming effects. The neurolin-

guistic research, using various forms of electrophysiological and hemodynamic neuro-imaging, has provided evidence of distinct brain localizations for semantic, morphosyntactic, and phonological properties of lexical units, based on experiments with subjects' reactions to ambiguities and anomalies as well as observations of impairments in aphasia patients.

(vi) Partly following O'Neill (2012), Seinhorst (2014), and Seinhorst and Leufkens (this volume), we replace the operation of Articulation in the Output Component by an operation of Phonetic Encoding, which produces a Phonetic Level. Note that there have been proposals to furthermore distinguish between an underlying phonological sublevel and a surface phonological sublevel within the Grammatical Component (O'Neill 2012, Seinhorst 2014), and an auditory-phonetic sublevel and an articulatory-phonetic sublevel within the Output Component (Seinhorst 2014) that we do not take over here (see Seinhorst and Leufkens this volume for discussion).

The resulting adapted model in Figure 2[1] contains many different connections, indicated by arrows. These arrows represent different things:

– Vertical single-headed arrows indicate actual operations as executed by the relevant interfaces of conceptualization, formulation, encoding, and articulation;

– Horizontal single-headed arrows indicate feeding relationships: the different subcomponents of the Fund feed their corresponding operations by providing the basic building blocks needed by those operations, and, similarly, the different subcomponents of the Contextual Component feed their corresponding operations by providing the contextual conditions and restrictions relevant for those operations;

– Vertical double-headed arrows provide the connections between the pragmatic, semantic, morphosyntactic, and phonological aspects of a lexical or grammatical element within the Fund.

2.3 The internal organization of interfaces

In Hengeveld and Mackenzie (2008) we take the position that Formulation, Encoding, and Articulation, which we here interpret as FDG's interfaces, contain operations, i.e. sets of rules, but that position needs to be modified in two different respects.

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1 We only represent the spoken modality in Figure 2, but the model could be applied to written and signed modalities as well.

First of all, given the typological orientation of FDG, the model should capture the fact that differences between the sets of expression possibilities of different languages are not random, but in many cases vary systematically. The parameters along which possible sets of rules are constrained can to a large extent be captured by typological hierarchies. What we suggest, then, is that interfaces contain rules, but that the domain of application of these rules is defined as a number of settings along typological hierarchies. Of course, not all typological properties of a language are governed by hierarchies. For instance, the fact that a language has accusative or ergative alignment cannot be predicted from any other property of the language. Thus, apart from typological hierarchies, basic typological settings are needed as well. These basic typological settings are reflected in the sets of primitives available in the Fund of a language.

Secondly, neither rules nor typological hierarchies and settings can handle irregular forms. Forms and structures that cannot be handled productively by regular rules have to be taken care of by the Fund, which links irregular paradigms to lexemes or frames through the connections between its subcomponents. Rules apply in the regular cases after the Fund has been checked for the presence of irregular forms. This principle is called "lexical priority" in Dik (1997, 1: 345), but given the broad conception we have of the Fund as containing not only lexemes, but also frames, templates, grammatical morphemes, etc., this should rather be called "fundal priority".

We thus distinguish between rules, typological constraints, and the principle of fundal priority. The three can be illustrated using the following Spanish example.

(1) *El   indulto le   fue   denegado al   reo   por el   juez.*
    the   pardon   him   was   denied   to.the accused by   the judge
    'The pardon was denied the accused by the judge.'

At least three typological domains are relevant for the analysis of this sentence: they concern constituent order, alignment, and passivization. As regards constituent order and alignment, there are no known typological hierarchies that predict what kind of constituent order the clauses of a language will have, just as there are no typological hierarchies that predict the alignment type of a language. In these cases there are basic typological settings for the language (for Spanish, SVO and Accusative), and the interface which takes care of morphosyntactic encoding will simply select the relevant templates from the Fund, which encode these basic settings implicitly.

As regards passivization, it has been claimed that in accusative languages the semantic function hierarchy in (2) is relevant:

(2) A ⊃ U ⊃ Rec ⊃ Ben ⊃ Other

Languages allow subject assignment to portions of this hierarchy, in such a way that when a constituent with a certain semantic function on this hierarchy can be assigned the subject function, then constituents with all semantic functions to the left of it will also allow subject assignment. Some English speakers, for instance, allow subject assignment up to the Beneficiary function, but not beyond that point (i.e. all speakers reject subject assignment to Instruments). In Spanish the possibilities are much more limited:

(3) *El   juez   le   denegó el   indulto al   reo.*
     the judge him   denied   the   pardon   to.the accused
     'The judge denied the accused the pardon.'

(4) *El   indulto le   fue   denegado al   reo   por el   juez.*
     the pardon   him   was   denied   to.the accused by   the   judge

(5) **El reo   fue   denegado el   indulto por el   juez.*
     the accused was   denied   the   pardon   by   the   judge
     'The accused was denied the pardon by the judge.'

(6) **María fue   comprado un   libro   por Pedro.*
     María   was   bought   a   book   by   Pedro
     'María was bought a book by Pedro.'

(7) **El   destornillador fue   arreglado el   coche por Pedro.*
     the screwdriver   was   fixed   the   car   by   Pedro
     'The screwdriver was fixed the car by Pedro.'

Thus, the morphosyntactic encoder for Spanish has to indicate that for Spanish the cut-off point on the hierarchy in (2) is between the Undergoer and the Recipient.[2]

     Once this setting has been established, the morphosyntactic rules that regulate passive expressions in Spanish can apply to the relevant cases. These rules have to assign such subject properties as position and agreement to the constituent that has been selected as the subject. They also have to make sure that non-subjects are expressed according to their semantic functions, as in the case

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2 As reflected in the translations, in English the cut-off point is between the Beneficiary and Other semantic functions.

of *por el juez* in (4) and (5) and *por Pedro* in (6) and (7). Finally, they have to make sure that the predicate is expressed as a combination of the auxiliary *ser* and the past participle.

When a verb is regularly formed, the rules of verb inflection may apply straightforwardly, and produce *arregla-do* from *arreglar*, as in (7). However, in the case of the irregular form *fue* of the auxiliary *ser* in (4)–(7) no such rule can be applied, and the Fund has to kick in. Checking the paradigm of *ser* through the connections in the Fund, the irregular form will be selected ready-made from the paradigm stored in the morphosyntactic part of the Fund. The rule of fundal priority ensures that the inappropriate selection of the regular form is avoided.

2.4 Top-down architecture and feedback

There is a small range of phenomena, to be discussed in more detail later in this chapter, that are problematic for a strictly top-down model of grammar. For instance, in some languages phonotactic constraints co-determine syntactic placement. A case in point is Tagalog. In this language nouns and adjectives within noun phrases are joined together, irrespective of order, through a linker that has two allomorphs: *-ng* and *na*. The allomorph *-ng* occurs when the preceding word either ends in a vowel or in an alveolar nasal or glottal stop. In the latter case, the word-final alveolar nasal or glottal stop is deleted. The allomorph *na* occurs in all other cases. Since the order of head and modifier is rather free, pairs like the one in (8)–(9) may be found (Shih and Zuraw 2017: 322), in which the form of the linker varies depending on the order chosen:

(8) *áso-ng   ulól*
    dog-LK   mad
    'mad dog'

(9) *ulól   na   áso*
    mad   LK   dog
    'mad dog'

In the default order in Tagalog, the adjective precedes the noun, but the opposite order is possible too, and may be triggered by various factors, several of which are phonological in nature. For instance, as shown by Shih and Zuraw (2017: 325), in order to avoid a sequence of two nasals, there is a preference for placing the noun before the adjective, as in (10), which is preferred over (11), which would represent the default order:

(10) *pelúka-ng   itim*
     wig-LK   black
     'black wig'

(11) *itim   na pelúka*
     black   LK wig
     'black wig'

It is clear that in cases like these, the morphosyntactic encoder needs to have access to information from the Phonological Level, which has, however, not been reached yet at this point.

We therefore tentatively propose to relax the top-down restriction in FDG in such a way that this restriction applies to grammatical processes, but not to the Fund. Through the Fund, with its connecting compartments, information can be retrieved bottom-up. In the example mentioned above, the phonological shape of the adjective can be consulted by the morphosyntactic encoder in order for the latter to decide on its placement. Our proposal is to allow look-ahead operations, but to limit them to those that are mediated through the Fund, where pragmatic, semantic, morphosyntactic, and phonological aspects of one and the same lexeme or frame are connected and accessible. By taking this approach, bottom-up processes are allowed but at the same time restricted in a principled way.[3]

In a similar vein, information can be passed on bottom-up in the Contextual Component from lower strata to higher strata. As shown in Mackenzie (2012), the Contextual Component is a bridge between the encoding activities of the speaker and the decoding activities of the addressee. The former process is top-down, the latter is bottom-up. Since speakers and addressees switch roles all the time, decoding processes may influence encoding processes over time. For instance, a frequent phonetic realization that deviates from the underlying phonological representation may become the norm over time, in which case the Phonetic Level influences the Phonological Level from a diachronic perspective. One such case is discussed in Seinhorst and Leufkens (this volume), referring to Kohler (1998), and concerns the pronunciation of German *haben* 'have', which they present as having undergone reduction over time from /haː.bən/ to /haːb.n̩/ > /haːb.m̩/ > /haːm.m̩/ > /haːm/. Since this means that phonetic reduction is grammaticalized

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3 Note that this goes against the proposal of Hengeveld and Smit (2009), who permit certain bottom-up processes in the grammar itself.

into a phonological rule, Seinhorst and Leufkens (this volume) represent this as a bottom-up process within the grammar itself.

We have a somewhat different take on this process, giving a central role to the Contextual Component. The Morphosyntactic Level (ML) is responsible for ordering the verb /ha:b/ and its infinitive suffix (or agreement suffix). In the initial phase of the phonological change described by Seinhorst and Leufkens (Stage 1), this sequence is sent on to the Phonological Level, where the suffix is given the form /ən/, stored in the Fund, resulting in the Phonological Word /ˈhaːbən/ (with resyllabification as /ha:/ + /bən/). This then passes to the Articulator, where phonetic processes of reduction, assimilation and degemination take place (not phonological processes, as is suggested by Seinhorst and Leufkens' use of slashes, see above), ultimately resulting in the phonetic realization [ha:m], which as a consequence of those phonetic processes displays a mismatch between phonology and phonetics (notably, one syllable rather than two). The Contextual Component (CxtC) stores the form [ha:m] at the Output Stratum (as it stores all phonetic forms), and when, over time, this grows into an established pronunciation of *haben*, the form [ha:m] becomes available as an option for the application of fundal priority in the phonological form /ha:m/ (Stage 2). As this becomes entrenched through repeated application (Stage 3) and removes the /-ən/ syllable, the ML sequence /ha:b/ + infinitive/agreement affix comes to be mapped onto the ready-made Phonological Word /ha:m/. The resultant form then is realized without any mismatches between the Phonological Level (PL) and the Phonetic Level (PhonL) as [ha:m]. The process can be visualized in bottom-up fashion as in Figure 4.
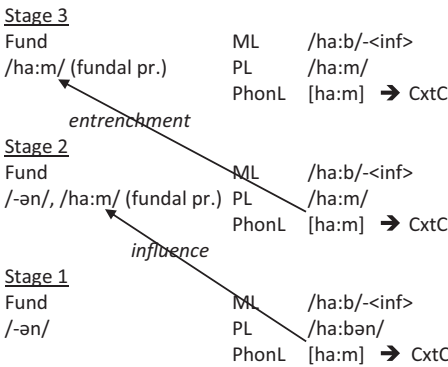
```
Stage 3
Fund                      ML      /ha:b/-<inf>
/ha:m/ (fundal pr.)       PL      /ha:m/
                          PhonL   [ha:m]  ➜ CxtC
            entrenchment
Stage 2
Fund                      ML      /ha:b/-<inf>
/-ən/, /ha:m/ (fundal pr.) PL     /ha:m/
                          PhonL   [ha:m]  ➜ CxtC
            influence
Stage 1
Fund                      ML      /ha:b/-<inf>
/-ən/                     PL      /ha:bən/
                          PhonL   [ha:m]  ➜ CxtC
```

Figure 4: Bottom-up influence of the Contextual Component (CxtC).

With this adapted architecture in mind, we will now turn to the treatment of mismatches in FDG.

3 Mismatches

3.1 Introduction

When there are straightforward, i.e. transparent (see Hengeveld and Leufkens 2018), mappings between levels, interfaces are not stretched in any way. This happens, for instance, when a single Subact of Reference at IL maps onto a single Individual at RL, which is expressed by a single Noun Phrase at ML and a single Phonological Phrase at PL. Interfaces have a more challenging task in the case of mismatches. In this section we will discuss different types of mismatches and the way these can be handled in the architecture sketched in Section 2.

3.2 Mismatches between IL and RL

3.2.1 Introduction

The communicative intention captured by the Conceptual Level gives rise to two levels in Formulation, the Interpersonal and the Representational Levels (IL and RL). In FDG, these are seen as each having their own status within Formulation, with IL covering all aspects of Formulation that concern the rhetorical and pragmatic aspects of the grammar of the Linguistic Expression under analysis, and RL dealing with all the semantic aspects. One and the same morphosyntactic unit generally conveys both interpersonal and representational meaning: for example, a Noun Phrase like *those men* in English is definite and potentially focused (interpersonal meanings) and also plural and distal (representational meanings), so that it is to be expected that there will be correspondences between IL units and RL units, in which case the interface between IL and RL merely serves to confirm the one-to-one relationship. In other cases, however, we can observe a lack of correspondence (a mismatch) between IL and RL, and it is to an overview of such mismatches that this section is devoted.

It is worth noting that the existence of mismatches between IL and RL helps to justify the distinction between them that is characteristic of the FDG architecture. In pre-FDG work (Hengeveld 1997), it was proposed, in the tradition of Functional Grammar (Dik 1997), that there was a single underlying structure in which interpersonal layers were situated higher in the hierarchy than representational ones. Comparable proposals have been made in generative syntax, especially in the cartographic variant (Rizzi and Cinque 2016), in which it has been proposed to introduce, at relatively high positions in the syntactic tree, "projections" (i.e. syntactic phrases) with clearly IL-like names such as Topic, Focus and (illocu-

tionary) Force. However, in FDG, the two types of meaning are clearly separated, but linked by an interface that specifies correspondences, mismatches, and complementarities between the two Levels. The default setting of the interface is one-to-one correspondence (in more mathematical terms, a bijective function). The major default relations between the IL and the RL pertain to:

– Subacts of Reference (R_1) at IL, each of which generally corresponds to a single (α_1) at RL, where α is a variable over the various RL layers (p_1, ep_1, e_1, f_1, x_1, l_1, . . .);
– Subacts of Ascription ($T_{1)}$ at IL, each of which generally corresponds to a single Property (f_1) or to a semantic operator at RL;
– Communicated Contents (C_1) at IL, each of which generally corresponds to a single (p_1) at RL.

The focus of this section will be on mismatches. Mismatches between IL and RL can be divided into four types (cf. also Leufkens 2015):

1. null-to-nonnull (where there is no unit at IL corresponding to one or more units at RL)
2. nonnull-to-null (where there is no unit at RL corresponding to one or more units at IL)
3. one-to-many (where one unit at IL corresponds to more than one unit at RL)
4. many-to-one (where one unit at RL corresponds to more than one unit at IL)

The section will deal with the following mismatches:

Subacts of Reference (R_1)
– null-to-nonnull: no (R_1) corresponding to one (α_1), exemplified by zero anaphora
– many-to-one: {(R_1), (R_2), . . .}, corresponding to one (α_1), exemplified by cross-reference

Subacts of Ascription (T_1)
– null-to-nonnull: no (T_1) corresponding to one (f_1), exemplified by gapping
– many-to-one: {(T_1), (T_2), . . .}, corresponding to one (f_1), exemplified by certain infinitive + finite sequences in Spanish and other languages

Communicated Contents (C_1)
– one-to-many: one (C_1), corresponding to {(p_1), (p_2), . . . }, exemplified by certain conditional adverbial constructions
– many-to-one: {(C_1), (C_2), . . . }, corresponding to one (p_1), exemplified by certain temporal adverbial constructions

The preceding overview displays three of the four types of mismatch. The question arises whether there are nonnull-to-null mismatches between IL and RL, i.e. cases where some unit at IL has no equivalent at RL. There are indeed such cases, e.g. Expressives (like *Ouch!*), Interactives (like *Congratulations!*) and Vocatives (like *Hey John!*), but here the RL is not involved at all, and such expressions are dealt with by the interface with PL (cf. Hengeveld and Mackenzie 2008: 77).

The six types of mismatch will be treated in the following subsections.

3.2.2 Zero anaphora

A major difference between IL and RL is that the former is a record of the activity carried out by the language user, specifically the Discourse Acts (A_1, A_2, . . .) that s/he performs and the Subacts that make up the Communicated Content, while the latter is a non-actional description of semantic content. This entails that the IL will show only those Acts and Subacts that are actually carried out, in the sense of having an explicit reflection at the Morphosyntactic and Phonological Levels. As a consequence, instances of zero anaphora will be analyzed as involving a null-to-nonnull mismatch between the IL and the RL, cf. (12):

(12)   *She came into the room and left the door open.*

In the clause *left the door open* there is no expression of the Actor. Nevertheless, the clause will be understood as having the same Subject as the preceding clause, and this fact will be shown at RL; the fact that the speaker has not used any linguistic material to express this Actor will be analyzed as the absence of any Subact of Reference corresponding to that Actor at IL. Compare (13) and (14):

(13) (R_I) (T_I)   (T_J) (R_J)   (T_K) (R_K)   (T_L)
      She   came   into   the room   and   left   the door   open.

(14) (R_I) (T_I)   (T_J) (R_J)   (R_K) (T_K) (R_L)   (T_L)
      She   came   into   the room   and   she   left   the door   open.

Zero anaphora is characteristic of languages with "low referential density" in the sense made familiar by Bickel (2003). Bickel shows how an elicited monologue in Belhare, a Sino-Tibetan language spoken in the Himalayan foothills of Eastern Nepal, displays very little use of Subacts of Reference. Here is a gloss provided by Bickel (2003: 709) of a passage from that monologue:

> First, . . . uh . . . picked mangos and took down in a big bag. Then put into a basket. Moved over by pulling from over there, and then came on a rickshaw, uh.. on a bike, on a bike and then . . . .

As Bickel (2003: 710) comments about this passage, "Identifying who did what in the story is mostly the listener's task". In FDG this strategy will be reflected in the relative non-use of Subacts of Reference, while at RL the Belhare verb for 'put, direct', *leŋs*, will have argument positions for Actor, Undergoer and Locative, although only the last of these is explicitly mentioned. Bickel (2003: 733) speculates that users of languages structured like Belhare "pay relatively more attention to the event than to the participants"; however, from an FDG perspective, it is more a question of communicative strategy, since the participants are fully present at the RL.

According to current typological insights, the degree of referential density of a language cannot be predicted from other features. This means that zero anaphora has to be captured by basic settings that specify correspondences between representational and interpersonal frames. In a language not allowing zero anaphora a two-place predication frame, for instance, at RL has to correspond to a content frame with two Subacts of Reference at IL:

(15) [(T_1) (R_1) (R_2)]
      [(f_1) (x_1) (x_2)]

while in languages allowing zero anaphora, depending on their degree of referential density, the correspondences would be as in (16) and (17):

(16) [(T_1) (R_1)]
      [(f_1) (x_1) (x_2)]

(17) [(T_1)]
      [(f_1) (x_1) (x_2)]

Note that in order to establish these relationships, a certain amount of bottom-up consultation through the Fund is required.

3.2.3 Cross-reference

A form of mismatch in which the Speaker at IL performs two Subacts of Reference that both correspond to a single unit at RL is cross-reference, a term introduced

in Functional Grammar by Dik (1997). Dik (1997, 2: 403) discusses how a Theme – Clause – Tail sequence as in French (18), modified here, can lead through "demarking" to a single-clause expression of the type shown in (19):

(18)   *Jean,*   *il*   *le*   *lui*   *a*   *donné*   *à*   *Pierre,*
      Jean   3SG.M.NOM   3SG.M.ACC   3SG.DAT   AUX.3SG   give.PTCP   to   Pierre
      ton   *livre.*
      2SG.POSS   book
      'John, he gave it to Peter, your book.'

(19)   *Jean*   *il=le=lui=a=donné*   *à*   *Pierre*
      Jean   3SG.M.NOM=3SG.M.ACC=3SG.DAT=AUX.3SG=give.PTCP   to   Pierre
      ton   *livre.*
      2SG.POSS   book.
      'John gave Peter your book.'

In the structure shown in (19), which informally represents the procliticization of the pronouns and the auxiliary verb, the erstwhile pronouns *il, le* and *lui* have come to act as "cross-referencing elements rather than as independent pronouns" (Dik 1997, 2: 404).

    Agreement is in FDG a purely morphosyntactic operation, and as such does not involve the interface between IL/RL and ML (see 3.3). Cross-reference, by contrast, involves an appositional relationship in the sense that both the noun/ adposition phrases (in (19), *Jean, à Pierre* and *ton livre*) and the markers on the verb reflect Subacts of Reference. The latter are identified in Hengeveld (2012) as "appositional referential markers", the underlying insight being that in each case the speaker is performing two Subacts at IL corresponding to a single unit at RL. The referential status of the markers is clear from the fact that they can occur in combination with the verb without the appositional element, in which case the entities being referred to can be retrieved from the Contextual Component. Consider the following example from Chickasaw (Hengeveld 2012: 476, data from Munro and Gordon 1982: 110):

(20)   *Aboha*   *anõ'k-akõ*   *Dan*   *ib-aa-binni'li-li-tok.*
      house   in-CONTR.NONSBJ   Dan   COM-LOC-sit-1.SG.A-PST
      'I sat with Dan in the house.'

As Hengeveld (2012: 476) observes, the "Comitative, the Locative, and the Actor argument are all cross-referenced on the verb. Information on the semantic functions of these arguments can in most cases only be unequivocally retrieved on

the basis of the referential affixes on the verb themselves". The sentence *Ib-aa-binni'li-li-tok* would also be grammatical in the sense of "I sat with someone there". In other words, the Speaker's strategy here involves, for each of the three arguments/modifiers at RL, the performance of two Subacts of Reference, dividing the single unit of semantic information over the two.

Contrast this with "unique referential markers", as found in Canela-Krahô (Hengeveld 2012: 471, data from Popjes and Popjes 1986: 139), where there is a one-to-one correspondence between Subacts and semantic units:

(21) *Hũmre te po curan.*
 man PST deer kill
 'The man killed the deer.'

(22) *Cu-te po curan.*
 3-PST deer kill
 'He killed the deer.'

(23) *Cu-te ih-curan.*
 3-PST 3-kill
 'He killed it.'

Here in each case there is a single expression of the Actor (*hũmre*, *cu-* and *cu-* respectively) and single expression of the Undergoer (*po*, *po* and *ih-*). There is thus no agreement, but also no cross-reference, and the IL and RL align perfectly.

It seems that cross-reference, too, cannot be predicted from other typological properties of the language. This means that cross-reference has to be captured by basic settings that specify the correspondences between content frames and representational frames. In this case, the question is whether at IL one or more Subacts of Reference will be executed in connection with one argument or adjunct at RL. For instance, in order to produce (20), the following correspondence should be allowed:

(24) [(T_1) (R_1) (R_2) (R_3) (R_4) (R_5)]
 [(f_1) (x_1) (x_2) (x_3)]

In (24) (R_1), (R_2), and (R_4) correspond to the referential markers on the verb, while (R_3) and (R_5) correspond to the lexical realizations of the locative and comitative constituents.

3.2.4 Gapping

The term "gapping" owes its origins to transformational grammar: the formal-syntactic viewpoint was that an element is introduced into the tree only to be deleted at a later stage, creating a gap, hence the name (Jackendoff 1971). Gapping can be subsumed under the more general heading of ellipsis (Haspelmath 2007) and from an FDG standpoint involves the non-performance of a Subact of Ascription in a non-initial coordinated clause (Mackenzie 2018). Consider example (25), in which the second coordinated clause corresponds to two Subacts of Reference only (*he* and *lemonade*), without any Subact of Ascription:

(25) *I had coffee*_{Foc}*, and he lemonade*_{Foc}.

Gapping is subject to various preconditions at the Interpersonal Level. The most fundamental of these, as in (25), is that the "gapped" or non-performed Subact of Ascription, if it had been performed, would have corresponded to a non-topical element in the initial coordinated clause which remains cognitively available for the interpretation of the non-initial clause. In addition there is typically a contrast between the two clauses, as again in (25): where this contrast has phonological consequences, the pragmatic function Contr(ast) will apply to the respective Subacts (in (25), to *I* and *coffee* in the first clause and to *he* and *lemonade* in the second).

   Gapping is a phenomenon of formal written usage in English (Miller and Weinert 1998: 82) and is absent from those authors' corpus of spoken English. It is also entirely absent from various other languages, including the SVO languages Mandarin Chinese and Thai, and is not normally applied in Maltese (Borg and Azzopardi-Alexander 1997: 83, cited in Haspelmath 2007: 42):

(26) *Jien ħadt   kafè   u   hu   ħa   luminata.*
      1SG   took.1SG   coffee and   3SG.M took.3SG.M lemonade
      'I had coffee, and he (had) lemonade.'

Gapping is never obligatory in coordinated constructions,[4] and should be seen as deriving from a strategic choice available for formal communication in particular languages in order to bring out a contrast by using a marked construction.

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4 Cf. Spanish 'subdeletion' as in *María leyó más libros que Juan (*leyó) revistas* ('Mary read more books than John (read) magazines'; Reglero 2006).

Given FDG's ban on deletion, gapping cannot be an operation of omission or suppression internal to ML. Otherwise ML would randomly delete any parallel material, which may lead to ungrammatical results, as in (27) and (28), and may even have a comical zeugmatic effect (28):

(27) *John heard no one object, and Bill ~~heard no one~~ say anything.*

(28) *She called Mary a taxi and ~~she called Mary~~ an idiot.*

Rather, ML has to create a clause for which the Subact of Ascription has not been made available. However, to encode the remaining elements of the non-initial clause, the ML is dependent upon a complete RL analysis. This is visible in the following examples of gapping from German:

(29) *Er   unterstütz-te mich,   und   ich   ihn.*
      3SG.M.NOM support-PST   1SG.ACC and 1SG.NOM 3SG.M.ACC
      'He supported me, and I him.'

(30) *Er   half   mir,   und   ich   ihm.*
      3SG.M.NOM help.PST 1SG.DAT and 1SG.NOM 3SG.M.DAT
      'He helped me, and I him.'

In the second coordinated clause, the case-marking of the second argument is dependent upon the selection of the verb: *unterstützen* 'support' requires accusative marking and *helfen* 'help' requires dative marking. It is therefore necessary for the verb to be present in the Configurational Property to ensure correct case-marking of its arguments. The fact that this verb must be identical to the verb in the initial clause suggests that the Contextual Component, which retains a full copy of the RL of that clause, may play a role here, influencing the process of formulation to ensure semantic parallelism between the clauses.

It seems that the extent to which languages allow gapping cannot be predicted from a typological perspective, so it has to be specified as a basic setting within the grammar, which concerns the matching between a content frame at IL and a representational frame at RL, as illustrated in the following representation of sentences like (30):

(31) $[$ (T_1) (R_1) (R_2) (R_3) (R_4) $]$
      $[$ (f_1) (x_1) (x_2) (f_1) (x_2) $(x_1)_U$ $]$

Only the first instance of (f_1) in (31) corresponds to a Subact of Ascription; the second one does not, and therefore is not expressed overtly, though it is present in the semantic representation. In languages like Maltese, as illustrated in (26), there would be a Subact of Ascription corresponding to the second instance of (f_1).

There are certain morphosyntactic restrictions on gapping in languages like German. Consider for instance the following example (Hella Olbertz, p.c.):

(32)   *Er   schlägt   mich   und   ich   *(schlage)   ihn.*
        He   strikes   me   and   I   strike   him
        'He strikes me and I him.'

When two verb forms are not formed in a parallel way because they form part of an irregular paradigm (note the umlaut in the 3rd person form *schlägt*), gapping is not allowed. Since this restriction is based on formal properties of the constituent only, there is a phonological restriction on a pragmatically and semantically motivated operation. This means that in this case we need a bottom-up verification process, which checks within the Fund whether or not the verb form to be gapped corresponds in its basic form with the first occurrence of that same verb. The vertical connections within the Fund proposed in Section 2.4 allow for this.

3.2.5 Verb doubling

Whereas gapping involves a null-to-nonnull relation between IL and RL, we will now consider an example of a many-to-one (strictly speaking a two-to-one) relation between IL and RL. The construction in question occurs in various languages in different but similar guises. In Spanish, Portuguese and Catalan, it involves an infinitive form of a zero- or one-place intransitive verb followed by a finite form of the same verb, which may be negated. Hengeveld and Mackenzie (2008: 348) analyzed the Spanish construction – we now believe erroneously – as involving a dummy predicate at ML. Consider the following examples from Spanish:

(33)   a   *Llov-er   lluev-e.*   b   *Llov-er   no   lluev-e.*
            rain-INF   rain-IND.PRS.3SG   rain-INF   NEG   rain-IND.PRS.3SG
            'It does rain to a certain extent.'   'It doesn't really rain.'

(34)   a   *Ayud-ar   ayud-a.*   b   *Ayud-ar   no   ayud-a.*
            help-INF   help-IND.PRS.3SG   help-INF   NEG   help-IND.PRS.3SG
            'It does help to a certain extent.'   'It doesn't really help.'

The construction is typical of the informal spoken language, but it can be found in written form in certain informal settings on the internet, such as web fora and blogs. It is pronounced in a single Intonational Phrase and in writing usually occurs without a comma after the infinitive; these formal properties signal the presence of a single Discourse Act.

These constructions, we argue, contain two Subacts of Ascription at IL, with distinct pragmatic functions, Topic and Focus respectively. The Subact corresponding to the infinitive is Topic, evoking a contextually available event (e.g. rain), and the Subact corresponding to the finite verb is Focus, offering new information about that Topic, namely that the event happens or does not happen. At RL, however, there is only one State of Affairs, the one denoted by the finite verb. This means that a sentence like (33a) has the following representation, in which the mismatch is visible in the presence of two Subacts of Ascription and a single Lexical Property.:

(35)　[　$(T_1)_{Top}$　　　$(T_2)_{Foc}$　]
　　　[　　　　　　(f_1)　　　　　]

The extent to which languages allow this kind of construction seems again to be largely a basic setting, rather than being predictable from other features of the language.

3.2.6 Asyndetic conditionals

Another case of a mismatch between IL and RL concerns cases in which one Communicated Content at IL corresponds to two Propositional Contents at IL. This is the case of asyndetic conditionals of the type found in informal usage in certain varieties of English (cf. also Jackendoff and Audring 2020: 247–248), as illustrated in (36):

(36)　*He's home he's having dinner.*

This sentence corresponds to the more explicit (37):

(37)　*If he is home he is having dinner.*

In (37), the conditional is at RL a subordinate Propositional Content that is a modifier within the main Propositional Content:

(38)　[　　　　　　　　　　　　　　(C_I)　　　　　　　　　　　　　　]
　　　[$(p_j$: – he is having dinner – (p_j): $(p_i$: – he is home – $(p_i))_{Cond}$ $(p_j))$]

Thus the Communicated Content at IL corresponds to a single Propositional Content (p_j) at RL, which itself contains another Propositional Content (p_i). The propositional nature of (p_i) and (p_j) follows from the fact that the conditional can be paraphrased as in (39):

(39) *If **it is true that** he is home then he is having dinner.*

while the main clause may contain a propositional modifier, as in (40):

(40) *If he is home he is **probably** having dinner.*

The interpretation of the asyndetic (36) is identical to the syndetic one in (37). However, in this case the two Propositional Contents are simply juxtaposed, and the conditional relation is not expressed but implied. In this case the representation would therefore be as in (41):

(41) [(C_I)   ]
     [(p_i: – he is home – (p_i)) (p_j: – he is having dinner – (p_j))]

As shown in (41), one Communicated Content is now mapped onto two Propositional Contents.

  The circumstances under which a language can use constructions like (36) have to be specified as a basic setting concerning the possible mappings between content frames at IL and representational frames at RL.

3.2.7 Temporal adverbial clauses

Mackenzie (2019: 311–314) discusses the following construction:

(42) *After Mary introduced herself to the audience, she turned to a man she had met before.*

He argues that in this case we have two Communicated Contents corresponding to a single Propositional Content. An argument in favour of analyzing (42) as based on two C's is that both the subordinate clause and the main clause may be modified separately by a reportative modifier:

(43) *After Mary **reportedly** introduced herself to the audience, she turned to a man she had met before.*

(44)   *After Mary introduced herself to the audience, she **reportedly** turned to a man she had met before.*

An argument in favour of analyzing (45) as containing just one (p) is that propositional verbs have scope over both clauses:

(45)   *I **believe** that after Mary introduced herself to the audience, she turned to a man she had met before.*

Here we thus have the opposite situation to the one sketched in the previous section, where the relationship was one-to-many. Here we have a case in which the relationship is many-to-one, as schematically represented in (46):

(46) $[(C_I)$ $(C_J)]$
$[(p_i: –$ After Mary introduced   she turned to a man she
herself to the audience,   had met before – $(p_i))]$

For a full representation of this sentence, see Mackenzie (2019: 311–314).

3.3 Mismatches between IL/RL and ML

3.3.1 Introduction

Mismatches between IL/RL and ML are the ones that have received most attention in the literature. In the FDG model it is here that the relation between (interpersonal and representational) meaning and (morphosyntactic) form becomes relevant, a relation that has also been central in the discussion of transparency in language. In this section we limit ourselves to mismatches that originate in the interface between IL/RL and ML, which is called *Morphosyntactic Encoding*. It is important to note that mismatches may also originate outside that interface. As discussed in Hengeveld and Leufkens (2018), several non-transparent features of language originate within ML itself. For instance, it is within ML that dummy insertion is taken care of, where the insertion of a dummy creates a discrepancy between IL/RL and ML, as the dummy does not have an IL/RL counterpart. As this type of discrepancy does not arise in an interface, it will not play a role in this section.

Mismatches that do arise in the interface between IL/RL and ML can be organized into three different pairs, the members of which will be discussed one by one in the following subsections:

(i) a In languages that display grammatical relations (at ML), there is *neutralization* of pragmatic (IL) and semantic (RL) functions. Thus there is a reduction of the distinctions available at IL and RL to a smaller number of distinctions at ML. For instance, in English Actor and Undergoer arguments of intransitive predicates (RL) are both treated in the same way as Subjects at ML. This is thus an instance of a many-to-one mismatch.

  b The opposite situation occurs when a language displays *suppletion*, which may be lexical or syntactic. In the case of lexical suppletion, a single meaning is realized in different forms. In the case of syntactic suppletion the same unit, e.g. a Communicated Content, may be realized differently depending on whether it is realized as a main or as a subordinate clause. Both are instances of one-to-many mismatches.

(ii) a *Incorporation* and *compounding* lead to a situation in which two or more meaning units are realized as a single morphosyntactic unit, as in the case of *truck driver* or *bookcase*. Again this is a case of a many-to-one mismatch.

  b The opposite situation occurs in *idiom formation*, where a single meaning unit at IL and RL corresponds to a series of morphosyntactic units, e.g. when the idiomatic Verb *kick_the_bucket* at RL corresponds to a sequence of (Vp) and (Np) at ML. This is a one-to-many mismatch.

(iii) a *Fusion* leads to a situation in which two or more meaning units fuse into a single morphosyntactic unit, as when a stem and an affix fuse into a single morphosyntactic unit, e.g. *went* as the past tense of *go*. This is a case of a many-to-one mismatch.

  b The opposite of fusion is *discontinuity*, where a single meaning unit is distributed over different positions. Circumfixes are a clear example of this situation.

Note that we only have instances here in which there is a one-to-many or a many-to-one mismatch. Null-to-nonnull mismatches do exist, but do not arise in the interface. Above we mentioned the case of dummy insertion, which introduces an element in morphosyntax (nonnull) that does not correspond to any semantic or pragmatic material (null). The opposite case, nonnull-to-null, is not something we would expect in FDG, as deletion, just like other transformations, is not allowed in this theory.

3.3.2 Neutralization

Neutralization of semantic functions is illustrated in the following examples from English:

(47)   *I ran.* (A)

(48)   *I'm good.* (U)

(49)   *I'm feeling lazy.* (L)

All three sentences have a single argument. In (47) this argument is an Actor, in (48) an Undergoer, and in (49) a Locative. Experiencers are treated as a subtype of Locative in FDG, see Hengeveld and Mackenzie (2008: 194–206). Despite these different semantic functions, the arguments behave the same way in all three sentences: they do not carry a case marker, occupy the preverbal position, and trigger verbal agreement. The neutralizing effect becomes particularly visible when these examples are compared to parallel ones in Chickasaw, a language without neutralization (Munro and Gordon 1982: 81, 81, 83):

(50)   *Malili-li.* (A)
       run-1.SG.A
       'I ran.'

(51)   *Sa-chokma.* (U)
       1.SG.U-good
       'I'm good.'

(52)   *An-takho'bi.* (L)
       1.SG.L-lazy
       'I'm lazy.'

We can thus say that in Chickasaw there is a transparent relation between RL and ML in this respect, and there is no mismatch, while in English there is: three different semantic functions are mapped onto a single morphosyntactic function, usually called Subject.

A proportion of the languages that show neutralization in intransitive predications also show neutralization between intransitive and transitive predications. When there is neutralization of the A argument in transitive predications and the only argument in intransitive predications, the alignment system is accusative.

When there is neutralization of the U argument in transitive predications and the only argument in intransitive predications, the alignment system is ergative. In accusative languages the nominative arguments may be called the Subject, and in ergative languages the absolutive arguments may be called the Subject. Neutralization shows up especially clearly in passivization in accusative languages and anti-passivization in ergative languages. Thus, in the examples (53)–(54) the A (53) and U (54) arguments in the accusative language English show the same formal behaviour, and in (55) and (56) the U (55) and A (56) arguments show the same formal behaviour in the ergative language Basque (Hualde and Urbina 2003: 431).

(53) *The man read a book.* (A-Subject)

(54) *The book* (U) *was read by the man* (A). (U-Subject)

(55) *Gutun   hau   zuk   idatzia   da.* (U-Subject)
       letter   this.ABS you.ERG write.PFV.DET AUX.3.SG
       'You have written this letter.'

(56) *Ni   gutun asko   idatzia   naiz.* (A-Subject)
       I.ABS   letter a.lot.ABS write.PFV.DET AUX.1.SG
       'I have written a lot of letters.'

A proportion of the preceding group of languages also show neutralization of U arguments in transitive predications and L arguments in ditransitive predications, as shown in the following examples from Kham (Watters 2002: 67, 68):

(57) *Ŋa:-Ø   no:-lai   ŋa-Ø-rĩ:h-ke.*
       I-NOM   he-OBJ   1.SG.SBJ-3.SG.OBJ-see-PFV
       'I saw him.'

(58) *Ŋa-lai   bəhtanji   y-ã:-ke-o.*
       I-OBJ   potato   give-1.SG.OBJ-PFV-3.SG.SBJ
       'He gave me a potato.'

These neutralized arguments in this case are called Objects.

In the case of Kham this is the only way of marking U and L arguments, and the alignment type is called secundative. In other languages, the alignment type is indirective, as for instance in German (Haspelmath 2008: 78):

(59) *Sankt Georg-Ø* (A)   *tötete   den   Drach-en* (U).
     St.   George-NOM   killed   DEF.ACC   dragon-ACC
     'St. George killed the dragon.'

(60) *Sankt Martin* (A)   *gab   dem   Bettler* (L)   *seinen   Mantel* (U).
     St.   Martin   gave   DEF.DAT   beggar   his.ACC   cloak
     'St. Martin gave the beggar his cloak.'

In yet other languages there is variable assignment of the Object function, called dative shift. This is illustrated here for English:

(61)   *Peter* (A) *gave some flowers* (U) *to Sheila* (L).

(62)   *Peter* (A) *gave Sheila* (L) *some flowers* (U).

In ergative languages the arrangement of the U and L arguments works out differently. As the U argument already aligns with the only argument of intransitive predications, and is thus the absolutive Subject, this Subject function extends to the ditransitive U in indirective alignment, and the ditransitive L in secundative alignment. The Object function is thus not needed for ergative languages (see Hengeveld and Mackenzie 2008: 329).

In order to account for these phenomena, the interface needs to contain at least the following basic settings and constraints. First of all, the position of the language with respect to the Syntactic Function Hierarchy in (63) should be specified.

(63)   Syntactic Function Hierarchy
          Subject   >   Object
      1. +   +
      2. +   −
      3. −   −

If a language has a syntactic function Object, it also has the syntactic function Subject; a language may have the Subject function only, but the hierarchy also predicts a language type that does not have any syntactic functions at all, in which case there is no mismatch. Chickasaw above is a case in point.

If a language does have syntactic functions, the interface has to know whether the language is ergative or accusative, and whether it is indirective or secundative, which are basic settings.

The next step is for the question to become relevant which arguments, in the case of variable assignment, can become subject or object, in terms of their semantic functions. The Semantic Function Hierarchy takes different forms for accusative and ergative languages:

(64)   Semantic Function Hierarchy – Subject assignment (accusative)

	A	>	U	>	L	>	Other
1.	+		+		+		+
2.	+		+		+		–
3.	+		+		–		–
4.	+		–		–		–

(65)   Semantic Function Hierarchy – Subject assignment (ergative)

	U	>	A	>	L	>	Other
1.	+		+		+		+
2.	+		+		+		–
3.	+		+		–		–
4.	+		–		–		–

(66)   Semantic Function Hierarchy – Object assignment (accusative)

	A	>	U	>	L	>	Other
1.			+		+		+
2.			+		+		–
3.			+		–		–

3.3.3 Suppletion

In the preceding section we illustrated a situation in which several types of semantic unit map onto a single morphosyntactic unit, i.e. Subject or Object. In this section we will focus on a process that is quite the opposite, that is, one in which a single semantic unit maps onto several morphosyntactic units. This happens when a semantic unit assumes different forms depending on the specific morphosyntactic configuration in which it occurs. This phenomenon is called suppletion when applied to lexical stems, but we will also apply it to larger morphosyntactic units.

Lexical suppletion may be illustrated with the following examples from Wambon (de Vries 1989: 23), a language in which several verbs have various manifestations, depending on the TMA category that has to be expressed. For instance, the meaning 'eat' is expressed in Wambon as either *en-*, *ande-* or *na-*.

Ande- is used with past and future tenses and with the plural imperative, *na-* is used with the singular imperative, and *en-* is used elsewhere. Some examples are given in (67)–(68) (de Vries 1989: 24, 32):

(67) *Ande-t-ep-mbo.*
  eat-PST-1.SG-PST
  'I ate.'

(68) *E-nok-si-t.*
  eat-NEG-INT.NEG-3.SG
  'He does not want to eat.'

As noted in Section 2.3, forms and structures that cannot be handled productively by regular rules have to be taken care of by the Fund through the rule of fundal priority. The various forms in a paradigm have to be listed in the set of primitives that feeds the ML and the conditions on their insertion have to be implemented through language-specific rules. This example demonstrates the importance of a distributed approach to the lexicon in FDG.

Syntactic suppletion is a term that we propose here, in parallel with its lexical counterpart, for the phenomenon in which a complex semantic unit has different morphosyntactic manifestations. Consider the following examples from Dutch:

(69) *Ik betreur* [*dat gisteren gezegd te hebben*].
  I regret DEM yesterday said to have
  'I regret saying that yesterday.'

(70) *Ik betreur* [*dat ik dat gisteren heb gezegd*].
  I regret SUB I DEM yesterday have said
  'I regret that I said that yesterday.'

(71) *De jongen* [*die dat gisteren heeft gezegd*] *is mijn broer.*
  the boy who DEM yesterday has said is my brother
  'The boy who said that yesterday is my brother.'

(72) **De* [*dat gisteren gezegd hebbende*] *jongen is mijn broer.*
  the DEM yesterday said having boy is my brother
  'The boy saying that yesterday is my brother.'

In FDG both the complements of commentative verbs and relative clauses are treated semantically as Episodes, as they may contain absolute temporal

expressions, such as *gisteren* 'yesterday'. Yet the way in which these Episodes are expressed in Dutch is different, as (under similar conditions of coreference), the relative clause has to be finite, as shown in (71)–(72), while the complement clause of the commentative predicate may be realized non-finitely, as shown in (69)–(70). This means that in Dutch the expression of an Episode depends on the question whether it occupies an argument or a modifier position.

In other languages such discrepancies do not occur. Consider the following examples from Maltese (Borg and Azzopardi-Alexander 1997: 30, 35):

(73) [*Li*   *l-ġimgħa*   *d-dieħla*   *se*   *tkun*   *vaganza*]   *hija*
      SUB   DEF-week   DEF-entering.F.SG   FUT   COP.3.F.SG   holiday   3F.SG
      stqarrija   *sorprendenti*.
      statement   surprising
      'It is a surprising statement that next week will be a holiday.'

(74) *Rajt*   *il-qattus*   [*li*   *t-tfal*   *xtraw*   *il-bieraħ*].
      saw.1SG   DEF-cat   SUB   DEF-children   bought.3PL   DEF-yesterday
      'I saw the cat that the children bought yesterday.'

The complement clause in (73) and the relative clause in (74) are both finite and identical to main clauses, except that the coreferential element in the relative clause is not expressed, but this depends on independent factors that we looked at in Section 3.2.

Hengeveld and Luberti (2020) investigate how syntactic suppletion fits into Hengeveld and Leufkens' (2018) transparency hierarchy, and show that languages behave systematically as regards the extent to which they allow the use of the same clause type in different functions. The distribution of this feature can thus be captured by a typological hierarchy (see Hengeveld and Luberti 2020: 14). The clause types themselves are captured by morphosyntactic templates.

3.3.4 Incorporation/compounding

In cases of incorporation and compounding two pragmatic/semantic units map onto one morphosyntactic unit. A full treatment of incorporation in relation to interfaces in FDG can be found in Olthof and Hengeveld (this volume). We focus here on compounding.

Hengeveld and Mackenzie (2016) distinguish between three types of compounds, illustrated in (75)–(77), in which the dollar sign is a variable for lexemes:

(75) $(f_i: [(f_j: (\$_i|drive) (f_j)) (x_i)_A (x_j: (f_k: (\$_j|truck_N (f_k)) (x_j))_U) (f_i))$ *truck driver*

(76) $(f_i: (f_j: (\$_i|case) (f_j): (f_k: (\$_j| book) (f_k)) (f_j)) (f_i))$ *bookcase*

(77) $(f_i: [(f_j: (\$_i|singer) (f_j)) (f_k: (\$_j| composer (\$_j)) (f_k))] (f_i))$ *singer-composer*

In (75) *truck* (x_j) is an argument of *drive* (f_j); in (76) *book* (f_k) modifies (:) *case* (f_j); in (77) *singer* (f_j) and *composer* (f_k) are juxtaposed. In all cases the combination of elements forms a complex Property f_i. The various lexical elements are expressed as a single Morphosyntactic Word at ML.

Compounding is not universal. For instance, Fortescue (2004: 1394) notes with respect to West-Greenlandic: "In stark contrast to its rich derivational potential the language does not allow nominal or verbal compounding at all". When languages do have compounding, the types of compounding they have do not seem to be predictable in implicational terms (Bauer 2011: 355). The compounding possibilities of the language concerned thus have to be specified in the Fund in terms of semantic frames such as the ones given in (75)–(77).

3.3.5 Idiom formation

The opposite of incorporation and compounding is idiom formation. Keizer (2016) distinguishes three types of idioms: (i) unmotivated, semantically non-decomposable idioms such as *to kick the bucket*; (ii) motivated, semantically non-decomposable idioms, such as *to smoke the peace pipe*; and (iii) motivated, semantically decomposable idioms, such as *to spill the beans*. Idioms of the first class are represented by Keizer as single but complex lexical items at IL and RL but as multiple morphosyntactic units at the Morphosyntactic Level. In this case there is thus a mismatch between IL/RL and ML. Thus, the analysis she proposes for (78) at IL, RL, and ML is given in (79):

(78)   *He kicked the bucket.*

(79)   IL: $(A_1: [(F_1: DECL (F_1)) (P_1)_S (P_2)_A (C_1: [(\mathbf{T_1)_{FOC}} (+ id R_1)] (C_1))] (A_1))$
       RL: $(p_1: (past\ ep_1: (e_1: (f_1: [\mathbf{(f_2: kick\_the\_bucket_V (f_2))}\ (1x_1)_U] (f_1)) (e_1))$
             $(ep_1)) (p_1))$
       ML: $(Cl_1: [(Np_1: (Nw_1: he (Nw_1))_{Subj} (Np_1))\ \mathbf{(Vp_1: (Vw_1: kick\text{-}past (Vw_1)) (Vp_1))}$
             $\mathbf{(Np_2: [(Gw_1: the (Gw_1)) (Nw_2: bucket (Nw_2))] (Np_2))}] (Cl_1))$

The second and third classes are treated by Keizer as complex both at RL and ML, but as a single Subact and a fixed combination of Subacts at IL. These cases are therefore not of interest to us here.

Idioms such as *kick_the_bucket* must be listed as lexical entries in the Fund, with the pragmatic, semantic and morphosyntactic information being independently specified in the respective components of the Fund. Given the highly idiosyncratic nature of idioms, typological parametrization is not possible (see also Contreras García 2012, Jackendoff and Audring 2020).

3.3.6 Fusion

The notion of fusion applies to two different phenomena in language. On the one hand, it covers *cumulation*, which is the expression of more than one grammatical category in one morpheme. For instance, the morpheme *-é* in the Spanish example (80) expresses four grammatical categories at the same time:

(80) *compr-é*
      buy-IND.PAST.PF.1SG
      'I bought.'

Cumulation seems not to be predictable from a typological point of view. Virtually all languages in Leufkens (2015)'s study show cumulation of one type or another, and the author remarks that "the fusion feature 'Cumulation of TAME and/or case' also shows a scattered distribution" (Leufkens 2015: 138). It thus seems that for every language one has to stipulate the categories that are expressed cumulatively.

On the other hand, the notion of fusion also covers *stem alternation*, which occurs when the form of a lexical stem is affected by the expression of a grammatical category. Thus, *saw* in (81) expresses the lexical meaning *see* and the past tense simultaneously.

(81) *saw*
      see.PAST.SG

Hengeveld (2007) shows that stem alternation is not randomly distributed, but partly depends on the parts-of-speech system of a language. Most importantly, if languages do not make a distinction between verbs, nouns, adjectives, and adverbs, they have no stem alternation at all; if they do not make a distinction

between nouns, adjectives, and adverbs, they do not have stem alternation in nouns and adjectives; and if they do not make a distinction between adjectives and adverbs, they do not have stem alternation in adjectives. However, in all other circumstances languages may or may not have stem alternation in unpredictable ways, and where languages show stem alternation it is not predictable for which specific lexical items. Hence stem alternation has to be specified in the Fund.

3.3.7 Discontinuity

The opposite of fusion is discontinuity, which may manifest itself in the morphology and in the syntax of a language. A morphological example is given in (82), from Dutch, and a syntactic example in (83).

(82)   **ge**-*wandel*-**d**
      RES.PTCP-walk-RES.PTCP
      'walked' (participle)

(83)   *I saw **a man** yesterday **that was carrying a huge suitcase.***

Discontinuity occurs when a single semantic unit is expressed in more than one morphosyntactic position. Thus, in (82) the two parts of the circumfix *ge-X-d* together express resultativity, and none of the two parts has a meaning by itself.[5] In (83), the single description of an Individual *a man that was carrying a huge suitcase* is expressed in two different syntactic positions.

     In Hengeveld and Leufkens (2018) discontinuity is the only feature investigated that cannot be assigned a position in the transparency hierarchy without counterexamples. It thus seems that, again, the types of discontinuity have to be stipulated, in terms of the morphosyntactic templates listed in the Fund.

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5 Similarly, in languages with non-concatenative stems, the discontinuity is a property of both the stem and its inflection. In Arabic (Ryding 2005: 45–47), for example, a system of consonantal roots interlocks with patterns of vowels to yield words that may contain affixes and/or involve consonantal gemination. For example, the sequence kV_1tV_2b 'writing' is seen in *kitaab* 'book', *kutub* 'books', *kutub-an* 'books-ACC', *kaatib* 'writer', *kuttaab* 'writers', *katab-a* 'he wrote', *katab-at* 'she wrote', *na-ktub-u*, 'we write', etc. Here too, the root *k-t-b* has meaning, but neither the individual V_1 nor V_2 does.

4 Mismatches between IL/RL/ML and PL

4.1 Introduction

The mismatches pertaining to the interaction between the Phonological Levels and the higher levels involve (a) cases where phonological phrasing does not run parallel to morphosyntactic phrasing and (b) cases where phonological considerations have an impact upon the workings of the higher levels and in this way cause mismatches. These will be dealt with in turn.

4.2 Phonological versus morphosyntactic phrasing

There appear to be major differences across languages in the extent to which phonological structure reflects morphosyntactic structure. In particular, it has been argued (Lahiri and Plank 2010) that in Germanic languages rhythmic considerations predominate over the groupings that follow from morphosyntactic considerations, leading to rather radical differences between ML and PL. In Romance languages, by contrast, there is quite good alignment between ML and PL.

An example of the former situation discussed in Lahiri and Plank (2010: 376–377) is given in the famous slogan shown in (84):

(84) *Drink ‖ a pint | of   milk ‖ a   day.*
       /ˈdrɪŋkə   ˈpaɪntə(v)   ˈmɪlkə   ˈdeɪ/

The syntactic structure in (84) involves a succession of Vp, Np and Np, the first Np containing an Adpp. In pronunciation, however, the divisions between the Phonological Phrases, each characterized by carrying stress, are radically at odds with the morphosyntactic analysis: the indefinite article of *a pint* is realized as a single Phonological Phrase with the verb, and the head noun *pint* of *a pint* is realized as a single Phonological Phrase with the preposition *of* from the Adpp *of milk*. In fact, the effect is so strong that a neologism *pinta* /ˈpaɪntə/ arose in UK advertising to mean 'pint of milk'.

By contrast, in French main clauses there is good alignment between syntactic and phonological phrases, as in the following advertising slogan:

(85) *Du pain,   du vin,   du Boursin.*
       /dyˈpɛ̃   dyˈvɛ̃   dybuʁˈsɛ̃/
       PARTV bread   PARTV wine   PARTV Boursin.cheese
       'Bread, wine, Boursin.'

The Intonational Phrase divides into three (rhyming) Phonological Phrases and each Phonological Phrase corresponds exactly to a Noun Phrase.

Languages can thus differ quite strikingly in the extent to which there are one-to-one or many-to-many mappings between morphosyntactic and phonological structure. In the case of a one-to-one mapping, information from ML can be fitted directly into a prosodic template at PL. In the case of a many-to-many mapping, the string of elements that is the output of ML acquires its phonological shape, including lexical stress where relevant, at PL, and this string is then fitted into a prosodic template based on phonological rather than syntactic considerations. In the case of (84), the unstressable indefinite article *a* as well as the unstressable preposition *of* form a unit with the stressed lexical unit that precedes them, thus following the trochaic pattern of the prosodic template. This is shown in (86).

(86) (Cl_i: [(Vp_i: –drink– (Vp_i)) (Np_i: [((Gw_i: a (Gw_i))
   (IP_I: [(PP_i: – 'drɪŋkə – (PP_i))
            (Nw_i: pint (Nw_i)) ($Adpp_i$: [($Adpw_i$: of ($Adpw_i$))
            (PP_j: – 'paɪntə(v) – (PP_j))
            (Np_j: milk (Np_j))] (Np_i)) ($Adpp_i$)) (Np_k: [(Gw_j: a (Gw_j))
            (PP_k: – 'mɪlkə – (PP_k))
            (Nw_k: day (Nw_k))] (Np_k))]   (Cl_i))
            (PP_I: – 'deɪ/ – (PP_I))]   (IP_I))

4.3 Bottom-up impact of phonology

Phonological considerations may in some cases determine the choices that have to be made at higher levels. Such cases of bottom-up processes are difficult to deal with in a strictly top-down architecture. In 2.4 we argued that FDG should allow bottom-up feedback processes, but should restrict these to the Fund and to the Contextual Component. We will make use in this section of this adaptation of the architecture of FDG. Note that Inkelas (2014: 281–315), who inventories these cases, after considering a wealth of earlier studies finds that in general the influence of phonology on morphology is "fairly limited" (2014: 314). However, a number of the cases she treats are relevant to our considerations here. In the following we will discuss examples where PL may have a bottom-up impact on IL, RL or ML. One may expect that the larger the distance between PL and a higher level, the less likely it is that this higher level will be sensitive to PL.

4.3.1 PL-IL: Norwegian imperatives

Inkelas (2014: 289) raises the problem of "ineffability", i.e. cases where some phonological constraint makes it impossible to express a regular meaning, giving (2014: 292) the example of Norwegian imperatives, which are identical to the infinitive, but without the final suffix −*e*. Where this leads to an unacceptable syllabic coda (specifically certain phonologically illicit syllable-final consonant clusters), the imperative form is blocked:

(87) INFINITIVE IMPERATIVE
  å åpne **åpn* 'open'
  å padle **padl* 'paddle'
  å sykle **sykl* 'bike'

According to Inkelas (2014: 292), ". . . some speakers repair the problem phonologically by devoicing the final sonorant (i.e. /n/ or /l/), while others simply recruit the infinitive form for use as the imperative. Still other speakers experience a genuine paradigm gap in these cases, and resort to periphrasis to express the intended meaning."[6] The third option is relevant to us here, as in this case the speaker feels forced to select a basic Illocution other than IMP at the Interpersonal Level. Thus, a choice at IL is co-determined by phonological considerations. Note that RL plays a role in this process as well, as the choice of a particular verb, such as *åpne* 'open' in (87), takes place at that level. This means there has to be feedback from RL to IL too. By allowing this feedback within the Fund, both the choice of the basic Illocution and the choice of the verb can be made sensitive to the phonological shape of the verb, which is stored in the compartment of the Fund corresponding to PL.

4.3.2 PL-RL: Comparative adjectives in English

The basic facts and a treatment of comparative adjectives in English in terms of FDG were proposed in Hengeveld and Mackenzie (2008: 454–455, see also Inkelas 2014: 290). They observe that there is an alternation between the syntactic option of creating an Adjp with *more* (*more delicious*) and the morphological operation

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6 This has been confirmed by speaker of Norwegian Hilde Hasselgård (p.c.), who recognizes the second and third options; in the third option, speakers will sense the phonological problem, she says, and use such circumlocutions as *Kan du åpne . . .* 'Can you open . . .' or *Du må åpne . . .* 'You must open . . .'.

of suffixing −*er* (*tastier*). Which form is chosen depends upon the phonological characteristics of the adjective: the suffix is required where the stem is monosyllabic (*old*, *older*) and often preferred where the adjective is disyllabic with an unstressed second Syllable (*tasty*, *tastier*). Where the stem has three or more Syllables, the syntactic option has to be taken (*persistent*, *more persistent*).

Hengeveld and Mackenzie (2008: 455) take *more* to be lexical, because it can be modified (*much more persistent, enormously more persistent*) and propose the frame in (89) (here modified in the light of post-2008 developments in FDG) for the Configurational Property of, for example, (88):

(88)   *John is noticeably more intelligent than his brother.*

(89) $[(f^c_1: (f_1: \blacklozenge_{Adj} (f_1): (f_2: more_{Adv} (f_2): (f_3: \blacklozenge_{Adv} (f_3)) (f_2)) (f_1)) (x_1)_{Standard})) (f^c_1)) (x_2)_U]$

It is hypothesized by the authors that the same frame also underlies (90), so that at the Representational Level, both forms have the same analysis.

(90)   *John is noticeably bigger than his brother.*

As for the Morphosyntactic Level, Hengeveld and Mackenzie (2008: 455) propose that (90) is not only semantically parallel to (88) but also has the same general form as (88). In other words, what is found at ML is the ungrammatical *John is markedly more big than his brother*; it is left to PL, where it is possible to be sensitive to the monosyllabic property of *big*, to yield the grammatical form *bigger*.

There is, however, a problem with this analysis, which is that in (88) modification of the degree expressed by *more* is indeed possible, but in (90), with the suffixal expression, it is not. One of the readings of (88) is that the property *intelligent* holds to a higher extent for John, and that this extent is noticeable. The reading in (90), however, is that John's being bigger than his brother is noticeable. Thus, in (90), *noticeably* modifies *bigger* as a whole, and not just the *-er* suffix. This is due to the fact that the comparative suffix is triggered by an operator (Comp), a grammatical element that cannot be modified, so that (90) should have the representation in (91):

(91) $[(f^c_1: (Comp\ f_1: \blacklozenge_{Adj} (f_1): (f_2: \blacklozenge_{Adv} (f_2)) (f_1)) (x_1)_{Standard})) (f^c_1)) (x_2)_U]$

As a result, (88) and (90) have different semantic representations.

The second problem is that our earlier analysis requires a transformation at ML, in that first the Advw *more* is inserted, which subsequently is changed into the Aff *-er*. Such transformations are dispreferred in a functional approach.

The modifications of FDG proposed in Section 2 now allow us to propose a different solution, which makes use of bottom-up feedback provided through the Fund. In creating a comparative construction, there are two representational frames available for English, as given in (89) and (91). The choice of one or the other of these two frames is dependent on the phonological properties of the lexeme selected for the (f_1) slot in those frames. Through the Fund, the phonological properties of this lexeme are consulted, and the choice of one or the other frame is determined. The representations at ML and PL can from there on be formed regularly.

4.3.3 PL-ML: Affix metathesis in Witsuwit'en

In Section 2.4 we already discussed the case of Tagalog, where the order of head and modifier in noun phrases is in some cases determined by the phonological properties of the lexemes used in building up the noun phrase. A parallel case, but now in morphology, is that of affix metathesis in Witsuwit'en, an Athabaskan language (Inkelas 2014: 311–312). Cases like these are characterized by Inkelas as "not easy to find" (2014: 311). This is a rare instance of where affix order is determined by phonological rather than, as would be expected in FDG (and more generally in grammatical theory), semantic considerations. Witsuwit'en is a language in which negation scopes over aspect (referred to as "tense" by Inkelas) and accordingly the negative prefix *s-*[7] occurs further from the stem than aspect prefixes. However, this prefix is constrained at the Phonological Level to only occur as the coda of a syllable, and this requirement imposes positioning of the prefix after an aspect prefix to guarantee that this happens:

(92) *We#**c'-ə-s**-ɛ-xw-ʔɛnʔ.*
NEG#UNSP.OBJ-INSERT-NEG-PROG-PL.SUBJ-see
'You-guys don't see anything.'

(93) *We#**c'-ɛ-s**-Ø-ʔɛnʔ.*
NEG#UNSP.OBJ-PROG-NEG-SG.SUBJ-see
'He/she doesn't see anything.'

Each portion in bold print shows a syllable and how *s-* on both occasions occurs in the coda. Note that in (92), a meaningless schwa is inserted to create a syllable

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7 Negation is expressed by two prefixes: an initial *we#* and *s-*.

peak. It is perhaps significant that the prefix which can appear in different positions in the sequence is a prefix of negation. Hengeveld and Mackenzie (2018) point out that the unified cognitive operation of negation can correspond to an operator at many different layers of semantic (and indeed pragmatic) structure: the lower positioning of NEG in (93) may therefore not affect the interpretation of the clause as negative.

This is a case in which phonological considerations influence the ordering choices to be made at ML. This can be accounted for by bottom-up feedback through the Fund, by means of which the phonological features of the various suffixes can be consulted in determining morpheme order.

5 Conclusions

In this chapter we set out to revise FDG's architecture in order to be able to more accurately define and delimit the number and position of interfaces in the theory. Within interfaces we distinguished three types of units: parameters, rules, and exceptions. As a typologically-oriented theory of language structure, FDG prefers to define differences between interface conditions across languages in terms of typological hierarchies, such that for every language a basic setting on the many hierarchies will predict the working of the interfaces. Apart from these hierarchies a number of basic settings should be provided, potentially including questions such as whether the language allows zero anaphora or not, what its alignment system is, whether modifiers are allowed to fall outside the Intonational Phrase of the main clause, and whether cliticization is allowed or not. These basic settings are reflected in the Fund, where frames, templates, and contours capture the configurations permitted in a language. We have also argued that within the Fund, there should be compartments corresponding to the Levels in the grammar, such that for every lexical item and for every construction, the interpersonal, representational, morphosyntactic, and phonological aspects are stored separately. Finally, we argued that apart from top-down processes, some bottom-up processes should be allowed, though severely restricted in the sense that these processes can only take place in the Fund and in the Contextual Component, but not within the grammar as such.

We have used the resulting new architecture to systematically discuss mismatches between the four levels of organization in FDG. In doing so we have shown that indeed all the interfaces recognized are relevant, in the sense that at all these interfaces mismatches may occur. We have also demonstrated that some mismatches can be accounted for as following from typological settings, in some

cases derived from well-established typological hierarchies, and in some cases as basic choices a language makes among various typological options. Finally, we have shown that bottom-up processes in the Fund are needed in order to account for certain types of mismatches, especially, but not exclusively, those involving feedback from the Phonological Level to higher levels.

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Lucía Contreras-García

Grammar in 5D: The interface design of a mismatching grammar

Abstract: This chapter deals with grammar design, interfaces, mismatches and metatheory. The core question is: how can one describe and assess grammar design and, in particular, interface design? The distribution, derivation and direction of linguistic information being computed both between and within levels are hereby analysed in order to see how these parameters may combine in any theory of language modelling. More particularly, this chapter looks into the Functional Discourse Grammar framework and its hybrid approach to these features – non-derivational yet strongly directional – and advocates for a complete elimination of empty nodes in the search for a fully modular approach. This work further examines the architectural compatibility of Functional Discourse Grammar with various modular and constraint-based approaches with a strong lexical emphasis such as the Parallel Architecture, Autolexical Syntax, Head-Driven Phrase Structure Grammar or Lexical Functional Grammar. Accordingly, it argues for the following design features for the functional framework: an interface-based lexicon which links distinct types of fully encapsulated information by means of bi-directional interfaces within lexical entries and with the grammar proper; and unification for intra-level construal in the search for weaker directionality.

Keywords: interface; mismatch; the architecture of grammar; lexicon; Functional Discourse Grammar.

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1 Introduction

This chapter discusses five parameters that can be used to describe and assess the architecture of a grammatical framework. These are: Distribution, Derivation, Direction, Decoherence and Degeneracy. Thus, the first goal of this chapter is to analyse these interdependent parameters because they help understand the overall architecture of any theoretical framework and, in particular, the approach of a theory to interface design. Namely, they deal with the following: the number, nature, autonomy and direction of levels and inter-level mappings; the compliance of the theory at hand with its own architectural parameters; and the provision of functionally equivalent information by various levels both within the grammar proper and with further components.

The analysis of these five parameters is a step toward achieving the second goal of this chapter: assessing the interface design of Functional Discourse Grammar. Therefore, I describe and evaluate Functional Discourse Grammar (henceforth FDG, Hengeveld 2004; Hengeveld and Mackenzie 2008, 2010) against the abovementioned architectural parameters. In particular, I look into the theory's hybrid approach to these design features and argue for a fully non-derivational approach with no empty nodes that would also benefit from a lesser emphasis on strict top-down directionality.

The third and final goal of this chapter is to gather design elements of constraint-based, modular frameworks with a strong lexical basis such as the Parallel Architecture, Automodular Grammar, Head-Driven Phrase Structure Grammar or Lexical Functional Grammar, and analyse some of their features which, I believe, could be beneficially implemented in the FDG framework. In particular, I look at the possibility of applying, for FDG, the following: a constrained-based interface design based on unification for level construal; and a "modular" lexicon conceived as an interface algorithm rooted in the correct combination of distinct types of encapsulated information (pragmatic, semantic, syntactic and phonological) which directly and bi-directionally interfaces both within lexical entries themselves and with the various, corresponding levels of the grammar proper.

The structure of this paper is as follows. In Section 2, I analyse Distribution, Derivation and Direction, the "macro" architecture and interface design features of any framework (the distribution of linguistic information into various levels, the derivational vs the modular character of the relations between them, and the direction of those mappings). I further see how FDG approaches these three parameters. In Section 3, I see whether FDG shows an (un)expected combination of architectural features as described in Section 2 (i.e. whether it shows an encapsulated distribution of information into levels, it lacks derivation, and also direction). Also, I analyse whether FDG makes a coherent use of its parameters

in its representations of mismatch phenomena. In Section 4, I see whether functionally equivalent information is to be provided both by the grammar proper and the lexicon in FDG (i.e. at the lexicon-grammar interface). In Section 5, I take a closer look at the nature of the lexicon. I draw insights from various theories such as the Parallel Architecture, Autolexical Syntax, Lexical Functional Grammar or Head-Driven Phrase Structure Grammar and see whether some of their design features could be implemented in the FDG framework. In Section 6, and also drawing insights from competing theories, I discuss the applicability of unification constraints to intra-level interface design in FDG. In Section 7, I gather the main proposals and their architectural benefits. In Section 8, I summarize the main aspects of this chapter.

2 Interfaces in 3D: Distribution, Derivation, Direction

2.1 Linguistic theories and the 3 Ds

Any grammatical framework may be measured against a set of properties that I have called the 3 Ds (Contreras-García 2013). The first D, Distribution, refers to all those notions that are related to the formalization and storage of linguistic information throughout the various layers, levels and components that a theory may distinguish: where each type of information is represented. Distribution includes the following: the number and type of levels of representation; the number and type of level formation rules (whether they are independent or not); and the number and type of inter and intra-level mapping processes. These of course are not independent features, but they rather determine each other.[1] That is, Distribution, Derivation and Direction are interdependent (for the relation between derivation and direction, see Culicover and Jackendoff 2005: 15).

The second D is "Derivation". The concept of Derivation is at the centre of any discussion on interfaces. Derivation is the property whereby a grammatical framework possesses levels of representation that are translated or calculated from one another (Sadock 2000 Section 1), i.e. there is a hierarchical relation among levels. Whereas derivation is central to some frameworks such as Generative Grammar (Chomsky 1957, 1965, 1972, 1975, 1981, 1993, 1995; Hornstein, Nunes, and Grohmann 2005), it is fully rejected by other frameworks of the autonomous or

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1 Lachlan Mackenzie, p.c.

modular type such as the Parallel Architecture (Jackendoff 1997, 1999, 2002, 2007, 2010, 2012, 2017; Culicover and Jackendoff 2005) and Autolexical Syntax (Sadock 1991, 1996, 2012). In frameworks of the modular type, levels are not derived from each other but independent, which provides for autonomous modules among which mismatches may arise.

Therefore, whether a theory of language translates one level into another or rather has autonomous levels has enormous consequences regarding the representation of meaning and form and their relation. This of course has a particular impact on the syntax-semantics interface – for the role of syntax and semantics in language and uniformity constraints for their interface, see Culicover and Jackendoff (2005). Whereas a derivational framework will possess levels that depend upon each other, non-derivational frameworks will not. Thus, the derivational vs the non-derivational character of a particular architecture of grammar will lead to a tendency to showing transparent vs non-transparent interfaces between the various levels. That is why derivation and modularity are at the heart of interfaces, transparency and mismatches in any architecture of grammar.

Finally, Direction refers to whether "certain levels are descriptively prior to others" (Zwicky 1972: 103). The analysis of inter-level direction leads to a study of the (at least) two levels which are involved in any given linguistic computation. Of those levels, some are source and some are target level(s). For example, the interface syntax > semantics (source level syntax, target level semantics) is different from the interface semantics > syntax (source level semantics, target level syntax). This is extremely relevant, since it determines which level rules over which, and is normally a direct consequence of derivation. In other words, in a derivational framework, the main level will be the source of computation whereas derived levels will be target levels. Contrarily, in a non-derivational theory, all levels will be potential source and target levels – which translates into all possible combinations of bidirectional inter-level interfaces.

The link between these 3 Ds (Distribution, Derivation and Direction) creates an almost determining "domino effect" (see Contreras-García 2011, 2013). Firstly, the distribution of various types of information into different levels can be redundant or not: on the one hand, in a non-derivational model, information will be neatly distributed into the various levels, creating mismatching interfaces; on the other hand, in a derivational theory, one level may have to reflect the main computational level so as to maintain interface transparency, such that levels may be redundant. Secondly, regarding the direction of interfaces, a derivational model will most probably have a pre-determined direction of inter-level interaction (topdown or bottom-up), whereas a non-derivational model will not (all directions being possible).

2.2 Functional discourse grammar and the 3 Ds

Figure 1 below shows the architecture of FDG related to the three design parameters described above: the distribution of linguistic information into levels (rectangles in the middle); top-down interfaces among hierarchically-related units (black arrows on the left); and bottom-up feedback among non-hierarchically related units (grey arrows on the right) (see Hengeveld and Mackenzie 2008; Hengeveld and Smit 2009). In what follows, I discuss FDG in relation to Distribution, Derivation and Direction.
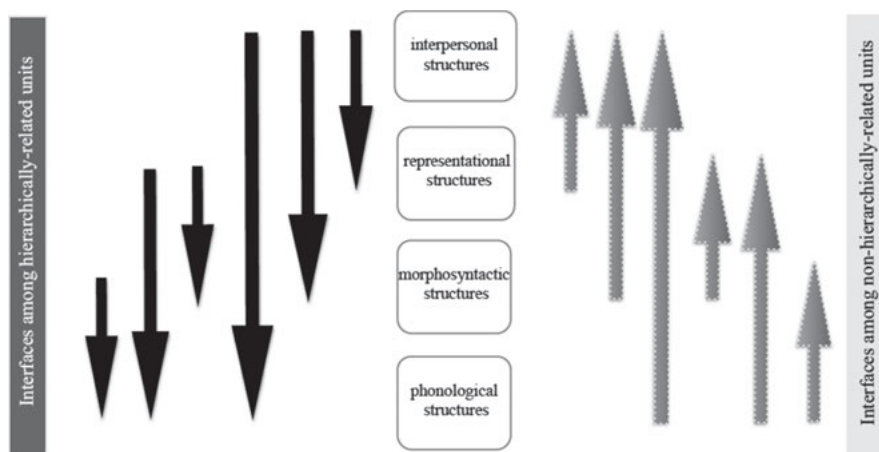
Figure 1: Interfaces in FDG.

Firstly, Functional Discourse Grammar may be described, regarding its Distribution of linguistic information, as a theory which shows four independent levels of representation that are themselves the result of four independent types of formation rules and discrete units for each of the levels. That is, each level possesses its discrete primitives or units of representation, which are not derivable from units at other levels (see Hengeveld 2004: 5–8). In FDG, pragmatic information is located at the Interpersonal Level (henceforth IL), semantic information at the Representational Level (henceforth RL), morphosyntactic information at the Morphosyntactic Level (henceforth ML) and phonological information at the Phonological Level (henceforth PL).

Secondly, regarding Derivation, all four levels are independent, thus none is fully derived from any other. The independence of the levels means that inter-level interfaces are flexible, thus may show mismatches and need not observe full transparency. This takes place e.g. with existential sentences of the "there is x" type,

whereby IL may be represented merely as a referential subact "R" (see Hengeveld and Mackenzie 2008: 295). Since there is no ascriptive subact "T" corresponding to the pragmatics of the verb at IL (and the verb is represented at ML), a deviation from the default interface IL–ML correspondence is to be seen (a zero-to-one IL–ML interface). Such independence between levels is due to the non-derivational character of the model.

Thirdly, with regard to Direction, FDG can be defined as a "form-oriented function-to form approach" (Hengeveld and Mackenzie 2008: 39). It is a function-to-form approach because linguistic phenomena are represented in a top-down fashion, from function (IL and RL) down to form (ML and PL) (Hengeveld 2004: 3; see bottom-up feedback in Section 2.3 below). It is form-oriented because only those features having a systematic impact on the form of expressions are reflected (Hengeveld and Mackenzie 2008: 39).

2.3 Top-down and bottom-up interfaces in FDG

As can be seen in Figure 1 above, the number of levels in FDG is four. This is directly related to the number of potential interfaces, which is the result of a simple combination rule.[2] (1) below illustrates this.

(1)   a.   Number of potential interfaces in FDG = 6 (no order involved, i.e. no difference made between source and target levels; no difference made between hierarchical vs. non-hierarchical units)
      b.   Number of potential interfaces in FDG = 12 (order involved; no difference made between hierarchical vs. non-hierarchical units)
      c.   Number of potential interfaces in FDG = 24 (order involved; difference made between hierarchical vs. non-hierarchical units)

As noted in (1b) above, it is important to consider the difference between interface A>B versus interface B>A. As noted in (1c) above, it is also relevant to consider that FDG differentiates between hierarchical and non-hierarchical relations between units, which means that the number of potential interfaces is to be multiplied by

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2 The number of ntuples that can be formed out of a set of m elements is given by the following: $m!/[n!(m-n)!]$ (where $m! = m(m-1)(m-2). . .1$). Hence, 4 elements (levels) lead to 6 possible pairs ((1a), interfaces, no order involved). Order is relevant for these pairs. This is given by permutations, i.e. by n! In this case, $2!=2$, such that each unordered pair leads to two different ordered pairs – e.g. elements 1 and 2 lead to pairs (1,2) and (2,1). Hence, each of the 6 pairs lead to 2 possibilities, giving a total of 12 possible ordered pairs ((1b), interfaces, order involved).

two (two times twelve). That is, in theory, there could be up to twelve interfaces between hierarchically related units when one considers the order of levels involved in an interface (which is the source and which is the target level), plus twelve interfaces between non-hierarchically organized units. The total number of potential interfaces for FDG proper therefore equals twenty-four. Of those, the model actually uses twelve. This is due to the fact that FDG allows for top-down "conversation" between levels of representation as far as hierarchical units are concerned, while bottom-up feedback is allowed for when non-hierarchical unit relations are involved (for bottom-up feedback, see Hengeveld and Smit 2009). This gives us the following inter-level mappings: IL>RL, IL>ML, IL>PL, RL>ML, RL>PL, and ML>PL for hierarchically related units; and PL>ML, PL>RL, PL>IL, ML>RL, ML>IL, and RL>IL for non-hierarchical relations.[3]

Hengeveld and Smit (2009) speak of the following bottom-up interfaces involving non-hierarchical relations in the dynamic implementation of the model: ML up into RL; ML up into IL; and RL up into IL. Actually, while "hierarchical organization is always top-down . . . the depth-first implementation of configurational organization requires the higher levels to receive information from lower ones" such that "an efficient implementation of the grammar requires higher levels to anticipate the needs of these lower ones" (Hengeveld and Smith 2009: 1119). The depth-first principle (see Bakker 2001, 2005, cited in Hengeveld and Smit 2009: 1123), which combines with the top-down inter and intra-level organization of the model (Hengeveld and Mackenzie 2008), implies that there is no need to instantiate all variables at a given level before going on to a lower one.

At the IL–RL interface, the interaction which takes place in a predication between arguments and predicates is non-hierarchical ("equipollent"). On the other hand, the interaction between a variable and the predication which restricts it is hierarchical. This means that sometimes it is IL that calls upon RL while sometimes it is RL that calls upon IL (Hengeveld and Smit 2009: 1120, 1122). Thus, there is both IL>RL as well as RL>IL interaction. That is, "while in a strict top-down conception [subacts of Ascription and Reference] would precede the construal of any denotational structure, in a dynamic model, the representational and predication frames to be evoked are selected first". This would reflect that a speaker first chooses what to communicate and only then how to do so. While hierarchical frames at IL come before RL and codetermine it, it is RL that comes first and codetermines non-hierarchically related subacts at IL (Hengeveld and Smit 2009: 1127; see also Butler 2007, cited in Hengeveld and Smit 2009: 1127). This in turn allows for the combination of the top-down organization of the model

3 Note that Hengeveld and Smit (2009) only speak of interactions involving IL, RL and ML.

(non-hierarchical units are processed first) and of the depth-first principle (once a configurational relation is reached, the processing goes down to lower levels) (see e.g. Hengeveld and Smit 2009: 1129).

At the IL/RL–ML interface, this means that one may start processing those units at ML which correspond to already instantiated variables at formulation until a non-hierarchical configuration appears at RL. Then, so as to fulfil the depth-first principle, the order in which those semantic units holding a non-hierarchical relation are instantiated depends on ML (Hengeveld and Smit 2009: 1123). Thus, in a dynamic implementation of the model, once hierarchical placement has taken place at ML with a partial template, the interfaces ML>RL and ML>IL are activated in order to look for units at IL and RL which are to be expressed first – i.e. so as to be able to assign positions to further units at ML. This means that "the depth-first principle is partially driven by the morphosyntactic level" (Hengeveld and Smit 2009: 1128).

3 The fourth D: Decoherence. Empty categories and interface transparency

Decoherence is a term which is used in quantum mechanics. Quantum particles may behave both as particles and as waves. This wave behaviour is not observed in classical particles. When quantum particles interfere with a complex environment, they lose their wave behaviour, which explains the transition between classical and quantum behaviour. Since waves can no longer interfere among themselves (coherence), decoherence arises (for decoherence see e.g. Schlosshauer 2007).

I will use the term here to refer to a) those instances in which the various architectural D-properties interact in an inconsistent manner (i.e. they go against the default association of distributional, derivational and directional design features); and b) show surprising, unexpected representations which go against the architectural principles of the theory itself (i.e. they do not comply with their architectural parameters in the representations of linguistic phenomena). I will refer to a) as architectural decoherence and to b) as representational decoherence. It is important to note that architectural decoherence is certainly not negative per se – actually, a theory of language could actually benefit from a hybrid combination of design parameters leading to a flexible architecture. On the other hand, representational decoherence is more likely to lead to negative consequences. However, if a framework is architecturally decoherent, i.e. hybrid, I see no reason to fully reject the consequent use of somewhat decoherent representations.

3.1 Architectural Decoherence

3.1.1 Linguistic theories and architectural Decoherence

As mentioned beforehand, there is usually a "domino effect" between Distribution, Derivation and Direction. Thus, a grammatical framework where different types of linguistic information (semantic, syntactic, etc.) are distributed into neatly differentiated levels will most probably lead to an architecture of grammar where levels need not be derived from each other and will not possess a pre-determined order for its inter-level interfaces, with all levels being potential sources and targets of computation. This is the case of non-derivational or modular frameworks, whereby the allowance for mismatching interfaces means that information at one level need not be reduplicated at a different level.

On the other hand, a framework where different types of linguistic information are not fully clear-cut will lead to a derivational model in which certain levels are born from one main, source level of computation such that interfaces are transparent. In the latter, the direction of interfaces will be pre-determined – from the source level into derived levels. This is the case of derivational frameworks, whereby the avoidance of mismatching interfaces means that information at one level is usually mirrored at other levels, thus provoking informational reduplication and less clear-cut informational distribution.

In both case-scenarios described above, the architectural domino effect between Distribution, Derivation and Direction takes place: the combination of the various architectural parameters that make up the design of the model is to be expected or "coherent". The following section deals with the (non)compliance of FDG with this domino effect between architectural features, i.e. "architectural (de)coherence".

3.1.2 FDG and architectural Decoherence: FDG is a hybrid

FDG shows architectural decoherence in that a top-down approach whereby function levels necessarily precede, motivate, and come before formal ones coexists with the lack of a fixed, pre-determined correspondence between units at distinct levels that produce mismatching interfaces. Therefore, Functional Discourse Grammar shows a surprising combination of architectural features.

On the one hand, it shows features which are typical of a modular grammar. First, all levels possess linguistic information which is specific to them – each level is independent in that it has its own rules and primitives. In theory, pragmatic information is represented strictly and solely at the interpersonal level,

semantic information at the representational level, morphosyntactic information at the morphosyntactic level, and phonological information at the phonological level. Thus, levels are not derived from each other and may be mismatching. Mismatches are guaranteed by the Maximal depth principle, which means that no level is to be empty ("vacuous") because there is no need for all levels to be present in the construction of a given linguistic representation (Hengeveld and Mackenzie 2008: 25; see also Contreras-García 2013: 289). Although the lack of necessary representation of all four levels infringes upon the Generalized Interface Principle (determining a tendency for function and form to show correspondence, Sadock & Schiller 1993: 393), "iconic order, which remains a default preference, may be overridden by other independent communicative strategies" (Hengeveld & Mackenzie 2008: 285).

Moreover, lower levels may start processing information as soon as enough information is fed to them by higher ones – incremental processing or "depth first principle", Hengeveld and Mackenzie 2008: 23–25; see also Hengeveld and Smit 2009 Section 3.2; cf. Bakker 1999 for Functional Grammar, cited in Hengeveld and Mackenzie 2008: 23; Contreras-García 2013: 22; see also this chapter Section 2.3). Therefore, there is no need for full computation of one level to go on to the next one. Furthermore, the model allows not only for top-down hierarchical relations but also for bottom-up non-hierarchical or "equipollent" mappings (Hengeveld and Mackenzie 2008: 23), which might render somehow bi-directional interfaces.

Also, IL may be processed together with (rather than necessarily before) RL. "A strict top-down interpretation of FDG would run from evocation at the interpersonal level to denotation at the representational level, to encoding at the morphosyntactic and phonological levels" and "representational structure would in that case basically be triggered by interpersonal considerations concerning the proportion of the intended denotation that needs to be evoked in order to realise the intended communicative intention" (Hengeveld and Smit 2009: 1126). Instead of that, Hengeveld and Smit "argue that, in pursuit of a dynamic implementation of FDG, such strict directionality should be abandoned in favour of a model where interpersonal and representational considerations are partly processed in tandem" (Hengeveld and Smit 2009: 1126; see also this chapter Section 2.3). This tandem processing of IL and RL, together with all features above, are typical of a non-derivational or modular grammar design.

On the other hand, however, FDG shows features which are typical of a derivational grammar. First, it has a clear top-down directionality: function levels (IL and RL) come first and formal levels (ML and PL) only come after (see Hengeveld 2004: 3; Hengeveld and Mackenzie 2008: 8, 1–3). It is only after pragmatics and semantics have kicked in that computation starts to go down to formal levels such that all computation in the grammar proper starts off with functional levels.

Thus, it is only in (non-hierarchical) bottom-up feedback processes that encoding actually targets formulation and the mapping direction is reversed (see Hengeveld and Smit 2009; also in this chapter Section 2.2 above). This can be called a "pragmato-semantocentric" approach (Kees Hengeveld p.c.), which gives priority to functional levels of representation.

In keeping with inter-level relations, the construction of individual levels also takes place in a top-down fashion until a configurational relation is reached (see e.g. Hengeveld and Smit 2009: 1128). What is more, intra-level construction ("the dynamic and stepwise procedure in which the grammar generates underlying representations", Hengeveld and Smit 2009: 1118) takes place in a sequential manner. For example, operators and modifiers at RL "have to be inserted step by step for each relevant layer" (Hengeveld and Smit 2009: 1123–1124). All these are typical features of derivational theories of language modelling.

For all the above-mentioned reasons, FDG exhibits a hybrid approach to interfaces: it shares architectural features which are traditionally identified with both derivational and modular linguistic frameworks (see also Contreras-García 2013: 22–23, 2015: 30–31).

3.2 Representational decoherence

3.2.1 Linguistic theories and mismatches

Under the umbrella term Decoherence, I will also refer to the representational inconsistency of a particular framework with regard to its own architectural parameters – i.e. whether the representation of one particular phenomenon at one or more levels infringes upon the parameters of the grammar design itself. I will call this type of decoherence "representational Decoherence". A theory of language can be representationally decoherent in that it for example is non-derivational yet it infringes upon its preferred used of mismatches and introduces empty categories to observe interface transparency. On the other hand, a theory of language can also be representationally decoherent if it is derivational and, instead of observing interface transparency, it introduces a representational mismatch. In what follows, I will now focus on representational decoherence in relation to a phenomenon that is deeply related to interfaces: mismatches.

Mismatches are conceived as a non-default way of linking linguistic elements (see Francis and Michaelis 2000 Section 1). Thus, mismatches go against the default correspondence between function and form enunciated in the Generalized Interface Principle (Sadock and Schiller 1993: 393; see also this chapter Section 3.1.2). The representation of *hello* illustrates a simple case of mismatch. A grammatical

framework could choose to represent *hello* at pragmatics and phonology, thus leaving syntax and semantics unrepresented. That would be an instance of a quantitative mismatch, i.e. a non one-to-one correspondence between levels.

Because mismatches lead to deviations from transparency between levels, the governing principles of a theory have two broad options: it may allow for their formalization as such, thus prioritizing the independence of levels and closeness to what one can actually hear or read; or it may represent mismatches by means of a theory-internal device e.g. and empty category that provides one element at one level with a counterpart at another level, thus prioritizing the formalization of interface transparency to the detriment of factuality (understood as sticking to overt linguistic manifestations rather than posited, theory-dependent material).

For example, for the syntax-semantics interface, Culicover and Jackendoff (2005) discuss uniformity considerations of grammatical traditions which, taken to an extreme, involve the introduction of covert material such that all semantic elements have a syntactic counterpart. On the contrary, they argue for a mismatching syntax-semantics interface (i.e. for a "simpler syntax" which may have a more complex semantic counterpart).

Mismatches are thus relevant in that they determine the interface architecture of a formalised theory and are therefore related to distribution, derivation, and direction. For instance, in the representation of *hello* above, one could argue, as already explained, that some levels are simply absent from the representation, thus yielding a mismatching representation. If, on the other hand, the theory possesses dependent levels which do not allow for mismatches, it may rather fill missing levels with empty categories in order to have a one-to-one inter-level correspondence.

It is interesting to note that the concept of mismatch is almost a philosophical one, since the analyst may only determine whether there is a mismatch or not by setting up pre-established categories and relations between them, which, to a great extent, depends on theoreticians themselves. It is also to be noted that mismatches are *not* to be seen as something wrong – quite the opposite. Mismatches are merely seen as a non-default case scenario. In the following two sections, I shall deal with FDG and mismatches.

3.2.2 FDG and representational Decoherence

Although peripheral, some instances of representational Decoherence related to interface transparency do appear in FDG, namely in raising and control (for raising and control see e.g. Borsley 1996; Carnie 2007; for raising and control in FDG see also Contreras-García 2013 Section 5.6, 2015 Section 5.4). In what follows,

I will explain why the theory goes against its default mismatching architecture by introducing empty categories which are uncalled for by the system design.

In raising, a syntactic element has supposedly been "raised" from the subject or object position of the embedded clause up into the matrix clause. The semantic argument that corresponds to such subject or object belongs within the embedded structure. A syntax-semantics mismatch arises in that the position of the semantic argument and that of the syntactic realization of that argument do not coincide, since the argument of the raised element belongs within the embedded structure whereas its morphosyntactic realization belongs within the matrix clause. This discrepancy is qualitative rather than quantitative, since it does not affect the number of syntactic or semantic elements but their relative distribution or scope. The sentence in (2) below is an instance of raising.

(2)   *I seem to study interfaces.*

(2) above illustrates a structural mismatch in that the scope relations of a linguistic unit are not the same at the syntactic and at the semantic level – *I* is a morphosyntactic subject of the main clause but a semantic argument at the embedded level.[4] The semantic reading would be something like *It seems that I study interfaces*. On the other hand, the sentence in (3) below illustrates a further mismatch phenomenon named control.

(3)   *I want to study interfaces.*

In (3) above, *I* is a syntactic subject of the main clause that corresponds to two semantic arguments, one at the level of the main clause and another one at a more embedded level. The syntax-semantics mismatch created in control phenomena is both qualitative and quantitative, since it affects both the number and the distribution or scope of the syntactic and semantic elements involved. The semantic reading would actually be something like *I want that I study interfaces*.

As mentioned above, various types of frameworks (derivational vs modular) deal with such mismatches differently. A derivational framework will try to keep the interface as transparent as possible, thus making the number and scope of the syntactic and semantic representations match. On the other hand, a non-derivational framework such as FDG need not keep the transparent syntax-semantics interface such that neither the number nor the relative position of syntactic and semantic elements would have to reflect each other (i.e. its param-

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4 For a representation of raising in FDG with a pragmatic focus, see García Velasco (2013).

eters do not oblige the framework to keep transparency). Now, the problem arises when there is no theoretical obligation for a theory to flout its own principles, yet it does – e.g. a supposedly modular framework such as FDG using empty categories to keep interface transparency. This I have referred to as representational Decoherence (which is, in turn, probably the consequence of architectural decoherence). Figure 2 below[5] offers a representation of the raising structure (2) *I seem to study interfaces* in FDG (following Hengeveld and Mackenzie 2008: 372; see also Contreras-García 2013 Section 5.6.2.4, 2015 Section 5.4). It shows representational Decoherence.[6]

IL　$(M_I : (A_I : [(F_I : DECL) (C_I : [(R_I : [+S]) (T_I) (T_J) (R_J)])]))$

RL　$(p_i : (ep_i : (e_i : (f_i : [(f_j) (ep_i : (e_j :[(f_k : [(x_i)_A (f_i) (x_j)_U])]))_U]))))$

ML　$(Le_i : (Cl_i : [(Np_i)_{Subj} (Vp_i) (Cl_j : [(Gw_i) (Np_i)_{Subj} (Vp_j) (Np_j)_{Obj}])]))$

PL　$(U_i : (IP_i : [(PP_i) (PP_j)]))$

Where:
$R_I - x_i - Np_i - PP_i$: 'I';
$T_I - f_j - Vp_i - PP_i$: 'seem';
$T_J - f_i - Vp_j - PP_j$: 'study';
$R_J - x_j - Np_j - PP_j$: 'interfaces'.

Figure 2: FDG, raising and empty categories.

Figure 2 above illustrates how IL contains one referential subact RI for *I*. At RL, RI maps onto x_i, which is at the level of the embedded clause (within the scope of f_k),

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5 Note that the representations presented in this chapter deviate from standard FDG, whereby opening and closing variables are offered for all categories (Hengeveld and Mackenzie 2008; cf. Mackenzie 1987; cf. Keizer 2015). Firstly, for representational simplicity, I will only use opening variables (if both opening and closing variables were to be used, I would suggest that FDG mimic programming languages and make a difference between opening and closing segments by representing e.g. the opening variable for *I* as "RI" and the closing one as "/RI"). Secondly, the representation of referential and ascriptive subacts is done according to their appearance at IL (with referential subjects coming first). An advantage of this proposal is that it is consistent with the incremental order of online production (Riccardo Giomi p.c.). Finally, and following notations of other frameworks such as the Parallel Architecture, I have not added lexical elements in the representation in an attempt to keep linguistic information encapsulated – i.e. with a clear-cut separation between the various components. However, a legend is provided for relevant items below each Figure.
6 Note that (2) could be represented without resorting to the notion of raising, which is typical of other grammar traditions, emphasizing the role of p at RL and of participant RI at IL (Núria Alturo Monné p.c.).

as the agent of studying, f_l. x_i then maps onto two Np_i, one within the main clause Cl_i and one within the embedded clause Cl_j. The first Np_i then maps onto phonology and belongs within PP_i, though the second Np_i does not map onto PL. Therefore, this second Np_i provides the external argument of the embedded clause with a morphosyntactic counterpart that has no phonetic realization. This non-realized Np is meant to trigger either active or passive voice at ML and PL (Hengeveld and Mackenzie 2008: 372).

The *I* is thus represented twice at ML, once where it is actually morphosyntactically expressed (within the main clause) and once where it it semantically represented (within the embedded clause), although it overtly only appears one. This means that the second Np at the embedded clause is an empty node. I call these unneeded noun phrases "empty categories" because they fulfil all the requisites of their very definition: unpronounced syntactic material that has no overt realization (see Chomsky 1981). The introduction of such empty category goes against the "form-oriented" approach claimed by the authors whereby FDG "is form-oriented in providing, for each language analysed, an account of only those interpersonal and representational phenomena which are reflected in morphosyntactic or phonological form" (Hengeveld and Mackenzie 2008: 39; cf. Mackenzie 2018 against empty subjects). Since this infringes upon the theory's architectural parameters, it is an instance of representational Decoherence.

On the other hand, Figure 3 below offers a representation of the control structure (3) *I want to study interfaces* in FDG (following Hengeveld and Mackenzie 2008: 372 for raising; see also Contreras-García 2013 Section 5.6.3.4).

Figure 3 below shows that *I* is represented as RI at IL. At RL, it is represented twice as x_i, once at the level of the matrix clause under the scope of f_i, the agent of wanting f_j, and once as an argument at the level of the embedded clause under the scope of f_k, the agent of studying f_l.[7] At ML, *I* appears twice as Np_i, once within the matrix clause Cl_i and once within the embedded clause Cl_j.[8] The first Np_i then belongs within the phonological phrase PP_i whereas the second Np has no phonological counterpart.

Note that *I* is represented twice at ML, once where it is actually phonologically expressed and semantically represented as an argument within the main clause, and once where it is also semantically represented as an argument of the

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7 Note that an alternative representation for RL *to study interfaces* would have (f) instead of (e), if one assumes that there must not always be a subject (Núria Alturo Monné, p.c.). Note as well that *interfaces* is represented as "x" here although it is not a concrete, first-order entity (Riccardo Giomi, p.c.).

8 Note that an alternative representation for *to study interfaces* at ML would be Vp instead of Cl (Daniel García Velasco, p.c.).

IL (M$_I$: (A$_I$: [(F$_I$: DECL) (C$_I$: [(R$_I$: [+S]) (T$_I$) (T$_J$) (R$_J$)])])))

RL (p$_i$: (ep$_i$: (e$_i$: (f$_i$: [(f$_j$) (**x$_i$**)$_A$ (e$_j$: (f$_k$: [(f$_l$) (**x$_i$**)$_A$ (x$_j$)$_U$]))])))))

ML (Le$_i$: (Cl$_i$: [(**Np$_i$**)$_{Subj}$ (Vp$_i$) (Cl$_j$: [((Gw$_i$) (**Np$_i$**)$_{Subj}$ (Vp$_j$) (Np$_j$)$_{Obj}$])$_{Obj}$]))

PL (U$_i$: (IP$_i$: [(PP$_i$) (PP$_j$)]))

Where:
R$_I$–x$_i$–Np$_i$–PP$_i$: 'I';
T$_I$–f$_j$–Vp$_i$–PP$_i$: 'want';
T$_J$–f$_i$–Vp$_j$ –PP$_j$: 'study';
R$_J$–x$_j$–Np$_j$–PP$_j$: 'interfaces'.

Figure 3: FDG, control and empty categories.

embedded clause, though without having any overt phonological reflection. The Np$_i$ at ML in the embedded clause is therefore a further empty category. Again, this creates representational Decoherence: why represent the Np$_i$ for *I* twice at ML if RL and ML are supposed to be independent and the the embedded Np$_i$ has no phonological realization?

3.2.3 FDG and mismatches

In this section, I propose a mismatching analysis for raising and control in FDG that eliminates empty nodes and is thus coherent with the non-derivational character of the model (see also Contreras-García 2012a, 2013 Sections 5.6.2.4 and 5.6.3.4, 2015 Section 5.4; see also Mackenzie 2018). An increase in representational mismatches will also lead to a greater distinction between levels, thus to a stronger non-derivational character of the model. I include this here because the mainstream representation of these phenomena in the framework are a case of representational Decoherence – a case of non-compliance with the theory's own parameters (in this case, level independence, non-derivationality and mismatching interface design). As mentioned beforehand, there should in principle be no need to introduce any theory-internal device in FDG in the search for a transparent representation of raising and control. Because it does, an inconsistency arises. Such representational Decoherence is linked to the hybrid approach of FDG to derivation, i.e. architectural Decoherence. In fact, if the theory were fully non-derivational (modular), there would be no need at all to comply with interface transparency.

Figure 4 below offers a mismatching proposal for the raising structure (4 (=2)). I have inserted subscripts for inter-level interfaces (as e.g. in the Parallel

Architecture).[9] The sequential numbering of subscripts could start from IL down to PL as below or from PL up to IL. However, if one is to argue for a fully modular approach, the subscript numbering process should be liable to start from any of the levels and at any point within the levels themselves. Such subscript allocation might be helpful for the constraint-based unification of nodes (see Section 6 below).

(4)   *I seem to study interfaces.*

IL $(M_I : (A_I : [(F_I : DECL) (C_I : [(R_I : [+S])_1 (T_I)_2 (T_J)_3 (R_J)_4])]))$

RL $(p_i : (ep_i : (e_i : (f_i : [(f_j)_2 (ep_i : (e_j : (f_k : [(f_i)_3 (x_i)_{AI} (x_j)_{U4}])))_U]))))$

ML $(Le_i : (Cl_i : [[(\mathbf{Np_i})_{\mathbf{Subj1}} (Vp_i)_2 (Cl_j : [[(Gw_i) (Vp_j)_3 (Np_j)_{Obj4}]])]))$

PL $(U_i : (IP_i : [[(PP_i)_{1,2} (PP_j)_{3,4}]]))$

Where:
$(R_I)_1 - (x_i)_1 - (Np_i)_1 - (PP_i)_1$: 'I';
$(T_I)_2 - (f_j)_2 - (Vp_i)_2 - (PP_i)_2$: 'seem';
$(T_J)_3 - (f_i)_3 - (Vp_j)_3 - (PP_j)_3$: 'study';
$(R_J)_4 - (x_j)_4 - (Np_j)_4 - (PP_j)_4$ 'interfaces'.

Figure 4: FDG and mismatches with subscripts.

Figure 5 below offers a mismatching proposal for the control structure (5 (=3)) which uses lines for inter-level interfaces as an alternative to the subscripts given in Figure 4 above. Inter-level lines (cf. Sadock 2012) help the reader identify which units correspond to the same elements at distinct levels, i.e. to represent interfaces. Although this proposal is not new (cf. Hengeveld and Mackenzie 2008: 318, 321, 323, where mono-directional, top-down arrows are implemented), I believe FDG could benefit from rendering a systematic representation of such lines to identify inter-level mappings on the vertical axis between all four levels.[10]

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9 Cf. Hengeveld and Mackenzie (2008: 44) for the difference between general frames and templates with numerical subscripts and the representation of actual examples with alphabetical subscripts. In mainstream FDG, subscripts follow a sequential order in discrete levels rather than identify the correspondence between various levels of representation. Subscripts are also used for anaphoric reference. While letters are used for layers which have undergone instantiation, numbers are used for those which are not (yet) instantiated (Hengeveld and Smit 2009: 1119, 1122). Cf. Smit (2010) for superscripts between IL and RL.
10 Inter-level lines help identify the unexpected correspondence of the various representations in mismatching interfaces. An option regarding inter-level lines would be to represent all correspondences between all levels in a systematic way – this, however, would be sometimes illegible. A further option would be to do so between subsequent levels – although, again, if one is

(5) *I want to study interfaces.*

IL $(M_I : (A_I : [(F_I : DECL) (C_I : [(R_I : [+S]) (T_I) (T_J) (R_J)])]))$

RL $(p_i : (ep_i : (e_i : (f_i : [(f_j) (x_i)_A (e_j : (f_k : [(f_i) (x_i)_A (x_j)_U]))])))))$

ML $(Le_i : (Cl_i : [(Np_i)_{Subj} (Vp_i) (Cl_j : [(Gw_i) (Vp_j) (Np_j)_{Obj}])_{Obj}]))$

PL $(U_i : (IP_i : [(PP_i) (PP_j)]))$
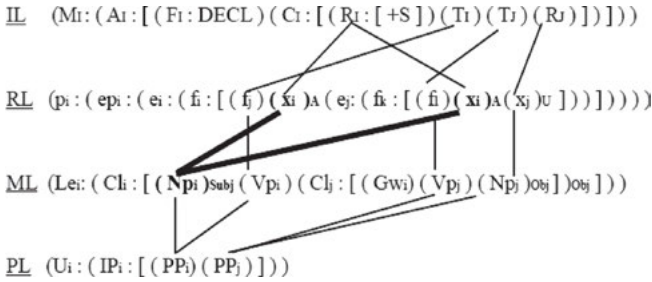
Where:
R_I–x_i–Np_i–PP_i : 'I';
T_I–f_j –Vp_i–PP_i : 'want';
T_J–f_i –Vp_j –PP_j: 'study';
R_J–x_j–Np_j–PP_j: 'interfaces'.

Figure 5: FDG and mismatches with inter-level mappings.

In Figures 4 and 5 above, there is only one Np for *I* at ML, only there where its is actually expressed – even if the element in question is not paired with its scope at RL as in raising, or even if it is read twice at RL, as is the case of control. The Np within the embedded clause was meant to inform about whether active or passive voice was being triggered (Hengeveld and Mackenzie 2008: 372). However, the distinction between the active and passive voice can be easily made in that the morphosyntactic cues of the passive voice (verb to be+past participle, by-object) are enough to identify the passive voice, as is the presence of a patient or under-goer at RL that interfaces with a subject at ML, leading to the correct distribution of grammatical functions (Contreras-García 2013: 258). That is, a constraint is more than enough in order for the correct RL and ML to represent various per-spectives of the same linguistic structure.

Furthermore, the introduction of unpronounced material at an underlying level that needs to be cancelled at overt syntax would mean the introduction of a deletion rule, which would go against the main tenets of the FDG framework (Contreras-García 2012a, 2013: 286). Since levels are independent, there is no

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to argue for a fully modular approach, the distinction between adjacent vs all levels would not make much sense. Another option would be to do so only in cases where there is a mismatch (e.g. when the number or scope of elements differs at the various levels). Note that, instead of lines, one could also choose to represent interfaces with bi-directional arrows in keeping with full modularity (see Figure 7 in Section 4.3 below).

need for the framework to double up its noun phrases in such cases – there is nothing wrong with having unexpected correspondences between levels, more so when the phenomenon is indeed an epitome of the "complicated conversation" between syntax and semantics. Note that, even though these are only two phenomena and the theory is located more toward a non-derivational rather than toward a derivational theory of language in a derivationality spectrum, it is in function-form mismatch instances that full modularity may be achieved.

4 The fifth D: Degeneracy

4.1 Degeneracy vs redundancy

In biology, degeneracy refers to the fact that different components may be functionally exchanged in particular contexts (see Edelman and Gally 2001; Mason 2015; Whitacre 2010; Whitacre and Bender 2010; Van de Velde 2014; cf. "convergent evolution" in e.g. McGhee 2011). "Degeneracy is observed in a system if there are components that are structurally different (nonisomorphic) and functionally similar (isofunctional) with respect to context" (Mason 2010: 281). It is important to note that experts normally make a difference between "degeneracy" and "redundancy" such that "[d]egeneracy is the ability of elements that are structurally different to perform the same function or yield the same output" whereas redundancy "occurs when the same function is performed by identical elements" (Edelman and Gally 2001: 1).

The difference between degeneracy and redundancy lies therefore in that the former shows a "many-to-one structure–function" relation whereas the latter would be a one-to-many (though identical) (Friston and Price 2003:152) (one-to-one, in Mason's terms 2010, cf. "pluripotency" or the ability of one path to perform various functions). For example, if I see you on the street and want to acknowledge your presence and be polite, I can either say *hi* or smile. This would be two different paths to achieve the same goal. If I say *hi* and smile at you at the same time, I am being "degenerate" – bad as it may sound, degenerate communication means that I will achieve my goal even if I smile too little and you don't see it yet you hear me, or if I speak too low and you cannot hear me yet you see me smile.

Degeneracy is thus efficient in the sense that the goal is still achieved, should one of the two different paths fail. Now, if I say *hi* twice, or smile twice (identical paths) to achieve the same goal (acknowledging your presence and being polite), then I'm being redundant rather than degenerate. Such redundancy would not be efficient since, if I am not able to smile properly and you don't see me, or if I

tend to speak too low and you don't hear me, you will not understand me anyway, regardless of whether I smile or say *hi* one or a thousand times.

The difference between redundancy and degeneracy is thus analysed in terms of efficiency and natural selection – survival! That is, degeneracy helps cognitive neural evolution while redundancy is inefficient (Friston and Price 2003: 152–153) and eventually leads to the dying out of one of the elements which are being redundant (Mason 2010). Since degeneracy is present in biological systems (the brain most probably stores redundant information, see Jackendoff 2002: 153) and it is related to evolvability, robustness and complexity (Whitacre 2010; Whitacre and Beder 2010), it is only natural to assume that it may also be beneficial for language and linguistic systems.

Since degeneracy refers to the provision of functionally equivalent information through different paths (in linguistic terms, through different levels, modules or components), it is of particular relevance when speaking about interfaces: two degenerate modules will have a transparent, non-mismatching interface.

4.2 Systematic degeneracy vs hidden symmetry

Degeneracy is also widely used in quantum mechanics to refer to various states that possess the same energy value or "eigenvalue" (Merzbacher 1998) and is thus related to symmetric or consistent properties. This is called systematic degeneracy. I will use the term to refer to functionally equivalent information given by various components.

Accidental symmetry, on the other hand, arises with hidden symmetry (see Levine 1991 and Messiah 1967). I will use this term to speak of hidden (covert) linguistic material that is used in order to provide the system with symmetry e.g. empty categories.

Redundancy between modules or within a lexical entry or rule is degeneracy, and "[d]egeneracy, as Edelman and Gally describe it, is exactly the kind of functional duplication that automodular analysis imputes to the system of natural languages" (Sadock 2012: 226). Since I advocate for a fully modular architecture for FDG, it is interesting to see whether degeneracy may be implemented and whether FDG could benefit from functional duplication of information between its different components.

4.3 FDG and inter-level hidden degeneracy

Representational degeneracy may appear in cases where there is an inter-level mismatch, as is the case of raising and control. If the FDG system allows for the

introduction of empty categories in the search for a transparent syntax-semantics interface, representational degeneracy is present in that unnecessary elements (unneeded by the parameters of the framework) are introduced to the detriment of the theory's representational coherence (why introduce empty categories and the need for a deletion rule that go against the theory's main tenets?) and against the framework's architectural coherence (why not be fully modular and allow for mismatches between the levels all across the board and no matter the phenomenon?)

Figure 6 (=(3), plus subindexes) below shows a degenerate representation for the control structure in (6 (=3)).[11] Note that the overt syntactic subject of the matrix clause *I* appears twice at ML, once in the matrix and once in the subordinate position, thus mirroring semantics and leading the theory to a state of degeneracy and representational decoherence.

(6) *I want to study interfaces.*

IL   M : (A : [(F : DECL) (C : [(R : [+S])$_1$ T$_2$ T$_3$ R$_4$])])

RL   p : (ep : (e : (f : [x$_{1A}$ f$_2$ (e : (f : [x$_{1A}$ f$_3$ x$_{4U}$]))]))))

ML   Le : (Cl : [**Np**$_{Subj1}$ Vp$_2$ (Cl : [Gw **Np**$_{Subj1}$ Vp$_3$ Np$_{Obj4}$])$_{Obj}$])

PL   U : (IP : [PP$_{1,2}$ PP$_{3,4}$])

Where:
R$_1$–x$_1$–Np$_1$–PP$_1$: 'I';
T$_2$–f$_2$–Vp$_2$–PP$_2$: 'want';
T$_3$–f$_3$–Vp$_3$–PP$_3$: 'study';
R$_4$–x$_4$–Np$_4$–PP$_4$: 'interfaces'.

Figure 6: FDG and hidden degeneracy.

Contrarily, Figure 7 (see 5) below shows a non representationally decoherent representation of (7 (=6)) with no hidden symmetry, i.e. whereby ML does not mirror RL. There is only one Np to represent the subject of the matrix clause *I* whereas there are two arguments at RL to represent the same element: a representational

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11 Note that, apart from adding numerical subindexes, I have eliminated alphabetical subindexes and parentheses where considered unnecessary. This deviates from mainstream FDG, whereby alphabetical subindexes regularly indicate how many variables of the same type appear at one particular level (e.g. how many events "e" appear at ML, such that the first instantiated event is "e$_i$", the second one is "e$_j$", etc.). The absence of closing variables means that alphabetical subindexes do not really add much information to the representation, since they no longer mark the scope of the corresponding opening variable, which is now only marked by parentheses.

syntax-semantics mismatch is created. I advocate for the non-degenerate representation in Figure 7 below.[12] Bi-directional arrows for inter-level interfaces have been added (cf. Hengeveld and Mackenzie 2008: 318, 321, 323, where top-down arrows appear between IL, RL and ML) in keeping with the modularity of the model and of the lexicon to be discussed in the following section.

(7) *I want to study interfaces.*
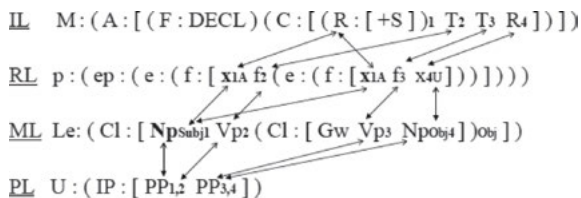
Where:
$R_1 \longleftrightarrow x_1 \longleftrightarrow Np_1 \longleftrightarrow PP_1$: 'I';
$T_2 \longleftrightarrow f_2 \longleftrightarrow Vp_2 \longleftrightarrow PP_2$: 'want';
$T_3 \longleftrightarrow f_3 \longleftrightarrow Vp_3 \longleftrightarrow PP_3$: 'study';
$R_4 \longleftrightarrow x_4 \longleftrightarrow Np_4 \longleftrightarrow PP_4$: 'interfaces'.

Figure 7: FDG without hidden degeneracy.

4.4 FDG, degeneracy and the lexicon-grammar interface

In Figure 8 below, I suggest a representation of the mismatching control structure in 8 (=7)) with degeneracy at the lexicon-grammar interface. The lexical entry for *I* (on the left in Figure 8) interacts with the grammar proper for *I want to study interfaces* (on the right in Figure 8). The information that the grammar proper may retrieve from the lexicon can be both represented in the lexical entry itself but also within the grammar proper. Note that the lexical entry for *I* interacts once at IL, ML and PL but twice at RL, thus creating a (welcome!) mismatch.

(8) *I want to study interfaces.*

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12 Note that alphabetical, sequential subindexes have been cancelled.

I R₁ ... IL M : (A : [(F : DECL) (C : [(**R** : [+S])₁ T₂ T₃ R₄])])

R x₁ ... RL p : (ep : (e : (f : [xı̄Á fı̄ (e : (f : [fȷ̄ xı̄A x₄U]))]))))

M Np₁ ... ML Le : (Cl : [Np$_{subj1}$ Vp₂ (Cl : [Gw Vp₃ Np$_{obj4}$])$_{Obj}$])

P aı̨ ... PL U : (IP : [**PP**$_{1,2}$ PP$_{3,4}$])

Where:
R₁ ⟷ x₁ ⟷ Np₁ ⟷ PP₁ : 'I';
T₂ ⟷ f₂ ⟷ Vp₂ ⟷ PP₂ : 'want';
T₃ ⟷ f₃ ⟷ Vp₃ ⟷ PP₃ : 'study';
R₄ ⟷ x₄ ⟷ Np₄ ⟷ PP₄ : 'interfaces'.
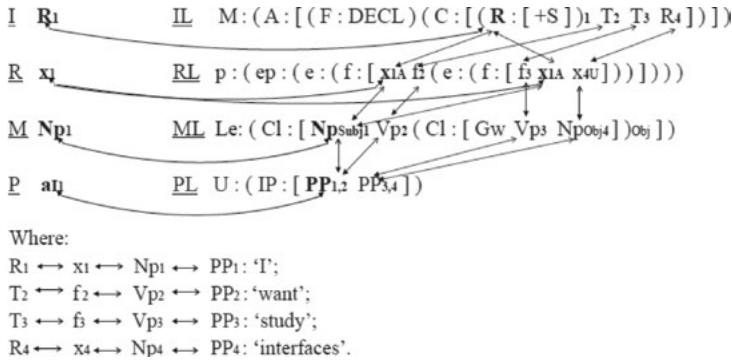
Figure 8: Systematic degeneracy in FDG and the lexicon-grammar interface.

Degeneracy is a basic architectural feature of language. It is relevant both for language acquisition and communication and allows for the correct functioning of language in those contexts which may otherwise lead to communication problems (Sadock 1991: 14–15, 2012: 225–227). Thus, degeneracy helps communication work there where one single path would not suffice. If that is the case, degeneracy at the lexicon-grammar interface may also be seen as a positive feature to be implemented in FDG. This conception of the lexicon is further illustrated in Section 5.

5 Lexical entries as interfaces in FDG

I believe that FDG is compatible with the conception of the lexicon and its relation with the grammar proper as presented in the Parallel Architecture. In this theory of language, there are three independent generative components, none of which is "over" any of the other two (i.e. it is not a framework with syntax driving everything such as e.g. mainstream Generative Grammar). The three components (phonology, syntax and semantics) are independent. Language consists of triples of these three types of well-formed structures (phonological, syntactic and semantic) linked by means of interfaces which are stored in the brain.

In the Parallel Architecture, the distinction between lexical entries and rules is blurred such that one can speak of a "continuum" ranging from the most typical lexical items with no or little rule features (e.g. *car*) to traditional rules (e.g. a regular phrase-structure rule). In between, one could have idioms (which have a peculiar combination of syntax and semantics e.g. *go through the roof)* or interjections lacking one of the levels (e.g. *oh*, lacking syntax) (Jackendoff 2017 Section 4). Thus, in the Parallel Architecture, a lexical entry is seen as a com-

bination of phonological, semantic and syntactic information – or at least one of them – related through interfaces (see Jackendoff 2002: 154, 2007: 9–11, 2010: 17–20, 2017 i.a.; see also Culicover and Jackendoff 2005) or actually as an "interface rule" linking the distinct structures (Jackendoff 2017: 192).

This conception of the lexicon of the Parallel Architecture is compatible with the architecture of FDG proper (see Contreras-García 2012b; see also O'Neill 2012; cf. Genee, Keizer and García Velasco 2016). Now, how to apply this to FDG? Instead of speaking of the lexicon, one could speak of the fund and, instead of speaking of rules, one could refer to frames and templates. These would be considered as constraints that would provide the possible structures at a particular level of representation. On the other hand, a typical lexical unit could also be seen as a sort of linking algorith[13] or interface rule joining interpersonal, representational, morphosyntactic and phonological information that would interface with the grammar proper and would simultaneously feed the relevant grammatical operation as in Figure 8 above.

This conception is also compatible with other modular frameworks such as Autolexical Syntax (Sadock 1996, 2012) and guarantees the wellformedness of structures (Pollard and Sag 1987: 44; Jackendoff 2002: 48). In constraint-based unification grammars, "syntactic rules, lexical entries, universal principles and language-particular parameters can all be viewed as simultaneous constraints on output structures" (Sag et al 1986: 243). The lack of hierarchy in the application of constraints could in principle clash against the hierarchy of elements in the FDG representation, though this would be solved by the fact the lexical entries act as a kind of constraints themselves that make all necessary information accessible to the computing/parsing system at any moment in time.

In constraint-based grammars, words, phrases, etc. are viewed "as *partial information structures*, which mutually constrain possible collocations of phonological structure, syntactic structure, semantic content, and contextual factors in actual linguistic situations. Such objects are in essence data structures which specify values for attributes" (Pollard and Sag 1987: 7). Such data structures possess three particularities: first, as mentioned above, they are represented as values for variables (attributes); second, they are recursive (values may be atomic or an information structure which may itself be decomposed into smaller units); third, several attributes in a bigger structure may share the same value (Pollard and Sag 1987: 7). These ideas relate to unification-based grammars in that in such grammars "linguistic objects under study are associated with lin-

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13 Note that the term "linking algorithm" is used by Van Valin (2005) to refer to the rules linking syntax and semantics (pragmatics being also involved).

guistic information about the objects, which information is modelled by mathematical objects called FEATURE STRUCTURES" (Sag et al 1986: 238). This is also compatible with FDG.

Thus, I believe notions of competing theories such as Lexical Functional Grammar (see Kaplan and Bresnan 1982), the Parallel Architecture and Head-Driven Phrase Structure Grammar (see Pollard and Sag 1994) may be transposed into FDG. For example, a lexical entry may also be represented in FDG as a feature-matrix notation and have a maximum of four attributes (one interpersonal, one representational, one morphosyntactic and one phonological attribute), it may lack some levels, be mismatching, etc.[14]

In what follows, I represent a typical word, an idiom, an interjection and a traditional "rule". By doing so, I wish to show that the various items (ranging from the least to the most "rule-like" of which Jackendoff speaks when deconstructing the grammar-lexicon distinction) can also be represented as a linking algorithm in FDG (for a continuum of typical vs atypical lexical items and why the distinction between rules and the lexicon should be erased, see Jackendoff 2007 Section 5 or 2010 Section 4 i.a.). Figure 9 for (9) below illustrates a typical word in FDG.

(9) *I*
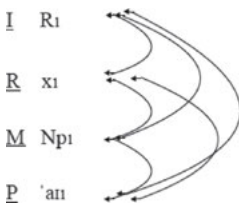
Figure 9: The lexicon in FDG as an all-directional interface.

In Figure 9 above, interfaces among the various, encapsulated types of information are bidirectional and have thus included all possible interfaces among them. I have also co-indexed the various pieces of interpersonal, representational, morphosyntactic and phonological information – following the view of unification grammars where various, partial pieces of information of an expression express equality through e.g. the identity of indexes (Sag et al 1986: 243). Figure 10 below for (10) represents an interjection in FDG.

(10) *Oh!*

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14 Cf. García Velasco (2016) for the meaning of lexemes.

I   T₁

P   ˈəʊɪ   **Figure 10:** The lexicon in FDG and missing levels.

In Figure 10 above, there is no representation at RL or ML. This is compatible with the Parallel Architecture which, just like FDG, allows for missing levels in the representation of lexical entries while avoiding empty categories and covert structures in a more surface-oriented model (Jackendoff 2017:189). If one attribute is not specified, it is not because of underspecification, but because there is no need to accord a value to each of the four attributes – and this includes lexical entries. The creation of a mismatch goes hand in hand with a fully modular FDG and fully independent levels. Note that it is also in keeping with the Maximal Depth Principle mentioned above whereby there is no need to assign a value to all levels (Hengeveld and Mackenzie 2008: 25). This guarantees the possibility of mismatching interfaces, also within the lexicon. Figure 11 below represents an idiom for (11).

(11)   *Have a blast*

I   T₁

R   f₁

M   (Vp Np)₁
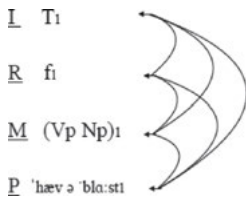
P   ˈhæv ə ˈblɑːst₁   **Figure 11:** The lexicon in FDG and idioms.

Note that in Figure 11 above some values are atomic (i.e. one specific value, a simple feature e.g. "f") whereas others are a feature structure (i.e. a complex feature, several values organized hierarchically or non-hierarchically e.g. the flat structure "Vp Np"). Note that a simple pragmatic and semantic structure correspond to a more complex syntactic one, thus creating a mismatch.[15] Finally, Figure 12 below shows the representation of a traditional "rule" for (12). Note that

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15 Variations of the idiom are to be noted e.g. with modifiers such as *real* for *real blast* or a change of tense at ML e.g. *had* instead of *have* (Núria Alturo Monné, p.c.). These would lead to slight modifications in the feature structure representation, though the conception of the lexicon would remain the same.

the interpersonal level is missing, thus creating a mismatch (and also in keeping with the Maximal Depth principle).

(12) *-ed*

R   past₁

M   Affix₁

P   d/t/Id₁
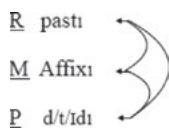
Figure 12: The lexicon in FDG and templates.

In Figures 9–12 above, independent values for the attributes may be seen as partial pieces of information or constraints to be fulfilled by a particular utterance. Together, they make up the lexical entries that feed the FDG representation at various levels, which could indeed be seen as a way of constraint-checking. All these features make up an interface-like lexicon that constrains itself from within and which is compatible with, and maps from and onto, an also constraint-based grammar.

6 Interfaces as constraints

The conception of the lexicon illustrated in Section 5 is, as aforementioned, most compatible with a constraint-based grammar. An inter-level interface, i.e. the interaction between levels, can be represented by means of a rule that determines correspondences between the various levels of representation (Van Valin Jr. 2005 Section 5.1, the "linking algorithm"). Alternatively, one can speak of constraints in constraint-based grammars. Such grammars have been a matter of much discussion (see Shieber 1986, 1992; Smolka 1992 for feature constraint logic). Constraints are the possible sets of values that variables may have in a particular possible world, which, in turn, is the way a world may look like when assigning sets of values to those variables (Poole and Mackworth Section 4.1.1) such that "[e]ach constraint determines or licenses a small piece of linguistic structure or a relation between two small pieces" and "[a] linguistic structure is acceptable overall if it conforms to all applicable constraints" (Culicover and Jackendoff 2005: 15). Actually, the Parallel Architecture is an example of a "constraint-based and nondirectional" framework (Jackendoff 2007: 8). In the following sections, I will deal with the main aspects of constraints, the relation between constraints and grammar design, and their applicability to the FDG framework.

6.1 Constraint satisfaction

This concept was born with artificial intelligence in the 1970s (see e.g. Laurière 1978) and consists in giving values to variables which are restricted by constraints (Tsang 2014[1993]). Ideally, constraint satisfaction is obtained in those cases where each and every variable receives a value that comes from a domain which is normally finite i.e. with a finite set of possible values. Thus, all assigned values have to comply with (satisfy) all constraints. In linguistic terms, finite domains may therefore be specified or not. Linguistic values are specified as a possible set of values (14) rather than as a range as is the case for integers (13).

(13) X= 1. . .3

(14) X= *choose, go for, opt for*.

The role of constraints is to check whether a given output is correct (well-formed) at *any* time. This is related to the non-directional character of constraint-based grammars. Once constraints are established, the system can start by rejecting all those instantiations of variables with given values which are incompatible with (do not conform to) those constraints.

6.2 Constraint propagation

If one or more variables are instantiated as values that do not conform to one or more constraints, then those values are ruled out by the constraint(s) all throughout the board – this is called constraint propagation such that "[c]onstraint propagation embeds any reasoning which consists in explicitly forbidding values or combinations of values for some variables of a problem because a given subset of its constraints cannot be satisfied otherwise" (Bessiere 2006: 1). Constraint propagation checks the satisfiability of constraints (for propositional calculus and the propagation of clauses, see Davis and Putnam 1960).

   Propagating a constraint leads to local consistency, i.e. to a reduction in the number of values for a possible set of variables, given the specific set of constraints that propagate among all initially, theoretically possible values. For example, in the control structure *I want to study interfaces* (vs *I want (that) I study interfaces*), the presence of a non-finite verb in the subordinate clause means that the subject position of the subordinate clause may not be explicit unless it is dif-

ferent from that of the main clause (i.e. a possible instantiation of the value *me* is forbidden for that variable slot).[16]

6.3 Constraint consistency

A constraint-based grammar needs to implement "consistency". There exist various types of local consistency (see Jeavons, Cohen and Cooper 1998). Firstly, there is original local consistency: the constraint applicable to an X variable under certain Y circumstances may apply to any such X variable under Y circumstances. For example, any subordinate clause under control (e.g. in *I want to study interfaces*) needs a 0 singleton at the subordinate subject slot at ML unless the subordinate subject and the main clause one do not coincide.

Secondly, directional consistency may apply at an inter-level as well as at an intra-level domain and could apply to hierarchical relations in FDG. In the case of inter-level directional consistency in e.g. control instances, if the argument slot for the main and the subordinate clauses coincides at RL, then the subordinate subject slot would need to comply with the 0 value assignment at ML, thus working top-down.

Regarding intra-level directional consistency, in the case of e.g. control again, an intra-level ranking may also be established such that a non-finite verb may immediately rule out all complementizers preceding it. Note that inter and intra-level constraints need not be contradictory but rather complement or may even repeat each other output wise (see degeneracy in Section 4 above).

6.4 Constraint weight

Another important aspect when dealing with constraints is their relative weight. In this sense, in Harmonic Grammar (HG) and Optimality Theory (OT) "the structure of a given language is determined by the relative strengths of a set of constraints" such that "[t]hey differ in how these strengths are represented: as numerical weights (HG) or as ranks (OT)" (Pater 2009: 999). As within the OT framework (Prince and Smolensky 1993; Kager 1999; Legendre, Grimshaw, and Vikner 2001; McCarthy 2001, 2007, 2008; Heinz, Kobele, and Riggle 2009), FDG might wish to consider a constraint hierarchy. Should certain constraints be contradictory when applying values to given variables, then the highest-ranked one/the heaviest one would prevail.

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16 Cf. *I want you to study interfaces*, which is e.g. well-formed (Daniel García Velasco p.c.).

We can apply constraint ranking in the case of control mentioned above in the control structure *I want to study interfaces*. One could for example wish to establish a constraint determining that no complementizer *that* nor a finite verb may appear in the subordinate clause at ML as a primary constraint that would prevail over the default constraint establishing that any clause needs an explicit subject, or that determining that a subordinate clause may be introduced by the complementizer *that* in particular contexts. The highest-ranked or heaviest constraints would then "rule out" (rather than just "rule") certain impossible instantiation of variables i.e. the assignment of particular values to those variables in that given context. In this sense, a high-ranked constraint may impose exactly the opposite of a lower-ranked one, thus blocking it, in a non-default case scenario. Thus, a context-dependent constraint such as the one described for control would block the default constraint.

For example, in *I want to study interfaces*, a mismatching non-default case scenario, the constraints determining ruling out complementizers and overt subjects in the subordinate clause at ML would be ranked higher/would be heavier than that establishing that a clause must have an overt subject as is normally the case when there is no infinitival clause or control involved. Thus, such non-default constraints will tend to be the highest-ranked, prevailing ones for cases in which mismatches appear. That is, in mismatch cases such as raising and control, constraints that prevail in transparent interface cases may be ranked lower than usual.

The distinction between high vs low-ranked constraints is not to be mixed up with primary vs secondary constraints. Secondary constraints could be considered in FDG as in other constraint-based frameworks: they may only apply once primary constraints have been complied with, hence the name. For example, in the case of control in *I want to study interfaces*, a primary constraint would establish that, in the presence of control, no complementizer nor a finite verb may be present in the subordinate clause, while a secondary constraint would determine that the non-finite verb is however to keep all other morphosyntactic slots typical of the verb (e.g. object *interfaces*). However, I am not sure whether the applicability of primary and secondary constraints is desirable, since it implies order of application, which is in itself incompatible with the no-time no-direction character of constraints.

Finally, note that constraints only work if there actually is at least one value that can be assigned to each variable. In the case of the control structure *I want to study interfaces*, the only possible set of values that can be assigned to the variable filling the subject slot of the subordinate clause (if there is semantic identity of the agents of the main and subordinate clause) is empty (not an empty category!). This does not mean that the constraint system does not work, but rather that the

possible set of values assignable to that variable slot is a singleton: 0 (thus not providing a full set of possibilities or arbitrary values such as *John, Mary, Ann* but rather an integer). This is illustrated in (15) below:

(15) domain (variable X, 0), whereby X= subject slot of subordinate clause

6.5 Constraints and the architecture of grammar

Constraints are the opposite of derivation, and that is precisely why they are the obvious consequence of a neatly distributed, fully non-derivational grammar. What is important is that they are complied with, rather than the order in which they are applied – as is the case in derivational frameworks, whereby the output of one step is the input for the next one. Actually, the concept of "next" contradicts the non-directionality of constraints.

Unification, a static constraint-based approach that adds complementary information, is opposed to the dynamic implementation of transformations or derivations that provoke changes in the structures of the various steps of the derivation. In unification grammars, constraints are applied in an "arbitrary" and "simultaneous" manner (Sag et al 1986: 239, 243; for unification, see this chapter Section 7 below). That is, whereas lexical entries would be something like constraint objects, constraint rules would be something like a constraint system working as a set of rules implemented without any specific order. Thus, a grammar could be subject to constraint satisfaction such that all information be provided by constraints (Blache 2000: 221, see also 2005), i.e. "starting at any point in the sentence" and going "top-down, bottom-up, left-to-right, or any combination thereof" (Culicover and Jackendoff 2005: 15).

The relation between constraints, what I have called the 3Ds (distribution, derivation, direction) and a constraint-based lexicon is straight-forward. They are related to the following design features: the presence of independent rules, primitives and levels; a lack of derivation (Culicover and Jackendoff 2005: 17, Section 1.4.1 "Constraints rather than derivations"); a lack of direction for building structures (Culicover and Jackendoff 2015: 15); and a blurred distinction between words and rules (Culicover and Jackendoff 2015: 26). Now, are constraints applicable to the FDG framework? If it is true that FDG possesses independent rules and primitives for IL, RL, ML and PL, and that it is almost fully non-derivational, it still is a strongly directional theory of language. The question then is whether interfaces could be conceived as constraints in FDG. This is dealt with in Section 6.7.2 below.

6.6 Constraints, mismatches and FDG

Very interesting is that the nature of constraints is strongly related to the presence of mismatches as described in the previous sections. In constraint-based, modular frameworks of grammar, modularity and factuality come indeed at the expense of inter-level transparency. The following inversely proportional rule applies: the weaker the one-to-one correspondence between levels, the stronger the constraints between them. Of course, if one cannot predict what is going to happen at other levels, one needs to know to what extent two levels may differ and still represent the same unit (Culicover and Jackendoff 1997: 200–201).

If constraints are needed in the lack of derivation to determine why two distinct structures represent the same utterance at various levels, it is only natural to think of the possibility of designing them for a non-derivational theory of language such as FDG. For example, if one is to accept the mismatching RL and ML representations in raising and control as seen in Section 3 above, one needs constraints to limit the possible mismatch between both levels. If FDG is to look more like a modular approach to grammar, then it may do so by resorting to that which characterizes that type of grammar, i.e. fully non-derivational levels governed by constraints. Actually, whereas a derivational approach would allow for empty category deletion rules in middle steps of the derivation (Jackendoff 1997: 12) in mismatch phenomena such as raising and control, modular approaches do not. As a non-derivational model that it is, empty categories needn't be introduced in FDG to provide semantic arguments with a syntactic counterpart (neither quantitatively nor scope wise). Rather, a hierarchy-based constraint theory may be introduced in order to deal with mismatch phenomena.

6.7 Unification

6.7.1 Linguistic theories and unification

Unification is "an operation that does nothing more than to amalgamate compatible partial information and to fail to amalgamate incompatible partial information" (Sag et al 1986: 246, see also Shieber 1986). There is unification success when the linguistic output relies on an existing solution to the "equation" whereas "unification failure" arises when the output does not conform to any of the possible solutions (see Sag et al 1986: 249). In unification, "linguistic phenomena are modelled by constraints of equality over the feature structures; the fundamental operation upon the feature structures, allowing solution of such systems of equations, is a simple merging of their information content" (Sag et al 1986: 238).

As mentioned above, a constraint-based system is the opposite of derivation, since it is based on "identity constraints superimposed on structured expressions rather than in terms of the derivational history of those expressions" (Sag et al 1986: 251). In this sense, constraint and unification are concepts which are incompatible with derivation in that no ordered sequence of steps are to be followed in the correct formation of structures. Unification is shared by grammars as diverse as the Parallel Architecture, Lexical Functional Grammar and Head-Driven Phrase Structure Grammar. It can be done both top-down and bottom-up and is consistent with the incrementality of natural language parsing algorithms as discussed in Ferreira (1996), Ferreira and Swets (2002) and Wheeldon and Lahiri (1997).

In unification, two identical nodes (categories at any level of representation) are computed as identical (e.g. two "x", two "Np") at one particular node such that their respective branches are glued to the tree. Well-formedness is thus checked by confirming that all "treelets" correspond to one of the allowed combinations in the lexicon (Jackendoff 2007: 8, 2012). Unification identifies nodes which coincide and then puts them together (see e.g. Jackendoff 2017 Section 5).[17]

For example, *the interface* could be "put together" or unified by first taking the lexical item *the*, listed as "determiner", and pasting it to the noun phrase tree "determiner+(adjectival phrase)+noun+(prepositional phrase)" through the shared node "determiner". Then, one would take the item *interface*, which is listed as "noun", and glue it to the resulting noun phrase "determiner+(adjective phrase)+noun+(prepositional phrase)" again through their shared node, this time "noun". One could adopt the reverse order (or any possible order, really) – paste the "noun" node (lexical element *interface*) to the noun phrase structure "determiner+(adjective phrase)+noun+(prepositional phrase)" first, then paste that output structure to the "determiner" node (lexical element *the*) on the "determiner" shared node. I think this construction system may be very useful for intra-level construction in FDG. This is dealt with in Section 6.7.2 below.

6.7.2 FDG and unification

In FDG, there is a number of layers related to each other in a hierarchical manner such that intra-level directionality is conceived, just as inter-level mappings, as being top-down, with generation rules kicking off at higher layers first and lower ones doing so only after (see e.g. Hengeveld and Mackenzie 2008: 125, 280, 311, 455 for explanations on how the IL, RL, ML and PL are built in a topdown fashion).

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17 See also Escribano (2008) for dynamic term construction in functional approaches.

Note also that this is so until a configurational relation is hit by the system (see Hengeveld and Smit 2009).

Regarding ML, the level is built dynamically, such that higher hierarchical layers at IL and RL are processed until they reach an equipollent relation and then start to go down to lower levels.[18] In order to decide in which order elements are placed, there are pivot positions (which are filled in first) and relative positions (which are relative to pivot ones and filled in only after, see Hengeveld and Mackenzie 2008: chapter 4 and Hengeveld and Smit 2009: 1128).

I think that unification could be implemented in FDG intra-level construction. Actually, the fact that one does not need to choose a specific order to apply constraints is one of the main advantages that unification systems have as opposed to derivational frameworks (Sag et al 1986: 252). In (16) below, I give a possible ML representation of the raising structure *I seem to study interfaces* following this construction system and then go on to give a couple of possibilities to build the structure using unification for FDG intra-level construal.

(16) *I seem to study interfaces.*

<u>ML</u> (Lei: (Cl_i : [(Np_i)$_{Subj}$ (Vp_i) (Cl_j : [((Gw_i) (Vp_j) (Np_j)$_{Obj}$])]))
Where:
Np_i: 'I';
Vp_i: 'seem';
Gw_i: 'to';
Vp_j: 'study';
Np_j: 'interfaces'.

If we wanted to apply unification to the intra-level construction of the ML of (16) above in FDG, one could start with [(Gw_i) (Vp_j) (Np_j)Ob_j] (selected and put together in any possible order), which would be pasted on to the structure (Cl_j : [(Gw_i) (Vp_j) (Np_j)Ob_j]) through any of the shared nodes. Then one would take (Np_i)$_{Subj}$ and (Vp_i) (or the other way around, or before (Cl_j)) and paste them on to the structure [(Np_i)$_{Subj}$ (Vp_i) (Cl_j)] through any shared node, thus yielding [(Np_i)$_{Subj}$ (Vp_i) (Cl_j : [(Gw_i) (Vp_j) (Np_j)$_{Obj}$])]. Then, one would go on pasting that to the structure (Cl_i : [(Np_i)$_{Subj}$ (Vp_i) (Cl_j)]) via any of the shared nodes, and

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18 Note that further options are: applying the depth first principle both for hierarchical and non-hierarchical relations such that language-dependent factors determine which IL and RL units within an equipollent relation are selected first and then sent down to ML, thus determining ML placement; and sending all non-hierarchically related units down to ML at the same time and leaving it up to ML language-specific rules to determine ML placement (Riccardo Giomi p.c.).

finally glue that to (Le_i: (Cl_i : [(Np_i)$_{Subj}$ (Vp_i) (Cl_j)])) via any shared node, thus yielding (Le_i: (Cl_i : [(Np_i)$_{Subj}$ (Vp_i) (Cl_j : [(Gw_i) (Vp_j) (Np_j)$_{Obj}$])])). This would follow a predominantly bottom-up approach.

A further option would be to go top-down, thus beginning with (Le_i), to be pasted to (Le_i: (Cl_i)) via the shared node (Le_i), then on to the structure (Cl_i : [(Np_i)$_{Subj}$ (Vp_i) (Cl_j)]) via the shared node (Cl_i). Afterward one would superpose (Le_i: (Cl_i : [(Np_i)$_{Subj}$ (Vp_i) (Cl_j)])) and (Cl_j : [(Gw_i) (Vp_j) (Np_j)Ob_j]), with (Gw_i), (Vp_j) and (Np_j)$_{Obj}$ being selected in any possible order, thus yielding the final structure (Le_i: (Cl_i : [(Np_i)$_{Subj}$ (Vp_i) (Cl_j : [(Gw_i) (Vp_j) (Np_j)$_{Obj}$])])). This would follow a predominantly top-down approach. These are only some of the possible order combinations in which ML can be built. Actually, "the constraint-based formalism does not presuppose any particular implementation; it is compatible with serial, parallel, top-down, or bottom-up computation" (Jackendoff 2007: 8). That is, "the order of application of the constraints [. . .] is purely arbitrary" such that different orders may give equal results (Sag et al 1986: 243).

If, as has been shown above, intra-level interface construction can make use of unification in FDG, this framework complies with the main requisites that grammar design needs in order for it to apply constraints as the main source for interface computation: a neat distribution of linguistic information into distinct levels with their own rules of formation and primitives; non-derivational mappings between levels; the possibility of applying non-directional construction mechanisms to (at least, intra-level) interactions; and the possibility of conceiving the lexicon as a constrained-based, unification system. The question remains whether it is possible, or even desirable, to implement all/no-directionality to inter-level interface processes, thus rejecting the main idea of functional grammars (going from function to form) at the computational level, or even at the conceptual one.[19]

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19 All-Directionality would of course have to be compatible with a conceptual vision of the model whereby function comes before form, even if that does not apply at a strictly computing level. One could argue that a top-down image of the model is no longer necessary but that the modules may as well be represented in a parallel fashion in a dynamic implementation of the model. This aligns with the distinction made in Hengeveld and Mackenzie (2008: 2). The question of whether to fully separate representation from psycholinguistic processes is troublesome (Riccardo Giomi, p.c.). Jackendoff also hints at the need for framing formal theories within those of processing and learning (2017:188). Note, however, that unification may be inserted into theories of language processing (Sag et al 1986: 252).

7 Proposals and benefits

In what follows, I list the main suggestions and benefits for the FDG framework related to each of the architectural features which I have discussed throughout this chapter.

– Distribution: Through full encapsulation of linguistic information into the various, distinct levels within their own separate barriers (e.g. avoiding a syntactic level that mirrors semantics), fuller modularity is achieved.

– Derivation: Through the elimination of the few empty nodes still present in its architecture at the syntax-semantics interface, FDG moves more toward full non-derivationality (though to the detriment of transparency observance). The same applies to the implementation of an also "modular" lexicon with missing and mismatching levels. The implementation of constraints determines how mismatching the distinct structures at various levels may be and aligns FDG with non-derivational theories.

– Direction: Through all-directional representational computation, and although its inter-level interfaces are, conceptually, strictly top-down, FDG could align with logical computing constraint-based systems. All/no-directionality may be applied less problematically to intra-level interface construction through unification.

– Decoherence: Through the achievement of full non-derivation and the elimination of empty nodes in mismatching phenomena, FDG is more representationally coherent with its own parameters. On the other hand, through the implementation of unification at intra-level structure construal, FDG achieves greater architectural coherence (neatly distributed levels, non-derivational and non-directional grammar) while keeping a certain degree of flexibility in its hybrid architecture.

– Degeneracy: Through the provision of a constraint-based lexicon that interfaces bi-directionally within itself and with the grammar proper, constantly feeding information that is functionally though not structurally redundant to a constraint-based grammar, FDG ensures the success of communication in non ideal case scenarios and aligns with other scientific domains such as biology. The encapsulation of information in both the grammar and the lexicon, in turn, ensures that no inefficient, superfluous degeneracy arises in that no information is provided as a mere consequence of transparency observance in mismatching phenomena.

8 Conclusions

In this chapter, I have tried to answer the following questions: How can one describe and assess grammar design and, in particular, interface design? What implications does this have for the lexicon and the lexicon-grammar interface? And for the way in which interfaces are conceived? And how can all this be applied to Functional Discourse Grammar?

In order to come up with some answers, I have gathered insights from various competing, though to a great extent similar, modular and constraint-based approaches with a strong lexical emphasis such as the Parallel Architecture, Autolexical Syntax, Head-Driven Phrase Structure Grammar or Lexical Functional Grammar and looked into the possibility of implementing some of their features within the Functional Discourse Grammar framework.

I have also tried to transpose concepts like decoherence, typically used in other fields such as quantum mechanics, into linguistics, and used others which are already being used in linguistics but that originate in other fields such as biology, quantum mechanics or artificial intelligence, such as degeneracy and constraint systems.

I have discussed the architectural parameters that pretty much cover the architecture of grammar in general and of interfaces in particular, namely the distribution, derivation and direction of linguistic information between and within levels of representation, the (de)coherent application of those parameters, the encapsulation or degeneration of information among levels, and the (un)expected combination of all such features by a theory of language modelling.

More particularly, I have discussed FDG's hybrid approach to these architectural parameters, being non-derivational yet strongly directional, and have advocated for a complete elimination of empty nodes in the theory in the search for a fully modular FDG.

I have further discussed the possibility of implementing an interface-based lexicon that constantly links distinct types of encapsulated information (pragmatic, semantic, morphosyntactic and phonological) by means of bi-directional interfaces both within lexical entries themselves and with the grammar proper. This is in keeping with the possible application of a lexicon-grammar interface that would constantly feed and constrain FDG proper.

Finally, so as to further align FDG with other non-derivational theories, I have discussed the compatibility of FDG with constraint-based grammars. In particular, I have argued for the possibility of implementing non-directional unification for intra-level construal, thus avoiding a strict directional approach in the search, yet again, for a fully modular FDG.

Hopefully, I will have provided some food for thought in the field of grammar design, interfaces, mismatches and metatheory in general, and how all these insights might be applied to the FDG framework in particular.

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Klaas Seinhorst and Sterre Leufkens

Phonology and phonetics in Functional Discourse Grammar: Interfaces, mismatches, and the direction of processing

Abstract: In this paper we discuss the interfaces between phonological and phonetic representations in Functional Discourse Grammar, and the possible mismatches that occur at those interfaces. Firstly, we discuss different definitions of phonological opacity in the literature, and provide examples with these definitions. We argue that mismatches between phonological and phonetic representations can result from competing pressures of articulatory ease and perceptual distinctivity. In order to model these influences and the resulting mismatches adequately, the model should not be organised strictly top-down: we argue that FDG should incorporate bottom-up influences from the phonetics on the phonology. We show that these influences are language-specific, which entails that bottom-up feedback must involve the Grammatical Component. With this modification of the model's architecture, language users' tendency to speak efficiently can be incorporated into the model, explaining a wide array of phenomena such as (synchronic) reduction, the cross-linguistic frequency of phonological alternations, and (diachronic) grammaticalization.

Keywords: functional phonology, phonology–phonetics interfaces, mismatches, opacity, reduction, grammaticalization

1 Introduction

This article focuses on the phonological and phonetic representations in Functional Discourse Grammar (hereafter "FDG"), their interfaces, and the possible mismatches in which they are involved. We argue that the model, as far as pho-

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nology and phonetics are concerned, should not be organized strictly top-down: it must allow for bottom-up influences from the phonetics on the phonology. Furthermore, we argue that this bottom-up feedback must involve the Grammatical Component, because these influences are language-specific. With this modification of the model's architecture, language users' tendency to speak efficiently can be incorporated into the model, explaining a wide array of phenomena such as (synchronic) reduction, the cross-linguistic frequency of phonological alternations, and (diachronic) grammaticalization.

This paper is structured as follows. In Section 2, we discuss the notions of transparency and opacity in FDG, as well as their possible motivations; in Section 3, we explain how the notion of opacity is commonly used in the phonological literature. Section 4 treats the phonological and phonetic representations that have been proposed for FDG; Section 5 is concerned with the interfaces within and between phonological and phonetic representations, as well as possible mismatches between these representations. In Section 6 we argue that the model, as far as phonology and phonetics are concerned, cannot maintain its top-down organization: phonetic considerations exert a bottom-up effect on phonological representations. The conclusion remains for Section 7.

2 Opacity in FDG, and its motivations

In this section we provide examples of opaque phenomena, first in general, and second in the phonetic and phonological literature. We also discuss the various possible motivations for different types of opacity to arise.

2.1 Examples of opacity and their motivations

Over the last few years, much work in FDG has been devoted to the notions of transparency and opacity: Hengeveld (2011) provides an introduction of the relevant concepts, Contreras-García (2013) compares the way that different linguistic frameworks deal with transparency, and large-scale typological surveys were done by Leufkens (2015) and Hengeveld and Leufkens (2018). FDG's multi-level architecture is well suited for a straightforward definition of transparency as a one-to-one relation between two elements of different levels of representation, or between two elements within a single level of representation; opacity is the absence of such a relation. We choose to follow Hengeveld and Mackenzie's (this volume) definition, who regard mismatches strictly as numerical deviations of

a one-to-one relation. This means that correspondences between elements that are not prototypically related (e.g. between a State-of-Affairs and a noun), or correspondences between discrete elements and continuous representations, do not constitute mismatches under their (and our) definition. Mismatches occur at interfaces, that is, mechanisms of the grammar that execute a set of operations. Hengeveld and Mackenzie recognize Conceptualization, Formulation, Encoding, Articulation, and Contextualization as interfaces, but in Section 5 we will add interfaces pertaining to mechanisms operating between and within phonological and phonetic sublevels.

We will illustrate opacity by means of a Dutch sentence that contains (at least) three opaque phenomena.

(1) Mijn   zus   Sophie woon-t   in de   binnenstad
    POSS.1SG sister Sophie live-PRS.3SG in DEF.COMM   city_center
    van   Praag
    of   Prague
    'My sister Sophie lives in the city center of Prague.'

The first phenomenon is apposition, as seen in the noun phrase *mijn zus Sophie*: there are two Referential Subacts at the Interpersonal Level, but these only correspond to a single Individual at the Representational Level. Such a many-to-one relation is opaque.

The second opaque phenomenon is clausal agreement, which happens within the Morphosyntactic Level. The noun phrase *mijn zus Sophie* is the subject of example (1); in addition, the subject is marked by an agreement suffix *–t* on the verb. Such clausal agreement is opaque, because the same referent is expressed morphosyntactically twice.

A third opaque property is grammatical gender, as seen in *de binnenstad*. Dutch has two nominal genders: common and neuter. The word *binnenstad* has common gender, even though it does not possess any semantic properties that motivate why it should have common or neuter gender. In FDG, this means that a specification at the Morphosyntactic Level has no counterpart at the Representational Level. Such a none-to-one relation is opaque. A language would have transparent syntactic gender if it encoded natural gender distinctions morphosyntactically, or if it did not mark gender at all, like English.

Both in FDG studies on transparency and in other literature, some opaque phenomena have been argued to be motivated by communicative advantages (e.g. Dahl 2004; Barbiers 2008; Trudgill 2009; Leufkens 2015, 2020). This especially

holds for phenomena that involve some form of redundancy,[1] i.e. they supply a piece of information multiple times. For instance, in example (1), there are two items that signal the subject of the clause, and while such a structure is not transparent, it does provide the listener with an extra cue to identify the subject correctly. This increases the robustness of the transmission of information, likely increasing the probability of communicative success. Additionally, redundancy has been argued to facilitate processing (e.g. Coles-White 2004; Nichols 2009), increase saliency (Petré 2019), and increase learnability of the redundantly marked feature (e.g. Audring 2014).

However, other forms of opacity clearly lead to a decrease in learnability. For example, grammatical gender is notoriously difficult for language learners (De Houwer and Gillis 1998 and Blom et al. 2008 for Dutch; Van der Velde 2004 for Dutch and French; White et al. 2001 for Spanish): because gender is not predictable in these languages, learners will need to memorize the gender of each individual noun. In a grammatical judgment task of a semi-artificial language with determiner–noun agreement, Ćurčić (2018: 30) found that learners scored correctly more often on noun phrases in which the gender of the noun was motivated biologically than on items where it was not. The same holds for instances of irregularity in verbs, such as the vowel alternations that English strong verbs undergo when inflected for past tense: memorising which verbs undergo which alternation requires an extra effort that is disadvantageous to language users and learners. This type of opaque phenomena emerges when pragmatically or semantically motivated rules grammaticalize over time into purely morphosyntactic rules or features. As such, they have been referred to in the literature as "historical junk" (Lass 1997).

A possible strategy of language users to eliminate opacity is regularization, the elimination of exceptions in favour of regular, predictable structures: this strategy has been attested in the laboratory (a.o. Hudson Kam and Newport 2005; Smith and Wonnacott 2010; Seinhorst 2017). Regularization occurs in natural language too, a classic example being strong verbs that become weak diachronically (cf. Lieberman et al. 2007 for a corpus study of English). The likelihood and speed of this process seem to depend on social properties of the language community: loss of opacity proceeds more quickly in a community with a large L2 learner proportion and in sit-

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1 Redundancy can be viewed as a subtype of degeneracy. The latter involves structurally different elements that fulfill the same function, such as the expression of past tense by means of ablaut (*speak > spoke*) or by a suffix (*talk > talked*) in English, or the multiple expressions of argument information in the case of argument–verb agreement (Van de Velde 2014). In our interpretation of redundancy, the term only applies to situations in which the structurally different elements occur within the same phrase or clause. Hence, agreement marking is a case of both degeneracy and of redundancy, while past tense inflection in English is a case of degeneracy but not of redundancy.

uations of language contact, while phenomena like grammatical gender and irregular inflection are more likely to be retained in relatively isolated communities with a large proportion of L1 speakers (e.g. Kusters 2003; Lupyan and Dale 2010; Trudgill 2011). In such languages, opaque features may persist because they do not seem to reduce learnability, despite the absence of a clear communicative or perceptual motivation. It should be noted that languages may also exhibit deregularization, for instance when weak verbs become strong: an example would be the English verb *make*, which used to be weak with past tense *maked*. However, we are not aware of any sources that directly compare the effect sizes of both phenomena (regularization and deregularization) with an appropriate statistical analysis.

2.2 Opacity in phonology and phonetics, and its motivation

The examples of opacity in the previous subsection pertain to the Interpersonal, Representational and Morphosyntactic Levels in FDG, but mismatches may occur in the phonology and phonetics as well, for instance at the interface of Phonological Encoding. A phonological surface transcription of example (1), repeated here as (1′) for convenience, would look as (2), with periods indicating syllable boundaries:

(1′) Mijn   zus   Sophie woon-t   in   de   binnenstad van
      POSS.1SG sister Sophie live-PRS.3SG in   DEF.COMM   city_center of
      Praag
      Prague
      'My sister Sophie lives in the city center of Prague.'

(2)   /mɛin.zɣs̠o.fi.ʋoːnt.ʔɪn.də.bɪ.nə.stɑt.fɑm.praːχ/

The different nature of the representations (orthographic in (1′), phonological in (2)) makes it somewhat difficult to compare them at first glance, but some differences can be seen, of which we will discuss two here. Firstly, of the two consecutive *s*-es in *zus Sophie*, only a single /s/ remains: this is an example of degemination, a process in which two successive identical consonants are reduced to a singleton segment. The remaining /s/ is ambisyllabic, which we indicated here by underlining it; this means that it is simultaneously the coda of one syllable and the onset of the following syllable. This happens because the Maximum Onset Principle (Kahn 1976; Selkirk 1981) requires segments to be assigned to onsets whenever possible, but since Dutch syllables cannot end in lax vowels such as /ɣ/, the same segment needs to function as the coda of that syllable as well.

Secondly, the final *n* of *van* is realized as a labial nasal /m/ instead of a coronal /n/, because it has assimilated to the place of articulation of the following consonant. Both these phenomena suggest opaque mappings between some sort of lexical representations and their realizations; we will further discuss these representations in Section 3.

The existence of such opaque mappings cannot be motivated only by the same motivations we mentioned above, because many of these phonological processes do not seem to yield any advantages in terms of processing, learnability, or robustness of transmission, nor can they be seen as "historical junk"; there must be another explanation. In functionalist approaches to phonology and phonetics (a.o. Passy 1890; Martinet 1960; Boersma 1998), two forces are assumed to be at play: a pressure towards perceptual clarity, and a pressure towards articulatory ease.[2] This entails that language users prefer unambiguous auditory cues in order to aid successful communication, while at the same time speakers try to expend as little gestural effort as necessary to convey a phonological contrast. These forces counteract each other, as careful speech is typically more effortful than sloppy speech: speakers aim to strike an optimal balance between the two factors, and try to be as efficient as possible in making themselves understood. In addition, we should acknowledge that regressive assimilations are arguably advantageous to the listener, because they anticipate upcoming content and thereby facilitate word recognition: in our example above, the labial place of the nasal signals the presence of a following labial consonant.

The tendency towards perceptual clarity will try to prevent opaque mappings, so such mappings are more likely due to considerations of articulatory effort. The interaction of these pressures is not only situation-specific, but also language-specific: for instance, coronal nasals undergo place assimilation in English, but not in Limburgish (cf. Section 4). Considerable cross-linguistic variation is also found in, for instance, phonotactic restrictions: whereas complex syllable onsets are illicit in many languages, probably because they compromise articulatory ease as well as perceptual distinctivity, Georgian allows for at least six segments in this position.

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2 In this paper, we take a dynamic approach to the FDG framework by considering it as a model that reflects the process of the language user. This can be contrasted with a view of the model as primarily describing grammar, that is, reflecting a static version of the language system. For example, Hengeveld and Mackenzie (2008: 2) state that FDG is not a model of the speaker, but "a theory about grammar, but one that tries to reflect psycholinguistic evidence in its basic architecture." Without taking position as to whether FDG should model speakers or grammars, our aim in this paper is to incorporate evidence about the interplay between functional forces in phonology and phonetics, as it exists in the individual speaker–listener, into the FDG model.

It is often assumed that the tendency to be clear co-determines the grammatical choices of a speaker, either within a certain utterance or within the entire sound system, possibly taking the listener's perception process into account (Martinet 1960; Kirchner 1998/2001; Padgett 2003; Hendriks and De Hoop 2001 for semantics). Boersma and Hamann (2008) argue for a non-teleological alternative: language users learn in perception which auditory cues are least ambiguous, and reuse this same knowledge in production.

The interaction of the tendencies towards perceptual clarity and articulatory ease manifests itself in various domains, both at the level of the individual speaker and at the level of the linguistic system. For instance, speakers tend to reduce repetitions of words by, for instance, centralizing vowels and/or deleting segmental content (Koopmans-van Beinum 1980; Ernestus 2000; Johnson 2004); listeners are not able to recognize reduced forms outside of context, but if context is provided they do identify such forms correctly (Kemps et al. 2004). In the structure of sound systems, the maintenance of auditory contrast plays a central role (Liljencrants and Lindblom 1972; Ten Bosch 1991), but only to the extent that sufficient contrast is ensured. Because both pressures exert effects in various domains of the linguistic system, we argue that they have to be integrated in the grammar. We return to this matter in Section 4.

3 The term "opacity" in the phonological literature

Phonologists would not normally refer to the mismatches discussed in the previous section with the term "opacity". This notion has been discussed extensively in the phonological literature (a.o. Kiparsky 1973; Kenstowicz and Kisseberth 1979), but its definition is more restricted than in FDG-based research (as also signalled by Leufkens 2015: 21–22). In order to understand the difference between what we will call "FDG opacity", that is, the use defined in Section 2.1, and "phonological opacity", that is, the use defined in this section, we need to know a bit more about phonological theory.

Generative models of phonology traditionally assume two levels of representation: an underlying form (UF) and a surface form (SF) (Chomsky and Halle 1968; Prince and Smolensky 1993/2004). The UF is structured in terms of phonemes (i.e. categories that distinguish between different meanings), morphemes, and morphophonemic words; it is the underlying form where the phonological structure of the morphosyntactic representation is retrieved from the lexicon. The SF is structured in terms of prosodic units such as syllables, phonological feet, and intonational phrases; the morphophonemic boundaries that are still present

at UF have been erased at SF. The SF is subject to phonotactic restrictions, and in order to ensure that these restrictions are met, repairs to the UF may be required. For instance, the Dutch UF |fiɔnd+ən| 'dogs' surfaces as /fiɔndən/, but the singular |fiɔnd| surfaces as /fiɔnt/, because Dutch does not allow phonological words to end in a voiced obstruent. The mismatches in Section 2.2 are examples of such repairs: in the underlying representation of transcription (2), there are two adjacent |s| segments, because |zʏs| *zus* 'sister' and |sofiː| *Sophie* are still divided by a morpheme boundary; at SF, this boundary has been deleted, and therefore a phonotactic restriction that disallows geminates can apply. Similarly, we assume that underlyingly there is still a final |n| in |vɑn| *van* 'of', because this is most likely the form that has been stored in the mental lexicon; however, the labial place of articulation of the initial |p| in |praːχ| *Praag* 'Prague' causes this |n| to surface as a labial /m/ (as in (2)). In Optimality Theory (Prince and Smolensky 1993/2004; hereafter "OT"), the relation between UF and SF is evaluated by so-called faithfulness constraints (McCarthy and Prince 1995), that aim to preserve the information in the UF and prevent any mismatches such as degemination or place assimilation. In the UF–SF mapping, then, this notion of faithfulness is an example of transparency as applied in FDG research by Hengeveld and Leufkens (2018), and any violations of faithfulness induce opacity in the sense in which it is used in FDG.

However, the term "opacity" is used differently in the phonological literature, where it is a possible property of a transformational rule, or of an interaction of transformational rules. Such rules have the format A → B / C __ D, where A, B, C and D are phonological features, matrices of features, or contexts such as syllable boundaries; the format means that A changes into B if it follows C and precedes D. A and B can also be empty sets, in the case of epenthesis and deletion, respectively; at least one of the contexts C or D needs to be present. A rule, or an interaction of rules, is said to be opaque when one of three conditions is met: (i) there are surface representations in which A also occurs in the context C __ D; (ii) there are surface representations in which the rule or interaction of rules creates B in a different context than C__D; (iii) there are surface representations in which B occurs in the context C__D, but has not been created by the rule or interaction of rules.

For instance, in Japanese, a phonological process exists that palatalizes consonants before front high vowels; another process deletes high vowels between voiceless obstruents. The UF |sika|, then, is realized as the SF /ɕka/. This interaction is opaque: the palatalization process introduces an alveolopalatal fricative segment, but the trigger for this segment is subsequently deleted by the vowel deletion process. In this example, the palatalization rule needs to apply first; if the high vowel deletion would occur first, we would get an incorrect (i.e. unattested) output. Both the correct and incorrect orders are shown in (3), where the asterisk indicates an unattested form.

(3) **correct derivation**: **incorrect derivation**:

sika	*underlying form*	sika	*underlying form*
ɕika	*palatalisation*	ska	*high vowel deletion*
ɕka	*high vowel deletion*	ska	*palatalisation (n/a)*
ɕka	*surface form*	*ska	*surface form*

Another example is found in Canadian English. This variety of English has a phonological rule that raises low vowels before voiceless obstruents ("vowel raising"), and another rule that turns coronal stops into flaps if they occur between vowels ("intervocalic flapping"). The derivations of the words *writing* and *riding* are given in (4). In the underlying representations, the only difference between the forms is the voicing feature value of the final segment of the root; as a consequence of this difference, *writing* undergoes vowel raising while *riding* does not. Subsequently, the voicing difference is obscured by the intervocalic flapping rule. The only difference between the surface forms lies in the quality of the diphthong; the interaction of rules that leads to the SF of *writing* is opaque, because this SF contains a raised diphthong followed by a voiced segment, while raised vowels normally only occur before voiceless segments.

(4) **derivation of *writing***: **derivation of *riding***:

ɹaɪt+ɪŋ	*underlying form*	ɹaɪd+ɪŋ	*underlying form*
ɹʌɪtɪŋ	*vowel raising*	ɹaɪdɪŋ	*vowel raising (n/a)*
ɹʌɪɾɪŋ	*intervocalic flapping*	ɹaɪɾɪŋ	*intervocalic flapping*
ɹʌɪɾɪŋ	*surface form*	ɹaɪɾɪŋ	*surface form*

In both these examples, it is impossible to arrive at the correct SF without an intermediate step: the rules need to apply separately and sequentially. Rule-based approaches allow for as many intermediate representations as necessary; each representation is derived from the last through the application of a transformational rule, as in (3) and (4).

However, in OT, the current mainstream framework in generative phonology, an SF is derived from a UF directly, and intermediate representations do not exist, at least in OT as originated by Prince and Smolensky. To account for the data from (3) and (4) with OT, a somewhat hybrid model needs to be assumed that selects an optimal candidate through a ranking of violable constraints (as in OT), but that allows for intermediate representations (as in pre-OT approaches). Such models are usually referred to as Stratal OT (Bermúdez-Otero 1999; Kiparsky 2000), with a "stratum" being an intermediate representation; in every stratum, the OT grammar (i.e. the set of constraints as well as their ranking) is different. OT formalizations of the acquisition of opaque mappings can be found in McCarthy (1999, 2003), Kipar-

sky (2000), Bermúdez-Otero (2003), Jarosz (2016), Nazarov and Pater (2017), and Prickett (2019). Learners, both simulated and human, acquire transparent mappings more successfully than opaque ones (Ettlinger 2008; Kim 2014; Prickett 2019).

It is debated whether opacity is a synchronic, productive process, or instead a historically motivated phenomenon (and, as such, another case of "historical junk" as mentioned earlier), in which case phonological grammars may not need to be able to account for it. The answer probably needs to be established on a case-by-case basis: Donegan and Stampe (1979) give examples of opaque yet productive processes in English, and Al-Mozainy (1981) argues that opacity in Bedouin Arabic is indeed productive, but Kawahara (2017) discusses several kinds of opacity in Japanese for which the evidence for their productivity is mixed. Sanders (2003) divides known cases of opacity into three groups: cases that are synchronically unproductive, cases that are synchronically productive but morphologically conditioned, and cases that can be reanalysed transparently.

In summary, the term "opacity" as used in the phonological literature has a more restricted application than in the FDG literature. In the remainder of this paper, we will restrict the discussion to opacity in the FDG sense of the word.

4 Phonology and phonetics in FDG

As outlined in the previous section, many phonologists assume that at least two levels of representation are needed. In the layout of FDG as presented in Hengeveld and Mackenzie (2008), the model has a single level of phonological representation, which is structured in terms of prosodic constituents and therefore seems to be identical to a traditional surface form. O'Neill (2013) proposed to add an underlying level, and the terminology in Hengeveld and Leufkens (2018: 158) suggests the authors' acknowledgment of this distinction: "purely phonological rules [may] apply that adapt an underlying phoneme to its surface environment". Hengeveld and Mackenzie (this volume) do not explicitly represent the distinction in their model, but still refer to an underlying phonological representation, suggesting that they do in fact recognize the distinction.

As the term "surface form" suggests, many phonologists consider this representation to be the one that is accessible to inspection, i.e. directly measurable: this means either that the SF is translated into a phonetic representation through a universal phonetic encoder that is of no interest to the linguist (the stance taken by Chomsky and Halle 1968, and many other generative phonologists), or that the SF itself contains phonetic detail, specifying a plan of auditory cues and articulatory gestures in addition to phonological prosodic content. Kirchner (1998/2001),

for instance, evaluates the SF in terms of its articulatory effort. In this view, the SF is a mix of discrete (i.e. phonological) and continuous (i.e. phonetic) properties.

A theoretical framework that teases apart phonological and phonetic representations is Boersma's bidirectional model of phonology and phonetics (cf. Boersma 2011 for an overview). This framework assumes continuous auditory-phonetic and articulatory-phonetic representations in addition to the traditional discrete phonological UF and SF. This separation allows for an explicit formalization of the phonology-phonetics interface. It is also advantageous when explaining a number of phenomena in natural language, such as loanword adaptation (Boersma and Hamann 2009), auditory dispersion (Boersma and Hamann 2008; Seinhorst, Boersma and Hamann 2019) and *h-aspiré* in French (Boersma 2007). The BiPhon model is explicitly bidirectional, meaning that it assumes speaker–listeners to use the same knowledge both in perception and in production; FDG focuses on the production direction, but can be used in both directions of processing. The BiPhon and FDG models differ with respect to their stance on parallel/serial processing: in the BiPhon model, "later" representations may influence earlier ones, while FDG assumes strict seriality. (For a more detailed comparison of the two models, see Seinhorst 2014.) We challenge the assumption of seriality in Section 6.

Following the BiPhon's model separation of phonology and phonetics, Seinhorst (2014) proposed to extend FDG with a Phonetic Level. Since the (sub)levels within the Grammatical Component are considered to be discrete representations, this level should be placed in the Output Component, where non-discrete processes take place.
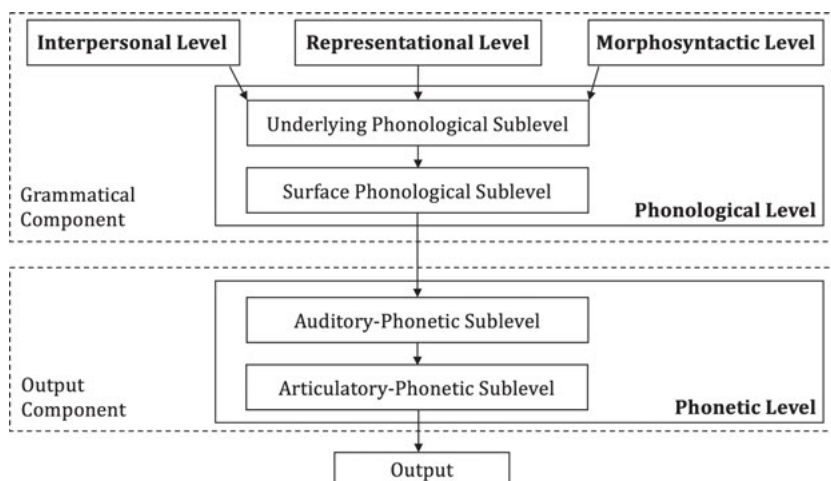
Figure 1: The combined architecture of FDG and Boersma's BiPhon model, proposed by O'Neill (2013), who divided the Phonological Level into two representations, and Seinhorst (2014), who added the Phonetic Level. We further refine this proposal below and in Figure 2.

Figure 1 shows part of the architecture of FDG with the four proposed sublevels, with strictly top-down processing in the production direction (which we will amend in Section 6), and disregarding the Contextual Component for now (but again see Section 6 for a discussion on the role of this component in language change). The Auditory-Phonetic Sublevel is a representation of auditory events, such as formants, frication noise, plosive release bursts, pitches, and so on; the Articulatory-Phonetic Sublevel contains a gestural plan specifying the muscle movements that are needed to produce the utterance.

These phonetic representations are necessary to make FDG compatible with the tenets of functionalist phonology (discussed in Section 2.2). The pressure towards perceptual clarity crucially involves the selection at the Auditory-Phonetic Sublevel of the least ambiguous auditory cues for a phonological input structure, and the pressure towards articulatory ease crucially involves an evaluation of the gestural effort needed to produce the content of the Articulatory-Phonetic Sublevel.

Figure 1 reflects the UF–SF distinction familiar from generative phonology, but as García Velasco (p.c.) pointed out, the architecture of FDG may obviate this distinction. In generative phonology, the underlying form is the representation where the phonemic form of an utterance is retrieved from the lexicon once its morphosyntactic shape has been defined. In FDG, by contrast, such phonemic forms may already become available after the Interpersonal Level, if the Representational and Morphosyntactic Levels are skipped (Hengeveld and Mackenzie 2008: 13), or at the Representational Level if the Morphosyntactic Level is skipped (ibid.). In such cases, the output of the formulation levels is sent to the Phonological Encoding process, which we could therefore interpret as the retrieval of morphophonemic forms from the set of lexemes and other primitives, the concatenation of these morphophonemic forms into utterances, and the translation of this concatenation to the prosodic representation that is the Phonological Level. We are agnostic with respect to the status of an underlying phonological sublevel in FDG, and with respect to the question whether the interface between a lexical representation and a prosodic one is best modelled in FDG as an interaction between separate levels or as part of Phonological Encoding; in the remainder of this paper, we will forgo the assumption of an underlying sublevel, adhering to the architecture proposed by Hengeveld and Mackenzie (2008). The mismatches discussed in this paper do not bear on this question.

We might expect that the effects of the tendency towards articulatory ease are not language-specific, since all humans have (roughly) the same speech apparatus at their disposal, and the notion of effort may therefore be universal. However, languages differ in their use of the available auditory and articulatory space. For

instance, a vowel system with three vowel heights will occupy a larger auditory space than a vowel system with only two heights, and the production of the contrasts in this bigger system will require more articulatory effort. At the same time, the advantage of this increased effort is a larger number of contrasts, and hence a lower degree of perceptual confusion. Another example of the language-specificity of the conflict between perceptual clarity and articulatory ease is nasal place assimilation. In many languages, coronal nasals undergo place assimilation to a following consonant: for instance, in example (1), the |n| of |vɑn| 'of' assimilated to /m/ under the influence of the following |p|, deleting the tongue tip gesture that is needed to produce an [n]. In Limburgish, however, coronal nasals remain coronal, maintaining the tip tongue gesture (Boersma 1998: 469). Since the outcome of this conflict is language-specific, we argue that both forces should be reflected somewhere in the Grammatical Component; this will be the topic of Section 6.

5 Interfaces and mismatches between the phonological and phonetic levels of FDG

Within FDG, phonological opacity (as defined in Section 3) would emerge in the Phonological Encoding process, as a result of two consecutive mismatches that should occur in a specific order: in both examples (3) and (4), a substitution is followed by a deletion or by another substitution. However, more interfaces involving phonology and phonetics exist, and therefore many more mismatches occur, giving rise to FDG opacity (i.e. the definition from Section 2.1). This section discusses those interfaces as well as mismatches that may obtain there. We can only discuss a small number of mismatches here, although countless examples are available: an immense degree of variation exists between languages with regard to their phoneme inventories, phonotactic constraints, phonological processes, and phonetic implementation.

As noted in Section 4, information can be taken to the phonology from any higher level (Hengeveld and Mackenzie 2008: 13), but this will usually be the Morphosyntactic Level.

5.1 Mismatches between the morphosyntactic and phonological levels

Hengeveld and Leufkens (2018) provide a number of examples of mismatches between morphosyntactic and phonological units of representation, for instance

when morpheme and syllable boundaries do not coincide, or when multiple syntactic elements are expressed within a single morpheme, as in stem or affix alternations: for instance, in Dutch, the verb *lop-en* 'walk-INF' is realized in the past tense as the monomorphemic form *liep* 'walk.PST.SG'.

Many other opaque phenomena occur at the interface between the Morphosyntactic and Phonological Levels as well. One such phenomenon is phonologically conditioned allomorph selection, such as the choice between *vieux* and *vieil* 'old-M' in French: this choice depends on the following segment, with *vieux* occuring before consonants or *h-aspiré*. Other such examples are the choice between the articles *a* and *an* in English, or in some cases, the choice between the articles *el* and *la* in Spanish: even though the Spanish word *agua* 'water' is feminine, it is preceded by the masculine definite article to avoid hiatus. These phenomena all represent one-to-many relations between morphemes and their phonological realisation.

Another example of a mismatch between the Morphosyntactic and Phonological Levels comes from Yawelmani, an almost extinct Yokutsan language. Yawelmani has an underlying contrast between long and short vowels, but long vowels are not allowed to surface before a syllable coda (Kenstowicz and Kisseberth 1979), as can be seen in the examples in (5). In (5a) the verbal root |xil| 'to tangle' has a short vowel, which surfaces as short irrespective of the occurrence of a syllable coda. In (5b), the long vowel in |sa:p| 'to burn' surfaces unaltered in the dubitative form, because the following /p/ belongs to the second syllable. It is, however, shortened in the future passive form, because it precedes a coda consonant.

(5) a. Underlyingly short vowels remain short before a syllable coda:

tangle-DUB	tangle-FUT.PASS	*meaning*
xil+al	xil+nit	*lexical form*
xi.lal	xil.nit	*surface form*

b. Underlyingly long vowels become short before a syllable coda:

burn-DUB	burn-FUT.PASS	*meaning*
sa:p+al	sa:p+nit	*lexical form*
sa:.pal	sap.nit	*surface form*

This last example also shows a different mismatch, already mentioned by Hengeveld and Leufkens (2018): the misalignment of morphophonemic and prosodic units, as a consequence of their fundamentally different natures. The root 'to burn' is |sa:p|, so the underlying form of the dubitative has a morpheme boundary after the |p|; however, the Maximum Onset Principle requires that in the syllabification

process, onsets be filled first, so in the surface representation, the /p/ is assigned to the onset of the second syllable rather than to the coda of the first one. Examples of this mismatch abound cross-linguistically; the Maximum Onset Principle is likely rooted in properties of human audition, preferring large sonority contrasts between syllable onsets and syllable nuclei (Delgutte 1982).

Interestingly, many languages display phonological sensitivity to morphological class. In Chuukese, an Austronesian language, nouns need to contain at least two moras, but verbs may surface as monomoraic (Smith 2011), and in Arabic, roots but not affixes may contain pharyngeal segments (McCarthy and Prince 1995). Reduplication, the copying of (part of) the phonological structure of a morphological unit for morphosyntactic purposes, is a cross-linguistically frequent phenomenon as well, often used to pluralize or intensify. Consider, for instance, example (6) from Etsako, a language spoken in Nigeria (Elimelech 1978), in which reduplication of a noun signifies the meaning 'every'.

(6) [ówà]   'house'
    [ówǒwà] 'every house'

These phenomena are not examples of mismatches, but they show how morphology and phonology may interact.

5.2 Mismatches between any higher level and the phonological level

Although the Morphosyntactic Level is the most frequent supplier of input to the Phonological Encoding module, it is not the only one. Regardless of the input level, Phonological Encoding translates a phonemic representation into a representation that is structured in terms of intonational and phonological phrases, words, syllables, segments, and possibly moras, if those are needed in the description of the language; this representation obeys language-specific phonotactic restrictions. Hengeveld and Leufkens (2018: 158) already mention a number of phonological processes that may decrease transparency during Phonological Encoding, such as vowel harmony, nasal (place) assimilation, and final devoicing (the process that requires Dutch word-final obstruents to be voiceless, cf. Section 3). Hengeveld (2011: 19) also mentions Dutch degemination (cf. Section 2.2), Spanish diphthongization, and Turkish vowel harmony as opaque features that emerge "when phonological rules apply that adapt an underlying phoneme to its phonological environment", hence on the interface between a phonemic form and the Phonological Level. Leufkens (2011) adds nasalization, segment epenthesis and deletion. Yet other processes that may occur in this

interface are, for instance, vowel reduction, tone spreading, tonal sandhi, and so on. These are all examples of phenomena where a mismatch is found between the stored form of the lexeme and the way in which it surfaces in the Phonological Level, violating the notion of faithfulness (cf. Section 3) in order to ensure that the surface representation meets phonotactic requirements.

Example (6) above, repeated here as (7), is not only a case of reduplication but also an example of tone spreading. Etsako has two lexical tones: high (H) and low (L). It also has a phonological rule that deletes a vowel if it is followed by another vowel. In a phrase like |ówà#ówà| 'every house' (example 7a), for instance, the |à| from the first word needs to be deleted, in order to resolve possible hiatus (i.e. two adjacent vowels in successive syllables). However, the deletion of this vowel leaves its high tone stranded (7b), since tone is autosegmental, i.e. represented on a tier separately from the segments (Goldsmith 1976; Clements 1976; McCarthy 1981). The stranded tone is then associated with the next syllable. Since this syllable already carries a high tone in addition to the formerly stranded tone, it surfaces with a rising LH tone /ówǒwà/ (7c).

(7) a. *lexical representation*   owa # owa (CV tier)
         | | | |
         H L   H L (tonal tier)

     b. *hiatus resolution*   ow   owa
         | | |
         H L   H L

     c. *prosodic representation (PL)* ow   owa
         | ╱│ │
         H   L H L

This process yields a form that obeys the phonotactic restrictions of Etsako, in terms of both segments and tones; note that, although the hiatus resolution induces opacity at the segmental tier because it deletes a vowel, the tone of this vowel was maintained. Thus, the mapping from the lexical representation to the prosodic representation is transparent as far as the tonal tier is concerned.

5.3 The interface between the phonological and phonetic levels

The interface between the Phonological and Phonetic Levels is the interface between the Grammatical Component and the Output Component: this is where the discrete is translated into the continuous, in a process we would like to call

Phonetic Encoding. Following Boersma (2009, 2011), we assume that the prosodic representation (the traditional surface representation, and the Phonological Level in FDG) is translated into an auditory and an articulatory process in parallel, as opposed to the strict top-down processing in Figure 1 above. The Phonetic Encoding process uses all knowledge of the relation between discrete phonological units and their auditory and articulatory correlates, for instance the knowledge that a plosive segment is usually marked by an auditory release, or that a phonologically high vowel has a low first formant, or that an extremely high first formant is articulatory extremely effortful.

Since the phonetic representations are continuous and infinitely variable, no numerical mismatches occur in this interface (remember our definition from Section 2.1): it is hard to imagine what would constitute a match or a mismatch here, although speaker–listeners do classify certain tokens as more prototypical instances of a phonological category than others (Johnson, Flemming and Wright 1993; Frieda, Walley, Flege and Sloane 2000).

5.4 The interface between the auditory-phonetic and articulatory-phonetic sublevels

We assume the auditory and articulatory representations to be computed in parallel, which entails that we do not assume the articulatory form to be derived from the auditory form. Nevertheless, speaker–listeners possess sensorimotor knowledge, that is, knowledge of the relation between auditory events and articulatory gestures. An example of sensorimotor knowledge would be that muscles involving the lowering of the jaw need to be active if a vowel with a high first formant is produced. The acquisition of this knowledge already begins when an infant starts babbling, and it may need to be reorganized at any point in the speaker–listener's life, for instance if she has an (innate or acquired) speech impediment that she aims to resolve.

In Figure 1 above, an arrow connects the Articulatory-Phonetic Sublevel and the Output, suggesting the existence of another interface. However, by "Output" we mean the sound waves that eventually impinge on the listener's ear; the transition from articulation to air pressure differences is inherent to the articulation process. It is this Output that feeds into the Contextual Component.

5.5 Mismatches and learnability

One might argue that all mismatches within and between the phonological and phonetic interfaces are equal, but from the point of view of the listener/learner,

this may not be true. In the same way that many-to-one relations have different repercussions for learnability than null-to-one-relations like grammatical gender (as argued in Section 2.1), different forms of opacity at the phonological level may have different effects as well. A case in point is that phonological processes can cause neutralization, meaning that they may cause an underlying contrast to be obscured at the surface: in German, final devoicing causes the UF |ʁaːt| *Rat* 'council' and the UF |ʁaːd| *Rad* 'wheel' both to surface as /ʁaːt/. In perception and learning, processing a neutralizing mismatch likely causes more difficulty than a non-neutralizing one. For instance, a Dutch listener, upon perceiving the surface form /fiɔnt/, does not have to disambiguate between |fiɔnd| and |fiɔnt|, as the latter form does not exist. In a sense, neutralization can be regarded as a mismatch on its own, in which one representation at the Phonological Level corresponds to two lexical entries in the Fund, with different semantic and potentially different morphosyntactic properties. While neutralization only occurs in certain prosodic contexts (in this example, the final devoicing process that causes the neutralization between *Rad* and *Rat* only happens at the end of the phonological word), full homonyms would be another example of opaque relationships between items in the lexicon and their semantic and morphosyntactic behaviour, whose phonological representations are already indistinguishable in the Fund.

6 The direction of processing: Bottom-up phonetic influences

It is noteworthy that only three opaque traits are shared by all thirty languages in Hengeveld and Leufkens' (2018) sample: apposition, cross-reference, and phonological alternations. Hengeveld and Leufkens argue that the former two are examples of repetition of information, motivated by a need for expressivity, and that the latter is motivated by a need for articulatory efficiency. We would like to point out that these two motivations are fundamentally very different. The need for expressivity only adds information, while the need for efficiency will only change or delete information, which might hamper communicative success as well as the acquisition process (cf. Section 2). For this reason, the ubiquity of phonological alternations in Hengeveld and Leufkens' sample actually seems much more surprising than the occurrence of the two redundant traits.

Such efficiency, counterproductive as it may be, is motivated by the force of articulatory ease (while taking perceptual clarity into account), so within FDG, it involves the representations within the Phonetic Level. The observation that such efficiency has become obligatory, as part of the phonological grammar, indicates

that the Phonetic Level must interface with the Phonological Level somehow, i.e. bottom-up, serving as a bottleneck: auditory and articulatory considerations can force categorical processes to occur, and cause loss of phonological substance, such as syllables, tones, and words. Examples of this bottom-up influence are in reduced speech, and also in the stepwise process of grammaticalization. Grammaticalizing constructions usually undergo a rise in frequency, which makes them more predictable: the speaker will therefore be more likely to expend less articulatory effort to produce the construction, making it more prone to phonological reduction and erosion (Bybee, Perkins, and Pagliuca 1993; Bybee 2003; Hopper and Traugott 2003; within FDG: Keizer 2007; Olbertz 2007; Grández Ávila 2010). Probably the most well-studied instance of grammaticalization is the English periphrastic future marker *to be going to*: *I'm going to* is commonly reduced to *I'm gonna* or even *imma* (a.o. Givón 1979; Bybee, Perkins, and Pagliuca 1994; Hopper and Traugott 2003). In this last form, only two syllables remain. In a survey of the use of *don't* in spoken American English, Scheibman (2000) found that *don't* was reduced most, to [ə], after the pronoun *I* and before high-frequency verbs such as *know*. Not only does this reduction display significant segmental deletion, it has also lost its prosodic independence: it is no longer a phonological word, but a clitic.

Evidence for the language-specificity of this bottom-up influence is provided, for instance, by Wanrooij and Raijmakers (2020, under review), who show that languages have their own reduction rules: German and Dutch infinitive verbs both end in |ən|, but under reduction, German infinitives undergo schwa deletion and consecutive assimilation of consonants (e.g. *haben* |haːbən| 'to have' is reduced from haː.bən to haːb.n > haːb.m > haːm.m > haːm (Kohler 1996)) whereas in Standard Dutch *hebben* the word-final /n/ is deleted. We interpret this observation as evidence that the influence of phonetics on phonology must have a place in the Grammatical Component: the phonetic process of reduction is grammaticalized into language-specific, obligatory phonological rules. Importantly, the Dutch and German rules differ for good reason. If the word-final /n/ were dropped from the German infinitive |haːbən| (the "Dutch" strategy), we would get the form /haːbə/; applying the "German" strategy to the Dutch infinitive |hɛbən| would yield /hɛm/. Both of these words already exist in the language: in German, /haːbə/ is the form of the first person singular of the same verb, and in Dutch, /hɛm/ is the personal pronoun "him". Both languages, then, show phonetically-based reduction, but they do so in a way that minimizes confusion with other lexical items. Hengeveld and Mackenzie (this volume) argue that phonetic processes such as reduction, assimilation and degemination occur in the Articulator, and that the reduced form may eventually become available as a lexical entry through a feedback loop involving the Contextual Component. While we agree that the Contextual Component is indeed relevant in this diachronic entrenchment, the Articulator is not part

of the Grammatical Component, and therefore Hengeveld and Mackenzie's solution fails to account for the German and Dutch data by denying that reduction proceeds in a language-specific way which takes lexical considerations into account.[3]

We model the effect of auditory and articulatory considerations on a prosodic representation as a bottom-up influence of the Phonetic Encoding process on the Phonological Encoding process, which we believe best explains that a need for articulatory ease, as far as it is allowed by lexical and perceptual factors, may result in a phonologically reduced representation. Figure 2 shows a modified version of Figure 1, now including the bottom-up interface by an arrow from the Phonetic Encoding process to the Phonological Encoding process. The grey double-sided arrow between the Auditory- and Articulatory-Phonetic Sublevels indicates that the latter is not derived unidirectionally from the former, but that speaker–listeners do possess knowledge of the relation between these two forms.
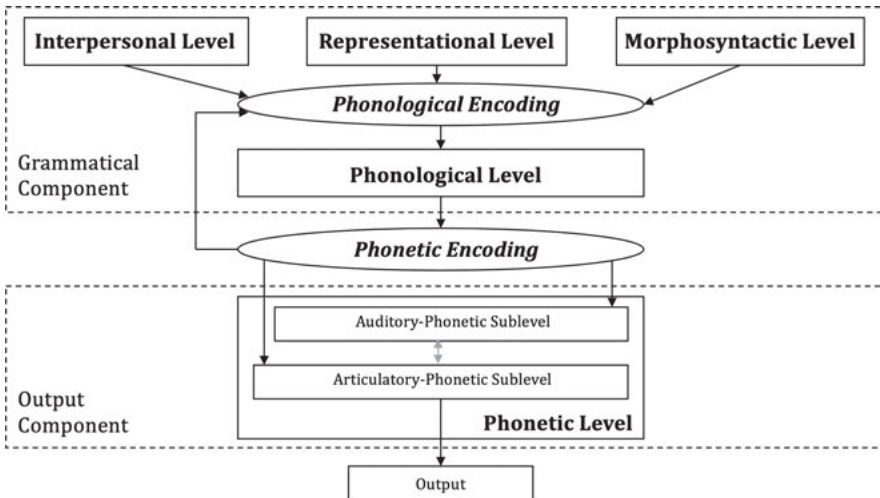
Figure 2: The coupling of FDG and the BiPhon model from Figure 1, as proposed by O'Neill (2013) and Seinhorst (2014), now including a bottom-up feedback loop from the phonetics to the phonology.

Although we place the Phonetic Encoding process outside the Grammatical Component because it involves non-discrete representations, we would like to stress once more that this process is language-specific, since it is fed by the Pho-

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3 As we mentioned in Sections 2.2 and 4, assimilation processes are language-specific too, and so is degemination. We therefore argue that these processes do not belong in the Articulator, but rather in Phonological Encoding.

nological Level, and since the weighing of lexical, perceptual and articulatory factors is language-specific. We believe that the introduction of this bottom-up bottleneck allows FDG to increase its explanatory adequacy, and strengthen its functional nature. We would also like to note that, even though the phonological processes and examples that are described in this paper are taken from spoken languages, the basic notions extend to sign language as well, which is equally subject to the forces of perceptual clarity and articulatory ease (a.o. Crasborn 2001; for grammaticalization in sign languages, cf. Pfau and Steinbach 2011).

7 Conclusion

In this paper we have discussed extensions to the FDG model's architecture that were proposed by O'Neill (2013) and Seinhorst (2014), as well as some mismatches that may occur between the phonological and phonetic levels of FDG. These processes seem to be motivated by perceptual and articulatory considerations, pointing to a bottom-up influence from the phonetics on the phonology. We have assumed that mismatches can only occur between discrete units of representation, i.e. that mismatches may only occur with and within the Phonological Level; since numerous phonological processes can cause opacity, it will be interesting to compare the types of mismatches at the Phonological Level with those found at the other levels of representation. Finally, we have argued that the tenets of functional phonology, which state that language users aim to speak as efficiently as they can while still being understood correctly, can be incorporated into FDG through the introduction of a bottom-up influence from the phonetics to the phonology, increasing the model's explanatory adequacy.

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Marieke Olthof and Kees Hengeveld

Noun incorporation in Functional Discourse Grammar

Abstract: This chapter discusses the treatment of noun incorporation within the framework of Functional Discourse Grammar in relation to the place of interfaces within this grammatical theory. Interfaces are organized, on the one hand, in terms of implicational typological hierarchies, which constrain the possibilities for noun incorporation to occur in a language, depending on the cut-off points relevant for that language. On the other hand, there are restrictions on incorporation that are not predictable in terms of typological hierarchies, which are captured by basic settings within the interfaces. Starting from this division of labour between hierarchies and settings, we discuss the typology of noun incorporation in terms of the interfaces between pairs of levels within the grammar. Since noun incorporation is a morphosyntactic phenomenon, the Morphosyntactic Level is always involved in these pairs. Thus, the relevant interfaces are the interface between the Interpersonal Level and the Morphosyntactic Level, the one between the Representational Level and the Morphosyntactic Level, and the one between the Morphosyntactic Level and the Phonological Level. After this pairwise typological discussion of constraints on noun-incorporation, we present one worked example of a full set of constraints within a single language, Kalaallisut.

Keywords: Noun incorporation, Functional Discourse Grammar, typological hierarchies, interfaces

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1 Introduction

Noun incorporation concerns the situation in which a nominal unit combines with a verbal unit to form a single verbal word (Gerdts 1998: 84; Mithun 2000: 916; Aikhenvald 2007: 11; Massam 2017). An initial example from Yucatec Maya is given in (1).

(1) a. *t-in   ch'ak-ah   che' ichil in   kòol*
         PST-1SG.SBJ cut-COMPL   tree in   1SG.POSS milpa
         'I chopped trees in my cornfield.'

     b. *h   ch'ak-che'-nah-en   ichil in   kòol*
         PST cut-tree-COMPL-1SG.ABS   in   1SG.POSS milpa
         'I chopped trees in my cornfield.'
         (Bricker, Po'ot Yah, and Dzul de Po'ot 1998: 354, cited in Lehmann and Verhoeven 2005: 150)

Example (1a) shows a regular transitive clause in Yucatec Maya, with a verb with the stem *ch'ak* 'cut' and an object noun *che'* 'tree'. In example (1b), the noun *che'* is incorporated into the verb: the noun here follows the verbal stem *ch'ak* but precedes the verbal inflectional suffixes.

Noun incorporation constructions show highly varied properties cross-linguistically. For instance, languages differ in whether their incorporated nouns can be used to refer (Massam 2009: 1084; Murasugi 2014: 284–285; Borik and Gehrke 2015: 6), and whether incorporation functions to background the participant designated by the incorporated noun (Mithun 1984: 859; Gerdts 1998: 86). In addition, whereas some languages restrict noun incorporation to arguments, others also show incorporated modifiers (Mithun 1984: 875; Gerdts 1998: 87; Murasugi 2014: 284). Besides, in many but not all incorporating languages there are, for most noun incorporation constructions, corresponding constructions in which the noun and verb appear as separate words (Mithun 1984: 847–848; Gerdts 1998: 84–85; Massam 2017), as exemplified for Yucatec Maya in (1). Furthermore, incorporated nouns may be phonologically identical to non-incorporated nouns in the same language or may have specialized forms (Mithun 1984: 876; Caballero et al. 2008: 387–388).

Because the various pragmatic, semantic, morphosyntactic and (morpho)phonological properties associated with incorporated nouns appear to be combined in different ways in different languages, noun incorporation is particularly interesting for discussions about interfaces in grammatical theory. An interface can be defined as a set of rules that state the possible relations between

different types of grammatical representations. Functional Discourse Grammar (FDG) has four such representations, i.e. the Interpersonal Level (IL), Representational Level (RL), Morphosyntactic Level (ML) and Phonological Level (PL), which contain pragmatic, semantic, morphosyntactic and phonological representations respectively. As all these levels play a role in the way the phenomenon of noun incorporation manifests itself cross-linguistically, FDG provides a suitable framework to study interface conditions in noun incorporation (see Section 2).

In this paper, we provide an FDG analysis of the interface conditions involved in noun incorporation. Following Hengeveld and Mackenzie (this volume), we consider that differences between interface conditions across languages are preferably defined, whenever possible, in terms of typological hierarchies or constraints, such that for every language the cut-off point that it displays on the many hierarchies involved will predict the working of the interfaces. Based on earlier literature and data from a large number of incorporating languages, this paper proposes a set of hierarchies that determine the constraints on the possible mappings between the FDG levels in noun incorporation in different languages. In addition to these hierarchies, a number of basic settings concerning noun incorporation is provided. These state, for instance, whether a language allows incorporation at all and which alignment system is applied in incorporation. The distinction between hierarchies and basic settings may at first sight seem similar to the one between principles and parameters in the generative tradition (see e.g. Chomsky and Lasnik 1993). There is a major difference, however, as in the Principles and Parameters approach in Generative Grammar, principles are assumed to be common to all languages, whereas in FDG the typological hierarchies constrain variation between languages, as it does not assume alle languages to be fundamentally the same.

We first introduce the FDG framework and its approach to interfaces in Section 2. Our FDG definition of noun incorporation follows in Section 3. Subsequently, we look at the relevant interfaces between pairs of levels, where the pairs are presented in a top-down manner, starting from the highest level. As incorporation is a morphosyntactic phenomenon, ML is always involved in these pairs. Thus, the relevant interfaces are the IL-ML interface, discussed in Section 4, the RL-ML interface, addressed in Section 5, and the ML-PL interface, examined in Section 6. We provide examples concerning the relevant pairs in each of these sections, but in Section 7 we exemplify these in one particular language, Kalaallisut, showing how the interfaces between the three different pairs of levels together capture its possibilities for noun incorporation. Here we also exemplify how the pragmatic, semantic, morphosyntactic, and phonological properties of incorporated nouns may or may not match across the

different levels in FDG. In Section 8, we then discuss our findings and draw our conclusions.

2 Functional Discourse Grammar

Functional Discourse Grammar (Hengeveld and Mackenzie 2008) is a typologically-based theory of language structure with the four-level architecture shown in Figure 1. The figure shows that FDG is the Grammatical Component of a wider theory of verbal interaction, in which it interacts with a Conceptual, Contextual, and Output Component. Figure 1 also shows that FDG has a top-down organization, working down from larger to smaller units.

Within the Grammatical Component itself, there are four levels of analysis. Two of these, the Interpersonal Level and the Representational Level, are the output of the operation of Formulation. This operation converts conceptual representations into pragmatic and semantic representations. The Morphosyntactic Level and the Phonological Level are the output of the operation of Encoding, which translates pragmatic and semantic representations into morphosyntactic and phonological ones.

Internally, every level is hierarchically organized in terms of layers relevant to that level. For instance, at the (actional) Interpersonal Level, layers such as the Discourse Act and the Referential Subact are relevant; at the (designational) Representational Level, layers such as the Propositional Content and the State-of-Affairs are needed; at the Morphosyntactic Level layers such as the Noun Phrase and the Clause are used; finally, at the Phonological Level prosodic units such as the Intonation Phrase and the Phonological Word are relevant.

Layers may be further modified by modifiers, operators and functions. Modifiers differ from operators and functions in being lexical rather than grammatical. The difference between operators and functions is that the latter are relational while the former are not. Examples of operators that will show up in Section 4.4 are identifiability and specificity operators that operate on Referential Subacts at the Interpersonal Level. Examples of modifiers are adjectives that modify Individuals and locative phrases that modify States-of-Affairs, both at the Representational Level. Finally, examples of functions are the Actor and Undergoer functions of arguments at the Representational Level and the Subject function of Noun Phrases at the Morphosyntactic Level.

In the next section, we will consider how noun incorporation fits into this general architecture.
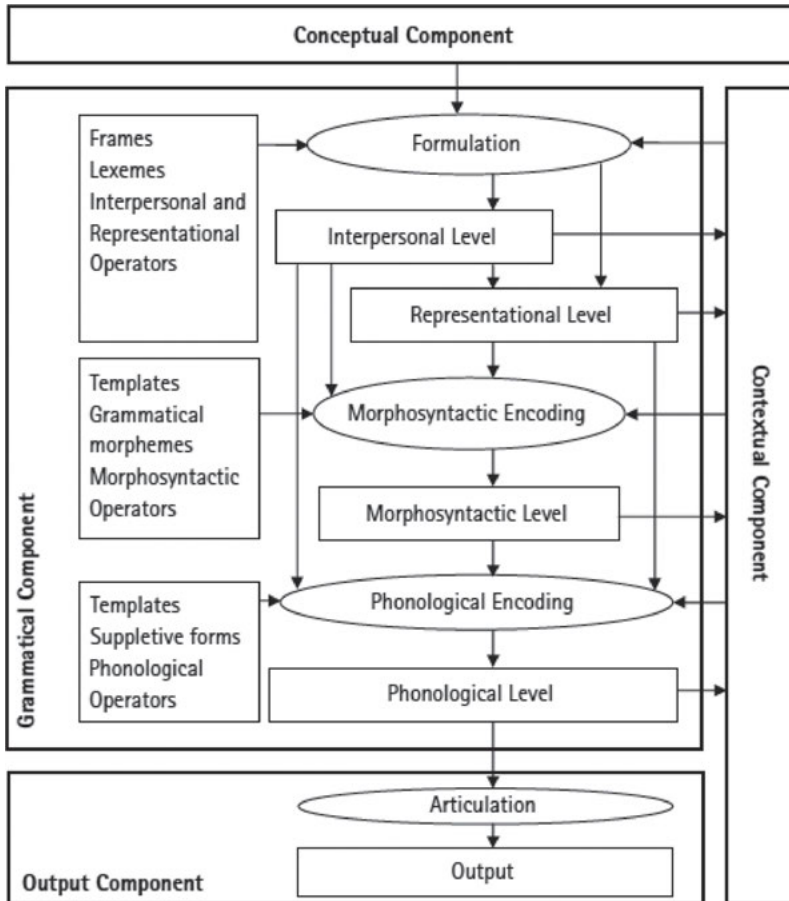
Figure 1: *General architecture of Functional Discourse Grammar* (Hengeveld and Mackenzie 2008: 13).

3 Defining noun incorporation in FDG

Before moving to the actual interfaces involved in noun incorporation, it is important to indicate how we define noun incorporation in FDG. Various definitions of noun incorporation have been proposed in the literature, differing chiefly in whether they characterize noun incorporation as a lexical or syntactic process (Massam 2009: 1077; Murasugi 2014: 284; Haugen 2015: 414; Johns 2017). In this study, we restrict the term noun incorporation to productive, semantically transparent processes in which a nominal and a verbal unit at RL together form a

single verbal Word at ML. Thus, we consider noun incorporation a phenomenon that takes place at the grammatical levels rather than in the Lexicon. More specifically, we define noun incorporation constructions as cases in which a nominal and a verbal unit that are in a dependency relation of the form head-modifier or predicate-argument at RL, form a single verbal Morphosyntactic Word.

Note that this definition entails that noun incorporation shows a certain degree of overlap with compounding.[1] In FDG, a distinction can be made between compounds formed by combining lexical primitives in the Lexicon and semantically transparent compounds that are productively created in the Grammatical Component (Hengeveld and Mackenzie 2016: 1150–1153). The latter type can be further divided into head-modifier, predicate-argument and conjunct-conjunct compounds. Head-modifier and predicate-argument compounds consisting of a nominal and a verbal unit that are morphosyntactically verbal equal noun incorporation as we define it here.

Noun incorporation can also be linked to the notion of polysynthesis. In the literature on noun incorporation, the phenomenon has sometimes even been considered a necessary feature of polysynthetic languages (Genee 2018: 243). Within the FDG framework, Genee (2018: 264) has identified five parameters that contribute to a language's degree of polysynthesis and noun incorporation may play a role in each of them. Most importantly, noun incorporation leads to higher lexical density, because incorporation of a noun into a verb always results in a Morphosyntactic Word with at least two lexical Morphemes.

According to our definition, noun incorporation takes place at ML. This level distinguishes the morphosyntactic layers presented in (2).

(2) *Morphosyntactic layers in FDG*
     Le_n = Linguistic Expression
     Cl_n = Clause
     Xp_n = Phrase (of type x)
     Xw_n = Word (of type x)
     Xm_n = Morpheme

Morphemes are further divided into three types: Stems (Xs_n), Roots (Xr_n) and Affixes (Aff_n). Note that the difference between a Stem and a Root in FDG is that

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1 Correspondingly, the hierarchies proposed in this paper for the interface conditions on noun incorporation may also be relevant for other grammatical head-modifier and predicate-argument compounds.

a Root cannot occur independently, i.e. without being attached to another lexical Morpheme, while a Stem can (Hengeveld and Mackenzie 2008: 404).

All morphosyntactic layers in (2), except for Le_n, which represents the maximal morphosyntactic unit, may be embedded into other units, leading potentially to full recursivity. This means that Morphosyntactic Words too may embed other morphosyntactic units, with incorporation as the result. Many different configurations are possible within the template of a Morphosyntactic Word. In (3), we illustrate the possibilities for noun incorporation. For reasons of space, we limit ourselves here to configurations in which the nominal unit precedes the verbal one, even though the reverse can also be found (Caballero et al. 2008), and in which the verbal unit is a Stem (Vs_1), although verbal Roots may incorporate nouns as well.[2]

(3) a. $(Vw_1: [(Aff_n) (Nr_1) (Vs_1) (Aff_n)] (Vw_1))$
   b. $(Vw_1: [(Aff_n) (Ns_1) (Vs_1) (Aff_n)] (Vw_1))$
   c. $(Vw_1: [(Aff_n) (Nw_1) (Vs_1) (Aff_n)] (Vw_1))$
   d. $(Vw_1: [(Aff_n) (Np_1) (Vs_1) (Aff_n)] (Vw_1))$

The different possible configurations also illustrate the morphosyntactic characteristics that we use to verify that apparent noun incorporation constructions are single Morphosyntactic Words. This is important because our definition of noun incorporation depends on Morphosyntactic Word status. In most cases, the position of a nominal unit between a verbal Affix and a verbal Root or Stem shows that it is incorporated into the verbal Word. In a few languages that do not tend to use Affixes, verbal clitics and particles can be considered in the same way as verbal Affixes. Finally, in some languages the Root status of either the nominal or the verbal unit can be used to recognize incorporation: as Roots necessarily combine with another lexical Morpheme in a Morphosyntactic Word, the occurrence of a nominal Root next to a verbal lexical Morpheme or the occurrence of a verbal Root next to a nominal lexical Morpheme shows that the two form a single Morphosyntactic Word.

Another important aspect of noun incorporation shown in the configurations in (3) is that the incorporated unit may be a nominal Root (Nr_1), as in (3a), a nominal Stem (Ns_1), as in (3b), a nominal Word (Nw_1), as in (3c), or a Noun Phrase (Np_1), as in (3d). A terminological comment is in order now: what is generally called 'noun incorporation' is not always 'noun stem incorporation' but may also be 'nominal root incorporation', 'nominal word incorporation' or 'noun phrase

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2 We also include constructions with bound verbal units that are sometimes called derivational affixes as noun incorporation constructions, as long as these verbal units form a large group in the relevant language and have concrete, verb-like meanings. These considerations concern languages like Eastern Canadian Inuktitut, Kalaallisut and Nuu-chah-nulth.

incorporation'. In order to avoid unnecessary terminological complexities, we use the term 'noun incorporation' for all four situations.[3]

The possibilities represented in (3) do not appear in languages randomly. Olthof (2020a) investigates the range of morphosyntactic units that may be incorporated cross-linguistically. Based on her results for noun incorporation specifically, the implicational hierarchy given in (4), in which the class of lexical Morphemes includes both Roots and Stems, may be proposed to describe the possibilities for incorporated nouns.

(4) lexical Morpheme ⊃ derived Stem ⊃ inflected Word ⊃ Phrase

This hierarchy expresses that the most common form of noun incorporation concerns the incorporation of lexical Morphemes, followed by grammatically derived Stems, inflected Words and Phrases. Also, the hierarchy states that if, in a particular language, a noun of a category more to the right in the hierarchy can be incorporated, then nouns of all categories to the left can be incorporated as well. Data from 30 languages presented in Olthof (2020a) largely confirm the hierarchy in (4).[4] It thus seems that languages can be parametrized, in that for every language a particular cut-off point in (4) can be specified at ML. Note that this is not an interface condition, but a restriction that applies in the Morphosyntactic Encoder itself.

Interfaces between ML on the one hand and IL, RL and PL on the other hand are, however, highly relevant for noun incorporation. In noun incorporation constructions, the nominal unit at ML may map onto various units at IL, RL and PL, as will be discussed in the next sections. Some of these mappings create mismatches between levels. Most importantly, noun incorporation constructions typically involve two separate units at RL that form a single unit at ML. Usually it is one of the two arguments of a transitive verb that is incorporated into this verb (see also Section 5.4). This means that two units from a single Configurational Property at RL form a unit at ML, while the other argument that plays a role in the same Configurational Property is expressed as a separate unit at ML. In this way, noun incorporation entails a mismatch between RL and ML, i.e. in Encoding (see Section 7 for an illustration).

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3 The different types of incorporated units contribute in different degrees to the polysynthetic character of a language, as the inclusion of higher morphosyntactic layers within one Word may be assumed to make a language more polysynthetic than the inclusion of lower morphosyntactic layers within one Word (Genee 2018: 264).

4 Only one of the 30 languages does not conform to this hierarchy of the forms of incorporated nouns: in Yimas, incorporated nominal Stems and incorporated nominal Words occur, while no examples of incorporated nominal derived Stems are found in the study. Note, however, that the incorporation of adverbial derived Stems is attested.

4 The IL-ML interface

4.1 Introduction

There are several aspects of IL that (co-)determine whether noun incorporation is or is not allowed in a language. The relevant aspects are the following:

(i)   The interpersonal category of the incorporated noun: is it a Referential Subact or not?
(ii) The head of the incorporated noun: is it a proper name or a common noun?
(iii) The pragmatic operators applying to the incorporated noun: what are its identifiability (+id/−id) and specificity (+s/−s) values?
(iv) The pragmatic function of the incorporated noun: does it have a Focus function, a Background function, or neither of them?

We will address these aspects one by one in what follows.

4.2 The interpersonal category of the incorporated noun

Languages may show non-referential incorporated nouns only, limit incorporation to referential nouns, or allow both referential and non-referential incorporated nouns. In Paraguayan Guaraní, incorporation is restricted to non-referential nouns. Example (5) shows that it is not possible in this language to refer anaphorically to an incorporated noun.

(5)   *A-hova-hei-se   pe-mitã,   pero i-sy   he'i
      1.ACSBJ-face-wash-DES   that-child but   3.INACSBJ-mother say
      nda-i-ky'a-i   ha.
      NEG-3.INACSBJ-dirty-NEG   that
      'I wanted to wash the child's face but his mother said that it wasn't dirty.'
      (Velázquez-Castillo 1995: 694; Velazquez Castillo 1996: 144)

Paraguayan Guaraní incorporated nouns do thus not correspond to Referential Subacts at IL. Instead, they are part of the Ascriptive Subacts corresponding to the incorporating verbs (see also Smit 2005: 105).[5]

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5 Alternatively, non-referential incorporated nouns like the ones in Paraguayan Guaraní may correspond to independent Ascriptive Subacts. It does not seem possible to decide which of these possibilities is correct. Ascriptive Subacts can be recognized on the basis of the presence of a modifier or operator of approximation (Hengeveld and Mackenzie 2008: 111–112), but for most of

By contrast, in Panare "incorporation can be used when the incorporated unit refers to a highly referential and specific entity" (Payne 1995: 309). In this language, incorporation has "specific semantic effects which do not include "downplaying" the identity, referentiality or identifiability of an O[bject] argument" (Payne and Payne 2013: 330). Thus, we conclude that incorporated nouns in Panare instantiate Referential Subacts. An example of noun incorporation from Panare is shown in (6).

(6) *Yu'pétyaka-ñe*   *këj*   *kën.*
     y-pu-pétyaka-ñe   *këj*   *kën*
     3-head-split-NSPEC.TR   AN.PROX   AN.INVIS
     'He's$_i$ gonna split his$_j$ head.'
     (Payne 1995: 301; Payne and Payne 2013: 332)

In Bininj Kun-Wok, both referential and non-referential incorporated nouns can be found. Example (7) shows the incorporation of the noun *murrng* 'bone' into the verb *bimbom* 'paint'. Here, *murrng* is used referentially, i.e. it corresponds to a Referential Subact, as evidenced by the demonstrative *na-mekke*, which appears as modifier of the incorporated noun external to the incorporation construction. In example (8), on the other hand, the incorporated noun *yaw* 'baby, child' is non-referential. It is used as a secondary predicate and correspondingly instantiates an Ascriptive Subact.

(7) *Nga-murrng-bimbom*   *na-mekke.*
     1>3-bone-paint.PST.PFV   M-DEM
     'I painted those bones.'
     (Evans 2003: 235)

(8) *Birri-yaw-ni.*
     3.AU-baby/child-sit.PST.IPFV
     'They sat down like children.'
     (Evans 2003: 484)

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the languages we studied we have not been able to verify whether or not non-referential incorporated nouns can combine with such a modifier or operator. Moreover, the potential unavailability of such modifiers and operators could also be due to morphosyntactic restrictions on what can be incorporated rather than on interpersonal ones. Note that incorporated nouns functioning as nominal predicates are an exception to these considerations, as these always instantiate their own Ascriptive Subacts.

In a study on the referential potential and modification possibilities of incorporated nouns in a sample of 21 incorporating languages, Olthof (2020b) finds that two languages restrict incorporation to referential nouns, in 8 languages only non-referential nouns occur, and eleven languages show both referential and non-referential incorporated nouns. Based on these data, there does therefore not seem to be an implicational relationship between the incorporation of nouns used referentially and those used non-referentially. All possible combinations occur. We can thus formulate a basic setting regarding the pragmatic category of incorporated nouns, where languages belong to one of the three following types:

(9) *Incorporation of referential nouns / Incorporation of non-referential nouns / Incorporation of both referential and non-referential nouns*

4.3 The head of the incorporated noun

In addition to this basic setting, a number of hierarchies concerning the pragmatic characteristics of incorporated nouns seem to emerge from the data. The first of these has to do with the question whether the incorporated noun is a common noun or a proper name. The incorporation of proper names is cross-linguistically rare (Mithun 1984: 864; Borik and Gehrke 2015: 5) and has even been proposed to be impossible (Mardirussian 1975: 386). It appears that the few languages that do allow the incorporation of proper names, such as Eastern Canadian Inuktitut (Johns 2009: 190–191), Kalaallisut (Sadock 1980: 314; see example (77)), Nivkh (Mattissen 2017: 861) and Ute-Southern Paiute (Givón 2013: 322–323), additionally show the incorporation of common nouns. Thus, in Eastern Canadian Inuktitut, we find both construction (10), with the incorporated common noun *savi* 'knife', and construction (11), with the incorporated proper name *Miali*.

(10) *savi-siuq-tunga.*
knife-look.for-1SG.PART
'I am looking for a knife.'
(Johns 2009: 187)

(11) *Qallupilluq   Miali-tu-niaq-pa?*
Qallupilluq   Mary-consume-NEARFUT-3SG.INTERR
'Is Qallupilluq (a sea monster) going to eat Mary?'
(Johns 2009: 191)

Most other languages, however, limit incorporation to common nouns. For instance, in Mapudungun (Loncon Antileo 2017: 46), Nadëb (Weir 1990: 325), Nuu-chah-nulth (Stonham 2008: 524) and Southern Tiwa (Allen, Gardiner, and Frantz 1984: 301), common nouns may be incorporated, whereas proper names may not. A possible explanation for the rare occurrence of incorporated proper names could be that languages generally only allow the incorporation of lexemes inserted at RL, while proper names differ from other nouns in appearing at IL (Hengeveld and Mackenzie 2008: 19). In addition, proper names are special in that they are only used for referents that are assumed to be identifiable for the addressee (Hengeveld and Mackenzie 2008: 117). Many languages limit incorporation to non-referential nouns, as discussed in the previous subsection, or to nouns with referents that are not identifiable for the addressee, as will be discussed in the next subsection.

The hierarchy in (12) captures the data concerning the heads of incorporated nouns observed so far.

(12)   *Incorporation of common nouns ⊃ Incorporation of proper names*

Since proper names are intrinsically referential, the fact that a language allows the incorporation of proper names automatically implies that it allows the incorporation of Referential Subacts, not only those expressed by proper names but also those expressed by other types of referential nouns.

4.4 The pragmatic operators applying to the incorporated noun

With respect to pragmatic operators, we consider here the restrictions on noun incorporation that have to do with the identifiability of the referent for the addressee and the identifiability of the referent for the speaker. In languages with referential incorporated nouns, speakers may or may not assume these referential nouns to be identifiable for the addressee. In several languages, such as Chimalapa Zoque (Johnson 2000: 274) and Nuu-chah-nulth (Waldie 2004: 52), the referents evoked by referential incorporated nouns are necessarily non-identifiable for the addressee. Other languages, including Kalaallisut (Sadock 1985: 399), Mapudungun (Baker, Aranovich, and Golluscio 2005: 174), Mohawk (Baker 1996: 288), Nivkh (Mattissen 2003: 175–176) and Sora (Anderson 2017: 941, fn. 12), do show incorporated nouns with referents that are taken to be identifiable for the addressee. This is often evidenced by the possibility to combine them with demonstratives, as in example (7) above. However, these languages allow the incorporation of nouns with referents that are not identifiable for the addressee as well. In example (13) from Mohawk, for instance, the noun *ather* 'basket' is assumed not to be identifiable for the addressee

in the first incorporation construction, but in the second incorporation construction it is identifiable for the addressee (Baker 1996: 288).

(13) *Thetʌ́re* *ʌ́ska* *w-ather-a-yʌ́-tah-kwe'* *nek* *tsi* *Wíshe*
yesterday one N.SG.SBJ-basket-Ø-lie-HAB-PST but PRT Michael
í-k-ehr-e' *wa-ha-[a]ther-a-hnínu-'*.
Ø-1SG.SBJ-think-IPFV FAC-M.SG.SBJ-basket-Ø-buy-PNCT
'There was a basket (here) yesterday, but I think Michael (basket-)bought it.'
(Baker 1996: 288)

From facts like these, we tentatively derive the following implication:

(14) *Incorporation of −id nouns ⊃ Incorporation of +id nouns*

Languages may also restrict the incorporation of referential nouns to those with referents that are not identifiable for the speaker, i.e. that are non-specific. Thus, Chimalapa Zoque (Johnson 2000: 274) and Nuu-chah-nulth (Nakayama 2014: 455) do not show the incorporation of nouns that evoke specific referents. By contrast, Kalaallisut (Fortescue 1984: 251, 300), Mohawk (Baker 1988: 79, 1996: 288), Southern Tiwa (Allen, Gardiner, and Frantz 1984: 297) and Washo (Lemieux 2010: 154; Bochnak and Rhomieux 2013: 271) do allow the incorporation of nouns with specific reference. These languages additionally show incorporated nouns with referents that are not identifiable for the speaker. For instance, the incorporated noun *qimmi* 'dog' in the Kalaallisut example in (15) has a non-specific incorporation, while the Kalaallisut noun *piili* 'car' in example (16) has a specific interpretation.

(15) *qimmi-qar-puq*
dog-have-3SG.IND
'He has a dog/dogs/there are dogs.'
(Fortescue 1984: 300)

(16) *(sukka-suu-mik)* *piili-si-vuq*
(be.fast-INTR.PTCP-INS.SG) car-buy-3SG.IND
'He bought a (fast) car.'
(Fortescue 1984: 251)

Based on these facts we preliminarily propose the implication in (17).

(17) *Incorporation of −s nouns ⊃ Incorporation of +s nouns*

4.5 The pragmatic function of the incorporated noun

Finally, the possible pragmatic functions of incorporated nouns play a role in the IL-ML interface. It has been noted that in many languages, noun incorporation is a backgrounding device (Mithun 1984: 874; Gerdts 1998: 86; Massam 2017). Thus, nouns may be incorporated in order to mark them as having a Background function. Focal nouns, by contrast, are generally not found in incorporation constructions (Baker 1988: 78–79; Gronemeyer 1996: 29; Aikhenvald and Green 1998: 453; Lehmann and Verhoeven 2005: 117; DeClaire, Johns, and Kučerová 2017: 5, 7).

Mohawk is an example of a language in which incorporated nouns may have a background function but not a focus function (Mithun 1984: 869; Baker 1996: 290; DeClaire, Johns, and Kučerová 2017: 5–7). More precisely, in this language noun incorporation is obligatory unless either the noun or the verb has a focus function. Thus, example (18b), in which the incorporated noun *honwa* 'boat' has a background function, is grammatical, while example (19b) is not accepted. Here the incorporated noun *'sereht* 'car' has a focus function.

(18) a. *Ónhka   wa'ehonwahní:non'*
    onhka   wa'-e-honw-a-hninon-'
    who   FAC-F.SG-boat-LK-buy-PNCT
    'Who bought a boat?'

   b. *Wá:ri   wa'ehonwahní:non'*
    Wari   wa'-e-honw-a-hninon-'
    Mary   FAC-F.SG-boat-LK-buy-PNCT
    'MARY bought a boat.'
    (DeClaire, Johns, and Kučerová 2017: 4)

(19) a. *Wahahonwahní:non'*   *ken   ne   Sewátis?*
    wa-ha-honw-a-hninon-'   *ken   ne   Sewatis*
    FAC-M.SG-boat-LK-buy-PNCT   Q   PRT   John
    'Did John buy a boat?'

   b. *#Iah.   Waha'serehtahní:non'*
    iah   wa-ha-'sereht-a-hninon-'
    no   FAC-M.SG-car-LK-buy-PNCT
    'No. He bought a car.'
    (DeClaire, Johns, and Kučerová 2017: 4)

Similarly, in Ket "incorporation [tends] to be used to background an item in discourse", while a construction without incorporation is "used to topicalize the

same item" or "expresses instead a focused, unexpected, or otherwise individu-
ated verb-external object" (Vajda 2017: 910–911).

However, there are also languages in which both backgrounded and focal
nouns can be incorporated. In the Kalaallisut example (20a), *kaage* 'cake' is part
of the focal part of the message. In (20b) it is picked up again and therefore now
part of the background. In (21), the incorporated noun *aput* 'snow' refers to the
new topic introduced in this sentence and is therefore focal in nature, just like
kaage in (20a).

(20) a. *Ipassaq   kaage-liur-pugut.*
          yesterday   cake-make-1PL.IND
          'Yesterday, we made cake.'

      b. *Ullumi   kaage-rniar-pugut.*
          today   cake-sell-1PL.IND
          'Today, we are selling cake.'
          (van Geenhoven 1998: 37)

(21) (Piuutsuq was unable to continue)
      Nuna-Ø   aput-qar-lir-riir-puq.
      land-ABS.SG   snow-have-INGR-already-3SG.IND
      'Snow was on the land already.'
      (Bittner 2007, cited in Smit 2010: 247–248)

Given that we have not encountered languages in which focal nouns can be incor-
porated while backgrounded ones cannot, we speculate that the hierarchy in (22)
correctly describes the distribution of incorporated nouns with Background and
Focus function.

(22) *Incorporation of nouns with Background function ⊃ Incorporation of nouns
      with Focus function*

Based on the findings for noun incorporation and Background and Focus func-
tion, it could also be expected that other dimensions of information structure,
such as the one dividing a discourse act into Topic versus Comment and the one
distinguishing Overlap and Contrast, are subject to similar hierarchies, as sug-
gested in (23) and (24):

(23) *Incorporation of nouns with Topic function ⊃ Incorporation of nouns with
      Comment function*

(24) *Incorporation of nouns with Overlap function ⊃ Incorporation of nouns with Contrast function*

However, data concerning pragmatic functions of incorporated nouns are very limited and the definitions of topic and contrast used in different studies vary greatly. For this reason, these expectations could not be tested.

5 The RL-ML interface

5.1 Introduction

At RL, too, there are many factors that (co-)determine whether or not noun incorporation is allowed in a language. These include the following:

(i)   The semantic layer of the incorporated noun: does the noun designate a Property or an Entity?
(ii)   The semantic function of the incorporated noun: is it an Undergoer, an Actor or something else?
(iii)   The type of dependent element with respect to the incorporating verb: is the incorporated noun an intransitive argument, transitive argument or a modifier?
(iv)   Alignment system: for verbs with more than one argument, which argument may be incorporated?
(v)   Relationality: is the incorporated noun relational or non-relational?

5.2 The semantic layer of the incorporated noun

Incorporated nouns may either be Property-denoting nouns, i.e. nouns at the RL layer of the Property, here called f-nouns, or Entity-designating nouns, such as nouns at the RL layer of the Individual or other RL layers, here indicated as α-nouns (Smit 2005: 102–103). These types of incorporated nouns can be differentiated based on their modification possibilities: f-nouns are non-modifiable, while α-nouns can be modified.[6] Languages differ in which of these types of nouns they show in incorporation constructions: they may limit incorporation to

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6 It is possible for f-nouns to combine with Property modifiers (Hengeveld and Mackenzie 2008: 230–231). However, because this type of modification is highly marginal, we consider f-nouns as non-modifiable here.

f-nouns, only allow α-nouns as incorporated nouns, or show both incorporated f-nouns and incorporated α-nouns.

In Western Frisian all incorporated nouns are f-nouns. The examples in (25) show that it is not possible to modify an incorporated noun in this language by means of plural inflection (25a), determiners (25b), adjectives (25c) or adpositional phrases (25d).[7]

(25) a. *Heit   jerappel/*jerappel-s dolt   de   hiele   dei*
       father   potato/potato-PL   digs DEF   whole   day
       'Our father is digging potatoes all day long.'

    b. *De   buorlju   sieten   bûten   te *de/*dy/*sokke wyn-drinken*
       DEF   neighbours sat   outdoors to DEF /DEM /such   wine-drink
       'The neigbours sat outdoors to drink the/that/such wine.'

    c. **Heit   sit   te   grouwe   jerappel-skilen*
       father sits to   huge   potato-peel
       'Father is sitting, peeling huge potatoes.'

    d. **Heit   sit   te   jerappel mei   in   soad spruten skilen*
       father sits to   potato   with INDF lot   sprouts peel
       'Father is sitting, peeling potatoes with a lot of sprouts.'
       (Dijk 1997: 15–16)

In contrast to the Western Frisian incorporated nouns, incorporated nouns in Niuean are always α-nouns. In this language three types of noun incorporation can be recognized, which are called "general", "existential" and "instrumental" (Seiter 1980, cited in Massam 2001: 167). Incorporated nouns in each of these types are α-nouns, as they may be modified by relative clauses and/or constitute the head of full noun phrases (Massam 2001: 169, fn. 18, 175, 178). An example of a Niuean incorporated noun modified by a relative clause is shown in (26).[8]

(26) *Ne fai   fale   a   Sione ne   tā   e   au.*
      PST have house ABS Sione PST build ABS I
      'Sione has a house that I built.'
      (Massam 2001: 175)

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7 In Western Frisian, the morphosyntactic word status of noun incorporation constructions can be identified on the basis of the verbal infinitive marker *te*, which usually directly precedes the verbal word but precedes the noun in a noun incorporation construction, as in (25b–d).
8 In Niuean, verbal enclitics follow incorporated nouns (Seiter 1980: 69), thus showing that the incorporated noun and the incorporating verb form a single morphosyntactic word.

Finally, in Bininj Kun-Wok both incorporated f-nouns and incorporated α-nouns are found. Incorporated body-part nouns and incorporated generic nouns, which function semantically as arguments of incorporating verbs, may be modified by adjectives, possessive pronouns, demonstratives, numerals and relative clauses (Evans 2003: 452), as exemplified in (7) above. By contrast, incorporated nouns functioning as secondary predicates, shown in (8), are not modifiable (Evans p.c.) and can thus be considered f-nouns. These examples are repeated here for convenience.

(7) *Nga-murrng-bimbom   na-mekke.*
   1>3-bone-paint.PST.PFV   M-DEM
   'I painted those bones.'
   (Evans 2003: 235)

(8) *Birri-yaw-ni.*
   3.AU-baby/child-sit.PST.IPFV
   'They sat down like children.'
   (Evans 2003: 484)

These facts from Western Frisian, Niuean and Bininj Kun-Wok illustrate that an implicational relationship cannot be established between the incorporation possibilities of the two semantic types of nouns (see also Olthof 2020b). Languages therefore need a basic setting for this parameter, as given in (27).

(27) *Incorporation of f-nouns / Incorporation of α-nouns / Incorporation of both f-nouns and α-nouns*

Within the class of α-nouns, the ones designating Individuals exhibit in many languages a distinction between those designating animate Entities and those designating inanimate Entities. In these languages, inanimate nouns may be the only type of nouns that can be incorporated (Mithun 1984: 863; Borik and Gehrke 2015: 5) or may "incorporate more readily than animate nouns" (Gerdts 1998: 85; see also Lehmann and Verhoeven 2005: 115; Sadock 2006: 585). This asymmetry between animate and inanimate nouns may be related to the different functions of animate and inanimate nouns in discourse, as animate nouns are typically more central in discourse than inanimate ones, while incorporation often functions to background nouns (Mithun 1984: 863; Gerdts 1998: 85–86).

In Southern Tiwa, incorporation is obligatory for inanimate direct objects, inanimate subjects of intransitive verbs, animate non-human direct objects (unless they are singular and co-occur with an external modifier, in which case incorporation is optional) and plural human direct objects (unless they co-occur

with an external modifier, in which case incorporation is optional) (Allen, Gardiner, and Frantz 1984: 293, 295, 296, 299–300). By contrast, human singular direct objects are only optionally incorporated (unless when the subject is third person, in which case the incorporation is obligatory) (Allen, Gardiner, and Frantz 1984: 294) and animate subjects are never incorporated (Allen, Gardiner, and Frantz 1984: 298). Animacy thus influences the possibility or obligation to use an incorporation construction in Southern Tiwa, and the language prefers inanimate incorporated nouns.

Animacy is also relevant for incorporation in Bininj Kun-Wok. This language makes use of three types of productive, semantically transparent noun incorporation: body-part noun incorporation, generic noun incorporation and secondary predicate incorporation (Evans 2003: 325). Although incorporated secondary predicate nouns may be animate and body-part nouns could be considered animate nouns, generic noun incorporation uses a closed set of around 60 nouns (Evans 2003: 332–333). These are almost all inanimate (Evans 2003: 390). This set includes only three human nouns, *daluk* 'woman', *bininj* 'man' and *beywurd* 'child' and one other animate noun *bod* 'bee' (Evans 2003: 473).

Finally, there are also languages in which animacy does not play a role in incorporation. For instance, in Nuu-chah-nulth, both human entities, other animate entities and inanimate entities can be found in noun incorporation constructions (Stonham 2008: 512).

These facts lead us to tentatively postulate the following implicational hierarchy:

(28)   *Incorporation of inanimate nouns ⊃ Incorporation of non-human animate nouns ⊃ Incorporation of human animate nouns*

5.3 The semantic function of the incorporated noun

There seems to be a general preference for the incorporation of nouns in Undergoer function: languages that allow the incorporation of nouns with other semantic functions always allow the incorporation of Undergoers as well (Mithun 1984: 875; Lehmann and Verhoeven 2005: 118).[9] In addition, it has often been argued in the literature that nouns functioning as Actors cannot be incorporated or are at least very unlikely to be incorporated (Mithun 1984: 863; Gerdts 1998: 87; Massam

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9 Undergoer arguments are alternatively called patients, objects of transitive verbs or subjects of stative verbs in the sources used here.

2009: 1089; Johns 2017).[10] Nevertheless, a few languages have been shown to allow such incorporation. Based on examples from these languages, we speculate that the incorporation of Actors is not impossible but rather appears at the lowest position of the hierarchy regarding the semantic functions of incorporated nouns.

In Palikúr, incorporation is restricted to Undergoer arguments (Aikhenvald and Green 1998: 451). Example (29) shows the incorporation of the Undergoer argument of a transitive verb, while in example (30) the Undergoer argument of an intransitive verb is incorporated. Note that in the latter example the possessor of the Undergoer argument appears as the subject of the verb. Such constructions with possessors occurring as clausal arguments are also known as external possessor constructions (Payne and Barshi 1999: 3, 6).

(29) *kuri*   *ig*   *hakis-ota-ne*   *han*   *akiw*
     now   3.M   rub-eye-CONT.NF   thus   again
     'He continued rubbing his eyes again.'
     (Aikhenvald and Green 1998: 452)

(30) *eg*   *barew-kug*
     3.F   clean-foot
     'She is clean-footed.' (i.e. 'Her feet are clean.')
     (Aikhenvald and Green 1998: 452)

In Mapudungun, Undergoers, such as *pullku* 'wine' in (31), and Locative modifiers of intransitive verbs, such as *kawellu* 'horse' in (32), can be incorporated, while nouns functioning as Actor arguments and other modifiers cannot occur as incorporated nouns (Baker, Aranovich, and Golluscio 2005: 171; Zúñiga 2017: 703–705).[11]

(31) *Juan*   *ngilla-pullku-la-y.*   *Iñche*   *ngilla-fi-ñ.*
     Juan   buy-wine-NEG-3SG.SBJ.IND   I   buy-3.OBJ-1SG.SBJ.IND
     'Juan didn't buy the wine. I bought it.'
     (Baker, Aranovich, and Golluscio 2005: 146)

(32) *püra-kawellu-*
     ascend-horse
     'mount a horse'
     (Zúñiga 2017: 705)

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10 Actor arguments are alternatively called agents, subjects of active intransitives, subjects of transitives, or agentive subjects in the sources used here.
11 Locative modifiers are alternatively called location or ground in the sources used here.

Yucatec Maya allows the incorporation of Undergoer arguments, Instrument modifiers and Locative modifiers (Lehmann and Verhoeven 2005: 149). *Che'* 'tree' in example (1b) above, repeated below, *k'ab* 'hand' in example (33) and *pach* 'back' in example (34) illustrate the incorporation of nouns with these semantic functions.

(1)   b.   *h   ch'ak-che'-nah-en   ichil   in   kòol*
            PST   cut-tree-COMPL-1SG.ABS   in   1SG.POSS   milpa
            'I chopped trees in my cornfield.'
            (Bricker, Po'ot Yah, and Dzul de Po'ot 1998: 354,
            cited in Lehmann and Verhoeven 2005: 150)

(33)   *in   lom-k'ab-t-ik-ech*
        3.SBJ   poke-hand/finger-TR-INCOMPL-2SG.ABS
        'I poke you with my finger.'
        (Sullivan 1984: 151; Lehmann and Verhoeven 2005: 161)

(34)   *táan   in   kuch-pach-t-ik   in   nal*
        PROG   1SG.SBJ   load-back-TR-INCOMPL   1SG.POSS   corn
        'I am carrying my corn on my back (multiple trips).'
        (Bricker, Po'ot Yah, and Dzul de Po'ot 1998, cited in Lehmann and
        Verhoeven 2005: 166)

In Movima, incorporated Undergoer arguments (35), Instrument modifiers (36) and Locative modifiers (37–38) are found as well (Haude 2006: 368, 383, 384).

(35)   *ij   wul-a-saniya   (ni-kis   saniya)*
        2.INTR   sow-DR-melon   OBL-ART.PL.AB   melon
        'You sow melon.'
        (Haude 2006: 368)

(36)   *jayna   nis-na=is   is   bari=is   di'   jayna*
        DISC   wipe.clean-DR=PL.AB   ART.PL   foot=PL.AB   REL   DISC
        ay'-but-eł   n-is   bereya:-buń
        smear-BR.mud-APPL   OBL-ART.PL   tar-BR.mud
        'Then they wiped clean their feet (of the macaws), which were smeared
        with tar.'
        (Haude 2006: 385)

(37) *am-a-sɨɬ-a=is*   *os*   *lume'*   *n-os*   *sɨɬ-kwa*
enter-DR-BR.hole-LV=PL.AB ART.N.PST agouti OBL-ART.N.PST BR.hole-ABSS
'They (the dogs) made the agouti go into the hole.'
(Haude 2006: 384)

(38) *kas*   *isko-ni-wa*   *rey*   *ja'*   *ena'*   *kamay-chorada-neɬ*
NEG   3PL.AB-VBLZ-NMLZ again just DUR.STD yell-street-APPL
'Those were not just yelling in the street.'
(Haude 2006: 384)

South Slavey shows incorporated nouns with various semantic functions. Example (39) shows the incorporation of the Undergoer argument *too* 'night'. Example (40) demonstrates that in this language Locative modifiers can be incorporated, whereas (41) exemplifies Instrument modifier incorporation. In addition, South Slavey Actor arguments can be incorporated, as in example (42).

(39) *too-go-d-í-tl'e*
night-area-QU-QU-be.dark
'It (night) is dark.'
(Rice 1989: 655, cited in Rice 2008: 386)

(40) *k'e-ke-e-h-dzoh*
around-foot-ASP-1SG.SBJ-slide
'I skated, slid on feet.'
(Rice 1989: 665, cited in Rice 2008: 387)

(41) *tse*   *na-xee-ye-'a*
wood   back-pack-3.DOBJ-handle.default.object
'S/he is packing wood back.' (i.e. 'S/he is handling wood by means of pack.')
(Rice 1989: 664, cited in Rice 2008: 387)

(42) *be-se-we-h-xee*
sleep-1SG.DOBJ-QU-CAUS-kill.SG.OBJ
'I am sleepy.' (i.e. 'Sleep overcomes me.')
(Rice 1989: 663, cited in Rice 2008: 387)

Finally, Sora shows the incorporation of Undergoer arguments of transitive verbs (Anderson 2017: 937), such as *dʒaʔt* 'snake' in (43). Locative modifiers (44) and Instrument modifiers (45) can be incorporated too. In addition, Actor arguments

of transitive verbs can be incorporated in this language (Anderson 2017: 945–946), as shown in (46).

(43) *ɲen ɲam-dʒaʔt-[t]ɩ-n-aj*
     I   catch-snake-NPST-INTR-1.SBJ
     'I am catching a snake.'
     (Anderson 2017: 939)

(44) *lem-dʒeŋ-te-ben-dʒi*
     bow-foot-NPST-2PL.OBJ-3PL.SBJ
     'They bow to your feet.'
     (Anderson 2017: 937)

(45) *ɲen a-dʒiŋ-ɩn-dʒi=aɖoŋ aba:-si-t-ai*
     I   3-foot-NSFX-PL=OBJ   wash-hand-NPST-1.SBJ
     'I am washing their feet by hand.'
     (Anderson 2017: 937)

(46) *ɲem-bud-t-am*
     seize-bear-NPST-2.OBJ
     'The bear will seize you.'
     (Anderson 2017: 946)

Table 1 summarizes the possible semantic functions of incorporated nouns in these different languages.

Table 1: Semantic functions of incorporated nouns in six languages.

Language	Undergoer	Other semantic functions (Locative, Instrument)	Actor
Palikúr	+	−	−
Mapudungun	+	+	−
Yucatec Maya	+	+	−
Movima	+	+	−
South Slavey	+	+	+
Sora	+	+	+

Table 1 reflects the hierarchy given in (47):

(47) *Incorporation of Undergoer ⊃ Incorporation of other semantic functions ⊃ Incorporation of Actor*

5.4 Type of dependent with respect to the incorporating verb

Incorporated nouns and incorporating verbs are in a dependency relation of the form head-modifier or predicate-argument. Typically, the incorporated noun is either a modifier or an argument of the incorporating verb (Mithun 2000: 917; Haugen 2015: 414–415).[12] It has been proposed that the incorporation of nominal modifiers only occurs in languages that also show the incorporation of nominal arguments (Mithun 1984: 875; Aikhenvald 2007: 19). More specifically, it seems that all incorporating languages allow the incorporation of transitive (Undergoer) arguments, that languages may additionally incorporate intransitive (Undergoer) arguments, and that languages that show both incorporated transitive and intransitive arguments may optionally also allow incorporated modifiers (Mithun 1984: 875; Haspelmath 2018: 318, fn. 9).[13]

In Kalamang, incorporation appears to be restricted to transitive arguments (Visser p.c.). An example of an incorporation construction in Kalamang is shown in (48).[14]

(48) *ma   mua'waruo*
      ma   muap-paruo
      3SG   food-make
      'She is cooking.'
      (Visser, Van Lier, and Olthof 2019)

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12 In addition, incorporated nouns may function as nominal predicates in constructions in which the incorporating verbs function as semi-copula (Hengeveld 1992: 34–39), as in the Ket example in (i).

(i) *tab-aŋ-t-o-n-aq*
     dog.PL-3PL.AN.SBJ-TC-PST-PST-become
     'They turned into dogs.'
     (Vajda 2017: 918)

In such cases, the incorporating verb may be considered an operator of the nominal predicate, which then functions as the head of the verbal operator.

13 Some languages also show the incorporation of arguments into ditransitive verbs. This type of incorporation is addressed in the discussion of morphosyntactic alignment in Section 5.5.

14 In the isolating language Kalamang, the absence of the accusative marker on a noun that directly precedes a verb shows that it is incorporated (Visser p.c.).

In Nadëb, arguments can be incorporated into transitive and intransitive verbs, as shown in example (49) and (50) respectively.[15]

(49) *ta=tú   i-tïï*
      3SG=food   ASP-fish
      'He is fishing his (i.e. someone else's) food.'
      (Weir 1990: 331)

(50) *ïïh=tʉg   da-tés*
      1SG=tooth   TH-hurt
      'I have toothache.' (lit. 'I tooth-hurt.')
      (Weir 1990: 323)

These types of noun incorporation are the only possible types in Nadëb (Weir 1990: 325), which entails that modifier incorporation is not found in this language.

    In Hokkaido Ainu, incorporation is also limited to nouns functioning as transitive or intransitive arguments. In this language, four types of incorporation are recognized: transitive Undergoer incorporation, intransitive argument incorporation in which the argument is a natural phenomenon noun, intransitive argument incorporation in which the argument is a body-part in its possessive form and transitive Actor incorporation in which the incorporated Actor is a (super)natural phenomenon or insect noun (Bugaeva 2017: 897).

    By contrast, in Chukchi both incorporated transitive arguments, incorporated intransitive arguments and incorporated modifiers are found. Firstly, in example (51), the incorporated noun *wala* 'knife' functions as the Undergoer argument of the transitive incorporating verb *mna* 'sharpen'.

(51) *Mə-wala-mna-rkən*
      1PL.S.INT-knife-sharpen-1PL.S
      'Let us sharpen the knives.'
      (Skorik 1948: 73, cited in Spencer 1995: 445)

Secondly, the incorporated noun *ətlʔa* 'mother' in example (52) is the intransitive Undergoer argument of the intransitive incorporating verb *wʔe* 'die'.

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15 In Nadëb, incorporated nouns, which precede the stem of the incorporating verb, follow the pronouns that appear as verbal proclitics, such as *ta=* in (49) (Weir 1990: 331). An incorporated noun and an incorporating verb thus form a single morphosyntactic word together. However, the noun and verb remain independent phonological words (see Section 6.3).

(52) *ətləg-ən   ətlʔa-wʔe-gʔe*
      father-ABS   mother-die-3SG.S
      'Father's mother died (on him).'
      (Polinskaja and Nedjalkov 1987: 259, cited in Spencer 1995: 450)

Thirdly, in example (53), the incorporated noun *ənnə* 'fish' is a modifier that in a clause without incorporation would take so-called instrumental case-marking (Skorik 1948: 72, cited in Spencer 1995: 457).

(53) *[. . .]   ənnə-tke-rkən*
           fish-smell-3SG.S
      '[. . .] (it) smells of fish.'
      (Skorik 1948: 72, cited in Spencer 1995: 457)

Like Chukchi, Ket shows the incorporation of arguments that normally function as transitive Undergoers, exemplified in (54), the incorporation of arguments of intransitive verbs, as in example (55), as well as the incorporation of modifiers, shown in example (56).[16]

(54) *da=nan-si-bed*
      3.F.SBJ=bread-PRS-make
      'She is making bread.'
      (Vajda 2017: 912)

(55) *ul-a-ta*
      rain-PRS-falls
      'It rains.'
      (Vajda 2017: 921)

(56) *assano   keʼd   tīb   d=sal-a-t-a-kit*
      hunting   person   dog   3.SBJ=tobacco-3SG.M.OBJ-TC-PRS-rub
      'The hunter "tobaccoed" the dog (to rid it of fleas).'
      (Vajda 2017: 916)

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16 Note that this sentence cannot be read as 'the hunter rubbed tobacco on the dog', as 'the dog' is cross-referenced on the verb as an object.

Finally, Western Frisian also shows incorporated arguments and modifiers (Dijk 1997: 94, 136, 162). Note, however, that the incorporation of intransitive incorporated arguments is limited to a few isolated cases in sentences with expletive subjects, such as the one in example (57) (Dijk 1997: 162).

(57) *It begjint te snie-wiskjen*
      It begins to snow-fly
      'The snow begins to fly.'
      (Dijk 1997: 162)

Table 2 shows the types of dependents found in incorporation constructions in the different languages.

Table 2: Types of incorporated dependents in five languages.

Language	Transitive argument	Intransitive argument	Modifier
Kalamang	+	–	–
Nadëb	+	+	–
Hokkaido Ainu	+	+	–
Chukchi	+	+	+
Ket	+	+	+
Western Frisian	+	+	+

The implicational hierarchy that may be derived from Table 2 is given in (58).

(58) *Incorporation of transitive arguments ⊃ Incorporation of intransitive arguments ⊃ Incorporation of modifiers (adjuncts)*

Interestingly, in cases in which the only argument of an intransitive verb is incorporated, the incorporation construction, i.e. a single Morphosyntactic Word at ML, may correspond to a complete Configurational Property at RL. In such cases, noun incorporation creates a transparent match between a single unit at RL and a single unit at ML. In this respect, there is a contrast between the incorporation of arguments into intransitive verbs on the one hand and the incorporation of arguments into transitive verbs and the incorporation of modifiers on the other hand. Note finally that a language's ability to incorporate full Configurational Properties also adds to this language's degree of polysynthesis, in that a relatively high unit at RL corresponds to a single Word at ML (see Genee 2018: 257–260).

5.5 Morphosyntactic alignment

In FDG, the selection of arguments with specific semantic functions in certain privileged syntactic positions is handled by the interface between RL and ML as well. For instance, at the Clause layer, the choice of arguments with certain semantic functions to fulfill the role of Subject and Object is handled by this interface. A language shows an accusative or ergative alignment if there is neutralization between the argument of an intransitive verb and the Actor or Undergoer argument of a transitive verb. Furthermore, on the basis of neutralization between the Undergoer argument of a transitive verb and the Undergoer or Locative argument of a ditransitive verb, languages can be characterized as either indirective or secundative.

Similarly, at the Morphosyntactic Word layer, similarly the choice of arguments that can be incorporated is an issue of alignment. The alignment system of a language for noun incorporation may simply depend on the interpersonal or representational characteristics of the arguments, but may also be of the morphosyntactic type. The following examples demonstrate that the different morphosyntactic alignment systems distinguished for the Clause layer are found at the Morphosyntactic Word layer, i.e. in noun incorporation, as well.

In Bininj Kun-Wok the only argument of an intransitive (59–60) and the Undergoer argument of a transitive verb (61) can be incorporated, while Actor arguments of transitive verbs cannot (Evans 2003: 455, 468–471).

(59) *Ga-wardde-djabdi.*
  3-rock-stand.up.straight.NPST
  'There is a rock standing up straight.'
  (Evans 2003: 451)

(60) *Ga-yau-dolga-n.*
  3-baby/child-get.up-NPST
  'The baby (kangaroo) gets out of its pouch.'
  (Evans 2003: 468)

(61) *Al-ekge al-gohbanj   ba-gurlah-bimbu-ni.*
  F-DEM   II-old.person   3>3.PST-skin-paint-PST.IPFV
  'That old lady used to paint buffalo hides.'
  (Evans 2003: 451)

Note that, in the case of intransitive verbs, both Actors and Undergoers can be incorporated (Evans 2003: 468), which shows that the alignment system for incor-

poration in Bininj Kun-Wok cannot be explained solely on the basis of semantic functions. Thus, the alignment system for noun incorporation in this language is not representational in nature, as it neutralizes the semantic functions Actor and Undergoer. Rather, this language has a morphosyntactic alignment system of the ergative type (see also Hengeveld and Mackenzie 2008: 408).

Kalamang, on the other hand, has an accusative system, as it allows the incorporation of transitive Undergoers, as exemplified in (48) in Section 5.4, but not of intransitive arguments (Visser p.c.).

With respect to ditransitive verbs, noun incorporation is typically limited to Undergoer arguments, such that most languages have an indirective alignment system (Malchukov, Haspelmath, and Comrie 2010: 42). Thus, Southern Tiwa incorporates the Undergoer arguments of both transitive (62) and ditransitive (63) verbs (Allen, Gardiner, and Frantz 1984: 293, 303; see also Hengeveld and Mackenzie 2008: 408–409):

(62) *Ti-seuan-mũ-ban.*
    1SG>SG-man-see-PST
    'I saw the/a man.'
    (Allen, Gardiner, and Frantz 1984: 294)

(63) *Ti-'u'u-wia-ban*   *ĩ-'ay.*
    1SG>SG-baby-give-PST   2SG-ALL
    'I gave the baby to you.'
    (Allen, Gardiner, and Frantz 1984: 303)

Nivkh, on the other hand, has secundative alignment in noun incorporation, as the Locative of a ditransitive verb (64) can be incorporated, just like the Undergoer of a transitive verb, as shown in (65) (Mattissen 2003: 137, 140; see also Hengeveld and Mackenzie 2008: 408–409):

(64) *objezdṭik*   *k'e*   *atak-asqam-ḍ*
    bay.watcher   net   grandfather-take.away-IND
    'The bay watcher took the net away from grandfather.'
    (Otaina 1978: 34, cited in Mattissen 2003: 142)

(65) *atak*   *k'e-seu-ḍ*
    grandfather   net-dry-IND
    'Grandfather dried the net.'
    (Otaina 1978: 34, cited in Mattissen 2003: 137)

Finally, in Hokkaido Ainu, ditransitive verbs may sometimes incorporate both their Undergoer argument and their Locative argument at the same time (Bugaeva 2017: 899), as in (66).

(66)   *cep-ya-o-kuta=an*
       fish-shore-APPL-throw=INDF.S
       'I threw the fish (he caught) onto the shore.'
       (Nakagawa, Bugaeva, and Kobayashi 2016, cited in Bugaeva 2017: 883)

Based on examples like (66), we conclude that languages may also have a neutral alignment system for noun incorporation.

The alignment system of a language in its incorporation strategies is not predictable from other properties and therefore has to be stipulated as a basic property of the language, as in (67).

(67)   *Accusative / Ergative / Neutral*
       Indirective / Secundative / Neutral

5.6 Relationality

In many languages, relational nouns or, more specifically, body-part nouns are either the only type of nouns that can be incorporated or the type of nouns that is incorporated most frequently or easily (Mithun 1986: 383; Aikhenvald 2007: 20; Massam 2009: 1090). Moreover, in some languages incorporation is limited to constructions in which a body-part noun or another relational noun is incorporated and its (inalienable) possessor is expressed as an argument of the incorporating verb, i.e. as an external possessor.

In Palikúr, incorporation is limited to body-part nouns (Aikhenvald and Green 1998: 451; Aikhenvald 2007: 20). These nouns are obligatory possessed, and when they are incorporated, their possessor is generally expressed as the direct object, in the case of a transitive incorporating verb, or as the subject, in the case of an intransitive incorporating verb (Aikhenvald and Green 1998: 451–452). An example of an incorporated body-part noun with its possessor expressed as direct object is shown in (68), in which the noun *ot* 'eye' is incorporated and its 3rd person singular possessor is expressed as the verbal suffix *-gi*. The incorporation of a body-part noun and the expression of its possessor as subject was exemplified in (30) above, repeated below.

(68) *ig-kis hapis patuk-ot-bet-h-e-gi*
3.M-PL shoot burst-eye-MULT-INTS-COMPL-3.M
'They shot his eyes out.' (lit. 'They eye-shot-him.')
(Aikhenvald and Green 1998: 452)

(30) *eg barew-kug*
3.F clean-foot
'She is clean-footed.' (i.e. 'Her feet are clean.')
(Aikhenvald and Green 1998: 452)

In contrast to Palikúr, Yucatec Maya does not restrict incorporation to body-part nouns or relational nouns. This language shows both the incorporation of body-part nouns, such as *k'ab* 'hand' and *pach* 'back' in example (33) and (34) above, and the incorporation of non-body-part nouns, such as *che'* 'tree' in example (1b). The examples are repeated here for convenience.

(33) *in lom-k'ab-t-ik-ech*
3.SBJ poke-hand/finger-TR-INCOMPL-2SG.ABS
'I poke you with my finger.'
(Sullivan 1984: 151; Lehmann and Verhoeven 2005: 161)

(34) *táan in kuch-pach-t-ik in nal*
PROG 1SG.SBJ load-back-TR-INCOMPL 1SG.POSS corn
'I am carrying my corn on my back (multiple trips).'
(Bricker, Po'ot Yah, and Dzul de Po'ot 1998, cited in Lehmann and Verhoeven 2005: 166)

(1) b. *h ch'ak-che'-nah-en ichil in kòol*
PST cut-tree-COMPL-1SG.ABS in 1SG.POSS milpa
'I chopped trees in my cornfield.'
(Bricker, Po'ot Yah, and Dzul de Po'ot 1998: 354, cited in Lehmann and Verhoeven 2005: 150)

Based on these facts we tentatively suggest the hierarchy given in (69).

(69) *Incorporation of relational nouns ⊃ Incorporation of non-relational nouns*

6 The ML-PL interface

6.1 Introduction

PL receives its input from ML. It is here that it is determined how the incorporated noun is realized segmentally and prosodically. We therefore consider here the following issues:

(i) Type of head: is it suppletive or non-suppletive?

(ii) The phonological layer of the incorporated noun: is it a separate Phonological Word (Pw) or is it part of the verbal Pw?

In the area of the interface between ML and PL no hierarchies have been proposed that would capture the cross-linguistic constraints on incorporation. Rather, it seems that languages use two basic settings in the interaction between these two levels.

6.2 Type of head

In some languages, (some) nouns take suppletive or phonologically alternate forms when they are incorporated, while in other languages incorporated nouns have the same form as unincorporated ones (Mithun 1984: 876; Aikhenvald 2007: 13; Caballero et al. 2008: 387–388). In Sora, incorporated nouns have special forms, called "combining forms", which are monosyllabic or mono-moraic counterparts of the "full forms" that are used in contexts without incorporation (Anderson 2007: 175). The full forms typically show some similarity to the combined forms in that the full forms often appear to be derived from the corresponding combining forms by either reduplication, prefixation, suffixation or compounding (Anderson 2007: 175). For instance, the noun meaning 'banana' has the full form *kənte* and the combining form *-te*, as shown in (70).

(70) a. *ɲen kənte-n   dʒum-t-ai*
      I   banana-NSFX   eat-NPST-1.SBJ
      'I am eating a banana.'

   b. *ɲen dʒum-te-ti-n-ai*
      I   eat-banana-NPST-INTR-1.SBJ
      'I am eating a banana.'
      (Anderson 2017: 939)

Incorporated body-part nouns in Palikúr either have the same form as unincorporated body-part nouns or alternate forms that are clearly related to the unincorporated body-part nouns (Aikhenvald and Green 1998: 451). The set of body-part nouns that can be incorporated is presented in Table 3, in which both the independent and incorporated forms are included.

Table 3: Forms of unincorporated body-part nouns, body-part nouns incorporated into stative verbs and body-part nouns incorporated into transitive verbs in Palikúr (Aikhenvald and Green 1998: 451).

Form of unincorporated noun	Form of noun incorporated into a stative verb	Form of noun incorporated into a transitive verb
duk 'chest'	*-duk*	*-duka*
kugku 'foot'	*-kug*	*-kuga*
wak 'hand'	*-ok*	*-oka*
tew 'head'	*-tiw*	*-tew*
utyak 'eye'	*-ot*	*-(h)ot(a)*
biy 'mouth'	*-bi*	*-biya*
tip 'top (lid)'	*-tip*	*-tipa*

Finally, in Mapudungun incorporated and unincorporated nouns have the same form, as shown by the nouns *wün* 'snout' and *waka* 'cow' in example (71) and (72) respectively.

(71) *Püff pi   nga ñi   wün   ngürü,*
     paff say.3SG.SBJ PRT 3.POSS snout   fox
     wichaf-wün-tu-y   [. . .].
     become.big-snout-RE-3SG.SBJ.IND
     'The fox said "paff!" with his snout, (and) his snout became big again [. . .].'
     (Salas 1992: 303–304, cited in Baker, Aranovich, and Golluscio 2005: 167)

(72) a. *Ñi   chao   kintu-le-y   ta.chi pu   waka.*
         my   father seek-PROG-3SG.SBJ.IND the   COLL cow
         'My father is looking for the cows.'

     b. *Ñi   chao   kintu-waka-le-y.*
         my   father seek-cow-PROG-3SG.SBJ.IND
         'My father is looking for the cows.'
         (Salas 1992: 195, cited in Baker, Aranovich, and Golluscio 2005: 139)

Whether an incorporating language displays suppletive forms cannot be predicted from other properties of the language. The grammar therefore needs a basic setting as in (73).

(73) *Incorporated nouns have suppletive forms / Incorporated nouns have non-suppletive forms*

6.3 The phonological layer of the incorporated noun

Incorporation constructions may or may not form single Phonological Words (Mithun 1984: 849; Aikhenvald 2007: 14–15; Caballero et al. 2008: 385–386). In some languages, there is clear evidence for the status of incorporation structures as Phonological Words. For instance, in Chukchi the vowel harmony rules that operate in phonological words are also at work in incorporation constructions (Mithun 1984: 875; Spencer 1995: 445). This is shown in example (74), part of which repeats example (51).

(74) a. *Wala-t*   *mə-mne-rkənet*
          knife-ABS.PL   1PL.A.INT-sharpen-3PL.P
          'Let us sharpen the knives.'

      b. *Me-wala-mna-rkən*
          1PL.S.INT-knife-sharpen-1PL.S
          (Skorik 1948: 73, cited in Spencer 1995: 445)

The recessive vowel *e* in the verbal stem *mne* 'sharpen' changes into the dominant vowel /a/ under influence of the dominant *a* vowels in the incorporated noun in (74b).

In Cayuga, an incorporated noun and its incorporating verb also form a single phonological word. In this language, phonological words have stress on their fourth syllable, and this pattern also holds for incorporation constructions (Mithun 1994, cited in Aikhenvald 2007: 14).

In other languages, however, incorporation constructions do not form single Phonological Words, even though they constitute Morphosyntactic Words. In Yimas, for instance, incorporated nouns and their incorporating verbs may both carry stress like independent phonological words (Foley 1991: 84). Thus, in example (75), both the incorporated deverbal noun /wacakm/ and the verb including the stem /tɨ/ carry phonological word stress.

(75) *mamam   p-na-waca-k-m-tɨ-n*
      sore.VII.SG   VII.SG.S-DEF-small-IRR-VII.SG-become-PRS
      'The sore is getting smaller.'
      (Foley 1991: 83)

In addition, the form of the class and number agreement marker on the incorporated noun /wacakm/ shows that this incorporated noun is an independent phonological word. The marker takes the form /m/, which is the allomorph that is used word-finally, rather than the form /mp/, which is the allomorph that normally occurs in word-medial position (Foley 1991: 84).

    In Nadëb, the position of verbal clitics shows that an incorporated noun and an incorporating verb form a single morphosyntactic word (Weir 1990: 330–331). Nevertheless, just like in Yimas, the noun and the verb remain independent phonological words in terms of stress placement (Weir 1990: 323, 330–331). In example (49) above, repeated here, for instance, the verbal proclitic *ta* appears in front of the incorporated noun, thus showing that the noun *tú* 'food' is part of the verb with the stem *tɨɨ* 'fish' morphosyntactically. At the same time, nouns and verbs in incorporation constructions are stressed independently and can therefore be considered independent phonological words.

(49) *ta=tú   i-tɨɨ*
      3SG=food   ASP-fish
      'He is fishing his (i.e. someone else's) food.'
      (Weir 1990: 331)

Whether or not incorporated nouns in a particular form separate Phonological Words cannot be predicted from other properties of the language. It therefore has to be specified as a basic setting in the grammar, as given in (76).

(76) *Incorporated nouns as separate Pw / Incorporated nouns as part of the verbal Pw*

7 A worked example

7.1 Introduction

One complete set of interface conditions for noun incorporation can be exemplified for Kalaallisut on the basis of the constructions in example (77–81). In order to show how these interface conditions are dealt with in FDG, we provide the

underlying representations at the four levels of analysis in FDG for these examples, which will serve as a point of reference for the ensuing discussion. Our representations at the Phonological Level are tentative, and based on Arnhold (2014). Arnhold (2014: 221) assumes that for Kalaallisut the mora, the phonological word and the intonation phrase are the relevant prosodic units. We will only consider the latter two. Arnhold (2014: 221) furthermore argues that generally the phonological word coincides with the morphological and syntactic word, something we will assume below as well. Intonation contours are not indicated, as these are not relevant to our concerns here.

(77) *pinnir-su-ni*k   *pani-qar-puq*
      be.beautiful-INTR.PTCP-INS.PL   daughter-have-3SG.IND
      'He has beautiful daughters.'
      (Kristoffersen 1992: 154)

IL: $(A_I: [(F_I: DECL (F_I)) (P_I)_S (P_J)_A (C_I: [(T_I) (R_I) (-id +s R_J: (T_J) (T_K) (R_J))_{TopFoc}] (C_I))] (A_I))$

RL: $(p_i: (ep_i: (e_i: (f^c_i: [[(f_i: qar (f_i)) (x_i)_A (m x_j: (f_j: panik (f_j)) (x_j): (f_k: pinnir (f_k)) (x_j))_U] (f^c_i))(e_i)) (ep_i)) (p_i))$

ML: $(Cl_i: [(Np_i: (Nw_i: [(Vs_i: pinnir (Vs_i)) (Aff_i: suq (Aff_i)) (Aff_j: nik (Aff_j))] (Nw_i)) (Np_i)) (Vp_i: (Vw_i: [(Ns_i: panik (Ns_i)) (Vr_i: qar (Vr_i)) (Aff_k: vuq (Aff_k))] (Vw_i)) (Vp_i))] (Cl_i))$

PL: $(IP_i: [(PW_i: /pinnirsunik/ (PW_i)) (PW_j: /paniqarpuq/ (PW_j))] (IP_i))$

(78) *Nuu-liar-poq.*
      Godthaab-go.to-3SG.IND
      'He went to Godthaab.'
      (Sadock 1980: 314)

IL: $(A_I: [(F_I: DECL (F_I)) (P_I)_S (P_J)_A (C_I: [(T_I) (R_I) (+id +s R_J: Nuuk (R_J))] (C_I))] (A_I))$

RL: $(p_i: (ep_i: (e_i: (f^c_i: [[(f_i: liar (f_i)) (x_i)_A (l_i)_L] (f^c_i)) (e_i)) (ep_i)) (p_i))$

ML: $(Cl_i: [(Vp_i: (Vw_i: [(Ns_i: Nuuk (Ns_i)) (Vr_i: liar (Vr_i)) (Aff_i: voq (Aff_i))] (Vw_i)) (Vp_i))](Cl_i))$

PL: $(IP_i: (PW_i: /nu:liarpuq/ (PW_i)) (IP_i))$

(79) *(*utuqqar-mik)   palasi-rpalup-puq   (*utuqqaq-Ø)*
      old.one-INS.SG   priest-be.like-3SG.IND   old.one-ABS.SG
      'He is like an old priest.'
      (Kristoffersen 1992: 154)

IL: (A$_I$: [(F$_I$: DECL (F$_I$)) (P$_I$)$_S$ (P$_J$)$_A$ (C$_I$: [(T$_I$) (R$_I$)] (C$_I$))] (A$_I$))

RL: (p$_i$: (ep$_i$: (e$_i$: (sim f^c$_i$: [(f$_i$: palasi (f$_i$)) (x$_j$)$_U$] (f^c$_i$)) (e$_i$)) (ep$_i$)) (p$_i$))

ML: (Cl$_i$: [(Vp$_i$: (Vw$_i$: [(Ns$_i$: palasi (Ns$_i$)) (Vr$_i$: (r)palug (Vr$_i$)) (Aff$_i$: vuq (Aff$_i$))] (Vw$_i$)) (Vp$_i$))] (Cl$_i$))

PL: (IP$_i$: (PW$_i$: /palasirpaluppuq/ (PW$_i$)) (IP$_i$))

(80) *atisa-ssip-parma*
clothes-give-2SG>1SG
'You gave me clothes.'
(Fortescue 1984: 323)

IL: (A$_I$: [(F$_I$: DECL (F$_I$)) (P$_I$)$_S$ (P$_J$)$_A$ (C$_I$: [(T$_I$) (+id R$_I$: [−S, +A]) (−id R$_J$: (T$_J$) (R$_J$)) (+id R$_K$: [+S, −A])] (C$_I$))] (A$_I$))

RL: (p$_i$: (ep$_i$: (e$_i$: (f^c$_i$: [[(f$_i$: ssit (f$_i$)) (1 x$_i$)$_A$ (x$_j$: (f$_j$: atisaq (f$_j$) (x$_j$))$_U$ (1 x$_k$)$_L$] (f^c$_i$)) (e$_i$)) (ep$_i$)) (p$_i$))

ML: (Cl$_i$: [(Vp$_i$: (Vw$_i$: [(Ns$_i$: atisaq (Ns$_i$)) (Vr$_i$: ssit (Vr$_i$)) (Aff$_i$: varma (Aff$_i$))] (Vw$_i$)) (Vp$_i$))](Cl$_i$))

PL: (IP$_i$: (PW$_i$: /atisassipparma/ (PW$_i$)) (IP$_i$))

(81) *Esta   nutaa-mik   aalisagar-si-vuq.*
Esther fresh-INS.SG fish-get-3SG.IND
'Esther got (a) fresh fish.'
(van Geenhoven 1998: 18)

IL: (A$_I$: [(F$_I$: DECL (F$_I$)) (P$_I$)$_S$ (P$_J$)$_A$ (C$_I$: [(T$_I$) (R$_I$: Esta (R$_I$)) (−id R$_J$: (T$_J$) (T$_K$) (R$_J$))] (C$_I$))] (A$_I$))

RL: (p$_i$: (ep$_i$: (e$_i$: (f^c$_i$: [(f$_i$: si (f$_i$)) (x$_i$)$_A$ (1 x$_j$: (f$_j$: aalisagaq (f$_j$)) (x$_j$): (f$_k$: nutaaq (f$_k$)) (x$_j$))$_U$] (f^c$_i$)) (e$_i$)) (ep$_i$)) (p$_i$))

ML: (Cl$_i$: [(Np$_i$: (Nw$_i$: Esta (Nw$_i$)) (Np$_i$)) (Np$_j$: (Nw$_j$: [(Ns$_j$: nutaaq (Ns$_j$)) (Aff$_i$: mik (Aff$_i$))] (Nw$_j$)) (Np$_j$)) (Vp$_i$: (Vw$_i$: [(Ns$_j$: aalisagaq (Ns$_j$)) (Vr$_i$: si (Vr$_i$)) (Aff$_i$: vuq (Aff$_j$))] (Vw$_i$)) (Vp$_i$))] (Cl$_i$))

PL: (IP$_i$: [(PW$_i$: /esta/ (PWI)) (PW$_j$: /nuta:mik/ (PW$_j$)) (PW$_k$: /a:lisagarsivuq/ (PW$_k$))] (IP$_i$))

7.2 The IL-ML interface

Starting with the IL-ML interface, we observe that in Kalaallisut both referential nouns, such as *panik* 'daughter' ((R$_J$) in (77)) and *Nuuk* 'Godthaab' ((R$_J$) in (78)), and non-referential nouns, like the predicatively used noun *palasi* 'priest' ((T$_I$) in (79)), can be incorporated. Incorporated referential nouns are usually common nouns, but referential proper names are also found in incorporation construc-

tions in Kalaallisut, as shown by example (78), where *Nuuk* is the direct head of
(R_J). The language also shows several possibilities with respect to the pragmatic
operators of referential incorporated nouns. Firstly, the noun *panik* 'daughter' in
(77) "cannot be understood as definite" (Kristoffersen 1992: 156), hence the oper-
ator –id on (R_J), whereas the noun *Nuuk* in (78), being a proper name, has a refer-
ent that is presented as identifiable for the addressee (Sadock 1980: 314), hence
the operator +id on (R_J). Secondly, although *panik* 'daughter' in (77) "can refer to
[a] specific [entity]" (Kristoffersen 1992: 156), incorporated nouns in Kalaallisut
can also refer to non-specific entities (Fortescue 1984: 300). In addition, while
non-referential incorporated nouns like *palasi* 'priest' in (79) lack a pragmatic
function, referential incorporated nouns in Kalaallisut, as illustrated in Section
4.5, may either be focal or backgrounded.

The basic settings and position on the hierarchies for the IL-ML interface for
noun incorporation in Kalaallisut are summarized in (82–86).

(82) *Incorporation of referential nouns / Incorporation of non-referential nouns /
Incorporation of both referential and non-referential nouns*

(83) ***Incorporation of common nouns ⊃ Incorporation of proper names***

(84) ***Incorporation of –id nouns ⊃ Incorporation of +id nouns***

(85) ***Incorporation of –s nouns ⊃ Incorporation of +s nouns***

(86) ***Incorporation of nouns with Background function ⊃ Incorporation of
nouns with Focus function***

7.3 The RL-ML interface

The examples in (77–81) also illustrate the RL-ML interface conditions for noun
incorporation in Kalaallisut. Firstly, the examples include both the incorporated
non-modifiable f-noun *palasi* 'priest' ((f_i) in (79)) and the incorporated α-noun
panik 'daughter' that is modified by *pinnir* 'beautiful' ((x_j) in (77)). Secondly,
incorporated α-nouns can both designate animate entities, as with (x_j) in example
(77) and (x_j) in (81), and inanimate entities, as exemplified with (l_i) in (78) and
(x_j) in (80). Note that animate incorporated entities may both be human and
non-human: the verb *-qar* 'have' incorporates the human noun *panik* 'daughter'
in example (77), while the verb *si* 'get' in (81) incorporates the non-human noun
aalisagaq 'fish'. Thirdly, the constructions in (77), (80) and (81) show an incorpo-

rated noun with the semantic function of Undergoer $((x_j)_U)$, while *Nuuk* in (78) is an incorporated noun that has the semantic function of Locative $(l_i)_L$. Crucially, Sadock (2003: 31, 46) notes that an incorporated noun in Kalaallisut always corresponds to a verb's "semantic object", with the exception of predicatively used incorporated nouns like *palasi* 'priest' in (79). From this we infer that the incorporation of nouns with the semantic function of Actor is not possible. In addition, this information indicates that the incorporation of intransitive arguments and modifiers is excluded. Correspondingly, the morphosyntactic alignment system for noun incorporation in Kalaallisut is accusative, as arguments of intransitive verbs and Actor arguments of transitive verbs contrast with Undergoer arguments of transitive verbs in not being able to be incorporated. Kalaallisut also predominantly shows neutralization between Undergoer arguments of transitive and ditransitive verbs: in the same way as transitive verbs, ditransitive verbs tend to incorporate their Undergoer arguments, as illustrated in example (80). The language thus shows a primarily accusative-indirective morphosyntactic alignment system in noun incorporation. Interestingly, at the clausal layer Kalaallisut generally uses an ergative-secundative system for case-marking (Fortescue 1984: 80, 82; Malchukov 2013: 283), i.e. in Kalaallisut the morphosyntactic alignment system for the Clause and Word layer differ. Finally, the examples show that both relational nouns, such as *panik* 'daughter' (x_j) in (77), and non-relational nouns, such as *Nuuk* (l_i) in (78), can be incorporated in Kalaallisut.

The basic settings and position on the hierarchies for the RL-ML interface for noun incorporation in Kalaallisut can thus be presented as in (87–92).

(87) *Incorporation of f-nouns / Incorporation of α-nouns /* **Incorporation of both f-nouns and α-nouns**

(88) **Incorporation of inanimate nouns ⊃ Incorporation of non-human animate nouns ⊃ Incorporation of human animate nouns**

(89) **Incorporation of Undergoer ⊃ Incorporation of other semantic functions** *⊃ Incorporation of Actor*

(90) **Incorporation of transitive arguments** *⊃ Incorporation of intransitive arguments ⊃ Incorporation of modifiers (adjuncts)*

(91) **Accusative** */ Ergative / Neutral*
Indirective */ Secundative / Neutral*

(92) **Incorporation of relational nouns ⊃ Incorporation of non-relational nouns**

7.4 The ML-PL interface

The examples in (77–81) also provide information about the two basic settings for Kalaallisut that are relevant for the ML-PL interface. Incorporated nouns in Kalaallisut do not take suppletive forms: they simply correspond to the stems of independently used nouns (Sadock 1985: 399).[17] Finally, an incorporated noun and its incorporating verb form a single phonological word in Kalaallisut, which can be shown on the basis of several morphophonological processes (Sadock 2003: 12–19). For instance, the incorporated noun *panik* 'daughter' in (77) loses its final consonant /k/ under influence of the word-internal following /q/ of the verbal Root *-qar* 'have', while the incorporating verb *–(r)paluq* 'be like' in (79) takes the form /rpaluq/ rather than /paluq/ because it is attached to a nominal stem that ends in a vowel, i.e. *palasi* 'priest'.

The basic settings for the ML-PL interface for noun incorporation in Kalaallisut are shown in (93) and (94).

(93) *Incorporated nouns have suppletive forms / **Incorporated nouns have non-suppletive forms***

(94) *Incorporated nouns as separate Pw / **Incorporated nouns as part of the verbal Pw***

7.5 Mappings

When comparing the representations at the various levels in (77)–(81) it is remarkable that, although some constructions show one-to-one mappings between IL, RL, ML and PL, in other constructions mismatches can be found. Interestingly, the construction in (81) shows one-to-one mappings between IL and RL on the one hand, and between ML and PL on the other, but mismatches occur between IL/RL on the one hand and ML/PL on the other. This is shown in (95):

(95) *Esta   nutaa-mik   aalisagar-si-vuq.*
     Esther   fresh-INS.SG   fish-get-3SG.IND
     'Esther got (a) fresh fish.'
     (van Geenhoven 1998: 18)

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17 More rarely, incorporated nouns may correspond to independent inflected nouns (Sadock 1980: 315), but such incorporated nouns are not found in the examples in (77–81).

(A₁: [(F₁: DECL (F₁)) (P₁)ₛ (P₁)ₐ (C₁: [(T₁) (R₁: Esta (R₁)) (−id R₁: (T₁) (T_K)) (R_J)]] (C_J))] (A₁))

(p₁: (ep₁: (e₁: (f^c₁: [(f_I: si (f_I)) (x_I)]ₐ (1 x_J: (f_J: aalisagaq (f_J)) (x_J)): (f_K: nutaaq (f_K)) (x_J)]_U] (f^c₁)) (e₁)) (ep₁)) (p₁))

(Cl₁: [(Np₁: (Nw₁: Esta (Nw₁)) (Np₁)) (Nw₁: [(Ns₁: nutaaq (Ns₁)) (Aff₁: mik (Aff₁))] (Nw₁)) (Np₁)) (Vp₁: (Vw₁: [(Ns₁: aalisagaq (Ns₁)) (Vr₁: si (Vr₁)) (Aff₁: vuq (Aff₁))]] (Vw₁)) (Vp₁))] (Cl₁))

(IP₁: [(PW₁: /esta/ (PW₁)) (PW₁: /nutaːmik/ (PW₁)) (PW_K: /aːlisagarsivuq/ (PW_K))] (IP₁))
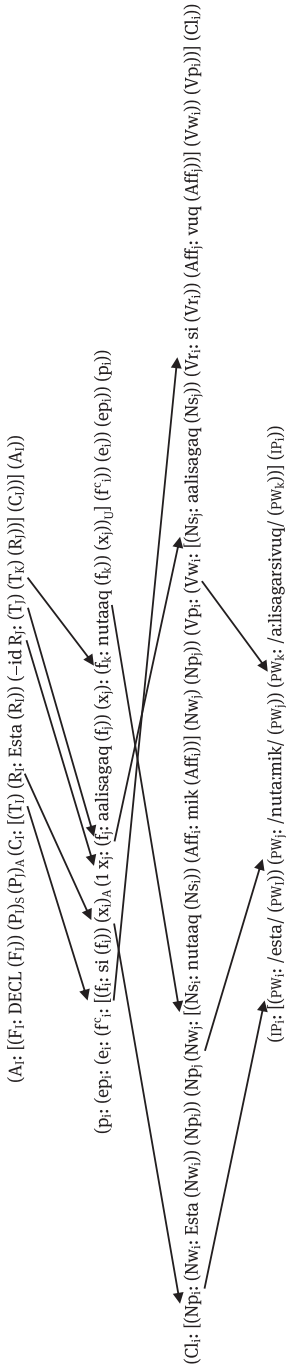
That is, in example (95) the mismatches are purely a matter of Encoding. In this example a single Referential Subact (R_J) at IL maps onto a single Individual (x_j) at RL. The two Ascriptive Subacts (T_J) and (T_K) that make up (R_J), map onto one Property, (f_j) and (f_k), each. So there is a straightforward mapping from IL to RL. In the step from IL/RL to ML things are radically different. The Property (f_i) and the head of its Undergoer argument (f_j) form a singleVerbal word (Vw_i) at ML. The modifier of the Undergoer argument (f_k) forms a single Noun phrase (Np_i), and the Actor argument (x_i) constitutes another Noun phrase (Np_i). The elements that make up the Verbal word at ML thus do not make up any unit at RL. The mapping from ML to PL is then straightforward again, as Morphosyntactic Words at ML correspond to Phonological Words at PL.

8 Conclusions

This paper has shown that the constraints on noun incorporation require a multi-level analysis, such as that provided by FDG. As opposed to other models of grammar, FDG posits four levels of analysis, which provide the means to capture the pragmatic, semantic, morphological, and phonological properties of incorporated nouns. All of these have been shown in this paper to be important in understanding the differences between noun incorporation constructions among languages. The operations connecting these levels in FDG furthermore provide the means to define the constraints that govern the possible mappings between all these levels in incorporation in a given language. By defining these constraints as a combination of typological hierarchies and basic settings, the cross-linguistic variation in the field of noun incorporation can be described in a systematic way.

Furthermore, in studying how combinations of properties from all levels of analysis play a role in the system of noun incorporation in a single language, Kalaallisut, in Section 7, we have demonstrated that the basic distinction in FDG between Formulation and Encoding, i.e. between IL/RL on the one hand and ML/PL on the other, is neatly reflected in the mismatches that incorporation can bring along.

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Riccardo Giomi

A Functional Discourse Grammar typology of reflexives, with some notes on reciprocals

Abstract: This chapter presents the first-ever Functional Discourse Grammar typology of reflexives and opens the way to a comparable typology of reciprocals. The main finding of the paper is that the striking morphosyntactic diversity of reflexive markers can be reduced to only three basic classes, which differ as regards the structure of the predication frame on which the construction is built. In Type I reflexives the lexical predicate takes two coindexed arguments; Type II reflexives are based on a one-place frame in which the predicate bears a reflexive (or reflexive/reciprocal) operator; finally, Type III reflexives are characterized by the presence of a configurational predicate which takes both an external and an internal argument. All further differences are explained with reference to different ways of aligning the underlying pragmatic and semantic structures of each construction-type – more specifically, the number and information-structural status of referents at the Interpersonal Level and the number and structural position of verb arguments at the Representational Level. A further advantage of the proposed typology is that of accounting for possible differences in the lexical distribution of reflexive markers on the basis of the notion of partially instantiated predication frames, i.e. partially lexicalized constructional templates of the Representational Level.

Keywords: Reflexives; Reciprocals; Linguistic typology; Functional Discourse Grammar; Pragmatics-semantics-syntax interfaces; Grammar-lexicon interface

1 Introduction

This paper presents a general typology of reflexives cast in terms of Functional Discourse Grammar (FDG), which will hopefully also serve as a basis for an analogous typology of reciprocal constructions. Since it would not be possible to offer an

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encompassing analysis of both types of constructions within the space of a single paper, I have chosen to focus primarily on reflexives, which are usually regarded as a more fundamental grammatical category. As a matter of fact, all of the basic types into which reflexive constructions can be classified are also attested among reciprocal constructions, while the opposite is not the case. Correspondingly, reflexives constitute a prime diachronic source for reciprocal markers, whereas the opposite development is cross-linguistically exceptional (although not unattested: see Bahrt 2020: 226–233 for evidence from at least five different language families).

There are two main reasons why reflexive markers are particularly interesting from the perspective of FDG, both of which also concern the synchronically and diachronically related functional cluster of reciprocity. First, reflexives display a remarkable degree of cross-linguistic variation and therefore represent an appealing topic for a model with a strong typological orientation like FDG. In this regard, the aim of the paper is to show that the perspective afforded by FDG allows for a radical reduction in the variation that stems from any attempt to classify reflexive constructions on morphosyntactic grounds, also eliminating all of the fuzziness that is inherent to such classifications. Second, many reflexives are characterized by a mix of properties typical of transitive and intransitive clauses, which has often been explained with the fact that, conceptually, such constructions are characterized by the assignment of two distinct participant roles to the same referent(s). My working hypothesis as regards this particular point is that FDG, with its strict separation between different levels of grammatical analysis and its emphasis on the mapping relations between hierarchically higher and lower levels, is well positioned to account for the ambivalent behaviour of reflexive markers with respect to the transitive/intransitive opposition. More specifically, I will argue that the mixed transitive/intransitive properties of many reflexive (and reciprocal) constructions may derive either from the presence of a configurational predicate at the Representational Level which takes both an external and an internal argument, or from a mismatch between the number of Referential Subacts performed at the Interpersonal Level and the number of arguments taken by a lexical predicate at the Representational Level. Moreover, it will be shown that languages may be distinguished (i) into those that do or do not allow for such mismatches in the interpersonal and representational configurations underlying their reflexive and reciprocal constructions; and (ii) into those in which reflexivization and/or reciprocalization takes place in the grammar "proper" and those which make use of a partially instantiated representational frame which already contains a specification of reflexivity or reciprocity – being stored as such within the Fund of primitives and retrieved as a ready-made unit during the operation of Formulation.

The paper is organized as follows. In Section 2 I present an overview of the attested morphosyntactic types of reflexive constructions and point out the

weaknesses of a morphosyntactically-based classification of reflexives. In Sections 3–5 I switch to a functional perspective and describe the three basic groups into which reflexive markers can be divided according to the semantic structure that underlies each class of constructions. In Section 6 I illustrate the opposition between frame storing and top-down grammatical processing with a discussion of two specific cases of reflexive/reciprocal multifunctionality. Section 7 rounds up the preceding discussion and delves into its theoretical implications for FDG, offering an account of how the various construction types differ from each other in terms of the interactions between the various modules of the grammar. Finally, in Section 8, I summarize the conclusions of the paper and indicate possible directions for future research.

2 Overview of reflexive constructions

Any general, pre-theoretical characterization of reflexivity will take its cue from the following defining feature: a construction is reflexive if one and the same event participant simultaneously plays two different roles in the action or process denoted by the predicate. It is immediately evident that, at a more formal level of semantic analysis, this preliminary definition may be captured in two alternative ways: as Dik (1983: 255) puts it, "[r]eflexives are regarded as ambivalent in this respect. They can be seen as relations with two distinct, but identical arguments, or as relations which re-apply, loop-wise, to one single argument position".

In FDG terms, this means that the Configurational Property underlying the construction may be seen as containing two coindexed arguments, each with its own semantic function, or a single argument which contracts two semantic functions at the same time.[1] A third possibility, proposed by Mackenzie (2018) for English verbs with the prefix *self-*, is to represent reflexivization as an operator on the lexical predicate. In any case, the common characteristic of all reflexive markers is that they can only combine with (di)transitive predicates, that is, predicates that usually occur in predication frames with at least two argument slots. It follows that if a given reflexive construction is analyzed as a one-place predication – either with two semantic functions assigned to the same argument or with a Reflexive operator on the lexical predicate – then the use of that con-

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1 The latter possibility, corresponding to Dik's notion of relations "re-apply[ing], loop-wise, to one single argument position", is not made provision for in standard FDG, nor in other theoretical frameworks such as, for instance, Generative Grammar. This option will however not be excluded *a priori* in the present paper.

struction must be regarded as a valency-reducing process.[2] The three alternatives mentioned above are represented in (1), (2a) and (2b) for basically transitive predicates; it goes without saying that the same alternative presents itself for the reflexivization of ditransitive predicates, in which case the underlying frame will contain an additional argument.

(1) $(f_1: [(f_2: \blacklozenge (f_2)) (v_1)_{\phi 1} (v_1)_{\phi 2}] (f_1))$

(2) a. $(f_1: [(f_2: \blacklozenge (f_2)) (v_1)_{\phi 1, \phi 2}] (f_1))$
    b. $(f_1: [(\text{refl } f_2: \blacklozenge (f_2)) (v_1)_{\phi}] (f_1))$

The choice between (1), (2a) and (2b) is directly connected to the fact that, as is well known, reflexive constructions behave like typical transitive clauses in some languages but as intransitive ones in other languages. In addition, there are several reflexivization strategies which share properties of both transitive and intransitive clauses. Before proceeding any further, it is important to remark that (in)transitivity is in itself a purely morphosyntactic concept. As argued in an influential paper by Hopper and Thompson (1980), it is a property of clauses that arises from a number of language-specific semantic and pragmatic parameters, which may include the referentiality, definiteness, person, animacy and pragmatic or semantic function of the arguments, as well as telicity, modality and polarity. As such, (in)transitivity should not be confused with the semantic distinction between one-place and two- (or more) place predications: the latter is *quantitative valency* in the FDG sense. From a semantic point of view, in fact, the crucial question is not whether a reflexive clause does or not contain a direct object but whether the morphosyntactic encoding of the construction patterns with that of mono-argumental predications or with that of multi-argumental ones.

Ideally, these two options correspond to the two basic families into which reflexive constructions can be classified on morphosyntactic grounds: predicate-marking and argument-marking strategies of reflexivization. At least since Faltz (1977), these two strategies have often been referred to as verbal and (pro)

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2 Expressions like "valency reduction" and the like are strictly speaking inaccurate from an FDG perspective. Unlike traditional Functional Grammar, FDG does not assume predicates to be inherently specified for quantitative or qualitative valency in the lexicon but has it that lexemes and frames are stored separately and connected to each other by means of default associations. Consequently, so-called valency-changing processes are not regarded as predicate-formation rules but as coercion processes signalling that a predicate is inserted into a non-default predication frame. The term "valency reduction" must therefore be understood as shorthand for "a process signalling the insertion of a n-place predicate into a n^{-1}-place predication frame".

nominal reflexives respectively. Generally speaking, the former tend to have only one argument expressed, whereas in the latter two coreferential arguments receive overt morphosyntactic expression. Yet, as we shall see, the correspondences between the morphosyntactic locus for the marking of reflexivity and the number of arguments expressed are far from straightforward. Moreover, as the very label "(pro)nominal" suggests, more fine-grained distinctions may be drawn within each family of constructions on the basis of the morphosyntactic make-up of the second argument constituent or the reflexive marker on the verbal predicate. A provisional classification of reflexive constructions based on the (pro)nominal *vs.* verbal opposition is represented in Figure 1 and illustrated with examples in (3)–(8).
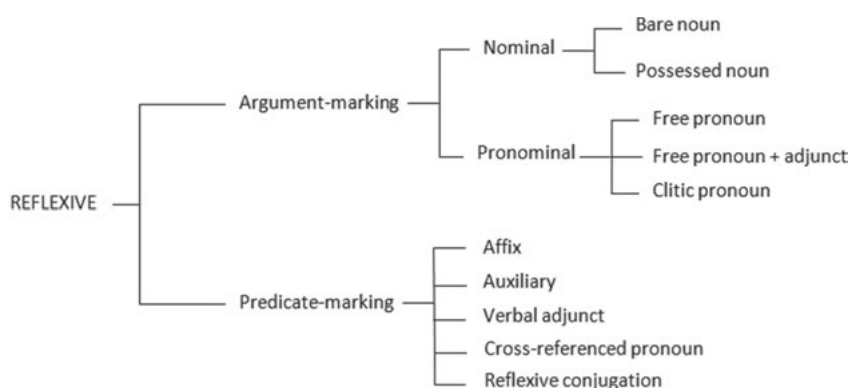
Figure 1: Preliminary morphosyntactic typology of reflexives.

– Argument marking:

(3) a. Nominal reflexive: bare noun
    Bari (Nilotic: Eastern)
    Nye rerem mʊgʊn.
    he kill body
    'He kills himself.'
    (Schladt 2000: 115)

b. Nominal reflexive: possessed noun
    Fula (Atlantic-Congo: North-Central Atlantic)
    mi gaañi hooreqam.
    1.SG.NOM wound.PFV head.1.SG.POSS
    'I wounded myself.'
    (Faltz 1977: 32)

(4) a. Pronominal reflexive: free pronoun
        Russian (Indo-European: Slavic)

        Iuda   *ubi-l-ø*   *sebja.*
        PN.NOM.M.SG kill.PFV-PST-M.SG REFL.ACC
        'Judas killed himself.'
        (Haspelmath 2003: 224)

    b. Pronominal reflexive: clitic pronoun
        Warlpiri (Australian(?): Pama-Nyungan)[3]

        Ngarrka-jarra-rlu *ka-pala=nyanu*   *paka-rni.*
        man-DU-ERG   IPFV-3.DU.SBJ=REFL/RECP strike-NPST
        'The (two) men are striking themselves/each other.'
        (Evans, Gaby, and Nordlinger 2007: 558)

    c. Pronominal reflexive: pronominal adjunct
        Irish (Indo-European: Celtic)

        ghortaigh *Sean* *é*   *féin.*
        hurt.PST   PN   3.SG.M.NSBJ self
        'Sean hurt himself.'
        (Faltz 1977: 34; my glosses)

–   Predicate marking:

(5) Verbal affix
    Ho (Austroasiatic: Mundaic)

    aṛsi-re-m   *nel-ke-n-a*
    mirror-in-2.SG see-PST-REFL-FIN
    'You saw yourself in the mirror.'
    (Everaert 2012: 196)

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3 There is some controversy among Australianists surrounding the classification of Pama-Nyungan languages (the large majority of those spoken in Australia) as members of an overarching Australian family, a separate language family or indeed an erroneous grouping (see Dixon 2002: 44–54 for criticism of what he refers to as "the 'Pama-Nyungan' idea" and O'Grady and Hale 2004 for a heartfelt defence of that idea). Without committing myself to any of these stances, I will refer to Pama-Nyungan languages for the sake of presentational convenience.

(6) Cross-referenced pronoun
Marrithiel (Australian: Western Daly)
ngi-din-ngin-a
1.SG.SBJ.RLS -see-1.SG.OBJ-PST
'I saw myself.'
(Green 1989: 84)

(7) Auxiliary verb
Sinhala (Indo-European: Indo-Aryan)
Sriya   tuwaalə-karə-gatta.
PN   injury-make.PST.PTCP-take.PST
'Sriya hurt herself.'
(Henaderaage 1998: 3)

(8) Verbal adjunct
Paicî (Austronesian: Oceanic)
rë   uti   rë   cöwâ   i   pââ   akënâ
3.PL bite 3.PL backwards DET PL   dog
'The dogs are biting themselves.'
(Moyse-Faurie 2008: 149)

(9) Reflexive conjugation
Veps (Uralic: Finnic)
toińe   mužik   möst   nogō   voidnū-zȩ
second man   also   with.soot smear-3.SG.REFL
'The second man also smears himself with soot.'
(Geniušienė 1987: 310)

Useful as they may be from a descriptive point of view, morphosyntactically-oriented typologies of reflexives based on the (pro)nominal vs. verbal distinction face a number of theoretical problems.

First, the cutting points between some of the strategies of reflexivization distinguished in Figure 1 are not always clearly demarcated. For instance, both Faltz (1977) and Dik (1983) regard reflexive constructions that employ dedicated clitic pronouns as predicate-marking ones, because the reflexive clitic is typically attached to the verb; on that line of reasoning, the same should be argued, *a fortiori*, for cross-referenced pronominal reflexives. At the same time, however, clitic and cross-referenced pronouns typically possess features of phrase-projecting nominal elements such as the possibility of having other nominals apposed to them, so, on that criterion, both strategies could legitimately be regarded as

argument-marking ones. Similar classification problems arise within the two traditional macro-groups illustrated in Figure 1. For instance, the so-called reflexive conjugations of Uralic languages[4] result from the fusion of a reflexive affix with verbal personal endings. Although they are usually treated as distinct conjugational classes in the grammatical tradition of Uralic languages, their diachronic origin is still transparent in some languages. This indicates that, like the border between (pro)nominal and verbal reflexives, the subdistinction between reflexive affixes and full-fledged reflexive conjugations cannot always be drawn with certainty.

While such indeterminacies may be solved by invoking the diachronic and synchronic fuzziness of the borders between the various strategies (cf. Faltz 1977: 15), a more serious problem for the twofold classification into (pro)nominal and verbal reflexives is that it is not uncommon for both strategies to be combined with each other. (10a)–(10c) illustrate three different possibilities:

(10) Predicate+argument marking
  a. Verbal affix + reflexive pronoun
      Kuuk Thaayorre (Pama-Nyungan)
      nhangkanunt   kar   nhaath-e-ø
      2.SG.REFL   like   look-REFL-IMP
      'You should look at yourself.' (Gaby 2008: 264)

  b. Verbal auxiliary + reflexive pronoun
      Kannada (Dravidian: Southern)
      avanu   tann-annu   hoDedu-koND-a
      he   himself-ACC   beat-REFL.PST-3.SG.M
      'He beat himself.' (Everaert 2012: 196)

  c. Verbal affix + personal pronoun
      Hmwaveke (Austronesian: Oceanic)
      yo   ve-ibi   yong
      1.SG   PREF-pinch   1.SG
      'I am pinching myself.'
      (Moyse-Faurie 2008: 123; glosses from the original)

Unlike the problem with clitic and cross-referenced reflexive pronouns, the existence of such constructions cannot be explained away as a matter of fuzziness

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4 See Laakso (2001: 200, 2011: 186) on Veps and the chapters on Fennic, Khanty, Nenets and Samoyedic in Abondolo (1998).

in the context of the (pro)nominal *vs.* verbal reflexive opposition: with respect to that opposition, argument+predicate-marking reflexives represent a third, independent group of reflexive constructions, which cannot be conflated with either of the preceding, nor be seen as a transitional stage between the two.

Likewise, among reflexive markers that formally surface as adjuncts, some cannot be ascribed either to the argument-marking or to the predicate-marking class. These are most notably adverbs meaning 'again' or 'alone', which are neither adverbal nor adnominal adjuncts but so-called clause-level adverbials (iconically reflecting the fact that, semantically, such expressions relate to event quantification ('again') or the specification of event participants ('alone'), and thus qualify as modifiers of the State-of-Affairs and the Configurational Property, respectively). Such reflexives are particularly common in Oceanic languages, one example being Maori:

(11) *i*　　*tapahi*　*a*　　　　*Marama$_i$*　*ia*　*ia$_i$*　　*anō/anake*
　　　PERF　cut　　DET.PERS　PN　　　　OBJ　3.SG　again/alone
　　　'Marama cut herself.'
　　　(Moyse-Faurie 2008: 145)

An additional problem with Oceanic lexemes meaning 'again' is that these elements can often also be used as directional modifiers meaning 'back' or predicates meaning 'return'. The constructions in (12) (Xârâcùù) and (13) (Saliba) clearly originated in serial verb constructions and must be regarded as predicate-marking reflexives. Synchronically, however, the question is whether these markers are better analyzed as verbal auxiliaries or adjunct(-like) reflexives:

(12) *è*　　*sêê*　　　*mûgé*　*wâ*　*rè*
　　　3.SG　be.proud　again　OBL　3.SG
　　　'He is proud of himself.'
　　　(Moyse-Faurie 2008: 144)

(13) *ya-kita-uyo-i-gau*
　　　1.SG-see-again-APPL-1.SG.OBJ
　　　'I saw myself.'
　　　(Moyse-Faurie 2008: 143)

Note that the glossing in Moyse-Faurie (2008) suggests an adverbial reading of the reflexive markers; however, the author explicitly argues that these elements are to be understood as the second verb of a serial verb construction. This indeterminacy shows that distinguishing between the two readings is not only difficult,

but may even be theoretically inaccurate for specific types of languages. This is because the opposition between verbs and adverbs is irrelevant – actually, misleading – for languages in which heads and modifiers of the predicate phrase are conflated in a single lexical class (see Hengeveld, Rijkhoff, and Siewierska 2004; Hengeveld and van Lier 2008).[5]

So much should suffice to show that morphosyntactically-based taxonomies of reflexives are not only difficult to construct but easily run the risk of yielding an inaccurate portrait of both the synchronic status of individual constructions and the cross-linguistic variation observed when typologically diverse languages are taken into account. In the following sections, I will therefore abandon any effort to pursue a morphosyntactic typology of reflexives to concentrate on the semantics and pragmatics of the various construction-types surveyed above.

3 Two-place reflexives

English provides a good example of a language where the main reflexive construction is a clearly bi-argumental one. English is no exception to the generalization that languages usually have more than one reflexivization strategy at their disposal (Faltz 1977), witness the possibility of expressing reflexivity by means of the prefix *self-* with certain verbs and of using a non-reflexive complement pronoun in contrastive contexts ("override non-reflexive" in Huddleston and Pullum 2002: 1485, e.g. *I hate me*). However, the only fully productive reflexive construction makes use of dedicated free pronouns ending in *-self*/*-selves*. Consider the following four utterances, from Everaert (2012: 197):

(14) a. *I hate myself.*
      b. *John sees himself.*
      c. *He had no money on him.*
      d. *John washes.*

Given a pre-theoretical definition of reflexivity such as the one given in Section 2, one could argue that all these constructions are reflexive in nature; indeed, Everaert regards (14a)–(14d) as "four morphosyntactically distinct [reflexivization]

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5 On the difficulty of distinguishing serial verb constructions from adverbial modification structures in languages with flexible lexeme classes see Ferreira (2017: 563–565, 578–579), who points out that in the Amazonian language Yanomám "all adverbial words are also attributive verbs".

strategies". From an FDG perspective, however, the basic principle of pragmatic and semantic analysis is that no other underlying structure should be assumed than is motivated by the actual grammatical behaviour of the construction under consideration. In other words, grammatical semantic representation is not simply equated with abstract, conceptual-semantic event structure. With this distinction in mind, it becomes clear that only (14a)–(14b) are explicitly encoded as reflexive constructions, corresponding to a two-place predication frame with two coindexed arguments. (14c) also contains two coindexed Individuals at the Representational Level (henceforth RL) but is not a reflexive construction in that one of these Individuals, corresponding to the non-subject pronoun *him*, is not an argument of the main predicate *have* but the internal argument of a prepositional phrase used as a modifier. Finally, (14d) presents an instance of a so-called lexical reflexive: such predicates, also referred to as "grooming" or "inherently self-directed" designate actions that are known by language users to be typically applied by an Actor to him/herself. For FDG, utterances of the type of (14d) do not represent a separate reflexivization strategy but simply attest to the possibility of certain lexical predicates occurring in different types of predication frame. The verb *wash*, for instance, is most commonly used in two-place predications, but nothing prevents it from taking one argument only: this possibility is not restricted to typically self-directed situations (see Connolly 2007: 26–27) but is also found with predications in which the Actor and the expected Undergoer are not coreferential (e.g. *This machine washes well*; *The laundress is washing*). Conversely, a verb such as *shave* usually occurs in one-place "grooming" predications, but may as well be found in two-place ones (e.g. *The barber shaves his customers*). The intransitive uses of such verbs are not to be interpreted as elliptical constructions but as genuinely mono-argumental predications: since there is no grammatical evidence that the "missing" argument is actually present in the representational frame, the corresponding referent can at best be assumed to be reconstructed in the Conceptual Component on the basis of the language user's encyclopaedic knowledge – first and foremost, the assumptions stemming from the nature of the Actor's referent.

Returning to English pronominal reflexives such as (14a)–(14b), these structures behave like two-place predications in all respects, involving two distinct, though coindexed arguments. At the Interpersonal Level (henceforth, IL), reflexive pronouns do not differ from normal personal pronouns, corresponding to a [+identifiable] and [+specific] Referential Subact, specified with the relevant [±S, ±A] features. Exceptions to this general rule are (semi-)lexicalized predicates that may be regarded as single Subacts of Ascription, as is most evident when the pronoun is semantically empty, e.g. *enjoy oneself*, *avail oneself of sth.*,

etc. (Mackenzie 2018: 87).[6] Apart from these specific cases, the Subact status of *self*-pronouns is demonstrated by the possibility of (contrastive) focalization (e.g. *It's herself that she hates*). At the RL, the reflexive pronouns in (14a)–(14b) represent arguments of the main predicate, as shown by the possibility of coordination with full, referential noun phrases (e.g. *He hates himself and his family*). The general form of the IL and RL frames underlying two-place pronominal reflexives is given in (15) (only the operators and abstract features cross-linguistically relevant to the reflexive pronoun are represented).

(15) IL: $(C_1: [(T_1) (R_1) (+id, +s\ R_2: [\pm S, \pm A] (R_2))] (C_1))$
      RL: $(f_1: [(f_2: \blacklozenge (f_2)) (v_1)_A (v_1)_\phi] (f_1))$

Other languages that make use of this type of reflexive strategy are the Pama-Nyungan languages Warlpiri and Warluwarra. Unlike in English, the reflexive pronouns of these languages also allow for a reciprocal reading, as shown in (4b) above for Warlpiri (where the reflexive/reciprocal pronoun has been reduced to a clitic), and in (16) for Warluwarra.

(16) *Warrawurla-wiya-gu   wulaba   danmarna.*
      dog-DU-ERG   3.DU.REFL/RECP bite.PST
      'The two dogs bit themselves/one another.'
      (Evans, Gaby, and Nordlinger 2007: 557)

The Warlpiri and Warluwarra reflexive/reciprocal constructions consistently pattern with normal two-place predications, as is evident from the fact that the Actor argument takes ergative marking, as in any regular transitive clause. Regardless of which interpretation is more contextually relevant on each occasion (reflexive or reciprocal), these constructions must therefore be derived from a two-place representational frame, identical to the one given in (15) for English.

   Nominal reflexives of the type of Bari (3a) and Fula (3b) will be assumed to be built on the same type of representational frame. Whether reflexive nouns also behave like English reflexive pronouns in being liable to the assignment of pragmatic functions – which constitutes a conclusive test for referentiality – will have to be determined for each language individually. Unfortunately, the literature on reflexives is seldom explicit on this point. In any case, the following data from

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6 Such lexicalized verb+pronoun combinations are stored as single, one-place lexical predicates and do not constitute real reflexive constructions. This is because the predication frames in which these Properties are used do not contain either a Reflexive operator or two coindexed arguments.

Yoruba (Atlantic-Congo) show that, as a rule, nothing prevents reflexive nouns from being referential:

(17) a. *araa mi ni mo ri*
       body 1.SG.POSS FOC 1.SG.NOM see
       'It's myself that I saw.'
       (Sanusi and Rafiu 2016: 805)

   b. *araa wa ni a mo*
       body 1.PL.POSS FOC 1.PL.NOM know
       'It's ourselves that we know.'
       (Sanusi and Rafiu 2016: 806)

Other two-place reflexives involve elements that surface as adnominal or adverbal adjuncts, verbal auxiliaries or particles. Like English reflexive pronouns, these elements are often also used as adnominal or adverbial "intensifiers", as in English *The Queen herself will come to the final* or *I have swept this court myself* (König and Siemund 2000). In Oceanic languages, the elements in question may come from a variety of lexical sources, including adverbs meaning 'alone', verbal or adverbial elements with directional and/or event-quantification meanings (see [11]–[13] above), predicates meaning '(be) true/exact' or '(be) (a)like' and nouns meaning 'duty, responsibilty'. Grammatical sources are particles with interpersonal meanings such as Focus, Contrast or Emphasis, e.g. Nengone, *ko*, which Moyse-Faurie (2001) characterizes as an "emphatic marker". Below are a few examples from Moyse-Faurie (2001: 11, 2008: 132–152; my glosses):

(18) Fagauvea
   a. Adverbial intensifier
      na hage mate de tangata
      PST alone die DET man
      'The man committed suicide.' (Lit. "The man died by himself")

   b. Reflexive
      e hage matea ia ia a cica
      IPFV alone admire ABS 3.SG DET dad
      'Dad admires himself.'

(19) Tahitian
   a. Adnominal intensifier
      'o te 'orometua iho tē haere mai
      PRED DET parson downwards DET.NSPEC go DIR
      'The parson himself will come.'

b. Reflexive
’ua   taparahi rātou iā   rātou iho
PERF   hit   3.PL   OBL   3.PL   downwards
‘They hit themselves.’

(20) East Uvean
a. Attributive intensifier
’e   maheka ia   Petelo ki   tona foha   totonu
NSPEC   jealous ABS   PN   OBL   his   son   true
‘He is jealous of his own son.’

b. Reflexive
’e   ilo’i e   Petelo ia   ia   totonu
NSPEC   know   ERG PN   ABS   3.SG   true
‘Petelo knows himself.’

(21) Nengone
a. Adverbial intensifier
inu   ha   co   rue   ko
1.SG   PERF FUT   do   EMPH
‘I’ll do it myself.’

b. Reflexive
bone co   ridi bone ko
3.SG   FUT   hit   3.SG   REFL
‘He is going to hit himself.’

To the extent that the Oceanic constructions in (11)–(13) and (18)–(21) are fully grammaticalized, they can all be analyzed as straightforward two-place reflexives. The difference with English, Warlpiri and Warluwarra is that the reflexive markers used in these constructions are not pronominal in nature, that is, they do not designate one of the two arguments of the two-place frame in which they are used. This raises the question whether these morphemes are better analyzed as marking the coindexation of the two arguments or perhaps as reflexive operators, along the lines suggested by Mackenzie (2018) for the English prefix *self-*. Let us briefly evaluate these two alternatives.

Mackenzie (2018: 79–86) shows that *self-*prefixed verbs occur both with a single argument and in two- or three-place predications with two coreferential arguments (besides other possibilities not directly relevant to the present discussion). Consider (22a) and (22b):

(22)   a.   *Those ideologues tend to self-contradict.*
       b.   *Atheists are able to self-congratulate themselves because they don't attend to fundamental distinctions.*

Rejecting an object-incorporation analysis of *self*+verb formations, the author argues that the predication frame underlying (22a) is a one-place one, with the shape shown in (23a). Accordingly, (22b) would be built on a two-place frame, as shown in (23b):[7]

(23)   a. $(f_1: [(/self/ f_2: \blacklozenge_V (f_2)) (x_1)_A] (f_1))$
       b. $(f_1: [(/self/ f_2: \blacklozenge_V (f_2)) (x_1)_A (x_1)_U] (f_1))$

As noted by Mackenzie (2018: 85), the frame in (23b) contains "a redundant specification of reflexivity, since that notion is present both in the prefix /self/ and in the explicitly coreferential second argument". This redundancy is not merely a matter of notational convention but does justice to the fact that both specifications of reflexivity in the representational frame (23b) trigger a separate element of the Morphosyntactic Level (henceforth ML): the operator corresponds to the verbal prefix *self-* and coindexation to the pronominal suffix *-self/-selves*. None of these elements is dependent on the other, witness the possibility of reflexive pronouns occurring with non-prefixed verbs and the verbal prefix occurring in one-place predications.

Turning now to the Oceanic reflexive markers illustrated above, these differ from English *self-* in that they cannot be used in one-place frames but always co-occur with two coreferential arguments. Analyzing these elements as representational operators would result in unjustified redundancy, since the complement pronouns with which they co-occur are simple personal pronouns and not specialized reflexive ones. The reflexive morpheme is thus the only explicit marker of reflexivity in the constructions in (11)–(13) and (18)–(21); this is particularly evident in the third person, where, in the absence of the reflexive marker, the complement pronoun could always be interpreted as designating a distinct referent (Moyse-Faurie 2008: 116–117, 157). Therefore, if one wished to retain an operator analysis of the Oceanic reflexives, the only way in which redundancy could be avoided would be to assign different indexes to the two arguments; but

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7 Note that *self-* is not represented as a fully grammaticalized operator but as a *lexical operator* (see Keizer 2007) on account of (i) the possibility of coordination with both affixoids such as *peer* and full-fledged prefixes such as *co-* (Mackenzie 2018: 77), (ii) its homophony with the lexeme *self*, (iii) the status of the prefix as a Phonological Word and (iv) the limited productivity of *self*-prefixation (Lachlan Mackenzie, p.c.).

that would of course yield a totally different interpretation of the utterance, *viz.* one in which the two arguments can never be coreferential. It follows that the only way in which two-place reflexives of the Oceanic type can be properly captured at the RL is by getting rid of the Reflexive operator and having the reflexive marker triggered by the very fact that the two argument-variables share the same index. Therefore, all the Oceanic reflexives seen so far must be derived from the representational frame in (24):

(24) $(f_1: [(f_2: \blacklozenge_V (f_2)) (v_1)_A (v_1)_U] (f_1))$

This is the very same frame as underlies the pronominal reflexives of English, Warlpiri and Warluwarra. The difference between the two strategies is therefore a purely morphosyntactic one: in English and Warlpiri/Warluwarra the coindexation of two arguments triggers a special form of the pronoun, whereas in the Oceanic languages it is realized by a separate word, which may occupy different morphosyntactic slots depending on the lexical source of the construction.

4 One-place reflexives

The common feature of the reflexive constructions seen so far is that they involve two overtly expressed arguments. At the opposite pole of a semantic typology of reflexives are constructions in which the relevant event participant is only encoded once. These constructions are possibly always predicate-marking. Insofar as they are clearly intransitive, they can in principle be derived from a one-place predication frame, either with a reflexive operator on the lexical predicate or with two semantic functions assigned to the single argument:

(25)   a. $(f_1: [(f_2: \blacklozenge_V (f_2)) (v_1)_{\phi1, \phi2}] (f_2))$
        b. $(f_1: [(\text{refl } f_2: \blacklozenge_V (f_2)) (v_1)_{\phi1}] (f_2))$

What these two alternatives have in common is that they make explicit reference to reflexivity (either in the form of double function assignment or in the presence of a Reflexive operator). However, it has been questioned "whether there are any [. . .] verbally marked constructions which are *only* used for indicating reflexive relationships. What one finds again and again in languages of quite different types is that the alleged verbal reflexive also has other uses, which cannot easily be understood in terms of a derived or metaphorical application of a basically reflexive meaning" (Dik 1983: 233; emphasis in the original). The "other uses"

mentioned by Dik are first and foremost reciprocity and the various functions usually subsumed under the cover-term "middle", which typically relate to valency reduction. Accordingly, Dik (1983) concludes that so-called verbal reflexives are actually semantically void derivational morphemes whose basic function is that of reducing the valency of the predicate by one argument slot. Depending on the context and the lexical semantics of the predicate, this may result in various interpretations, among which reflexivity and reciprocity.

All the same, there also are verbal intransitivizers which do appear to be strictly reserved for the expression of reflexivity. One language for which the literature does not mention any alternative interpretation of the reflexive construction is Blackfoot (Algic: Algonquian). Blackfoot verb stems are subcategorized as inherently transitive or intransitive (see Genee 2013: 97 and references therein). In addition, the root obligatorily takes an "abstract final" suffix specifying the (in)transitivity of the predication frame in which the verb occurs, as well as the (in)animacy of the non-Actor argument, for transitive verbs, and of the single argument for intransitive ones. As a result, virtually any verb can be adapted to occur in any type of predication frame, provided that the stem is equipped with the adequate suffix. If the resulting combination yields a transitive predicate, both arguments must be cross-referenced on the verbal word:[8]

(26) *nitánistaawa*
       nit-waan-ist-aa-wa
       1-say$_{INTR}$-TA-DRCT-3.SG
       'I told him/her.'
       (Genee 2013: 98)

As in many other languages, reflexive constructions pattern morphosyntactically with intransitive verbs, requiring cross-referencing of only one argument:

(27) *nitsskonaakatohsi*
       nit-sskonák-at-ohsi
       1-shoot$_{INTR}$-TA-REFL.AI
       'I shot myself.'
       (Frantz 1971: 53; my glosses, based on Genee 2013)

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8 Note that the agreement rules are somewhat more complex for third person arguments, especially if unidentifiable and/or non-specific (Genee 2013; Corral Esteban, this volume). I will return to this point in Section 6.

The "concrete final" reflexive suffix can only attach to transitive or transitivized bases (which of course matches the general, cross-linguistic requirements about reflexivization) and has the effect of turning the predicate intransitive. This is not only evident from the cross-reference pattern but also from the fact that a reflexivized verb can in turn be subject to further word formation processes such as causativization, which in Blackfoot is only available with intransitive predicates (Genee 2013: 107). It is clear, then, that Blackfoot reflexive clauses are built on a one-place predication frame. Also, since reflexivity appears to be the only possible interpretation of such clauses, this meaning must be explicitly reflected in the underlying semantic representation. The two alternative frames hypothesized in (25a) and (25b) would thus yield the following possible analyses for (27) (where the operator *1* indicates Singular number):

(28) a. $(f_i^c: [(f_j: sskonák (f_j)) (1 x_i)_{A,U}] (f_i^c))$
      b. $(f_i^c: [(refl f_j: sskonák (f_j)) (1 x_i)_A] (f_i^c))$

The drawback of the analysis in (28a) is that it would blur the distinction between the reflexive and the reciprocal construction. Blackfoot reciprocals display the same selectional restrictions and cross-reference pattern as reflexives and may be the input for the same further morphological processes, but crucially differ from reflexives in that a different suffix is employed. Compare (27) with (29):

(29) *Omiksi   ponokáómitaiksi   áísiksipotsiiyiyaawa*
      om-iksi   ponokáómitaa-iksi   á-siksip-o:tsiiyi-yi=aawa
      that-3.PL   horse-3.PL   DUR-bite(TA)-RECP.AI -3.PL=PRO[9]
      'Those horses are biting each other.'
      (Frantz 1991: 107)

Again, this could be analyzed either as (30a) or as (30b) (where *m* indicates a Plurality operator):

(30) a. $(f_i^c: [(f_j: siksip (f_j)) (m x_i:−ponokáómitaa−(x_i)_{A,U}] (f_i^c))$
      b. $(f_i^c: [(recp f_j: siksip (f_j)) (m x_i:−ponokáómitaa−(x_i)_A] (f_i^c))$

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9 The pronominal element *aawa* is not a second cross-reference marker but an enclitic form which must be attached to the verb if the subject is an overt noun phrase preceding the verb (Frantz 1991: 46–49).

Given that reflexives and reciprocals are built on the very same structural template, if (27) is analyzed as in (28a) the same underlying frame should be assumed for (29), resulting in the analysis in (30a). That, however, would obscure the semantic difference between reflexives and reciprocals, which is reflected morphologically in the use of two different suffixes. Alternatively, one could retain the analysis in (28a) for reflexives and postulate an operator Reciprocal in order to capture the meaning of the suffix *-o:tsiiyi* (as in [30b]): but this move would raise the opposite problem, that is, it would fail to account for the structural isomorphism of Blackfoot reflexives and reciprocals. If instead both suffixes are analyzed as operators, as shown in (28b) for reflexive *-o(o)hsi* and in (30b) for reciprocal *-o:tsiiyi*, then there is no problem in deriving the two constructions from a similar type of representational configuration. In this way, the semantic difference between reflexives and reciprocals is brought out by representing the two suffixes as distinct operators, while their common morphosyntactic behaviour is still captured by the structural identity of the underlying frames.[10]

A parallel situation is observed in Kolyma Yukaghir. As in Blackfoot, Yukaghir verb stems are subcategorized as either transitive or intransitive. Transitive and intransitive verbs are differentiated through distinct paradigms of person+number agreement; thus, a verb like *juö*, 'see' normally requires transitive agreement, as shown in (31a). Reflexivity and reciprocity are encoded by two different prefixes, both triggering intransitive verbal agreement, cf. (31b)–(31c) (Maslova 2007: 1837):

(31) a. *met   tudel   juö-ø*
          I   he   see-1.SG.TR
          'I saw him.'

      b. *tudel   met-juö-j*
          he   REFL-see-3.SG.INTR
          'He is looking at himself.'

      c. *mit   n'e-juö-ji:l'i*
          we   RECP-see-1.PL.INTR
          'We saw each other.'

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10 In another Algonquian language, Arapaho, reflexives and reciprocals behave like in Blackfoot in making use of an intransitivizing "concrete final" attached to transitive bases; the difference is that in Arapaho the same suffix is used for both reflexivity and reciprocity (Cowell and Moss 2008: 139–140). This means that, unlike in Blackfoot, Arapaho reflexives and reciprocals are built on one and the same predication frame, namely a one-place frame with an underspecified Reflexive/Reciprocal operator, i.e. $(f_1: [(refl/recp \, f_2: \blacklozenge (f_2)) \, (v_1)_\phi] \, (f_1))$.

The two prefixes appear to be specialized for the expression of the respective meanings (in the two sections dedicated to the functions of these morphemes, Maslova 2003: 227–232 does not mention any other possible interpretation). Therefore, *met-* must be triggered by a Reflexive operator and *n'e-* by a Reciprocal operator. At the same time, intransitive agreement shows that both prefixes have the effect of detransitivizing an inherently transitive verb root, that is, they both serve as markers of structural coercion that adapt a two-place predicate for use in a one-place representational frame. Thus, Kolyma Yukaghir reflexives and reciprocals belong to the very same type as Blackfoot ones. Both are derived from the following general frames:

(32) a. $(f_1: [(refl\ f_2: \blacklozenge (f_2))\ (v_1)_\phi]\ (f_1))$
    b. $(f_1: [(recp\ f_2: \blacklozenge (f_2))\ (v_1)_\phi]\ (f_1))$

If this is analysis is correct, the existence of intransitivizers reserved to the expression of reflexivity or reciprocity strongly points to the necessity of distinguishing a class of grammatical elements which has sometimes been implicitly assumed in the FDG literature, but never explicitly acknowledged. In Hengeveld and Mackenzie (2008) a rather sharp distinction is drawn between elements that express operators or functions of the levels of Formulation and semantically and pragmatically void elements inserted during Morphosyntactic Encoding in fulfilment of strictly structural requirements such as coercion (support morphemes or words) or the filling of obligatory morphosyntactic slots (dummies). As argued in Giomi (2020: 195–197), however, many words and morphemes across the world's languages may be claimed to serve both types of function at the same time. Such portmanteau elements often occur in deranked clauses, marking the argument or modifier status of a semantic unit that could not otherwise be used in that way (morphosyntactic coercion) and simultaneously encoding a grammatical distinction relevant to the Formulation levels. Examples are participle markers which incorporate tense distinctions and modal, reportative and quotative complementizers (which mark the argument status of a Discourse Act or Communicative Content and simultaneously express an interpersonal operator at the relevant layer; see Hengeveld and Mackenzie 2008: 353–354, 367 on Spanish and Jacaltec). Other coercion markers with representational content are derivational in nature, e.g. affixes like English *-able* (which derives Adjectival Words from Nominal Stems but also expresses a modal operator) and nominalizers which, besides marking the occurrence of the underlying semantic unit in a non-default slot, also express temporal, aspectual or other representational meanings (e.g. past nominalizers in Eskimo-Aleut languages, see Mithun 2000). Finally, certain types of copulas – usually regarded as dummy forms in FDG – do not only indicate that a non-verbal

element is being used as a predicate but also encode specific representational or interpersonal meanings (e.g. Portuguese *ser*: inherent Property, *estar*: contingent Property, *ficar*: Resultative). Reflexive and reciprocal intransitivizers of the type observed in Blackfoot and Kolyma Yukaghir also fall in this special class of grammatical markers: on the one hand they express a representational operator at the layer of Lexical Properties, on the other they function as support morphemes signalling the use of that Property in a predication frame with which it is not associated by default.

It could be objected that, instead of positing portmanteau elements with both semantic or pragmatic and purely structural functions, it would perhaps be more economical to account for the ambivalent nature of the grammatical markers listed above by invoking the notion of *partially instantiated frame* (Keizer 2016). On this approach, we would not have portmanteau reflexive and/or reciprocal intransitivizers but (i) a one-place frame stored as such in the Fund of primitives in which the operator position is pre-specified with the relevant type of operator and (ii) a semantically void intransitivizer signalling the insertion of a two-place predicate into that partially instantiated, one-place frame. Now, the notion of partially instantiated frame is a powerful tool and, as all powerful tools, it must be handled with care – especially when the matter to be decided on is rather subtle, as in the present case. Putting it simply, the question here is whether a reflexive or reciprocal operator is pre-specified in a special, ready-made representational frame or is inserted during the operation of Formulation like most ordinary operators. This is essentially a matter of psycholinguistic processing, which boils down to one of the ever-recurring questions of language modelling: the division of labour between storing/holistic access and procedure/analytic access. The partially-instantiated-frame approach, according to which reflexive and/or reciprocal intransitivizers are semantically void support morphemes, implies a lesser deal of processing effort, but postulates that a larger set of representational frames must be acquired and stored in the Fund of primitives; conversely, regarding reflexive and/or reciprocal intransitivizers as portmanteau morphemes with both semantic and structural functions requires a smaller set of representational frames, putting more emphasis on the computational aspects of language processing.

In my view, there is no once-and-for-all answer to this question, but which approach is more plausible must be decided case by case. The crucial factor in making this decision is whether the construction-type at stake is regularly and productively used or is subject to precise (although possibly idiosyncratic) lexical restrictions. In the case of English *self*-prefixed predicates, for instance, it probably makes more sense to go for a partially-instantiated-frame approach, since the application of the prefix is limited by rather strict semantic and phonological

constraints (Mackenzie 2018: 86–88). Such a scenario is very much compatible with the idea that the possible lexeme-frame combinations are specified in the Fund in the form of default associations. By contrast, when a one-place reflexive or reciprocal construction can be freely and productively combined with potentially all (di)transitive verbs of the language, as seems to be the case in Blackfoot and Yukaghir (see Genee 2013: 107; Maslova 2003: 227–232), I see no reason to assume that a special reflexive or reciprocal frame should be stored as such in the Fund of primitives.[11] In such cases, the lack of compelling constraints on the possible combinations of frames, lexemes and operators is straightforwardly accounted for by the regular top-down workings of language production.

5 Transitive, intransitive or "somewhere in between"?

In between clearly two-place and clearly one-place reflexives are a variety of constructions which display mixed properties of transitive and intransitive constructions. Such apparent idiosyncrasies are most evident in ergative languages, where the Actor argument takes different marking depending on whether the predication also contains a second (Undergoer) argument. In some Australian languages with valency-decreasing reflexive (or reflexive/reciprocal) affixes, these constructions are typologically anomalous in that they allow ergative marking of intransitive subjects. In Gooniyandi (Bunaban), the reflexive clause looks intransitive in that only one argument is cross-referenced on the verb (compare reflexive [33a] with transitive [33b], where both the Actor and the Undergoer are cross-referenced by the portmanteau bound pronoun -*li*); however, the subject of a reflexive clause is marked ergative instead of absolute, just like in regular transitive clauses:

(33) a.   *nganyi-ngga   mila-ng-arni*
           1.SG-ERG   see-1.SG-REFL/RECP
           'I saw myself.'
           (McGregor 1990: 318; my glosses)

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11 The productivity and semantic predictability of Blackfoot reflexives and reciprocals is also an argument to reject Genee's (2013: 120) analysis of these morphemes as "as a special type of verbal lexemes".

  b. *nganyi-ngga   wayandi   jard-li*
     1.SG-ERG   fire.ABS   light-1.SG.A>3.SG.U
     'I lit a fire.'
     (McGregor 1990: 318; my glosses)

In other languages, the ambivalence of reflexive constructions with respect to (in)transitivity manifests itself in different ways. As in Gooniyandi, the Wambaya (Mirndi) reflexive/reciprocal construction looks intransitive in that Undergoers are not cross-referenced on the verb; however, third-person singular subjects make use of a cross-reference pronoun *gini-* otherwise reserved for transitive clauses (in the other persons there is no corresponding distinction between transitive and intransitive pronominal series):

(34) a. *Gulugbi   g-a.*
         sleep   3.SG.S-NFUT
         'He slept.'
         (Evans, Gaby, and Nordlinger 2007: 565)

      b. *Ngajbi   gini-ng-a.*
         see   3.SG.M.A-1.OBJ-NFUT
         'He saw me.'
         (Evans, Gaby, and Nordlinger 2007: 565)

      c. *Ngajbi   **gini-ngg**-a.*
         see   3.SG.M.A-REFL/RECP-NFUT
         'He saw himself.'
         (Evans, Gaby, and Nordlinger 2007: 565)

      d. **Ngajbi   **gi-ngg**-a.*
         see   3.SG.S-REFL/RECP-NFUT
         (Evans, Gaby, and Nordlinger 2007: 565)

Yet, unlike in regular transitive clauses, Actors coreferential with the subject pronoun take absolutive instead of ergative case. This is evident with lexical noun phrases such as *janji* 'dog' in (35). In Wambaya, reflexive/reciprocal clauses are "the only situation in which there is a mismatch between transitive subject bound pronouns and ergative/locative case marking" (Nordlinger 1998: 142):

(35) *Janji   gini-ngg-a   wagardbi.*
      dog.ABS   3.SG.A-REFL/RECP-NFUT   wash
      'The dog is washing himself.'

Note that, although it occupies the same morphological slot as cross-referenced object pronouns, the reflexive/reciprocal marker clearly functions as a true valency-decreasing morpheme, since it also occurs with so-called semi-transitive verbs, which do not allow cross-referencing of the second argument (Nordlinger 1998: 142, 192–194; Evans, Gaby, and Nordlinger 2007: 566–567).

Uradhi (Pama-Nyungan) resembles Wambaya in that the subject of a reflexive clause must obligatorily occur in absolutive case (cf. [36a] and [36b]) but differs from it in allowing a reflexive pronoun to co-occur with the verbal reflexive, as in (36c). Reflexive pronouns are formed by adding the ending *-ma* to a regular personal pronoun and reduplicating the form thus derived:

(36)   Uradhi (Atampaya dialect)
    a.   *ama-:lu*   *akurpu*   *umpi-n*
        man-ERG   red.kangaroo.ABS   kill-PST
        'The man killed the red kangaroo.'
        (Crowley 1983: 374)

    b.   *ama*   *umpi-:ni-n*
        man.ABS   kill-REFL-PST
        'The man killed himself.'
        (Crowley 1983: 375)

    c.   *ama*   *uluma~uluma*   *uya-:ni*
        man.ABS   3.SG~REFL   smell-REFL
        'The man is smelling himself.'
        (Crowley 1983: 375)

In some cases, such anomalies may be explained by independent factors. For Gooniyandi, McGregor (1990: 320) suggests that the optional use of the ergative marker in reflexive/reciprocal and other clauses with a single overt argument may serve to confer "some sort of salience to the constituent to which it is added". This statement is made more precise in McGregor (1992), where "unexpectedness" of the Actor is identified as a trigger for the use of ergative marking in Gooniyandi. Now, with typically other-directed actions (the large majority of transitive predicates), reflexive predications may be regarded as prototypical cases of "unexpected Actor", since in such situations the individual affected by the action is by default not expected to coincide with the initiator of the action. It may thus be possible to argue that Gooniyandi reflexives and reciprocals are in fact one-place predications, where the single argument takes ergative case because the corresponding Subact of Reference bears an Emphasis operator (or possibly the pragmatic function Contrast). If this is so, (33a) would translate literally as some-

thing like "I myself saw myself". A comparable situation is observed in Dyirbal (Pama-Nyungan) and in the Yuman language Yavapai (Dik 1983). Both these languages have a general intransitivizer which may yield different interpretations including reflexivity (and, in Yavapai, reciprocity); in both languages a reflexive reading may be forced out by adding an intensifier focussing the subject noun phrase (a nominal suffix in Dyirbal, an adverbial meaning 'all alone/all by oneself' in Yavapai). A similar construction in Mezquital Otomi (Otomanguean) is described by Gast and Siemund (2006).

In other languages, however, it is hard to explain the ambivalent properties of reflexives by invoking the pragmatic notion of Emphasis (or Contrast). In Uradhi, the reduplicated reflexive pronouns are not reported to have intensifying functions, so their optional co-occurrence with a verbal reflexive and an absolutive-marked subject must have a different explanation. As regards Wambaya, transitive subjects are not optional at all but are explicitly described by Nordlinger (1998) as the only possible encoding for third-person reflexives: this means that the mix of transitive and intransitive properties is an inherent feature of Wambaya reflexives.

Ambivalent reflexive constructions are of course not restricted to Australian languages. In French, the perfect tenses of transitive verbs are formed with the auxiliary *avoir* ('have'); with emphatic reflexive pronouns the verb is constructed in the same way, but when a clitic reflexive pronoun is used the auxiliary *être* ('be') must obligatorily be selected – which otherwise never happens with predicates that take a direct object:

(37)   a.   *Il a lavé la vaisselle.*
            'He washed the dishes.'
       b.   *J'ai trahi moi-même et tout le monde.*
            'I betrayed myself and everybody.'
       c.   *Il s'**est** lavé.*
            'He washed.'

(38)   a.   *J'ai envoyé une lettre à ma soeur / à moi-même.*
            'I sent a letter to my sister / to myself.'
       b.   *Je me **suis** envoyé une lettre.*
            'I sent a letter to myself.'

In itself, auxiliary selection is not as strong a piece of evidence for valency reduction as is often claimed, because *être* is not exclusively used in one-place predications. All the same, there are further indications that reflexivization in French involves a reduction in the valency of the predication. Under causativization, the

causee must be marked for dative case if the embedded clause is transitive (i.e. if the second argument is an Undergoer) but not if it is intransitive (i.e. if there only is one argument or the second argument is not an Undergoer):

(39) a. *Je **lui** ai fait laver la vaisselle.*
          'I made him wash the dishes.'
      b. *Je **l'**ai fait sortir (de la salle).*
          'I made him leave (the room).'

When the embedded clause is a reflexive one, its subject does not take dative marking but is treated in the same way as the subject of an intransitive clause, even if the causee is semantically an Actor and the clitic pronoun represents an Undergoer:

(40) *Je l' / *lui ai fait se laver.*
      'I made him wash.'

Since dative marking of the Actor is triggered by the presence of an Undergoer as the second argument of the causativized predication, the unavailability of this option in (40) shows that French reflexive clauses do not contain such an argument. It follows that such utterances display reduced valency when compared to non-reflexive two-place predications. At the same time, French reflexive markers are undoubtedly pronominal forms and therefore are not devoid of their own denotational potential: that is, the pronoun must necessarily surface as a separate variable at the RL. Were it not so, it would be impossible to have a nominal or adjectival phrase apposed to the clitic pronoun in embedded or modifying secondary predications (e.g. *Il se considère un homme heureux*, 'He considers himself a happy man'; *Il s'est vu perdu*, 'He saw himself lost'). FDG offers a simple and effective solution to this puzzle, since it allows for the possibility of a Configurational Property with an internal argument being used as the main predicate within a superordinate Configurational Property. That is, while a transitive clause such as *Il lave la vaisselle* ('He washes the dishes') presupposes a two-place predication frame, I suggest that the reflexive clause *Il se lave* ('He washes') is built on the frame in (42), where the reflexive Configurational Property (f_j) *se laver* takes the Actor (x_i) as its sole argument:[12]

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[12] For a lexicalist version of this analysis cast in the framework of "traditional" Functional Grammar (and incorporating a reflexive operator), see Vet (1985: 60).

(41) *Il lave la vaisselle.*
      $(f_i^c: [(f_j: laver (f_j)) (x_i)_A (x_j:-vaisselle-(x_j))_U] (f_i^c))$

(42) *Il se lave.*
      $(f_i^c: [(f_j: [(f_k: laver (f_k)) (x_i)_U] (f_j)) (x_i)_A] (f_i^c))$

This analysis is consistent with the fact that, if a causativized reflexive predication does contain an Undergoer, but this argument is not the participant designated by the reflexive clitic, then dative marking of the Actor becomes obligatory again. This is shown in (43a), where *se* designates the Recipient of the death-causing event; compare (43b), where *se* corresponds to the embedded Undergoer – and, accordingly, dative marking of the Actor is impossible:

(43) a. *La crainte du scandale a fait se donner la mort *(à) une dizaine de personnes.*
          'The fear of a scandal caused a dozen of people to kill themselves.'
          (gabrielwyler.com/page558.html)

      b. *La crainte du scandale a fait se tuer le juge / *au juge.*
          'The fear of a scandal caused the judge to kill him/herself.'
          (gabrielwyler.com/page558.html)

Accordingly, as shown in (46), *se donner la mort* (lit. "give death to oneself") must be analyzed as displaying reduced valency with respect to the three-place predication *donner la mort à quelqu'un/à soi-même* ('give death to somebody/to oneself.CONTRAST'):

(44) *donner la mort à quelqu'un*
      IL: $(C_I: [(T_I) (R_I) (R_J) (R_K)] (C_I))$
      RL: $(f_i^c: [(f_j: donner (f_j)) (x_i)_A (e_i:-mort-(e_i))_U (x_j)_{Rec}] (f_i^c))$

(45) *donner la mort à soi-même*
      IL: $(C_I: [(T_I) (R_I) (R_J) (R_K)_{CONTR}] (C_I))$
      RL: $(f_i^c: [(f_j: donner (f_j)) (x_i)_A (e_i:-mort-(e_i))_U (x_i)_{Rec}] (f_i^c))$

(46) *se donner la mort*
      IL: $(C_I: [(T_I) (R_I) (R_J)] (C_I))$
      RL: $(f_i^c: [(f_j: [(f_k: donner (f_k)) (x_i)_{Rec}] (f_j)) (x_i)_A (e_i:-mort-(e_i))_U] (f_i^c))$

This analysis reveals that the French reflexivization strategy shares aspects of both pronominal reflexives and verbal reflexives of the type of Blackfoot and Yuk-

aghir. French reflexive clitics retain their denotational potential but (unlike their emphatic counterparts) they also serve structural coercion, marking the insertion of a (di)transitive predicate in a non-default predication frame.

The analysis proposed here for French helps shed light on some of the otherwise confusing evidence presented above for Australian languages. Consider again the situation in Wambaya, where a transitive subject pronoun unexpectedly co-occurs with the reflexive intransitivizer:

(47) *Janji   gini-ngg-a   wagardbi.*
     dog.ABS   3.SG.A-REFL/RECP-NFUT   wash
     'The dog is washing himself.'

If such utterances have a configurational predicate with an unexpressed Undergoer argument, then there is no problem in regarding the reflexive/reciprocal marker as a valency-decreasing derivational morpheme, as is in fact suggested by Nordlinger (1998) and Evans, Gaby, and Nordlinger (2007). This explains absolutive inflection on the co-occurring subject noun phrase. All we need to assume, at this point, is that the factors licensing the so-called transitive subject pronoun are (i) that the syntactic function Subject is assigned to the Actor argument of the nuclear predication, which the pronoun cross-references, and (ii) that the lexical predicate takes an Undergoer argument. This accounts for the occurrence of the transitive-subject marker in reflexive/reciprocal construction as well as in normal transitive clauses such as (34b), where both the Actor and the Undergoer are direct arguments of the lexical predicate. The difference between French and Wambaya reflexives and reciprocals is that in the latter language, but not in the former, an underspecified Reflexive/Reciprocal operator is required to trigger the intransitivizing suffix: this is because, unlike French *se*, Wambaya *-ngg* does not have general intransitivizing functions but always triggers either a reflexive or a reciprocal interpretation (depending on which reading is more contextually adequate). Therefore, (47) will be analyzed as

(48) $(f_i^c: [(f_j: [(\text{refl/recp } f_k: \text{wagardbi } (f_k)) (x_i)_U] (f_j)) (x_i:-\text{janji}-(x_i))_A] (f_i^c))$

The same type of representational frame accounts for the optional use of reflexive pronouns alongside absolutive-marked subjects in Uradhi. The difference with Wambaya is that the Uradhi affix *-:ni* is not a specialized reflexive or reciprocal marker but has general valency-decreasing functions, as is also the case of the French clitics. For instance, a Uradhi clause like (49) can yield either a reflexive or an anticausative reading:

(49) *ama   uɣa-:ni*
man.ABS   smell-INTR
'The man is smelling himself' or 'The man smells/is smelly.'
(Crowley 1983: 375; my glosses)[13]

Such utterances are built on the following one-place predication frame:

(50) $(f_1: [(f_2: \blacklozenge_V (f_2)) (x_1)_U] (f_1))$

corresponding to the content frame

(51) $(C_1: [(T_1) (R_1)] (C_1))$

Since the Uradhi verbal suffix is not a specialized reflexive marker but a general marker of decreased valency, the possibility of a reflexive pronoun co-occurring with the absolutive-marked noun phrase is straightforwardly explained as a means of forcing out the desired interpretation in case of possible ambiguity. In that case, the detransitivized predicate will be construed as a Configurational Property with an internal slot for the non-Actor argument, which is coindexed with the Actor of the main predication and corresponds to an additional, focalized or contrasted Subact of Reference at the IL. In the default case, corresponding to (49), the application of the verbal suffix simply signals a mismatch between the usual valency of the lexical predicate and the one-place predication frame in which this predicate is being used; but, if needed for the sake of disambiguation, an additional slot for an embedded argument is created and this referential argument is overtly expressed as a reflexive pronoun, resulting in a predicate+argument marking construction:

(52) *ama   uluma~uluma   uɣa-:ni*
man.ABS   3.SG~REFL   smell-INTR
'The man is smelling himself.'
IL: $(C_1: [(T_1) (R_1) (R_J)_{FOC/CONTR}] (C_1))$
RL: $(f_i^c: [(f_j: [(f_k: u\gamma a (f_k)) (x_i)_U] (f_j)) (x_i:-ama-(x_i))_A] (f_i^c))$

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13 Given the multiple readings of the suffix *-:ni*, I have substituted Crowley's gloss "REFL" with the more neutral "INTR(ansitivizer)". The same goes for (52) and for the Kuuk Thaayorre and Mosetén-Chimané examples below.

An analogous situation is observed in another Pama-Nyungan language, Kuuk Thaayorre. Here, the verbal suffix *-e* can be used to indicate that "[t]he Actor is backgrounded or unknown" (Gaby 2006: 512), as is evident from (53a) and (53b).

(53) a. *nhul   Jesus   werngka yongk-e-nam*
        3.SG.NOM Jesus.ABS middle   hang-INTR-PST.IPFV
        'Jesus was hanging in the middle'
        (Gaby 2006: 512; my glosses)[14]

    b. *yangan   kaal-ak kath-e-r*
        hair.ABS ear-DAT bind-INTR-PST.PFV
        '[his] hair is tied over [his] ears'
        (Gaby 2006: 513; my glosses)

As in Uradhi, the verbal intransitivizer can co-occur with an explicit reflexive pronoun (see also (10a) above):

(54) *pam   yuur-u   reenng-e-nham   nhangnul*
      man.ABS hand-INS scratch-INTR-PST.IPFV 3.SG.REFL
      'The man was scratching himself with his hand.'
      (Gaby 2006: 508, my glosses)
      IL: $(C_I: [(T_I) (R_I) (R_J) (R_K)_{FOC/CONTR}] (C_I))$
      RL: $(f_i^c: [(f_j: [(f_k: reenng (f_k)) (x_i)_U] (f_j)) (x_i:-pam-(x_i))_A] (f_i^c): (x_j:-yuur-(x_j))$
            $_{Instr} (f_i^c))$

Note that the reflexive pronouns in these constructions cannot be interpreted as intensifiers apposed to the subject noun phrase. As mentioned above, Uradhi reflexive pronouns are not reported to have intensifying functions; as for Kuuk Thaayorre, this language does have a series of dedicated pronouns for reference intensification, but while these can co-occur with the reciprocal suffix *-rr* they appear to be banned from the reflexive construction with the suffix *-e*, at least judging from the description in Gaby (2006: 226–227, 504–517, 2008: 266–268). Accordingly, as noted by Gaby (2006: 509), reflexive pronouns co-occurring with the intransitivizing suffix "appear to have an emphatic function, stressing that the event is or should be self-directed rather than directed towards others": as is

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14 As many other Australian languages, Kuuk Thaayorre has nominative-accusative alignment in the pronominal system and ergative-absolutive elsewhere (Gaby 2006: 10). For this reason, I use the gloss "ABS(olutive)" for nouns where Gaby uses either "NOM" or "ACC" but retain the latter glosses for pronouns/determiners.

evident from this wording, the emphasis here is on the Undergoer argument, not on the Actor. If this is so, the reflexive pronoun must be analyzed as a Subact of Reference corresponding to the embedded Undergoer and not as an adnominal intensifier targeting the Actor argument. That Kuuk Thaayorre reflexive pronouns have referential potential and are not mere markers of Emphasis or Contrast on other Subacts is furthermore confirmed by the fact that these pronouns can occur in simple two-place predications. In this case the verb does of course not take the intransitivizing suffix *-e* (note the use of the transitivity marker *-m* in its stead):

(55) *ngay*   *wash-m*   *rirk-r*   *ngathney*
       1.SG.NOM wash-TR   do-PST.PFV 1.SG.REFL
       'I'm washing myself'
       (Gaby 2006: 224)

Typologically, the French situation is quite unusual in that one and the same element acts both as a support morpheme and as a reflexive pronoun. More commonly, these two functions are distributed over two separate elements: a derivational morpheme with general intransitivizing (or in any case valency-decreasing) functions and a reflexive pronoun representing the embedded argument – the latter being in most cases optional. This is precisely the situation observed in several Australian languages, as shown above for Uradhi and Kuuk Thaayorre. But this type of reflexive construction is by no means limited to the Australian languages. Another case in point is that of Sinhala, where reflexivity is expressed by the verbal auxiliary *gannəwa* (originally meaning 'take'). This has been characterized as a middle marker with meanings "generally defined as 'subject-directed', i.e. as 'do sth for oneself' or 'to affect oneself'" (Nedjalkov 2007: 269). However, non-self directed meanings related to intransitivization are also attested, such as anticausative (56a) and the so-called potential passive (56b). Nevertheless, *gannəwa* may also co-occur with a reflexive pronoun in accusative case, as in (57):

(56) a. *Kapaa*   *gatta*
          cut.PTCP.PERF take.PST
          '(s/he) got cut'
          (Beavers and Zubair 2016: 101, my glosses)[15]

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15 Note that Beavers and Zubair regard *gannəwa* constructions as periphrastic, unlike Henadeerage (1998) and Nedjalkov (2007).

b. *Meeka kaar-eka pahasuven viku gannəwa.*
   this   car-DET   easily   sell.PTCP.PERF take.NPST
   'This car sells easily.'
   (Beavers and Zubair 2016: 101, my glosses)

(57) *Sriya (taman-wə) tuwaalə-karə-gatta.*
    PN   REFL-ACC   injury-make.PTCP.PERF -take.PST
    'Sriya hurt herself.'
    (Henaderaage 1998: 3)

The Sinhala middle auxiliary appears to have developed under the influence of the nearby language Kannada (Dravidian), which also uses a verbal auxiliary originally meaning 'take' as a middle marker. According to Nedjalkov (2007: 268), this is historically a reflexive marker, but "at present it has a number of concomitant meanings caused by detransitivization". Among these meanings, the author cites autocausative (i.e. "reflexive in the broad sense", e.g. *bacchiD* 'hide (transitive)' → *bacchiTTu-koL-* 'hide (intransitive)') and anticausative (e.g. *mucch* 'close (transitive)' → *mucchi-koL-* 'close (intransitive)'). The anticausative function is illustrated in (58a), while (58b) exemplifies the co-occurence of the general intransitivizer with an explicit reflexive pronoun. Note that, as in Kuuk Thaayorre and Uradhi, the accusative reflexive pronoun cannot be interpreted as an intensifier (it is clearly not apposed to the nominative proper name *Hari*); for reference intensification, the emphatic form *Hari taanee* would have been used instead (Lidz 2004: 110). In addition, the intensifier *taane* may occur on the accusative-marked reflexive pronoun, as in (59), indicating that this pronoun expresses a Subact of Reference:

(58) a. *baagil-u tere-du-koND-itu*
      door-NOM open-PTCP.PERF -take.PST-3.SG.N
      'The door opened.'
      (Lidz 2004: 98; my glosses)

    b. *Hari tann-annu hogaL-i-koND-a*
      PN   REFL-ACC   praise-PTCP.PERF -take.PST-3.SG.M
      'Hari praised himself.'
      (Lidz 2004: 106; my glosses)

(59) *Hari tann-annu-taane hoDe-du-koND-a*
    PN   REFL-ACC-INTS   hit-PTCP.PERF -take.PST-3.SG.M
    'Hari hit himself.'
    (Lidz 2004: 127; my glosses)

Compare (56)–(59) with (60a)–(60b), from the Amazonian language Chimané (Mosetén-Chimané). Here too, the intransitivizer -*ti* may be used for anticausativization and reflexivization, the latter meaning being optionally reinforced by a reflexive pronoun. Again, "reflexive verbs exhibit the same agreement morphology as other types of intransitive verbs", with feminine subjects being marked by a glottal suffix and masculine subjects not indexed on the verb (Ritchie 2019: 111):

(60)　a.　*Mo'　chụi'dye'　vanac-yi-'　/　vanac-ti-'*.
　　　　　the.F　door.F　open-CL-F.SBJ　open-INTR-F.SBJ
　　　　　'The door opened.'
　　　　　(Ritchie 2019: 121; my glosses)

　　　b.　*Maria　ĉat-ji-ti-'　　　(ĉụi')*.
　　　　　PN　hit-CL-INTR-F.SBJ　self
　　　　　'Maria hit herself.'
　　　　　(Ritchie 2019: 120; my glosses)

Note that the intransitivizer alternates with the stem-forming verbal classifier -*yi* in (60a), but not in (60b). This is presumably due to matters of lexical subcategorization: the inherently transitive verb root *ĉat*-, 'hit' requires an overt classifier, but an ambitransitive root like *vanac*-, 'open' can occur without the classifier if the intransitivity marker is used in its stead. In the related language Mosetén -*ti* triggers the same intransitive agreement pattern as in Chimané and, besides being used for reflexivity, reciprocity and antipassivization (hence, a further intransitivizing function), has itself turned into a stem formative with "general intransitive meanings" (Sakel 2011: 191–195, 218, 233, 311). As in Chimané, -*ti* can co-occur with a reflexive pronoun when used in reflexive function, but the agreement pattern is still intransitive. Compare (61a) and (61b):

(61)　a.　*Alfredo　wae-ti-ø*.
　　　　　PN　hit-INTR-M.SBJ
　　　　　'Alfredo hit himself.'
　　　　　(Sakel 2011: 137; my glosses)

　　　b.　*Alfredo　khäei'　wae-ti-ø*.
　　　　　PN　REFL　hit-INTR-M.SBJ
　　　　　'Alfredo hit himself.'
　　　　　(Sakel 2011: 137; my glosses)

Despite the phylogenetic and typological diversity of the languages considered here, all these apparently redundant constructions with a verbal marker and a

reflexive pronoun are accounted for by the representational frame proposed in (42), (52) and (54) for French, Uradhi and Kuuk Thaayoorre. This frame is repeated here in its general form:

(62) $(f_1: [(f_2: [(f_3: \blacklozenge (f_3)) (x_1)_U] (f_2)) (x_1)_A] (f_1))$

This unified account of reflexive constructions that seem to lie somewhere in between transitive and intransitive clauses is in full accordance with Evans, Gaby, and Nordlinger's (2007: 553) insightful suggestion that "reciprocals give MIXED – as opposed to INTERMEDIATE – signs of valency and/or transitivity" (emphasis in the original), with "different [aspects] of a complex semantic representation motivat[ing] different parts of the morphosyntactic structure". Although the focus of Evans, Gaby, and Nordlinger's paper is specifically on reciprocal constructions, this felicitous formulation can unproblematically be extended to reflexives of the type considered here. Namely, the intransitive-like properties of these constructions are motivated by the presence of a single argument in the main predication and the transitive-like ones by the fact that the embedded lexical predicate takes an argument suitable for Object assignment. Thus, the mono-argumentality of the predication triggers the use of a (general or reflexive/reciprocal) intransitivizer, as well as absolutive subjects in the Australian languages, intransitive agreement in the Mosetén-Chimané languages and the lack of dative marking of the causee in French. At the same time, the presence of an embedded Undergoer is responsible for the use of transitive subject pronouns in Wambaya, the possibility of apposed nominals in French (cf. Evans, Gaby, and Nordlinger 2007 on object-controlled complement clauses in Australian reciprocals) and the optional use of (accusative-marked) reflexive pronouns in the remaining languages.

Further evidence for the cross-linguistic relevance of the frame in (62) comes from the Kolyma Yukaghir reciprocal construction. As we saw in Section 4, Yukaghir reciprocals are normally built on a straightforward one-place predication frame with a specialized Reciprocal operator; at the same time, reciprocals are exceptional in being the only type of verbal word to allow noun incorporation:

(63)   *n'e-pöme-aŋs'i-jejl'i*
       RECP-louse-search-1.PL.INTR
       'we look for each other's lice'
       (Maslova 2007: 1844)

Such constructions are unexpected because both object incorporation and the application of the reciprocal prefix are only compatible with basically two- (or

three-)place predicates, and both result in the detransitivization of the predicate. Therefore, whatever process is applied first, the second should be disallowed. These exceptional and otherwise puzzling instances of incorporation are easily explained on the basis of the frame in (62). Once again, the co-occurrence of transitive and intransitive properties reflects the competition between the one-place argument structure of the nuclear predication (f_1), triggering intransitive agreement, and the presence of an Undergoer slot within the configurational predicate (f_2): noun incorporation is triggered when the head of this embedded argument is restricted by a Lexical Property such as *pöme* in (63).

6 Storing and processing in reflexive/reciprocal multifunctionality

As is well known, reflexivity and reciprocity are often not formally differentiated. For instance, morphosyntactic constructions that can express both meanings were found in 66 (i.e. 34,2%) of the 175 languages in Maslova and Nedjalkov's (2005) worldwide sample. As Heine and Miyashita (2008: 201) put it, in these cases "[t]here is no categorical boundary separating reflexive from reciprocal readings [. . .], even if there are morphosyntactic devices for disambiguation." For instance, French *Ils se détestent* and German *Sie hassen sich* can mean either 'They hate themselves' or 'They hate each other'. While Heine and Miyashita (2008) claim that reflexive/reciprocal multifunctionality is always due to polysemy, I would suggest that whether a polysemy or a monosemy account is preferable for constructions that can yield either reading must necessarily be decided case by case, on the basis of language-specific evidence. Due to limits of space, this matter cannot be explored here as exhaustively as it would deserve. In this section, I will therefore concentrate on one specific aspect of reflexive/reciprocal multifunctionality that is particularly relevant to the modelling of interfaces in FDG. This is the question whether, for each individual reflexive/reciprocal construction, this multifunctionality is best accounted for in terms of the storing of partially instantiated frames in the Fund of primitives or the top-down processing of the construction in question within and across the Formulation and the Encoding levels of the Grammatical Component.

When one and the same construction is used to mark both reflexivity and reciprocity, what one usually finds, language after language, is that in the appropriate context either reading can emerge with whatever (di)transitive predicate. Lithuanian presents an uncommon situation in this respect, since "it displays practically no verbs with [the reflexive/reciprocal marker] *-si-/-s* that might have

both meanings" (Geniušienė 2007: 636). For instance, the verb *ginti*, 'protect, defend' can be reflexivized in two different ways:

(64) a. *ginti*   *save*
          protect.INF   oneself
          'protect oneself'

      b. *ginti-s*
          protect.INF-REFL
          'protect oneself'

With verbs of this type, the synthetic reflexive/reciprocal never yields a reciprocal interpretation: in order to bring out that meaning, a bipartite quantifier like *vienas kitą*, 'one another' or one of its equivalents must be used (Geniušienė 2007: 666). The other way round, the verb *milėti*, 'love/make love' can only mean 'love each other/make love to each other' when it takes the reflexive/reciprocal marker; to say 'love oneself', the reflexive pronoun *save* must be used (Geniušienė 1987: 168):

(65) a. *milėti*   *save*
          love.INF   oneself
          'love oneself'

      b. *milėti-s*
          protect.INF-RECP
          'love each other / make love to each other'

In FDG, this state of affairs is straightforwardly accounted for by the dissociation between lexemes and frames – that is, at the interface between what O'Neill (2012: 123–124) refers to as the "lexicon" and the "structicon" sections of the Fund of primitives. On the one hand, both *ginti* and *milėti* are compatible with the two-place reflexive frame formalized in (66), triggering the pronominal construction *ginti save* / *milėti save*: this means that this unambiguously reflexive construction can be productively and unrestrictedly used with (di)transitive predicates of either type in the course of top-down language processing:

(66) $(f_1: [(f_2: \blacklozenge_V (f_2)) (x_1)_A (x_1)_U] (f_1))$

At the same time, *ginti*, but not *milėti*, can occur in one-place frames including a reflexive operator (67a), yielding the form *gintis*; the other way round, *milėti* can occur in the reciprocal frame (67b), corresponding to *milėtis*, from which predicates of the *ginti*-type are excluded:

(67) a. $(f_1: [(refl\ f_2: \blacklozenge_V\ (f_2))\ (x_1)_A]\ (f_1))$
  b. $(f_1: [(recp\ f_2: \blacklozenge_V\ (f_2))\ (m\ x_1)_A]\ (f_1))$

Now, as pointed out in Section 4, the existence of strict, although possibly idiosyncratic lexical constraints on the use of a given construction is a clear indicator that the underlying representational frame must be stored as such within the Fund of primitives. In this regard, it should be stressed that, despite the rigid association of each predicate with one or the other frame, the reflexive or reciprocal interpretation of Lithuanian *s-/-si*-verbs cannot be predicted on the basis of the lexical meaning of the verbal predicate.[16] This means that the association between each lexical verb and one of the two frames in (67a) and (67b) must be learnt and stored in the lexicon (and may well undergo subsequent processes of lexicalization). Nevertheless, the meaning of every individual *s-/-si*-verb can be consistently described in configurational terms by means of one of the two predication frames above. Following the criteria for lexical *vs.* syntactic derivation posited by Keizer (2018: 43–44, 60–61), this entails that reflexive and reciprocal verb formation in Lithuanian is not an instance of lexical derivation – that is, the application of a derivational operator to the base predicate, which enriches the lexical meaning of the latter yielding a new, derived lexeme. Rather, at least before lexicalization, all *s-/-si-* verbs must result from a regular process of syntactic derivation, triggered by the insertion of a two-place predicate into one of the two predication frames in (67) – where the representational operator *refl* or *recp* applies to the Lexical Property (f$_2$), and not to the lexical predicate ($\blacklozenge_V$). In other words, in this case we are presumably dealing with two partially instantiated, one-place predication frames, each of which includes an operator corresponding to one of the two alternative meanings of a polysemous reflexive/reciprocal morpheme.

Interestingly, the polysemy of Lithuanian *s-/-si-* provides a counterexample to Heine and Miyashita's (2008: 185, 188) claim that all reciprocal constructions that diachronically derive from older reflexives allow both readings in many contexts. Another language in which this is not the case is Tahitian. As in a few

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16 Prototypically self-directed predicates meaning 'shave', 'comb' etc. tend to form reflexive *-s/-si*-verbs, but there also are several non-self directed predicates that enter the same pattern, e.g., *ginti*, 'protect, defend', *gelbėti*, *išgelbėti*, 'save', *gražinti*, 'adorn, make beautiful', *nužudyti*, 'kill, murder', *nušauti*, 'shoot', *priverti*, 'force'. Correspondingly, predicates designating prototypically reciprocal actions such as 'meet', 'make love', 'exchange', etc. will usually form reciprocal *-s/-si*-verbs, but there also are many other verbs that receive the same interpretation and not a reflexive one, e.g. *šauti*, 'shoot', *padėti*, *pagelbėti*, 'help, aid', *barti*, 'abuse', *pakeisti*, 'substitute for' (Geniušienė 1987: 58, 77–78, 91, 2007: 645, 666).

other Oceanic languages, such as Maori, Xârâcùù and Rapa Nui, in Tahitian a non-pronominal, two-place reflexive construction has later developed reciprocal functions (Moyse-Faurie 2001: 16, 2008: 144–152). Compare (11)–(12) and (19b) above with (68)–(70):

(68) Maori
    nā   *Hone rāua ko*   *Mere i*   *patu a*   *rāua anō*
    belong PN   3.DU   SPEC PN   TAM beat DET.PERS 3.DU   again
    'John and Mary hit themselves/each other.'

(69) Xârâcùù
    pa   *xûûchî chëi mûgé na*   *ri*   *ngê kwââ*
    COLL child   hit   again PST   3.PL with stick
    'The children hit themselves/each other with a stick.'

(70) Tahitian
    e   *aroha tātou*   *iā*   *tātou*   *iho*
    IPFV love   1.PL.INCL OBL 1PL.INCL downwards
    'Let's love each other.'

As in the case of the Warlpiri/Warluwarra pronouns, the reciprocal uses of these morphemes do not correlate with any morphosyntactic difference when compared to the reflexive uses. Therefore, we do not need to posit two different semantic representations for the reflexive and reciprocal uses of these constructions: in such cases, reflexivity and reciprocity are two contextually determined interpretations of a single, underspecified (i.e. monosemous) predication frame. Moreover, for all these languages no special lexical restriction on either the reflexive or the reciprocal reading is mentioned in the literature. In accordance with the criteria established above, this suggests that the semantically vague reflexive/reciprocal predication frame that underlies the constructions in (11)–(12), (19b) and (68)–(70) is not stored in the lexicon in connection with any specific predicate, but any (di)transitive predicate may in principle be inserted into this two-place frame in the course of the grammatical operation of Formulation.

    Despite these general similarities, the Tahitian reflexive/reciprocal construction crucially differs from those of Maori and Xârâcùù in that, in Tahitian, the two meanings may optionally be differentiated by dropping the so-called oblique marker *i/iā* in the reciprocal use, whereas this is not possible when the meaning is reflexive (Moyse-Faurie 2008: 151–152). Compare (70) with (71):

(71) *'ua   taparahi rātou rātou iho*
     PERF   hit   3.PL   3.PL   downwards
     'They hit each other.' ['*They hit themselves.']

This calls for some considerations about the status of the preposition *i/iā* (the first form is used with common nouns, the second with proper nouns and pronouns). This preposition occurs with various types of non-Actor arguments, among which Undergoers (72a), Recipients (72b) and Allatives (72c):

(72) a. *E   fārerei ua   iā   Tama   ananahi.*
        ASP meet   1.SG PREP   PN   tomorrow
        'I'll meet Tama tomorrow.'
        (Peltzer 1996: 68; my glosses)

    b. *E   parau ātu 'oe iā   rātou.*
        ASP speak DIR 2.SG PREP 3.PL
        'You will speak to them.'
        (Tyron 1970: 63; my glosses)

    c. *E   haere vau i   te   'oire.*
        ASP go   1.SG PREP DET   town
        'I shall go to town.'
        (Tyron 1970: 63; my glosses)

Since *i/iā*-marking neutralizes the opposition between several non-Actor functions, it is likely to be related to the assignment of the syntactic function Object. However, analyzing this preposition as the sole exponent of the function Object would fall short of explaining utterances such as the following, where *i/iā* occurs both on the Undergoer and on the Recipient argument:

(73) a. *E   horo'a ātu vau iā   'oe i   te   tao'a.*
        ASP give   DIR 1.SG PREP 2.SG PREP DET   present
        'I shall give you a present.'
        (Tyron 1970: 63; my glosses)

    b. *E   horo'a mai 'oia i   te   tao'a iā   'u.*
        ASP give   DIR 3.SG PREP DET   present PREP 1.SG
        'He will give me a present.' [Lit. "He will give a present to me"]
        (Tyron 1970: 63; my glosses)

What these examples show is that Object assignment is not marked by *i/iā* alone but by this preposition in conjunction with syntactic position. *Mutatis mutandis*,

this is reminiscent of the marking of Object in English, where the zero-marked Object immediately follows the verb, regardless whether its semantic function is Undergoer (as in *I shall give a present to you*) or Recipient (as in *I shall give you a present*). In accordance with the basic VSO word order of Tahitian, Object is assigned to the *i/iā*-marked constituent (be it an Undergoer, a Recipient or an Allative) that occurs in the first available post-verbal position after the Subject has been placed. Other arguments or modifiers, if present, are placed to the right of the Object noun-phrase and may as well be introduced by *i/iā*, if bearing one of the semantic functions that can be expressed by that preposition.

But this is not the full story yet. As mentioned in Section 2, pragmatic matters play an important role in the transitive/intransitive opposition. First, as in many other languages, only referential arguments can be treated as Objects in Tahitian. Recall, in fact, that semantic function of the second argument is only one of the factors that may (co-)determine the transitive or intransitive status of the clause at the ML. In Blackfoot, for instance, only [+identifiable] and [+specific] second arguments are cross-referenced on the verb; and for Rapa Nui (closely related to Tahitian) Kieviet (2017: 395) identifies humanness and pragmatic "saliency" of the second argument as the crucial factors for Object assignment. Now, the referentiality of the affected participant has been known to be one major trigger for transitive encoding at least since Hopper and Thompson (1980). In Tahitian, this is evident from the fact that non-specific, non-referential Undergoers do not take the preposition *i/iā* and surface in immediate post-verbal position (i.e., the slot otherwise occupied by the subject). Compare (74a) and (74b):

(74) a. *E   huna   'ona   **i   te   mau   inu**   i   muri*
          TAM hide   3.SG   PREP DET   PL   drink PREP behind
          mai   i   te   fare.
          DIR   PREP DET   house
          'He hides drinks behind the house.'
          (Paia and Vernaudon 2004: 256)

     b. *E   huna   **inu**   'ona   i   muri   mai   i   te   fare.*
          TAM hide   drink   3.SG   PREP behind DIR   PREP DET   house
          'He hides drinks behind the house.'
          (Paia and Vernaudon 2004: 256)

In (74a) the Undergoer *inu* occurs in the expected position and takes the Object marker *i*, bearing the plural marker *mau* and the determiner *te*. In (74b), by contrast, the Undergoer appears a bare noun. As pointed out by Paia and Vernaudon (2004: 56), this is "a typical example of 'object incorporation'". Accordingly, the

utterance has become intransitive: the incorporated noun occurs in immediate post-verbal position, preceding the subject, and does not take the Object marker. Semantically, however, *inu* is still an argument of *huna*, just as the incorporated noun *mountain* in the English compound *mountain-climbing* is still an argument of *climb* (Mackenzie 2018: 76).

In addition, the prepositional Object marker may be left out if the noun phrase in its scope is referential but not in Focus. This is evident from the so-called Actor Emphatic Construction (AEC), which is characterized by a suppletive form of the perfective aspect marker (*'ua* > *i*) and by the fact that the Actor occurs to the left of the predicate. The construction has the three variants illustrated in (75b)–(75d) (all from Potsdam and Polinsky 2012: 59; glosses from the original); in the last two of these, the Undergoer lacks the typical marks of objecthood:

(75) a. *'Ua hōhoni te ma'o i te tāvana.*
PFV bite DET shark ACC DET chief
'The shark bit the chief.'

    b. *Nā te ma'o i hōhoni i te tāvana.* (AEC1)
PREP DET shark PFV bite ACC DET chief
'It's the shark that bit the chief.'

    c. *Nā te ma'o i hōhoni te tāvana.* (AEC2)
PREP DET shark PFV bite DET chief
'It's the shark that bit the chief.'

    d. *Nā te ma'o te tāvana i hōhoni.* (AEC3)
PREP DET shark DET chief PFV bite
'It's the shark that bit the chief.'

As is clear from the translations, the Undergoer *te tāvana* is not in Focus (it is not new information). In (75b) this argument is treated as the Object of a normal transitive clause, as shown by comparison with the unmarked construction (75a); the fact that it appears in immediate post-verbal position is simply due to fronting of the Actor. In (75c)–(75d), however, the preposition is dropped and in (75d) the Undergoer is even preposed to the predicate. Since, as noted above, the syntactic function Object is marked both by *i/iā* and by syntactic position, (75c)–(75d) must be regarded as intransitive clauses.[17]

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17 (75c) and (75d) also show that *i/iā* is not simply a marker of referential status (see Hengeveld and Mackenzie 2008: 108 on Fijian *na*). If this were so, the Undergoer *te tāvana*, which lacks the preposition, would be non-referential, which is at odds with the fact that this noun phrase

With these facts in mind, it becomes clear that the unambiguously reciprocal construction in (71) should be analyzed as an intransitive one. Although at this stage I do not wish to claim that this is a full-fledged instance of object incorporation (which would entail that the first occurrence of the pronoun represents a non-referential Undergoer and the second a referential Actor, cf. [74a]–[74b]), this would in principle be a possible interpretation of the reciprocal construction. At any rate, it is clear that the Undergoer in (71) is not treated as an Object in the syntax. Dropping of the preposition in the reciprocal construction thus indicates that the second argument is either non-referential (as in incorporation constructions) or referential but not in Focus (as in the AEC). This does not alter the valency of the predication at the RL, but results in non-assignment of the function Object at the ML. This analysis is formalized in (76) and (77): the former corresponds to the monosemous reflexive/reciprocal construction in (19b) and (70), the latter to the unambiguous reciprocal in (71). Note that in (76) the preposition *i/iā* is represented as a placeholder <obj> because its final form can only be determined at the Phonological Level (in the reflexive/reciprocal construction the selected allomorph will always be /ia:/, since the following word can only be a pronoun). In (77), the two alternatives proposed for the IL reflect the two possible analyses illustrated above for (71): in line (a) the non-Actor argument is referential but not in Focus, in line (b) it is just not referential at all.

(76) IL: $(C_1: [(T_1) (R_1)_{TOP} (R_2)_{FOC}] (C_1))$
RL: $(f_1: [(f_2: \blacklozenge (f_2)) (v_1)_A (v_1)_\phi] (f_1))$
ML: $(Cl_1: [(Vp_1) (Np_1)_{Subj} (Adpp_1: [(Gw_1: <obj> (Gw_1)) (Np_2)] (Adpp_1))_{Obj}] (Cl_1))$

(77) IL: a. $(C_1: [(T_1) (R_1)_{TOP} (R_2)] (C_1))$
   b. $(C_1: [(T_1) (R_1)_{TOP}] (C_1))$
RL: $(f_1: [(f_2: \blacklozenge (f_2)) (m\ v_1)_A (m\ v_1)_\phi] (f_1))$
ML: $(Cl_1: [(Vp_1) (Np_1)_{Subj} (Np_2)] (Cl_1))$

As shown in (77), even when the Object marker is omitted the Tahitian reciprocal construction cannot be argued to presuppose a one-place predication frame. This is because a noun phrase or pronoun may well be non-referential, but if it is spelled out it must necessarily correspond to some element of the RL. There also is no evidence whatsoever that these constructions make use of a configurational

still takes the determiner *te*. In fact, Moyse-Faurie (2016), who agrees with Hengeveld and Mackenzie's analysis of Fijian *na*, argues that in Tahitian it is precisely the determiner *te* that marks referential status (note its absence on the non-referential argument *inu* in [74b]).

predicate with an embedded argument, as in the languages surveyed in Section 5. Therefore, the formal intransitivity of the reciprocal construction cannot be due to matters of argument structure at the RL but must be explained with the absence of a (focussed) Subact of Reference corresponding to the Undergoer. Hence, this construction differs from the reflexives and reciprocals discussed in the two previous sections in that it does not signal the adaptation of a two-place predicate to a one-place predication frame. Nevertheless, it is an intransitive construction to all intents and purposes. Note finally that, even though the construction in (71) is unambiguously reciprocal, this need not be reflected at the RL by inserting a Reciprocal operator on the lexical predicate (f_2); actually, doing so would result in a redundant representation, since the particle *iho* merely marks the coindexation of the two arguments (see the discussion of Oceanic reflexives in Section 3). In the case of Tahitian, it is the combination of IL and RL frames represented in (77) that, by itself, is sufficient to ensure the reciprocal interpretation of the construction.

7 Summary and discussion

7.1 An FDG typology of reflexives

Reflexive constructions can be classified in three basic types according to the underlying representational frame. The general format of the three types is given below for basically two-place predicates (as usual, further arguments can be added if the predicate is a ditransitive one), alongside a few examples of genetically unrelated languages which make use of each frame-type. Curly brackets represent the possible presence of Reflexive (or Reflexive/Reciprocal) operators, including lexical operators of the type of English *self-*.

(78)   General classification of reflexive constructions

Type I	$(f_1: [(\{\pi\} f_2: \blacklozenge (f_2)) (v_1)_A (v_1)_\phi] (f_1))$	English, Warlpiri, Yoruba, Tahitian
Type II	$(f_1: [(\pi f_2: \blacklozenge (f_2)) (v_1)_A] (f_1))$	Blackfoot, K. Yukaghir, Lithuanian
Type III	$(f_1: [(f_2: [(\{\pi\} f_3: \blacklozenge (f_3)) (v_1)_\phi] (f_2)) (v_1)_A] (f_1))$	French, Wambaya, Kannada, Chimané

As should be clear from the previous sections, languages often have more than one reflexive frame-type at their disposal. English and Lithuanian have both Type

I and Type II, as shown in (14)a–(14b), (64a) and (22a), (64b), respectively. French and Kuuk Thaayorre have Type I and Type III, cf. (37b), (55) and (42), (54). Kolyma Yukaghir has Type II and, for reciprocals, Type III (used in noun incorporation), cf. (31b)–(31c) and (63). Where there is an alternative, the variation is of course not random but reflects a communicative choice pertaining to the RL, to the IL or indeed to both of these levels.

Note that, unlike in Types I and III, the operator position in Type II cannot be left unspecified: this is because otherwise we would not be dealing with a specialized reflexive (and/or reciprocal) construction but with a general marker of intransitivity. As usual, the operator in question may be a specialized Reflexive or Reciprocal one, as in Blackfoot, Kolyma Yukaghir (which have different affixes for reflexivity and reciprocity) and Lithuanian (where -*s*/-*si*- has been argued to be a polysemous morpheme) but may as well be a monosemous Reflexive/Reciprocal operator, as in Arapaho (see footnote 10). Also note that Type II always presupposes that a single Subact of Reference is performed at the IL, corresponding to the single argument $(v_1)_A$. The reason for this is that if a referent is evoked at the IL, that Subact of Reference must necessarily correspond to some unit of the RL (while, the other way round, representational arguments may well not correspond to any Subact of Reference). This means that the content frame underlying one-place reflexives of Type II will always be as follows:

(79) $(C_1: [(T_1) (R_1)] (C_1))$

By contrast, constructions of Types I and III vary as regards (i) the referentiality of the non-Actor argument and (ii) the presence of a Reflexive (or Reflexive/Reciprocal) operator.

As argued in Section 3, (pro)nominal reflexives of Type I usually correspond to a content frame containing two Subacts of Reference. Certain combinations of verb + reflexive (pro)noun, however, may be better analyzed as forming a single Subact of Ascription at the IL. English *introduce oneself*, for instance, can be regarded as "a single predicate of self-naming" (Mackenzie 2019: 313), at least in the default case:[18]

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18 Accordingly, with such predicates the reflexive pronoun is usually phonologically reduced (e.g. /hɜːˈsɛlf/ > /əˈself/) (Lachlan Mackenzie, p.c.). This does not mean that the Undergoer argument cannot be treated as a Referential Subact under specific circumstances, for instance in *Mary introduced herself, her band and her manager to the audience* (Mackenzie 2019: 313), in which case no phonological reduction is observed.

(80)   *Mary introduced herself.*
    IL: $(C_I: [(T_I) (+id, +s R_I: Mary_N (R_I))] (C_I))$
    RL: $(f_i^c: [(f_2: introduce_V (f_2))\ ^f(1\ x_i)_A (x_i)_U] (f_i^c))$

In addition, two-place frames may include a Reflexive (or Reflexive/Reciprocal) operator, yielding apparently redundant structures of the type of *Atheists are able to self-congratulate themselves* (see the discussion of [22b] above).

Type III reflexives likewise differ as regards the referentiality of the non-Actor argument – which in this case is embedded within a configurational predicate, as shown in (78). In Romance, where reflexive/reciprocal clitics are never referential,[19] the underlying content frame will always contain a single Referential Subact (or two, if the lexical predicate is a ditransitive one, as for instance in [46]). The same goes for Wambaya, where the embedded argument is never overtly expressed. In the other Type III languages discussed in Section 5, however, this argument is always referential, since it is precisely the evocation of a second Subact of Reference that motivates the selection of the relevant predication frame. Moreover, reflexives of Type III differ as to whether they include a Reflexive (or Reflexive/Reciprocal) operator, as in Wambaya, or make use of a general, semantically void intransitivizer.

7.2 Reflexives and reciprocals at the interfaces

In a top-down, modular approach to the structure of grammar such as FDG's, modelling the inter-level interfaces means making sense of the ways in which higher-level configurations are mapped onto lower-level ones. As emerges clearly from the various contributions to this volume, it is when these configurations are not perfectly aligned with each other that the issue becomes particularly interesting. Of the three classes of reflexives and reciprocals identified in this paper, Type II is the least interesting in this regard: these constructions are invariably built on a one-place representational frame with no embedded argument, which entails that only one Subact of Reference is performed at the IL. Hence, at the ML no other option is available than to encode the construction as a straightforwardly

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19 During the discussion at IW-FDG-2019, one of the participants suggested that these clitics can be contrasted in such structures as Spanish *Él se vió a si mismo* ("He$_i$ saw [him$_i$ himself$_i$]") and thus must necessarily be referential. In my view, it is in fact the so-called emphatic reflexive *si mismo* that expresses a contrasted Subact of Reference (cf. the analysis of French *soi-même* in [45]), whereas the clitic *se* has representational meaning only, designating a non-referential embedded argument in a Type III reflexive frame.

intransitive one. The other two groups of reflexives and reciprocals, by contrast, provide quite some food for thought as regards for the study of interfaces.

As we saw in Section 5, constructions now labelled "Type III" tend to display an ambivalent morphosyntactic behaviour with respect to the transitive/intransitive opposition. The crucial point, as regards these constructions, is that they are not "in between" transitive and intransitive clauses; rather, their transitive and intransitive properties reflect different aspects of underlying semantic structure. More specifically, the fact that the embedded lexical predicate takes an Undergoer argument triggers such features as (i) the use of a pronominal form designating this argument (obligatory in Romance, optional in most other languages); (ii) the possibility of object-controlled secondary predications, with full noun phrases apposed to the reflexive pronoun; (iii) the use of transitive subject pronouns in Wambaya; and (iv) the possibility of object incorporation in Kolyma Yukaghir reciprocals. Also note that in virtually all of the examples in Section 5 the Undergoer is animate and highly affected by the action, the action itself is punctual and controlled by a volitional Actor, the modality is realis and the polarity affirmative. That is, most of our examples possess all of the semantic features identified by Hopper and Thompson (1980: 252) as prototypical triggers of transitivity. All these factors, however, are systematically overridden by the fact that the overall predication frame is a one-place one, which turns out to be, by itself, a sufficient trigger for intransitive encoding at the ML. This shows up in all of our languages in the use of a (general or semantically specialized) intransitivizer and is additionally signalled in individual languages by absolutive marking of subject noun phrases (Kuuk Thaayorre, Uradhi, Wambaya), intransitive agreement on the verb (Mosetén-Chimané, Yukaghir) or the morphosyntactic treatment of causees (Romance).

In some Type III constructions, the competition between triggers of transitivity and intransitivity is not limited to different aspects of the representational frame but also involves a mismatch between the number of Referential Subacts at the IL and the number of main-predication arguments at the RL. Recall that Kuuk Thaayorre, Uradhi, Sinhala, Kannada and the Mosetén-Chimané languages have general intransitivizers which can yield various interpretations, among which reflexivity. In the default case, the interaction between (i) the lexical meaning of a two-place predicate, (ii) the use of this predicate in a one-place frame (signalled by the intransitivizer) and (iii) the context of utterance is sufficient to provide the addressee with all the clues necessary to derive the desired interpretation. In this case, only one Subact of Reference is performed, corresponding to the single argument of the detransitivized lexical predicate, as indicated in (50)–(51). But, if needed for the purpose of disambiguation, a second referent can be evoked, triggering the selection of a frame of Type III and the use of a reflexive pronoun for the embedded argument. Note that in such cases this argument is not only referential

but also highly identifiable (it always coincides with the Actor), which, again, is a cross-linguistically prominent trigger of transitivity – this time related to the IL – as shown by Hopper and Thompson (1980). But, as we have seen, this does not affect the overall intransitivity of the construction, even when the Subact in question is emphasized or assigned a pragmatic function such as Focus or Contrast, as is particularly clear in Kuuk Thaayorre (see the quotation from Gaby 2006: 509 in Section 5) and Kannada (where the accusative-marked reflexive pronoun may bear the intensifying affix *taane*). In other words, in Type III reflexives any mismatch between the number of Referential Subacts in the content frame and the valency of the predication frame is systematically resolved in favour of the RL.

Similar "conflicts" between the IL and the RL are also sometimes observed in constructions of Type I. Reflexives of this type are for the most part encoded as transitive clauses, which straightforwardly reflects the correspondence between the presence of two Referential Subacts at the IL and two main-predication arguments at the RL (one of which must bear the semantic function Undergoer in many, but by no means all languages). Yet, there are cases in which the correspondence is not perfect. In English *introduce oneself*, for instance, there is arguably only one Subact of Reference, but the predication frame is a bi-argumental one: once again, it is the RL that wins out, and the predication is encoded as a transitive clause. In other cases, however, the competition is solved in favour of the IL. In the Tahitian reciprocal construction, whenever there is only one Referential Subact – or the second Referential Subact, if present, is not in Focus – the object marker is omitted and the predication is encoded as an intransitive clause. In other words, the presence of two main-predication arguments at the RL is not sufficient to trigger transitive coding in Tahitian: in order for the non-Actor argument to be assigned the function Object at the ML, this argument must be both referential and in Focus. Interestingly, this is in accordance with the well-known centrality of interpersonal factors in the grammatical organization of Oceanic and, more generally, Austronesian languages (e.g. the long-standing debate on the so-called Philippine-type voice system – including Hengeveld and Mackenzie's 2008: 317–319 discussion of interpersonal alignment in Tagalog; cf. also pp. 107–108 on Subact-status marking in Samoan, Tagalog and Fijian).

Besides being sensitive to the competition between different aspects of the RL and between the RL and the IL, the morphosyntax of reflexives and reciprocals reveals cross-linguistic differences concerning the degree of flexibility of the IL/RL interface. Consider again the situation in French, as opposed to other Type III languages and Type I languages such as English and Tahitian. As argued above, in Kuuk Thaayorre, Uradhi, Sinhala, Kannada and the Mosetén-Chimané languages the predicate of a detransitivized clause can optionally be expanded by creating a slot for an embedded argument, encoded as a reflexive pronoun and corresponding

to a second Subact of Reference. That is, a content frame with either one or two Subacts of References can be mapped onto a one-place predication frame, corresponding to the two following combinations of IL and RL configurations:

(81) a. IL: $(C_1: [(T_1) (R_1)] (C_1))$
      RL: $(f_1: [(f_2: \blacklozenge (f_2)) (v_1)_A] (f_1))$
   b. IL: $(C_1: [(T_1) (R_1) (R_2)] (C_1))$
      RL: $(f_1: [(f_2: [(f_3: \blacklozenge (f_3)) (v_1)_\phi] (f_2)) (v_1)_A] (f_1))$

The other way round, the content frame underlying English Type I reflexives and Tahitian Type I reflexive/reciprocals usually contains two Subacts of Reference, but in certain cases only one such Subact is performed. This has consequences for Encoding, determining a reduction in the phonological form of the pronoun in English (see footnote 18) and the dropping of the Object marker at the ML in Tahitian (resulting in an unambiguously reciprocal construction). In both languages, however, the RL remains unaffected – the lexical predicate still takes two direct arguments. In short, in both English and Tahitian the two following configurations are possible:

(82) a. IL: $(C_1: [(T_1) (R_1) (R_2)] (C_1))$
      RL: $(f_1: [(f_2: \blacklozenge (f_2)) (v_1)_A (v_1)_\phi] (f_1))$
   b. IL: $(C_1: [(T_1) (R_1)] (C_1))$
      RL: $(f_1: [(f_2: \blacklozenge (f_2)) (v_1)_A (v_1)_\phi] (f_1))$

In French reflexives, by contrast, the evocation of a coindexed referential argument always triggers the use of a stressed (bare or emphatic) pronoun. When this happens, a one-place representational frame of Type III cannot be used and a two-place frame of Type I will be selected in its stead. That is, in French reflexives there is always a one-to-one match between the number of Referential Subacts at the IL and the number of main-predication arguments at the RL, as shown in (45)–(46) for the ditransitive predicate *donner*, 'give'. This means that, at least as regards reflexive constructions, the interface between the two levels of Formulation is more rigid in French (and Romance in general) than in the other Type I and Type III languages considered here. An interesting question for future research will be whether similar differences between the languages in question are also observed in other areas of the grammar.

Finally, reflexives and reciprocals offer interesting insights on the relation between the Fund of primitives and the grammatical operations of Formulation and Encoding. Unlike the interfaces between the four levels of the Grammatical Component, the interface between the Fund and the grammar proper cannot be modelled in terms of mapping relations: the central issue, in this regard, is rather the division

of labour between storing and processing. With respect to this parameter, reflexives and reciprocals differ as to whether they are derived from (i) a partially instantiated frame incorporating a Reflexive and/or Reciprocal operator or (ii) a non-instantiated frame plus an operator specified during Formulation or a coindexation marker inserted at Morphosyntactic Encoding. Languages that favour the former option, like Lithuanian (and English, as regards *self*-prefixation), require a lesser deal of processing effort for building up the constructions in question, relying more heavily on storing and memorization – namely, as regards the default associations between frames and lexemes. However, the majority of the reflexives and reciprocals surveyed in this paper are productively derived in the course of top-down language production without any particular lexical restriction. This uneven distribution between the two options is consistent with the fact that, diachronically, grammaticalizing elements tend to become increasingly free of selection restrictions, thus expanding their range of application ("host-class expansion" in Himmelmann's 2004 terms). From this point of view, it seems reasonable to hypothesize that, as grammaticalization proceeds, operators specified in partially instantiated frames are gradually dissociated from these ready-made structural schemas (and thus from the constraints on the set of predicates that may occur in such frames) and start to be selected independently during Formulation. In other words, since grammaticalization always involves an expansion of the set of predicates that may enter the construction, a very general pattern of change may be assumed which gradually relieves memory and puts more and more burden on top-down processing. It is only towards the end of the grammaticalization cycle, when the productivity of the construction starts contracting again and lexeme/frame combinations become fossilized, that operators may shift back into a partially instantiated frame stored as a whole in the Fund.

8 Conclusions

A first conclusion to be drawn from our survey of reflexive constructions is that

(i) the considerable variety of construction types that inevitably results from a morphosyntactically-based classification of reflexive markers is drastically reduced when we switch to a functional perspective.

Taking the RL as the central level of analysis for the study of reflexives, I have identified three basic types of reflexivization strategies, two of which (Types I and III) vary across languages as regards (i) their interactions with different types of content frames of the IL and (ii) the presence or absence of a Reflexive (or Reflexive/Reciprocal) operator in the underlying predication frame. We have seen that

the same three types of predication frames are also attested in various reciprocal constructions. A more comprehensive typology of reciprocals will have to be left for future research, but it seems likely that the principles applied here in the classification of reflexives will also provide a suitable basis for accommodating all those reciprocal markers that could not be discussed in this paper.

Besides reducing the number of attested reflexivization strategies, the FDG perspective allows us to take the problems inherent to morphosyntactically-oriented classifications to a more theoretically interesting level of analysis. More specifically, FDG's multi-level approach to the organization of the grammar and the layered structure of the individual levels reveals that

(ii) the variation observed across reflexive constructions is adequately described in terms of different interpersonal and representational configurations.

In particular, we have seen that FDG is well equipped to accommodate Evans, Gaby, and Nordlinger's (2007) suggestion that the transitive and intransitive morphosyntactic properties often co-occurring in reflexives and reciprocals are motivated by different aspects of underlying structure. What is crucial, then, is that we gather an understanding of exactly which aspects of the IL and the RL act as triggers for transitive or intransitive encoding in different languages. This is of course a complex matter, which can only be evaluated on a language-specific basis and whose implications extend well beyond the morphosyntax of reflexives and reciprocals. In general terms, however, it turns out that

(iii) in Type I reflexives a competition between triggers of transitivity and triggers of intransitivity may derive from a mismatch between the IL and the RL. When this happens, languages differ as to which of the two levels of Formulation prevails in determining the encoding of the construction as a transitive or intransitive clause.

(iv) Type II reflexives are invariably built on a one-place predication frame, which entails that only one Subact of Reference is performed at the IL. Therefore, the construction is always encoded as an intransitive clause.

(v) In Type III refexives the competition between triggers of transitivity and intransitivity is primarily internal to the RL and concerns the presence of an embedded argument potentially suitable for Object assignment *vs.* the mono-argumentality of the nuclear predication. The former aspect of Representational Formulation is reflected at the ML in a variety of language-specific ways; additional triggers of transitivity present at the IL may also play a role, but, on the whole, it is always the one-place argument structure of the predication frame that wins out, triggering an intransitive clause.

Finally, I have argued that

(vi)   languages differ as to whether they allow for mismatches in the number of Referential Subacts and main-predication arguments in the content and predication frames underlying reflexive and/or reciprocal constructions;

(vii)   individual reflexive and/or reciprocal constructions differ as to whether they make use of a partially instantiated frame or are built up in an entirely top-down fashion in the course of Formulation.

Future research will have to assess the cross-linguistic validity of the conclusions summarized in this section. In particular, it remains to be ascertained whether the three frame-types distinguished here are really sufficient for describing all attested reflexive constructions; whether the intra- and inter-level contrasts identified in (iii)–(vi) account for all the possible variation in the formal properties of reflexives; the extent to which the findings of this paper can be extended to reciprocals, and how the reciprocal constructions not investigated here can be formalized and typified in FDG terms.

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Thomas Schwaiger

Serial verb constructions, interface mismatches and Functional Discourse Grammar

Abstract: This chapter discusses serial verb constructions (SVCs) from a Functional Discourse Grammar (FDG) perspective. The study serves as a test drive for FDG's typological basis and contributes to what, with respect to the model, has been called 'the interface issue'. Drawing on earlier Functional (Discourse) Grammar work and various fragmentary contributions scattered throughout the FDG literature, a proposal is made on how the most prominent typological features of serial verbs can be captured by the specific set-up of the theory. Given FDG's top-down levels-and-layers architecture, the central feature of SVCs concerns a mismatch between the Representational Level and the Morphosyntactic Level. Proceeding from this non-transparent many-to-one mapping between semantics (relating to complex Properties, States-of-Affairs and Episodes) and (morpho)syntax (relating to single Clauses and various manifestations of Verbal Words within them), an updated, more comprehensive FDG account of SVCs is developed. Adjacent level pairs of the Interpersonal, Representational, Morphosyntactic and Phonological Levels are checked for default relations and possible mismatches as they are found in different kinds of serial verbs according to varying parameters like eventhood, symmetry, contiguity and wordhood. The resulting interface-based diversity of SVCs within FDG goes beyond the latter's previous differentiation of merely 'nuclear', 'core' and 'event serialization'.

Keywords: serial verbs, syntax-semantics interface, inter-level mismatches, Functional Discourse Grammar

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1 Introduction

The present study deals with the phenomenon of serial verb constructions (SVCs) or, simply, serial verbs – i.e. "a sequence of verbs which act together as a single predicate, without any overt marker of coordination, subordination, or syntactic dependency of any other sort" (Aikhenvald 2006: 1; see also Aikhenvald 2018b: 1–2) – from the perspective of Functional Discourse Grammar (FDG; Hengeveld and Mackenzie 2008; Keizer 2015). The article is neither meant as yet another annual "reappraisal of what serial verbs are" (Aikhenvald 2018b: 18) nor as merely another among many "reinterpretations in terms of a formalism" (Aikhenvald 2006: 1, note 2). Rather, it tries to serve as a general test drive for FDG's explicitly typological basis (see also Schwaiger 2018: 118 on reduplication) as well as to contribute to advancing the model with respect to what Hengeveld and Mackenzie (2008: 42) call "the interface issue" (see also Schwaiger 2018: 137, again in the context of reduplication).

In pursuing the above goals, reference is made to several influential contributions from the descriptive, comparative and theoretical literature on SVCs, and a programmatic proposal is offered on how the latter's most prominent typological features can be captured by the specific set-up of the FDG theory. Accordingly, section 2 begins with a definition of serial verbs, describes the ways in which they have been found to vary across languages and reviews their occasional previous treatment in different studies cast within the linguistic framework of FDG.[1] Section 3 turns to an updated and more systematic FDG approach to SVCs from a broader cross-linguistic view, grounded in serialization mismatches and the pertinent interfaces. Section 4 concludes with an outlook on important open questions.

2 The typology and FDG theory of serial verbs

2.1 Definitional properties

Serial verbs can be defined prototype-and-continuum-style (but see Haspelmath 2016: 313 for scepticism) by having, in an individual language, most but not necessarily all of the following characteristics (Aikhenvald 2006: 3, 2018b: 3–4; see also

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1 Apart from passages of various publications referred to in this paper, I have had access to unpublished earlier Functional (Discourse) Grammar work on verb serialization by Kees Hengeveld and by Miriam van Staden as it is manifested in a number of talks (e.g. Hengeveld 1997), a project description and a presentation abstract (van Staden 2008).

 Dixon 2006: 339–341; Bisang 2009: section 2.2; Haspelmath 2016: sections 2.2–2.4 and 3; Aikhenvald 2018b: 18; Unterladstetter 2020: section 3.2.1):

A. **An SVC consists of two or more verbs, each of which could also function as the sole verb in a clause.**

B. **There is no mark of dependency – such as coordination, subordination, or dependency of any sort – between the verbs within an SVC.**

C. **An SVC is monoclausal – it functions as a single predicate.** This may include all verbs in an SVC together being in the scope of grammatical categories like tense, aspect, evidentiality, modality, mood, reality status, illocutionary force and negation, as well as them falling within one intonation contour and being pronounced as one verb would be, with no pause likely in the middle.

D. **The SVC itself will have its own transitivity value.**

E. **There is usually at least one core argument shared by all the verbs in an SVC.**

F. **The SVC is conceived as describing a single event.**

Most of these criteria are in one way or another represented by the illustrative examples of serial verbs from different languages in (1)–(7) below.[2] The majority of these SVCs comprise two (1–4), some three (5, 6) and the last one in (7) as many as six component verbs (though see section 3.2 for a qualification of the Sranan example), each single one of which could also appear on its own in appropriate clausal contexts (criterion A). Additionally, in none of the cases is there a marker of syntactic dependence between the verbal components to be found (criterion B). Monoclausality and monopredicativity (criterion C) are fairly broad and multi-faceted notions bound to vary considerably in their specifics from language to language. Here, they are most clearly reflected in (1), (3), (4) and (6) by the respective component verbs all falling under the same scope of different specifications for tense/evidentiality (1, 6) or modality/mood (3, 4).[3]

The independence of a serial verb's overall transitivity from the respective values of its components (criterion D) can best be gleaned from examples where the latter do not match. In (1) from Igbo, for instance, the SVC is transitive while none of the component verbs could be used by itself with the same object *éféré*: transitive *tí* for its selectional restrictions ("only a lunatic would try to beat a

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2 Adopting conventions laid out in Aikhenvald (2018b: xvi), serial verb components appear here in bold and English translations of SVCs are followed by a literal sequencing of the respective glossed verbs.

3 The less obvious (in written form at least) prosodic properties of monoclausal intonation or the impossibility of intonational breaks between SVC components are explicitly described for languages like Tetun Dili (Hajek 2006: 248), Taba (Bowden 2001: 303–304) and Alamblak (Bruce 1988: 25).

plate"; Lord 1975: 27) and *wá* for the plain reason of being intransitive (Lord 1975: 27–28; see also Aikhenvald 2006: 6–7).

(1) Igbo
*ó   **tì-wà**-rà   éféré   à*
he   hit-split.open-TNS   plate   the
'He shattered the plate.' (hit split.open)
(Lord 1975: 27)

The usual sharing between serial-verb components of minimally one syntactic core argument (criterion E) most often occurs with same subjects (e.g. 1; 4–7) but may extend to both same subjects and same objects or diverge to so-called switch-function SVCs as in (2) from Tetun Dili, where *bola* is the object of the first verb *tuda* and the subject of the second verb *mai* (Hajek 2006: 244).

(2) Tetun Dili
tuda**   bola   **mai
throw   ball   come
'Throw the ball over here.' (throw come)
(Hajek 2006: 243)

The single eventhood said to be captured by serial verbs (criterion F) can be illustrated with reference to the Taba example in (3): The death of the pig must here be understood as directly and immediately connected to its being bitten, while a respective paraphrase with the component verbs in two coordinated clauses does not entail such an intimate causal and temporal connection between the dying and the biting (Bowden 2001: 297; see also Aikhenvald 2006: 7 as well as (18a) and (18b) in section 3.2.1).

(3) Taba
*n=**babas**   welik   n=**mot**   do*
3SG=bite   pig   3SG=die   REAL
'It bit the pig dead.' (bite die)
(Bowden 2001: 295)

(4) Alamblak
*Wa-yarim-**ak**-**hita**-n-m-ko*
IMP-ELEV-get-put-2SG-3PL-ELEV
'Get them on a level plane toward me (and) put them up (there).' (get put)
(Bruce 1988: 27)

(5) Dâw
    yõ:h   **bə-hãm-yɔw**
    medicine   spill-go-happen.straight.away
    'The medicine spilt straight away.' (spill go happen.straight.away)
    (Aikhenvald 2006: 2)

(6) Tariana
    phia-ka   *p**hita**   *pi-**thaketa***   *pi-**eme***   *ha-ne-na*
    you-REC.P.VIS 2SG.take 2SG-cross.CAUS 2SG-stand.CAUS DEM-DIST-CL:VERT
    hyapa-na-nuku
    hill-CL:VERT-TOP.NON.A/S
    'It was you who brought that mountain across to the other side.'
    (take make.cross make.stand)
    (Aikhenvald 2018b: 2)

(7) Sranan
    Lon go teki *a*   *buku* ***tyari go gi***   *a*   *leriman*
    run go take the book carry go give the teacher
    'Run and fetch the book and take it to the teacher.' (run go take carry go give)
    (Sebba 1987: 40)

Of the properties reviewed in this section, especially A–C seem to be present in all SVCs. Thus, their multi-verbal yet syntactically non-dependent, monoclausal and monopredicative nature appears to constitute the constant prototypical centre for the definition of such constructions (see also section 3.3.1). The remaining criteria D–F, on the other hand, are more variable in character and as such are responsible for continuous gradations of the serial-verb prototype in terms of valency, shared arguments (for both of which see also section 3.3.2) and event structure (see also section 3.3.3).

2.2 Parameters of variation

Proceeding from their defining features in section 2.1, serial verbs can cross-linguistically vary and be classified further according to the following parameters (Aikhenvald 2006: 3–4, 2018b: 6–7; see also Bisang 2009: section 2.3; Unterladstetter 2020: sections 3.2.4 and 3.2.6):

I. COMPOSITION (see also Aikhenvald 2006: section 3, 2018b: chapter 3; Dixon 2006: 342–343): SYMMETRICAL SVCs consist of two or more (major) verbs each chosen from a semantically and grammatically unrestricted class. ASYM-

METRICAL SVCs include a (minor) verb from a grammatically or semantically restricted class.

II. **CONTIGUITY** VS. NON-CONTIGUITY of components (see also Aikhenvald 2006: section 4.1, 2018b: section 4.1; Dixon 2006: 342): Verbs which form an SVC may have to be next to each other or another constituent may be allowed to intervene between them.

III. **WORDHOOD OF COMPONENTS** (see also Aikhenvald 2006: section 4.2, 2018b: section 4.2; Dixon 2006: 341–342): Components of an SVC may or may not form independent grammatical or phonological words (MULTI-WORD VS. SINGLE-WORD SVCs).

IV. **MARKING** of grammatical categories in an SVC (see also Aikhenvald 2006: section 4.4, 2018b: section 4.4): Verbal categories – e.g. person of subject and object(s), tense, aspect, mood, negation or valency change – may be marked just once per construction (SINGLE MARKING) or can be marked on every component (CONCORDANT MARKING).

The symmetry, or symmetricity, of serial verbs (parameter I) is a distinction based on different paradigmatic possibilities for the verbal slots in an SVC.[4] While symmetrical serial verbs do not impose a restriction on any of their major components, asymmetrical serial verbs are made up of at least one open major slot without restrictions as well as a relatively closed minor slot endowed with a grammatical and/or semantic restriction (e.g. to motion verbs like *mai* in (2) and *thaketa* in (6) or to verbs of manner like *yɔw* in (5) above). The contiguousness of SVCs (parameter II) pertains to the difference between component verbs without intervening material (e.g. 1; 4–6) and component verbs which may be interrupted (e.g. by *bola* in (2), *welik* in (3) and *a buku* in (7) above). Grammatically and/or phonologically, the verbal components of a serial verb may retain their status as words of their own or they may together form one word (parameter III). This is shown by contrasting the multi-word examples in (2), (3), (6) and (7) with the single-word examples in (1), (4) and (5).[5] Finally, the ways in which the expression of a grammatical category can be marked in an SVC (parameter IV) – which for different categories may co-occur in one and the same language as in (3) from Taba – are contrasted by single-marked past tense in (1), realis mood in (3) and subject-object person in (4) versus concordantly marked subject person in (3) and (6).

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4 I owe this observation to Riccardo Giomi.

5 The obvious problem of differentiating single-word serial verbs from verbal compounds is addressed in section 3.2.1.

2.3 Earlier FDG approaches

Although the conspicuous features of serial verbs have spawned a large amount of theoretical literature from various generative (e.g. transformational like Stahlke 1970 or minimalist like Baker 1989 and Veenstra 1996), functional-typological (e.g. Givón 1991; Durie 1997; Aikhenvald 2006, 2018b; Dixon 2006; Bisang 2009; Haspelmath 2016) and, more specifically, Role and Reference Grammar (RRG; e.g. Foley and Olson 1985; Riccio 2017) angles, FDG treatments of SVCs seem sparse and selective.[6] The latter are surveyed in the remainder of this section and discussed further in section 3.

Based on RRG terminology, Hengeveld and Mackenzie (2008: 169–170, 184, 217), in their main presentation of the model, analyse cases of so-called core serialization and nuclear serialization[7] at the Representational Level (RL) of FDG as, on the one hand, a combination of two or more equipollent Configurational Properties (f^c) constituting the complex head of a State-of-Affairs (SoA, e; e.g. (9), analysing (8) from Virgin Islands Creole Dutch)[8] and, on the other hand, as a combination of two

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6 Recent overviews on the theory of SVCs, to the exclusion of FDG, can be found in Aikhenvald (2006: 58–60, 2018b: section 1.6) and Riccio (2017: section 2). Aikhenvald (2018a) provides a commented bibliography on serial verbs.

7 In FDG's precursor model Functional Grammar, these have also been called syntactic and lexical serialization, respectively (Hengeveld 1997: 3–4). Roughly, core (syntactic) serialization is said to combine properties like non-contiguity, concordant marking and a semantics different from contiguous, single-marked nuclear (lexical) serialization (Aikhenvald 2006: 50, including note 19; for a critique of the distinction see also Aikhenvald 2018b: 17–18).

8 A similar proposal from the early days of FDG (and in an older, now largely obsolete notation) is made by van de Vate (2004: 25–26) for the Saramaccan example in (i), yielding the general semantic representation in (ii) as well as the specific Interpersonal Level (IL), Representational Level (RL) and Structural Level (SL) analysis in (iii). For further details see note 12, section 3.3.1 and note 16.

(i) Saramaccan

    à   *bì*   ***jáka***   *en*   ***púu***

    3SG.NOM PAST   chase   3SG.OBJ remove

    'He chased him away.' (chase remove)

    (van de Vate 2004: 24; cf. Veenstra 1996: 75)

(ii) RL $(\pi_2\, e_1\, [(\pi_1\, f_1)\, (x_1)_\Phi\, (x_2)_\Phi], [(\pi_1\, f_2)\, (x_1)_\Phi\, (x_2)_\Phi]\, (e_1))$ (van de Vate 2004: 26)

(iii) IL $(A_I:\, [DECL\, (P_I)_S\, (P_J)_A\, (C_I:\, [(T_I)\, (R_I)\, (R_J)]\, (C_I))]\, (A_I))$

         RL $(past\, e_i:\, [(f_i:\, jáka\, (f_i))\, (x_i:\, á\, (x_i))_{Ag}\, (x_j:\, en\, (x_j))_{Pat}],\, [(f_j:\, púu\, (f_j))\, (x_j)_{Ag}]\, (e_i))$

         SL $[[à]_{RefPhr}\, [bì\, jáka]_{PredPhr}\, [en]_{RefPhr}\, [púu]_{PredPhr}]_{Clause}$ (van de Vate 2004: 31)

Lexical Properties (f) forming a compound Property expression (e.g. (11), analysing (10) from Nêlêmwa).[9]

(8) Virgin Islands Creole Dutch
   Fan *som fligi **gi** mi*
   catch some flies give me
   'Catch some flies for me.' (catch give)
   (Jansen, Koopman, and Muysken 1978: 130)

(9) RL $(e_i$: [
       $(f^c_i$: [$(f_i$: fan $(f_i))$ $(x_i)_A$ $(x_j$:−fligi−$(x_j))_U$] $(f^c_i))$
       $(f^c_j$: [$(f_j$: gi $(f_j))$ $(x_i)_A$ $(x_k)_L$] $(f^c_j))$]
     $(e_i))$

(adapted from Hengeveld and Mackenzie 2008: 169; semantic functions added following Genee 2016: 1093)

Coindexation of the Individuals (x) in (9) shows the Actor (x_i) but not the Undergoer (x_j) or Locative (x_k) arguments to be shared between the two transitive predication frames, which together constitute a ditransitive predication frame. By contrast, both Lexical Properties (f_j) and (f_k) in (11) occur in the same transitive predication frame and thus share a single set of arguments, as morphosyntactically evinced by the transitive concord suffix *-e* on the verb *hââhuux*, which is stative intransitive when used by itself (Bril 2004: 11, 15). The problem with the analysis of *diya* as a modifier of a head *hââhuux* will be addressed in section 3.2.1.

(10) Nêlêmwa
   *Hla **diya hââhuux-e** mwa eli*
   3PL   do   be.recent-TR house that.ANAPH
   'They built this house recently.' (do be.recent)
   (Bril 2004: 15)

(11) RL $(f^c_i$: [$(f_i$: $(f_j$: hââhuux (f_j): $(f_k$: diya $(f_k))$ $(f_j))$ $(f_i))$ $(x_i$:−hla−$(x_i))_A$
   $(x_j$:−mwa−$(x_j))_U$] $(f^c_i))$

(adapted from Genee 2016: 1092)

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9 The formalization in (11) adapted from Genee (2016) makes explicit what Hengeveld and Mackenzie (2008: 217) only suggest (but see also section 3.2.1).

In addition to core and nuclear serial verbs, Genee (2016: 1093–1094) differentiates a third type under the name of event serialization. Proceeding from causative constructions in Blackfoot like (12), "the fact that the causing and caused events each represent at least a State-of-Affairs, but that their relationship does not involve embedding or subordination" is "analyzed as a configurational head of an Episode" (Genee 2016: 1093) as in (13), where the cause-and-effect relationship is reflected by the second SoA having the semantic function of Result with respect to the first SoA in the Episode (ep). The assignment of a function here and in the following RL representations of (14) and (15) actually creates a serious conflict with the very nature assumed for SVCs, an issue to be taken up again in section 3.3.5. However, the rest of the analysis as discussed below provides useful additions to the FDG theory of serial verbs, especially at the Interpersonal Level (IL) and the Morphosyntactic Level (ML). The Phonological Level (PL), on the other hand, has been typically ignored in these and other formalizations of serialization.

(12)   Blackfoot
       *nit-**a'po'taki-áttsi**-aa-wa*
       1-work.AI-cause.TA-DIR-3SG
       'I caused her to work.' (work cause)
       (Genee 2016: 1086; glossing from Genee 2018: 252)

(13)   RL $(ep_i: [(e_i) (e_j)_{Res}] (ep_i))$ (Genee 2016: 1093)

The minimal representational frame and respective verbal word template for a Blackfoot causative are given in (14): The transitive predication frame of the first SoA is specified for the Lexeme *áttsi* as well as for an Actor and Undergoer argument, and the Configurational Property of the second SoA built around an open Lexeme (♦) slot at least contains an additional Actor that is coreferential with the first Undergoer (Genee 2016: 1093), triggering at the ML a Verbal Word (Vw) consisting of at least a Verb Stem (Vs) or Root (Vr), an Animate Intransitive Affix (Aff) and the Verb Root *áttsi* (Genee 2016: 1094).

(14)   RL $(ep_i: [$
              $(e_i: (f^c_i: [(f_i: áttsi (f_i)) (x_i)_A (x_j)_U] (f^c_i)) (e_i))$
              $(e_j: (f^c_j: [(f_j: ♦ (f_j)) (x_j)_A . . .] (f^c_j)) (e_j))_{Res}]$
           $(ep_i))$
       ML $(Vw: [. . . (Vs/Vr) (^{AI}Aff) (Vr: áttsi (Vr)) . . .] (Vw))$
                                               (adapted from Genee 2016: 1094)

A more detailed representation of example (12) can be found in (15), expanding on (13) and (14) as well as incorporating the fact that there are two separate Ascriptive Subacts (T) at the IL corresponding to two Lexical Properties at RL and a Verbal Root and Stem, respectively, at ML.

(15) IL $(A_I: [(F_I: DECL (F_I)) (P_I)_S (P_J)_A$
$(C_I: [\textbf{(T_I) (T_J)} (R_I: [+S, -A] (R_I)) (R_J: [-S, -A] (R_J))] (C_I))]$
$(A_I))$

RL $(ep_i: [(e_i: (f^c{}_i: [(f_i: \textbf{áttsi}_{TA} (f_i)) (x_i)_A (x_j)_U] (f^c{}_i)) (e_i))$
$(e_j: (f^c{}_j: [(f_j: \textbf{a'po'taki}_{AI} (f_j)) (x_j)_A] (f^c{}_j)) (e_j))_{Res}]$
$(ep_i))$

ML $(Le_i: (Cl_i: (Vp_i:$
$(Vw_i: [(Aff_i: nit- (Aff_i)) (^{AI}Vs_i: \textbf{a'po'taki} (Vs_i)) (^{TA}Vr_i: \textbf{-áttsi} (Vr_i))$
$(Aff_j: -aa (Aff_j)) (Aff_k: -wa (Aff_k))]$
$(Vw_i)) (Vp_i)) (Cl_i)) (Le_i))$ (adapted from Genee 2018: 252)

Yet, compared to the typological diversity reviewed before in sections 2.1 and 2.2, the narrowing down of SVCs into the three types of nuclear, core and event serialization still seems too simplistic a move to be left standing as it is. The next section will suggest a more comprehensive approach that tries to do justice to both the typology of serial verbs and the theory of FDG by explicitly incorporating the potential for mismatches between different linguistic levels as a key feature of the phenomenon under scrutiny and its theoretical analysis.

3 A new FDG approach to interface mismatches in SVCs

3.1 Serial verbs and mismatches in general

As will be elaborated on in section 3.2, some of the previously proposed FDG analyses adduced in section 2.3 already hint at what Bodomo (1998: 204), himself working in the "parallel and relational architecture" called Lexical Functional Grammar (LFG), states explicitly: "[T]he structure of SVCs, as a type of complex predicates, illustrates a case of mismatch between syntax and semantics". For him, this poses "one of the most compelling challenges to all theories of grammatical representation: how to represent complex predicates both as different, separate entities at one level and as simple, single entities at another level" (Bodomo 1998: 200). The respective challenge can be formulated more concretely such that "serial

verbs . . . require each verb to provide a sub-event dimension within a complex event viewed holistically as unitary in syntax" (Nolan and Diedrichsen 2017: 2; see also criteria C and F in section 2.1). Furthermore, there can also be mismatches between the boundaries of grammatical and phonological words in that some SVCs constitute one grammatical and many phonological words or vice versa (Aikhenvald 2006: 38; see also parameter III in section 2.2).

In light of mismatch phenomena being so common in serial verbs and elsewhere, Francis and Michaelis (2003: 6) identify three broad theoretical approaches to account for them:

A. **Derivational approaches** (e.g. Transformational Grammar, Minimalism): Mismatches are typically represented by means of permutation operations which affect the hierarchical position or structural realization of syntactic categories projected by a given head.

B. **Level-mapping approaches** (e.g. Autolexical Syntax, LFG): Mismatches are typically treated as incongruent mappings between relatively independent levels of linguistic structure, where incongruity is defined relative to a prototypical association of components from different levels.

C. **Licensing-based approaches** (e.g. Construction Grammar, Cognitive Grammar): Mismatches are represented by non-default constructions, which contain information that is not inherited from those constructions to which they are related taxonomically or partonymically.

Now, although "most approaches use a combination of strategies in accounting for mismatch phenomena" (Francis and Michaelis 2003: 7, note 2), FDG seems to fall relatively clearly on the level-mapping point (approach B) of this spectrum (along with one of its close associates, Autolexical Syntax; see Hengeveld and Mackenzie 2008: 31 and also section 3.2.1). This is most obvious in the face of the theory's organization into four distinct linguistic levels of analysis, even if the top-down orientation of the model (with each level governing all those below it) somewhat weakens their independence (see also Contreras-García 2013: 116 on "the hybrid character of FDG"). Prototypical associations of units at various layers belonging to the levels in question are found under the name of transparency and often in the guise of certain one-to-one "default relations between layers across levels" (García Velasco 2017: 16). However, that in many cases non-isomorphic (i.e. opaque) one-to-many or many-to-one relationships are permitted as well "is, of course, a compelling reason for distinguishing separate levels" (Keizer 2015: 139) in the first place.

From a theoretical viewpoint, then, FDG looks well up for the task of tackling the specific mismatches encountered in SVCs. What is more, from a typological perspective, the form-oriented 'function-to-form' stance of the framework – "providing, for each language analysed, an account of only those interpersonal

and representational phenomena which are reflected in morphosyntactic or phonological form" (Hengeveld and Mackenzie 2008: 39) – resonates to a certain extent with the following statement by Aikhenvald (2018b: 5): "Serial verbs have to be defined *in the first place* [emphasis mine] based on their formal features; a *purely* [emphasis mine] semantic definition of serial verbs . . . may run into problems to do with the hard-to-pinpoint notions". As a consequence, Aikhenvald (2018b: 36) stresses the importance of morphosyntactic and phonological criteria (e.g. monoclausality, grammatical category sharing, monoverbal prosody) for defining SVCs over semantic ones like eventhood, the latter being rather fuzzy to apply on an autonomous basis (see also Haspelmath 2016: section 3.1 and, for a more optimistic view, Bisang 2009: section 3.1).

3.2 Serial verb mismatches and interfaces in FDG

In general, the subject matter of mismatches between separate linguistic levels is highly relevant for the architecture of FDG and the latter's further advancement along the lines of an inter-level interface modelling (Hengeveld and Mackenzie 2008: 42; see also Contreras-García 2015: 25). According to García Velasco (2017: 3), FDG is a modular linguistic theory in Sadock's (2012) sense, "as it is organized in four independent levels of representation with their own linguistic primitives each", for which "the relation between the different levels (more technically, the nature of the interfaces) is a central issue". The syntax-semantics mismatches (and, eventually, others; see sections 3.2.2 and 3.2.3) found with serial verbs appear to have a particular potential for exploring this topic in more depth, to the benefit of both an increasingly comprehensive theoretical appraisal of SVCs as well as of testing and developing the inner workings of a typologically-based, form-oriented 'function-to-form' approach (see section 3.1) to language structure.

To that effect, drawing on a number of relevant examples from the available literature (see especially section 2), the present section aims to capture the most important cross-linguistic properties and variations of serial verbs within the confines of FDG and its capability of handling pertinent interface issues. For the sake of simplicity as well as pertinence, the discussion mainly concentrates on the analyses of two-verb SVCs, as Dixon (2006: 344) has proposed the generalization that most cases of verb serialization in a language comprise just two verbs, with serialized constructions of three and more verbs – if allowed at all – occurring considerably less frequently. Furthermore, even a rather excessive-looking example like (7) from Sranan has been analysed "on the basis of binary relationships between 'V1' and 'V2'" (Sebba 1987: 40), i.e. as V1 [[*lon go*] *teki*] followed by V2 [[*tyari go*] *gi*] (see also Sebba 1987: chapter 4). In principle, however, the theoretical tools employed

and the analytical treatment offered should be extendable to multi-verb serializations as well (see also Aikhenvald 2006: 21).

As a reminder from section 2.1, here are the primary characteristics that will need to be addressed from the top of the grammar down to its bottom: SVCs describe single events; they tend to have just one value for grammatical categories like tense, aspect, mood, evidentiality and polarity (TAMEP; see also Hengeveld, Narrog, and Olbertz 2017; Hengeveld and Mackenzie 2018; Hengeveld and Olbertz 2018); and they may share core and other arguments, while their individual verbal components may have different transitivity values and must be able to also occur on their own.[10] Moreover, serial verbs are monoclausal and often show the same intonational properties as monoverbal clauses.

3.2.1 The RL-ML interface

At the outset, the prominent mismatch between the semantics and morphosyntax of SVCs mentioned in section 3.1 needs to be specified and recast for the purposes of FDG. The following are some transparent (and possibly default) relations[11] between units of the respective levels that have been described for the model: SoAs restricted by a Configurational head at RL and Clauses at ML (Keizer 2015: 126, 300; García Velasco 2017: 16), Lexical Property predicates in Configurational Properties at RL and Verb Phrases at ML, Individual arguments in Configurational Properties at RL and Noun Phrases at ML (Keizer 2015: 179) as well as Lexemes at RL and morphosyntactic Words at ML (Keizer 2015: 235).

For serial verbs, the determining feature that two or more predicates act as if they were one and are expressed as a single clause establishes the central

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10 The latter criterion of "independent verbs" can be understood in at least two ways and accordingly should be read as "suggesting that each verb in a SVC should *in principle* [emphasis mine] be able to occur on its own (behaving like a full-fledged independent verb)" (Unterladstetter 2020: 89), otherwise it would necessitate the exclusion of single-marked one-word serial verbs consisting of verbal roots and/or stems like (12) from Blackfoot. See also Schwaiger (2019) on the rather strong assertion that "a serial verb construction consists of two or more verbs each of which can be used as independent predicates *in the very form they occur in a serial verb* [emphasis mine]" (Aikhenvald 2018b: 136).

11 As suggested to me by Riccardo Giomi, it is perhaps better to keep transparent and default correspondences strictly apart in that, although the two are often overlapping, the latter might be language-specific to a certain degree and the former thus not the expected condition in all languages at every level and layer. But see also Contreras-García (2013: 91–93) on expected transparency and deviations from it in terms of quantitative versus qualitative mismatches. Obviously, this issue is fairly intricate, theoretically subtle and still open to debate.

incongruity which should consequently show up in the analysis of all kinds of SVCs, no matter what their further variations in terms of composition, contiguity, wordhood and marking (see sections 2.2 and 3.3) may be. Tracing FDG's top-down directionality, the basic discrepancy is thus a many-to-one relationship between RL and ML (with certain similarities to incorporation and compounding; see Hengeveld and Mackenzie, this volume; Olthof and Hengeveld, this volume, and also below), more specifically the relation of a complex event structure at RL corresponding to a unitary clausal structure at ML. This is explicitly found already in the event serialization analyses (14) and (15): A complex Episode consisting of two SoAs, each formed in turn by a Configurational Property that contains a respective Lexical Property, all together map onto one Verbal Word (Genee 2018: 252–253) as part of a single Verb Phrase (Vp) and Clause (Cl) in a Linguistic Expression (Le).

The mismatches with ML are left implicit for the core serialization analysis (9) and the nuclear serialization analysis (11), which both only formalize RL. As shown in (16), the complex SoA repeated from (9) would again map onto a single Clause, the latter this time consisting of two Verbal Words (corresponding to the verbal Lexemes) within two Verb Phrases as well as of the Noun Phrases expressing the arguments.[12]

(16) RL $(e_i: [$
  $(f^c_i: [(f_i: fan (f_i)) (x_i)_A (x_j:-fligi-(x_j))_U] (f^c_i))$
  $(f^c_j: [(f_j: gi (f_j)) (x_i)_A (x_k)_L] (f^c_j))]$
  $(e_i))$
  ML $(Cl_i: [$
  $(Vp_i: (Vw_i: fan (Vw_i)) (Vp_i)) (Np_i: [(Gw_i: som (Gw_i)) (Nw_i: fligi (Nw_i))] (Np_i))$
  $(Vp_j: (Vw_j: gi (Vw_j)) (Vp_j)) (Np_j: (Nw_j: mi (Nw_j)) (Np_j))]$
  $(Cl_i))$

Note at this point that mismatched verb serializations like (17a) and (18a), which are similar to (8) and (12) in several semantic and morphosyntactic respects, can be demonstrated to crucially differ from the respective one-to-one correspondences in coordinated structures like (17b) and (18b).

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12 This is essentially also the case in the early FDG notation (iii) of note 8: A complex event description is mapped onto two predicate phrases (next to the referential phrases) inside a single clause template (van de Vate 2004: 29).

(17) Yoruba

    a. *mo* **mú** *ìwé* **wá** *ilé*
       I   took book came house
       'I brought a book home.' (took came)
       (Stahlke 1970: 61)

    b. *mo mú ìwé mo si wá ilé*
       I   took book I   and came home
       'I picked up a book and came home.'
       (Stahlke 1970: 78)

    c. *ṣùgbọ́n mo gbàgbé láti* **mú wá** *pèlú*
       but   I   forgot to take come with
       'But I forgot to bring it along.' (take come)
       (Stahlke 1970: 78)

(18) Igbo

    a. *ó* **tì-gbù**-*rù nwóké áhù*
       he hit-kill-TNS man   that
       'He beat that man to death.' (hit kill) (The killing was a direct result of
       the hitting.)
       (Lord 1975: 28)

    b. *ó tì-rì nwóké áhù òkpó gbú-é yá*
       he hit-TNS man   that blow kill-CONSEC him
       'He hit that man and killed him.' (The killing was not necessarily a
       result of the hitting.)
       (Lord 1975: 28)

Semantically, (17c) – containing an SVC itself – can only follow the coordination in (17b), whereas it would be a nonsensical continuation of the serial verb in (17a) according to Stahlke (1970: 78). Similarly, when comparing (18a) and (18b), only the SVC comprises a necessary semantic connection between the two (sub-)events expressed by the verbs. For the more transparent biclausal coordination by way of a conjunction, i.e. an independent Grammatical Word (Gw) like *si* in (17b), the difference vis-à-vis the less transparent monoclausal serial verbs is schematically reflected for the relevant layers in the representations (19a) and (19b), respectively.

(19)   a.   coordination (one-to-one)
           RL $(e_1: (f^c_1) (e_1)) \& (e_2: (f^c_2) (e_2))$
           ML $(Cl_1) (Gw_1) (Cl_2)$

       b.   SVC (many-to-one)
           RL $(e_1: [(f^c_1) (f^c_2)] (e_1))$
           ML (Cl_1)

Furthermore, from (19) it becomes clear that the question of transparency, opacity and potential default relations in FDG may additionally depend on inner-layer complexity, an SoA headed by more than one Configurational Property arguably being less transparent when not expressed by a similarly complex clause structure at ML, as would be the case with all sorts of dependent Clauses, which are not involved in SVCs by definition.

Lastly, the verbs of the complex Property in (11) would likewise map onto a single Clause, but this time again as one Verbal Word (including a transitivity marker), similar to (14) and (15). One problem with (11), though, is that it analyses nuclear serialization as a form of endocentric compounding (with *diya* modifying *hââhuux*), which seems to contradict the syntactically non-dependent status holding between the components of serial verbs. Thus, representation (20), paralleling exocentric compounding (Hengeveld and Mackenzie 2008: 216) or, more precisely, copulative (Keizer 2015: 150) or conjunct-conjunct compounding (Hengeveld and Mackenzie 2016: 1151), appears more appropriate.[13]

(20)   RL $(f^c_i: [(f_i: [(f_j: diya (f_j)) (f_k: hââhuux (f_k))] (f_i)) (x_i:-hla-(x_i))_A$
                $(x_j:-mwa-(x_j))_U] (f^c_i))$

However, this analysis now raises the question of whether, and how, such nuclear (or root)[14] serializations can be distinguished within FDG from proper (verbal) compounds in a language. According to Aikhenvald (2018b: 5–6, 96), the latter stem from a derivational morphological process that is restricted in its productivity to a limited number of verbs, can be exhaustively listed (e.g. in a dictionary) and are prone to developing non-compositional meanings. This conforms to Hengeveld and Mackenzie's assertions in this volume that compounding is not a universal device of morphology, that its different cross-linguistic types cannot be predicted by typological implications and that the possibilities of compounding

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13 Hengeveld and Mackenzie (2008: 216–217) themselves are ambiguous in this regard.
14 Root serialization as an alternative term for nuclear serialization is only of limited applicability since single-word serial verbs may consist of roots and/or stems (Aikhenvald 2018b: 96).

in a specific language therefore have to be stored in the Fund as semantic frames. Accordingly, the Fund (or Lexicon; see Genee, Keizer, and García Velasco 2016) will also play a fundamental role when it comes to the non-compositionality and exhaustive listing of verb compounds. By contrast, SVCs hail from syntactic processes in the grammar and as such are more productive essentially by definition, even if according to Dixon (2006: 342) they "are never fully productive" themselves (see also Unterladstetter 2020: section 3.2.3 on the semantic non-compositionality and restricted productivity of verb serialization).[15]

Concluding this section, serial verbs always (at least partly) violate the isomorphic (i.e. transparent) relations that may obtain between RL and ML layer units and which perhaps exist due to a default matching of interface constraints like those of (inviolable) lexical correspondence and (violable) categorial as well as geometric correspondence postulated by Sadock (2012: 24; see also Hengeveld and Mackenzie, this volume) in his Automodular (or Autolexical) framework (see also section 3.1). Next to the RL-ML interface, which crystallized as the central one in the description of SVCs, mismatches between higher and lower levels of FDG may also arise, but they do not have to, as the coming sections demonstrate.

3.2.2 The IL-RL interface

Some major transparent (and perhaps default) interpersonal-representational relations for FDG are the following: Communicated Contents at IL and Propositions at RL (Hengeveld and Mackenzie, this volume), Ascriptive Subacts at IL and Properties at RL as well as Referential Subacts at IL and Property arguments like Individuals at RL (Keizer 2015: 139).

The event serialization representation in (15) makes explicit a one-to-one correspondence between two Ascriptive Subacts and two Properties. Evidence for separate Subacts of Ascription in some serial verbs comes from a number of West African languages like Ewe, Fon and Yoruba, "where components of SVCs can be questioned and focused separately" (Aikhenvald 2006: 20), which is claimed to "not go against their monoclausal status" (Aikhenvald 2006: 44). Yet, typically, serializations seem to be "more tightly-knit structures" (Aikhenvald 2006: 44) that

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15 Riccardo Giomi makes the intriguing suggestion that a strict distinction between single-word serial verbs and headless verbal compounds might not always be maintained after all, such that the term serialization could in principle be extended to other kinds of exocentric/copulative/conjunct-conjunct compounding as well, making it possible to additionally speak of serial noun constructions/serial nouns (e.g. *singer-songwriter*) and serial adjective constructions/serial adjectives (e.g. *bittersweet*).

disallow selective focusing, so, in the absence of evidence to the contrary, a mismatch between one Ascriptive Subact and two Properties is implicitly deduced for the core and nuclear serializations in (9) and (20).[16] In addition, these different mappings schematized and illustrated in (21a) – partly repeated from (15) – and (21b) – slightly expanding on (20) – are also good candidates for differentiating what with respect to eventhood have been called single-scene and multi-scene SVCs (Aikhenvald 2018b: 35–36), whereby "[i]n terms of its semantics, a multi-scene serial verb is similar to a sequence of clauses" (Aikhenvald 2018b: 36). Since a mismatch between RL and ML will be found in both kinds of SVCs as a defining criterion, the macro-event character of multi-scene serial verbs ("a combination of subevents forming one whole"; Aikhenvald 2018b: 36; see also Pawley 2008: 173–174, including note 6) may be captured by a one-to-one correspondence nevertheless obtaining between IL and RL, as opposed to single-event SVCs in a narrower sense, where there is only one Ascriptive Subact for more than one Property.

(21) a. one-to-one

IL (T_1) (T_2)

RL (f_1) (f_2)

e.g. IL $(A_I: [(F_I: DECL (F_I)) (P_I)_S (P_J)_A$

$(C_I: [\mathbf{(T_I) (T_J)} (R_I)) (R_J)] (C_I))]$

$(A_I))$

RL $(ep_i: [(e_i: (f^c_i: [(f_i: \mathbf{áttsi}_{TA} (f_i)) (x_i)_A (x_j)_U) (f^c_i)) (e_i))$

$(e_j: (f^c_j: [(f_j: \mathbf{a'po'taki}_{AI} (f_j)) (x_j)_A] (f^c_j)) (e_j))_{Res}]$

$(ep_i))$

b. one-to-many

IL (T_1)

RL (f_1) (f_2)

e.g. IL $(C_I: [\mathbf{(T_I)} (R_I) (R_J)] (C_I))$

RL $(f^c_i: [(f_i: [(f_j: \mathbf{diya} (f_j)) (f_k: \mathbf{hââhuux} (f_k))] (f_i))$

$(x_i:–hla–(x_i))_A (x_j:–mwa–(x_j))_U]$

$(f^c_i))$

3.2.3 The ML-PL interface

Common FDG transparency between morphosyntax and phonology pertains to possible default relations between Clauses at ML and Intonational Phrases at PL,

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16 For early FDG, this is in fact explicitly formalized by (iii) of note 8, where (T_I) corresponds to (f_i) and (f_j).

both Verb and Noun Phrases at ML and Phonological Phrases at PL as well as morphosyntactic Words at ML and Phonological Words at PL (Keizer 2015: 256, 272, 280; see also Hengeveld and Mackenzie, this volume).

Serial verbs may display a one-to-one relation between grammatical (i.e. morphosyntactic) and phonological words, or they may show mismatches in either direction: "An SVC can constitute one grammatical word and several phonological words. . . . Alternatively, an SVC can consist of one phonological word which is made up of several grammatical words" (Aikhenvald 2006: 38). Earlier FDG analyses did not formalize the PL of SVCs, but a schematic rendering of the three possibilities above is given in (22), including descriptions of relevant cases from the serializing languages Dumo (22a, b) and Goemai (22c).

(22) a. one-to-one
      ML $(Vw_1) (Vw_2)$
      PL $(pw_1) (pw_2)$
      e.g. "In Dumo, all constituent verbs in SVCs are distinct grammatical words insofar as they take marking for subject person-number. Phonologically, all non-contiguous SVCs consist of verbs that are realized as separate phonological words (where a phonological word is defined by the presence of a single word-level primary stress)" (Ingram 2006: 220; see also (22b) below).

     b. many-to-one
      ML $(Vw_1) (Vw_2)$
      PL (pw_1)
      e.g. "Amongst contiguous SVCs [in Dumo], however, SVCs are treated as single phonological words with respect to stress assignment" (Ingram 2006: 220; see also (22a) above).

     c. one-to-many
      ML (Vw_1)
      PL $(pw_1) (pw_2)$
      e.g. "While Goemai SVCs constitute single clauses, they do not constitute single (phonological or grammatical) words. Under nominalization, however, they show some similarities to single predicates. ... In a nominalized SVC, determiners and clitics follow to the right of the construction ... indicating that the verbs are treated as a unit" (Hellwig 2006: 93–94).

3.3 The interface-based diversity of serial verbs in FDG

The previous section has shown that the unifying feature for all SVCs is an RL-ML mismatch between a complex event structure (relating to Properties, SoAs or Episodes) and a simple clause structure (relating to a single Clause and various manifestations of Verbal Words within them). Additional mismatches between IL and RL, on the one hand, and ML and PL, on the other hand, have been demonstrated to occur in several but not all instances of serial verbs. This cross-level matching variation is indicative of FDG's potential to capture the diversity of SVCs as found in the world's languages through different combinations of the various kinds of transparency and opacity discussed in sections 3.2.1–3.2.3. This is desirable in so far as "[a]pproaching the diversity of coexisting serial verbs in terms of their formal and semantic features (rather than trying to fit them into arbitrarily defined core and nuclear categories) allows for a more fine-tuned understanding of the mechanisms at play" (Aikhenvald 2018b: 18; see also Aikhenvald 2006: 50, note 19). While this quote goes somewhat too far in dismissing nuclear and core SVCs as arbitrary classes (the distinction normally resting on grammatical considerations and corresponding tests), it rightly highlights the need for a more nuanced view of the phenomenon potentially allowing for further types (as already the additional introduction of event serialization in FDG has shown). The general points of such an approach will be outlined in the remainder of this section (and in time will need to be supplemented by more exemplification and in-depth analyses of various serial verbs in different languages).

3.3.1 Non-dependent, monopredicative and monoclausal verb sequences

Properties A–C from section 2.1 help to distinguish SVCs from other multi-verb sequences (Aikhenvald 2018b: 4). In FDG, the monopredicativity and monoclausality is taken care of by the interface mismatches between RL (more than one predicate) and ML (one Clause). The non-dependency between two or more verbs is represented by the equipollence of the different complex heads containing them, which seems to be a general feature that can be specifically instantiated at different layers like the SoAs of an Episode, the Configurational Properties of an SoA or the Lexical Properties of a complex Property.

Concerning the scope of different grammatical categories, serializations at different layers make different predictions. For instance, an analysis like (9) predicts the values of SoA operators and modifiers like those of event location, relative tense, event-oriented modality, event perception, polarity, event quantification and reality status (Hengeveld and Mackenzie 2008: 181) to hold obligatorily for all

component verbs,[17] while those of Configurational Property operators and modifiers like aspect, participant-oriented modality, quantity, manner and duration (Hengeveld and Mackenzie 2008: 214–215) will not necessarily apply throughout (see also Genee 2016: 1093). Although, in this regard, Aikhenvald's (2018b: 17–18) critique of RRG's binary approach to serial verbs in terms of core and nuclear layering and the concomitant, allegedly arbitrary classification of grammatical categories may also lash out at a related theory in terms of layering like FDG, the question of differing scope mostly remains an empirical issue to be investigated and tested in individual languages.[18] It finds support, at least, from Saramaccan constructions of the kind discussed in note 8, where "[u]sually aspect markers will precede the first verb of a SVC, but as opposed to tense markers, aspect markers may precede the second verb as well. In the latter case these markers will only have a scope over the second verb" (van de Vate 2004: 26; see also Veenstra 1996: 76). By the same reasoning, one could try similar tests for other cases of core serialization like the one from Virgin Islands Creole Dutch analysed in (9), while further scope differences would also have to be checked for relevant operators and modifiers like directionality (Hengeveld and Mackenzie 2008: 236) and absolute tense (Hengeveld and Mackenzie 2008: 166) at the respective layers of nuclear and event SVC analyses like (20) for Nêlêmwa and (15) for Blackfoot.

3.3.2 Overall transitivity and argument sharing

Prototypical properties D and E from section 2.1 are found in serial verbs to varying degrees. In FDG, the equipollent combination of different predication frames as part of an overall predication frame and the concomitant coindexation of arguments supply well-suited mechanisms for the representation of these features in all their occurring varieties.

Thus, languages without ditransitive single predicates may allow indirect valency expansions by introducing additional arguments via serialization (Hengeveld and Mackenzie 2008: 169, 184; see also Keizer 2015: 131) as in (9). Furthermore, both same-subject as well as switch-function serializations, in the latter of which "[t]he subject of one component of an SVC can be identical to a non-subject con-

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17 Note that a shared grammatical category value is not the same as concordant marking of grammatical categories since the former (situated at RL) may also be expressed by single marking at ML (see also section 3.3.6).

18 In some places, Aikhenvald's own stance on this matter seems contradictory, like her discussion of differing SVC negator scopes in Aikhenvald (2006: 8–10), as pointed out by Unterladstetter (2020: 101–102). See also Schwaiger (2019) on Aikhenvald (2018b: chapter 2).

stituent of the other component" (Aikhenvald 2006: 14), can be captured by appropriate coindices as in (9) and (15), respectively. Further examples are (1) from Igbo (same-subject) and (3) from Taba (switch-function), repeated for convenience in (23) and (25), respectively, with their tentative RL representations given in (24) and (26).

(23) Igbo
    ó   **tì-wà**-*rà*   *éféré*   *à*
    he   hit-split.open-TNS   plate   the
    'He shattered the plate.' (hit split.open)
    (Lord 1975: 27)

(24) RL   (tns e_i: [
                 $(f^c_i: [(f_i: tí (f_i)) (x_i)_A (x_j:−éféré−(x_j))_U] (f^c_i))$
                 $(f^c_j: [(f_j: wá (f_j)) (x_i)_A] (f^c_j))]$
       $(e_i))$

(25) Taba
    *n=**babas***   *welik*   *n=**mot***   *do*
    3SG=bite   pig   3SG=die   REAL
    'It bit the pig dead.' (bite die)
    (Bowden 2001: 295)

(26) RL   (real e_i: [
                 $(f^c_i: [(f_i: babas (f_i)) (x_i)_A (x_j:−welik−(x_j))_U] (f^c_i))$
                 $(f^c_j: [(f_j: mot (f_j)) (x_j)_U] (f^c_j))]$
       $(e_i))$

3.3.3 Single event

To get a firmer grip on the question of "what counts as an [sic] single event, albeit complex, versus what counts as multiple events" (Foley 2010: 91), the notoriously fuzzy property F from section 2.1 can be accommodated more concretely in FDG by taking into account not only the complex representational structures based on equipollence but also their interpersonal counterparts, which may or may not induce an SVC mismatch between IL and RL.[19]

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19 See also van Staden (2008): "[T]he FDG distinction between a Conceptual Level and a Representational Level, as well as the recognition of a semantic category over and above the 'event' can help us refine this idea of unitary eventhood in serialization".

Only further language-specific and construction-specific investigation may supply ultimate confirmation, but from the present typological perspective all sorts of transparency and mismatch combinations in Formulation and/or Encoding, of which only some have been encountered in the previous sections, are expected to occur as well as to cut across the distinction between event, core and nuclear serial verbs that will be reexamined in the next section.

3.3.4 Nuclear, core and event serialization revisited

From their introduction in section 2.3, nuclear, core and event SVCs have emerged as specific equipollent constellations in underlying representations, with event serialization being delimited by the relatively outer layer of the Episode, core serialization by the intermediate layer of the SoA and nuclear serialization by the inner layer of the Property. These types could be seen as the cross-linguistically recurring focal points setting the basic RL-ML mismatch constitutive for every serial verb (see section 3.2.1), which ideally should be testable by different modifier and operator scope effects at the respective layers (see section 3.3.1).

Additional SVC variation may come in based on the inter-level convergence or divergence between IL and RL as well as ML and PL (see section 3.2.3). The IL-RL relation may be transparent or opaque, also capturing the single-scene versus multi-scene distinction in serialization (see section 3.2.2), which again should be testable via focalization and the like and, as an independent dimension, is expected to potentially occur with all three focal kinds of serial verbs (see section 3.3.3). Apart from different transitivity frames and argument distributions (see section 3.3.2), further variation may moreover be due especially to the semantic composition as well as the morphosyntactic and phonological make-up of SVCs, each discussed in the next sections.

3.3.5 Symmetry

It has been pointed out in section 2.2 that the symmetricity of serial verbs should be understood paradigmatically, for speaking syntagmatically of asymmetrical and symmetrical SVCs in actual syntactic configurations is generally problematic. This is so because the first kind would distinguish a minor component from a closed class and a major component (or semantic 'head') from an open class (Aikhenvald 2018b: 6; but see also Aikhenvald 2006: 22) for a definitionally non-

headed construction.[20] For FDG, the problem is reflected in the head-modifier structure of Nêlêmwa nuclear serialization in (11) and the employment of a semantic function for Blackfoot event serialization in (14) and (15), both analyses contradicting the definitional equipollence of serial verbs by introducing a dependency relation between the components. A more appropriate representation for the complex Property in (11) has been suggested in (20). The conflict of (14) and (15) could be resolved as in (27), by deleting the function of Result from the second SoA containing the major verb slot and instead marking the minor verb slot of the first SoA for the semantic class of causative.

(27)   RL $(ep_i: [$
$$(e_i: (f^c{}_i: [(f_i: {}^{cause}\blacklozenge (f_i)) (x_i)_A (x_j)_U] (f^c{}_i)) (e_i))$$
$$(e_j: (f^c{}_j: [(f_j: \blacklozenge (f_j)) (x_j)_A \ldots] (f^c{}_j)) (e_j))]$$
$(ep_i))$

Subclasses of lexemes are indicated by preposed superscripts in FDG (Hengeveld and Mackenzie 2008: 224) and positing them in a language of course needs grammatical support and argumentation. The facts of Blackfoot actually rather speak for the minor slot being specifically confined to the causative Lexeme *áttsi* (see section 2.3), the representation thus resembling a partially instantiated frame (Keizer 2016), but the basic analysis can be easily extended to larger and other classes of lexemes that typically fill the minor slot of an asymmetrical SVC in different languages, like motion verbs and manner verbs (among many others; see Aikhenvald 2018b: section 3.2).

Furthermore, an analysis incorporating IL has the advantage of capturing the further difference that, in contrast to asymmetrical serial verbs, symmetrical SVCs tend to be iconic in the way the verb sequence mirrors the internal setup of the event described (Aikhenvald 2006: 35–36): Iconicity as an external constraint governing the ML expression of the relation between IL and RL in FDG (Hengeveld and Mackenzie 2008: 283; see also García Velasco 2017: 16) is capable of working only when there is a transparent correspondence between the relevant units at both Formulation levels. At this point, however, one could take issue with positing two Ascriptive Subacts in the representation of Blackfoot in (15), as the sequence of caused event and causing event is obviously non-iconic in this case

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20 See also van Staden (2008): "Serial verb constructions are special in the way in which two lexical verbs occur in a single clause, sharing their argument structure and clausal modifiers to different degrees, while neither of these verbs would appear to be the 'head' in the construction".

(the working being expressed before its cause).[21] This suggests that Formulation transparency does not necessarily license iconicity, especially when a restriction obtains at RL in the guise of a predetermined Lexeme slot as it has been proposed in (27) for asymmetrical verb serialization.

3.3.6 Contiguity, wordhood and marking

A final challenge for the solution to which FDG provides a natural place concerns the different degrees of looseness and tightness within the single clause hosting a serial verb, ranging from multi-verb constructions to single-word verbal 'compounding' (Aikhenvald 2006: 37–38; see also section 3.2.1). The relevant Encoding factors concern SVC contiguity, wordhood and marking (see section 2.2), and in FDG the principle of Domain Integrity, akin to Iconicity (see section 3.3.5), can be adduced as an external constraint providing "for the units that belong together at the Interpersonal Level and at the Representational Level also to be juxtaposed to one another at the Morphosyntactic Level" (Hengeveld and Mackenzie 2008: 285; see also García Velasco 2017: 17). Again, this is not always the case in SVCs, since all four logically possible types of contiguity-wordhood combinations exist (Aikhenvald 2006: 39, 2018b: 97):

(I)   non-contiguous, multi-word (e.g. (2) from Tetun Dili, (3) from Taba, (7) from Sranan)
(II) contiguous, multi-word (e.g. (6) from Tariana)
(III) contiguous, one-word (e.g. (1) from Igbo, (4) from Alamblak, (5) from Dâw)
(IV) non-contiguous, one-word (e.g. Cantonese, Northern Paiute, Tepehua; see Aikhenvald 2018b: 94, 97–98)

Respective ML templates for several or just a single Verbal Word within one or more Verb Phrases and a single Clause can represent all these varieties in FDG as well as the concomitant concordant or single marking of grammatical categories, which is an ML phenomenon independent of the RL specification of the relevant values. For maximum contrast, compare (2) from Tetun Dili (non-contiguous, multi-word) and (4) from Alamblak (contiguous, one-word), repeated for convenience in (28) and (30), respectively, with their tentative ML formalizations given in (29) and (31).

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21 A similar non-iconic causative construction in Cheyenne, a closely related Algonquian language, is classified as an asymmetrical multi-verb sequence by Corral Esteban (2017: 328–329, section 4.2.1). See also Aikhenvald (2018b: 45) for a summary of, inter alia, the (non-)iconic cause-and-effect relationship in symmetrical (cause-effect) versus asymmetrical (causative) SVCs.

(28) Tetun Dili
tuda *bola* **mai**
throw ball come
'Throw the ball over here.' (throw come)
(Hajek 2006: 243)

(29) ML (Le$_i$: (Cl$_i$: [(Vp$_i$: (Vw$_i$: toda (Vw$_i$)) (Vp$_i$)) (Np$_i$: (Nw$_i$: bola (Nw$_i$)) (Np$_i$))
(Vp$_j$: (Vw$_j$: mai (Vw$_j$)) (Vp$_j$))] (Cl$_i$)) (Le$_i$))

(30) Alamblak
*Wa-yarim-**ak**-**hita**-n-m-ko*
IMPER-ELEV-get-put-2SG-3PL-ELEV
'Get them on a level plane toward me (and) put them up (there).' (get put)
(Bruce 1988: 27)

(31) (Le$_i$: (Cl$_i$: (Vp$_i$:
(Vw$_i$: [(Aff$_i$: wa- (Aff$_i$)) (Aff$_j$: yarim- (Aff$_j$)) (Vs$_i$: ak (Vs$_i$)) (Vs$_j$: hita (Vs$_j$))
(Aff$_k$: -n (Aff$_k$)) (Aff$_l$: -m (Aff$_l$)) (Aff$_m$: -ko (Aff$_m$))]
(Vw$_i$)) (Vp$_i$)) (Cl$_i$)) (Le$_i$))

4 Conclusions and outlook

Pursuing the main tenet of linguistic functionalism as embodied in FDG, one goal of this article was to elaborate on how to explain the structural (im-)possibilities of different kinds of serial verbs in different languages by way of their different underlying (i.e. interpersonal and representational) representations (see also Keizer 2016: 1002 on idiomatic expressions). FDG is well equipped for this enterprise through its levels-and-layers make-up, and it appears a reasonable hypothesis that the formal variation and restrictions of SVCs derive from the particular functional constellations which reflect event complexities via, inter alia, Ascriptive Subacts, Episodes, SoAs and Configurational as well as Lexical Properties. The role of the interfaces is thereby to (dis-)allow certain morphosyntactic configurations, a selection process that is additionally mediated by grammar-external constraints like, inter alia, Iconicity and Domain Integrity.

Apart from the dire need of additional backing through further examples and more detailed analyses of all sorts of SVCs, two open questions which at some point also need to link up with the present approach concern the following:

1. An FDG analysis will have to embrace the fact that "[a]symmetrical serial verb constructions tend to undergo grammaticalization – the minor verb becomes a grammatical marker. In contrast, symmetrical serial verb constructions tend to become lexicalized and develop idiomatic meanings" (Aikhenvald 2006: 30). Concerning an SVC component becoming grammaticalized (into a light verb, an auxiliary, a clitic or an affix; cf. Hopper and Traugott 2003: 111), a typical case is presented by the development of verbs meaning 'give' into markers of benefactive, perspective/stance, permissive, causative, purpose/consequence and reason in West African as well as East and Southeast Asian languages (Lord, Yap, and Iwasaki 2002; but see also examples (7) and (8) from Sranan and Virgin Islands Creole Dutch, respectively). Outside the phenomenon of serial verbs, both diachronic developments mentioned above have been discussed in considerable detail in the context of FDG (e.g. Giomi 2017, 2020 and Hengeveld 2017 on grammaticalization as well as Keizer 2016 on lexicalization).
2. An FDG analysis will have to be able to differentiate within single languages several constructions lying on a more general scale of multi-verb constructions, of which serial verbs have been said to form merely one segment (Aikhenvald 2006: 37).

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Avelino Corral Esteban

A Functional Discourse Grammar account of voice in Plains Algonquian Languages

Abstract: Algonquian languages have always attracted considerable interest due to their rich and complex grammar, and this paper offers an account of voice in Plains Algonquian languages (USA) within the theoretical framework of Functional Discourse Grammar (Hengeveld 2004; Hengeveld and Mackenzie 2006, 2008). One of the main reasons why the study of this grammatical phenomenon seems so interesting is because it concerns every grammatical level (especially, the morphosyntactic, semantic, and pragmatic levels). Thus, the main purpose of the paper is, firstly, to explore the correlation between the pragmatic, semantic, and syntactic properties of a passive-style construction in these Algonquian languages; secondly, I analyse how the Functional Discourse Grammar model represents this interaction; and thirdly, I examine the possible mismatches that arise from the correspondence between levels. Finally, the findings will serve to shed light on whether the Algonquian direct / inverse distinction should be treated in the same manner as the active / passive voice alternation. This theory has been chosen because it is strongly typologically-oriented, concerns both sentence grammar and discourse structure, and, consequently, seems ideally suited to the study of voice in Plains Algonquian languages.

Keywords: Pragmatics-Semantics-Syntax interface, voice, Plains Algonquian languages, Functional Discourse Grammar

1 Introduction

Linguistic theories generally approach the study of the grammar in a given language by treating it as an entity made up of different components (e.g. morphosyntactic, semantic, phonological, pragmatic, etc.), and the analysis of the relations between the different levels of linguistic representation enable us to explain the properties of a large number of grammatical phenomena. The interactions between the different levels are straightforward when there is a correspondence between the syntactic, semantic, and pragmatic properties of the grammatical phenome-

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non in question. However, sometimes, mismatches between levels occur, showing that the mappings between the syntactic, semantic and pragmatic properties are not so obvious, so that a well-founded and fine-grained interface is required to make the levels correspond with each other.

Voice, or diathesis, can be defined as the relationship between the action expressed by a predicate and its arguments. A traditional view of the active / passive distinction (Tesnière 1965; among others) is that there is a choice between two alternative constructions that, being pragmatically conditioned, have the same semantic interpretation. The two semantically equivalent constructions were thus described in terms of a binary active / passive opposition, and traditional grammar – and even generative grammar – assumed that the passive construction was built out of an active construction, which is considered the default or underlying construction. Finally, it was also often suggested that a true passive is only a construction where the patient becomes the subject.

According to Functional Grammar (Dik 1997: 260), to be considered as passive, a construction must express the same predication as an active counterpart, the semantic valency of the predicate in both variants must be identical, and an argument of the potential passive construction must possess the same coding (e.g. positioning, marking, agreement) and behavioural properties (e.g. relativization, formation of constituent questions, reflexivization, reciprocalization, etc.) as another argument in the active construction. These properties are well illustrated in a language like English thanks to the grammatical relation of subject, which involves a neutralization of semantic roles for syntactic purposes. This view underlies the consideration of voice in the Functional Discourse Grammar framework, which analyzes the active and passive alternatives as special operations involving a differential assignment of the Subject function to arguments with different semantic functions (Hengeveld and Mackenzie 2008: 325).

However, the choice between the active and the passive construction is not only determined by syntactic and semantic properties, but also by pragmatic factors, so that syntax, semantics, and pragmatics are involved. Consequently, this grammatical phenomenon may also reveal possible mismatches among the components. Thus, for example, while the agent in an English passive is still a semantic argument of the predicate, the by-phrase essentially behaves like a peripheral adjunct rather than an obligatory complement, which consequently leads to a syntax-semantics mismatch, as the syntactic valence of the verb is reduced by one.

This paper attempts to examine transitive constructions in Plains Algonquian languages with the aim of finding a close equivalent to the traditional passive and analyzing it from the perspective of the Functional Discourse Grammar framework. The second section will then offer a brief summary of the most distinctive

grammatical properties of Plains Algonquian languages and a number of different transitive constructions will be explored to ascertain which of these constructions possesses the properties of an English-style passive. Next, in the third section, an analysis of a transitive construction involving a non-local interaction (i.e. a context involving the presence of two third person referents) will allow us to explore and discuss the pragmatic, semantic, and syntactic properties of this construction and reveal mismatches among the different levels from the perspective of the Functional Discourse Grammar approach. Finally, the conclusion will offer a summary of this study's main findings, which will confirm the strong typological orientation of Functional Discourse Grammar and its validity in terms of studying comparable constructions in different languages in a similar way.

2 Plains Algonquian languages

2.1 Typological description

Like the other members of the Algonquian family, Plains Algonquian languages (e.g. Arapaho, Blackfoot, Cheyenne and Gros Ventre) lie on the synthetic side of the morphological typology cline, as they have a high morpheme-to-word ratio, fairly regular morphology, and highly inflected verbal complexes capable of expressing the same information as a whole sentence in English. They are also clear examples of pronominal-argument languages (Jelinek 1984), as they express all the arguments of the predicates in the form of pronominal affixes, with overt lexical reference phrases being mainly reserved for third person participants and, then, only optionally. They are also instances of head-marking languages (Nichols 1986) because all grammatical relations are coded in the verb, which is the head of the clause, rather than in the NPs (although the latter may also exhibit obviative marking and sporadically the instrumental case). Finally, Plains Algonquian languages can be considered discourse-configurational languages (Hale 1983; Jelinek 1984; Kiss 1995), as they display a pragmatically conditioned word order – that is to say, the positioning of the syntactic constituents within clauses appears to be arranged according to their discourse, rather than syntactic or semantic functions.

2.2 Grammatical systems and hierarchies

Algonquian languages have an extremely complex grammatical system, especially regarding the marking of grammatical relations. In these languages, gram-

matical information about the predicate arguments is conveyed by prefixes[1] and suffixes simultaneously, the latter generally being expressed by a portmanteau bound morpheme so that it may not always be possible to separate the information provided by each of the affixes and assign each grammatical function a different affix. Accordingly, the traditional syntactic relations of subject and object do not appear to play an important role in the grammar of these languages.

The grammar of Algonquian languages has traditionally been considered to be structured according to a hierarchical alignment (Mallinson and Blake 1981; Nichols 1992). This means that the morphosyntactic markers cross-referencing the predicate arguments in transitive constructions vary with respect to the position of each argument in terms of two hierarchies, a Person Hierarchy and a Semantic Role Hierarchy, in addition to the proximate / obviative distinction,[2] in such a way that clauses can be expressed either by using a direct or an inverse construction.[3] The combination of these two hierarchies plus the obviative marking enables the direct / inverse system to function as a type of role-indexing alignment that characterizes all person interactions in the transitive paradigm, reflecting the interaction of syntactic, semantic and pragmatic properties, as we as shown in Figure 1.

This Person Hierarchy, showing the ranking $2^{nd} > 1^{st} > 3^{rd} > 4^{th} > I$, conforms to the universal predominance of speech-act participants over non-speech-act participants, reflected in Silverstein's (1976: 122) Lexical Hierarchy, Givón's (1976: 152) Hierarchy of Topicality, Dixon's (1994: 85) Nominal Hierarchy, and Dik's (2007: 36) Person Hierarchy, since the local participants (i.e. first and second

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1 As will be discussed below, the prefix in Modern Arapaho and Gros Ventre affirmative sentences no longer cross-references an argument.

2 The proximate / obviative marking is closely related to the discourse-pragmatic status of every participant within a particular context so that, in contexts including more than one third person referent, the most salient or topical entity is marked as proximate and any other, less prominent, participants are marked as obviative.

3 Different analyses have been proposed for the analysis of theme markers in Algonquian languages. These approaches, such as the full direct / inverse (Wolfart 1973), the symmetrical split (Bloomfield 1946; Goddard 1979; Pentland 1999; among others), the asymmetrical split (Rhodes 1976; Oxford 2014; among others), and the object agreement (Goddard 2007; Oxford 2017), show an evolution in the consideration of theme markers from direct / inverse markers to object agreement markers, in such a way that the first model analyzes the theme markers in all sets as direction markers, the second considers these theme markers of local sets as object agreement and those of the mixed and non-local sets as direction markers, the third considers all the theme markers as object agreement except for that present in the 4→3 and 3→1/2 forms, and, finally, the most recent model analyzes all the theme markers as object agreement.
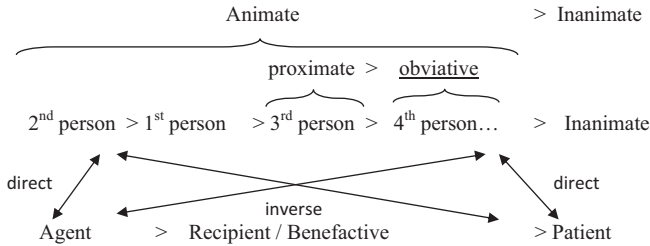
Figure 1: Correlation between the Person Hierarchy, the Semantic Role Hierarchy, and the proximate / obviative distinction in Plains Algonquian languages.

person) are considered to have more pragmatic salience[4] than the non-local participants (i.e. third and fourth person). Likewise, the Semantic Role Hierarchy – Agent > Recipient / Benefactive > Theme – appears to be determined by the degree of animacy of the participants[5] that commonly realize such semantic functions and resembles the Thematic Hierarchy outlined by Jackendoff (1972: 43), namely Agent > Source / Location > Theme, and, especially the Semantic Case-Role Hierarchy proposed by Givón (1984: 134), that is to say, Agent > Dative > Patient.

Depending on whether the action expressed by the construction represents an alignment of the two hierarchies or not, we say that the construction is direct (1a) or inverse (1b), which is reflected in a theme marker or direct / inverse marker situated in postverbal position:

(1)[6] a. ′ii-ch'i-níitɔn-aa′a   nati3[7]áh'a.   Gros Ventre
        1-NEG-hear-1SG>3SG[8] 1SG.POSS-wife
        'I don′t understand my wife.'

    b. Nati3áh'a   ′ii-ch'i-níitɔn-ei?aa?
        1SG.POSS-wife   1-NEG-hear-3SG>1SG
        'My wife doesn′t understand me.'

---

4 I use pragmatic salience as an equivalent to Aissen's (1999: 468) concept of prominence, that is to say as "a function of inherent semantic features like animacy and pragmatic features such as topicality".

5 The higher-ranking semantic roles such as agent, recipient or beneficiary are linked with animate participants, while the lowest-ranked semantic role, patient, is associated with inanimate participants.

6 The abbreviations used in the glosses are included in the opening section of this volume.

7 The symbol '3' in Arapaho and Gros Ventre stands for an interdental fricative consonant sound.

8 Gloss 1SG>3SG should be read as a first person singular agent-like participant acting on a third person singular patient-like participant.

The sentence in (1a) reports an event including a first person agent and a third person patient and, as it shows the alignment between the Person Hierarchy and the Semantic Role Hierarchy, it is an instance of a direct construction. Example (1b) also expresses a process involving a third person agent and a first person patient. However, it does not show the results expected by the correlation between the two hierarchies and, consequently, it is an example of an inverse construction. As we can see, the direct / inverse system serves to disambiguate the role of the participants and therefore seems to be functionally equivalent to the case marking system in other languages.

Plains Algonquian languages do not have the equivalent of personal pronouns in English, that is to say, free words providing information about the person of the participants involved in the situation denoted by the predicate. Rather, as illustrated by *'ii-. . . -aa´a* in (1a) and *'ii-. . . -ei?aa?*, they appear as prefixes and suffixes – sometimes bound up in a portmanteau morpheme – that express complementary grammatical information. The theme markers indicating the direction of the construction merge with one or more additional suffixes that complement the prefix, so that the person, number, animacy, semantic role, and salience of each participant are recovered by piecing together information distributed over the prefix, the theme suffix, and the outer suffixes. This confirms that it may be a mistake to consider the prefix and the suffix as corresponding to the semantic roles of agent and patient respectively. Instead, in Plains Algonquian languages these semantic roles are fused in both the pronominal markers, so that the prefix and the suffix must be analyzed jointly:[9]

(2)   a.   *No-nóóhob-é3e-n.*   Arapaho
             IPFV~see-1SG>2SG-2SG
             'I see you.'

       b.   *No-nóóhow-ú-n.*
             IPFV~see-2SG>1SG-2SG
             'You see me.'

(3)   a.   *No-nóóhob-ááá-n´o.*   Gros Ventre
             IPFV~see-1SG>2SG-2SG
             'I see you.'

---

9 As will be discussed below, the labels direct and inverse have normally been used mostly for the non-local and mixed sets, rather than the local set, due to the difficulty in deciding which of the two forms, namely 1→2 and 2→1, represents the direct or inverse direction.

b. *No-nóóhob-ei´aa-n´o.*
IPFV~see-2SG>1SG-2SG
'You see me.'

(4) a. *Kit-s[10]-iino-o.*   Blackfoot
2-EP-see-1SG>2SG
'I see you.'

b. *Kit-s-iino-oki.*
2-EP-see-2SG>1SG
'You see me.'

(5) a. *Né-vóom-àtse.*   Cheyenne
2-see-1SG>2SG
'I see you.'

b. *Né-vóom-e.*
2-see-2SG>1SG
'You see me.'

As evidenced by these instances of local (1↔2) interactions, Plains Algonquian languages behave differently in terms of the way that they code the participants involved in the action. Thus, Arapaho and Gros Ventre appear to mark the grammatical information regarding person, number, and obviation, as well as the direction of the action through two suffixes, whereas Blackfoot and Cheyenne indicate it through both a prefix and a suffix as shown in Table 1:

Table 1: Comparison of theme and person markers in local contexts.

	2→1				1→2			
	prefix	**verb**	**theme**	**suffix**	**prefix**	**verb**	**theme**	**suffix**
Arapaho	Ø-	-nóóhob-	-í-	-n	Ø-	-nóóhob-	- éθe-	-n
Gros Ventre	Ø-	-nóóhow-	-ei´aa-	-n´o	Ø-	-nóóhow-	-áá(á)-	-n´o
Blackfoot	Kit(s)-	-iino-	-ok-	-i	Kit(s)-	-iino-	-o-	-Ø
Cheyenne	Né-	-vóom-	-e-	-Ø	Né-	-vóom-	-àt-	-(s)e

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10 An epenthetic sound /s/ is inserted in the middle of the sequence *-ti-*, which cannot occur in Blackfoot (Frantz 1997: 16).

Despite this difference, it is possible to see a correlation between the two systems used for cross-referencing the arguments by pronominal affixes:

(6) a. *Bííxoo3-e3eˊ-nee.*   Arapaho
IC[11] love-1SG>2SG-2PL
'I love you (pl.)'

   b. *Bííxoox-ú-nee.*
IC.love-2SG>1SG-2PL
'You (pl.) love me.'

(7) a. *Né-méhot-àtsé-me.*   Cheyenne
2-love-1SG>2SG-2PL
'I love you (pl.).'

   b. *Né-méhox-é-me.*
2-love-2SG>1SG-2PL
'You (pl.) love me.'

There is an exact parallel between the two pairs of examples from Arapaho and Cheyenne in (6) and (7), as in both cases an action of a first person agent on a second person patient is indicated by the suffix *e3e-/àtse* and an action involving a second person agent and a first person patient uses the suffix *u-* (underlying *-i-/-e-*). Furthermore, these examples in Arapaho and Cheyenne show that the second person is given prominence over the first person, as it is marked by an additional affix, namely the suffix *-n-* in Arapaho and the prefix *-né-* in Cheyenne, whether the second person is the agent or patient. Furthermore, while Arapaho and Gros Ventre do not make use of the prefixes in the affirmative forms of the Independent order, they do appear in the negative forms:

(8) a. *ˊeei-chˊi- niˊáaanib-áaaˊ.*   Gros Ventre
2-NEG-love-1SG>2SG
'I donˊt love you.'

   b. *ˊééí-chˊi-niˊáaanib-éiˊaaˊ.*
2-NEG-love-2SG>1SG
'You donˊt love me.'

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11 Initial change is an inflectional process typical of Algonquian languages whereby the first element of a verbal form is modified to indicate grammatical information such as tense or aspect.

Examples (2–8) therefore confirm that the second person is considered the highest ranking person in terms of the Person Hierarchy in Plains Algonquian, which means that it is regarded as the most prominent person in a local configuration. This will be reflected in the verb in the following way: whenever a second person participant is involved in a clause, regardless of whether it acts as the agent or patient, the verb will include a prefix – in Arapaho and Gros Ventre only in negative sentences – indicating the second person.[12]

In summary, mixed (1,2↔3,4) configurations, such as that illustrated by (1), and local configurations show that the speech-act participants (i.e. first and second person) are ranked above third / fourth persons and ultimately above the inanimate. Likewise, local interactions appear to provide important evidence that the second person is given preference over the first, as reflected in the fact that the second person is always cross-referenced by a special prefix or suffix in these contexts.

However, a comparison of the theme markers in Table 2 shows that it is not easy to decide which of the two local persons (i.e. first and second) is given preference in these languages:

Table 2: Theme markers in Plains Algonquian languages (Independent order).

		Local configuration	Mixed configuration	Non-local configuration
Arapaho	DIR	2→1 *-i-/-u-*	1/2→3/4 *-oo-*	3→4 *-oo-*
	INV	1→2 *-e3e-*	3/4→1/2 *-éí-*	4→3 *-éí-*
Gros Ventre	DIR	2→1 *-eí´-*	1/2→3/4 *-aa/oo-*	3→4 *-oo-*
	INV	1→2 *-aa-*	3/4→1/2 *-eí´-*	4→3 *-ei-*
Blackfoot	DIR	2→1 *-ok-*	1/2→3/4 *-a-*	3→4 *-(y)ii*[13]-
	INV	1→2 *-o-*	3/4→1/2 *-ok-*	4→3 *-ok-/-yii-*
Cheyenne	DIR	2→1 *-e-*	1/2→3/4 *-o-*	3→4 *-o-*
	INV	1→2 *-at-*	3/4→1/2 *–a(´e)-*	4→3 *-(a)a´e-*

For example, the complex form *bííxoo3-* would consist of two different morphemes: the imperfective marker *-ii-* and the VTA stem *bixoo3* 'love'.

12 This preference for second person can also be seen in the marking of the inclusive first person plural, which is marked in all Plains Algonquian languages, like the second person plural. Actually, the use of the second person prefix form for the inclusive first person plural holds true for all Algonquian languages so that it may be more appropriate to consider the existence of an inclusive second person plural, rather than an inclusive first person plural.

13 The suffix *–(y)ii* appears to replace the direct theme marker *–a-* in transitive constructions including two third person participants (Frantz 1997: 53).

The 2→1 forms in Gros Ventre and Blackfoot, for example, appear to use the same theme markers as those used in the inverse constructions in the mixed and non-local sets, namely -ei´- and -ok- in Gros Ventre and Blackfoot respectively.[14] This apparent contradiction between the Person hierarchy and the information provided by the direct / inverse markers may be accounted for by arguing that Plains Algonquian languages have historically developed a number of innovations in their morphology, which makes them the least conservative and, consequently, most divergent of the known Algonquian languages.[15] Thus, it seems plausible to consider data provided by Proto-Algonquian and other Algonquian languages in order to find out if theme markers in these languages may be governed by another distinct hierarchy or, by contrast, the description of their alignment system may be described more accurately by using a grammatical category different from direction. Thus, in the recent years, an examination of the conjunct order morphology in Proto-Algonquian has led to the consensus that, while the labels direct and inverse can be useful to describe how transitive constructions work in these languages at present, it is more accurate to view the theme markers as object agreement (Goddard 2007; Oxford 2017), as this analysis appears to reflect their original function more faithfully.

Following this approach, all the theme signs in Proto-Algonquian functioned as object agreement markers and the present-day inverse marker was originally only present in the 4→3 form in the conjunct order and both in the 4→3 and in the 3→1/2 forms in the independent order. However, this morpheme gradually extended to additional forms in both orders:

Table 3: Comparison of theme markers between Proto-Algonquian and Plains Algonquian languages.

Verb form	Proto-Algonquian		Arapaho		Gros Ventre		Blackfoot		Cheyenne	
	Ind	Con	Ind	Con	Ind	Con	Ind	Sub[16]	Ind	Con
2→1	*-i-	*-i-	-i/u-	-i/u-	-ei-	-ei-	-ok-	-ok-	-e-	-e-
3→1	*-ekw-	*-i-	-éi-	-éi-	-ei-	-ei-	-ok-	-otsi-	-a(e)-	-a(e)-
3→11	*-ekw-	*-i-	-éi-	-éi-	-ei-	-ei-	-ok-	-ok-	-a´e-	-ae-
1→2	*-eθ-	*-eθ-	-e3-	-e3-	-a-	-a-	-o-	-Ø-	-ȧt-	-ȧt-
3→2	*-ekw-	*-eθ-	-éi-	-éi-	-ei-	-ei-	-ok-	-otsi-	-a(e)-	-at-

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14 More evidence against equating theme markers in local forms to direction markers is provided by Oxford (2014: 57–60)

15 This may be due to the fact that Arapaho, Gros Ventre, and Cheyenne were some of the first languages to split off Proto-Algonquian and that Blackfoot could probably have been a sister rather than a daughter of Proto-Algonquian (Goddard 2015).

16 The subjunctive paradigm appears to reflect the Proto-Algonquian conjunct paradigm more accurately in Blackfoot (Oxford 2014).

Table 3 (continued)

Verb form	Proto-Algonquian		Arapaho		Gros Ventre		Blackfoot		Cheyenne	
	Ind	**Con**	**Ind**	**Con**	**Ind**	**Con**	**Ind**	**Sub[16]**	**Ind**	**Con**
3→22	***-ekw-***	*-eθ-*	*-éi-*	*-éi-*	*-ei-*	*-ei-*	*-ok-*	*-otsi-*	*-a´e-*	*-ae-*
1/2→3	***-a-***	*-a-*	*-o-*	*-o*	*-a-*	*-o-*	*-a-*	*-a-*	*-o-*	*-o-*
4→3	***-ekw-***	***-ekw-***	*-éi-*	*-éi-*	*-ei-*	*-ei-*	*-ok-*	*-otsi-*	*-a´e-*	*-a´e-*
3→4	***-a. . .e-***	*-a-*	*-o-*	*-o-*	*-o-*	*-o-*	*-i-*	*-a-*	*-o-*	*-o-*

As can be observed in Table 3, the Proto-Algonquian theme signs *-i*, *-eθ*, and *-a* always occur in conjunct forms representing a first, second, and third person patient (except for 4→3) respectively. Likewise, it is noteworthy that the extension of the inverse marker has taken place across the verbal paradigms of the four Plains Algonquian, changing from being a marker indicating a fourth person argument acting on a third person argument in Proto-Algonquian to becoming a marker that reflects the lack of alignment between the Person Hierarchy and the Semantic Role Hierarchy. An important exception is illustrated by Blackfoot – and possibly by Arapaho and Gros Ventre – where the inverse marker has strikingly become the theme sign in the 2→1 form, reversing this form to inverse.

According to Oxford (2014: 413), the extensive use of the inverse marker in the current verbal paradigms may be accounted for by arguing that, while the prefix (or suffix) – realized on a higher agreement head Infl° – may be able to target either the actor or the undergoer, the theme marker – realized on a lower agreement head Voice° – is able to agree only with the undergoer, and when both markers cross-reference the same argument, namely the undergoer, the inverse marker replaces the original theme marker as a result of a dissimilatory impoverishment operation.

While this more recent model appears to reveal the original function of the theme markers in Proto-Algonquian, making its alignment system more similar to a conventional nominative / accusative alignment than to a hierarchical alignment, the most traditional approach in the literature, namely the full direct / inverse analysis, will be followed in the remainder of the chapter, as it reflects more faithfully the shift in the type of the alignment system that these languages appear to exhibit in their current evolutionary stage, owing to the extension of the inverse marker in non-local, in mixed, and even in local sets.

With this in mind, it is important to note, as discussed above in relation to Table 3, that the hierarchical alignment system does not appear to be governed by this Person Hierarchy reflected in the prefix. Rather, the theme marker, which now appears to indicate the direction of the action, seems to work closely with the interaction of a different Person Hierarchy – as well as the Semantic Role Hierar-

chy and the obviation system, obviously –. This second Person Hierarchy, appears to show an increasing trend towards a predominance of the first person over the second in some languages – as illustrated by Blackfoot and Gros Ventre –, thereby conforming to the so-called universal person ranking[17] 1st > 2nd > 3rd > 4th > I.[18]

This lack of correlation between the prefixal Person Hierarchy and the suffixal Person Hierarchy[19] in local configurations confirms that there is no reason to connect the information provided by the prefix and the theme marker (and even the suffix). Consequently, it seems convenient to differentiate at least two distinct hierarchies: the prefixal Person Hierarchy governing the choice of a specific person for the prefix (or suffix in Arapaho and Gros Ventre affirmative sentences) and the suffixal Person Hierarchy determining the theme markers that govern the direct / inverse system. We might likewise assume that these two distinct hierarchies are based on different

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17 The question of a universal person ranking is debatable, however. A number of scholars (Greenberg 1966; Dixon 1994; Givón 2001; Siewierska 2004; among others) affirm that the universal ranking is first person > second person and other scholars, such as Jakobson (1962), Goddard (1978, 2001), and Junker (2011), think that there is a preference for the first person over the second. However, some authors, such as Silverstein (1976), Dixon (1979), and DeLancey (1981) acknowledge that the relative order between first and second persons varies cross-linguistically, so that it may not be universally hierarchized. As different person hierarchies seem to exist now in Plains Algonquian languages, the wisest thing would perhaps be to posit a universal whereby speechact participants outrank non-speech-act participants, with the relative ranking of the speech act participants dependent on one or two local hierarchies in specific grammatical contexts.

18 It is also of note that a distinction is found between the suffixes used in local interactions involving plural first and second persons. While Arapaho and Gros Ventre appear to favour second person over first person, Blackfoot and Cheyenne show a preference for the opposite:

	1→2	1→22	11→2	11→22	2→1	2→11	22→1	22→11
Arapaho	- é3en (sg)	-e3é**nee** (pl)	-éen (sg)	-ee**nee** (pl)	-ú/ín (sg)	-ei´een (sg)	-ú/í**nee** (pl)	-ei´éé**nee** (pl)
Gros Ventre	-aaan´o (sg)	-aaa**naah**(´) (pl)	-áan´o (sg)	-o´o**naah**(´) (pl)	-ei´aan´o (sg)	-ei´aan´o (sg)	-ei´aa**naah** (pl)	-ei´aa**naah** (pl)
Blackfoot	-o (sg)	-o:hpoaawa (sg)	-o**hpinnaan** (pl)	-o:**hpinnaan** (pl)	-oki (sg)	-oki**hpinnaan** (pl)	-okihpoaawa (sg)	-oki**hpinnaan** (pl)
Cheyenne	-átse (sg)	-atseme (sg)	-atse**meno** (pl)	-atse**meno** (pl)	-e (sg)	-e**meno** (pl)	-ème (sg)	-e**meno** (pl)

19 While I am aware that this denomination is not completely accurate, as languages such as Arapaho and Gros Ventre reflect the effects of this first Person Hierarchy in the form of a special suffix in affirmative sentences, I will henceforth use the term prefixal to refer to this first Person Hierarchy in order to distinguish it from a second Person Hierarchy – which I, by analogy, will name suffixal Person Hierarchy – that also interacts with the direct / inverse system and the proximate / obviative distinction in order to disambiguate the semantic role of the participants.

semantic and discourse-pragmatic properties and may therefore not be functionally equivalent. Thus, as regards the prefixal Person Hierarchy, there might be several pragmatic factors motivating the preference of second person over first person: avoidance of a negative or taboo target (Heath 1998), evidence of tuism rather than egoism (Singer 1984), a tuistical, rather than an ego-focused, nature of the Algonquian culture (Strauss 1989), politeness conventions (Siewierska 2004), empathy, or modesty, among others. While it is difficult to attribute this particular ranking of second person over first person to one single factor, we should assume that this more prominent, non-egocentric, role for second person appears to be pragmatically, rather than semantically, determined. The suffixal Person Hierarchy, by contrast, appears to be mainly determined by pragmatic factors such as deixis[20] or topicality.[21]

2.3 Do Plains Algonquian languages have voice?

Even though it is difficult to locate properties of the passive voice covering all the instances of this construction cross-linguistically, four main properties appear to have been traditionally associated with the passive: (i) there must be an alternative construction conveying the same semantic content but expressed from a different perspective (i.e. the active construction), (ii) the semantic valence of the predicate must not vary with respect to that shown in the active alternative, (iii) there must be a promotion of the patient and demotion of the agent, and (iv) there must be an argument exhibiting the same syntactic behaviour as another argument in the active counterpart.

The issue of whether Algonquian languages possess any equivalent construction to the English-style passive has always been widely debated (Rhodes 1976; Jolley 1982; Dahlstrom 1991; Wolfart 1991; among others), especially in relation to the resemblance between the active / passive alternation and the direct / inverse distinction. While the direction system of hierarchical alignment appears to map arguments to thematic roles and, consequently, functions like the voice system in languages like English, controversy exists as to whether the direct / inverse alternation should be regarded as analogous to the active / passive voice distinction. For example, the choice between two alternative semantically equivalent

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20 I use the concept deixis as the distance between a specific individual or entity and a point of reference, which turns out to be the first person rather than the second person.
21 This person hierarchy is based on pragmatic topicality in the sense that speech-act participants are prototypically more topical or given in any speech act than non-speech-act participants, which must be introduced into the discourse in order to be considered topical.

constructions offered by the voice system cannot be found in local configurations in Plains Algonquian languages:

(9) *Né-vovéstomve-àtse.*   Cheyenne
     2-teach-1SG>2SG
     'I teach you.' / 'You are taught by me.'

(10) *Né-vovéstomev-e.*   Cheyenne
      2-teach-2SG>1SG[22]
      'You teach me.' / 'I am taught by you.'

Examples (9) and (10) show that a change in the direction of the action does not give rise to two sentences expressing the same semantic content as with the active and passive constructions. Rather, the two sentences report two different events. Thus, examples of local interactions show a major difference between direction and voice: direct and inverse do not represent alternatives in the way that active and passive evidence.

The same situation occurs in mixed scenarios, that is to say, a change of direct to inverse or vice versa in the theme markers leads to two different sentences:

(11) *N-aaáhs-iksi*   *nit-s-ik-akomimm-okiaawa.*   Blackfoot
      1SG.POSS-grandparents-PL   1-EP-EMPH-love-3PL>1SG
      'My grandparents love me.' / 'I am loved by my grandparents.'

(12) *N-aaáhs-iksi*   *nit-s-ik-akomimm-ay(i)aawa.*   Blackfoot
      1SG.POSS-grandparents-PL   1-EP-EMPH-love-1SG>3PL
      'I love my grandparents.' / 'My grandparents are loved by me.'

Consequently, in local and mixed interactions, while it is possible to shift the direction of the construction, it is not possible to obtain two constructions with the same semantic interpretation. In these transitive constructions involving the presence of local participants, there is no means of expressing a different point of view, so there is no equivalent alternation to that shown by the active and passive in these languages. This may be linked to the fact that first and second persons (especially in the singular, but also in the plural) are not expressed by referential phrases.

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22 Despite what the comparison of theme markers provided by Table 3 appears to suggest, for the sake of clarity I will consider 1→2 and 2→1 interactions as inverse and direct respectively following Wolfart (1973)´s full direct / inverse analysis.

By contrast, a possible equivalent construction to an English-like active/ passive distinction appears to be illustrated by the non-local (3↔4) interaction, that is to say, a sentence involving the presence of two third person animate referents. The pragmatic property of obviation, which serves to provide a clausal disjoint reference between two distinct third person referents, distinguishes between proximate and obviative referents in such a way that, when two (or more) distinct third person referents are present in a clause or unit of discourse, only one of these referents retains the privileged and unmarked proximate status while the other(s) must be degraded, receiving obviative marking:

(13) a. *Hísei*   *nih-ii-niiteheiw-oo-t*   *hinénin.*   Arapaho
        woman   PST-IPFV[23]-help-3SG>4SG-3SG   man.OBV
        'The woman helped the man.'

     b. *Hinén*   *nih-ii-niiteheib-éí-t*   *hiséin.*
        man   PST-IPFV-help-4SG>3SG-3SG   woman.OBV
        'The woman helped the man.'

The two sentences in (13) are semantically equivalent but pragmatically distinct. A simultaneous shift of obviation and direction does not alter the semantic interpretation but shows it from two different points of view – offered by the agent and the patient – so that this situation seems to be reminiscent of the active / passive distinction.

Additionally, the important role played by word order in Algonquian languages should not be overlooked. As instances of discourse-configurational languages (Hale 1983; Jelinek 1984; Kiss 1995), which attach more importance to the encoding of the discourse functions than that of syntactic functions, word order in these languages is so flexible that it allows all kinds of possible combinations as to the position of the major constituents for pragmatic reasons. Thus, besides the two examples illustrated in (13a) and (13b), two other semantically equivalent sentences could be built in these languages due to a simultaneous variation of the proximate and obviative status of the participants, the direction of the theme markers, and the change of position of the two referential phrases:

(14) a. *Hinénin*   *nih-ii-niiteheiw-oo-t*   *hísei.*   Arapaho
        man.OBV   PST-IPFV-help-3SG>4SG-3SG   woman
        'The woman helped the man.'

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23 The presence of the imperfective marker *-ii-* implies that a person would help the other regularly, on multiple occasions.

b. *Hiséin*   *nih-ii-niiteheib-éí-t*   *hinén.*
    woman.OBV   PST-IPFV-help-4SG>3SG-3SG   man
    'The woman helped the man.'

While the direct / inverse system works in tandem with the proxima / obviative distinction to associate each participant with its corresponding semantic role, word order in Plains Algonquian languages is responsible for assigning a specific discourse-pragmatic function to each participant. In these languages for example, the clause-initial position appears to be generally reserved for accommodating newsworthy information, and, as proximate participants are pragmatically more salient than obviative participants, the latter do not usually precede the former, especially in preverbal position. For this reason, the example of the inverse construction in (13b) could be considered the closest equivalent to a traditional English-like passive. Consequently, it could perhaps be more accurately translated as 'The man was helped by the woman', as this construction promotes the patient – by marking it in the person suffix *-t*, assigning it proximate status, and placing it in clause-initial position – and demotes the agent – it is not marked in the special affix, receives obviative marking, and occurs in postverbal position –. On the other hand, while the constructions (14a) and (14b) represent possible alternative word orders, they would not sound very natural in these languages, as the correlation between preverbal position and obviative marking is pragmatically disharmonious. In summary, a sentence such as that illustrated in (13b) appears to show the trademark properties of an English-style passive. The only difference, perhaps, between the Algonquian construction in (13b) and the traditional English-like passive would lie in the detransitivization of the verb in the latter.

Algonquian languages have another construction commonly referred to as 'Unspecified Actor' (Hockett, 1996), which is understood to include a reference to a non-specific agent:

(15) *N-itákkaawa*   *Ø-aakóóˊ-a:wa.*   Blackfoot
     1SG.POSS-friend   3-cheat-x[24]>3SG
     'My friend was cheated.'

(16) *Nit-aakóóˊ-(o)koo.*   Blackfoot
     1-cheat-X>1SG
     'I was cheated.'

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24 The symbol 'X' stands for the non-specific agent.

As we can see in the glosses of these examples, this construction is built on the same transitive verb stem (e.g. VTA or VTI) as any other transitive construction. It is particularly striking that, when the patient of an Unspecified Actor construction is a speech-act participant (16b), the verb is accompanied by the inverse theme marker -*ok*- like the other VTA inverse forms:

(17) *Om-(w)a* *nínaa-wa* *nit-áákoo'-(o)ka*.   Blackfoot
     DEM-PROX man-PROX 1-cheat-3SG>1SG
     'That man cheated me.'

This reveals an important difference in the suffixal morphology of Unspecified Actor constructions involving speech-act and non-speech-act participants: verbal forms including speech-act participants as non-actor arguments appear to involve the inverse forms, and verbal forms including third persons as non-actor arguments appear to be equated with direct forms. This distinction also suggests that the person expressing the non-specific agent must be located between the speech-act and the non-speech-act participants in the Person Hierarchy determining direction, namely 2 > 1 > X > 3 > 4 > I. This fact would in turn imply that this construction should not be considered a "true passive" when it includes a non-speech-act participant, since, despite the fact that the agent is demoted to a non-specific referent, the patient is not given prominence, that is to say, it is not promoted to subject-like status. This fact also appears to suggest that it is not possible to establish a correlation between active and passive, on the one hand, and direct and inverse direction, on the other.

    According to Wolvengrey (2011: 158-160), the presence of a transitive verbal stem means that the construction does not remove the semantic argument corresponding to the agent of the action from the understanding of the state of affairs. However, owing to the fact that the agent participant is non-specific, it is not cross-referenced on the verb. Thus, once the agent is removed from this construction, the verb takes the inflectional endings appropriate to a verb with one less animate participant, which gives the impression that there is only one argument. This assumption appears to be confirmed by the fact that this construction does not permit the lexicalization of the agent, which is related to the idea that it is not indexed and specified on the verb:

(18) a.* *N-itákkaawa* *Ø-aakóó´-a:wa* *áiaua*.   Blackfoot
        1SG.POSS-friend 3-cheat-X>3SG certain
        'My friend was cheated by someone (lit. 'certain').'

b.* *N-itákkaayi*   *Ø-aakóó´-a:yini*   *áiaua.*
     1SG.POSS-friend.OBV   X-cheat-X>4SG   certain
     'My friend was cheated by someone (lit. certain).'

c. *N-itákkaayi*   *Ø-aakóó´-yii-wa*   *áiaua.*
     1SG.POSS-friend.OBV   3-cheat-3SG>4SG   certain
     'My friend was cheated by someone (lit. certain).'

Examples (18a), (18b), and (18c) show that, when a lexicalized agent is introduced, such as the third person indefinite pronoun *áiaua* 'someone' for example, the verb also uses the VTA stem and, additionally, requires the direct theme marker *-yi-* and accompanying suffixes indicating a third person agent (proximate) acting on a fourth person patient (obviative).

Given the similarity between the two constructions illustrated by (15) and (18c), we might assume that this verbal paradigm originally reflected an agent so indeterminate, general or easily inferred from the context that it stopped being cross-referenced by the verb suffix, although it continued being made explicit by the theme marker. Subsequently, this construction gradually adopted a suffixal inflectional morphology similar to the VAI paradigm, which makes it very similar to the English passive with the only difference being that the Algonquian construction does not permit the lexicalization of the agent. This makes it impossible to build two syntactically different alternatives reporting the same event so that this construction does not fulfill one of the aforementioned properties of a universal passive construction.

Once all types of interaction have been analyzed, it would seem logical not to equate direction with voice and to argue that non-local configurations are the closest to a traditional passive. Unlike local and mixed interactions, the presence of lexical referential phrases co-referring with two distinct third person pronominal arguments, along with the proximate / obviation distinction in non-local contexts, leads to two resulting constructions with the same semantic interpretation. These two alternatives would consequently represent two different points of view of the same event depending on whether the focus falls on an agent or a patient.

3 FDG analysis

The most outstanding features of Plains Algonquian transitive constructions are the prefixal and suffixal Person Hierarchies, the Semantic Role Hierarchy, the direct / inverse system, the proximate / obviative distinction, and word order. Given the fact that these features are determined by distinct semantic and prag-

matic properties (e.g. animacy, topicality, deixis, newsworthiness, etc.), it seems reasonable to think that they might also operate at different grammatical levels and, despite the apparently incompatible preferences shown by these hierarchies, their simultaneous operation may require an interaction between the different levels.

To this aim, an analysis of an Algonquian VTA (transitive construction containing two animate participants) construction involving a non-local interaction within the Functional Discourse Grammar framework will be offered in this section with the aim of revealing the syntactic, semantic, and pragmatic properties of the Algonquian construction in question, exploring a possible interaction between the different levels of linguistic representation and examining possible mismatches. This analysis will therefore enable us to shed more light on the similarities and differences between the Algonquian direct / inverse system and the traditional voice system illustrated by languages such as English.

One of Functional Discourse Grammar's trademark features is that it adopts a top-down approach to the construction of utterances and distinguishes two major operations: formulation, aimed at the formation of the underlying pragmatic and semantic representations, and encoding, responsible for the transformation of this pragmatic and semantic information into morphosyntactic and phonological representations. As a mirror image of these four representations, this framework considers that an utterance comprises four levels of organization, namely Interpersonal, Representational, Morphosyntactic, and Phonological, which reflect pragmatic, semantic, morphosyntactic, and phonological analysis respectively (Hengeveld and Mackenzie 2008: 5). These levels have a layered organization, which will be carefully examined in the following sub-sections.[25]

3.1 Interpersonal Level

The Interpersonal Level attempts to unveil all the linguistic aspects of an utterance that reveal an interaction between a Speaker and an Addressee. These aspects include the pragmatic considerations influencing the choices made by a Speaker to ensure that an utterance has the intended effect on the Addressee. For this reason, it is crucial to know which information corresponds to given or new, whether a particular linguistic unit is identifiable or not, etc.

Pragmatic considerations of this kind appear to influence the choice between an active and a passive construction, as this alternation is traditionally seen as involv-

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25 The Phonological Level is obviated for the sake of simplicity.

ing realizations of the same state of affairs but seen from different perspectives. This is illustrated in the pair of sentences (13a) and (13b), repeated here as (19a) and (19b):

(19) a. *Hísei   nih-ii-niiteheiw-oo-t   hinénin.*   Arapaho
      woman   PST-IPFV-help-3SG>4SG-3SG   man.OBV
      'The woman helped the man.'

    b. *Hinén   nih-ii-niiteheib-éí-t   hiséin.*
      man   PST-IPFV-help-4SG>3SG-3SG   woman.OBV
      'The man was helped by the woman.'

While these two constructions express the same state of affairs, the variant (19a) presents the event from the point of view of the woman and (19b) from the perspective of the man, which appear to be more pragmatically salient than the other participant in each clause. In view of the clause-initial position of these two referents both in the Arapaho and English constructions, changing the perspective in an active / passive voice alternation also appears to be mainly related to a matter of word order. This fact may be accounted for by arguing that word order in Algonquian languages appears to be linked to the discourse-pragmatic status of the participants involved.

In its treatment of pragmatic functions, Functional Discourse Grammar distinguishes three different oppositions, Focus / Background, Topic / Comment, and Contrast / Overlap, and observes that only the first value in every pair is normally encoded by a marked position within the clause, as well as through emphatic pronunciation, the addition of a special morpheme, or its presence in a special syntactic construction. This theory also highlights both the distinctiveness of every parameter and the interaction between them by affirming that it is possible for the first three values to combine with each other in the same element (Hengeveld and Mackenzie 2008: 99 — 100).

Word order in Algonquian languages is used for pragmatic purposes and the correlation between positioning and information-structural functions in Algonquian reveals a more complex pragmatic property, namely newsworthiness (Mithun 1987), a concept based on pragmatic saliency. On the basis of this property, the pragmatically-conditioned word order of Plains Algonquian languages regards the clause-initial position, which generally coincides with the preverbal position, as the most pragmatically important position in the clause, as it appears to have a foregrounded element introducing or changing a topic, representing new information, or even expressing contrast,[26] which reflects the aforemen-

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26 According to Mithun (1987), the term newsworthiness relates to the pragmatic salience or prominence given by a speaker to a specific constituent in a discourse span because s/he considers

tioned possibility of combining the values Focus, Topic, and Contrast with one another in the same constituent. Thus, the referents *hísei* 'woman' and *hinén* 'man' in examples (16a) and (16b) respectively may be seen to possess the three afore-mentioned values simultaneously: (i) being topical, they reveal the state of affairs being imparted to the addressee and relate the information being communicated with contextually available information; (ii), also being focal, they indicate the part of the Communicated Content that corresponds to new information; (iii) the fact that this position may contain contrastive information would also allow these elements to highlight or correct some part of the addressee's information.

In addition to word order, discourse prominence in Algonquian languages is also assigned to a participant via the obviation system, as it differentiates two participants on the basis of their different topicality.[27] Thus, in examples (19a) and (19b), the proximate participants *hísei* 'woman' and *hinén* 'man' are considered to have more pragmatic salience than the two obviative participants, namely *hinénin* 'man' and *hiséin* 'woman'.

Finally, the prefixal Person Hierarchy serves to single out one of the participants in terms of its pragmatic salience. In local and mixed interactions, the special prefix or suffix always designates the second person – or in its absence, the first person – as the most pragmatically prominent salient person in an event, which appears to reflect the influence of special emotional empathy towards the addressee and then towards the speaker. In examples (19a) and (19b), given the fact that they involve non-local interactions and the affixes cross-referencing third and fourth person are identical, it is not possible to discern linguistically

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this information important from the hearer´s perspective. This prominence should preferably be linked to the concept of empathy, that is to say, the capacity to recognize the feelings, emotions, beliefs, and opinions experienced by the addressee. Regarding equivalence to pragmatic functions, a newsworthy element would therefore correspond to a New Topic, Contrastive Topic / Replacing Focus, or Completive Focus in Functional Grammar terminology. In these languages the marking of Contrastive Focus appears to require a special focal construction, however:

E.g.: *Hetane   nea´háanéhe   tsé-véstàhém-aese   he´óho.*   Cheyenne
      man   PROX.AN.SG   CJT-help-4SG>3SG   woman.OBV
      'It is the man that was helped by the woman.' (Lit. 'The man is the one that
      was helped by the woman.')

27 According to Aissen (1997: 709), proximate / obviative distinction works as a reference tracking system that serves to track topic continuity across a discourse span. Thus, equating the proximate with the more prototypically topical third person referent and the obviative with the least topical appears to be a more likely reflection of the function conveyed by this Algonquian phenomenon, as, essentially, the proximate picks out the third person referent highest in topicality or discourse saliency. Deixis can also be seen as a triggering factor if the first person and second person are seen as proximate and obviative respectively.

which of the two participants is foregrounded. However, in such cases it is generally assumed that the special affix shows preference to the third over the fourth person; hence *hísei* 'woman' and *hinén* 'man', representing the third person participants in the two constructions, would receive more discourse prominence than *hinénin* 'man' and *hiséin* 'woman', which indicate fourth person participants.

In summary, it seems that all the systems used by Algonquian languages to give prominence to a specific participant over the other are linked with the use that speakers make of language in social communication. Accordingly, this function is linked to Functional Discourse Grammar's Interpersonal Level (IL), which reflects the representation of the dimension of pragmatics in utterances and therefore deals with the communicative function of a Linguistic Expression (i.e. the highest unit of analysis), leaving aside other factors of a syntactic and semantic nature:

(20) a. $(M_I: [(A_I: [(F_I: \text{DECL}(F_I))(P_I)_S(P_J)_A(C_I: [(T_I)(R_I: [-S, -A](R_I))_{NEWS/PROX}(R_J: [-S, -A](R_J))_{NON\text{-}NEWS/OBV}(C_I))](A_I)](M_I))$

  b. $(M_I: [(A_I: [(F_I: \text{DECL}(F_I))(P_I)_S(P_J)_A(C_I: [(T_I)(R_I: [-S, -A](R_I))_{NEWS/PROX}(R_J: [-S, -A](R_J))_{NON\text{-}NEWS/OBV}(C_I))](A_I)](M_I))$

These analyses show the structure at the IL of two linguistic units – each consisting of a single state of affairs – that correspond to the pair of clauses illustrated in (19). As we can see, the two utterances have the same structure at the IL.[28] Firstly, the interpersonal frame of the IL shows a layered structure and, in keeping with the top-down approach followed by Functional Discourse Grammar, its analysis must start with the highest layer, namely the layer of the Move (M_I). In these examples, the Move consists of only one Discourse Act (A_I),[29] which in turn contains a declarative Illocution (F_I). This Illocution identifies a relation between two speech-act participants, namely the speaker and the addressee (P_I and P_J) – which are not explicitly referred to in these utterances –, and the Communicated Content (C_I), which represents the information communicated by the speaker to the addressee. Secondly, the content frame contains one Ascriptive Subact (T_I), represented by a predicate denoting the event of helping, and two Referential Subacts (R_I and R_J), which refer to a man and a woman. In Algonquian languages a clause may consist of just a predicate containing referential markers that make

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28 The lexical items *hinén* 'man', *niiteheiw* 'help', and *hísei* 'woman' will be available at the RL and, subsequently, transferred unaltered to the ML. The grammatical elements *-nih-*, *-ii-*, *-oo-* /*-éí-*, and *-t* will be inserted at the ML.

29 The operator and modifier positions are not considered in the representation, as they are irrelevant to these examples.

the lexical expression of arguments potentially superfluous. These prefixes and suffixes on the verb are therefore capable of referring by themselves and must therefore be treated as the bound expressions of Referential Subacts.[30]

Because the IL represents units in terms of their communicative function and Subacts carry pragmatic functions, the distinct values of information-structural functions must be assigned to the corresponding elements in the content frame. As we will see in Section 3.3, judging by (19a) and (19b), in Plains Algonquian languages the Ascriptive element is typically placed in the pragmatically neutral clause-middle position, since the placement of a referential element in clause-initial position entails the presence of newsworthy information. As the pragmatic function of newsworthiness appears to subsume the three different parameters of information-structural functions proposed by Functional Discourse Grammar, each of the two referents in these two utterances is assigned a different value of this complex parameter. Thus, the first referent is assigned the pragmatic function of newsworthiness and the second receives the non-newsworthiness value. Additionally, the first referent in each utterance also receives prominence by being marked as proximate, so that it is assumed to be more topical and closer to the speaker. Finally, the fact that Plains Algonquian languages mark one of the two participants involved as more prominent – maybe because of a special emotional empathy towards that participant through a special prefix, or suffix, as in affirmative sentences in Arapaho and Gros Ventre – must be represented in the IL by attributing higher pragmatic status to the foregrounded element, in this case the third person participant.

In summary, the first referent in each utterance is pragmatically highlighted on the basis of three different properties: newsworthiness through word order, proximacy through the obviation system, and a special pragmatic salience through the prefixal Person Hierarchy. Furthermore, the possibility that the three information-structural statutes – Topic, Focus, and Contrast – would fall on the same element, which occurs in clause-initial position, shows that the three pragmatic functions may be combined in spite of the fact that they represent different parameters, although this is not necessarily so (see examples (14a) and (14b)).

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30 I discard the option of considering the two referential phrases as Discourse Acts related to the two constituents of the Nuclear Discourse Act represented by the two pronominal markers because they are not separated from the verbal complex by intonation and they cannot have their own Illocution. Furthermore, it is possible to place an element – for example indicating orientation – in clause-initial position preceding the first referential phrase.

3.2 Representational Level

The Representational Level examines those linguistic aspects related to the meaning of lexical units that can be described independently from the communicative intention of the Speaker. The identification of the referents and the assignment of their corresponding semantic functions is triggered in the grammar of Plains Algonquian languages by the hierarchical alignment system, which is articulated around the direct / inverse distinction. This distinction works alongside the suffixal Person Hierarchy, the Semantic Role Hierarchy, and the proximate / obviative opposition. The differentiation between the two third person referents of the examples (19a) and (19b), namely the woman and the man, is made thanks to the marking provided by the obviation system. The proximate picks out the referent higher up in topicality – the woman in (19a) and the man in (19b) – and the obviative marks the element that is prototypically less topical, and even more distant from the speaker, in other words less likely to be of current central interest in the discourse – the man in (19a) and the woman in (19b). Subsequently, the interaction between the suffixal Person Hierarchy and the Semantic Role Hierarchy determines the direction of the construction, which is reflected in the theme marker (e.g. *-oo-* in (19a) and *-éí-* in (19b)) and, consequently, the assignment of semantic functions. A crucial component of transitive constructions in Plains Algonquian is the theme or direction marker. This morpheme reveals an opposition between a direct construction, which indicates that the action flows in the expected direction, from higher-ranking agent to lower-ranking patient, and an inverse construction, which indicates the opposite, that is to say that a higher-ranking patient is being acted upon by a lower-ranking agent. Thus, while the direct marking on the verb in (19a), namely *-oo-*, indicates that the proximate NP (e.g. *hísei* 'woman') is the agent and the obviative NP (e.g. *hinénin* 'man') the beneficiary or more patient-like argument (i.e. the expected direction of action), the inverse marking in (19b), namely *-éí-*, indicates that the proximate NP (e.g. *hísein* 'woman') is the beneficiary and the obviative NP (e.g. *hínen* 'man') the agent (i.e., the less expected direction of action).[31]

The Functional Discourse Grammar analysis of the structure of a linguistic unit at the Representational Level (RL) concerns the examination of its semantic

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31 As discussed above, Arapaho is an instance of a head-marking language; hence the nucleus of the predicate is accompanied by an affix representing the two semantic relations between the nucleus and its two arguments. Furthermore, the fact that the second phrase is also morphologically marked for obviation shows an instance of double marking, which is compulsory in order to distinguish the two third person referents.

properties and the way that different semantic categories such as events and entities are designated:

(21) a. $(p_i: [(past ep_i: ((e_i: [(impf f_i: [(f_j: niiteheiw_V (f_j)) (1x_i: [(f_k: - hísei_N - (f_k)) (1x_i)])_A (1x_j: [(f_l: - hinén_N - (f_l)) (1x_j)])_U] (f_i))] (e_i)) (ep_i)] (p_i))$

   b. $(p_i: [(past ep_i: ((e_i: [(impf f_i: [(f_j: niiteheiw_V (f_j)) (1x_i: [(f_k: - hísei_N - (f_k)) (1x_i)])_A (1x_j: [(f_l: - hinén_N - (f_l)) (1x_j)])_U] (f_i))] (e_i)) (ep_i)] (p_i))$

As we can see, the representation of the structure of the two utterances illustrated in (19) is identical at the RL, as it was also at the IL. Only by relating both representations is it possible to ascertain where the difference in meaning lies, namely the different mapping between referents and the notion of newsworthiness and the proximate / obviative distinction:

(22) a. $(C_i: [(T_i) (R_i) (R_j)] (C_i))$

   $(f_i: [(f_j) (x_i)_A (x_j)_U] (f_i))$

   b. $(C_i: [(T_i) (R_i) (R_j)] (C_i))$

   $(f_i: [(f_j) (x_i)_A (x_j)_U] (f_i))$

The representation at the RL in (21) starts with a description of the representational frame, which contains the Propositional Content (p_i). In this unit of analysis, the Propositional Content consists of only one episode (ep_i), as evidenced by the presence of a single temporal specification indicating absolute (past) tense marking. The imperfective aspectual distinction is seen as an operator applied to the Configurational Property (f_i) of the State-of-Affairs.

   The nature of the Propositional Content in the State-of-Affairs (e_i) is partly determined by the requirements of the declarative Illocution at the IL, which, in the two examples under examination, requires a finite form of the verbal stem *níiteheiw* 'help' (e.g. a VTA stem) and a non-interrogative sentence form. The Propositional Content in both utterances is factual, as it relates to facts occurring in the actual world (e.g. "one person helps another") and refers to both the source of information and the degree of confidence concerning the knowledge upon which a certain proposition is based. Thus, if we take into account that this is a clause in the Indicative Mood and shows no marker of epistemic and evidential modality, it can be considered that the Speaker reports direct (e.g. visual or sensory) evidence of the event. This reveals a high degree of certainty that such an event actually occurred.

The State-of-Affairs also denotes a dynamic event including a complex Configurational Property (f_i) whose predication frame includes the specification of the two-place Property (f_j) of its semantic constituent (i.e. the predicate) specifying a relation between the two individuals involved in the event (x_i and x_j), designating concrete and tangible entities (e.g. a man and a woman, in these examples). Finally, the Configurational Property (f_i) is also used to specify the Lexical Properties of these individuals (f_k and f_l), hence the lexical items are introduced at this level and will subsequently be transferred to the ML without a change.

The relations between the elements within a predication frame, namely the nucleus –represented by the verb *nííteheiw* 'help' – and the dependents – portrayed by the referential phrases –, are specified by the semantic functions of actor (i.e. more agent-like) and undergoer (i.e. less agent-like). These functions are therefore attached to each of the arguments of the Property (f_j), which are represented by the two identifiable participants *hísei* 'woman' and *hinén* 'man' in the two utterances.

It is of note that, despite swapping their position in the clauses and possessing a different status with respect to the proximate / obviative distinction, the two referents keep the same semantic function. Thus, on the one hand, the participant with the more active role, namely the woman, which is represented lexically by the proximate form *hísei* and the obviative form *hiséin* in (16a) and (16b) respectively, will be assigned the semantic function of actor. On the other hand, the participant playing the less active role, namely the man, which is realized lexically through the proximate form *hinén* and the obviative form *hinénin* in each corresponding construction, will receive the semantic function of undergoer. This also highlights the fact that, while the agent assumes greater relevance in the direct construction, it is the more patient-like argument that plays a more important role in the inverse construction.

3.3 Morphosyntactic Level

The Morphosyntactic Level examines how interpersonal and representational information is coded morphosyntactically, that is to say, in the form and positioning of constituents, thereby showing the transition from the operation of formulation to that of encoding. In order to reflect how the communicative intentions of the Speaker are formally expressed, it is important to bear in mind that the ML receives its input from the two former levels of representation and that syntactic functions are different from semantic roles and pragmatic functions. Thus, in languages like English, for instance, at least one grammatical relation, namely the Subject, plays a central role in the way that core elements align

with morphosyntactic units in active and passive constructions. For example, in the corresponding English counterparts to (19a) and (19b), two different arguments – the agent in the active and the beneficiary in the passive – are assigned the Subject syntactic function through their agreement with the verb. The Subject syntactic function in languages like English therefore represents a neutralization of the formal marking of actor and undergoer. The fact that the morphosyntactic behaviour of clausal elements in English is determined by autonomous features of the Morphosyntactic Level without the need for reference to pragmatic and / or semantic properties leads to an instance of morphosyntactic alignment.

It is, however, more difficult to determine the type of alignment that Algonquian languages exhibit. These languages organize the Morphosyntactic Level around the interaction of the direct / inverse system, which works along with the suffixal Person Hierarchy and the Semantic Role Hierarchy in order to correctly assign a semantic function to the different arguments in each construction. Thus, while in (19a) the higher-ranking argument – *hísei* 'woman' – is the actor, and the verb is inflected as being direct, in (19b) the higher-ranking – *hinén* 'man' – is the undergoer and the inverse construction is used. It is therefore the system of verbal direction, realized through the theme markers, that examines a correspondence between both hierarchies and indicates whether both hierarchies are properly aligned (the construction will be marked as direct) or not properly aligned (the construction will be marked as inverse). The syntax of Algonquian languages therefore appears to be sensitive to semantic functions, as evidenced by the fact that the assignment of semantic functions to participants is dependent on hierarchies determined by person and animacy, among other semantic properties. In light of this fact, these languages can be said to exhibit a type of representational alignment commonly referred to as hierarchical alignment (Hengeveld and Mackenzie 2008: 321).

Nevertheless, we should also note the role played by the pragmatically motivated proximate / obviative distinction in the assignment of semantic functions to the two referents in non-local configurations. Thus, only after having established at IL which of the two participants is proximate – and consequently the higher-ranking argument – and which is obviative – and consequently the lower-ranking argument –, is it possible to use the direct / inverse system to assign semantic functions to each referent. The interpretation of the semantic functions of the two participants may be reversed through the direct / inverse system or through the proximate / obviative system. However, when both are applied simultaneously, the interpretation of the semantic functions does not change, thus opening up the possibility of expressing all the possible combinations of pragmatic and semantic functions. In summary, a simultaneous shift of the proximate / obviative status

in the participants and of direction in the construction leads to two semantically equivalent constructions.

Furthermore, it should not be forgotten that Algonquian languages reserve the initial (or final) position of the verbal complexes in these languages for the cross-reference of a pragmatically salient participant. Due to the use of the prefixal Person Hierarchy, a pragmatically-determined hierarchy, one of the two participants is given greater discourse prominence and, consequently, it is cross-referenced by a special prefix (or suffix in Arapaho and Gros Ventre affirmative sentences). It is in non-local contexts that the obviation system works more closely with the prefixal Person Hierarchy. As evidenced by the Arapaho examples in (19), the fact that third and fourth persons are represented by the same morpheme in Plains Algonquian languages means that it is difficult to ascertain exactly which of the two non-Speech-Act participants is cross-referenced by this special marker. However, it is understood, due to the information provided by the proximate / obviative distinction and the suffixal Person Hierarchy, that the third person is more pragmatically salient than the fourth. In these examples, the marker *-t* occupies a sole person slot at the end of the verbal complex, following the verb stem *niiteheiw* 'help' and the theme marker *-oo-* (19a) or *-éí-* (19b), and the more pragmatically salient participant in each transitive construction – namely the third person participant *hísei* 'woman' in (16a) and *hinén* 'man' in (19b) – has access to this single suffixal slot in the verbal complex. Likewise, there also appears to show an important correlation between the discourse-pragmatic properties of the referents and the position that the constituents realizing these referents occupy within the clause. Thus, for example, the preverbal position in the clause is reserved for the constituent expressing the most newsworthy information and proximate participants generally tend to precede obviative participants. This implies that the proximate / obviative distinction also appears to be related to the concept of newsworthiness – which underlies the parameters Topic / Comment, Focus / Background, and Contrast / Overlap – and, consequently, affects the syntactic arrangement of constituents within the clause. In conclusion, in view of the fact that pragmatic and semantic information also correlates to syntactic structure in Algonquian languages, it would seem logical to argue that these languages exhibit a mixed system of alignment, namely interpersonal and representational.

Finally, the function of the special affix in the Arapaho examples in (19) is reminiscent of the neutralization brought about by the Subject function in English, as two different arguments are linked to the suffix *–t*, which signals the more pragmatically salient: the agent in the direct and the more patient-like argument in the inverse. In summary, the existence of a privileged syntactic function leads to

a neutralization of semantic and pragmatic oppositions,[32] as the form of the personal prefix or suffix remains invariable regardless of the pragmatic status of the referent (e.g. topic, focus, etc.) or the semantic role played by the participants in the clause. Thus, although there are no grounds for positing the existence of two grammatical relations such as subject or object in addition to semantic roles in these languages, we may reasonably argue that the existence of this morphosyntactic element marking the person of the most prominent participant in a particular context appears to provide evidence for the existence of a single grammatical relation in both direct and inverse constructions (Dryer 1997: 131).

As the Discourse Act and the Propositional Content of the units of analysis illustrated by (19a) and (19b) have been analyzed at the IL and the RL respectively, it is now time to see how the operation of formulation gives way to that of encoding, which feeds the Morphosyntactic Level (ML) and the Phonological Level (PL). The ML takes pragmatic and semantic information from both the IL and the RL, combines them into a single morphosyntactic representation, represents the syntactic relations between predicates and arguments, and indicates syntactic order. The morphosyntactic structures corresponding to (19a) and (19b) are therefore as follows:

(23)   a. Le_i: [(Cl_i: [(Np_i: ($Nw_{i:}$ /hísei/ (Nw_i)) (Np_i))$_{PSA}$] (Vp_i: (Vw_i: [(Aff_i: /nih/ (Aff_i)) (Aff_j: /ii/ (Aff_j)) ($^{TA}Vs_i$: /niiteheiw/ (Vs_i)) (Aff_k: 3_{pro}:4_{pro} (Aff_k)) (Aff_l: 3_{pro} (Aff_l))] (Vw_i)) (Vp_i)) [(Np_j: ($Nw_{j:}$ /hinénin/ (Nw_j)) (Np_j))] (Cl_i))] (Le_i))

     b. Le_i: [(Cl_i: [(Np_i: ($Nw_{i:}$ /hinén/ (Nw_i)) (Np_i))$_{PSA}$] (Vp_i: (Vw_i: [(Aff_i: /nih/ (Aff_i)) (Aff_j: /ii/ (Aff_j)) ($^{TA}Vs_i$: /niiteheib/ (Vs_i)) (Aff_k: 4_{pro}:3_{pro} (Aff_k)) (Aff_l: 3_{pro} ($Affl_l$))] (Vw_i)) (Vp_i)) [(Np_j: ($Nw_{j:}$ /hiséin/ (Nw_j)) (Np_j))] (Cl_i))] (Le_i))

The analysis at the ML starts again with the highest layer, the Linguistic Expression (Le_i), and works down through the Clause (Cl_i) to the Phrase (Np, Vp, etc.) and finally to the lowest layer, the Word (Nw, Vw, etc.). The examples in (19) show only one unit that does not differ superficially from a Clause and operates as a domain for several morphosyntactic processes. The two resulting morphosyntactic structures show a linear sequence of three Phrases (e.g. two Nps and one Vp) for which ordering an appropriate template will be selected in accordance with

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32 It could be considered an equivalent grammatical function to that expressed by the Role and Reference Grammar notion of Privileged Syntactic Argument (Van Valin 2005: 94–107), which refers to a restricted neutralization of semantic roles and pragmatic functions for syntactic purposes. The difference between the PSA in English and Algonquian is that, while in the former the PSA is purely syntactic, in the latter it is pragmatically determined.

the principles of iconicity, domain integrity, and functional stability[33] (Hengeveld and Mackenzie 2008: 283–90) that determine the relation between the levels and guarantee the parallelism between the different structures. Given the absence of morphosyntactic marking for modifiers and operators other than tense and aspect, which are placed hierarchically in a centripetal manner (e.g. the higher tense operator -*nih*- is expressed before the lower aspect operator -*ii*-), the ordering deals exclusively with the positioning of the three Subacts designating the predicate and its two arguments.

The clause-initial element is a noun phrase that expresses one of the two Referential Subacts. This noun phrase is headed by a lexical item, namely the noun *hísei* 'woman' in (19a) and *hisén* 'man' in (19b), that is passed on from the RL. Owing to the polysynthetic[34] nature of Plains Algonquian languages, their words may contain a high number of morphemes. Thus, the second phrase, which contains the element expressing the Ascriptive Subact, is a complex verbal form consisting of five elements, as it carries prefixes for tense and aspect and suffixes expressing directionality and the different participants, that is to say, *nih-ii-niiteheiw-oo-t* in (19a) and *nih-ii-niiteheib-éí-t* in (19b). The first two affixes, -*nih*- and -*ii*-, are inserted into the structure in response to the tense and aspect operators at the RL. The occupant of the only word slot within the verb phrase (Vp$_j$), the verb *niiteheiw* 'help' – which was introduced at the RL –, is triggered by the imperfective operator and acquires its definite form (e.g./*niiteheib/* in (19b)) at the PL. The direction markers -*oo*- and -*éí*- and the additional suffix -*t* are considered placeholders that express the third person singular and the fourth person

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33 According to Hengeveld and Mackenzie (2008: 283–90), these three principles guarantee the maximal correspondence between the levels. Firstly, iconicity reflects the influence of the Conceptual Component on the ordering of units at the higher units of the IL and the RL. Secondly, domain integrity ensures that the organization of the IL and the RL is reflected at the ML. Finally, functional stability regulates the relative order of constituents at each level on the basis of their functional specification. Thus, the combination of these three principles ensures that the mapping across the levels is as straightforward as possible, which leads to a greater transparency and easier interpretability of linguistic structure.

34 I use the term polysynthetic typologically in the sense that words in Algonquian languages are composed of many morphemes. According to the use of the term in Functional Discourse Grammar, which is related to the presence of more than one lexical unit within a single morphosyntactic word, these languages can also be considered polysynthetic, as illustrated by the possibility of attaching a lexical unit such as *teco´ on* 'always' or *ce´i* 'again' to the left of the verb *niiteheiw* 'help' in examples (19a) and (19b). Likewise, in terms of transparency, they are agglutinating languages, because they generally show a one-to-one relation between a morpheme and a unit of meaning. However, they also show some characteristics of fusional languages, which do not exhibit such a transparent relation between units of form and meaning, as shown by their portmanteau verbal suffixes.

singular pronouns and become part of the same phonological word as the verb, to which they are attached, at the PL.[35] The clause-final position is occupied by a noun phrase expressing the second Referential Subact. This noun phrase is headed by the nouns *hinénin* 'man' and *hiséin* 'woman' in (19a) and (19b) respectively, which are marked for obviation.

Once the organization of the ML in Plains Algonquian languages has been presented, we should turn to an analysis of the hierarchical ordering of core units in these languages. As discussed above, the assignment of each Phrase to a position in the template in Functional Discourse Grammar results from a complex interplay between its morphosyntactic category and its pragmatic function, which is inherited from the Interpersonal Level. These pragmatic functions, such as Topic, Focus, and Contrast, are represented by the concept of newsworthiness in Algonquian. Furthermore, in these languages, the proximate / obviative distinction appears to be closely related to the Topic / Comment parameter and may consequently affect the syntactic arrangement of constituents within the clause, so that proximate participants tend to precede obviative participants.[36] Regarding the specific positions occupied by the different elements of the linguistic expression in these languages, the two peripheral positions, the Pre-Clausal position (P^{pre}) and the Post-Clausal position (P^{post}), are reserved for extra-clausal elements. The position (P^{centre}) can be considered the most important position in these languages, as it hosts the newsworthy elements, which are marked through their occurrence in P^1, and the verbal complex. The verbal complex, which occupies the Clause-medial position (P^M) unless it expresses newsworthy information, comprises the verb, the special prefix or suffix representing the most pragmatically salient participant according to the Person Hierarchy, the theme marker, and a suffix providing grammatical information about the predicate arguments.[37] The full morphosyntactic representation of (19a) and (19b), including the positions occupied by the different phrases, is shown in (24a) and (24b):

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35 Among the morphosyntactic primitives of these languages there will be one of these two Word templates, depending on whether they have either a person prefix or a person suffix:

  a. $(Vw_i: [(Aff_i) (Vs_i) (Aff_j) (Aff_k)] (Vw_i))$
  b. $(Vw_i: [(Vs_i) (Aff_i) (Aff_j) (Aff_k))] (Vw_i))$

36 A number of semantic properties such as referentiality or specificity also appear to determine the form of the predicate, as illustrated by the Unspecified Actor construction, for example.

37 Although grammatical Morphemes are inserted at the ML, pronominal affixes in Algonquian languages change their form when they are combined with others to form non-segmentable portmanteau suffixes, implying that their definitive phonemic form will be available at the PL.

(24) a.

P^{pre}
P^{centre}

$\qquad$ P^{I}

(Cl$_i$: [(Np$_i$: (Nw$_{i:}$ /hísei/ (Nw$_i$)) (Np$_i$))$_{PSA}$]

$\qquad$ P^{M}

(Vp$_i$: [

$\qquad\qquad$ P^{I}
$\qquad\qquad$ P^{M-2}

$\qquad$ (Vw$_i$: [(Aff$_i$: /nih/ (Aff$_i$))

$\qquad\qquad$ P^{M-1}

$\qquad$ (Aff$_j$: /ii/ (Aff$_j$))

$\qquad\qquad$ P^{M}

$\qquad$ (^{TA}Vs$_i$: /niiteheiw/ (Vs$_i$))

$\qquad\qquad$ P^{M+1}

$\qquad$ (Aff$_k$: 3$_{pro}$:4$_{pro}$ (Aff$_k$))

$\qquad\qquad$ P^{F}

$\qquad$ (Aff$_l$: 3$_{pro}$ (Aff$_l$))

$\qquad$] (Vw$_i$))

] (Vp$_i$))

$\qquad$ P^{F}

(Np$_j$: [

$\qquad\qquad$ P^{I}
$\qquad\qquad$ P^{M}

$\qquad$ (Nw$_j$: [(Ns$_i$: /hinén/ (Ns$_i$)

$\qquad\qquad$ P^{F}

$\qquad$ (Aff$_m$: /in/ (Aff$_m$)

$\qquad$] (Nw$_j$))

] (Np$_j$))$_{Non\text{-}PSA}$
P^{post}

] (Cl$_i$))] (Le$_i$))

$\qquad$ b.

P^{pre}
P^{centre}

$\qquad$ P^{I}

(Cl$_i$: [(Np$_i$: (Nw$_{i:}$ /hinén/ (Nw$_i$)) (Np$_i$))$_{PSA}$]

$$P^M$$
$(Vp_i: [$

$\qquad P^I$
$\qquad P^{M-2}$
$\quad (Vw_i: [(Aff_i: /nih/ (Aff_i))$
$\qquad\qquad P^{M-1}$
$\quad (Aff_j: /ii/ (Aff_j))$
$\qquad\qquad P^M$
$\quad (^{TA}Vs_i: /niiteheib/ (Vs_i))$
$\qquad\qquad P^{M+1}$
$\quad (Aff_k: 4_{pro}:3_{pro} (Aff_k))$
$\qquad\qquad P^F$
$\quad (Aff_l: 3_{pro} (Aff_l))$
$\quad] (Vw_i))$
$] (Vp_i))$
$\qquad P^F$
$[(Np_j: [$

$\qquad\qquad P^I$
$\qquad\qquad P^M$
$\quad (Nw_j: [(Ns_j: /hiséi/ (Vs_j))$
$\qquad\qquad P^F$
$\quad (Aff_m: /n/ (Aff_m))$
$\quad] (Nw_j))$
$] (Np_j))_{Non-PSA}$
P^{post}
$] (Cl_i))] (Le_i))$
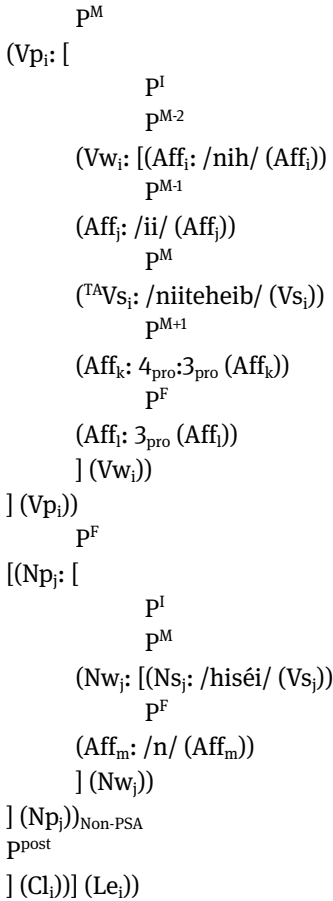
The fact that the verbal complex includes the predicate and the pronominal affixes cross-referencing its arguments implies that lexically realized arguments, which corefer with the pronominal affixes on the verbal complex, are syntactically optional. These referential phrases may occupy both preverbal and postverbal positions, which will be referred to as P^I and P^F within the P^{centre} position.

As regards the development of the Vp, further positions are provided within the phrase. Thus, the position reserved for the privileged syntactic argument (PSA) – cross-referenced by the special affix in the initial or final position of the verbal complexes in Algonquian languages –, which represents the most pragmatically salient participant, would commonly be P^I or P^F. Any operator or modifier preceding the verb stem would be placed in a different premedial (P^{M-n}) position. The verbal stem would occupy a central P^M position, and subsequent postmedial (P^{M+n}) and P^F positions would be provided for the theme marker and the

extra suffix containing information about the person, number, and animacy of the arguments, which are generally realized phonologically as a portmanteau suffix at PL.

3.4 Cross-level interaction

The multilevel analysis of the linguistic units under examination has uncovered a number of interface conditions – understood as devices that enable the different levels to communicate with each other –, allowing for an interaction between the different levels of grammatical description. In the Functional Discourse Grammar model, the operations of Formulation and Encoding function as interfaces that regulate the relations across the levels (Hengeveld and Mackenzie 2008: 287). These interfaces in Plains Algonquian languages, such as the distinction between proximate and obviative, the two Person Hierarchies, the Semantic Role Hierarchy, or the direct / inverse system, make up a complex system that forces all the levels to cooperate with each other, and the outcome of this cooperation finally determines the morphosyntactic structure of the transitive constructions in these languages.

In order to explain this important relationship between the different grammatical levels, it is necessary to use a theoretical framework consisting of a coherent and accurate structure that may be equally valid for all types of language and that enables us to undertake an exhaustive and rigorous description of the grammatical phenomena taking place at each level. Furthermore, at the same time, it must also be flexible enough to explore, identify, and explain the interactions that take place between the different levels of grammatical description. Functional Discourse Grammar is therefore a very appropriate theoretical framework for this purpose, since it shows the cross-level interactions in a clear, detailed, and elegant way. The following diagram shows mappings between the units illustrated in (19a) and (19b) at all levels:

(25) a. IL: $(C_I: [(T_I)\ (R_I)_{NEWS/PROX}\ (R_J)_{NON-NEWS/OBV}]\ (C_I))$

ML: $(Cl_i: [(Np_i: /hísei/)\ (Vp_i: (Vw_i: (Vs_i: /niiteheiw)\ (Aff_i: 3{:}4)\ (Aff_j: 3)))\ (Np_j: /hinénin/)]\ (Cl_i))$

$P^I \qquad P^M \qquad P^{M+1}\ P^{M+2} \qquad P^F$

RL: $(f_i: [(f_j: niiteheiw_V)\ (x_i: \text{-}hisei_N\text{-}(x_i))_A\ (x_j: \text{.}hinén_N\text{-}(x_j))_U\ (f_j)\ ]\ (f_i))$

b.

IL: $(C_I: [(T_I) \ (R_I)_{NEWS/PROX} \ (R_J)_{NON-NEWS/OBV}] \ (C_I))$

ML: $(Cl_i: [(Np_i: /hinén/) \ (Vp_i: \ (Vw_i: \ (Vs_i: /niitehew) \ (Aff_i: 4:3) \ (Aff_j: 3))) \ (Np_j: /hiséin/)] \ (Cl_i))$

P^I P^M P^{M+1} P^{M+2} P^F

RL: $(f_i: [(f_j: niiteheiw_V) \ (x_i: -hísein_N-(x_i))_A \ (x_j: -hinén_N-(x_j))_U (f_j) \ ] \ (f_i))$

The arrows in these two diagrams highlight the different mappings between the IL, the RL and the ML and show that the morphosyntactic configuration of the linguistic units is determined by both pragmatic and semantic properties. Thus, firstly, the differentiation between the two third person participants in the constructions is made thanks to the proximate / obviative distinction. This is mainly based on pragmatic properties that take into consideration how important the speaker thinks each referent is for the hearer as the discourse progresses. Such distinction works closely with the direct / inverse system, which reflects the presence or absence of correlation between the Person Hierarchy and the Semantic Role Hierarchy, to identify which semantic role must be assigned to each of the two arguments in each construction. It is important to emphasize here that any variation in the proximate / obviative marking not accompanied by a corresponding change in verbal direction would obligatorily lead to two semantically different constructions. Additionally, the proximate / obviative distinction is also related to the special coding of one of the arguments in the special verbal affix – suffix in the case of Arapaho – that singles out the highest ranking person in terms of the pragmatic properties that determine the prefixal Person Hierarchy for special treatment, which, along with the newsworthy value and the proximate status, grants higher discourse salience to that argument than to the other. Finally, the position of the two Nps in each construction is mainly determined by the pragmatic function of newsworthiness, which subsumes the parameters Topic / Comment, Focus / Background, and Contrast / Overlap. As the clause-initial position is associated with newsworthy value, the Np having this pragmatic value in each construction moves to the preverbal position, namely the P^I position. In conclusion, Algonquian languages use an intricate unified system consisting of a reference tracking mechanism based on the proximate / obviative distinction between third person participants, two Person hierarchies determined by the pragmatic-semantic notion of prominence, a Semantic Role hierarchy and a binary system of verbal direction to establish the link between pragmatic, semantic and syntactic information.

Despite the efficiency of this system, it is also possible to observe a lack of interaction in some respects. For example, besides the incompatibility shown by the two Person hierarchies in terms of the preference given to either first person

or second person, there also appears to be a difference in the criterion that determines their distinct rankings. Thus, we might assume that the two Person hierarchies may be working at different levels, as we have seen in section 3. As some scholars suggest (Zwicky 1977; Macauley 2005; Zuñiga 2008), Plains Algonquian languages may have two (or even more)[38] distinct Person hierarchies, which may be determined by different features, pragmatic or semantic, so that they may in fact have a different person ranking. This appears to lead us, again, to discard the idea that they may be two exponents of a single system.

On the other hand, despite the tendency for the morphosyntactic categories to correlate with pragmatic and semantic categories (Zwicky 1977: 714), there are mismatches between levels in transitive constructions in Plains Algonquian. Firstly, the fact that in these languages the pronominal affixes, such as *-oo-t* (3:4) in (25a) and *-éí-t* (4:3) in (25b), cross-reference arguments make noun phrases, such as *hísei / hiséin* 'woman' and *hinén / hinénin* 'man', function as adjunct and, consequently, be freely omitted. This cross-reference therefore leads to situations where two Referential Subacts correspond to a single unit at RL and, consequently, to a mismatch between IL and RL. A further instance of mismatch between the IL and the RL can be illustrated by the lack of isomorphism (i.e. homology of function and form) that characterizes these Algonquian languages, since different pragmatic values, such as newsworthy and proximate, can be associated with a single element. This can be illustrated by the referents *hísei* 'woman' in (25a) and *hinén* 'man' in (25b), which are marked morphologically as proximate third person argument and express the most newsworthy information, as is indicated by their clause-initial position.

Secondly, Plains Algonquian languages do not have a one-to-one relation between the unit of meaning and the unit of form, leading to a mismatch between the RL and the ML, as, like other polysynthetic languages, these languages have portmanteau pronominal affixes simultaneously expressing different types of grammatical information. This fusion or many-to-one relationship between the meaning and form is evidenced, for example, by the theme markers, *-oo-* (rep-

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38 In fact, the situation appears to be much more complex than this. For example, a comparative analysis of the suffix used for the exclusive first person plural, the inclusive first person plural and the second person plural in vai (i.e. intransitive construction with an animate agent) and vti (i.e. transitive constructions including an inanimate patient) constructions in terms of similarity as evidence for the preference for either first or second person shows great variation and provides conflicting results, which leads to the conclusion that first and second persons cannot be hierarchized in a simple manner (Macauley 2009).

resented as 3:4)[39] in (25a) and -*éí*- (4:3) in (25b), which express a third person singular agent acting on a fourth person singular beneficiary and a fourth person singular agent acting on a third person singular beneficiary respectively. A further instance of mismatch between the RL and the ML would be illustrated by the discontinuity shown by the expression of the same semantic unit – that is a third person argument such as *hísei* 'woman' in (25a) or *hinén* 'man' in (25b) – in two different morphosyntactic positions, namely in the suffix (or prefix in Cheyenne and Blackfoot) -*t* and in the theme marker -*oo*- (3:4) in (25a) or -*éí*- (4:3) in (25b).

Finally, with regard to the consideration of the direct / inverse constructions in Algonquian as analogous to the active / passive distinction in languages like English, the mappings observed in (25a) and (25b) illustrate the properties that have been traditionally attributed to the active / passive opposition, namely the choice between two semantically equivalent alternatives seen from two different perspectives, an identical semantic valency in the two variants, and the existence of a privileged syntactic position in the two constructions where two different arguments exhibit the same coding and behavioural properties. Judging by these characteristics, the only difference between direct and inverse constructions would lie in the element to be foregrounded. The arrows in the examples of representations offered in (25a) and (25b) reveal two correlations: newsworthy = proximate = P^I = agent = third person in (25a) and newsworthy = proximate = P^1 = beneficiary = third person in (25b), which show a promotion of the agent and demotion of the more patient-like argument in the direct construction and the promotion of the more patient-like argument and demotion of the agent in the inverse construction, which is in fact similar to active and passive constructions. Additionally, the only difference between an inverse construction such as (19b) and a traditional English-like passive lies in the different syntactic neutralization, namely pragmatic (determined by empathy, avoidance of a negative target, tuism, etc.) in Algonquian and purely syntactic in English (determined by agreement). This neutralization of pragmatic and semantic functions represented in the special syntactic position of the verbal prefix leads to a mismatch between the IL / RL and the ML, as it reflects a reduction of the distinctions available at IL and RL to a single distinction at ML. Likewise, it is this different type of neutralization – pragmatically-influenced in the case of Algonquian and purely syntactic in languages like English – that leads Functional Discourse Grammar to conclude that inverse constructions are not analogous to passive constructions.

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39 Taking into account they are portmanteau forms, these bound grammatical morphemes must be inserted at the PL. It is at this level that the placeholders such as '3:4' and '4:3', which are introduced at the ML, will be converted to the suffixes /oo/ and /éí/.

Keizer (2014: 412–418) posits a somewhat different treatment of the active / passive alternation within the Functional Discourse Grammar framework. This new proposal focuses on the factors that trigger the choice between one and the other variant rather than on the formal aspects of each construction. According to the author, of the four factors that appear to motivate the speaker to use a particular variant, the most important is the Speaker´s perspective, a pragmatic notion fulfilling an interpersonal, communicative function, as it depends on the communicative intention of the Speaker and is mainly determined by the discourse context. The information from the preceding discourse, or what can be inferred from it, motivates the demotion of the actor and the promotion of the patient, probably instigated by topic continuity and topic cohesion (Bolkenstein and Risselada 1987). Consequently, in keeping with this new view, the factor triggering subject (and object) assignment is now outside the Grammatical Component – to be more accurate, in the Contextual Component –. Rather, the cognitive process determining the Speaker´s perspective is therefore preverbal and is considered to pass from the Contextual Component to the Conceptual Component before entering formulation, where its outcome must be represented at the Interpersonal Level. The implication of this analysis for the theory of Functional Discourse Grammar is that, as the choice between active and passive in English is communicatively motivated and the perspective from which the message is going to be communicated is always present – every clause is either active or passive –, it must be represented as a single operator situated at the layer of the Referential Subact. As this new interpersonal operator, along with the information provided at the Representational Level, triggers the appropriate morphosyntactic form, the contextual information can be said to indirectly influence the form of the linguistic utterance.

In this analysis, the English-like active / passive alternation resembles more the direct / inverse distinction in Algonquian and, owing to the presence of the interpersonal operator, the two variants in each language no longer have the same structure at IL. As the subject[40] selects the referent in the speaker's focus of attention in English, the special affix representing the most pragmatically prominent participant in Algonquian constructions can also be said to reflect the perspective from which the message is going to be presented, as it is in this position that a specific participant changes the perspective involved in interpreting the utterance once the referent has been established as proximate. Thus, while these two constructions in (19) express the same state of affairs, the variant (19a) pre-

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40 If Keizer's perspective does not necessarily equate to subject assignment, then the shift in perspective in Algonquian could not only be attributed to the special affix, but also to the preverbal position occupied by the newsworthy element or to the referent marked as proximate, which generally conflate.

sents the event from the point of view of the woman and (19b) from the perspective of the man, so the two utterances have a different structure at the IL.

Finally, like Keizer's proposal for English, in Algonquian the Speaker's perspective can also be considered to be a composite notion comprising a number of pragmatic properties, such as empathy, avoidance of a negative target, tuism, politeness, or modesty. Likewise, as with the active / passive alternation, in Algonquian languages the choice between direct and inverse constructions is communicatively motivated, as every clause is either direct or inverse. Thus, this contextual information must be understood to pass from the Contextual Component to the Conceptual Component and enter formulation at the Interpersonal Level. This implies that this contextual information may be represented as an interpersonal operator, which has an impact on the direct / inverse system that determines the morphosyntactic form of the utterance.

4 Conclusion

This paper has offered an analysis of monotransitive constructions involving interactions between animate participants in Plains Algonquian languages with the aim of finding some that can be considered equivalent to the passive voice in languages such as English. Once such a construction – one involving a non-local interaction – was identified and its morphosyntactic, semantic, and pragmatic properties explained, a multilevel analysis of such a construction was offered within the Functional Discourse Grammar framework. This multilevel analysis was capable of offering a complete view of the linguistic phenomenon under examination and, consequently, of explaining its properties accurately.

This study has enabled us to observe that there is a solid relationship between the different levels of grammatical description in the direct and inverse VTA constructions and that the greater weight of this interplay lies in the pragmatic and semantic components due to the pervasive importance of concepts such as newsworthiness, topicality, animacy or referentiality in the grammar of Plains Algonquian languages, for example, in word order and in the different hierarchies. This confirms Functional Discourse Grammar's assumption that, within the top-down organization of the grammar, pragmatics and semantics govern morphosyntax (Hengeveld and Mackenzie 2008: 13).

The analysis of direct and inverse constructions in a non-local context has revealed a number of interface conditions, such as the two Person Hierarchies, the Semantic Role Hierarchy, the direct / inverse system, and the obviation system. This complex mechanism forces all the grammatical levels to cooperate

with each other in order to determine the morphosyntactic structure of the construction in question, thereby illustrating the way that the Functional Discourse Grammar operations of Formulation and Encoding function to regulate the relations across the different levels. More specifically, the discourse-pragmatic proximate / obviative distinction, which helps to differentiate between the two third person participants in a non-local transitive construction, works closely with the direct / inverse system, which reflects the presence or absence of correlation between the Person Hierarchy and the Semantic Role Hierarchy, with the aim of determining the assignment of semantic roles to arguments. Important evidence of the link between pragmatic, semantic, and syntactic information is illustrated when a variation in the proximate / obviative marking is accompanied by a corresponding change in verbal direction, as this situation leads to two syntactically different, but semantically equivalent, constructions, which makes the direct / inverse distinction analogous to the canonical active / voice alternation. Despite the efficiency of this intricate unified system, it is also possible to observe a lack of straightforward or transparent mappings between the levels or mismatches in some respects, such as, for example, the consideration of pronominal markers as syntactic arguments, the fact that the pragmatic values newsworthy and proximate are generally associated with a single element, the presence of portmanteau pronominal affixes simultaneously cross-referencing different arguments, the expression of arguments in different morphosyntactic positions, and the neutralization of pragmatic and semantic functions in a special syntactic position.

Finally, this analysis reveals that, although English and Algonquian languages have a different alignment type – morphosyntactic in the former and mixed interpersonal and representational in the latter –, the inverse VTA Algonquian construction in a non-local interaction shows characteristics traditionally attributed to the English-style passive, especially if the active / passive alternation is seen according to Keizer (2014)'s view, where the subject is considered to reflect the speaker's perspective and, consequently, seen as pragmatically motivated, as it occurs with the privileged syntactic position in Algonquian constructions. In this analysis, the English-like active / passive alternation resembles more the direct / inverse distinction in Algonquian since, analogously as the subject selects the referent in the speaker's focus of attention in English, the special affix representing the most pragmatically prominent participant in Algonquian constructions can also be said to reflect the perspective from which the message is going to be presented. This similar treatment of the active / passive alternation and direct / inverse distinction, therefore confirms the strong typological orientation of this theoretical framework, enabling us to represent similar constructions in languages of all morphosyntactic types (e.g. head-marking vs. dependent-marking, synthetic vs. analytic, etc.) in a similar way. This evidence therefore confirms that "FDG is capable

of providing a framework for the enunciation and comparison of universals and of offering lines of explanation" (Hengeveld and Mackenzie 2006: 32).

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Carmen Portero Muñoz

The English 'Time-measurement construction' as a case of gradience: A Functional Discourse Grammar approach

Abstract: The aim of this chapter is to show the adequacy of Functional Discourse Grammar (FDG) to account for a case of gradience in English, a time-measurement construction that expressions like *three months (maternity) leave* instantiate. These expressions pose a challenge to linguistic theories, as they show the overlap between different categories concerning the interface between two Levels of the architecture of FDG, the Representational and the Morphosyntactic Levels (and/ or Articulation). Firstly, these cases resemble compounds, such as *a six-day week*, where the absence of number marking on *day* and hyphenation indicate that it is a specific type of unit in which 'six-day' modifies the head noun. In addition, they are similar to the so-called measure genitive (e.g. *a ten days' absence*), in which the temporal noun is expressed as a genitive with an apostrophe and typically in plural form and which are usually interpreted in a similar way to compounds. By contrast, expressions like *three months maternity leave* are quantifying, used to measure the amount of the entity denoted by the second noun. By means of the architecture of the theory of FDG the distinctions between the different cases can be accounted for adequately at the different levels of linguistic representation. In addition, FDG's refined typology of entities will be shown to be crucial to provide an accurate account of the construction.

Keywords: Time-measurement construction, compounds, measure genitive, gradience, interfaces, FDG

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1 Introduction

The aim of this paper is to show the adequacy of the architecture of Functional Discourse Grammar (FDG) to account for a case of gradience: a Time-measurement construction that expressions like *three months (maternity) leave* instantiate (Bell and Portero, 2019). These expressions pose a challenge to linguistic theories, as they show the overlap between different categories, which can be seen as concerning the interface between two Levels of FDG's architecture, the Representational (that is, semantic) and the Morphosyntactic Levels. Thus, these cases resemble modifier-head (compound-like) constructions. For example, if we want to talk about a postgraduate course lasting three years, a *three-year post-graduate course* is used. In this case, the absence of number marking on *year* indicates that it is a specific type of unit, a compound or compound-like sequence where 'three year' modifies the head noun. However, expressions like *three months maternity leave* (or alternative expressions with an apostrophe like *three months' maternity leave*) are ambiguous between a modifier-head and a pseudo-partitive interpretation, that is, they can be analysed in a similar way to compounds as well as grammatical constructions used to indicate that only a part or fraction of a whole entity is referred to (such as *a slice of bacon, ten years of marriage*).

The contrast between pseudo-partitive expressions and modifier-head sequences is therefore blurred by the existence of cases with a plural (or -s ending) pre-modifying noun but no preposition, such as *three months maternity leave* (or the related *three months' maternity leave*). These might be regarded to provide a 'bridging construction' (Rosenbach 2006: 101) between modifier-head sequences and pseudo-partitive constructions. It will be shown that the description of this construction can benefit from the use of some of the basic principles of the theory, such as FDG's levels of linguistic description. More specifically, FDG's refined typology of entities will be shown to be crucial to provide an accurate account of the construction.

The present investigation is based on previous research in which the pattern under study was analysed in depth by using corpus data (Bell and Portero 2019). As a result of this, it was claimed to constitute an independent construction with a number of diagnostic properties. Taking this research as a starting point, the purpose of this paper is to make a proposal for the analysis of these expressions within FDG.

The paper is structured as follows. Section 2 will introduce the notion of linguistic gradience and will present the construction under study as a case of gradience and as a relevant case study for the issue of linguistic interfaces. In Section 3, a proposal will be made for the analysis of the construction from the perspective of the theory of FDG. Basic notions of the theory will be introduced in Section 3.1.

Section 3.2 explains the analytical proposal using the FDG framework, focusing on the interfaces between different levels. A final short conclusion is given in Section 4.

2 An interface issue: The Time-measurement construction as a case of gradience

2.1 Introduction: The notion of gradience

A number of current grammatical approaches support the position that categorization should be based on prototypes, rather than on clear-cut criteria, as the boundaries between categories are fuzzy and classifications of linguistic data are not completely accurate. A thorough overview of different approaches to gradience is provided by Aarts (2004b). As a reaction to theoretical frameworks that put few limits on fuzziness in grammar, Aarts (2004a: 1) argues that 'gradience *should* have a role to play in language studies (both descriptive and theoretical)' and he adopts a mid-way position between the Aristotelian, that is, all-or-none approach, and the cognitivist, prototype-based, conceptions of categorisation. Thus, he supports the proposition that gradience should be allowed, but that there must still be clear-cut boundaries between categories. Aarts points out that there are two types of gradience, which he refers to as Subsective Gradience and Intersective Gradience. The first type involves the members within a category, which can vary in degree of prototypicality. By contrast, the second type obtains in cases of inter-categorial resemblance, when two form types converge with each other. In the latter case, there is a continuum between two sets of elements A and B. The less A-like an element is, the more B-like it will be.

Different cases of Intersective Gradience have been put forward in the literature: between word classes like adverbs, prepositions and conjunctions (Bolinger 1971: 26–27, Jacobsson 1977: 40–41); between phrases, like noun and adjective phrases (Leech and Li 1995); and between constructions, like imperatives and declaratives (Givón 1986: 96), the nominal or verbal gerund and coordination and subordination (Quirk 1965). An often-cited example of a hybrid construction is the English gerund (Quirk et al. 1985: 1290–1291), which fluctuates between a nominal and a verbal analysis, as can be seen in (1):

(1)   Nominal
    some paintings of Brown's
    Brown's paintings of his daughters

The painting of Brown is as skilful as that of Gainsborough.
Brown's deft painting of his daughter is a delight to watch.

↑

Brown's deftly painting his daughter is a delight to watch.
I dislike Brown's painting his daughter.

↓
Verbal

I dislike Brown painting his daughter.
I watched Brown painting his daughter.
Brown deftly painting his daughter is a delight to watch.
Painting his daughter, Brown noticed that his hand was shaking.
Brown painting his daughter that day, I decided to go for a walk.
The man painting the girl is Brown.
The silently painting man is Brown.
Brown is painting his daughter.

The two fuzzy examples in the middle display nominal properties (the presence of a possessive) with verbal properties (the presence of a complement).

Drawing on Aarts (2004a, 2004b), Rosenbach (2006: 100) defines gradience as 'the mismatch in the mapping of meaning (in the sense of function) to form, and vice versa' and applies this notion to her analysis of the descriptive genitive in English. In Rosenbach's (2006: 103) view, the fact that we find *lawyer's fees* alongside *lawyer fees*, and *museum's shop* alongside *museum shop* (although in different frequencies) shows that there is overlap between the two constructions, which illustrate a mismatch in the mapping from function to form. In addition, the different interpretations of the indefinite dependent in cases like *a solicitor's office* as a determiner genitive ([a solicitor]'s office) or a classifying genitive (a [solicitor's office]) illustrate a mismatch from form to function. A similar approach will be pursued in this paper as regards time-measurement expressions.

2.2 The Time-measurement construction as a case of gradience

In this section, I will present three different cases that result in the fuzziness of the time-measurement construction and justify its treatment as a case of gradience (see Rosenbach 2006: 113).

(i) Compounds

As mentioned earlier, the construction illustrated by *three months (maternity) leave* is at first sight formally similar to modifier-head sequences (compound-like or phrasal) (e.g. *three-year post-graduate course*), as they both include a numeral followed by a noun, optionally an adjective, and a second noun, where the numeral makes a unit with the first noun and the adjective makes a unit with the second noun. However, on closer inspection, they are formally and semantically different. Formally, unlike in compounds, in the construction under study the first noun has a final inflectional mark 's'. As regards meaning, the largest sets of nouns occupying the first noun slot in these expressions are temporal nouns and they appear to share the denotation of a measure meaning with pseudo-partitives or they are at least semantically ambiguous *a priori*. Compare examples (2a) and (2b).

(2) a. *according to the Rocky Mountain Family Council, it's easier to get out of* **a ten-year marriage** *than it is to be rid of an employee hired one week ago.* (COCA)[1]
     b. *We are getting divorced after* **thirty-five years marriage**, *I have no place even to stay now.* (COCA)

While *a ten-year marriage* in (2a) designates 'a marriage lasting ten years', in (2b) the meaning of *thirty-five years marriage* seems to be 'thirty-five years of being married'.

(ii) The genitive of measure

In addition to compounds, there is quite a common construction of the form: number + time measure Noun + apostrophe + Noun (e.g. *ten days' work*), which appears to be very similar semantically to the construction with no apostrophe, so that they can be seen as variants of the same construction.

The form with an apostrophe is very common with time expressions, that is, the first noun is one of the following: *years, months, weeks, days, nights, afternoon, hours, minutes, seconds* (e.g. *20 years' imprisonment, eight months' work*). Quirk et al. (1985: 322) include these cases within the semantic group 'genitive of measure' (see also Biber et al. 1999: 296), in their semantic classification of the genitive, since the meaning in these cases is not possession. Instead, the genitive expresses a certain period of time associated to the second noun. The nature of this association is not very clear, however.

---

1 Corpus of Contemporary American English.

Quirk et al. (1985: 1333) make reference to the closeness between these different expressions, pointing out that in quantitative expressions there is possible variation, as shown in (3).

(3) *a ten day absence*
  a ten-day absence
  a ten days absence
  a ten days' absence

According to Quirk et al. (1985: 325, n.b), the apostrophe is "sometimes omitted" with temporal nouns. It should be noted, however, that the presence of the indefinite article in all these expressions indicates that the head noun is pre-modified by the preceding temporal expression. Therefore, the meaning of all these expressions would not be pseudo-partitive ('ten days of absence') but rather 'an absence lasting ten days.'

Biber et al. (1999: 293) note that this situation arises with plural expressions of measure with an uncountable head noun, and they point out that the choice between the form with and without an apostrophe involves a choice between genitive or common case, rather than alternative spellings of the genitive. By contrast, singular expressions of measure are regularly expressed in the genitive form, with an apostrophe (e.g. *an hour's discussion*), and in expressions with a countable head noun the modifying noun is usually in the singular (e.g. *a two-week period*).

Payne and Huddleston (2002: 470) analyse these cases as 'attributive' genitives, since they can be preceded by determiner and occupy attributive position, as shown in (4).

(4) *this [hour's delay], a second [one hour's delay]*

Payne and Huddleston observe, however, that in other cases the genitive can occupy determiner position, as shown in (5), though *an hour's delay* would still be interpreted as 'delay of one hour' according to these authors.

(5) *[an hour's] delay, [one week's] holiday*

Contrasting with Payne and Huddleston's analysis, Bauer, Lieber and Plag (2013: 143) consider these cases as semantically partitive, even though Quirk et al. (1985) mention the partitive meaning as one of the meanings that cannot be expressed by the English genitive (**a sugar's lump*). Thus, *an hour's delay* is given as the s-genitive equivalent of cases like *a lump of sugar*. In this case the meaning could be described as 'an hour of delay', where the two nouns appear to be in the wrong order (**a delay`s hour*).

In short, there seems to be some controversy as regards the analysis of the measure genitive. Most authors analyse it as a modifier (similar to descriptive genitives). More rarely, it is regarded as a partitive and thus probably a kind of determiner genitive.

The origin of the construction with an apparently plural measure noun and no apostrophe is unclear. At first sight, one might think that it arose through omission of the apostrophe, as a kind of typo, as an example of the current trend to drop the Saxon genitive in associative rather than possessive structures. However, on closer exploration it turns out that it might have been historically older, or, at least. more frequent than cases with apostrophe. This is shown in Figure 1, which shows three examples where the use of different constructions is compared using N-gram viewer.

Indeed, use of the apostrophe in these expressions became standard only in the 19th century. Furthermore, the lack of the apostrophe cannot be regarded as occasional or exceptional, as the frequency of cases with and without it is comparable nowadays. Further research would be required to draw any conclusions on the diachrony of the different expressions, which is beyond the scope of this paper. In any case, in their descriptive study of the time-measurement construction, Bell and Portero (2019) conclude that the different forms found are alternative realizations of the same construction. The authors identify a number of properties that time-measurement expressions (with or without apostrophe) exhibit and that are not derived from the genitive construction, so that these expressions instantiate a construction of their own. In the present study we adopt Bell and Portero's proposal and regard apostrophic and non-apostrophic cases as orthographic variants of the same general construction.

(iii) Pseudo-partitive constructions

An alternative explanation of the emergence of this construction is that it might have arisen through omission of the preposition *of*, as it is also semantically close to pseudo-partitives. However, the non-prepositional option seems to outweigh the prepositional one when tracing back the use of these constructions as far as 1800, as shown in Figure 1.

For Lehrer (1985) both partitives and pseudo-partitives are subsumed under a wider category, which she labels 'classifiers', alongside measure phrases and complements.

Measure phrases (e.g. *a number of important objections*, where 'objections' is the head).

Pseudo-partitives (e.g. *a selection of comments, a bunch of flowers*, where 'comments' and 'flowers' are the head).

Partitives (e.g. *a number of her objections*, where 'number' is the head).
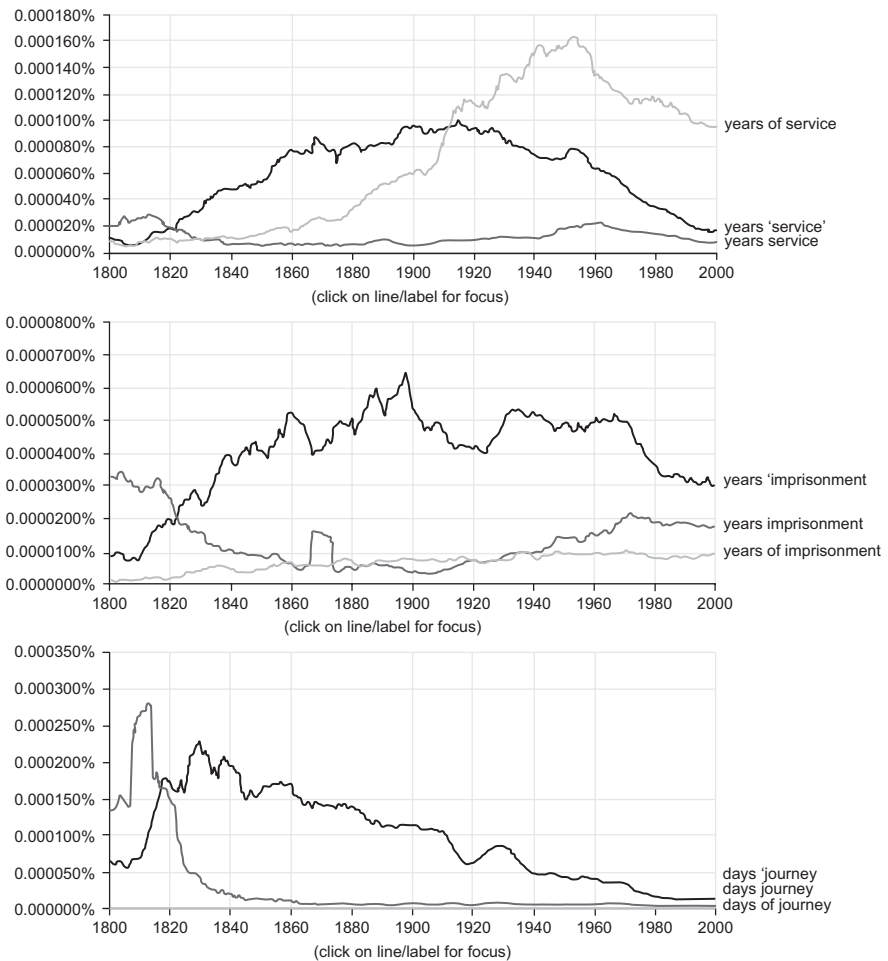
Figure 1: Diachronic use of Time-measurement expression, measure genitive and pseudo-partitives (N-gram viewer).

Semantics-wise, pseudo-partitives express a quantity of the entity denoted by the second noun, as shown in (6a), while partitives such as (6b) express a smaller quantity of the second noun taken out of a larger quantity of this noun.

(6)   a.   *A box of chocolates*
       b.   *A box of those chocolates*

In addition, the pseudo-partitive denotes a measured amount of a non-specific entity, while the partitive denotes a measured amount of a specific entity, which

is usually discourse-linked. This semantic difference is also syntactically manifest in a few important properties:

1. Partitives cannot be preceded by a definite determiner (*_The three of those cars_).
2. Partitives need a determiner before the second noun.
3. The preposition _of_ has different functions in the two constructions:

In pseudo-partitives it expresses a 'type-of' relation, specifying the type of the first noun (e.g. _a piece of chocolate_), which is similar to _a chocolate piece_. In these cases, it is not a preposition and it is regarded as a grammatical element that links the two nouns (Jackendoff 1977: 120). By contrast, in partitives, such as _a piece of the chocolate,_ it expresses a 'part-of' relation (that is, 'a piece out of the total number denoted by the second noun').

Pseudo-partitives, for their part, do not constitute a homogeneous category, as they subsume different subsets. Keizer (2007: 109) gives a typology (drawing on Vos 1999), which is based on the different function of the first noun:

Quantifier-noun constructions:	_a number of people_
Measure-noun constructions:	_a pint of beer_
Container-noun constructions:	_a box of chocolates_
Part-noun constructions:	_a piece of cake_
Collection-noun constructions:	_a herd of elephants_

Keizer (2007: 113, 125, 137) does not include time nouns as a separate group. However, she does mention temporal nouns within her group of measure nouns, as can be seen in the examples in (7):

(7) After _twenty-nine years of marriage_
ten years of Mrs Thatcher has wiped out the democratically. . ..
the _15 years of civil war_

Semantically, these cases are very close to those instantiating what Bell and Portero (2019) have called 'the time-measurement construction', which I will explore in this paper. These cases are illustrated in (8).

(8) _fifteen months imprisonment_
three months maternity leave

The closeness of the time-measurement construction to pseudo-partitives is seen more clearly when looking at their distinguishing properties (Selkirk 1977,

Jackendoff 1977). More interestingly for our purposes, Keizer (drawing on Selkirk 1977), points out that the element *of* may occasionally be absent with pseudo-partitives, which confirms the view that it does not function as a preposition. One example (from Keizer 2007: 111) is given in (9).

(9)   *She bought him **a dozen (*of) daffodils***
      *She bought him **a dozen *(of) those daffodils***

In contrast to partitives, pseudo-partitives allow the omission of the preposition, in which case they resemble the time-measurement construction illustrated in (8).

Keizer (2007: 149–151) proposes three different analyses for pseudo-partitives. In the preferred analysis pseudo-partitives are regarded as purely quantifica-tional pseudo-partitive constructions, that is, as simple noun phrases. In these, the second noun is the syntactic and semantic head, and the first noun is part of a complex determiner (or quantifier). This is supported by the fact that the element *of* can "occasionally" be absent, showing that it does not function as a preposi-tion and is only a linking element. An example of these cases is (10).

(10)   *a lot of people*

However, many first nouns can also have a referential function, such as the noun *cup* in (11), in which case they are the head of the construction and the second noun functions as a complement.

(11)   *a half-filled cup of coffee*

Finally, there are hybrid pseudo-partitive constructions where the first noun functions as the syntactic head and the second noun as the semantic head. This case is illustrated in (12).

(12)   *a steaming bowl of food*

The question of which of these three types the time measurement expressions fit will be addressed in Section 3.2.2.

To sum up, the time-measurement construction can be seen as a case of gradi-ence, as it shares properties with three other constructions but it is different from, at least, two of them. Firstly, examples of the construction are formally similar to compounds (e.g. a *three-day journey*), though unlike compounds, the first noun is plural (or apparently so). Secondly, these expressions are very much like examples of the so-called genitive of measure (e.g. *three days' journey*), except for the absence

of an apostrophe. Semantically, though, the genitive of measure has not been appropriately described and is ambiguous between a modifier and a determiner (i.e. partitive) interpretation. Thirdly, they look like pseudo-partitive expressions (e.g. *ten years of marriage*), though unlike pseudo-partitive expressions, the preposition is absent (and this does not just occur occasionally). Semantically, though, there is no distinction between them. Bell and Portero (2019) conclude that these time-measurement expressions instantiate an independent construction, that is, a unit of form and meaning that is regarded as semantically pseudo-partitive (or quantifying) on the basis of a number of semantic and formal properties (e.g. collocational preferences, lack of preceding determiner, use in specific syntactic environments).

This situation can be represented by ordering the different linguistic entities along a linear scale with clearly pseudo-partitive constructions at one end (the phrasal right-hand side pole) (e.g. *three months of maternity leave*) and cases closer to noun-noun sequences or compounds (with a measure modifier and a head) at the opposite pole (e.g. *three-month maternity leave*). Right in the middle, there is a blurred area where cases that cannot be assigned to any of the two polar categories fall, including the measure genitive (e.g. *three months' maternity leave*) and non-apostrophic sequences with a first noun ending in -s (e.g. *three months maternity leave*). These constructions are a sort of 'bridge class', to use Crystal's (1967: 50) term, which partakes of the meaning or some formal properties of the constructions at both extremes.

COMPOUNDS	GENITIVE OF MEASURE TIME-MEASUREMENT CONSTRUCTION	PSEUDO-PARTITIVES

$$\longleftrightarrow$$

three-month maternity leave *three months maternity leave*	*three months' maternity leave*	*three months of maternity leave*
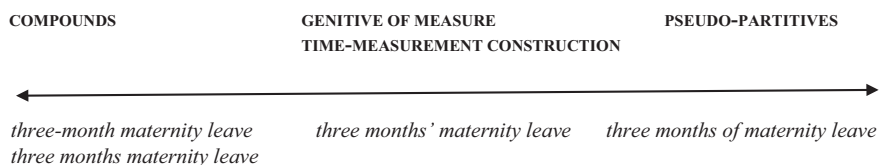
In line with Rosenbach's (2006) proposal for descriptive genitives, in this paper I want to propose an analysis for time-measurement expressions as a case of gradience, which will be regarded as the result of a mismatch in the meaning-form mapping.

2.3 The Time-measurement construction and interfaces

In Section 2.2. I have proposed to regard time-measurement expressions as a case of mismatch between form and meaning. This makes these expressions an eligible candidate to address the issue of linguistic interfaces, that is, the mapping process between different linguistic levels (see Section 3.1.3).

The mismatch that these expressions represent is bi-directional, that is, it takes place in the mapping from function to form as well as in the mapping from form to function. The former is seen in cases like *a two days journey, a two days' journey, a two-day journey,* and *a journey of two days,* where the same meaning is realized by different forms. The latter occurs when different interpretations are allowed, as in *two days journey* (or the apostrophic version), which can be interpreted as 'journey of two days' or 'two days of journey'.

The issue that I would like to address is that examples of gradience like this one pose a challenge to linguistic theory: these temporal measurement expressions instantiated by *two days journey* (and also the related so-called genitive of measure construction) illustrate a meaning-form mismatch, resulting in their ambiguous interpretation between modifier-head constructions and pseudo-partitive constructions. However, this does not mean that the different constructions cannot be differentiated from each other. Endorsing Langacker's (1987: 19) claim, "to posit a continuum is not to abandon the goal of rigorous description: we must still describe the individual structures in explicit detail, even as we articulate their parameters of gradation". A fine-grained architecture like FDG's can account for this construction so as to enable a differentiation from the borderline compound and pseudo-partitive prepositional expressions. The aim will thus be to account for these apparently fuzzy expressions from an FDG's perspective, which will be addressed in the following section.

3 A proposal within FDG

3.1 Basic notions

In this section I will provide a very brief summary of some of the relevant notions of the theory of FDG that will be made use of in the subsequent sections. For further information on this theory, the reader is referred to Hengeveld and Mackenzie (2008) and Keizer (2015).

3.1.1 FDG general architecture

A quick overview of the theory can be provided by Figure 2, which shows the following crucial elements: four components, four levels, three operations, and a number of primitives at each of the different levels.

(i) Four Components

FDG is conceived as the Grammatical Component of an overall model of verbal interaction. This Grammatical Component interacts with the Conceptual and the Contextual Components, though these two components are considered to lie outside the grammar proper (Hengeveld and Mackenzie 2008: 6–12, see also Hengeveld and Mackenzie's paper for this same volume, in which Conceptualization precedes Formulation, and is also outside the grammar like Articulation). In spite of this, the Conceptual Component is regarded as the force that sets in motion the whole process of language production, where the Speaker's communicative intention and the corresponding mental representation are devised. The Contextual Component contains situational information about extra-linguistic entities in the actual setting of the speech event, about the social relationships between the Participants and textual information about the co-text, that is, about the form and content of preceding discourse that affect the form of a linguistic expression. Finally, the grammatical information is converted into orthographic, acoustic or signed form in the Output Component.

(ii) Four Levels

One of the most important properties of the theory of FDG is the distinction of four different levels of analysis within the Grammatical Component, represented in rectangles in Figure 2 (Hengeveld and Mackenzie 2008: 4–6, 14–18). Each level consists of several layers and is hierarchically organized. FDG uses this hierarchical architecture to account for the pragmatic, semantic, and formal (morphosyntactic and phonological) aspects of linguistic expressions.

The Interpersonal Level accounts for that linguistically coded information that reflects a function in the interaction between Speaker and Addressee (Hengeveld and Mackenzie 2008: 46–127). The Representational Level deals with the semantics of a linguistic unit, that is, all the information required to designate the different entities or semantic categories playing a role in every act of verbal communication. While the function of the Interpersonal Level is evocation of entities, that of the Representational Level is designation of those entities (Hengeveld and Mackenzie 2008: 128–281). The Morphosyntactic Level takes care of the structuring aspects of linguistic units (from words to sentences), such as ordering principles (Hengeveld and Mackenzie 2008: 282–420). Finally, the Phonological Level receives information from all or any of the previous levels, takes care of those aspects of Encoding not addressed by the Morphosyntactic Level, and provides this information to the Output component (Hengeveld and Mackenzie 2008: 421–462).

(iii)   Three operations

Interactions between the different components mentioned earlier, and also within different levels, take place by means of three different operations, represented in ovals in Figure 2: Formulation, Encoding and Articulation (Hengeveld and Mackenzie 2008: 12–13). These operations involve the application of the rules of a specific language in order to construct linguistic utterances step-by-step. These interactions work in a top-down fashion, going from the highest level to the lowest one, so that pragmatics governs semantics, pragmatics and semantics govern morphosyntax, and all these three modules govern phonology.

First, the Speaker's communicative intention and mental representations at the Conceptual component are converted into language-specific pragmatic and semantic representations at the Interpersonal and the Representational Levels through the operation of Formulation. Secondly, the output of Formulation enters the Morphosyntactic Encoder, which converts these representations into morphosyntactic ones. Then, these representations are handed over to the Phonological Encoder, where they are turned into phonological representations. Finally, the grammatical information from the Grammatical component is converted into orthographic, acoustic or signed form in the Output Component by means of Articulation, though this operation takes place outside the grammar.

(iv)   Primitives

The different operations mentioned earlier make use of a number of primitives, represented in boxes in Figure 2, which can be classified in three different groups (Hengeveld and Mackenzie 2008: 19–22). First, there are structuring primitives, which include frames (at the Representational and Interpersonal Level) and templates (at the Morphosyntactic and Phonological Level). Secondly, there are units relevant at each level: Lexemes (at the Interpersonal and Representational Levels), Grammatical Morphemes (at the Morphosyntactic Level) and Suppletive forms (at the Phonological Level). In addition, there are operators, grammatical elements, at each of the different levels.

3.1.2 Semantic categories (entity types)

As mentioned in the preceding section, the Representational Level provides information on the semantic categories that are relevant in every act of communication. Drawing on Lyons' (1977: 442–447) threefold classification of entity types, Hengeveld and Mackenzie (2008: 131–132) distinguish three basic semantic categories, namely Individuals, States-of-Affairs and Propositional Content, corre-
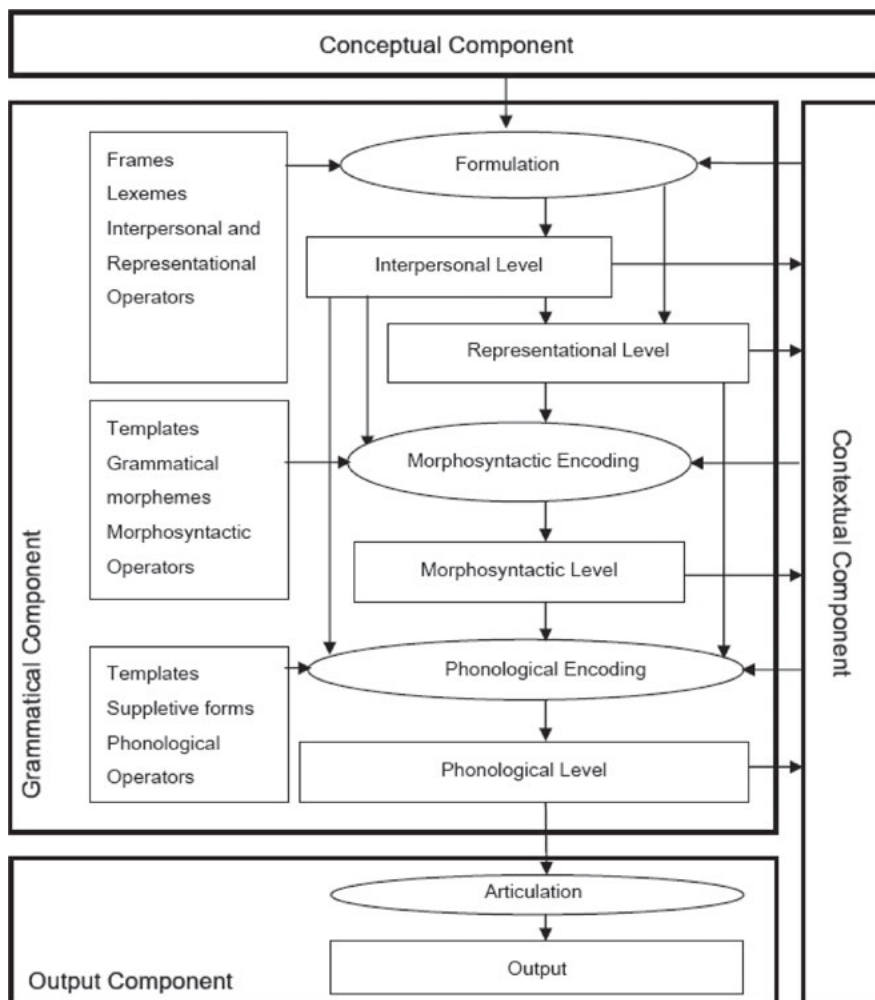
Figure 2: General layout of FDG (Hengeveld and Mackenzie 2008: 13).

sponding to Lyons' typology of first, second and third order entities, respectively (Hengeveld and Mackenzie 2008: 131).

While Individuals are physical objects that can be observed and can be said to exist, States-of-Affairs can be said to take place. Both first and second order entities can be located in space and time. However, in English reference to Individuals (Lyons' first order entities) is typically made by means of noun phrases headed by nouns like *girl, horse* or *car,* while States-of-Affairs (Lyons' second order entities) are typically referred to by means of clauses. When reference to

these entities is made by the use of noun phrases, these are headed by abstract nouns like *journey*, *arrest*, *acclimatisation* or *advertising*, which are very often nominalizations of some sort (Mackenzie 2008: 194–95).

Propositional Contents differ from Individuals and State-of-Affairs in their inability to be observed and in that they cannot be located in space or time. Therefore, they are abstract entities, mental phenomena, that cannot be said to exist or occur but can be evaluated in terms of their truth. The typical way of referring to this type of entities is by means of finite clauses. However, as in the previous cases they can also be referred to by noun phrases with noun heads like *idea*, *assumption* or *hope*.

To these basic semantic categories, Hengeveld and Mackenzie add a fourth category, the Property, which cannot be characterized by the locative or temporal dimensions and is applied to different types of entities. For example, *colour* and *intelligence* designate Properties that can be applied to Individuals, while *speed* and *duration* denote Properties applicable to State-of-Affairs.

Hengeveld and Mackenzie (2008: 135) stress that these categories are only relevant insofar as there are grammatical phenomena that are sensitive to the categories involved. For example, they show how nominalization strategies in English can be explained in terms of the entity type that is designated, as there is a clear relation between the process used to form a noun and the type of entity denoted (see Table 1).

Table 1: Derived nominal expression of basic semantic categories.

Entity type	Examples
Individual (x)	writ-er, employ-er, sing-er inhabit-ant, contest-ant
Property (f)	mean-ness, kind-ness, false-ness elastic-ity, rapid-ity, san-ity
State-of-Affairs (e)	explora-tion, deci-sion, deple-tion break-age, cover-age
Propositional content (p)	hope-$\varnothing$, wish-$\varnothing$, belief-$\varnothing$

The inclusion of Properties within FDG's typology does not suffice to account for all types of entities that are linguistically relevant, so Hengeveld and Mackenzie (2008: 132–135) have added further categories to these four basic ones, and they show different distributional criteria in a number of different languages to provide evidence for their linguistic relevance: Location and Time, Episode, Manner, Reason and Quantity. For example, in many languages there are usually specialized basic question words for Manner (how), Location (where), Time (when), Quantity (how many), and Reason (why).

More importantly for the present purposes, the introduction of a variable for quantities helps understand different cross-linguistic phenomena. One example

with a quantity expression of Scottish Gaelic from Hengeveld and Mackenzie (2008: 268–272) is given in (13):

(13) *triùir   pheathraichean*
      three.HUM   sister.GEN.PL
      'three sisters'
      A threesome of sisters
      $(x_i: (q_i: [(f_i: [(f_j: triùir_N (f_j)) (mx_i: [(f_k: piuthair_N (f_k)) (x_i)_\varphi])_{Ref}] (f_i)) (q_i)_\varphi]))$

In (13) the cardinal number *threesome* is the head and the quantified noun its modifier. Similar representations are proposed for lexical mensural classifiers (e.g. *three lumps of sugar*) and expressions with nouns like *number* or *amount,* which are typical heads of Quantity expressions that have a Configurational head in relational use (e.g. Felicity eats *a large amount of cheese* every day, where there is an internal head 'cheese'). In all these cases, the designation is an Individual, that is, what is being designated is not an abstraction but 'sisters', 'sugar' or 'cheese'. Some of these nouns can also take a State-of-Affairs as their argument, as can be seen in (14), where *volume* has a Configurational head.

(14) *the volume of traffic*
      $(q_i: [(f_i: [(f_j: volume (f_j)) (e_i: [(f_k: traffic_N (f_k)) (e_i)_\varphi])_{Ref}] (f_i)) (q_i)_\varphi])$

Designations of frequency can also be analysed as 'Quantities of time' (Hengeveld and Mackenzie 2008: 270), as shown in (15).

(15) *his rate of success* (i.e. how frequently he is successful in any time period).

Table 2 shows the complete list of semantic categories distinguished within FDG (Hengeveld and Mackenzie 2008: 136).

Table 2: Semantic categories in FDG.

Description	Variable	Example
Property	f	*Colour*
Individual	x	*Chair*
State-of-Affairs	e	*Meeting*
Propositional content	p	*Idea*
Location	l	*Top*

Table 2 (continued)

Description	Variable	Example
Time	t	*Week*
Episode	ep	*Incident*
Manner	m	*Way*
Reason	r	*Reason*
Quantity	q	*Litre*

3.1.3 Interfaces in FDG

Hengeveld and Mackenzie (this volume) point out that the mapping process between the different levels of linguistic organization (see 3.1.1.) is regulated by the operations of Formulation and Encoding, which, in their view, act as interfaces between the different levels. This mapping process is often straightforward, as can be seen in cases of transparency. For example, a Referential Act at the Interpersonal Level may correspond to an Individual at the Representational Level, to a noun phrase at the Morphosyntactic Level and to a phonological phrase at the Phonological Level. However, sometimes there is not a one-to-one relationship between layers at the different levels, and in these cases Hengeveld and Mackenzie speak of 'mismatches'.

Mismatches exist between all the different levels, that is, between the Interpersonal Level and the Representational Level, between the Interpersonal / Representational Level and the Morphosyntactic Level, as well as between the Interpersonal/ Representational/ Morphosyntactoc Level and the Phonological Level. However, it is mismatches between meaning and form, that is, between the Representational Level and the Morphosyntactic Level, that have received most attention. One of these cases, which is particularly relevant for the present study, is seen when different meanings or functions are represented with the same form, which Hengeveld and Mackenzie refer to as 'neutralization' and illustrate with the functions of Actor, Undergoer and Location in *I ran, I'm good, I'm feeling lazy*, respectively. In these three examples, three different functions show the same morphosyntactic behaviour, with no case marking, preverbal position and triggering agreement. This results in an inter-level mismatch and lack of transparency.

3.2 The Time-measurement construction in FDG: An interface challenge

3.2.1 Introduction: Fuzziness of the construction

In this section, I will provide an FDG account of the three cases that lie at the boundaries of the Time-measurement construction with the aim of showing how the theory's highly detailed architecture can adequately draw a distinction between them so as to avoid the interface mismatch triggered by these expressions.

(i)   Compounds

As mentioned earlier, expressions like *three years imprisonment* are very close to compounds such as *a two-year post-graduate course, a three-day journey, a one-night stand,* or *a five-day week,* though they are formally and semantically different. The latter would be analysed as a case of composition in FDG, that is, as a compositional lexical head where two or more lexical elements together express a single concept. More specifically, they would be regarded as endocentric compounds, which consist of a head (the right-hand component), corresponding to the entity designated, and a modifier, which specifies an additional property of this entity. This type of compounds are represented as shown in (16) (Hengeveld and Mackenzie 2008: 425, Keizer 2015: 244–245).

(16) $(f_1: (f_2: \blacklozenge (f_2): (f_3: \blacklozenge (f_3)) (f_2)) (f_1))^2$

In (16) the property (f_3) is a modifier of the property (f_2), and the head of (f_2) is the head of the compound.

A compound like *one-night stand* would be represented as shown in (17), where 'one' (1) designates a Quantity (q_1) of the temporal entity (t_1) 'night' that modifies the lexical property (f_1), restricted by the lexeme *stand*. The compound designates a State-of-Affairs with the lexical head *stand*:

(17) $(e_1: [(f_1: stand_N (f_1)): (1q_1: [(t_1: night (t_1))] (q_1)) (f_1)] (e_1))$

Compounding takes place at the interface between the Representational and Morphosyntactic Levels, as two lexemes are put together in a sequence at the Representational Level and become one Word at the Morphosyntactic Level. In this case, plural inflection of the first lexeme is not added to the first noun at the

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2 In the theory of FDG the symbol ♦ is used to represent lexemes.

Morphosyntactic Level, since it is preceded by the numeral *one,* but it would not have been added with other numerals either (e.g. *a five-day week,* 'a week having five working days'), indicating its compound nature. In addition, a hyphen might be later inserted during Articulation (see Section 3.1.1).

(ii)   Genitive of measure

Following the morphological tradition, the genitive of measure would be represented as a phrase with a sort of possessive premodifier in FDG. Possession is a very wide notion that subsumes different semantic relations that are, however, coded, in the same way, so that they are all given the same representation. This might be considered as a case of neutralization of semantic functions, that is, as an example of mismatch between the Representational and the Morphosyntactic Levels (see Hengeveld and Mackenzie, this volume).

Hengeveld and Mackenzie (2008: 243) use the semantic function Ass(ociative) rather than Poss(essor) in cases of alienable possession, which are analysed as modifiers, as example (18) shows. By contrast, they use the semantic function Ref(erence) in cases of inalienable possession (e.g. *the teacher's arm*), where possessors are regarded as internal arguments.

(18)   *the teacher's dog*
$(1x_i: [(f_i: dog_N (f_i)) (x_i)_\varphi]: [(f_j: (1x_j: [(f_k: teacher_N (f_k)) (x_j)_\varphi])_{Ass} (f_j)) (x_i)_\varphi])$

In (18) the modifier is analysed as a property (f_j) consisting of an individual (x_j) and is assigned the semantic function Associative. The genitive of measure in (19) would *a priori* be represented as a case of alienable possession. The difference is that in this case the lexical head is not an Individual but it designates a State-of-Affairs (e_i) and the modifier temporal entity designates a quantity (q_i).

(19)   *three hours' delay*
$(1e_1: [(f_1: delay_N (f_1)) (e_1)_\varphi]: [(f_2: (3q_1: [(t_1: hour_N (t_1)) (q_1)_\varphi])_{Ass} (f_2)) (e_1)_\varphi])$

It should be noted, however, that (18) would be the canonical representation in FDG to the date, where genitives of measure are interpreted in the way in which they have been analysed by the linguistic tradition, that is, as modifier-head structures semantically similar to compounds (meaning 'delay of three hours').

However, in their study on time measurement expressions like that in (19), Bell and Portero (2019) show that canonical examples of the so-called genitive of measure (with apostrophe) appear to be orthographic variants of time-measurement expressions, which, in their view, are semantically different from genitive expressions, that is, those in which the temporal noun modifies the second noun.

Bell and Portero (2019) explore the presence of some formal properties that expressions with and without the apostrophe share, as compared to compounds. Among these properties, they study the use of the indefinite article in time-measurement and compound constructions. Examples of the compound construction exhibit a significant use of the indefinite article, which determines the second noun, that is, the head. This property is nevertheless not big news, as it is expected from the countable nature of the second noun, which has already been accounted for by some scholars (Biber et al. 1999: 293, Payne and Huddleston 2002: 470). By contrast, the use of the indefinite article is shown to be very scarce in the Time-measurement construction (with or without apostrophe).

More importantly, the meaning of the construction can be different when preceded by a determiner. This is shown in the examples in (20), where 'three hour' acts as a modifier of 'drive' in a, while it is the head of the expression in b, as it denotes the distance to Willowvale. The apostrophic example in c behaves like b in expressing a specific temporal quantity.

(20) a. *in my entire life. MORRISON: (Voiceover) Debbie was praying too on **that three hour drive** to Chico, praying and trying to understand what had happened to her son* (BNC)
      b. *am an am a Gcaleka Xhosa-speaker and grew up in rural areas around Willowvale approximately **three hours drive** northeast along the coast from East London towards Durban.* (BNC)
      c. *So the third man goes I want **ten years' supply** of cigarettes.* (BNC)

In other words, it might be said that when the second noun takes a singularizing determiner the partitive meaning is cancelled, while it is an option when no determiner appears. For example, while *a six months subscription* should be interpreted as 'a subscription lasting six months', *six months subscription* could also mean 'six months being subscribed.'

Bell and Portero (2019) also explore the use of other determiners. As regards the use of quantifiers, the quantifier 'many' in the example in (21) determines the first noun, as it requires plural concord. The occurrence of these cases shows that the temporal expression is a noun phrase in its own right as it takes its own determiners. In addition, this can be taken as evidence that the first noun is being used referentially and is the head of the construction (see Section 3.2.2).

(21) *How **many years' experience** did the crew have?* (COCA)

What the previous observations imply is that, if it is true that expressions with an apostrophe (that is, so-called genitives of measure) are similar to those without

it, and if the meaning of these expressions is not, or not in all cases, genitive, the apostrophe does not mark an Associative function, as it does in other genitive cases expressing alienable possession. At least, it does not do so in all cases or unambiguously (see Bell and Portero, 2019). This results in a mismatch from function (two or more functions, namely Associative and a sort of Pseudo-partitive) to form (one form). From an FDG's perspective, this would be a case of mismatch in the mapping from the Representational to the Morphosyntactic Level, where a word order similar to modifier-head expressions is assigned, or between the Representational Level and Articulation, where an apostrophe is added.

(iii) Pseudo-partitives

As pointed out earlier, the time-measurement expressions addressed in this paper are semantically similar to pseudo-partitives (e.g. *ten years of marriage*), in spite of their different formal realization.

Hengeveld and Mackenzie (2008: 270) analyse similar cases as expressions with a Configurational head in which the second noun is assigned the function of Reference (Ref), and they represent them as shown in (22).

(22)   *the volume of traffic*
      $(q_i: [(f_i: [(f_j: volume_N (f_j)) (e_i: [(f_k: traffic_N (f_k)) (e_i)_\varphi])_{Ref}] (f_i)) (q_i)_\varphi])$

This could be regarded as an example of mismatch in the mapping from the Representational Level to the Morphosyntactic Level, as the same meaning captured in the previous representation can be realized by means of different forms at the Morphosyntactic Level, where the preposition *of* is inserted in some but not all cases.

Keizer (2007) does not provide an account of pseudo-partitives within the theory of FDG, but she does so for partitive constructions (Keizer 2017). She proposes a Predication Frame, that is, a primitive of the Representational Level (see Section 3.1.1) to account for the formation of English partitives. She calls this the 'Subset-set Partitive Predication Frame', which can be represented as shown in (23) (Keizer 2017: 32).

(23)   Subset-set Partitive Frame:
      $(\pi\ ^s x_1: [(f_1) (\pi\ ^s x_2: (f_1: \blacklozenge))_{Ref}])$
      Where the set symbolized by x_1 may be a singleton set or a plural set and the set symbolized by x_2 must be a plural set

      the set symbolized by x_1 must contain fewer entities than (or an equal number of entities as) the set symbolized by x_2

A similar Frame could be proposed for the specific case explored in this paper. This will be the topic of the following section.

3.2.2 The Time-measurement construction: An FDG proposal

In Section 2.2 it was argued that expressions instantiating the Time-measurement construction are different from compounds in that the temporal element is not a modifier of the second noun, so that they cannot be regarded as a Word at the Morphosyntactic Level. The analysis of these cases as phrases (that is, as a pseudo-partitive or a genitive of measure) also fails to account for the lack of any formal marking at the Morphosyntactic Level (that is, neither preposition *of* nor apostrophe in some cases). Yet, semantics-wise, these expressions appear to favour a pseudo-partitive interpretation.

According to Feist (2012: 279), the choice of the 's genitive or the prepositional construction would be a matter of construal.

> How the speaker construes entities can be crucial. That is so quite often. In #*the work of 43 days*, the genitive is descriptive and has content, so it fits modifying use. But it is not a good candidate for determiner function, since it is not deictic, or an abstract quantifier such as much. However, *43 days can be construed as an individuated unit of quantity*, and thereby as quantifying the work; in that construal it is acceptable as a determiner genitive: *43 days' work* (cf. much work).   (emphasis added)

It should be noted that different interpretations are also possible even when there is no formal differentiation. Thus, in the case of pseudo-partitives, Keizer (2007: 151) concludes that the categorization of N1-of-N2 constructions is not straightforward and that the classification of authentic examples is not always easy, as a construction can be subjected to different interpretations depending on how the discourse participant conceptualizes an entity. For example, *a cup of coffee* can, in her view, be interpreted as a certain amount of coffee, in which case the construction would be analysed as right-headed. Alternatively, it could be interpreted as a concrete object containing some fluid, in which case it would be left-headed. Keizer (2007: 151) observes that these cases might result from the blending of two different conceptual domains (containment and quantification) in the mind of the language user, so that the construction would be located mid-way between two different categories.

In this paper, I will endorse Feist's observation on the genitive of measure. Drawing on Feist (2012: 279) the first time-denoting noun can be regarded as being construed as 'an individuated unit of quantity' and therefore as quantifying the entity denoted by the second noun. The use of the structure Num+plural-

N1(time)+N2 will be regarded as the morphosyntactic expression of a different construal of an entity, where a specific time quantity is evoked. The construction under study is not an exception to the ambiguity that the genitive of measure and pseudo-partitive expressions are subjected to. However, FDG's complex architecture allows a more fine-grained representation of the meaning of the construction by means of the use of its layered structure, an improved semantic typology of entities and different types of primitives at each of the different levels (see Section 3.1.1).

(i)   The Interpersonal Level
The use of an expression like *two hours journey* in or *four days' journeying* in (24) is, first of all, a strategic choice made by the speaker to single out an entity that will play a role in the message he/she wants to communicate, specifically a temporal quantity.

(24)   a.   *Holland is a small country with an excellent motorway system, in fact most areas of interest are within **two hours journey** from Amsterdam.* (BNC)
       b.   *Only on the very clearest days, when the air was like the purest well-water, shadowy blots appeared to the west and north to show where the forest came to an end at hills, mountains; but they were a world away, two, three, **four days' journeying**; if one dared.*

The representation in (25) captures the fact that the evocation of this entity is made by an Act of Reference, whose head typically consists of one or more Ascriptive Acts (T), reflecting the speaker's attempt to evoke a property. In *four days journeying*, for instance, the phrase as a whole constitutes a Referential Act (R_1) with two Ascriptive Acts $(T_1$ and $T_2)$: one evoking the property 'day', and one evoking the property 'journey'.

(25)   IL: $(-id\ R_1:\ [(T_1)\ (T_2)]\ (R_1))$

What this means is that these time-measurement expressions move the reference backwards, that is, that the actual entity referred to is on the left-hand side, a specific amount of time. The second noun corresponds to an act of Ascription, that is, a Property assigned to the head of the Referential Subact. This contrasts with the pragmatic status of the temporal unit in compounds like *a one-night stand,* where 'one night' is not referential.

(ii)   The Representational Level
Moving on to the semantic characterization of the construction, we should first analyse what type of entity is evoked. In this case, the Speaker singles out an individuated quantity unit, more specifically, a temporal one. This should be easily accommodated within the theory, as Hengeveld and Mackenzie (2008: 135–136) include Quantity (q) in their list of semantic categories that are grammatically relevant (see Section 3.1.2).

In Section 3.1.2 it was mentioned that 'designations of frequency can be analysed as Quantities of time' (Hengeveld and Mackenzie 2008: 270), as shown in (26).

(26)   *his rate of success* (i.e. how frequently he is successful in any time period).

Likewise, designations of periods of time of different length (e.g. *hour, day, week, month, year*) can be regarded as time quantities. Therefore, I suggest that the entity Quantity is also an appropriate unit to account for the time-measurement construction and that similar representations to those proposed by Hengeveld and Mackenzie (2008: 268–72) might be proposed to account for it. Thus, tentatively the expression *four days journeying* could be represented as shown in (27).

(27) $(4q_1: [f_1: [(t_1: day_N (t_1)) (f_1)): (e_i: [(f_2: journey_N (f_2)) (e_i)])_{Ass}](f_1)(q_1)])$

This representation shows that at the Representational Level, the construction as a whole is analysed as a Quantity (q_1) designating a plural period of time (indicated by the operator '4'). This Quantity has a configurational head (f_1) consisting of a temporal entity (t_1) 'day', and its modifier, which is assigned the lexical property (f_2) 'journey', designates a State-of-Affairs (e_1), and has the semantic function Ass(ociative).[3] However, in Section 3.2.1 it was pointed out that these expressions differ from genitives semantically. This semantic representation would trigger a word order corresponding to modifier-head structures at the Morphosyntactic Level, as well as possibly the insertion of an apostrophe ('*two days' journeying*') during Formulation, so it fails to account for the fact that the meaning of these expressions is pseudo-partitive.

Likewise, a representation like that in (22) would fail to account for the lack of insertion of the preposition 'of' at the Morphosyntactic Level.

The fact that reference is made to a different type of entity in these expressions, a temporal quantity, is shown by the possibility of singular concord with

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3 Notice, however, that Hengeveld and Mackenzie (2008: 270–271) assign the Reference function to the second noun in quantity expressions like 'the volume of traffic' or twelve large sacks of cement'.

the verb with time measure expressions, as can be seen in the example in (28) (from Huddleston and Pullum 2005: 89):

(28)   *Ten days **is** a long time to be on your own*

The form of the temporal expression *ten days* is plural. However, it denotes a quantity or measure that is conceptualized as a single abstract entity, 'a single block of time' (Huddleston and Pullum 2005: 89). Similar examples are found with time-measurement expressions, as can be seen in (29).

(29)   a.   *two hours play **was** lost during the morning session and Wales were finally set a target 228 runs in 127 minutes plus 20 overs.* (BNC)[4]
       b.   *Because of the caves' varying depths, 25 minutes decompression **was** required before removing the two front mounted cylinders*, [. . .](BNC)
       c.   *In some countries four years training **is** the norm;* (BNC)

Further evidence for this singular conceptualization is provided by the possibility of these quantity nouns to occur with a singularizing determiner, as shown in the examples in (30).

(30)   a.   ***That ten days** we spent together in Paris was wonderful.* (Huddleston and Pullum 2005: 89). (BNC)
       b.   *It ended up being **a** great three days music and two weeks later, I was with The Waterboys.* (BNC)
       c.   *We can only guess whether inter-racial bickering – or even rows over bad food! – might explain such **a** bizarre two days' events.* (BNC)

In addition, the existence of cases like (31) shows that these time-measurement expressions designate a quantity of whatever (second order) entity is denoted by the second noun. Thus, in (31) the time measurement expressions 'three months rental' and 'six weeks leave' are part of a noun phrase headed by the relational nouns 'period' and 'maximum', requiring the specification of a quantity.

(31)   a.   *as far as I can gather, I don't know, I'd imagine where a line has **a minimum period of three months rental**.* (BNC)
       b.   *This can increase to **a maximum of six weeks leave**, depending on your length of service and grade.* (BNC)

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4 British National Corpus.

The meaning in all these examples is that the duration of a period of time for rental or leave is the quantity of time referred to by the time measurement expression, that is, 'the minimum period of rental is three months' or 'the maximum (duration) of leave is six weeks.'

Finally, examples like that in (32) further support the analysis of the designation of the first noun as a time Quantity.

(32)   *Ten minutes drive **later**, we finally found the field he had noticed.* (BNC)

FDG's typology of linguistically relevant semantic categories is therefore crucial for the description of this construction. This typology is also highly relevant because the construction appears to be restricted to -or, at least, it shows a marked preference for States-of-Affairs, that is, second order entities, as heads of the modifier second noun (Bell and Portero, 2019). This can be easily explained by the fact that the temporal dimension is an intrinsic semantic property of these nouns, so that, when they need to be measured, they can be quantified in terms of a time quantity. Similarly to pseudo-partitives, and in contrast to proper partitive constructions, the two nouns in time-measurement expressions do not share the same denotation. Thus, the first noun does not refer to a smaller amount of the entity denoted by the second noun, but to a quantity of a time entity in terms of which the entity denoted by the second noun can be measured.

In addition, Biber et al. (1999: 293) note that that the time measure expression is typically plural, and the second slot is occupied by an uncountable noun. In Bell and Portero (2019), it is shown that what this noun usually designates is a second order entity, rather than an uncountable noun, as already mentioned. An additional property is that this noun does not take any determiners, as shown in (33a). By contrast, the presence of an indefinite article and a singular countable noun in the second slot triggers the singular of the time measure expression and a different interpretation of the sequence, as can be seen in (33b).

(33)   a.   *About **20 minutes flight** from Papeete (the capital of Tahiti) is the famous [private atoll of Marlon Brando] Tetiaroa, perhaps the most photogenic of the populated islands.* (BNC)
            '20 minutes of flight' (how far is Tetiora?)
       b.   *It was **a two-hour flight** that Mother's Day evening and Gary Eastburn spent every second of it worrying about what had happened to his family.* (COCA)
            'a flight lasting 2 hours' (how long is the flight?)

A different issue is to determine the headedness of these expressions. My preferred analysis is to regard the temporal noun as the head of a time quantity expres-

sion and the second noun as its modifier. By looking at some examples from the corpus some evidence can be found to support this analysis. For example, the construction is notoriously frequent in temporal/durative phrases like that in (34), requiring a time noun as head:

(34) *On each occasion the band played **for more than 10 hours continuous dancing***. (BNC)

In (34) the verb 'played' is modified by a prepositional phrase that denotes duration. The head of this phrase is the temporal noun 'hours', which is then modified by 'continuous dancing' ('played for more than ten hours', NOT 'played for continuous dancing of more than 10 hours'). Similar cases are given in (35), where the time expressions ('five minutes or less', 'two hours per week' and 'about three and two hours respectively') are interrupted by their modifier.

(35) a. *within **five minutes** level walk or less of the shops, licensed bars, [...] **two hours** voluntary service **per week***.
      b. *Procedures a) and b) will require **about three and two hours** elapsed time **respectively***.

In (36) the verb 'save' (in the meaning 'to prevent time, money, or effort being wasted or spent') requires a temporal noun that functions as the head of the verb's argument.

(36) *A further advantage is that the amateur can also **save** 20 years practice*. (BNC)

Likewise, in (37) it is clear that 'the first of seven days' does not modify 'weather' (*the first of bad weather of seven days, *bad weather of the first of seven days) but specifies a quantity and is the (complex) head of the expression.

(37) *We were caught on our last night at Dhundi by **the first of seven days bad weather***. (BNC)

Notice that nouns in the second slot are not required by the meaning of the temporal nouns, as the latter are not relational. That is, while in expressions like *an amount of cheese, a period of three months* there must be an amount of something or a period of a specified duration, in *three months leave* the head noun does not require an argument in the same way.

Further evidence for the analysis of the second noun as a modifier of the temporal noun is that time-measurement expressions are often found as part of a larger structure in which the second noun can be omitted, as shown earlier in (31).

Keizer (2017) makes a similar observation as regards partitive constructions like *one of the boys* and concludes that the argument is required by the construction as a whole, not by the semantics of the head, so she proposes a Predication Frame (a primitive of the RL) to account for the formation of English partitives, as mentioned in 3.2.1. Drawing on Keizer's (2017) proposal for a number of frames to capture different types of partitive expressions, a similar frame like that in (38) could be proposed to account for the time-measurement expressions instantiated by *three months leave, two hours journey* and the like.

(38)   The Time-measurement frame
$(mq_i: [(f_i: [+time]) (e_i: (f_j: \blacklozenge))])$,
where the entity symbolized by q_1 must be a plural quantity (m), headed by a lexical property (f_i) denoting time and
the entity symbolized by e_1 must be a State-of-Affairs, headed by a lexical property (f_j). In this case there is no slot available for operators.

The combination of these pragmatic and semantic properties (reference to a specific time quantity by the first noun, designation of a second order entity by the second noun, -s final mark of the first noun and non-referentiality of the second noun) triggers a specific mapping at the Morphosyntactic Level.

(iii)   The Morphosyntactic Level
The Morphosyntactic Level captures the actual form of the construction. Two formal properties of the construction deserve closer inspection: the apparent plurality of the first noun and the absence of the preposition *of*.
a.   Plural N1
English morphology does not allow plural inflection in the first component of compounds. Even though some exceptions are found (Bauer 2017: 140–148), this property supports the analysis of these constructions as a unit different from compounds. This 'non-compound' analysis is nevertheless challenged by the absence of any formal marking (that is, no preposition and no apostrophe) between the two nouns, which results in compound-like expressions.
b.   Omission of the preposition. The function of *of*
When drawing a distinction between partitives and pseudo-partitives, Keizer (2007: 111, 149) refers to Selkirk's (1977) observation that the preposition *of* can sometimes be omitted in pseudo-partitives, as shown in example (9), repeated here for convenience.

(9) a. *She bought him a dozen (*of) daffodils.*
    b. *She bought him a dozen *(of) those daffodils.*

In Keizer's view this seems to suggest that in pseudo-partitives the element 'of' does not form a constituent with the following noun. According to her, this could be used as evidence for the analysis of *of* as a separate linking element, required by complex quantifiers consisting of a determiner and a noun when followed by another noun to follow the prototypical pattern of head-complement constructions.

However, if the element *of* is a kind of marker of a head-complement construction, this poses the question of what type of unit the (preposition-less) Time-measurement construction is or, at least, how can the second noun be best analysed. The reason why omission of *of* is not occasional in our construction but a defining formal property might be that these expressions do not instantiate head-complement constructions. The semantic function of the argument in partitives is represented by Ref(erence) in FDG, which unlike the argument of verbal (derived) predicates, must be introduced by a linking element, which is usually, though not necessarily, the preposition *of*. By contrast, the function Associative is used for possession and is assigned to modifiers (such as *the women's* bicycle). Hence, this was the function assigned to the second noun in the provisional semantic representation in (27). However, Keizer (2017: 32, n16) notes that the semantic relation that partitives express is different: 'it might be argued that yet another semantic function is needed to trigger partitive-*of*, since it codes a different semantic relation.' This might explain why the preposition is omitted in time-measurement expressions, where a different function or no function at all seems to be expressed.

Previous accounts of the element *of* appear to provide some kind of explanation to its omission. Jackendoff (1977: 120) analysed it as a purely grammatical element linking the two nouns (e.g. [NP [NP a bunch] [of] [N' men]]). Jackendoff's analysis appears to be the best option to account for the function of the preposition, as the lack of semantic content/ lexical function added by it makes it unnecessary.

At the Morphosyntactic Level, the Time-measurement construction can be represented as shown in (39), that is, a Noun Phrase (Np$_1$, corresponding to R$_1$ and q$_1$) which has a Nominal Word, Nw$_1$ (*day* in this case) as its head and a slot to accommodate any operators, such as determiners, especially numerals (like *four* in (39)) and, optionally, definite articles and possessives). Subsequently, there is a second Nominal Word corresponding to e$_1$. However, this second noun does not correspond to R at the Interpersonal Level, as is shown by the fact that no determiners precede it (note that when this second noun takes a determiner the partitive interpretation is cancelled, as in *a four-day journey/ that four-day*

journey/ my four-day journey, meaning 'journey lasting four days'). Finally, the absence of a semantic function does not trigger the insertion of preposition *of* as a constructional property, that is, a property triggered by the specific semantic frame accounting for these expressions.

(39)   ML: (Np$_1$: [(Gw$_1$: four) (Nw$_1$: day-PL) (Nw$_2$: journey)])

4 Conclusion

In this paper I have tried to show the adequacy of the theory of FDG to account for a case of gradience instantiated by a specific Time-measurement construction. More specifically, the construction explored in this paper has been shown to be an example of lack of transparency in English (Hengeveld 2011) and as a relevant case in a study of linguistic interfaces.

The fuzziness of this construction results from sharing properties with two or three other constructions, not being a good example of any of them. Thus, expressions like *three months maternity leave* appear to have the same meaning as the related pseudo-partitive expressions with a postmodifier (e.g. *three months of maternity leave*). However, these two pseudo-partitive expressions are different at the Morphosyntactic Level, as their morphosyntactic form is different. In the case of *three months of maternity leave,* the entity to which the measure expression is related takes the form of an Adpositional Phrase introduced by *of,* which encodes the representational meaning successfully, resulting in a clear interpretation. By contrast, no formal mark of the relation between the two nouns 'month' and 'leave' appears in cases like *three months maternity leave.* The failure in the representational-morphosyntactic mapping brings about semantic fuzziness, so that these expressions have been usually analysed as a modifier-head unit, that is, compound-like.

Lying at the boundary between compounds and phrases, this time measurement construction is a good example of the interface between what are usually regarded as different linguistic modules in the linguistic tradition, specifically, the morphology-syntax interface. From an FDG's perspective, it illustrates a mismatch between semantics and formal expression, that is, between the Representational and Morphosyntactic Levels, as the form of these expressions does not code their meaning in the expected way. While examples of gradience like this one pose a challenge to linguistic theories, an account of these apparently fuzzy expressions from an FDG's perspective can benefit from the enriched architecture of the theory.

Firstly, examples of the Time-measurement construction have been differentiated from compounds. Thus, the compounds *a one-night stand* or *a three-year course* ('a course lasting three years') have been represented as shown in (40).

(40)   RL: $(e_1: [(f_1: stand_N (f_1)): (1q_1: [(t_1: night_N(t_1))] (q_1)) (f_1))] (e_1))$

This representation shows that the time expression 'night' (t_1) modifies the property f_1, which is the head of the expression and designates a State-of-Affairs (e_1).

By contrast, in the pseudo-partitive expression in (41), the time expression is not a modifier. Instead, it is the head of the expression and the quantified noun can be analysed as an internal argument with a Reference function (see Hengeveld and Mackenzie 2008: 270).

(41)   *three years of experience*
       RL: $(3q_1: [(f_i: [(f_j: year_N (f_j)) (e_1: [(f_k: experience_N (f_k)) (e_1)])]_{Ref}] (f_i)) (t_i)])$

Finally, the difference in the formal expression of the time-measurement construction, which is also semantically pseudo-partitive, has been accounted for by proposing a specific frame at the Representational Level, similar to the frames proposed by Keizer (2017) for partitive expressions. This frame contains a number of semantic properties (for example, the presence of a plural time quantity in the first slot and a non-specific second order entity in the second, as proposed by Bell and Portero (2019), that trigger a distinctive preposition-less expression at the Morphosyntactic Level.

By means of the architecture of the theory of FDG the distinctions between the different cases can be accounted for adequately at the different levels of linguistic representation. The interface issue triggered by the mismatch in the meaning-form mapping of the different related expressions is successfully avoided by making fine-grained distinctions at the Representational Level.

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Inter-level mismatches in English coordinated partitives

Abstract: This chapter provides a Functional Discourse Grammar (FDG) analysis of various kinds of co-denotational partitive constructions (e.g. *one of the boys*, *some of them* and *one of the boys and girls*), concentrating on the interfaces between their interpersonal, representational and morphosyntactic structures. Using data from two corpora – the British National Corpus (BUY-BNC) and the Corpus of Contemporary American English (COCA), the paper sets out to account for the "elliptical" nature of partitive constructions in general, before moving on to the additional mismatches found in different kinds of partitives with coordinated embedded NPs (e.g. *one of the owners and the players*; *one of the founders and owners*; *one of the boys and girls*). It is demonstrated that the distinctive features of the FDG model (its top-down organization, its function-to-form approach and its four independent levels of analysis) allow us to identify and capture the mismatches involved in the use of these constructions. Furthermore, it is argued that, although the presence of several mismatches in partitive constructions with coordinated embedded NPs may make them less transparent, this is compensated for by the fact that these mismatches serve a communicative purpose, and as such are only allowed under specific, clearly identifiable circumstances.

Keywords: partitive constructions, coordination, interfaces, mismatches, Functional Discourse Grammar

1 Introduction

Any linguistic theory distinguishing different levels of analysis needs to discuss the nature of the relation between these levels, irrespective of the type of theory in question (modular or non-modular, directional or non-directional, formal or

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functional). Much of the research on this topic has been directed at the interfaces between three major components: semantics, syntax and phonology.[1] In addition, some authors (e.g. Sadock 2012) have concentrated on the relation between the various linguistic components, while others have also explored the cognitive processes involved in language production and perception (e.g. Jackendoff 2002, 2006, 2007, 2010). Pragmatics, on the other hand, is seldom mentioned as a separate component in this respect, and, if its role is recognized at all, it tends to become part of the syntax-semantics or phonology-semantics interface, attention being confined to aspects of information structure (Topic and Focus; e.g. Van Valin and LaPolla 1997: 623–624; Jackendoff 2002: 273; Rizzi 1997, 2004; Kuhn 2007). Moreover, the general assumption seems to be that theories that are modular (recognizing independent modules of representation) are by nature non-directional (with mapping between levels applying in both directions) (e.g. Jackendoff 2002: 197–200; Sadock 2012; Contreras-García 2013, 2015; García Velasco 2017).

FDG differs from other models in that it is characterized by a unique combination of features (see also Contreras-García 2013, 2015; García Velasco 2017):

– FDG recognizes a separate level for the representation of the pragmatic aspects of a linguistic utterance (i.e. discourse-pragmatic, discourse-organizational and rhetorical aspects), interacting with (complementing) a semantic level of representation.

– FDG is directional in nature, taking a top-down, function-to-form approach (Hengeveld and Mackenzie 2008: 38–39; Ten Wolde and Keizer 2016: 141; García Velasco 2017: 14), in which pragmatics governs semantics, and pragmatics and semantics together govern morphosyntax and phonology (Hengeveld and Mackenzie 2008: 13); at the same time, as argued by García Velasco (2017: 13–14), FDG is modular in the sense of Sadock (2012), in recognizing four independent levels of analysis, dealing with pragmatics, semantics, morphosyntax and phonology, respectively.

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1 As, for instance, in Generative Grammar (e.g. Chomsky and Lasnik 1977; Chomsky 1981; Chomsky 1993; Halle and Marantz 1993; Boeckx and Uriagereka 2007); formal semantics (e.g. Potts 2005, 2007; Higginbotham 2007; Büring 2007), Lexical-Functional Grammar and Head-driven Phrase Structure Grammar (see Kuhn 2007), Sadock's (2012) automodular grammar, Jackendoff's (1997, 2002) Parallel Architecture, as well as certain functional approaches (e.g. Role and Reference Grammar; Van Valin and LaPolla 1997; Van Valin 2005). See also Rappaport & Levin (2015) for an overview of different approaches to the relation between semantic roles and syntactic arguments.

- The operation of Formulation within the Grammatical Component receives its input from a Conceptual Component. Although this component is not itself part of the grammar, it is responsible for triggering all linguistic utterances, and to a large extent determines the form of these utterances (though not necessarily in a one-to-one relationship; e.g. Hengeveld and Mackenzie 2016: 1138).

As a result of this approach, FDG needs to consider two extra interfaces: one between the Conceptual Component and the Grammatical Component (for which Hengeveld and Mackenzie have recently suggested the term Conceptualization), and one between the Interpersonal and the Representational Levels (i.e. Representational Formulation). These two interfaces will be at the centre of the present paper, which will use various kinds of co-denotational partitive constructions (e.g. *one of the boys*, *some of them* and *one of the boys and girls*) to illustrate the advantages offered by the distinctive set of features characterizing the FDG model. Using data from two corpora – the British National Corpus (BUY-BNC; Davies 2004) and the Corpus of Contemporary American English (COCA; Davies 2008), the following questions will be addressed:

1. How can we account for the "elliptical" nature of partitive constructions? Which combination of interpersonal and representational features justifies the non-realization of the head at the Morphosyntactic Level? Which mismatches can be identified?
2. How do we analyse coordinated noun phrases? In particular, how do we deal with the fact that these involve the denotation of both the two component sets and an overall set?
3. How do we deal with the partitives with coordinated embedded noun phrases? And what is the status of their heads at the Interpersonal Level and the Representational Level?

The paper is structured as follows. In Section 2, the relevant features of FDG are discussed (its general architecture, the relation between the Conceptual and Grammatical Components, the relations between the four levels within the Grammatical Component, and the different types of heads allowed). Section 3 is devoted to a discussion of co-denotational partitives, in particular their interpersonal and representational analysis, the kinds of mismatches involved, the communicative function of these mismatches, and the ways in which they are constrained. In Section 4 this analysis is extended to partitives with different kinds of coordinated embedded NPs (*one of the owners and the players*; *one of the founders and owners*; *one of the boys and girls*). Section 5 concludes the paper.

2 Relevant features of FDG

2.1 General architecture

As a functional theory, FDG aims to capture systematic relations between the function and form of linguistic expressions; more specifically, however, it takes a "function-to-form" approach, taking as its input a speaker's communicative intentions and supplying these with a specific linguistic form. In between these two stages, we find the Grammatical Component (the FDG proper), which consists of two operations: Formulation, which takes care of all the meaningful aspects of an expression (its pragmatic and semantic properties), and Encoding, which deals with all the formal (morphosyntactic and phonological) features of an expression. In this way, "FDG takes the functional approach to language to its logical extreme", as pragmatics is taken to govern semantics, pragmatics and semantics to govern morphosyntax, and pragmatics, semantics, and morphosyntax to govern phonology (Hengeveld and Mackenzie 2008: 13). A simplified representation of the overall architecture of the model is given in Figure 1 (based on Hengeveld and Mackenzie [2008: 6, 13]):
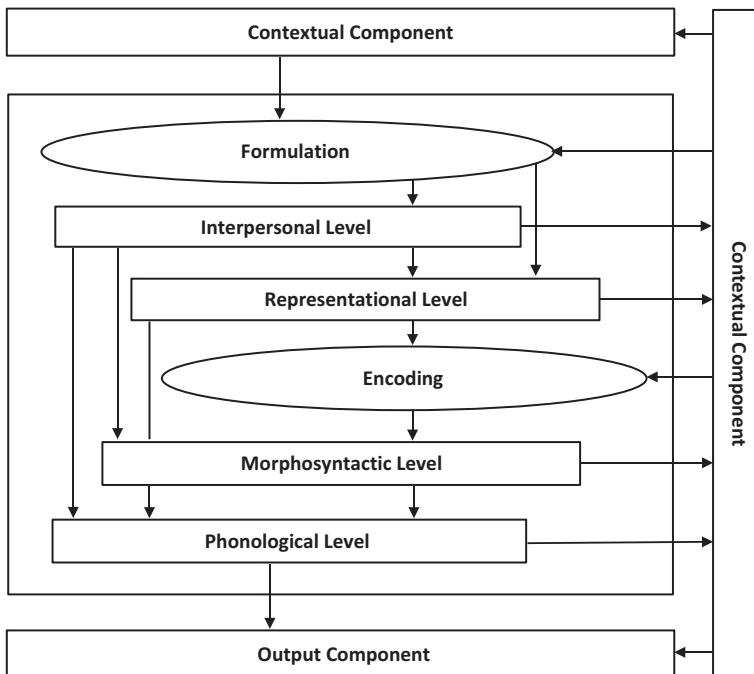
Figure 1: The overall organization of FDG.

From Figure 1 it will be clear that FDG does not model grammar in isolation; instead it conceives of the Grammatical Component as part of a "wider theory of verbal interaction" (Hengeveld and Mackenzie 2008: 1), linked to three non-linguistic components: a Conceptual Component, which contains all the prelinguistic conceptual information relevant for the production of a linguistic expression; a Contextual Component, containing non-linguistic information about the immediate discourse context that affects the form of a linguistic utterance; and an Output Component, generating spoken, signed or written expressions on the basis of information provided by the Grammatical Component (Hengeveld and Mackenzie 2008: 6).

Within the Grammatical Component, we find the two operations, Formulation and Encoding, and the ensuing four levels of analysis. The first of these, the Interpersonal Level (IL), deals with "all the formal aspects of a linguistic unit that reflect its role in the interaction between the Speaker and the Addressee" (Hengeveld and Mackenzie 2008: 46). This level represents the strategic choices made by speakers in terms of different kinds of actions. The units of analysis at this level include the Discourse Acts (characterized by an Illocution) and the Subacts of Ascription (evoking properties) and Reference (evoking entities). The Subacts make up the Communicated Content (the totality of what the speaker wishes to communicate).

The second level is the Representational Level (RL), which captures the semantic aspects of a linguistic unit, i.e. those aspects of a linguistic expression that reflect the way in which language relates to the real or imagined world it describes (Hengeveld and Mackenzie 2008: 128–129). At this level we find such units as the Propositional Contents (a mental entity, characterized by the presence of a truth value), which in turn consists of one or more Episodes, i.e. combinations of thematically coherent States-of-Affairs (coherent in showing unity or continuity of time, place and participants). Each State-of-Affairs is headed by a Configurational Property, typically made up of a Verbal Property and a number of arguments. Arguments often take the form of Individuals (concrete entities), which are headed by Nominal Properties and further restricted by adjectival Properties. Although these two levels of Formulation contain different kinds of units, default relations can be assumed to hold between units from these two levels, as illustrated in the (simplified) interpersonal and representational analyses of the sentence in (1a):

(1)   a.   *My brother married a teacher.*
      b.   IL: $(C_1: \quad [(T_1)\ (R_1)\ (R_2)]\ (C_1)]\ (A_1))$
           RL: $(p_1: (ep_1: (e_1: (f^c_1: \quad [(f^l_1)\ (x_1)\ (x_2)]\ (f^c_1))\ (e_1))\ (ep_1))\ (p_1))$

In the default case, Communicated Contents (C) at the IL tend to correspond to Propositional Contents (p) at the RL, while Subacts of Ascription (T) tend to correspond to lexical Properties (f^l) and Subacts of Reference (R) to Individuals (x). Similar default relations exist between the two Formulation levels and the two Encoding levels. Thus Discourse Acts at the IL are typically expressed as Clauses at the Morphosyntactic Level (ML) and as Intonational Phrases at the Phonological Level (PL). Similarly, Subacts of Reference (R) tend to correspond to Nominal Phrases at the ML and to Phonological Phrases at the PL, while Subacts of Ascription tend to be expressed as Verbal or Adjectival Words at the ML and Phonological Words at the PL.

Finally, the brief characterization of FDG provided in this section clearly reveals some of the major theoretical features of the model. First of all, FDG has been described as a directional (top-down) model. At the same time, however, the presence of four independent levels, each providing different kinds of linguistic information (pragmatic, semantic, morphosyntactic and phonological), can be taken to indicate that FDG is modular in nature (García Velasco 2017: 2–3, 11–15).[2] This view is supported by the fact that, although one-to-one relations are the default, mismatches between the four levels of analysis are allowed. These mismatches may occur both between the Grammatical Component and information contained in the surrounding three components, as well as between the different levels within the Grammatical Component. In what follows, the types of mismatches relevant for the present paper will be discussed in some more detail.

2.2 FDG and the Conceptual Component

As we have seen, FDG has a top-down architecture, with each linguistic expression being triggered by information contained in the Conceptual Component (CC), which "is responsible for the development of both a communicative intention relevant for the current speech event and the associated conceptualizations with respect to relevant extra-linguistic events" (Hengeveld and Mackenzie 2008: 6)

The CC is situated outside the grammar: it interacts with (provides input to) a Grammatical Component (GC) without being part of it. Hengeveld and Mackenzie (2016: 1137–1138) thus choose to take what Kecskes (2007) calls a two-level

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2 As pointed out by García Velasco (2017: 13–14), FDG does not entirely fulfil Sadock's (2012) requirement that in modular models the operation of one level does not depend on what has been (or is being) constructed at other levels. After all, in FDG specification of the encoding levels necessarily follows the operation of Formulation. FDG may, therefore, be regarded as weakly interpretative/derivational.

approach, clearly separating conceptual (extra-linguistic, cognitive) information from grammatical (intra-linguistic, semantic) representation. This, in turn, means that mismatches (many-to-many relations) between the CC and the two levels of Formulation within the GC are possible.

The fact that there need not be a one-to-one relation between the CC and the GC leads to the second question: how do we determine which conceptual information is represented in the GC? To a considerable extent this question is answered by the form-oriented nature of FDG. Thus, according to Hengeveld and Mackenzie (2008: xii, 10, 39), FDG not only takes a function-to-form approach, but is, in addition, form-oriented "in providing, for each language analysed, an account of only those interpersonal and representational phenomena which are reflected in morphosyntactic or phonological form" (Hengeveld and Mackenzie 2008: 39; see García Velasco, Hengeveld, and Mackenzie 2012: 49; Keizer 2015: 25). This, of course, begs the question of what exactly counts as (regular) formal reflection or encoding, a question that will be addressed in Section 3.

Finally, it will be clear that the Conceptual Component is important in that it is here that, as part of the Speaker's intention, "construal" (as defined by Langacker 1987) takes place, as speakers can conceptualize one and the same event or situation in different ways, taking different perspectives on and profiling different aspects of these events or situations. As we will see in Section 4, this may affect the speaker's choice for a particular partitive construction.

2.3 Relations between levels within the Grammatical Component

When it comes to the relation between different levels within the GC, FDG once again takes the position that units represented at different levels need not be related in a straightforward, one-to-one fashion. FDG, in other words, allows for mismatches between the four levels of analysis within the GC (Hengeveld and Mackenzie 2008: 31; Hengeveld 2011; Leufkens 2015; García Velasco 2017: 11). These mismatches come in two broad types (for more details, see Contreras-García 2013: 91–106). Mismatches of the first type constitute a deviation from the default relation between specific units at different levels of analysis. Thus, although, as pointed out above, Discourse Acts are typically expressed as Clauses, this need not be the case: one of the advantages of taking the Discourse Act, rather than the clause, as the basic unit of analysis is that can be realized in different forms (e.g. as single words, as in the case of Vocatives, or phrases, e.g. *to the market*). Nor do all Subacts of Ascription correspond to a Verbal or Adjectival Property at the RL: predicatively-used NPs like *a teacher* in example (2) corresponding to an

Individual at the RL, are nevertheless analysed as Subacts of Ascription at the IL, since they are used to ascribe a property rather than to evoke a referent:[3]

(2)   a.   *My brother is a teacher.*

   b.   IL: $(C_1:$ $\qquad$ $[(T_1)\ (R_1)]\ (C_1))$

   RL: $(p_1: (ep_1: (e_1: (f^c_1:$ $[(x_1)\ (x_1)]\ (f^c_1))\ (e_1))\ (ep_1))\ (p_1))$

The second type of mismatch does not so much concern the kinds of units involved, but rather the number of units that they correspond to at other levels; i.e. those cases where, rather than a one-to-one relation, we are dealing with a one-to-many, many-to-one, or zero-to-one relation. In FDG, these kinds of mismatches are described in terms of transparency: an expression is transparent when each of the units it contains corresponds to exactly one layer at each level of representation, i.e. when there is a one-to-one relation between units at each of the four levels; if this is not the case, the expression is opaque (Hengeveld 2011; Leufkens 2015; Gomes Camacho and Goreti Pezatti 2017; Hengeveld and Leufkens 2018). This means that in FDG opaqueness may result not only from a lack of one-to-one relationships between meaning and form, i.e. between Formulation and Encoding, but also from mismatches within Formulation, i.e. between the Interpersonal and Representational Levels, and within Encoding, i.e. between the Morphosyntactic and Phonological Levels. Moreover, different categories of non-transparency can be distinguished by looking more closely at the nature of the mismatch between two levels. Four different categories have so far been recognized: redundancy (a one-to-many relation, e.g. number agreement), discontinuity (a one-to-many relation, e.g. in raising constructions), fusion (a many-to-one relation, e.g. in fused inflectional suffixes), and 'form-based-form' (i.e. a null-to-one relation, e.g. in the case of dummy-elements inserted only at the ML). In addition, FDG also allows for a one-to-null relation, as in the expression of anaphoric relations, where a co-indexed variable may be left unexpressed (e.g. in coordinated constructions like *The student had read the book but didn't like it,* see example (5) below) (Hengeveld and Mackenzie 2008: 143, 237).

   Clearly, however, the fact that default relations between the independent levels of presentation within the GC can be violated, leading to the mismatches described above, means that constraints need to be formulated to prevent units from one level from corresponding to just any unit, or any number of units, at any of the other levels. In other the words, the mismatches allowed by the model as a

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3 The copula verb *be* is not regarded as a lexical verb and as such not represented at the Representational Level.

whole, or in any particular language, need to be restricted to certain identifiable, well-defined circumstances. In Section 3 we will discuss the kinds of constraints needed to justify the mismatches characterizing partitive constructions.

2.4 Types of heads

The mismatches involved in the analysis of partitive constructions typically involve the absence of a lexically expressed head (resulting in "ellipsis"). This does not mean, however, that these constructions have no head at all, since FDG allows for a number of non-lexical heads, at both the IL and the RL. What follows is a brief summary of the types of heads allowed in FDG.

At the RL, the most prototypical head is the lexical head. Lexical heads restrict a lexical Property (f^l), which in turn may restrict an Individual (x) (Hengeveld and Mackenzie 2008: 263). Consider example (3), where the nominal lexeme *book* functions as the head of the Lexical Property f^l_i, which in turn heads the Individual x_i. At the IL, the Lexical Property corresponds straightforwardly to a Subact of Ascription (T_I) and the Individual to a Subact of Reference (R_I). Note that whereas the Subact of Reference is headed by the Subact of Ascription, this Subact of Ascription does not have a head.

(3) a. *the book*
     b. IL: (R_I: (T_I) (R_I))
     c. RL: (x_i: (f^l_i: book$_N$ (f^l_i)) (x_i))

At the RL, heads can also be configurational, in which case they contain more than one lexical item. An example would be the combination of a relational Lexical Property (e.g. *brother* in (4)) and its argument (*the boy*, x_j). Once again, all the elements involved have a direct counterpart at the IL (cf. Hengeveld and Mackenzie 2008: 116, 239, 384):

(4) a. *the boy's brother*
     b. IL: (R_I: [(T_I)   (R_J: (T_J)   (R_J))]   (R_I))
         RL: (x_i: (f^c_i: [(f^l_i: brother$_N$ (f^l_i))   (x_j: (f^l_j: boy$_N$ (f^l_j))   (x_j))] (f^c_i))   (x_i))

In other cases, however, a variable may not have a head at all. At the IL, this is typically the case for Subacts of Ascription (as in examples (3) and (4)). Subacts of Reference, however, may also be headless, for instance when they are used anaphorically (R_k in (5b)); in that case, the corresponding Individual at the RL is also headless (x_i in (5c)), leading to the use of a definite pronoun (*it* in (5a)).

In those cases where the Individual is not explicitly expressed, there is no corresponding Subact of Reference at the IL, leading to the non-realization (Ø) of the unit in question.[4] (Hengeveld and Mackenzie 2008: 237).

(5) a. ***The student*** *had read* ***the book*** *but* **Ø**

    b. IL: $(R_I:(T_I) (R_I))$ $(R_J: (T_J) (R_J))$

      RL: $(x_i: (f^l_i: student_N (f^l_i)) (x_i))$ $(x_j: (f^l_j: book_N (f^l_j)) (x_j))$ (x_i)

            didn't like   ***it***.

                      (R_K)

                      (x_j)

In addition, units may have empty heads. In that case, the variable has a head, but this head consists of a variable only. In English this type of head is typically expressed in the form of a dummy element, such as *one* in (6), representing the empty Property f^l_j (co-denotational with the Property 'bike').

(6) a. ***The boy*** *wanted* ***a red bike***   *not*

    b. IL: $(R_I: (T_I) (R_I))$ $(R_J: [(T_J) (T_k)] (R_J))$

      RL: $(x_i: (f^l_i: boy_N (f^l_i)) (x_i))$ $(x_j: (f^l_j: bike_N (f^l_j)) (x_j): (f^l_k: red_N (f^l_k)) (x_j))$

          a blue one.

          $(R_K: [(T_K)(T_L)] R_J))$[5]

          $(x_k: (f^l_j): (f^l_l: blue_N (f^l_l)) (x_k))$

Finally, units may have abstract heads. In Hengeveld and Mackenzie (2008), such abstract heads can be found only at the IL, where they may, for instance, be used in the representation of deictic Subacts of Reference. As shown in example (7), these deictic Subacts are characterized by a unique combination of the features ±S and ±A (Hengeveld and Mackenzie 2008: 118):

(7) a. *I/we:*[6] $(R_I: [+S -A] (R_I))$

    b. *you*: $(R_I: [-S +A] (R_I))$

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4 Note that whereas at the RL the variables representing one and the same entity are co-indexed (e.g. x_j for *the book* and *it*), the corresponding Subacts at the IL are not, since each Subact is unique, representing an individual action at a particular time.

5 The presence of a Subact of Ascription evoking the property 'bike' is debatable here: it is clear that this property is assigned, but it is not lexically expressed (the pronoun *one* being a dummy element). We will discuss exactly this problem in the analysis of co-denotational partitives below.

6 Note that number distinctions are made at the RL.

In Keizer (2011, 2012) it is argued that abstract heads would also be useful at the RL, for instance in the analysis of non-phoric definite pronouns. Consider the sentence in (8). Here the pronoun *he* is used neither anaphorically nor deictically. It is, however, modified, which is problematic since definite pronouns are assumed to be headless (Hengeveld and Mackenzie 2008: 237). If, however, we provide the Individual in question with an abstract head (consisting of the features [+Hum], [+M] or [+F]), we can account for the fact that these pronouns can be modified. At the same time, the information provided in the abstract head triggers the correct form (neuter, feminine, masculine) of the pronoun.

(8)   a. ***he who increaseth knowledge*** *increaseth sorrow* (see Keizer 2012: 417)
       b. (sg x_i: [+M]: (Pres ep_i: -- who increaseth sorrow))

As we will see in the next sections, all these different types of head play a role in the analysis of partitive constructions.

3 Co-denotational partitives in FDG

In a partitive construction, the overall referent of the noun phrase is presented as a subset of the set referred to by an embedded noun phrase.[7] A prototypical example can be found in (9a), where reference is made to a subset of the superset referred to by the definite noun phrase *the boys*; this subset consists of a single, unidentifiable entity. In this example the first element takes the form of the numeral *one*. In other cases, however, the element *one* functions as pronoun; in that case *one* appears in the head position of the matrix NP, where it is preceded by a quantifier (example (9b)). As shown in (9c), this kind of partitive can also be used to refer to a mass.

(9)   a. *one of the boys*
       b. *any one of the many side streets*
       c. *some of the milk*

In all these cases, the matrix NP denotes the same kind of entity as the embedded NP: overall reference in the examples in (9) is to a boy, a street and milk,

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7 In what follows the term matrix NP will be used for the partitive as a whole, while the NP following the element *of* will be referred to as the embedded NP. Note that these terms merely serve as convenient, pre-theoretical labels, to be distinguished from the FDG notions of Noun phrase (Np) and Adpositional phrase (Adp).

respectively. However, not all partitives are co-denotational. In (10a), for instance, the embedded NP is not a plural NP but a singular collective NP, and overall reference is to a member of the collection denoted by this NP, while in (10b), reference is to part of the single entity denoted by the embedded noun. In addition, there are, of course, those cases where a partitive is headed by a lexical noun, as in (10c):

(10) a. ***One of the crew*** *climbed down it and then jumped to the tarmac.*
          (COCA, spoken)
      b. *And **some of the book** is based on his late father's medical journals.*
          (COCA, spoken)
      c. *the majority of (the) students*

For reasons of space, this paper will only be concerned with co-denotational partitives. Section 3.1 will present an RL analysis of these partitives, while Section 3.2 will look at possible IL analyses.

3.1 Co-denotational partitives at the Representational Level

Example (9) presented some prototypical co-denotational partitive constructions. There are, however, also less prototypical ones. In (11a), for instance, we find a partitive with an indefinite embedded NP (Ladusaw 1982; Reed 1991, 1996; Abbott 1996; Keizer 2017), while in (11b–e) the partitive as a whole is definite. Example (11c) contains neither a numeral nor a pronoun in the matrix NP, example (11d) shows the first noun (rather than the second) may be expressed lexically, and example (11e) shows that it is even possible to express both nouns lexically.

(11) a. *one of several problems*
      b. *the smartest one of the four*
      c. *the elder of the two brothers*
      d. *the older man of the two* (COCA, spoken)
      e. *the larger bone of the two bones of the forearm* (The Free Dictionary – online)

The question thus arises whether it is possible to provide an FDG analysis that can be applied to all these different types. In Keizer (2017) it is argued that this is indeed the case. Let us first consider a simple, co-denotational partitive like *one of the boys* in (9a). These partitives are represented at the RL as Individuals with an empty head, i.e. as Individuals headed by a Property f_i (co-denotational with the head of the embedded NP) which itself lacks a lexical head:

(12)   a.   *one of the boys*
       b. $(1 \; ^{s}x_i: [(\mathbf{f^l_i}) \; (m \; ^{s}x_j: (\mathbf{f^l_i: boy \; (f^l_i)}) \; (x_j))_{Ref}] \; (x_i))$

The construction as a whole is analysed as an Individual (x_i) designating a singleton set (indicated by the operator '1' and the superscript 's' on the x-variable). This Individual has a configurational head consisting of a headless Property (f_i) and its argument (x_j) (with the semantic function Reference; cf. example (4) above). The argument designates a plural set $(m \; ^{s}x)$, corresponding to the embedded NP. The headless Property f_i corresponds to (is co-indexed with) the lexical head of x_j (*boy*), thus accounting for the fact that the Property 'boy' is predicated of both sets, despite the fact that x_i lacks a lexical head.

This analysis captures the fact that the same property is (necessarily) predicated of the two Individuals x_i and x_j and that the head position of x_i can (and sometimes has to) be filled (by the pronoun *one* or the appropriate noun itself, e.g. (9b), (11b,d&e)). It also accounts for the status of the following PP (represented as an argument)[8] and the possible use of premodifiers (functioning as restrictors of the empty head, as in example (11c)) (see Hengeveld and Mackenzie 2008: 237–238). In other words, all the different realizations of co-denotational partitives in examples (9) and (11) can be accounted for by assuming the following Subset-set Partitive Predication Frame (a representational primitive; Keizer 2017: 32) (♦ represents a lexeme):

(13)   Subset-set Partitive Frame:
       $(\pi \; ^{s}x_1: [(f_1) \; (\pi \; ^{s}x_2: (f_1: \blacklozenge \; (f_1)) \; (x_2))] \; (x_1))$
       where   the set symbolized by x_1 may be a singleton set or a plural set and
               the set symbolized by x_2 must be a plural set
               the set symbolized by x_1 must contain fewer entities than (or an
               equal number of entities as) the set symbolized by x_2

---

8 If we look at the formal behaviour of the PPs in these constructions (in terms of the various syntactic tests mentioned by e.g. Radford [1988], Fries [1999], Payne and Huddleston [2002: 441–443]; see also Keizer [2004]), they clearly behave more like complements than adjuncts. This is captured in the representation given here by representing the superset as an argument within the frame. Note, however, that unlike other NPs with relational heads (e.g. *the father of my friends*, *the roof of the house*) the argument is not required by the semantics of the head, but rather by the construction as a whole: in order to have a subset-set partitive, there must be two sets. This difference is reflected in the fact that the argument is not assigned any semantic function (note that in Keizer [2017] the argument was assigned the very general semantic function of Reference; this has been disposed with in the present analysis).

Finally, the lack of lexical information in the head of the construction logically leads to the absence of a corresponding lexical Word at the Morphosyntactic Level (see (16d) below).

One type of co-denotational partitive, however, cannot immediately be accounted for by the frame in (13). As pointed out by Payne and Huddleston (2002: 412), an empty-head analysis cannot account for partitives with a pronominal embedded NP, such as *one of them* or *many of those*, as in these cases it is not possible to explicitly express the first noun (**many girls of those*). This, indeed, is predicted by the analysis proposed. In partitives like *many of us*, the embedded NP *us* does not have a lexical head; as such, no Property is assigned to the referent of the embedded NP. This means that no Property can be assigned to the referent of the matrix NP either, since there is no Property to be shared. Note that in some cases this lack of a denotational head turns out to be very useful, as in examples like (14a&b), where it is clear that the referents of the embedded NP do not share a retrievable Property:

(14)   a.   *if somebody for instance er say you've got **a husband and wife** living together, **one of them** suddenly becomes handicapped in a particular way*, (BYU-BNC, meeting)
       b.   *I felt sorry for Wales, but why the hell did they let Bodin take the penalty. Whats wrong with **Saunders/Rush/Giggs**? If one of them took it it would have been a goal for certain*. (BYU-BNC, email)

At the same time, however, the matrix NP can contain a premodifier, in which case the head takes the form of the indefinite pronoun *one* (e.g. *the only one of us*, *the oldest one of them*); moreover, the PP complement is still present. Both these facts suggest the presence of an implicit head. The solution to this apparent contradiction is to assume that, just as in example (8b), these partitives have an abstract head, this time consisting of the feature [±Anim]. Thus, a partitive like *many of us* will be given the analysis in (15):

(15)   a.   *one of them*
       b. $(1 \, {}^s x_i: [[+\text{Anim}] \, (m \, {}^s x_j)] \, (x_i))$

3.2 Co-denotational partitives at the Interpersonal Level

But what about the interpersonal representation of such partitives? Should the implicit (empty-headed or abstract) head restricting the Individual at the RL be represented at the IL as a Subact of Ascription (given that the property in question

is necessarily ascribed to the Individual, rather than being inferred), or should this property not be represented (given that it is not formally expressed in the form of a corresponding lexical Word)?

In Keizer (2017), the Property predicated of the Individual by means of an empty head at the RL corresponded to a Subact of Ascription at the IL, resulting in the representation in (16b). Here we find two Subacts of Reference (R_I and R_J), one of which is unidentifiable and specific (-id, +s) (corresponding to the indefinite matrix NP) and one identifiable and specific (+id, +s) (corresponding to the definite embedded NP *the boys*). Both these Subacts of Reference are restricted by a Subact of Ascription, reflecting the fact that both referents (or referent sets) are assigned a Property.

(16)   a.   *one of the boys*
      b.   IL: $(\text{-id} +s\ R_I\colon [(\mathbf{T_I})\ (\text{+id} +s\ R_J\colon (\mathbf{T_J})\ (R_J))]\ (R_I))$
      c.   RL: $(1\ ^s x_i\colon [(\mathbf{f^I_i})\ (m\ ^s x_j\colon (\mathbf{f^I_i\colon boy\ (f^I_i)})\ (x_j))]\ (x_i))$
      d.   ML: $(Np_i\colon [(Gw_i\colon \text{one}\ (Gw_i))\ (Adpp_i\colon [(Adpw_i\colon \text{of}\ (Adpw_i))\ (Np_j\colon [(Gw_j\colon$
                    $\text{the}\ (Gw_j))\ (Nw_i\colon \text{boy-pl}\ (Nw_i))]\ (Np_j))]\ (Adpp_i))]\ (Np_j))$

Despite the lack of an overt realization at the ML, such an analysis was regarded as justified, as it is the combination of the relevant interpersonal and representational frames that triggers a particular template at the ML (the partitive template). In that case, it could be argued that the requirement that all interpersonal and representational information needs to be formally expressed is fulfilled.

It will be clear, however, that such an analysis involves several mismatches between the IL, RL and ML. First, there is a mismatch between the first evocation of the property in (16b), i.e. T_I, and the lack of a lexical head at the RL (the empty-headed f_i). Secondly, there is a mismatch between each of the two Formulation levels and the ML, since neither the first Subact of Ascription in (16b) nor the corresponding empty-headed Property in (16c) is realized at the ML.

The alternative would be to assume that, since there is no lexical equivalent at the RL (and no corresponding lexical Word at the ML), there cannot be a Subact of Ascription at the IL: if there is no expression, there cannot be an "act" on the part of the speaker. The question is what kind of IL representation would be appropriate in that case. Just leaving out the Subact of Ascription evoking the property 'boy' as applying to the overall referent is not an option. This would lead to the representation in (17), where the head of the overall Subact of Reference consists of the second Subact of Reference (corresponding to the embedded NP) only; a

presentation which, incorrectly, suggests that the overall referent is characterized by the second Subact of Reference only, without any additional content.[9]

(17) (-id +s R_I: [(+id +s R_J: (T_I) (R_J))] (R_I))

The solution would be to represent the two Subacts of Reference as separate Subacts, leaving the RL to deal with the head-complement relation; this would, of course, be entirely in line with the idea of a division of labour between the two levels.[10] The result would be (18):

(18) (-id +s R_I) (+id +s R_J: (T_I) (R_J))

This final analysis will be the one adopted in this paper, as it is more in accordance with the form-oriented approach of FDG: it involves no mismatches between the IL and the ML, the only non-default feature being the presence of an empty-headed (co-denotational) head at the RL – exactly the feature that defines a partitive construction, distinguishing it from regular NPs with embedded PPs.

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9 Note that Hengeveld and Mackenzie (2008: 111) use an empty slot to represent the head position (see also Van de Velde 2007: 218). In (ia), the empty slot represents the head of a Subact of Ascription (here T_J, *defamatory*). Lexical heads are, however, normally absent at the IL; since, however, the Subact of Ascription is modified (by the interpersonal adverb *allegedly*), the absent head somehow needs to be represented.

(i) a. *an allegedly defamatory article*
     b. (-id +s R_I: [(T_I) (T_J: **[ ]** (T_J): allegedly (T_J))] (R_I))

In a partitive construction like *one of the boys* in (9a), however, the Subact of Ascription, if present, would be part of a configurational head restricting the overall Subact of Reference (see (12b)); replacing the unexpressed property by means of an empty slot would lead to the representation in (ii), which is clearly unacceptable, since there is no indication even what kind of unit is being left out:

(ii) (-id +s R_I: [**[ ]** (+id +s R_J: (T_I) (R_J))] (R_I))

10 Note, however, that so far embedding (within the NP) has also been reflected at the Interpersonal Level, as in Hengeveld and Mackenzie's (2008: 116) analysis of constructions like *Joan's father's car*, where *Joan* is represented as part of the Subact of Reference *Joan's father*, and *Joan's father*, in turn, as embedded in the larger Subact of Reference evoking to overall referent:

(i) (+id R_I: [(T_I) (+id R_J: [(T_J) (+id R_K: Joan (R_K))] (R_J))] (R_I))

The position taken in this paper is that such embedding is not required (or desirable) at the Interpersonal Level.

3.3 Directionality, functionality and constraints

As mentioned above, FDG is a directional model: it starts with the speaker's communicative intention, contained in the CC, which triggers the grammatical process of interpersonal and representational Formulation. We have also seen that the relation between concepts in the CC and units at either of the Formulation levels in the GC need not be one-to-one. In the case of partitives, we may assume that the speaker's intention involves a (singular or plural) set of entities (expressed in the form of a partitive) about which the speaker wishes to say something. This set of entities is conceptualized as a subset of a larger set (expressed as the embedded NP). This means that both sets are assigned the same property, which is, however, expressed only once. The speaker, therefore, has to make sure that her linguistic utterance conveys the fact that this one property is to be assigned to both sets. At some point (either at the IL or at the RL; see above), this will lead to a mismatch between the CC (where the same concept is related to two sets) and the GC (where it is only expressed as part one of the NPs used to refer to these sets).

The next question is where the CC-GC mismatch first manifests itself in the grammar. Although often regarded merely as a mismatch between semantics and syntax, it turns out that in FDG, the first mismatch is actually between the CC and the IL, since a property that the speaker intends to assign to two entities is represented only once at the IL (in the form of single Subact of Ascription). At the RL, however, the property conceptually assigned to both the subset and the superset is represented twice: once in the form of a lexically headed Property and once as a Property without a head. We thus have a mismatch between the IL and the RL, but not between CC and RL. At the ML, the property in question is again expressed only once, in accordance with the IL representation (one Subact of Ascription) and, partly at least, also with the RL (where only one of the two Properties has a lexical head, the other being a co-indexed variable only). We can therefore conclude that within the grammar, the mismatches are restricted to the RL, where the selection of the Partitive Frame tries to reconcile the IL representation (a single Subact of Ascription, since the Property is expressed only once) with the speaker's intention (to communicate that this Property is to be ascribed to both the superset and the subset).

From the above, it will also have become clear that the non-realization of the head in these constructions is restricted to those cases where (i) there is a single Subact of Ascription at the IL; (ii) there are two co-denotational heads at the RL, one restricting a (singular or plural) subset, the other restricting the (plural) superset (triggering the partitive frame in (13)). Since it is only this particular combination of features that licences the selection of a partitive template at ML,

i.e. the non-realization of the head of a matrix Np in the presence of an embedded Np, we can say that the use of this template is properly constrained.

Finally, it will be clear that the non-realization of an empty head in partitive construction is clearly functionally motivated. Thus, it is only in those instances where explicit, unambiguous language is required, as in the case of definitions like the one given in (11e), that repetition of the same noun seems to be acceptable. In all other cases, one of the two heads (typically the first) is left implicit, while in those cases where the property in question is retrievable from the context, it need not be expressed at all (e.g. in *one of them*). Note moreover that the absence of any Property in the head of the matrix Np may also be inspired by the wish or necessity to leave the denotation of the subset underspecified (as in example (14)).

4 Partitives with coordinated embedded NPs

In this section, we will be looking at partitives with coordinated embedded NPs, such as *one of the boys and (the) girls*; these, as we will see, pose some further interesting problems for the relation between the CC and Formulation on the one hand, and between the two levels of Formulation on the other. The origin of these problems is twofold: first there are mismatches involved in the analysis of (some) coordinated noun phrases; second, there are mismatches resulting from the embedding of these coordinated noun phrases in a partitive construction.

Let us start by distinguishing three types of coordination relevant to the present discussion; these three types are illustrated in (19):

(19) a. *The current labor agreement between **the owners and the players** will expire in 2017,* (COCA, magazine)
b. ***The chef, TV host and cookbook author** is also **the founder and president of Tavola Productions***. (COCA, news)
c. *And we'll want some shots of **the bride and groom** before sunset, which happens at seven forty-one.*

In (19a) we find coordination of two full noun phrases, each of which refers to a separate set of Individuals. In (19b), we find two instances of coordination between nouns within a single noun phrase (with the definite article scoping over the construction as whole); reference here is to a single entity (an Individual) to which the Properties denoted by the various nouns apply. Example (19c) also contains a single noun phrase with two coordinated nouns; in this case, however,

the Properties denoted by the two nouns ('bride' and 'groom') are clearly not ascribed to the same Individual.

In what follows, we will look at each of these three types to find out how they can be analysed in FDG in such a way that their different features are accounted for, and to see what kind of mismatches (if any) they involve. In each subsection, the coordinated expression will be analysed first; subsequently we will discuss partitive constructions with these coordinated expressions as their embedded NP.

4.1 Type 1: *The owners and the players*

Coordination of two full noun phrases is very common and, at first sight, quite straightforward. Coordination of this type may involve plural noun phrases, as in (19a), as well as singular noun phrases, as in (20):

(20)   ***The boy and the father*** *get their picture taken in front of a bamboo fence.*
         (COCA, fiction)

In FDG, constructions like these do not appear to involve any mismatches, since two Subacts of Reference at the IL seem to correspond in a direct, one-to-one fashion to two Individuals at the RL and two Nps at the ML. However, the analysis of these constructions turns out to be more complicated than expected.

At the IL, these coordinated noun phrases will simply be analysed as two separate (identifiable, specific) Subacts of Reference, each headed by a Subact of Ascription (see (21b) and (22b)):

(21)   a.   *the owners and the players*
         b.   IL: $(+id +s R_I: (T_I) (R_I)) (+id +s R_J: (T_J) (R_J))$
         c.   RL: $(m\ ^s\mathbf{x_i}: (f^c_i: [(m\ ^s x_j: (f^l_i: owner (f^l_i)) (x_j)) \& (m\ ^s x_k: (f^l_j: player (f^l_j)) (x_k))]$
               $(f^c_j)) (x_i))_A$

(22)   a.   *the boy and the father*
         b.   IL: $(+id +s R_I: (T_I) (R_I)) (+id +s R_J: (T_J) (R_J))$
         c.   RL: $(m\ ^s\mathbf{x_i}: (f^c_i: [(1\ ^s x_j: (f^l_i: boy (f^l_i)) (x_j)) \& (1\ ^s x_k: (f^l_j: father (f^l_j)) (x_k))]$
               $(f^c_j)) (x_i))_A$

At the RL, however, matters become more complicated, since the two coordinated Individuals semantically need to be represented as forming one overall set. This is particularly clear from example (22), where the overall set (x_i) is

needed to capture the plurality of the coordinated set, triggering plural agreement on the verb (*get*), as well as the use of the plural anaphoric pronoun *their* in example (20). Moreover, the two Individuals together are assigned a single semantic function (Actor in (20)). On the other hand, it is clear that this overall Individual consists of two separate sets, each with its own head, and each available for anaphoric reference (e.g. *the former*, *the latter*).[11] This leads to a representational analysis of these coordinated noun phrases as one overall plural set, headed by a Configurational Property (f^c_i) consisting of the two coordinated (plural or singular) sets (x_j and x_k). It will be clear that such an analysis involves a mismatch between the IL (two Subacts of Reference) at the RL (one overall set, two component sets).

The ML representation matches the RL analysis. Thus, in (23), which provides the ML representation of (22a), we have one overall Np, which is assigned a single syntactic function (Subject in (21)), and which fills one clausal position. This overall Np contains two embedded coordinated Nps, each with its own determiner and its own nominal head (Nw), corresponding to the two coordinated Individuals at the RL.

(23)   ML: $(Np_i: [(Np_j: [((Gw_i: the (Gw_i)) (Nw_i: boy (Nw_i))] (Np_j)) (Gw_j: and (Gw_j))$
                $(Np_k: [((Gw_k: the (Gw_k)) (Nw_j: father (Nw_j))] (Np_k))] (Np_i))_{Subj}$

Let us now complicate matters further by embedding these coordinated noun phrases in a partitive construction; examples are given in (24):[12]

(24)   a.   *With the help of researchers from the University of Massachusetts Amherst, USA TODAY plotted the locations of schools to rank them based on chemicals likely to be in the air outside.* **Some of the schools and the companies responsible for the chemicals** *have closed or moved since the government collected the data. Others may have opened.* (COCA, newspaper)

         b.   *I hope have [sic] helped to dispel* **some of the prejudices and the false ideas** *we have about our older citizens* (COCA, spoken)

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11 As well as by means of a definite pronoun, if the pronoun uniquely picks out one of the two sets: *the boy and the girl . . . she*).

12 Strictly speaking the italicized in (24) are structurally ambiguous, as they may be regarded as coordinating a partitive noun phrase with a regular noun phrase, e.g. [some of the schools] and [the companies responsible for the chemicals] in (24a). This (unlikely) reading is excluded from the present discussion.

Partitives of this kind are perhaps best regarded as cases of gapping, i.e. coordination takes place not between two noun phrases, but between two partitives (*some of the schools and **some of** the companies*), with the quantifier being expressed only once at the ML. In that case, we would have four Subacts of Reference at the IL, representing the two overall and the two embedded sets (see (25b)). At the RL, these four Subacts of Reference would correspond to the subsets and supersets in two coordinated partitive constructions, whereby each of these partitive constructions (x_j and x_l) is specified by the quantifying operator *some* (Ǝ) (see example (25c)). At the ML, however, this operator is expressed only once, as part of the overall Np. This may therefore be regarded as a case of raising, with identical operators of two embedded Individuals at the RL being expressed as a single Grammatical Word within a higher Np.[13] Note that in this analysis the overall construction is not a partitive, and, as such, does not involve an empty head at the RL (unlike the two coordinated partitives).

(25)   a.   *some of the schools and the companies*
   b.   IL: (-id +s R_I) (+id +s R_J: (T_I) (R_J)) (-id +s R_K) (+id +s R_L: (T_J) (R_J))
   c.   RL: (m $^s x_i$: (f^c_i: [[(Ǝm $^s x_j$: [(f^l_i) (m $^s x_k$: (f^l_i: school (f^l_i)) (x_k))] (x_j)) & (Ǝm $^s x_l$: [(f^l_j) (m $^s x_m$: (f^l_j: company (f^l_j)) (x_m))] (x_l))] (f^c_i)) (x_i))$_A$
   d.   ML: (Np$_i$: [(Gw$_i$: **some** (Gw$_i$)) (Adpp$_i$: [(Adp$_i$: of (Adp$_i$)) (Np$_j$: [(Gw$_j$: the (Gw$_j$)) (Nw$_i$: school-pl (Nw$_i$))] (Np$_j$)) (Gw$_k$: and (Gw$_k$)) (Np$_k$: [(Gw$_l$: the (Gw$_l$)) (Nw$_j$: company-pl (Nw$_j$))] (Np$_k$))] (Adpp$_i$))] (Np$_i$))$_{Subj}$

Finally, it is worth pointing out that the analysis provided here predicts that we cannot have constructions like *⋆one of the boys and the fathers*. After all, if these constructions involve gapping, overall reference has to be to more than one referent (since the overall referent consists of the combined subsets denoted by the coordinated partitives at RL). Nor would one expect partitives of this kind to contain any other numeral (a construction like *four of the school and the companies* cannot result from gapping, as this would entail an underlying structure of 'four of the schools and four of the companies', which would lead to an overall set of eight entities). And indeed, neither the COCA nor the BYU-BNC yields any

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13 This is different from the kinds of quantifier raising proposed in generative approaches, which involve either covert movement at Logical Form (different interpretations [scopes] of quantifiers derived from the same syntactic representation) or quantifier floating (e.g. in the case of *all*). Both of these are irrelevant for the analysis of partitives. The process described here, however, does qualify as "raising" in an FDG context, as material semantically belonging to two lower units is syntactically expressed as belonging to a higher unit.

examples of partitives of this kind containing a numeral. Less specific plural quantifiers, such as *all* and *any*, can, however, be found (example (26)). This not only supports the gapping/raising analysis, but also puts a constraint on the use of these partitives.

(26) a. *It is 105 degrees today, and **all of the windows and the shutters** are closed* (COCA, Magazine).
   b. *And also, if you missed **any of the links and the references** that we made today or any other day, you can find them on the Web site there* (COCA, spoken)

In conclusion, it appears to be the case that, in addition to the mismatches found in the coordinated embedded NP, partitives of this kind involve a further mismatch, since the ML representation can be argued to involve gapping and raising. Note on the other hand that, unlike in the simplex partitives discussed in Section 3, the overall construction does not have an empty head at the RL; one could thus argue that one type of mismatch is replaced by another.

4.2 Type 2: *The founder and owner*

The second type of coordination discussed here, exemplified in (19b) above, constitutes a rather straightforward case of Property coordination. This type of coordination is less common than full NP coordination and (on its non-partitive use) typically involves singular noun phrases. Some additional examples are given in (27):

(27) a. ***The founder and owner of the company** was a man named Terrence Saddleton.* (COCA, fiction)
   b. *Not only does his high-energy, "life is beautiful" attitude keep him thin, but **this Italian actor and director** represents a sector of the world famous for health and longevity.* (COCA, magazine)

What characterizes an instance of Property coordination is that the coordinated Properties are predicated of the same entity (Individual) at the RL, as illustrated in (28c). At the IL, these Properties correspond to Subacts of Ascription within a Subact of Reference; this Subact of Reference, in turn, corresponds to the Individual. In addition, there is a one-to-one, default relation between the RL units and their ML counterparts (individual – Np; Property – Nw). Coordinated constructions like these are, therefore, completely transparent.

(28) a. *this Italian actor and director*
   b. IL: $(+\text{id} +\text{s } R_I: [(T_I) (T_J)] (R_I))$
   c. RL: $(1 \text{ prox } {}^s x_i: (f^c_i: [(f^t_i: \text{actor} (f^t_i)) \,\&\, (f^t_j: \text{director} (f^t_j))] (f^c_i)) (x_i): (f^t_k: \text{Italian} (f^t_k)) (x_i))$
   d. ML: $(Np_i: [(Gw_i: \text{the } (Gw_i)) (Adjp_i: (Adjw_i: \text{Italian} (Adjw_i)) (Adjp_i))$
      $(Nw_i: \text{actor} (Nw_i)) (Gw_j: \text{and} (Gw_j)) (Nw_j: \text{director} (Nw_j))] (Np_i))$

Note finally that in coordinated constructions of this kind the two coordinated Properties together can be replaced by the singular, indefinite pronoun *one* (example (29a)) as well as by the plural pronoun *ones* (example (29b)). This supports an analysis in which these two Properties together function as a configurational head.

(29) a. *the Italian actor and director and the French **one***
   b. *the one Italian actor and director and the two French **ones***

Using these coordinated constructions as the embedded Np of a co-denotational partitive construction is also relatively unproblematic. Some examples are given in (30):

(30) a. *MaryJane Foster is **one of the founders and owners of the Bridgeport (Conn.) Bluefish**,* (COCA, magazine)
   b. *That will be **one of the mainstays and pillars of the council tax**.* (BYU-BNC, written, hansard)
   c. *The obituary, issued by the Central Committee of the governing Chinese Communist Party, described Mr. Chen as a "great proletarian revolutionary and statesman, an outstanding Marxist, **one of the pioneers and founders of China's socialist economic construction**, . . ."* (COCA, news)

At the IL, we find two Subacts of Reference (R_I and R_J): the first, corresponding to the overall set, does not contain a Subact of Ascription; the second, corresponding to the embedded Np is headed by a combination of two Subacts of Ascription (T_I and T_J, evoking the Properties 'founder' and 'owner'). At the RL, the Individual x_i, representing the partitive as a whole, has an empty head in the form of a Configurational Property (f^c_i) that is co-indexed (and as such co-denotational) with the configurational head of the embedded Individual x_2. The empty head is not realized at the ML.

(31) a. *one of the founders and owners*
    b. IL: (-id +s R_I) (+id +s R_J: [(T_I) (T_J)] (R_J))
    c. RL: ($\mathbf{1}$ $^s x_i$: [($\mathbf{f^c_i}$) (m $^s x_j$: [($\mathbf{f^c_j}$: [(f^l_i: founder (f^l_i)) & (f^l_j: owner (f^l_j))] (f^c_j))] (x_j))] (x_i))
    d. ML: (Np_i: [(Gw_i: one (Gw_i)) ($Adpp_i$: [(Adp_i: of (Adp_i)) (Np_j: [(Gw_j: the (Gw_j))
                     (Nw_i: founder-pl (Nw_i)) (Gw_k: and (Gw_k)) (Nw_j: owner-pl (Nw_j))]
                     (Np_j))] ($Adpp_i$))] (Np_i))

This means that in partitives of this kind there is no gapping or raising; the overall construction is analysed as a partitive, and is as such represented in exactly the same way as partitives with a non-coordinated embedded NP, the only difference being that the empty head is now a Configurational Property rather than a simple Lexical Property.

4.3 Type 3: *The boys and girls*

The third type of coordinated noun phrase, illustrated in (19c) above, as well as in (32), is the most problematic from the point of view of the IL-RL interface.

(32) a. *These next 100 days is going to really separate the men, women from* ***the boys and girls***. (COCA, spoken)
    b. *Well, you know, the president has responded to all of our requests, certainly* ***the men and women in uniform*** *and a lot of people have been helping.* (COCA, spoken)
    c. *I want to thank* ***all the doctors and nurses at Bellevue***. (COCA, spoken)

At the surface, coordinated expressions of these kind are very similar to those of Type 2; the crucial difference, however, is that in this case the two properties are not ascribed to the same entity. This difference needs to be reflected in the specific combination of IL and RL representations provided for these constructions.

At the IL, this coordinated noun phrase will again be analysed as a single Subact of Reference: although the set is clearly heterogeneous, conceptually, the speaker groups the disparate entities together (cf. Langacker 2008: 104–105). In example (32a), for instance, the boys and girls are conceptualized as one group, which is separated from the men and women. At the IL, we are therefore dealing with a single Subact of Reference. This Subact of Reference is headed by two Subacts of Ascription, evoking the two properties in question ('boy' and 'girl' in (33b)); unlike in the coordinated expressions in Section 4.2, however, each member of the overall set evoked is ascribed only one of these two properties – a distinction made at the Representational Level.

(33) a. *the boys and girls*

b. IL: $(+id +s R_I: [(T_I) (T_J)] (R_I))$

c. RL: $(m\ ^s x_i: (f^c_i: [(m\ ^s x_j: (f^l_i: boy\ (f^l_i)) (x_j)) \& (m\ ^s x_k: (f^l_j: girl\ (f^l_j)) (x_k))] (f^c_i)) (x_i))$

d. ML: $(Np_i: [(Gw_i: the\ (Gw_i)) (Nw_i: boy\text{-}pl\ (Nw_i)) (Gw_j: and\ (Gw_j)) (Nw_j: girl\text{-}pl\ (Nw_j))] (Np_i))$

Semantically speaking, we are clearly dealing with two component sets (a set of boys, x_j, and a set of girls, x_k, in (33c); cf. Hengeveld and Mackenzie 2008: 423; Keizer 2012: 409, 416), as well as with the overall set evoked by the single Subact of Reference (x_i in (33c)). This means that there is a discrepancy between the relevant units at the IL and the RL: instead of the default relation between a Subact of Reference at the IL and an Individual at the RL, we have a single Subact of Reference expressed as three Individuals at the RL. In other words, these coordinated constructions combine the IL analysis of Type-2 coordinations with the RL analysis of Type-1 coordinations. Together these representations trigger a single, but complex, Np at the ML, similar to the syntactic realization of Type-2 coordinations.[14]

Note that the two coordinated sets are not necessarily plural; as shown in (34), combinations of two singular nouns can also be found. What all these constructions have in common, however, is that the two Properties evoked are very closely connected, with one almost inevitably activating the other. As a result, many of these expressions are frequently used fixed and semi-fixed combinations, to be considered as one conceptual whole. All of this supports the singular Subact of Reference analysis proposed in (33b).

(34) a. *If the thesis is correct that churches are irreconcilably disagreed on the fundamental meaning about **the nature and purpose of the church**,* (COCA, academic)

b. *They shared stories of family suffering as **the language and culture** were taken from them* (COCA, academic)

c. *Shouting turned to shoving, then **the husband and wife** were in handcuffs.* (COCA, news)

d. *It was the third day of Ascot Week, and all of British society was in attendance, including **the King and Queen**.* (COCA, fiction)

e. *Surprisingly Gerald was keen to proceed, even when **the advantages and disadvantages** were explained to him* (COCA, fiction)

f. *After Peter the Great's anti-sodomy law in 1716, homosexuality was banned in **the army and navy**.* (COCA, magazine)

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14 Note that this is not a straightforward case of redundancy (Hengeveld 2011; Leufkens 2015), since two of the Individuals function as the composite head of the third Individual.

The difference between Type-2 and Type-3 coordination is thus reflected in their RL representations: whereas in Type-2 coordination the Configurational Property heading the overall Individual consists of two Properties (both applying to the Individual in question), in Type-3 coordinations the Configurational Property consists of two Individuals, which together form the larger set. This difference also explains the differences in pronominalization allowed in these constructions. As we saw in Section 4.2, in Type-2 coordinations the singular pronoun *one* can be used to replace the two Properties making up the Configurational Property (example (29a)). Since in Type-3 coordinations it is not two Properties but two component sets that are coordinated, the use of singular *one* is not possible (example (35a)). As in the case of Type-2 coordination, however, use of the plural pronoun *ones* is allowed; in that case, the pronoun is triggered by the presence of two co-denotational Properties, predicated of two (sets of) entities (cf. Keizer 2012: 409, 416).

(35) a. *the British king and queen, and the Dutch **ones/*one***
     b. *the older boys and girls and the younger **ones***

Let us finally turn to partitive constructions with Type-3 embedded NPs, some examples of which are given in (36). What distinguishes these partitives from those discussed above is that their overall reference is underspecified. Thus, in example (36a), the most likely reading is one in which reference is made to an unidentifiable set consisting of both images and stories. In (36b), however, the overall set denoted by the two partitives may consist of both aunts and uncles, of aunts only or of uncles only. In (36c), it is clear from the context (where *you* refers to someone called Rose), that overall reference is to two sisters.

(36) a. *A caution: **Some of the images and stories** are disturbing*. (COCA, spoken)
     b. ***Five of the aunts and uncles of Elian** lived in Miami, **another three** remain in Cuba* (COCA, spoken)
     c. *And since you and Minna are **the only ones of the brothers and sisters who are still alive**, . . .* (COCA, fiction)

The lack of a specific denotation for the overall set is even clearer in those cases where overall reference is to a single entity, as in (37). In (37b), for instance, there is no way of knowing whether the partitive as a whole refers to a woman or a child. Note that the underspecification here is entirely functional: partitives of this kind allow a speaker to refer to a subset of a heterogeneous set even if she

does not know the exact denotation of the subset in question, or considers it to be irrelevant in the context.

(37) a. *The boys wear baseball caps; the girls are bareheaded. Some of these teenagers are just at the age where their own sexuality is unfurling, and* **one or two of the boys and girls** *show it* (COCA, magazine)

b. *Do you see one of the 100 million conquered humans who were seized and sold across the Mediterranean during the millennium of Rome's dominance? Or a chained African on a ship crossing the Atlantic toward U.S. shores and a Ufe [sic] of hard labor for the benefit of others? Or* **one of the women and children** *being sold into today's sex trade, which generates more crime-produced income than any other illegal industry except the drug trade?* (COCA, magazine)

But how to analyse partitives of this kind? If we assume that they are headed by an empty-headed Property (as strongly suggested by the presence of the pronoun *ones* in (36c)), then what form does this Property take? One solution would be to treat these constructions just like partitives with embedded pronominal NPs (*one of them*; see example (15b)), i.e. as constructions with an abstract head in the form of the semantic feature +Anim. At the ML this leads to the same syntactic realization as in the case of partitives with Type-2 embedded NPs (see (31d)):[15]

(38) a. *one of the boys and girls*

b. IL: $(-id +s R_I) (+id +s R_J: [(T_I) (T_J)] (R_J))$

b. RL: $(1 \, {}^s x_i: [+\text{Anim}] \, (m \, {}^s x_i: (f^c_i: [(m \, {}^s x_k: (f^l_i: \text{boy} \, (f^l_i)) \, (x_k)) \, \text{and} \, (m \, {}^s x_l: (f^l_j: \text{girl} \, (f^l_j)) \, (x_l))] \, (f^c_i)) \, (x_i))$

c. ML: $(Np_i: [(Gw_i: \text{one} \, (Gw_i)) \, (Adpp_i: [(Adp_i: \text{of} \, (Adp_i)) \, (Np_j: [(Gw_j: \text{the} \, (Gw_j)) \, (Nw_i: \text{boy-pl} \, (Nw_i)) \, (Gw_k: \text{and} \, (Gw_k)) \, (Nw_j: \text{girl-pl} \, (Nw_j))] \, (Np_j))] \, (Adpp_i))] \, (Np_i))$

This means that, although these partitives contain a non-default (abstract) head at the RL, the partitive construction itself does not display any real mismatches. As in the case of the partitives discussed in Section 4.2, they do not involve gapping or raising; as for the non-realization of the head at the ML, it may be argued, just as in the case of simple partitives, that this follows logically from the fact that the representational head is not lexical but abstract.

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15 This feature captures the fact that the overall referent is animate, thus accounting for the fact that anaphoric use by means of the neuter pronoun *it* is not allowed.

4.4 Directionality, functionality and constraints

It will have become clear that in the analysis of the coordinated noun phrases and partitive constructions dealt with in this section the top-down approach taken by FDG plays a crucial role. As for coordinated constructions (in particular Type 1 and Type 3), it seems reasonable to assume that mentally speakers are capable of conceptualizing one and the same situation as involving either two separate sets or one overall set (cf. Langacker 2008: 104–105, 408–409). According to Langacker (1987: 128), what is remarkable in this respect is that we cannot only shift between alternate construals (by directing our attention either to two separate sets or one single set), but that we can actually experience this "as an integrated event". Language is, however, less flexible in this respect, and speakers typically choose one of the two construals, coding them consistently (in conventionalized ways; see Taylor 2002: 368).[16] Sometimes, however, aspects of two competing construals "invade" the grammar, potentially leading to mismatches between the CC and the GC, and, within the latter, between the IL and the RL.

Consider once more Type-1 coordinations. Here conceptually (i.e. during Conceptualization) the two separate sets are in focus; at the IL this leads to two Subacts of Reference. At the RL, however, the overall set is also represented, leading to a mismatch between IL and RL. On the whole, however, the IL and RL representations together capture the fact that, conceptually, there are two construals (both represented at the RL), one of which is in focus (captured at the IL). In Type-3 coordinations, as we have seen, it is the overall set that is in focus, leading to a single Subact of Reference at the IL. This again leads to a mismatch between the IL and the RL, where the two component sets are also separately represented. In both cases, the ML realization is in accordance with the RL representation.

When we embed these coordinated noun phrases in a partitive, new mismatches may occur. In the case of Type-1 coordination, an analysis was proposed that involved gapping, as well as a kind of raising; unlike the simple partitives discussed in Section 3, however, the overall construction (not being a partitive) does not include an empty head. Similarly, in partitives with Type-3 coordinated noun phrases, one mismatch (the presence of an empty head at the RL, leading to non-realization at the ML) was replaced by another one (the presence of an abstract head at the RL, also leading to non-realization). The total number of mismatches, in other words, remains the same in both cases.

In addition, it will have become clear that the mismatches observed are not unconstrained. Thus gapping/raising in partitives with Type-1 coordinations is

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16 See Connolly (2018) on the importance of construal in FDG.

restricted to those cases where (i) at the IL the embedded NP corresponds to two Subacts of Reference, meaning that (ii) at RL the overall set must be plural; while at the same time (iii) the number of this set must be underspecified (excluding the use of numerals). Partitives with Type-3 coordinations, on the other hand, may have plural or singular overall reference; in both cases, however, use of these partitives is appropriate only in those cases where the denotation of the overall set is underspecified.

Finally, it will be clear that from a communicative point of view each of these mismatches has its advantages. Thus, the mismatches involved in the coordinated noun phrases can be regarded as the speaker's attempt to choose a linguistic form which best reflects a complex conceptual representation, while those involved in the partitives containing such noun phrases allow the speaker to be both efficient and less than fully specific (either when it comes to the overall number of entities involved, or when it comes to their exact denotation).

5 Conclusion

This paper has investigated a number of complex noun phrases (partitives, coordinated noun phases, and partitives with coordinated embedded noun phrases), concentrating on the mismatches these constructions involve, particularly at the CC-GC and IL-RL interfaces. It has been argued that in all of the constructions discussed the mismatches present in the FDG analysis result from the fact that a particular conceptual event (the speaker's intention, as contained in the CC) cannot be straightforwardly captured linguistically (by means of one-to-one relations between the levels in the GC). In the case of co-denotational partitives, the mismatch results from the fact that one and the same property is assigned to two entities within a single linguistic unit; this creates a mismatch between IL and RL (no Subact of Ascription to match the empty-headed Property), as well as between RL and ML (no ML unit to match the empty-headed Property), but not between IL and ML. The mismatches are thus created at the RL, which mediates between the speaker intention at CC and the morphosyntactic realization. In the case of the coordinated noun phrases, the mismatches result from the presence of alternate construals in the CC, one of which is in focus (either the overall set or the two component sets). It has been argued that this complex situation is dealt with in the GC by capturing the focal construal at the IL, and including the backgrounded construal at the RL. As for the additional mismatches following from embedding these coordinated noun phrases in a partitive construction, these have been shown to be both constrained and functionally motivated (by the need for efficiency and underspecification).

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Corpora

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Elnora ten Wolde

A Functional Discourse Grammar account of postnominal modification in English

Abstract: In English, the prenominal modifier position is considered the preferred choice, while use of the postnominal position is more restricted. Previous studies have suggested numerous criteria for English postmodification such as a restrictive or non-restrictive function, the denotation of temporary or permanent properties, the end-weight principle, text cohesion and emphasis. Consolidating previous research on postnominal modification and using data from the *Corpus of Contemporary American English*, this study found that there is no one particular rule or operator that sanctions its usage, but rather there are a conglomerate of semantic and pragmatic factors that facilitate or limit the use of this form. Concretely, the study proposes four constraints: the first is the end-weight principle. The second is that modifier in the postnominal position must have either an expressed or implied complement or adjunct. Constraint third is that, semantically, postnominal modifiers must restrict the referent and be restrictive. Constraint fourth is that, pragmatically, the hearer must be able to presuppose the existence of referent or referents denoted by the whole NP. In the context of this discussion, the paper explores the FDG discussion of interfaces between the Contextual Component and the Grammar and between the Interpersonal (pragmatic) and Representational (semantic) Levels in accounting for these constraints.

Keywords: the noun phrase, postmodification, mismatches, interfaces, Functional Discourse Grammar

1 Introduction

The underlying assumption with modifier placement within the NP is that the modifier position (prenominal or postnominal) contributes to the meaning or interpretation of the modifier and the noun phrase as a whole. For languages that systematically use both prenominal and postnominal adjectives, if one and the same adjective shows up in both positions, it is given two different interpretations, one for each position (Alexiadou, Haegeman and Stavrou 2007: 288). For English, the prenominal position is considered the preferred choice in the

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noun phrase (NP), while use of the postnominal position is more restricted. The modifier *outside* must be used postnominally (1a) and would be ungrammatical prenominally (1b). The opposite would be true for *beautiful* as shown in (1c-d); this adjective can only be used prenominally as in (1c) and not postnominally as shown in (1d). Then there are cases such as (2), where both the pre and postnominal positions are considered grammatical.

(1) a. *the people* **outside**
     b. **the** **outside** *people*
     c. *the* **beautiful** *dancer*
     d. **the dancer** **beautiful**

(2) a. *the person* **responsible**
     b. *the* **responsible** *person*

Numerous criteria have been suggested for English postmodification: semantic criteria such as a restrictive-non-restrictive function, or the denotation of temporary or permanent properties (Bolinger 1967); syntactic considerations such as the end-weight principle (modifiers which themselves are modified or include a complement are shifted to the postnominal position; Quirk et al. 1985: 1294) and that postmodifiers are essentially abbreviated relative clauses (Quirk et al. 1985: 418–419 ; cf. Ferris 1993: 49); or pragmatic criteria like text cohesion (Šaldová 2005) or emphasis (Ferris 1993: 44–45). However, for every rule or principle presented, counter examples can be found. This fact would seem to indicate that there is no one rule that would explain its use but rather a range of constraints that may or may not apply in a certain linguistic context.[1] If the postnominal position in English is indeed triggered by the interplay of multiple linguistic factors, this provides a challenge for a language theory to model. This paper discusses how Functional Discourse Grammar (FDG) would model postnominal modification in English and the role of interfaces in this explanation.

Below I will argue that several factors trigger the implementation of postnominal modification in English, not a single rule. In order to do so, this paper includes a qualitative analysis of data from the *Corpus of Contemporary American English* (COCA)[2] and discusses key findings from the literature. Con-

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1 Following Hengeveld and Mackenzie (this volume), constraints are separate from rules and part of the interfaces of FDG; rules are seen as derivations, e.g. S → NP-VP (see Jackendoff 2007: 8), constraints limit what is considered acceptable.
2 COCA was selected because it is the largest, most contemporary corpus available with over a billion words and data collected from eight genres, both spoken and written, from 1990 to 2012. This paper would not claim that the features discussed here, can only be found in American English.

cretely, in Section 2, I draw on previous research in order to discuss the possible triggers for postnominal modification in English, and in particular the role of syntactic-lexical, semantic and pragmatic constraints. Section 3 explains the important parts of the FDG model and the role of interfaces in the model before, in Section 4, presenting an FDG model of postnominal modification in English. Section 5 concludes the discussion and considers some remaining open questions.

2 English postnominal modification constraints

Looking at research from the past 60 years, there appear to be four central criteria discussed in relation to using postnominal modification (end-weight, semantic function, lexical form, and pragmatic functions). Below, these will be amalgamated into four constraints or triggers for the postnominal position. The first section (2.1) discusses the central syntactic-lexical criteria that warrants postnominal placement and proposes the first two constraints. The second (2.2) presents the semantic features that are usually attributed to postmodification and the third constraint. Finally, the third section (2.3) presents the pragmatic restrictions that have been proposed and a fourth constraint.

2.1 Syntactic/lexical criteria

The discussion around syntactic criteria centres round two different types of units, complex postmodifiers (i.e. modifiers of the noun head which themselves are modified) and single postmodifiers. Complex modifiers are discussed in Section 2.1.1. and single modifiers in 2.1.2.

2.1.1 Complex postmodifiers

A modifier which is modified or takes a complement is usually placed in the postnominal position (i.e. end-weight), and Huddleston and Pullum (2002: 445) even propose that the basic rule for English adjectival placement is that adjectives are placed in the attributive position unless they have post-head dependents. This end-weight principle coincides with Hawkins' Early Immediate Constituents principle, namely that "[i]n a head-initial language like English there is a clear pref-

erence for short phrases to precede longer ones, the short ones being adjacent to the head of the relevant phrase" (Hawkins 2004: 104).[3]

An example of this would be the prepositional phrase modifying *popular* in (3): *popular* is irregular as a single modifier in the postnominal position (3a); however, modified with a prepositional phrase (PP), *popular* is grammatical in the postnominal position (3b). Furthermore, in English a modifier with a post-head dependent is often considered unacceptable or marked in the prenominal position, as in (4a), but acceptable in the postnominal one, as in (4b) (McCawley 1988: 390–391; Ferris 1993: 55; Quirk et al. 1985: 420; Morzycki 2016: 80).

(3) a. ?*a play **popular***[4]
    b. *a play popular **in the 1890s*** (Quirk et al. 1985: 1294)

(4) a. **the **nice to us** people*
    b. *the people **nice to us*** (Matthews 2014: 161)

However, this shift between pre and postnominal position can work in the other direction as well: a modifier usually found in the postnominal position, as in *built* in (5a), which is unacceptable in the prenominal position as in (5b), may be considered grammatical with modification as shown in (5c) (Šaldová 2005: 231; see also Ferris 1993: 55).

(5) a. *the house **built***
    b. **the **built** house*
    c. *the **recently built** house* (Ferris 1993: 55)

The dispreference for adjectives or participles with adverbial modifiers to appear postnominally may be explained by Rijkhoff's Principle of Head Proximity. Developed in a large typological study of the Noun Phrase, the principle states that "[i]n a subordinate domain, the preferred position of the head constituent is as close as possible to the head of the superordinate domain" (Rijkhoff 2002: 264); this

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3 McCawley (1988: 392) has argued that this is not always the case and cited the example *hard to find* as counter evidence (a). However, in this case it is really a question of if *hard-to-find* has actually lexicalized, since the phrase can be used prenominally (b) and *find* can no longer be modified when used in this construction.
a. **hands on those items **hard to find*** (McCawley 1988: 392)
b. *Some advice about how to get your hands on those **hard to find** items, like Furbies.* (COCA)
4 The examples that you do find of this in COCA are phrases like 'make N popular', but here *popular* is an object complement.

would be possible prenominally (*a recently built house*) rather than postnominally (*a house recently built*). To what extent the prenominal or the postnominal positions are preferred in such cases would need to be clarified in a larger study.

With the exception of examples such as (5), the end-weight principle seems to be an automatic trigger for the postnominal modification position. A variation of this constraint applies to single modifiers and unexpressed complements.

2.1.2 Single modifiers

There are groups of modifiers that appear to have a postnominal position preference, in particular some modifiers from the *a-* prefix modifier group (e.g. *alive, asleep, afraid*), lexical items in fixed phrases such as *positive* in *proof positive* and *elect* in *president elect,* some location terms, modifiers ending with *-ible/-able* suffix (e.g. *possible, eligible*), and participles (e.g. *built, blessed*). The last three groups play a role in this discussion.[5]

One classic lexical category that can be used as a pre or postmodifier are location terms such as *the building opposite* or *adjacent* (Matthews 2014: 169–170). Matthews (2014: 169–170) proposes that the postnominal position stems from these phrases' locative meaning and syntactic analogy with phrases that semantically function very similarly, such as *nearby* or *in the garden*. These adverbials, when modifying a noun, are prototypically placed postnominally. Therefore, adjectives like *adjacent* that ascribe locative meaning, might prefer the postnominal position via analogy. I propose a more general rule here.

Some studies have proposed that morphological criteria such as *-able/-ible* endings allow for postmodification as shown in example (6) (Quirk et al 1985: 418–491; Huddleston and Pullum 2002: 445–446; Matthews 2014: 166; Morzycki 2016: 80). These modifiers consist of deverbal transitive verbs with suffix *-able/-ible*, and postmodification often gives them a temporary reading as in example (6) (Bolinger 1967: 3–4; for further discussion of the semantics, see Section 2.2).

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5 The *a*-prefix postnominal use appears to have historical origins. Markus (1997: 490–491) claims that these adjectives select the postnominal position because the weak or fake *a-* prefix is a historical remnant of the prepositions *in*, *on*, or *of,* meaning that *asleep* developed from *in sleep*. Evidence to support this conclusion, he argues, is provided by those *a*-modifiers where the *a*-prefix does not originate from a historical preposition; they are not used postnominally, e.g. *alone*, *alert*. In the case of fixed phrases, *positive* and *elect* can only be found postnominally with specific nouns, e.g. *president elect* but not *rector elect, and many of the phrases in this last group have been linked to French, where postnominal modification is systematic. Furthermore, these modifiers do not function like prototypical modifiers in that they cannot be modified: **the president newly elect will take office next week* (see Quirk et al. 1985: 1295–1296 for further discussion). Therefore, this group will not be discussed further here.

(6)   *the stars **visible*** (Bolinger 1967: 3–4)

Larson (2000) has noted, however, that there are some exceptions. A phrase like *probable reason* in example (7a) would be considered grammatical, but not *reason probable* as in (7b). On the other hand, *possible* can be used in the post-nominal position as demonstrated in (8). Larson (2000) explains this irregularity in that only adjectives implying clausal complements are allowed in the post-modifier position. *Possible* has an implied complement as it is always possible for someone to do something, but *probable* does not.

(7)   a.   *The **probable** reason was microbe disconnect.* (COCA)
      b.   **The reason **probable** was microbe disconnect.*

(8)   *. . .all stakeholders in every state want students to get the best education **possible***. (COCA)

When modifying nouns, participles may also, and commonly do, appear in the postnominal position. Both present and past particles can be placed postnominally, and the use of the postnominal position is often considered a feature of academic texts, where the doer of the action is elided, as demonstrated in (9). In (9), the noun phrase would actually mean 'the season that we considered in this particular experiment or context' (Šaldová 2005: 235; see also Quirk et al. 1985: 1329).

(9)   *In years with more bees, there is clearly a different quality of pollination and this varies with the time in the season **considered**, but. . .* (Šaldová 2005:234).

There is a difference between the use of present and past participles in the post-nominal position, and the syntactic restrictions apply more comprehensively to past participles (see semantic restrictions in Section 2.2. for a discussion of the present participle). Past participles in the premodifier position are considered to be adjectival since they are modified by adjectival modifiers such as *very*: *a very pleased person* (Sleeman 2011: 1570; see also Šaldová 2005: 232). Postnominal past participles are classified as verbal because a past participle followed by a compliment or modified by an adverb should move to a postnominal position as shown in (10a-c) (Sleeman 2011: 1570; Bolinger 1967).

(10)   a.   *the jewels stolen/ the stolen jewels*
       b.   **the **yesterday stolen** jewels*
       c.   *the jewels **stolen yesterday*** (Sleeman 2011: 1570)

In particular, studies have found that eventive past participles can take the postnominal position as demonstrated by (11a), and the stative and resultative are more questionable when used postnominally (11b) (James 1979: 697–698: Sleeman 2011; Embick 2004). Intransitive verbs are rarely used as postnominal past participles (Quirk et al. 1985: 1329).

(11) a. (Some chairs were broken). *All the chairs **broken** were old ones.*
      b. (One acre of forest is owned by someone) ?*The acre **owned** belongs to the head of the Clarke Institute.* (James 1979: 697)

2.1.3 Constraints 1 & 2

The end-weight principle seems to override all other possible constraints so that modifiers that would normally be considered awkward or ungrammatical in the postnominal position, such as in example (12a-b), become acceptable as in (12c).

(12) a. *Keller's more recent biography notes a similar instance of tea and performance of this **popular** play.* (COCA)
      b. **Keller's more recent biography notes a similar instance of tea and performance of this play **popular**.*
      c. *a play popular **in the 1890s*** (e.g. Quirk et al. 1985: 1294)

A second related constraint applies to single lexical postmodifiers, in that the modifier needs to entail some sort of latent argument. Returning to examples discussed above, *adjacent* and similar words like *opposite*, *eligible* and *worried* have an implied argument, e.g. a building is adjacent or opposite from an implied or explicitly stated other building or landmark, and a person is always worried about something (Matthews 2014: 169–170). *Eligible* in *the students eligible* restricts the set of students that are being referred to, but what the students are eligible for must be understood from the context, e.g. eligible for a scholarship (Matthews 2014: 170; see also Morzycki 2016: 80). This solution would also explain why past participles must be transitive as in broken in *all the chairs broken*, and explain why most participles, in particular past participles, have to be used postnominally. Transitive verbs used as participles would always entail an unexpressed argument.

This constraint would also explain why **tumblers empty* or **the delegates German* would not be acceptable, neither *empty* nor *German* entail an argument (although *German* also does not fulfil the semantic constraints). This would also explain why an unmodified *interesting* would be considered irregular in (13a) without modification, but then in (13b), would be considered acceptable: the comparative entails a comparison to something else.

(13) a. *A story **interesting** would be hard to find.
      b. A story **less interesting** would be hard to find. (Ferris 1993: 55)

The same would be true for superlatives (as demonstrated in (14)); superlatives intrinsically entail an object being compared to or the best of a certain category. This constraint also explains why *probable* is not used postnominally as in example (15) (Larson 2000).

(14) a. A barker meted out murder **most** subtle. (COCA)
      b. A barker meted out **subtle** murder.
      c. *A barker meted out murder **subtle**.

(15) a. The **probable** reason was microbe disconnect. (COCA)
      b. *The reason **probable** was microbe disconnect.

However, there seem to be some exceptions such as *the kittens mewing* that would appear to be liscensed by other factors.

2.2 Semantic functions

Postmodification in English has been attributed to a range of different functions and meanings. The three distinctions that appear to be most important are what have been called modifiers of the reference or the referent, modifiers with restrictive and non-restrictive functions, and modifiers denoting temporary versus permanent properties. Each will be discussed in more detail below.

2.2.1 Modifier of the reference or the referent

Bolinger (1967) was the first to point out that modifiers may select different meanings in a noun: that of reference (ascribing a property onto the head, i.e. ascribing the kind of class) as shown in (16a), and referent (ascribing a property onto the referent) as seen in (16b).[6] Prenominal modifiers can modify both the reference and the referent; postnominal modifiers only the referent.

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6 The terminology here is a bit confusing. Bolinger's reference modifier would be in FDG a modifier at the Property Layer and Bolinger's referent modifier, modifier at the Individual Layer. FDG's modifier of the Referent is a modifier of a Subact of Reference (R) on the Interpersonal Level. I adopt Bolinger's terminology here and then explain the FDG classification in Section 3.

(16) a. *a **criminal** lawyer*   'a class of lawyer'   Reference modification
      b. *the lawyer is a **criminal*** 'individual is criminal'   Referent modification
          (modified Bolinger 1967: 15)

This semantic distinction between pre and postnominal modification can be seen in the example of *outside* in (17a-b). Rooms and parts of rooms may be characterized or classified by their location (Matthews 2014: 31); thus, in English *the outside door* is a particular type of door, namely one that leads to outside an apartment or house, and therefore, as is often the case, it can be used prenominally as a modifier of the reference demonstrated in (17a). As a postnominal modifier, *outside* has a spatial meaning and *the door outside* can refer to the door outside of the space where the speaker is located, i.e. *outside* in (17b) could be interpreted as the door of the room. Therefore, here *outside* modifies the referent.

(17) a. *A blast of cold air and the slam of an **outside** door brought Rupert to his senses.* (COCA)
      b. *And BAM! They jump a mile. The Killer Robot. Launching himself against the door **outside**. . . Calvin whips round. Over here!. . . She leads Spooner down. . . A CORRIDOR of floor-to-ceiling PANELS.* (COCA)

This distinction can be seen most clearly in cases where there is not a premodifier option as in (18a-c). Rooms and parts of rooms may be classified by location; however, this is not usually true for people (Matthews 2014: 31). In English there is no class of outside people and therefore only *the people outside* would be grammatical, not **the outside people* in (18b), unless used metaphorically to refer to people outside of a certain group as in example (18c).[7]

(18) a. *Total darkness. I couldn't hear the **people outside**.* (COCA)
      b. **Total darkness. I couldn't hear the **outside people**.*
      c. *It's naïve for anyone to think that without using **outside people** we won't be at a disadvantage.* (COCA)

Therefore, the first semantic restriction is that postmodifiers must modify the referent and cannot modify the reference.

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7 This would also apply to phrases like *the person opposite* vs *the opposite direction*, which Quirk et al. (1985: 418) argue are fixed phrases, but I would argue the first modifies the referent and the second the reference.

2.2.2 Restrictive vs non-restrictive

Many researchers have pointed out the importance of the distinction between restrictive and non-restrictive functions in modifiers (e.g. Bolinger 1967; Quirk et al. 1985: 1239; Ferris 1993: Ch. 7; Huddleston and Pullum 2002: 1353; Larson and Marušić 2004: 275; Alexiadou, Haegeman and Stavrou 2007: 334–335; Cinque 2010: 7–8; Matthews 2014: 168; Keizer 2019). An example of a restrictive modifier can be found in (19a), where the noun provides the semantic field *beer,* and *German* restricts the reference to a particular part of this field (Ferris 1993: 118). In contrast, clear cases of non-restrictive modifiers are the use of *poor* in *Poor you!*, where the modifier expresses speaker sympathy and is no longer restricting the noun head (Keizer 2019: 381). However, there are ambiguous examples demonstrated in (19b). Theoretically, the modifier *friendly* could restrict the head to denote only those staff who are friendly; however, the context would suggest a non-restrictive reading in that the speaker employs a group of people and the staff is ascribed the property *friendly*.

(19) a. *I'll get some **German** beer for the party*. (Ferris 1993: 118)
      b. *Our **friendly** staff* is here to make sure that you have an outstanding experience. (Keizer 2019: 366)

The postmodifier can never be non-restrictive as demonstrated by *blessed* in (20) and (21). *Blessed* as a premodifier in (20) could be used either non-restrictively in (20b), in that all people were healed, or restrictively, as shown in (20c), where only those blessed were healed. Only the restrictive option is available in the postnominal use as in (21).

(20) a. *Every **blessed** person was healed*.
      b. All the people were healed.
      c. All the people that were blessed were healed.
          (Larson and Marušić 2004: 275)

(21) a. *Every person **blessed** was healed*.
      b. #All the people were healed.
      c. All the people that were blessed were healed.
          (Larson and Marušić 2004: 275)

The restrictive reading of the postnominal modifier is supported by the fact that many postnominal modifiers can be replaced by restrictive relative clauses, see example (22) below. In fact, many researchers have suggested that postmodifiers are therefore essentially abbreviated or elided restrictive relative clauses (e.g. Bolinger 1967; Quirk

et al. 1985: 418–419, 1239–1240; Ferris 1993: 49; McCawley 1988: 393; Huddleston and Pullum 2002: 1034–1035, 1265).

(22) a. *No light, but rather darkness **visible***. (COCA)
      b. *No light but rather darkness **which is visible***.

However, this cannot be the only semantic restriction on the postmodifier position or *German* in (23a) would also be grammatical in the postnominal position, which is not the case as seen in (23b).

(23) a. *some delegates **who are German** frowned*
      b. * *some delegates **German** frowned* (Ferris 1993: 49)

2.2.3 Individual level (permanent) verses stage level (temporary)

A further semantic criterion commonly cited is that the postnominal position ascribes temporary properties onto the head (stage-level properties), while prenominal modifiers can denote both temporary and permanent attributes (individual-level properties) (e.g. Bolinger 1967; James 1979; Cinque 2010). For example, in (24): *present* as a premodifier in (24a) refers to the current president (e.g. Biden in the US), and *present* as postmodifier in (24b) refers to the president that is present at the moment of speaking (Larson 1999; Larson and Marušić 2004; Alexiadou, Haegeman and Stavrou 2007: 296; Cinque 2010: 6–8; for FDG explanation see also Hengeveld and Mackenzie 2008: 389)

(24) a. *the **present** president*
      b. *the president **present** (*Alexiadou, Haegeman and Stavrou 2007: 296)

To complicate the issue, this function is also found in premodifier position. Example (25a) refers to the stars that are usually visible (permanent) but are now invisible (temporary), which is a plausible state. This is why example (25b) would be considered unnatural. James (1979: 696–697), in a study on adjective and participle postmodifiers, goes so far to argue that adjectives used postnominally must be able to denote a temporary state, and this semantic restriction would then explain the lack of acceptability of examples such as (26).

(25) a. th*e **invisible visible** stars*
      b. ?*the **visible invisible** stars* (Larson 1999)

(26)   *The tree **tall** is an oak*. (modified from James 1979: 696)

This restriction may explain why modifiers such as *tall* and *German*, which denote more permanent properties, cannot be used postnominally, but it does not explain how *adjacent*, which does ascribe a permanent property can, see (27a), and also some cases of the past participle in postnominal position indicate permanent properties as in (27b).

(27)   a.   *Welcome, my children, to this magnificent pond and the **swamp adjacent***. (COCA)
       b.   *Here are some of the **items named***. (COCA)

The exceptions listed in the literature such as *tall* and *German* do not prove that temporariness is a required property of postnominal modification because these examples also do not conform to constraint 2, the implied complement. It is more likely that this is the constraint that blocks their postnominal placement rather than their denoting permanent properties.

In conclusion, previous research has found that postnominal modifiers must be a modifier of the referent (or the Individual layer in FDG) and must be restrictive. This may result in a temporary reading. Naturally, these semantic conditions may be interrelated in that a modifier of the referent often indicates temporary and restrictive properties.

2.2.4 Constraint 3

The third constraint restricts the semantic information a modifier in the postmodifier position can denote: postmodifiers must be restrictive and modify the referent. In many cases, they may also denote a temporary property, but as we saw in examples in (27), that is not always the case.

Other researchers have argued that present participle postnominal use can only be explained if temporariness is a feature of postnominal modification. Of the four types of present participles, only those denoting progressive events, such as *mewing* in example (28a), and iterative participles, as in (28b), may also be used postnominally. Those participles denoting states, such as *loving* in (29), (James 1979: 698) and gnomic use, in (30) are also restricted to the prenominal position.

(28) a. *I got a blood sample from each kitten **mewing**, but I ignored those which were not mewing.* (James 1979: 689)
      b. *And I'll certainly not be letting you go about in a state like that especially with the hall decorated and the guests **arriving**!* (COCA)

(29) a. *Rover is a **loving** dog.*
      b. **The dog **loving** is Rover.* (James 1979: 698)

(30) *While the **exploding** cigar that was intended to blow up in Castro's face is perhaps the best-known of the attempts on his life, other have been equally bizarre.* (De Smet and Heyvaert 2011: 484 from Google)

Such examples have been presented as further evidence of the temporary property being a restriction; however, the limitations on the gnomic and stative present participles can be explained by the restrictive and referent modification constraints. Both *loving* in (29) is non-restrictive and *exploding* in (30) is a modifier of the reference and therefore, the first two constraints have been violated and not the temporary one.

2.3 Pragmatic function

Most postmodifier research have proposed lexical, semantic or syntactic explanations as discussed above. However, some pragmatic functions have also been proposed and will be outlined below.

2.3.1 Pragmatic triggers

One pragmatic function attributed to the postnominal position is emphasis. It seems logical that the postnominal position, as the non-default position, might be selected by the speaker for emphasis as in the case of *the bikes damaged* in example (31).

(31) a. *The bicycles **damaged** all had red handlebars.*
      b. *The **damaged** bicycles all had red handlebars.* (Ferris 1993: 44)

In this example both the prenominal and postnominal positions could have been chosen, and the postnominal one emphasizes the damage (Ferris 1993: 44).

However, as Ferris (1993: 44–45) points out, this might only be a by-product of the use of an irregular position and not the reason for the choice.

A few studies have suggested other pragmatic triggers. James (1979) argues the postnominal placement is allowed depending on whether the referent denoted by the NP can be presupposed or not by the speech participants. Therefore, one of James' (1979: 694) central constraints on using the postnominal positions is that "the hearer must presuppose the existence of a referent or referents describable by the NP".

A second study that looks at the pragmatic functions of the postnominal position is Šaldová (2005). She argues, similarly to James, that uncomplemented/ unmodified past participial postmodifiers are used as a cohesive device and have an anaphoric relation to previous information in the text in that "it presupposes some information retrievable from context" (Šaldová 2005: 236). This results in their having a cohesive function in that the whole noun phrase refers back to an idea already mentioned or introduced in the text, even if only implicitly. For example, in (32a) the released energy is presupposed by the previously mentioned earthquake, and the use of the definite article provides evidence for this reading (Šaldová 2005: 235). This cohesive effect can also transcend the sentence border as demonstrated in (32b) (Šaldová 2005: 236). In (32b), the parts of the buildings examined are first introduced two sentences previously.

(32) a. W*hen an earthquake occurs the **energy released** is transmitted in wave form in all directions*. (Šaldová 2005: 235)
b. *The inspection covers all those parts of the property that are readily visible or accessible, including the roof space – if there is easy access via a roof hatch. It will not normally include tests of the electrical, heating or drainage services. Any major defects noted on **those parts of the buildings examined** will be listed, with any recommendation for further investigations or courses of action*. (Šaldová 2005: 236, her emphasis)

The anaphoric function of the postnominal participle can most clearly be seen when compared with the more infrequent prenominal use of the participle as in (33a–b). In this example, Šaldová (2005: 241) argues, the whole noun phrase is anaphoric, and this can be demonstrated most clearly by the fact that the participle can be omitted without changing the underlying message. This would not be the case with the postnominal participle as shown in (34a–b).

(33) a. *To produce natural sounding speech it is necessary to utilize linguistic knowledge to produce the fundamental frequency and duration of **the produced signal**.* (Šaldová 2005: 241; her emphasis)

    b. *To produce natural sounding speech it is necessary to utilize linguistic knowledge to produce the fundamental frequency and duration of **the signal**.*

(34) a. *If it [water] is frozen at different atmospheric pressures, **the ice crystals formed** are different.*

    b. *If it [water] is frozen at different atmospheric pressures, **the ice crystals are different**.* (Šaldová 2005: 241; her emphasis)

In addition to referring to items in the co-text (as in (32)–(34) above), Šaldová (2005) also argues that the participles can also anaphorically refer to entities implied by the text-type. She found that in academic prose, participles often referred to scientific methodology (e.g. *examined, considered*), where the implied agent is, because of the text-type, understood to be the author/scientist (Šaldová 2005: 234–235). The writer then presupposes or assumes that the reader has knowledge of the features of this particular text type.

2.3.2 Constraint 4

The fourth constraint is that the referent denoted by the noun phrase must either be presupposed or retrievable from context. This constraint then also places some restrictions on determiner selection. This means that a noun phrase with a postnominal modifier is not usually considered grammatical if the matrix noun phrase has an indefinite determiner as **A person silent was in the room*. However, with a definite article *silent* can be used as a postmodifier: *The only person silent was my cousin Martha*. (James 1979: 688–690).

James (1979) shows that in cases where the determiner only provides information about the approximate number, e.g. with *some, several, many, a lot of* and numbers, the postnominal position is not always an option should the speaker not assume that the hearer has prior knowledge of the referent, i.e. **I bought some horses stolen*. However, this example would be considered acceptable should the speaker be able to infer it from context such as the fact that many faculty members have been hired in example (35) (James 1979: 689).

(35) (Presupposed: a number of faculty members have been hired.)
    Some/several/many/three/a *lot of faculty members hired should not have been hired.* (Larson 2000)

Larson (2000) notes other restrictions on the determiners in the matrix noun phrase and points out that in NPs with the strong determiners, as in (36a), *possible* as a postmodifier would be acceptable but not with those determiners listed in (36b).[8]

(36) a. *Mary sampled **every**/**all**/**the** sweetest foods possible*.
      b. **Mary sampled **a**/**no**/**three**/**more** foods possible*. (Larson 2000)

Only James (1979) makes the claim that this is a feature of all postnominal usage, and as far as I am aware, no one has conducted a comprehensive study to check if this is correct; Šaldová (2005) only discusses past participles. Based on James' analysis, this paper will assume that it is a general constraint. Nevertheless, even if it is found to be a restriction specific to a particular genre or word class, this would not affect the central question asking whether FDG can model all these constraints.

2.4 Four constraints on the postnominal position

The postnominal position in English is restricted, and it is clear from the discussion above that, although a number of rules have been proposed for the use of this position, no one study has been able to account for all the counter examples. This would seem to indicate that there is no one rule that would explain its use but rather a range of constraints or options available to the speaker/writer. Therefore, talking about constraints rather than rules would appear to be better suited for this particular case. In the sections above, I propose at least four central constraints on the postnominal modifier position that would link all the categories, exceptions and classifications discussed above.

The one central constraint is the end-weight principle, i.e. complex modifiers are shifted to the postnominal position. The second constraint is if the modifier is a single modifier, then encode an implied argument. The third constraint is that the modifier must modify the referent (in Bolinger's terminology) and be restrictive. Finally, pragmatically, the speaker assumes that the existence of referent or referents denoted by the whole NP are presupposed.

The next section will discuss how, with the use of interfaces, FDG is able to model this interplay of restrictions on the postnominal position.

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8 For more details on the weak-strong distinction in quantifiers see Milsark (1976), Barwise and Cooper (1981), and Keenan (2002).

3 Interfaces in Functional Discourse Grammar

The following sections first introduce FDG in general and discusses the relevant components before introducing the place and function of Interfaces in the Grammatical and Contextual Components.

3.1 A brief introduction to Functional Discourse Grammar

The model's architecture begins with a speaker's communicative intention on the prelinguistic level in the Conceptual Component. This mental representation feeds into the Grammatical Component and triggers the operation of formulation, which translates these conceptual representations into pragmatic representations at the Interpersonal Level (IL) and semantic representations at the Representational Level (RL).

Formulation draws on frames to structure representations at the pragmatic level (the Interpersonal Level) and the semantic level (the Representational Level), and lexemes, functions and operators provide the lexical and grammatical information. The first two play a role in this study. Lexemes either carry pragmatic meaning or designate entities (Genee et al. 2016: 885); functions are relational, "between the entire unit and other units as the same layer" (Hengeveld and Mackenzie 2008: 14). At the two levels of analysis resulting from formulation, a range of modifiers can be found, providing further lexical information, and being lexical, these modifiers can themselves be modified. The configurations from these two levels are then encoded on the Morphosyntactic Level (ML), using the templates, grammatical morphemes and operators available in the language in question. All this information feeds into the Phonological Level (PL), which does not play a role in this study, and therefore, will not be discussed here. Outside the Grammatical Component is the Contextual Component.

As has already been mentioned above, FDG models the grammar as being made up of primitives, which form the building blocks of linguistic utterances, as well as of the operations (formulating and encoding) which "combine these primitives in order to produce the various levels of representation" (Hengeveld and Mackenzie 2008: 19). Through the operation of formulation, these primitives take the form of frames, operators, and lexemes, and through encoding (i.e. the Morphosyntactic Level), of words, morphemes, and templates. All these elements are stored in the Fund, the storehouse of long-term linguistic knowledge (Genee et al. 2016: 880–881), in particular the templates and frames in the frame-set (or structicon), and the lexical items in the lexicon (Genee et al. 2016: 881, 885–887).

Outside the Grammatical Component is the Contextual Component. From the Contextual Component, contextual information can feed into any of the Levels (IL, RL, ML and PL) as demonstrated by the fact that anaphoric reference can refer to aspects of information from any of the different Levels (Hengeveld and Mackenzie 2014: 208). For example, with the *that* in (37), Speaker B refers to Speaker A's communication strategy, which is represented on Interpersonal Level, while with *that* in example (38), Speaker B refers to an external world situation referred to by Speaker A, which is represented on the Representational Level (Hengeveld and Mackenzie 2014: 208–209).[9]

(37) A. *Get out of here!*
      B. *Don't talk to me like **that**.*
          (Hengeveld and Mackenzie 2014: 208; their bold)

(38) A. *There are lots of traffic lights in town.*
      B. *I didn't notice **that**.*
          (Hengeveld and Mackenzie 2014: 208; their bold)

Therefore, the structure of the Contextual Component reflects the Levels of the Grammatical Component. The Grammatical Component consists of levels; the Contextual Component is made up of stratum, i.e. the Interpersonal, Representational, Morphosyntactic and Phonological Strata. The first two levels (IL and RL) include both situational and discoursal information. Situational information includes speech situation information such as participants, utterance time, utterance place and physical world information such perceived entities (e.g. individuals, events, properties, etc.) (Hengeveld and Mackenzie 2014: 209). The Discourse information is Level dependent, so that on the Interpersonal Level it would include Acts executed in the previous discourse, and Representational Level discourse information include entities that have been denoted in the previous discourse (Hengeveld and Mackenzie 2014: 209).

To explain the triggering of the postmodification template on the ML, information is not only drawn from the Grammar but the Fund and the Contextual Component as well.

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9 The focus here is on the Interpersonal and Representation Levels since those are the ones that play a role in this analysis. For examples from the ML and PL see Hengeveld and Mackenzie (2014: 208–209).

3.2 Interfaces in FDG

FDG posits certain prototypical relationships between linguistic variables on each level: isomorphic links result in transparency with no strain on the interfaces and non-isomorphic relations may result in non-transparency between the levels. Transparency is a property of interfaces between the Levels, not inherent in the Levels themselves, and a property of the grammar, not the Lexicon (Leufkens 2015: 13). An utterance or expression is transparent when each unit corresponds to its default variable on each level, as demonstrated in example (39).

(39) *a ferocious beast*
    a. IL: $(\text{-id } \mathbf{R_1}: [(T_1) (T_2)] (R_1))$
    b. RL: $(1 \mathbf{x_1}: (f_1: \text{beast } (f_1)) (x_1): (f_2: \text{ferocious } (f_2)) (x_1))$
    c. ML: $(\mathbf{Np_1}: [(Gw_1: \text{a } (Gw_1)) (Ap_1: (Aw_1: \text{ferocious } (Aw_1)) (Ap_1)) (Nw_1: \text{beast } (Nw_1))] (Np_1))$
    d. PL: $(\mathbf{PP_1}: [(PW_1: / ə / (PW_1)) (PW_2: /fəˈrəʊʃəs / (PW_2)) (PW_3: /ˈbiːst / (PW_3))] (PP_1))$

Example (39) is a (somewhat simplified) representation of the phrase *a ferocious beast* in FDG. (39a) shows the Interpersonal Level (IL); on the IL there is a single Subact of Reference R_1 whose head consists of two Subacts of Ascription (T_1 and T_2), one evoking the property 'beast' and the other the property 'ferocious'. Operators at the layer of the Referential Subact usually mark referent identifiability, e.g. in (39a) '-id' indicates that the speaker does not think the addressee will be familiar with the entity evoked. In (39b), the Referential Subact (R_1) on the IL coincides with the Individual (x_1) on the Representational Level (RL). The Individual designated by (x_1) is ascribed the Property 'beast' (f_1) and is further modified by the Property 'ferocious' (f_2). The operator '1' indicates that this is a single entity. On the Morphosyntactic Level (ML), the information from the previous two levels is encoded using a set of language specific morpho-syntactic primitives (Hengeveld and Mackenzie 2008: 282–287). Example (39c) is based on the prototypical Noun Phrase template, which includes a determiner slot, an adjective slot (filled by an Adjectival Phrase) and a noun slot (heading the Noun Phrase). Operators at this level take the form of 'placeholders' ('sg' for singular in example (39c)), triggering the use of the appropriate form of bound morphemes at the Phonological Level (PL). All the input from the previous three layers feed into the Phonological Level (39b).

    This prototypical example presented in (39) demonstrates a high degree of transparency between the different levels, resulting in default relations between

the units at the different levels (for further discussion see Leufkens 2015: 12–13). The Nominal Phrase prototypically relates to a Reference Subact (R) at the Interpersonal Level, an Individual (x) at the Representational Level, and a Phonological Phrase (PP) at the Phonological Level. The two Ascriptive Subacts (T) on the Interpersonal Level correspond to two Properties (f) on the Representational Level and the noun head and premodifier on the Morphosyntactic Level.

When there is no one-to-one relationship between the layers and/or levels, then these cases are called mismatches (Hengeveld and Leufkens 2018). An example of a mismatch between the two levels is given in (40), where the Individual (x) has a (configurational) head consisting of the verb 'dive' and its Actor argument. Since individuals normally have a nominal head, morpho-syntactically expressed as a noun phrase, the presence of a configurational head containing a verb leads to a clash at the Morphosyntactic Level. This, in turn, triggers a process of coercion, where the verb 'dive' is adapted to fit its morpho-syntactic requirements: it receives an *-er* ending to change the verb into a noun (Keizer 2015: 233; cf. Hengeveld and Mackenzie 2008: 403; Genee et al. 2016: 890–891).

(40) *a diver* ('a person who dives')
$$RL: (1x_1: [(f_1: dive_V (f_1)) (x_1)_A]^x)$$
$$ML: (Np_1: [(Gw_1: a (Gw_1)) (Nw_1: diver (Nw_1))]^{Np})$$
(Keizer 2015: 233)

Within the grammar, there are a number of interfaces: IL-RL, IL-ML, IL-PL, RL-ML, RL-PL, ML-PL (Leufkens 2015: 14; see also Hengeveld and Mackenzie (this volume)). Mismatches are usually one of four types (Hengeveld and Mackenzie (this volume); see also Leufkens 2015: 16–17):
1) null-to-nonnull
2) nonnull-to-null
3) many-to-one
4) one-to-many

The first and third are the mismatch types that apply for this study and therefore, will be discussed in more detail. Null-to-nonnull mismatch is when no unit appears on the Interpersonal Level, for example, but it is realized as one or more units on Representational Level, e.g. as in the case of dummy subjects *there* or *it* in constructions such as *it is raining* (Leufkens 2015: 17). *It* in these constructions does not evoke a referent and does not refer to a participant in the State of Affairs, and therefore, would not be represented on the Interpersonal and Representational Levels. However, it is inserted on the ML to fill an empty subject slot. Many-to-one mismatch is when two or more units of meaning are then encoded as a single morphosyntactic unit; an

example would be compounding where two meaning units are a single morphosyntactic unit, e.g. *bookcase* (Hengeveld and Mackenzie (this volume)).

Hengeveld and Mackenzie (this volume) argue that there must be an interface between the Grammatical and the Contextual Component, what they call a Contextualizer, creating a corresponding link between each Level in the grammar and its respective Stratum within the Contextual Component. The Contextual Component is then fed via a stacking process that reflects the notion of contextual saliency, "the actual mention of an entity in a discourse or its actual perception in the situation in which a text is produced" (Hengeveld and Mackenzie 2014: 210).

In sum, FDG is a top-down, uni-directional form-to-function model, starting with the formulation on the Interpersonal and Representational Levels and ending with encoding on the Morphosyntactic and Phonological Levels. It posits interfaces between all four levels in the Grammar and between the levels and its corresponding stratum in the Conceptual Component. When there is transparent mapping between the levels, there are no constraints; non-transparent mapping leads to mismatches. The next section will discuss how the constraints on postnominal modification in English can be modelled in FDG and how these constraints trigger non-transparency between Levels.

4 An FDG analysis of the postmodifier constraints

This section will propose a potential FDG analysis of the four constraints discussed in Section 2. The semantic distinctions discussed in this paper have already been greatly discussed and are generally accepted in the community, and are presented first, before discussing the more controversial analysis of the syntactic constraints. Finally, I present two potential analyses of the pragmatic restrictions.

4.1 Semantic constraints

There has been a great deal of discussion about modifiers in FDG (e.g. van de Velde 2007, 2009; García Velasco 2013, Portero Muñoz 2013; Keizer 2019), and many of the semantic distinctions discussed above can already be modelled in the theory without including interfaces. Restrictive modifiers are usually represented on the Representational Level (for more discussion see Portero Muñoz 2013; Keizer 2019), and what Bolinger (1967) calls modifiers of the reference are represented in FDG as a modifier at the Property layer, as in example (41). In this example, the Property "student" is restricted by the Property "medical" and these

two properties together denote the Individual (x) (Hengeveld and Mackenzie 2008: 230; Keizer 2015: 157). Example (42) represents what Bolinger would call modification of the referent in that the Property *clever* is a modifier at the layer of the Individual (x). Thus modifiers of the referent (descriptive modifiers) and modifiers of the Property or reference (classifiers) occur in two separate frames, as demonstrated in (41)–(42) (Portero Muñoz 2013: 130–132).

(41) *a medical student*
      $(1 \, x_i: (f_i: \text{student} \, (f_i)): (f_j: \text{medical} \, (f_j)) \, (f_i)) \, (x_i))$

(42) *a clever student*
      $(1 \, x_i: (f_i: \text{student} \, (f_i)) \, (x_i): (f_j: \text{clever} \, (f_j)) \, (x_i))$

A premodifier denotes a property at the Property Layer or the Individual Layer, as shown in examples (43b) and (43c) respectively. Postmodifiers, as in (44), always predicate a restrictive property at the layer of the Individual, as shown in example (44b) (Keizer 2015: 157; see Hengeveld and Mackenzie 2008: 389 for a discussion of encoding on the Morphosyntactic Level).

(43) a. *the outside door*
      b. $(1 \, x_1: (f_1: \text{door} \, (f_1)): (f_2: \text{outside} \, (f_2)) \, (f_1)) \, (x_1))$
      c. $(x_1: (f_1: \text{door} \, (f_1)) \, (x_1): (f_2: \text{outside} \, (f_2)) \, (x_1))$

(44) a. *the door outside*
      b. $(x_1: (f_1: \text{door} \, (f_1)) \, (x_1): (f_2: \text{outside} \, (f_2)) \, (x_1))$

Keizer (2019: 386–388) proposed a way to model the restrictive and non-restrictive distinction in FDG in that the non-restrictive modifiers are non-verbal predicates in a separate but dependent Propositional Content as demonstrated by example (45). This analysis takes into account that *old* does not simply restrict the head by referring to the friend's age, as *outside* does in (43), but assigns an additional Property to the denotation of the head, in this case the friendship, and is then represented as a separate Propositional Content (Keizer 2019: 387–388 for more discussion).

(45) a. *Suddenly those eyes were distracted by the flair of a familiar crimson cloak. "Doctor," Marlowe called out, stepping into the light to greet **his old friend**.* (COCA, Keizer 2019: 388)
      b. $(p_i: \ldots (e_i: (f^c_i: [(f^l_i: \text{greet} \, (f^l_i)) \, (x_i: (f^c_j: [(\mathbf{f^l_j}: \text{friend} \, (f^l_j)) \, (x_j)_{Ref}] \, (f^c_j)) \, (f^c_i))$
          $(e_i)) \ldots (p_i))$
          $(p_j: (f^c_k: [(f^l_k: \text{old} \, (f^l_k)) \, (\mathbf{f^l_j})_{Ref}] \, (f^c_k)) \, (p_j))_{Add}$

Therefore, the distinction between prenominal and postnominal modifier functions, examples (46) and (47) ((20) and (21) repeated here) demonstrate how FDG might model the semantic distinction between prenominal and postnominal nominal modifiers. The premodifier *blessed* in (46b) is a restrictive modifier at the Individual Layer and can also be interpreted as a non-restrictive modifier at the same layer as shown in (46c). However, as postmodifier in (47), the modifier can only be a restrictive modifier at the Individual Layer.

(46) a. *Every **blessed person** was healed.*
  b. (distr 1 x_1: (f_1: person (f_1)) (x_1): (f_2: bless (f_2)) (x_1))
  c. (distr 1 x_1: [(f_1: person (f_1))] (x_1))
      (p_1: (f_2: [(f_3: old (f_3)) ($1x_1$)$_{Ref}$] (f_2)) (p_1))$_{Add}$

(47) a. *Every **person blessed** was healed.*
  b. (distr 1 x_1: (f_1: person (f_1)) (x_1): (f_2: bless (f_2)) (x_1))

The temporary reading would not be represented in the Representational Level analysis. For most of the examples discussed, the temporary restriction is the result of being used in a particular template, i.e. a restrictive modifier at the Individual Layer, and Hengeveld and Mackenzie (2016: 1141–1146) argue that this information is in the Conceptual Component (there is some discussion about this, see also García Velasco 2016). In the case of the present participles, the fact that progressive modifiers may be used postnominally would be information encoded in the Fund. In the Fund there might be a link between this group of Lexemes and the postnominal template.

The semantic constraints discussed in Section 2.2 can be modelled in FDG. However, there is no difference between the underlying representation in (46b), where *blessed* is used as a premodifier, and in (47b), where *blessed* is used as a postmodifier. Therefore, there must be another trigger for the postnominal template.

4.2 Syntactic-lexical constraints

Nothing in the underlying representation in Section 4.1 would explain the triggering of the postnominal template on the Morphosyntactic Level nor would it explain why the prototypical prenominal template would not be acceptable in some cases. However, since the use of the postnominal template has been systematically encoded in the language, it must somehow be represented in the underlying representation (see Mackenzie and Keizer 1991; García Velasco 2013: 266–267).

The end-weight principle as a trigger for a shift to the postnominal position, can be explained by the Principle of Domain Integrity and End Focus (Hengeveld and Mackenzie 2008: 285; Keizer 2015: 263; for discussion of English postmodifiers see Garcìa Velasco 2017: 17), as shown in example (48). In this example the postnominal modifier with an adjunct modifies the head, *play*. *Popular* is modified by a phrase denoting time, through the Adpositional Phrase (Adp) *in the 1890s*.

(48) *a play popular in the 1890s* (e.g. Quirk et al. 1985: 1294)
 IL: (-id R_1: [(T_1) (T_2) (+id R_2: (T_3))] (R_1))
 RL: (1 x_1: [(f_1: play (f_1)) (x_1)]: [(f_2: popular (f_2)): [(t_1: [(f_3: in$_{Adp}$) (m x_2: (f_4: 1890 (f_4)) (x_2) (f_3)] (t_1))] (f_2)] (x_1)])

In the case of single modifiers, whether they are *-ible/-able* or participles, it is plausible to assume that the adjunct or modifier may still be present, even if it is not lexically expressed. The argument may still be present at the Representational Level because of the semantics of the modifier head, and in the case of the adjunct, it might still be present because of the linguistic context (semi-active, retrievable information) (see Section 4.3 for the role of the context) or it might simply be an option encoded in the semantics of the particular lexical item, e.g. *adjacent* always places one entity in relation to another. This unexpressed adjunct or modifier can be represented by simply inserting an empty-headed Property (f) at the Representational Level as shown in (49).

(49) *Scientists are finally isolating the **compounds responsible**.* (COCA)
 IL: (+id R_1: [(T_1) (T_2)(T_3)] (R_1))
 RL: (m x_1: (f_1: compounds (f_1)) (x_1): (f_2: responsable (f_2)): **(f_3)** (f_2)) (x_1))

In example (49), the Property (f_2) denotes a property at the Individual Layer and is itself modified by an unexpressed property (f_3). Since the Property does not have a lexical head, then it would not be represented by a Subact of Ascription on the Interpersonal Level (Hengeveld and Mackenzie 2008: 109–110). This would create a null-to-nonnull mismatch between the Interpersonal and Representational Level, because normally, a Property (f) aligns with a Subact of Ascription (T) on the Interpersonal Level.[10] Because (f_3) is lexically unexpressed, it would not be encoded on the Morphosyntactic Level. The use of the modification frame on the

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10 There are some cases where this is not true, ellipses, for example, or dummy *it* in sentences like *It is raining* (Hengeveld and Mackenzie 2008: 109).

RL with an unexpressed Property and the mismatch between the IL and RL would trigger the postnominal template on the Morphosyntactic Level.

Both options, the pre and postmodifier frames, would have to be indexed to the lexeme in the Fund. Whether the speaker/writer actually selects this postnominal template (when both are available) would depend on discourse/ pragmatic/ semantic factors discussed above.

4.3 Pragmatic constraints

James (1979) and Šaldová (2005) both argue that for the postnominal position to be activated, the entities referred to by the noun phrase must have been evoked or presupposed in the previous discourse or the context. Therefore, this would appear to be a systematic constraint and must be accounted for in the theory. In this section, FDG can model this constraint being triggered by information from the Contextual Component or by Function on the Interpersonal Level.

The first option is that the cohesive function of the postnominal modifier clearly stems from interaction between the Contextual Component and the Grammar. There would also be some sort of link to shared knowledge between the speech participants or at least the speaker's expectation that some of the knowledge is shared. The Grammar would then interface with the Contextual Component, in particular the Representational Stratum. This explanation would mean that the postnominal template could be triggered or licensed by discoursal information such as context saliency. Here this saliency would allow for the use of the postnominal position should this template be linked with the correct formulation of information from the Interpersonal and Representational Levels. The use of +id at the Interpersonal Level and information from the Contextual Component would trigger the unexpressed argument on the Representational Level. This solution would work to explain Šaldová's postnominal uses licensed by a particular text type, but it would not explain the anaphoric/text cohesion use.

A second option would be looking at this as a grammar-internal notion, hence a function on the Interpersonal Level. García Velasco (2013), in his discussion of subject and object raising in Spanish, argues that in certain cases Referent activeness should also be represented in the Grammar. He argues that along with an 'aboutness Topic', FDG may also account for the abstract notion of givenness, as a referent already active in the discourse. In his paper, he draws on Hengeveld and Mackenzie's (2011) contextual givenness and argues that FDG requires two dimensions of pragmatic structuring on the Interpersonal Level as shown in (50). Prominence/aboutness is static form-oriented and about individual utterance structure; time/givenness is dynamic and about the structuring of discourse (García Velasco 2013: 269).

(50) *Prominence dimension: aboutness*
 Focus (vs. background)
 Topic (vs. comment)
 Contrast (vs. overlap)
 Time dimension: givenness
 Active (vs. inactive)
 Shared (vs. unshared)
 (García Velasco 2013: 269)

This pragmatic information combines in content frames containing potential combinations of Subacts (SA) with pragmatic functions (García Velasco 2013: 268). The prominence dimension "deals with the strategic distribution of information within the utterance" and the structuring of individual utterances (García Velasco 2013: 269); the time dimension relates to discourse structuring and "the activation and sharedness states of referents in the minds of speech participants" (García Velasco 2013: 269). The prominence dimension results in Marked Pragmatic Articulations and the assignment of Pragmatic Functions on the Interpersonal Level; time dimension results in Unmarked Pragmatic Articulations (García Velasco 2013: 270).

In the postnominal cases, the Subact of Ascription may have a Focus function and the whole Referent would be Active. This can be seen in (51) where the earthquake occurring activates an earthquake schema that includes concepts such as energy; the energy would then be given an active pragmatic function and the empty property trigger the postnominal template on the Morphosyntactic Level.

(51) *When an earthquake occurs the **energy released** is transmitted in wave form in all directions.* (Šaldová 2005: 235)
 IL: (+id R_1: [$(T_1)(T_2)$]$_{\text{ACTIVE}}$ (R_1))
 RL: (x_1: [(f_1: energy (f_1)) (x_1)]: (past e_1: (f_2: release (f_2)): **(f_3)** (f_2)) (x_1))

On the Representational Level, *release* is modified by an empty-headed property (f_3). The Active function on the Interpersonal Level and the template and the unexpressed property on the Representational Level would trigger the postnominal template on the Morphosyntactic Level. In this case, three different meaning units trigger a single morphosyntactic unit, constituting a many-to-one mismatch between the Interpersonal and Representational Levels and Morphosyntactic Levels.

This solution can also model examples where the speaker/writer potentially have both pre and postnominal modification templates, but she selects the latter for emphasis. In example (52), grammatically both *confessions from the responsible person* or *the person responsible* would be options. However, the second

example emphasizes *responsible*, and can be represented as a focus function on the Subact of Ascription at the Interpersonal Level. In this case, postnominal not only has a cohesive function but also expresses speaker emphasis on the modifier.

(52)　*Last week, public figures in Germany experienced the "biggest data dump" in the country's history. Following a remarkably swift investigation, authorities say they have obtained a confession from the **person responsible**.* (COCA)
　　IL:　(+id R_1: [$(T_1)(T_2)_{\textbf{FOC}}]_{\text{ACTIVE}} (R_1)$)
　　RL:　(6 x_1: [(f_1:person (f_1)) (x_1)]: (f_2: responsible (f_2)): **(f_3)** (f_2)) (x_1))

These choice contexts show that this is a pragmatic phenomenon that effects the grammar and not simply speaker choice – this would provide evidence for the second solution. The second solution allows for a distinction between the multiple pragmatic and discourse functions of the postnominal position.

5 Conclusion

Based on previous research on English postnominal modification, this paper argues for four constraints on the postnominal modifier position: end-weight, entailed complement, restrictive modification on the Individual Layer and pragmatic saliency. With the exception of the end-weight principle, most of these constraints require a combination of factors for it to trigger the postnominal template in the morphosyntactic encoding. This combination of factors makes it impossible to explain postnominal modification with a single rule.

FDG can represent these constraints. The end-weight constraint can be easily modelled while maintaining transparency between the different Levels as do the semantic distinctions such as restrictive and non-restrictiveness. On the Representational Level, this paper argues that, for single modifiers, an unexpressed Property must be included in the underlying representation. This creates a mismatch between the Representational and the Interpersonal Levels (null-to-nonnull). For the pragmatic constraints, this paper presents two potential representations: one interfaces with the Contextual Component and the other one, expanding on the givenness frame suggested by García Velasco (2013), proposes that the givenness frame might also be a function of the Subact of Reference on the Interpersonal Level. This would then allow for multiple units on both the Interpersonal and Representational Levels to trigger the postnominal template (many-to-one).

This paper does not provide a definitive solution for the English postmodifier problem, and there is clearly a need for larger corpus studies of the postnominal use. One problem encountered in the literature is that linguists provide intuitive examples without context, and this paper has shown that it is not easy to judge the adequacy of some postnominal uses proposed without context. Second, the use of participles and the pragmatic use discussed above would need to be explored in more detail. Is the givenness constraint always required, as James (1979) proposes, or only a criterion with past participles? There are still many open questions left to be explored.

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Matthias Klumm

Meaning-to-form mismatches in Functional Discourse Grammar and Systemic Functional Grammar: A case study of the English discourse connective *however*

Abstract: This chapter investigates quantitative meaning-to-form mismatches with regard to the use of the English discourse connective *however* within the theoretical frameworks of Functional Discourse Grammar (FDG) and Systemic Functional Grammar (SFG). Rather than being fully transparent, languages usually display varying degrees of opacity between the different levels of linguistic organization. Given that inter-level mismatches can be said to be more difficult to process than transparent relations, this paper aims to answer the question as to why mismatches in language are allowed at all, and how they can be accounted for in the models of FDG and SFG. Based on data from the British National Corpus, the present study shows that *however* exhibits particular formal (i.e. syntactic) and functional (i.e. discourse-pragmatic) properties which give rise to quantitative mismatches between the levels of function and form. Even though mismatches contribute to a higher degree of opacity in language, it will be argued that in the case of *however* in English, they are indeed motivated by the speaker's communicative goals and are therefore allowed and accounted for by the rules of grammar. The present paper eventually proposes an alternative categorization of *however* in an FDG analysis based on the classification provided in SFG.

Keywords: meaning-to-form mismatches; Functional Discourse Grammar; Systemic Functional Grammar; discourse connectives; communicative intentions

1 Introduction

According to radically formal theories of language such as Chomskyan linguistics (see, e.g., Chomsky 1957, 1965, 1976, 1977, 1980), syntax is viewed as an autonomous, self-contained system of rules independent from meaning and context. By contrast, functional approaches to language consider linguistic structure to

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be functionally motivated, i.e. the form of language is regarded as being shaped by, and adapted to, the communicative functions that language serves. One group of linguistic theories, so-called *structural-functional* approaches to language (see Van Valin 1993; Butler 2003a, 2003b), take an intermediate position between radically formal and radically functional theories in that "they aim to account not only for both structure and (semantic and/or pragmatic) function, but also for the relationship between the two" (Butler and Gonzálvez-García 2014: 17). The present paper focuses on how the nature of the interface, i.e. the "formal interaction or interplay" (Contreras-García 2013: 84), between the levels of function and form is specified in two structural-functional theories of grammar, i.e. Functional Discourse Grammar (Hengeveld and Mackenzie 2008; henceforth FDG) and Systemic Functional Grammar (Halliday and Matthiessen 2014;[1] henceforth SFG). While both FDG and SFG adopt a function-to-form approach in that linguistic structure is taken to be shaped by particular communicative goals speakers aim to achieve when using language, the two models show differences with respect to how the different levels of linguistic organization (i.e. pragmatics, semantics, morphosyntax and phonology) are related to each other, as will be illustrated in this paper.

The relation between the levels of function and form can be conceptualized in terms of transparency. In very general terms, transparency can be defined as "a one-to-one relation between units of meaning and units of form" (Hengeveld and Leufkens 2018: 141). According to Contreras-García (2013: 85), "[a] transparent inter-level interface is a mapping . . . that allows for a straightforward correlation between a pair of levels, from a quantitative as well as from a qualitative point of view". Rather than being fully transparent (quantitatively and/or qualitatively), languages are typically characterized by various types of mismatches (i.e. non-transparent correspondences) between the different levels of representation. An inter-level mismatch can be defined as "a deviation from the expected quantitative one-to-one correspondence, and/or from the expected qualitative default iconicity between two differing levels of formal representation" (Contreras-García 2013: 86). If, as is generally acknowledged, language serves as a tool for achieving felicitous communication between a speaker and an addressee, the question arises as to why inter-level mismatches, which can be assumed to make the processing of discourse more complex, occur at all in language. The present paper aims to provide an answer to this question by investigating the formal and functional features (and the cor-

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1 From the 1970s onwards, two alternative versions of SFG have become established: the so-called *Sydney Grammar* (associated with Michael Halliday and colleagues in Australia) and the so-called *Cardiff Grammar* (associated with Robin P. Fawcett and colleagues in Wales). This paper will focus exclusively on the Sydney version of SFG (Halliday and Matthiessen 2014); for a comprehensive description of both versions of SFG, see Butler (2003a, 2003b).

respondences between them) of the English discourse connective *however*, which "has come to be the central adverbial connector marking CONTRAST in Present Day English" (Lenker 2010: 194). By using data from the British National Corpus (henceforth BNC),[2] this paper examines quantitative meaning-to-form mismatches with regard to the use of *however*, focusing in particular on the question as to how these non-transparent correspondences between the levels of function and form can be accounted for in the models of FDG and SFG. It will be argued that in the case of *however* in English, inter-level mismatches are motivated by the speaker's communicative goals and are therefore allowed and accounted for by the rules of grammar.

The present paper is structured as follows. Section 2 provides a general overview of the models of FDG and SFG, focusing in particular on similarities and differences with respect to how the different levels of linguistic organization are represented and related to each other in the two grammars. The English discourse connective *however* is introduced in Section 3, which describes how this connective is categorized in FDG and SFG, and which formal and functional features of *however* have been identified in previous research. Taking a function-to-form approach, Section 4 provides a comprehensive analysis of the discourse connective *however* based on the frameworks of FDG and SFG, thus showing how these two structural-functional theories can account for mismatches at the interface between function and form. A comparison of FDG and SFG with regard to the analysis of *however* is provided in Section 5, which proposes an alternative categorization of *however* in an FDG analysis based on the classification provided in SFG. The paper ends with a conclusion in Section 6.

2 Interfaces in FDG and SFG

As has been mentioned above, one of the main goals of structural-functional grammars is to specify the nature of the interfaces between the levels of function and form (see Hengeveld and Mackenzie 2008: 42; Halliday and Matthiessen 2014: 27; Mackenzie 2014: 251), which is the focus of this section. Section 2.1 provides an overview of the general architecture of FDG and SFG, focusing in particular on how the two grammars are organized with regard to the different levels of linguistic analysis. Section 2.2 takes a closer look at how inter-level mismatches (i.e. non-transparent correspondences between levels) are conceptualized in FDG and SFG.

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2 The data cited in this paper have been extracted from the online BYU-BNC (see Davies 2004). All rights in the texts cited are reserved.

2.1 General architecture of FDG and SFG

FDG is a typologically-based theory of language structure which is organized in terms of various components, levels and layers. The central component, FDG proper, is the Grammatical Component, which is systematically linked to a Conceptual, a Contextual and an Output Component within an overall model of verbal interaction (see Hengeveld and Mackenzie 2008: 13). This model is organized in a top-down manner, starting with the speaker's communicative intention (in the Conceptual Component) and working its way down to articulation (in the Output Component) via the operations of Formulation and Encoding (in the Grammatical Component). The Grammatical Component consists of four different levels of representation (i.e. Interpersonal, Representational, Morphosyntactic and Phonological), each of which in turn consists of its own set of hierarchically organized layers. In accordance with FDG's top-down, function-to-form approach, the four levels of organization within the Grammatical Component are related to, and interact with, each other in a hierarchical manner in that "pragmatics governs semantics, pragmatics and semantics govern morphosyntax, and pragmatics, semantics, and morphosyntax govern phonology" (Hengeveld and Mackenzie 2008: 13). The nature of the interfaces between the Interpersonal, Representational, Morphosyntactic and Phonological Levels will be described in more detail in Section 2.2 below.

SFG is a theory of language which is strongly oriented to the description of how language is shaped by the social and cultural contexts in which it is used. In contrast to FDG, SFG regards the linguistic system of a language as comprising two distinct types of layering (instead of just one), as is illustrated in Figure 1. On the one hand, language is organized in terms of four hierarchically ordered strata, i.e. semantics, lexicogrammar, phonology and phonetics.[3] According to Halliday and Matthiessen (1999: 4), the four strata are related to each other by the process of realization in that "[s]emantics, or the system of meaning, is realized by lexicogrammar, or the system of wording (that is, grammatical structures and lexical items); and lexicogrammar is realized by phonology, or the system of sounding". The different strata within SFG can thus be regarded as "interdependent with consequences from above being articulated all down the spectrum"

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3 SFG's hierarchical organization in terms of strata largely corresponds to FDG's hierarchical organization in terms of levels. In contrast to FDG, SFG does not comprise a separate level of pragmatics because the whole framework underlying the theory conceives of language as language use in context. The stratified linguistic system can be said to "interface with what goes on outside language: with the happenings and conditions of the world, and with the social processes we engage in" (Halliday and Matthiessen 2014: 25).
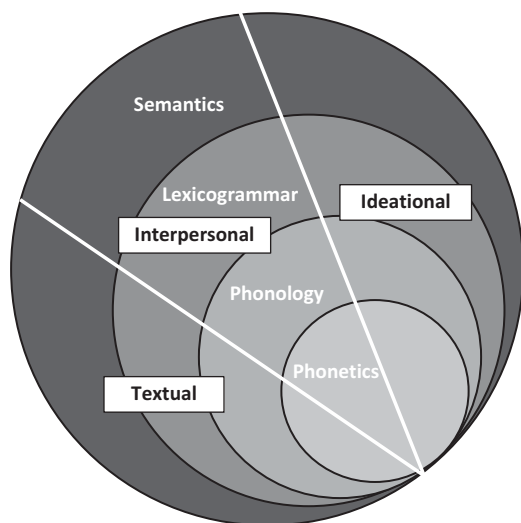
Figure 1: Stratal and metafunctional layering in SFG (based on Butler and Taverniers 2008: 696; Halliday and Matthiessen 2014: 26).

(Butt 2001: 1826). While the interface between the strata of semantics and lexicogrammar is interpreted as dynamic and natural in that linguistic structure is viewed as a resource for making meaning, the lexicogrammar is assumed to relate to the phonological and phonetic strata in a largely arbitrary and conventional way (see Butler and Taverniers 2008: 700; Halliday and Matthiessen 2014: 27). On the other hand, language is organized in a parallel manner in terms of three so-called *metafunctions*, which represent the fundamental functions language is assumed to fulfil: (i) to talk about and make sense of our experience of the world (= ideational metafunction), (ii) to interact with other people as well as to establish, maintain and negotiate social relationships with them (= interpersonal metafunction), and (iii) to build up sequences of discourse that is situationally relevant, i.e. to create text (= textual metafunction). While the Interpersonal and Representational Levels in FDG, which roughly correspond to SFG's interpersonal and ideational metafunctions,[4] are included in the general hierarchy of levels in the Grammatical Component, the three metafunctions "are seen as permeating the whole linguistic system" (Butler and Taverniers 2008: 697). In other words, they cut across the different strata simultaneously (as illustrated in

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4 There are, however, important differences between FDG's Interpersonal Level and SFG's interpersonal metafunction in that the Interpersonal Level in FDG can be said to include both SFG's interpersonal and textual metafunction (see Berry 2017: 53).

Figure 1), with each stratum being metafunctionally diversified into three components (i.e. ideational, interpersonal and textual). Any text is thus conceived of as simultaneously expressing three independent strands of meaning (i.e. an ideational, interpersonal and textual meaning).

2.2 Inter-level mismatches in FDG and SFG

Given that language users generally agree to act in accordance with Grice's (1975: 45) cooperative principle, i.e. to follow certain conventions (or maxims) to make communication with each other successful, one might expect languages to be maximally transparent, i.e. to display "a straightforward correlation between a pair of levels, from a quantitative as well as from a qualitative point of view" (Contreras-García 2013: 85). Quantitative transparency can be defined as "[t]he expected quantitative one-to-one correspondence" (Contreras-García 2013: 85) between the number of linguistic units at the different levels, whereas qualitative transparency refers to "the expected qualitative default iconicity between two differing levels of formal representation" (Contreras-García 2013: 86). According to Keizer (2015: 179), quantitatively and/or qualitatively transparent correspondences between units of meaning and units of form make "utterances easier to interpret and languages easier to learn". However, rather than being fully transparent, languages are typically characterized by varying degrees of opacity (see Leufkens 2015; Hengeveld and Leufkens 2018) in that the different levels of analysis do not always relate to each other in a quantitatively one-to-one and/or qualitatively default manner. Instead of transparent correspondences, the linguistic system often produces quantitative and/or qualitative mismatches between the levels of function and form. Quantitative mismatches display various types of inter-level correspondences that deviate from the expected quantitative one-to-one correspondence (e.g. one-to-null, null-to-one, one-to-many or many-to-one), whereas qualitative mismatches do not display "the expected qualitative default iconicity between two differing levels of formal representation" (Contreras-García 2013: 86). Given that mismatches can be said to be more difficult to process than transparent relations, the question remains open as to why meaning-to-form mismatches in language are allowed or tolerated at all, and how they can be accounted for. Before this question can be dealt with in more detail (see Section 4), this section provides an overview of how inter-level mismatches are conceptualized in FDG and SFG. For reasons of space, the analysis in the present paper will be primarily concerned with quantitative meaning-to-form mismatches.

With regard to the four levels of linguistic organization distinguished in FDG (i.e. Interpersonal, Representational, Morphosyntactic and Phonological), a lin-

guistic expression can be said to be quantitatively transparent "when each of the units it contains corresponds to exactly one layer at each level of representation" (Keizer and Olbertz 2018: 8). Very often, however, the four levels do not correspond to each other in a one-to-one manner, which gives rise to quantitative inter-level mismatches (e.g. one-to-null, null-to-one, one-to-many or many-to-one). In FDG, mismatches can occur at the interface between any of the four levels of representation, i.e. not only between the levels of meaning and form (e.g. between the Representational and the Morphosyntactic Level), but also between the two levels of meaning (i.e. between the Interpersonal and the Representational Level) as well as between the two levels of form (i.e. between the Morphosyntactic and the Phonological Level). A quantitative mismatch arises when a particular linguistic expression (i) is not represented at each of the four levels, or (ii) is represented by a varying number of layers at the different levels (see Contreras-García and García Velasco, this volume). The analysis of the English discourse connective *however* according to FDG in Section 4.1 of this paper will be restricted to quantitative mismatches between the Interpersonal and the Morphosyntactic Level.

SFG considers the interface between semantics (meaning) and lexicogrammar (form) to be natural in that it is functionally motivated (see Butler and Taverniers 2008: 700–701; Halliday and Matthiessen 2014: 27). Halliday and Matthiessen (2014: 27) claim that "[p]art of the task of a functional theory of grammar is to bring out this natural relationship between wording and meaning". In SFG, the mapping of semantic units onto grammatical ones is conceptualized in terms of congruent vs. metaphorical (or incongruent) realizational relations between semantics and lexicogrammar. On the one hand, congruently realized forms display an unmarked (or default) correspondence between meaning and form and can thus be considered "the most straightforward coding of the meanings selected" (Halliday and Matthiessen 2014: 731). On the other hand, incongruent realizations (which are subsumed under the notion of *grammatical metaphor*) are forms that are marked (or non-default) because they are "in some way different from that which would be arrived at by the shortest route" (Halliday and Matthiessen 2014: 731). For example, an imperative clause (e.g. *Close the door!*) is the congruent realization of a command, whereas more indirect expressions (e.g. *Would you mind closing the door?*) are considered metaphorical (see Halliday and Matthiessen 2014: 34, 700).

3 The English discourse connective *however*

3.1 Introduction

Discourse connectives can be defined as "linguistic items which signal a two-place relation between segments of text above the level of the phrase, i.e., between sentences or chunks of discourse" (Lenker 2011). By explicitly indicating the semantic relation between two units of discourse, discourse connectives serve as carriers of discursive glue and contribute to the construal of discourse coherence (see Fetzer 2018: 18–19). One of the various discourse relations which have traditionally been distinguished in the literature (e.g. Quirk et al. 1985; Mann and Thompson 1988; Biber et al. 1999; Asher and Lascarides 2003) is that of CONTRAST. Being closely related to, and often confused or conflated with, other discourse relations such as CONCESSION or ANTITHESIS, CONTRAST has been defined in different ways and classified into various subcategories, depending on the theoretical framework. In very general terms, discourse connectives marking CONTRAST are defined as expressing a dissimilarity in the propositional content between two (or more) discourse units. Without going into detail as to the exact nature of the discourse relation CONTRAST and its subcategories, this section focuses on the description of the discourse connective *however*, "the central adverbial connector marking CONTRAST in Present Day English" (Lenker 2010: 194; see also Bondi 2004: 141; Dupont 2015: 97).[5] Section 3.2 provides an overview of how *however* is categorized in FDG and SFG. Section 3.3 describes in some more detail the formal and functional features of this discourse connective.

3.2 Categorization of *however* in FDG and SFG

In FDG, *however* is classified as an operator at the Interpersonal Level which serves the basic function of expressing contrast. Along with frames, templates, lexemes and morphemes, operators constitute sets of so-called *primitives*, which "can be regarded as the building blocks needed for the construction of an utterance" (Keizer and Olbertz 2018: 3). Primitives feed into the operations of Formulation and Encoding and thus serve to produce the four different levels of representation within the Grammatical Component. At the Interpersonal Level,

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5 In Present-Day English, *however* can be said to be the main connector indicating CONTRAST (or CONCESSION) at discourse level (i.e. linking two sentences or even larger chunks of discourse), whereas the coordinating conjunction *but* is the prototypical connector indicating CONTRAST at sentence level (i.e. linking two main clauses) (see Bondi 2004: 146).

each layer (i.e. Move, Discourse Act, Illocution, Participants and Communicated Content) can be modified by (lexical) modifiers and specified by (grammatical) operators. The distinction between modifiers and operators has been based on two criteria, i.e. modification and focalization (see Hengeveld 2017: 30–31): Modifiers can themselves be modified and focalized, whereas operators cannot. The discourse connective *however* takes an intermediate position between modifiers and operators in that it can be focalized but not modified (e.g. **very however*), which suggests an analysis of *however* as a lexical operator (see Keizer 2007). Discourse connectives have varying degrees of scope in that they are able to connect units of differing sizes. This is accounted for in FDG by classifying *however* either as an operator at the layer of the Move (as in (1)) or as an operator at the layer of the Discourse Act (as in (2)), depending on the scope of the discourse connective.

(1) *Consider how Shamdev first behaved when rescued from the forest at the age of about 5: At first Shamdev cowered from people and would only play with dogs. He hated the sun and used to curl up in shadowy places. After dark he grew restless and they had to tie him up to stop him following the jackals which howled around the village at night. [. . .] Although such behaviour corresponds closely to the descriptions of other feral children, it is impossible to know whether these children might have developed similar patterns of behaviour even if brought up in greater contact with people, and it has been suggested that feral children might have been abandoned by their parents because of their behaviour problems.*

      __However__, another case of a child brought up in semi-isolation illustrates how unusual behaviour patterns would seem to be the product of minimal socialisation rather than the result of any inherent deficiency or abnormality. Isabelle is a case referred to by Kingsely Davis. She was an illegitimate child who spent most of her first six years of life in a darkened room with a deaf mute mother. When found, her behaviour was such that she was thought to be mentally deficient: Her behaviour towards strangers, especially men, was almost that of a wild animal, manifesting much fear and hostility.

<div align="right">(BNC, EDH 228, written, academic)</div>

(2) *In 1985, John had to give up his career as a consulting engineer because he was desperately ill. He was transferred to a hospital in Sydney where he was told he had AIDS. The doctors gave him two years to live. __However__, John was not prepared to die.*

<div align="right">(BNC, B06 501, written, miscellaneous)</div>

In (1), *however* can be said to have a more *global* connective function (see Lenk 1998), linking two Moves (which correspond to paragraphs in writing) rather than

two single Discourse Acts (hence the analysis of *however* as a Move operator). By contrast, the use of *however* in (2) can be said to be more *local* in that it only connects the two immediately adjacent Discourse Acts (hence the analysis as an operator of the Discourse Act). Even though the distinction between *however* as a Move operator and *however* as a Discourse Act operator is useful and actually justifies the distinction between different layers at the Interpersonal Level (Butler and Taverniers 2008: 739), Hengeveld and Mackenzie (2008: 60) admit that "[i]n actual practice, it may be difficult to distinguish between Move operators and Discourse Act operators, since often the same item may be used for both purposes". The use of *however* as an operator at the layers of the Move and/or Discourse Act will again be addressed in Section 4.1.

In SFG, Halliday and Matthiessen (2014: 156) make a distinction between three types of adjunct, each of which corresponds to one of the three metafunctions described in Section 2.1: circumstantial Adjuncts (which are ideational in metafunction), modal Adjuncts (which are interpersonal in metafunction) and conjunctive Adjuncts (which are textual in metafunction). The adverb *however* belongs to the group of conjunctive Adjuncts, which can be described as setting up "a contextualizing relationship obtaining between the clause as a message and some other (typically preceding) portion of text" (Halliday and Matthiessen 2014: 157). More precisely, *however* is classified as an adversative conjunctive Adjunct along with other items such as *yet* or *on the other hand*. Conjunctive Adjuncts in general, and *however* in particular, display various formal and functional features, as will be shown in the following section.

3.3 Formal and functional features of *however*

Discourse connectives such as *however* lack conceptual meaning and thus do not contribute to the propositional content of an utterance. Instead, they can be said to carry procedural meaning in that "they are useful, if not necessary, indications for the addressee on how to process the information contained in the speaker's discourse" (Margerie 2010: 316). In example (3), for instance, *however* is not a conceptual constituent of the proposition which follows the connector, but it contributes to the construal of discourse coherence by explicitly signalling the contrastive relationship between the discourse unit which precedes and the one which follows *however*.

(3) *In most cases your holiday flight is planned to be on a Boeing 737 or 767 jet aircraft operated by our sister company, Britannia Airways.* **However**, *we reserve the right to substitute alternative carriers/aircraft types as necessary.*
(BNC, AMW 1822, written, miscellaneous)

Given their purpose "as signals of the relationship between a discourse unit and its preceding context" (Dupont 2015: 89), it is usually claimed in traditional grammar that discourse connectives tend to occur in the left periphery (i.e. in initial position) of the discourse unit to which they belong (see Quirk et al. 1985: 643; Biber et al. 1999: 891). According to Lenker (2010: 198), "[a]dverbial connectors which are placed at the beginning of a sentence function as explicit signposts, guiding the readers and hearers through the text, because they facilitate the rapid processing of a passage. For speakers and writers, they help to make sure that their intentions about the semantic relations of the two propositions are understood". The placement of the discourse connective *however* in initial position (as in (3) above) can thus be said to facilitate discourse processing by the reader or hearer, marking explicitly and unambiguously a semantic dissimilarity in the propositional content between different discourse units (see Fetzer 2017: 278). While the left periphery can be said to be the unmarked or default position for *however* (or discourse connectives in general), empirical studies on the use of *however* in various text types from different time periods (e.g. Bondi 2004; Altenberg 2006; Lenker 2010; Dupont 2015) have shown that this connective is actually used in various positions in Present-Day English, i.e. not only in initial (i.e. left-peripheral) position, but also in medial and final positions.[6] This positional mobility of *however* is illustrated by the following examples from the BNC:

(4) *Because of the delicacy of the pigments and potential damage if exposed for too long to light, the papyrus will not be on continuous show.* **However**, *the museum plans to display it in the spring in the Egyptian galleries.*

(BNC, CKT 550, written, magazine)

(5) *Older workers in Britain have experienced conflicting pressures in the 1980s. In the early and middle part of the decade they were being urged to leave the workforce as soon as possible, as a way of coping with high unemployment and large numbers of school leavers. By the end of the 1980s,* **however**, *the position had been reversed, with calls on older workers to remain in employment for as long as possible.*

(BNC, B01 1349, written, non-academic)

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6 The term *medial* covers a broad range of syntactic positions which are non-initial and non-final (i.e. not in the peripheries of a discourse unit), e.g. between adjunct and subject (as in (5)), between subject and verb (as in (6)), between auxiliary and main verb (as in (7)) or between verb and complement (as in (8)). For an overview of the various medial positions which discourse connectives can occupy, see Lenker (2014: 22). The term *final* refers to the right periphery of a discourse unit, i.e. the position to the right of a host unit which includes items that do not contribute to the propositional content of the host unit.

(6) *Although Macmillan was the driving force behind the bid to enter Europe, he had no wish to weaken Britain's links with the States. Other members of his government,* ***however****, saw considerable advantages in developing a European nuclear deterrent, based on pooling British and French nuclear know-how and resources.*

(BNC, ABA 1231, written, non-academic)

(7) *The University of Warwick has for some time provided the possibility of studying both English and foreign texts in a comparative way at undergraduate level. The lessons have,* ***however****, been inconclusive.*

(BNC, A1A 1429, written, academic)

(8) *The 1740 invasion scare revealed some serious weaknesses in the nation's defences. Only 80 of the Royal Navy's 124 ships of 50 guns or more had proved fit for service, fewer than the 40 Spanish and 50 French ships of the line, and both in seaworthiness and weight of gunfire the best French and Spanish ships out-classed the finest English vessels. The war brought,* ***however****, a number of naval victories and 1740 saw the first performance of Rule Britannia, which soon acquired the status of a second national anthem.*

(BNC, BNB 465, written, non-academic)

(9) *When the time came to launch a leading brand of canned pork and beans in the Canadian market, the advertising company decided to continue the campaign that had worked successfully in other English-speaking areas, and retained the name Big John's. Canada is different,* ***however****. With a sizeable French-speaking population something was needed that would appeal to them as well, and the direct translation 'Grand Jean' seemed a bit tame.*

(BNC, BP4 343, written, miscellaneous)

The fact that *however* occurs in different positions within a discourse unit is not surprising given the general positional mobility of adverbials in Present-Day English. What is striking, however, is that in particular text types the frequency of *however* in medial position exceeds that in initial position, e.g. in (non-)fictional texts (see Altenberg 2006), academic abstracts (see Bondi 2004) or newspaper editorials (see Dupont 2015), which raises the question as to whether the initial position can still be called the unmarked, most natural position for *however*. In final position, the use of *however* is relatively rare and "more common in spoken than in written Present Day English" (Lenker 2010: 196; see also Biber et al. 1999: 891). This can be attributed to the fact that "[f]inal linking adverbials are . . . a comparatively recent phenomenon in English" (Lenker 2014: 20).

As has already been mentioned above, the main function of the discourse connective *however* is to make explicit the contrastive/concessive relation between the two discourse units which it connects, and thus to contribute to the construal of discourse coherence. This linking function can indeed be said to apply to the uses of *however* in initial (i.e. left-peripheral) position (as in (1) – (4) above), where it clearly serves "to facilitate the listeners' or readers' comprehension of the progression of discourse" (Altenberg 2006: 11). Nevertheless, the question arises as to why *however* has additionally come to be used in other (i.e. medial and final) positions where discourse processing by the reader or hearer is more challenging. Recent research on *however* (e.g. Bondi 2004; Altenberg 2006; Lenker 2010, 2011, 2014; Dupont 2015) has shown that this discourse connective does not only indicate a contrastive relation between two discourse units, but also fulfils other discourse-pragmatic (in particular information-structuring) functions which are related to the position within the discourse unit to which it belongs. As Lenker's (2011) study of adverbial connectors in English shows, medially placed *however* does not only have a linking function, but also serves to put emphasis on particular "parts of the sentence, i.e., either the immediately preceding element or the following part of the sentence" (see also Quirk et al. 1985: 632). In other words, *however* in medial position serves as a partition, i.e. "a textually parenthetical, syntactically extraneous element interrupting the syntactically dependent elements of the clause" (Dupont 2015: 108; see also Taglicht 1984: 22) and thereby highlighting either immediately preceding or following elements, depending on the exact position of *however* within a particular discourse unit.

In post-initial position, i.e. either between an initially placed adjunct and the subject (as in (5)) or between the subject and the verb (as in (6)), the discourse connective *however* can be said to be leftward-pointing in that it singles out and puts emphasis on the immediately preceding constituent (i.e. the theme) within the discourse unit. According to Dupont (2015: 110), placing *however* in post-initial position "makes it possible to highlight very clearly the focus of the contrastive relation expressed by the connector, i.e. what exactly is opposed through the adverb" (Dupont 2015: 110). In (5) above and in (10) below, for instance, contrastive emphasis is put on the (temporal or spatial) adjuncts in initial position (i.e. *by the end of the 1980s* in (5), and *in Britain* in (10)). These adjuncts can be said to have a "scene-setting effect" (Ungerer et al. 1984: 10) in that they set up a (temporal or spatial) framework for the rest of the utterance. Given that an initially placed adjunct is by itself "already marked because of its placement in front position instead of the default position for adjuncts, the end position" (Lenker 2011), the use of both an adjunct and the discourse connective *however* in (5) and (10) illustrates an overspecification (or multiple signalling) of the discourse relation CONTRAST (see also Maier, Hofmockel, and Fetzer 2016).

(10) *Multi-employer bargaining outside the establishment at regional and industry*
      level -- whose detailed substantive agreements were backed by law and left
      less scope for supplementary bargaining for improved terms -- could therefore
      be a means of continuing to exclude trade unions from the workplace. In
      Sweden, for instance, a strong employers' confederation enforced managerial
      prerogatives from the early years of the present century, prerogatives which
      were also supported by the legal framework until the law was changed in 1977
      (see Chapter 7). In Britain, **however**, *worker attempts in the 1950s and 1960s*
      to improve upon the minimum substantive terms of employment in more
      favourable labour market conditions, together with the lack of legally-binding
      disputes procedures, stimulated the expansion of (fragmented) workplace
      bargaining over pay and a high proportion of shopfloor strikes.

                                        (BNC, CLE 729, written, miscellaneous)

The leftward-pointing function of *however* in post-initial position is also prev-
alent when the immediately preceding constituent is the subject of the sen-
tence. In (6) above and (11) below, *however* serves to put contrastive emphasis
on the immediately preceding subject, and thus "focuses the reader's attention
on how the theme relates to what is to come" (Hannay and Gómez-González
2013: 113).

(11) *Clinical trials with mesalazine formulations have been more reassuring. In one*
      early study of colitis relapse, two patients treated with mesalazine 2.4 g daily
      for four weeks developed minor rises in plasma creatinine concentrations.
      More recent studies, **however**, *have not confirmed this finding and in a*
      number of studies, patients in relapse have been treated with doses up to 4.8
      g daily without untoward effect.

                                        (BNC, HU4 3167, written, academic)

In addition to laying emphasis on the initial element (i.e. the theme) of a dis-
course unit, *however* in post-initial position often serves to indicate a topic shift in
the progression of discourse. After initially placed adjuncts, *however* is often used
"to signal temporal or spatial shifts in discourse" (Altenberg 2006: 21). In (5), for
instance, the temporal adjunct *by the end of the 1980s* is set in contrast to the
topic of the preceding sentence, i.e. *in the early and middle part of the decade.* In
(10), the spatial adjunct *in Britain* marks a contrast to *in Sweden* in the preceding
sentence. A change of topic can also be observed in (6) and (11), where the two
subjects *other members of his government* and *more recent studies*, respectively,
present new information (with respect to the information provided in the preced-
ing discourse units) and thus signal a break in topic continuity.

In the other medial positions in which *however* can occur, e.g. between auxiliary and main verb (as in (7)) or between verb and complement (as in (8)), this discourse connective can be said to be rightward-pointing in that it draws attention to the following element (i.e. the rheme) within the discourse unit. More precisely, *however* delays the rheme and marks it off from the rest of the utterance, thus giving it "more attention than it would have received in the unmarked sequence" (Dupont 2015: 112). In (7) above, contrastive emphasis is put on the subject complement *inconclusive*, whereas in (8) the emphasis is on the direct object *a number of naval victories*. In addition to this rightward-pointing function, medially placed *however* is often said to function as an information-structuring device separating given information (in the theme) from new information (in the rheme). According to Dupont (2015: 113), *however* in medial position (i.e. between auxiliary and main verb or between verb and complement) signals "explicitly the transition between what the reader knows and the genuine informational contribution of the clause to the text". Thus, in (7) and (8) above, the elements preceding the discourse connective *however* can be said to be given (i.e. already known to the reader), whereas the elements following *however* represent new information, which is set in contrast to the propositional content provided in the immediately preceding sentence. As Lenker (2014: 30) points out, "[s]ince this is the default pattern of information structure, the placement of the adverbial here serves to underscore the information structure already present", and to give the new information in the rheme even "more attention than the usual amount of end focus".

As has been mentioned above, the use of *however* in final position (i.e. in the right periphery of a discourse unit) is comparatively rare and "more common in spoken than in written Present Day English" (Lenker 2010: 196; see also Biber et al. 1999: 891). Given that discourse connectives are supposed to facilitate the rapid processing of the discourse by the reader or hearer, the infrequent use of *however* in the right periphery is not surprising because it actually "force[s] a re-processing or even reinterpretation of the preceding assertions" (Lenker 2010: 198) on the part of the hearer (or reader). In spoken discourse, finally placed *however* can be said to fulfil functions similar to those of the English discourse connective *though*, e.g. expressing self-correction or restricting the validity of a proposition (see Haselow 2013: 398). As for written discourse, the data from the BNC actually provide numerous instances of *however* in final position, as in (9) above or (12) below:

(12) *A substantial minority of all paper readers, 42 per cent, thought their paper was biased in its treatment of the Alliance; and most of those who did detect bias thought their paper was biased against the Alliance. Guardian readers*

> *were exceptional, **however**. Over half the Guardian's readers thought the*
> *paper was biased towards the Alliance, while a mere 5 per cent thought it was*
> *biased against (Table 6.2).*

<div align="right">(BNC, A62 26, written, academic)</div>

In both (9) and (12), right-peripheral *however* can be assigned an anticipating function (see also Bondi 2004: 147). The discourse units concluded by *however* in these two examples contain new information which requires further specification in the following discourse. In (9), the reader wants to know to what extent Canada is different from other English-speaking areas, whereas in (12), the reader requires more information as to why Guardian readers were exceptional. Thus, while still signalling a contrastive relation between two discourse units, *however* in final position additionally indicates that the information provided in the following discourse unit(s) is relevant to the interpretation of the discourse unit to which the discourse connective belongs.

Table 1 below summarizes the various discourse functions which the discourse connective *however* fulfils in the different syntactic positions described in this section. Taking a function-to-form approach (in line with FDG and SFG), the present paper argues that the formal (in particular the syntactic) properties of the discourse connective *however* do not just correlate with the various discourse-pragmatic functions in a parallel manner, as may be assumed from the arrangement of the columns in Table 1. Instead, it is the speaker or writer's communicative intention to fulfil particular discourse-pragmatic functions that is taken to trigger a particular syntactic behaviour of *however*. In other words, the speaker or writer's choice of placing *however* in a specific syntactic position is assumed to be functionally motivated, i.e. governed by particular communicative functions and goals. The correspondences between the levels of function and form in the case of the discourse connective *however* will be investigated in Section 4.

4 Meaning-to-form mismatches in FDG and SFG: The case of *however*

As has been illustrated in Section 3.3, speakers place *however* in a particular syntactic position in order to explicitly signal the specific discourse function(s) this connective serves to fulfil in a particular communicative situation, and thus to ensure that their message is understood as intended. As will be shown in the following, the various discourse-pragmatic and rhetorical functions of *however*

Table 1: Discourse functions of *however* in different syntactic positions.

POSITION	FUNCTIONS
INITIAL (= in left periphery)	– signalling contrastive relation between discourse units
POST-INITIAL (= between initial adjunct and subject / between subject and verb)	– signalling contrastive relation between discourse units – putting emphasis on initial element (i.e. theme) within discourse unit – indicating topic shift in discourse
MEDIAL (= between auxiliary and main verb / between verb and complement)	– signalling contrastive relation between discourse units – putting emphasis on following element (i.e. rheme) within discourse unit – separating given and new information
FINAL (= in right periphery)	– signalling contrastive relation between discourse units – expressing self-correction – restricting validity of proposition – anticipating relevant information in further discourse

go hand in hand with mismatches between the levels of function and form. Even though inter-level mismatches contribute to a higher degree of opacity in language, it will be argued in this section that in the case of *however* in English, non-transparent relations between meaning and form are functionally motivated. They need to be allowed and accounted for by the rules of grammar in order for the speakers to be able to attain their particular communicative goals and contribute to felicitous communication. In other words, transparency in language sometimes needs to be sacrificed in favour of opacity in order for a speaker's communicative intentions to be achieved. Using the discourse connective *however* as the basis for analysis, Sections 4.1 and 4.2 investigate how meaning-to-form mismatches can be accounted for in FDG and SFG, respectively.

4.1 Meaning-to-form mismatches in FDG

Given that *however* contributes to the construal of discourse coherence but not to the propositional content of a particular discourse unit, this discourse connective is represented at the Interpersonal Level (i.e. as a Move or Discourse Act operator) but not at the Representational Level in FDG. In other words, the pragmatic representation of *however* at the Interpersonal Level can be said to circumvent the Representational Level (due to its lack of conceptual meaning), thus being sent directly from the Interpersonal to the Morphosyntactic Level via the operation of Morphosyntactic Encoding (see Hengeveld and Mackenzie 2008: 25). The task of

the Morphosyntactic Level is to convert the interpersonal and representational information from the two functional levels into a particular morphosyntactic representation which is supposed to represent the speaker's communicative intentions.

The Morphosyntactic Level is hierarchically organized in that the highest layer at this level, i.e. the Linguistic Expression, typically consists of one or more Clauses, which in turn consist of one or more Phrases, which in turn consist of one or more Words.[7] According to Hengeveld and Mackenzie (2008: 308), "[a] Linguistic Expression is any set of at least one unit that can be used independently; where there is more than one unit within a Linguistic Expression, they will demonstrably belong together morphosyntactically, while, crucially, one is not part of the other". While the grammatical operator *however* is analyzed at the Interpersonal Level as being part of the Move or Discourse Act which it modifies (see Section 3.2), it is analyzed as being syntactically non-integrated at the Morphosyntactic Level, i.e. as not being part of the argument structure of the Clause which it precedes, follows or interrupts. At the Morphosyntactic Level, therefore, *however* is represented as an Adverb Phrase which is dependent on a Clause (because *however* cannot stand on its own) without being a constituent of it, hence its representation as an extra-clausal constituent (see Hengeveld and Mackenzie 2008: 309). Example (13) provides the formal representation of the sentence *However, John was not prepared to die* at the Interpersonal Level (IL) and at the Morphosyntactic Level (ML).

(13) **However**, *John was not prepared to die*.

IL: $(\textbf{contr } A_1)$

ML: $(Le_1: [(\textbf{Advp}_1) (Cl_1)] (Le_1))$
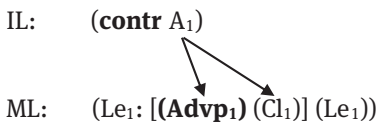
At the Morphosyntactic Level, example (13) is analyzed as a Linguistic Expression Le_1, which is a combination of two units (i.e. *however* on the one hand and *John was not prepared to die* on the other) from two different layers (i.e. Phrase ($Advp_1$) and Clause (Cl_1)). Given that one Discourse Act at the Interpersonal Level typically corresponds to one Clause at the Morphosyntactic Level (see Keizer 2015: 302), the contr(astive) operator *however* at the Interpersonal Level can be said to trigger a one-to-two mismatch between the Interpersonal and the Morphosyntactic Level.

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7 Clauses may not only consist of Phrases, but also of other Clauses and Words. Phrases may not only consist of Words, but also of Clauses and other Phrases.

More precisely, one Discourse Act at the Interpersonal Level is converted into a Clause and a phrasal extra-clausal constituent at the Morphosyntactic Level, as is illustrated by means of arrows in (13). This meaning-to-form mismatch between the Interpersonal and the Morphosyntactic Level can be accounted for by the fact that the operator *however* is actually required to be syntactically non-integrated (i.e. outside the clause to which it is attached) in order to be positionally mobile and thus able to fulfil the various discourse-pragmatic functions discussed in Section 3.3.

At the layer of the Linguistic Expression, FDG makes a distinction between three positions in which linguistic units can be placed, i.e. a preclausal position (P^{pre}), a clausal position (P^{centre}) and a postclausal position (P^{post}). In accordance with its overall hierarchical, top-down organization, FDG assumes that operators and modifiers at higher layers in the hierarchy (e.g. Move or Discourse Act operators) are put into the appropriate clausal (or extra-clausal) positions before operators and modifiers at lower layers (see Hengeveld and Mackenzie 2008: 311; Keizer 2015: 186). Moreover, it is assumed that operators and modifiers are "ordered in a centripetal manner, starting from the outside and then gradually moving inwards" (Keizer 2015: 187–188). This means that the relatively highest operator or modifier is to be placed in the outermost non-clausal position of a Linguistic Expression (i.e. P^{pre} or P^{post}), whereas operators and modifiers at lower layers in the hierarchy are placed in more central syntactic positions (see Hengeveld and Mackenzie 2008: 313; Keizer 2015: 188). Given that *however* is classified as an operator at either of the two highest layers in the hierarchy (i.e. Move or Discourse Act), this discourse connective is assumed to typically occur in preclausal position.

The centripetal organization of operators and modifiers claimed by FDG can indeed be said to apply when *however* functions as an operator at the layer of the Move (see (1) in Section 3.2). In this case, the operator has a more global linking function (see Lenk 1998) in that it has scope over larger stretches of discourse (i.e. all Discourse Acts within a Move) rather than just over a single Discourse Act. According to Hengeveld and Mackenzie (2008: 60), Move operators such as *however* "are typically constrained at the Morphosyntactic Level to appear either Move-initially or towards the beginning of the Move", which is in line with the centripetal organization described above. This constraint on the placement of the Move operator *however* at the Morphosyntactic Level can be accounted for in terms of the scope of the operator and the processing efforts on the part of the reader or hearer: As has been shown in Section 3.3, one of the main functions of discourse connectives such as *however* is "to facilitate the listeners' or readers' comprehension of the progression of discourse" (Altenberg 2006: 11) by explicitly signalling the semantic relation between two (or more) discourse units. Process-

ing efforts on the part of the reader or hearer are considerably reduced when the discourse connective is placed in preclausal/left-peripheral position, i.e. between the immediately preceding discourse unit and the discourse unit introduced by the connective. Given that it is more challenging for the reader or hearer to process the semantic relationship between two entire Moves (i.e. two relatively large discourse units) than to process the relation between two single Discourse Acts (i.e. two relatively small discourse units), speakers can be expected to use *however* as a Move operator in preclausal position in order to make their communicative intention (i.e. to express a contrastive relation between two Moves) explicit and to avoid misunderstandings. It can thus be concluded that the wider the scope of *however*, the higher is the processing effort on the part of the reader or hearer and, hence, the more restricted is the operator with regard to its positional mobility (i.e. restricted to preclausal/left-peripheral position).

When *however* is used as an operator at the layer of the Discourse Act, the centripetal organization at the Morphosyntactic Level does not necessarily apply since the operator is no longer constrained to occur in preclausal position. Instead, as has been shown in Section 3.3, *however* has come to be used not only in the left periphery of a clause, but also clause-medially as well as in postclausal (i.e. right-peripheral) position. This positional flexibility of the Discourse Act operator *however* at the Morphosyntactic Level can be accounted for in two ways: On the one hand, while *however* as a Move operator is restricted to preclausal position due to its wider scope and the higher processing effort on the part of the reader or hearer, the semantic relation between two single Discourse Acts is less challenging to process by the reader or hearer due to the narrower scope (i.e. the more local function; see Lenk 1998) of the operator, which allows *however* as a Discourse Act operator to be positionally more mobile. On the other hand, the Discourse Act operator *however* does not only have a linking function (i.e. signalling a contrastive relation between two Discourse Acts), but it may also serve to put emphasis on particular elements within the Discourse Act of which it is part. Depending on which elements within a Discourse Act the speaker wants to emphasize, the Discourse Act operator *however* is required to be either preceded or followed by the emphasized elements at the Morphosyntactic Level. Thus, the default centripetal organization of operators at the Morphosyntactic Level needs to be violated in the case of the Discourse Act operator *however* in order for the speakers to be able to achieve their particular communicative goals (i.e. expressing contrast *and* emphasis) by using this particular connective.

When speakers aim to exclusively signal a contrastive relation between two Discourse Acts by means of the Discourse Act operator *however*, they place it in preclausal position of the Linguistic Expression at the Morphosyntactic Level, which results in a one-to-two mismatch between the Interpersonal and the Mor-

phosyntactic Level (see (13) above). When speakers aim to both signal a contrastive relation between two Discourse Acts and put emphasis on the initial element (e.g. the subject or a spatial/temporal adjunct) of the Clause to which *however* is attached, the corresponding representation at the Interpersonal Level does not only include a contrastive operator at the layer of the Discourse Act (i.e. *however*), but also an emphatic operator which is taken to scope only over the unit that is to be emphasized (i.e. the corresponding Subact within the main Discourse Act). At the Morphosyntactic Level, the Adverb Phrase *however* is thus placed in clause-medial position (i.e. in P^{centre}) without being a constituent of the Clause to which it is attached,[8] while the emphasized element is placed immediately before *however*. This analysis is illustrated in the following formal representations of examples (14) and (15), which have been taken from examples (5) and (6) in Section 3.3, respectively:

(14) *By the end of the 1980s, **however**, the position had been reversed [. . .].*
IL: (**contr** A_1: [(F_1) (P_1)$_S$ (P_2)$_A$ (C_1: [(T_1) (emph R_1) (R_2)] (C_1))] (A_1))

ML: (Le$_1$: [(Cl$_1$) **(Advp$_1$)** (Cl$_1$)] (Le$_1$))

(15) *Other members of his government, **however**, saw considerable advantages in developing a European nuclear deterrent [. . .].*
IL: (**contr** A_1: [(F_1) (P_1)$_S$ (P_2)$_A$ (C_1: [(T_1) (emph R_1) (R_2)] (C_1))] (A_1))

ML: (Le$_1$: [(Cl$_1$) **(Advp$_1$)** (Cl$_1$)] (Le$_1$))

While *however* in (14) and (15) has a contrastive meaning within the Discourse Act which it belongs to (hence its function as a contrastive operator at the layer of the Discourse Act), it additionally triggers the use of an emphatic operator (at the layer of the Subact of Reference) which puts emphasis on the Referential Subact (R_1) corresponding to *By the end of the 1980s* in (14) and *Other members of his government* in (15). At the Morphosyntactic Level, examples (14) and (15) are analyzed as combinations of a Clause Cl$_1$ (i.e. *By the end of the 1980s, the position*

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8 Keizer (2018: 82) has recently suggested to add the extra-clausal position Interpolated (P^{int}) to the model in order to account for syntactically non-integrated modifiers in clause-medial position.

had been reversed in (14) and *Other members of the government saw considerable advantages in developing a European nuclear deterrent* in (15)) and the Adverb Phrase (Advp$_1$) *however*. As in (13) above, the operator *however* can thus be said to trigger a quantitative meaning-to-form mismatch between the Interpersonal and the Morphosyntactic Level in that one Discourse Act at the Interpersonal Level is converted into both a clausal and a phrasal constituent at the Morphosyntactic Level.

When speakers aim to both express a contrastive relation between two Discourse Acts and put additional emphasis on the final element (i.e. the Focus position) of the Clause to which *however* is attached, the corresponding representation at the Interpersonal Level does again include a contrastive operator at the layer of the Discourse Act (i.e. *however*) and an emphatic operator at the layer of the Subact. At the Morphosyntactic Level, the Adverb Phrase *however* is again placed in P^{centre} (with either auxiliary and main verb or main verb and complement being placed around it), while this time the emphasized element is placed after *however*. This is illustrated in the following formal representations of examples (16) and (17), which have been taken from examples (7) and (8) in Section 3.3, respectively:

(16) *The lessons have, **however**, been <u>inconclusive</u>.*
IL: (**contr** A$_1$: [(F$_1$) (P$_1$)$_S$ (P$_2$)$_A$ (C$_1$: [(T$_1$) (<u>emph</u> T$_2$) (R$_1$)] (C$_1$))] (A$_1$))

ML: (Le$_1$: [(Cl$_1$) **(Advp$_1$)** <u>(Cl$_1$)</u>] (Le$_1$))

(17) *The war brought, **however**, <u>a number of naval victories</u> [. . .].*
IL: (**contr** A$_1$: [(F$_1$) (P$_1$)$_S$ (P$_2$)$_A$ (C$_1$: [(T$_1$) (R$_1$) (<u>emph</u> R$_2$)] (C$_1$))] (A$_1$))

ML: (Le$_1$: [(Cl$_1$) **(Advp$_1$)** <u>(Cl$_1$)</u>] (Le$_1$))

In example (16), the emphatic operator puts emphasis on the Ascriptive Subact (T$_2$) corresponding to *inconclusive*, whereas in (17), it operates at the layer of the Subact of Reference (R$_2$) corresponding to *a number of naval victories*. Moreover, as in the preceding examples discussed in this section, there is a one-to-two mismatch between the Interpersonal and the Morphosyntactic Level in (16) and (17), with one Discourse Act at the Interpersonal Level being converted into both a clausal and a phrasal constituent at the Morphosyntactic Level.

Finally, speakers place *however* in postclausal position (i.e. in the right periphery of the Linguistic Expression to which it belongs) when they aim to both express a contrastive relation between two Discourse Acts and emphasize that the information provided in the further discourse is relevant to the interpretation of the discourse.[9] In this case, *however* can be said to fulfil both a contrastive and an emphatic function at the layer of the Discourse Act, and is thus represented as both a contrastive and an emphatic Discourse Act operator at the Interpersonal Level. This dual role of *however* at the Interpersonal Level triggers the placement of the corresponding Adverb Phrase in postclausal position (i.e. after the Clause to which *however* is attached), which again causes a quantitative meaning-to-form mismatch between the Interpersonal and the Morphosyntactic Level. The formal representation of the Discourse Act *Canada is different, however*, which is taken from example (9), is illustrated in (18) below:

(18) *Canada is different, **<u>however</u>**.*

　　　IL:　　(**contr** + <u>emph</u> A_1)

　　　ML:　　(Le_1: [(Cl_1) **(Advp$_1$)**] (Le_1))
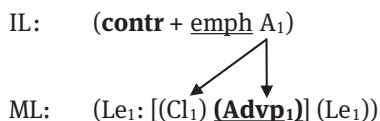
It has been shown in this section that the different syntactic positions *however* can be placed in (i.e. P^{pre}, P^{centre} or P^{post}) depend on both the scope of the operator and the particular discourse-pragmatic functions speakers intend to realize by using this particular connective. The quantitative meaning-to-form mismatches produced between the Interpersonal and the Morphosyntactic Level (see examples (13) to (18)) have been argued to be actually required in order for the speakers to achieve their particular communicative goals.

4.2 Meaning-to-form mismatches in SFG

According to SFG, conjunctive Adjuncts such as *however* are "characteristically thematic" (Halliday and Matthiessen 2014: 110), i.e. they typically occur clause-

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9 It is important to note that the analysis of *however* proposed in this paper is exclusively based on written data from the BNC. As has been discussed in Section 3.3, right-peripheral *however* can be assigned an anticipating function in written English, whereas in spoken discourse, finally placed *however* is more likely used to express self-correction or to restrict the validity of a proposition (see Table 1).

initially and are then analyzed as part of the Theme within the textual metafunction. Halliday and Matthiessen (2014: 89) define the Theme as

> the element that serves as the point of departure of the message; it is that which locates and orients the clause within its context. The speaker chooses the Theme as his or her point of departure to guide the addressee in developing an interpretation of the message; by making part of the message prominent as Theme, the speaker enables the addressee to process the message.

SFG makes a distinction between three types of Theme, i.e. topical, interpersonal and textual. The topical Theme is the first element in the clause which expresses some ideational meaning, i.e. which serves speakers to construe their experience of the world. In declarative clauses, the topical Theme is typically the subject of the clause (in which case the topical Theme is unmarked), but it can also be realized by a circumstantial Adjunct as in (5) and (10) above (in which case the topical Theme is considered marked). The interpersonal Theme is typically realized by linguistic elements which serve speakers to either comment on the propositional content of the clause (e.g. comment Adjuncts such as *sadly*, *luckily*, *surprisingly* etc.) or establish, maintain and negotiate social relationships with the addressee (e.g. vocatives such as *Sir*, *Mr Carmichael*, *John* etc.). The textual Theme, finally, is typically realized by conjunctions or conjunctive Adjuncts, whose main function is to relate the clause in which they occur to the preceding text. While any Theme of a clause consists of a topical Theme, interpersonal and textual Themes may optionally precede the topical Theme in order to form a so-called *multiple Theme*. An instance of a multiple Theme containing a textual and an unmarked topical Theme can be found in example (4) in Section 3.3, the final part of which is repeated here as (19):

(19) ***However**, the museum plans to display it in the spring in the Egyptian galleries*.

However	*the museum*	*plans to display it in the spring in the Egyptian galleries*
textual Theme	topical Theme	Rheme
	multiple Theme	

Even though the thematic position (i.e. realization as a textual Theme within the textual metafunction) has been claimed to be the default position for conjunctive Adjuncts, it has been shown throughout the present study that *however* is positionally quite mobile and can be used in various other (i.e. non-thematic) positions. The use of *however* in these non-default positions can be accounted for by the different discourse-pragmatic functions a speaker intends to fulfil by using this particular conjunctive Adjunct (see Table 1 in Section 3.3). When *however* is used in post-initial

position, i.e. immediately following the topical Theme of a clause, it is classified in an SFG analysis as being part of the Rheme, which "is usually defined by exclusion, as everything that is *not* part of the Theme, or as what remains once the Theme has been identified" (Dupont 2015: 92; emphasis in original). However, such an analysis does not do justice to the important discourse-pragmatic functions *however* fulfils in post-initial position (i.e. signalling contrastive relation between discourse units, putting emphasis on topical Theme, indicating topic shift in discourse). Thus, rather than being relegated to the general, ill-defined category *Rheme*, *however* in post-initial position can alternatively be analyzed as being part of what Gómez-González (1998, 2001) has termed *extended multiple Theme*, i.e. a topical Theme which co-occurs "with pre-topical and/or post-topical textual and/or interpersonal elements" (Gómez-González 1998: 81). Such an analysis is illustrated in examples (20) and (21) below, which have been taken from examples (5) and (6) in Section 3.3, respectively:

(20) *By the end of the 1980s, **however**, the position had been reversed, with calls on older workers to remain in employment for as long as possible.*

By the end of the 1980s	***however***	*the position had been reversed, with calls on older workers to remain in employment for as long as possible*
topical Theme (marked)	**textual Theme**	Rheme
extended multiple Theme		

(21) *Other members of his government, **however**, saw considerable advantages in developing a European nuclear deterrent, based on pooling British and French nuclear know-how and resources.*

Other members of his government	***however***	*saw considerable advantages in developing a European nuclear deterrent, based on pooling British and French nuclear know-how and resources*
topical Theme (unmarked)	**textual Theme**	Rheme
extended multiple Theme		

Examples (20) and (21) can be said to be marked in several respects. First of all, the conjunctive Adjunct *however* does not occur in the default position before the topical Theme but post-initially (i.e. after the topical Theme), where it serves the speaker to realize particular discourse-pragmatic functions. Secondly, while the topical Theme usually correlates with given information and the Rheme with new information

(with regard to what has come before), examples (20) and (21) provide a shift in topic (with new information in thematic position) and can thus be regarded as marked. This topical shift is additionally highlighted by the use of *however* in post-initial position. Finally, example (20) is marked in yet another way, i.e. by having a marked topical Theme (in this case the circumstantial Adjunct *by the end of the 1980s*) instead of an unmarked one (as in (21)).

When *however* is used in clause-medial position, i.e. either between the auxiliary and the main verb (as in (7)) or between the verb and the complement of a clause (as in (8)), it is classified in an SFG analysis as being part of the Rheme, which contains everything that is not the Theme. Again, given the important discourse-pragmatic functions *however* fulfils in clause-medial position (i.e. signalling contrastive relation between discourse units, putting emphasis on Rheme, separating given and new information), I would like to suggest that the conjunctive Adjunct *however* in clause-medial (i.e. rhematic) position be analyzed as a particular type of Rheme called *textual Rheme* (by analogy with the use of *however* as textual Theme in thematic position). One of the main functions of this textual Rheme is to put additional emphasis on the rest of the Rheme of the clause, which can thus – by analogy with the marked Theme – be called *marked Rheme* (Taglicht 1984: 23–25). This analysis is illustrated in examples (22) and (23) below, which have been taken from examples (7) and (8) in Section 3.3, respectively:

(22) *The lessons have, **however**, been inconclusive.*

The lessons	*have*	***however***	*been inconclusive*
topical Theme	Rheme	**textual Rheme**	Rheme (marked)

(23) *The war brought, **however**, a number of naval victories [. . .].*

The war	*brought*	***however***	*a number of naval victories [. . .]*
topical Theme	Rheme	**textual Rheme**	Rheme (marked)

Finally, when *however* is used in clause-final (i.e. right-peripheral) position, it is again analyzed as being part of the Rheme in an SFG analysis (without any further subcategorization at the textual level), even though Halliday and Matthiessen (2014: 158) assign conjunctive Adjuncts in clause-final position a separate function, i.e. that of Afterthought, at the interpersonal level. Thus, by analogy with the analysis in (22) and (23), I would like to suggest that the conjunctive Adjunct *however* in clause-final position be analyzed as a textual Rheme at the textual level (with different discourse-pragmatic functions; see Table 1 in Section 3.3). This is illustrated in examples (24) and (25) below, which have been taken from examples (9) and (12) in Section 3.3, respectively:

(24) *Canada is different, **however**.*
      *Canada   is different   **however***
      topical Theme   Rheme   **textual Rheme**

(25) *Guardian readers were exceptional, **however**.*
      *Guardian readers   were exceptional   **however***
      topical Theme   Rheme   **textual Rheme**

The preceding analysis of the relation between the different syntactic positions of *however* and the textual metafunction has shown that the use of this conjunctive Adjunct in its qualitatively default (i.e. clause-initial) position has been acknowledged in SFG by assigning it the function of textual Theme. By contrast, *however* has not (yet) been recognized accordingly in its use in qualitatively non-default (i.e. non-initial) positions, in which case it is relegated to the ill-defined and understudied category *Rheme* rather than being assigned a function of its own at the textual level.[10] It has therefore been suggested in this section that *however* be analyzed as a particular type of Rheme (i.e. a textual Rheme) when it occurs clause-medially or clause-finally, thus doing justice to the important discourse-pragmatic functions *however* fulfils in these non-initial positions.

5 Comparison of FDG and SFG with regard to *however*

Both FDG and SFG adopt a structural-functional approach to language in that linguistic structure is taken to be shaped by particular communicative goals speakers aim to achieve when using language. Nevertheless, as has been shown in the previous sections, the two theories differ from each other both with regard to how the levels of function and form are related to each other and, consequently, with regard to the analysis of the discourse connective *however*. In the current version of FDG (Hengeveld and Mackenzie 2008; see also Keizer 2015), *however* is analyzed as an operator at the Interpersonal Level which serves the basic function of expressing contrast, either between two Discourse Acts or between two

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10 While there has been previous research on rhematic elements based on both SFG (e.g. Fries 1992, 1994, 2002) and other theoretical frameworks (e.g. Firbas 1992, 1995), the Rheme in the current version of SFG (Halliday and Matthiessen 2014) remains underspecified.

Moves (depending on the scope of the connective). In Section 4.1, *however* in its function as a Discourse Act operator has been shown to additionally trigger the use of an emphatic operator within the Discourse Act of which it is part (at the layer of the Subact), which is reflected in the placement of *however* in particular syntactic positions at the Morphosyntactic Level. In the current version of SFG (Halliday and Matthiessen 2014), *however* is classified as a conjunctive Adjunct which is analyzed within the textual metafunction either as a textual Theme (when it occurs in clause-initial position) or as part of the Rheme (in all other syntactic positions). However, given the important discourse-pragmatic functions *however* fulfils in non-initial (i.e. post-initial, medial and final) positions (see Table 1 in Section 3.3), it has been suggested in Section 4.2 that this connective be analyzed as a particular type of textual element (i.e. either as a textual Theme within an extended multiple Theme in post-initial position, or as a textual Rheme in clause-medial and clause-final positions) rather than being relegated to the general and ill-defined category *Rheme*.

Despite the lack of a more fine-grained categorization of the Rheme (by analogy with the tripartite classification of the Theme into textual, interpersonal and topical) in the current version of SFG, this theory assigns discourse connectives such as *however* an important role in the model, which is due to SFG's strong focus on how individual clauses combine in order to create text. Thus, while SFG considers the text as a whole (rather than the individual clause) to be the object of linguistic description, FDG "is not a 'discourse grammar' in the sense of a grammar of discourse" (Hengeveld and Mackenzie 2008: 29), focusing instead on the Discourse Act, i.e. "the *minimal* unit of communication" (Hengeveld and Mackenzie 2008: 29; emphasis in original), as the basic unit of analysis. It will be argued in the following that the analysis of *however* in SFG may serve as the basis for an alternative categorization of *however* in FDG.

By providing *however* in left-peripheral (i.e. clause-initial) position with a category in its own right (i.e. textual Theme within the textual metafunction), SFG acknowledges the important role this connective plays in the development of the text as a whole. Setting up a contrastive relationship between a preceding discourse unit and the discourse unit it is attached to, and thus contributing to the construal of discourse coherence, initially placed *however* can be argued to serve as a separate, identifiable unit of communicative behaviour (see Kroon 1995: 65). This would then lead to the classification of left-peripheral *however* as a separate Discourse Act in an FDG analysis. Thus, rather than functioning as an operator at the layer of the Discourse Act, *however* can be said to fulfil a subsidiary function (i.e. as a Subsidiary Discourse Act) with regard to the Discourse Act it is attached to (i.e. the Nuclear Discourse Act). More precisely, the Subsidiary Discourse Act *however* has scope over the entire Nuclear Discourse Act and can

be said to be related to it by means of the rhetorical function Contrast (Contr).[11] The classification of *however* as a separate Discourse Act in preclausal position results in a quantitatively transparent (i.e. two-to-two) correspondence between the Interpersonal and the Morphosyntactic Level, with two Discourse Acts at the Interpersonal Level (i.e. Subsidiary and Nuclear) corresponding to two layers at the Morphosyntactic Level (i.e. Adverb Phrase and Clause). This is illustrated in example (26) below, which provides a slightly modified analysis of example (13) in Section 4.1:

(26)   **However**, *John was not prepared to die.*

      IL: $(M_1: [(\textbf{A}_1)_{\textbf{Contr}} (A_2)] (M_1))$

      ML: $(Le_1: [(\textbf{Advp}_1) (Cl_1)] (Le_1))$
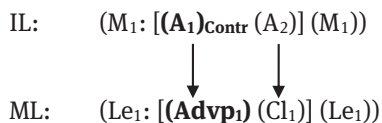
Another reason that speaks in favour of analyzing *however* as a separate (i.e. Subsidiary) Discourse Act when it occurs in preclausal position is that one Discourse Act typically corresponds to one Intonational Phrase at the Phonological Level (see Hengeveld and Mackenzie 2008: 432), thus displaying a quantitatively transparent (i.e. one-to-one) relationship between the Interpersonal and the Phonological Level. Due to its focus on written data, the present paper does not investigate the prosodic features of *however* in any detail.[12] However, it is generally assumed that this connective typically forms an independent intonation unit when it occurs in preclausal position, which is usually reflected in the use of a comma after *however* in writing.[13] Moreover, an intonation boundary after initial *however* serves to disambiguate the use of *however* as a discourse connective from that of a subordinating conjunction (see Quirk et al. 1985: 1101–1102). This analysis of preclausal *however* as a separate Discourse Act that is prosodically detached from the rest of the utterance is in line with Keizer's (2018) study of the interpersonal adverb *frankly*, according to which a distinction is to be made between *frankly* as an interpersonal modifier within a Discourse Act (in which case the adverb is prosodically integrated) and *frankly* as a separate Discourse Act (in which case the adverb is prosodically independent).

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11 Please note that the rhetorical function Contrast does not yet exist in FDG.

12 This issue is beyond the scope of the present paper and needs to be left for future research.

13 A search query performed on the data from the BNC has shown that in initial position (i.e. after a full stop), *however* is followed by a comma in 90 % of all instances in this position, which suggests a strong preference for *however* to be prosodically separated from the rest of the utterance when it occurs in left-peripheral position.

With regard to the other syntactic positions in which *however* can occur, the analysis in Section 4 has shown that the scope of *however* in post-initial and medial position is more specific than its scope in initial position. More precisely, while post-initial and medial *however* can still be said to have a contrastive meaning within the Discourse Act which they belong to (which justifies their function as contrastive operator at the layer of the Discourse Act), they additionally trigger the use of an emphatic operator within the corresponding Discourse Act (at the layer of the Subact) which puts emphasis on the Referential or Ascriptive Subact either immediately preceding or following *however* (see examples (14) to (17) in Section 4.1). Another reason which suggests two different analyses for post-initial and medial *however* on the one hand (i.e. as a Discourse Act operator) and for preclausal *however* on the other (i.e. as a separate Discourse Act; see example (26) above) is their varying prosodic realization: *However* in post-initial and medial position seems to be prosodically more integrated into the Intonational Phrase encoding the corresponding Discourse Act (see Hengeveld and Mackenzie 2008: 432–433) than preclausal *however*, which tends to be prosodically independent. These tendencies certainly need to be verified by means of authentic data of spoken language in order for more reliable claims to be made concerning the prosodic features of *however* in different syntactic positions.

6 Conclusion

The main aim of this paper has been to provide an explanation for why mismatches (i.e. quantitatively non-transparent correspondences) between the levels of function and form are allowed by the rules of grammar, and how they can be accounted for in the models of FDG and SFG. Taking a function-to-form approach and using the English discourse connective *however* as the basis for analysis, the present study has argued that the different formal features of *however* identified in previous research (i.e. syntactic non-integration and positional mobility) are shaped by the particular communicative goal(s) speakers aim to achieve by using this particular connective. The various discourse-pragmatic and rhetorical functions of *however* have been shown to give rise to quantitative mismatches at the interface between the levels of function and form. Even though inter-level mismatches contribute to a higher degree of opacity in language, it has been argued in the present paper that in the case of *however* in English, speakers exploit – in Gricean parlance – quantitatively non-transparent (i.e. non-one-to-one) meaning-to-form relations in order to ensure that their message is understood as intended and their communicative goals attained. In other words, transparency

in language sometimes needs to be sacrificed in favour of opacity in order for a speaker's communicative intentions to be achieved.

In order to specify the exact nature of the interfaces between the different levels of linguistic organization, further research is required. First of all, while the analysis provided in the present paper has been limited to mismatches between the levels of function and form, mismatches at other types of interface (i.e. function-to-function and form-to-form) need to be accounted for as well in future research. Secondly, future research needs to take into account not only quantitatively non-transparent (i.e. non-one-to-one) inter-level correspondences (which have been the primary focus of this paper), but also qualitative mismatches (see Contreras-García 2013). Thirdly, given that the focus of the present paper has been on one discourse connective only (i.e. *however*), empirical research on other discourse connectives in English is clearly called for in order to provide a more comprehensive picture of both quantitative and qualitative inter-level mismatches. Finally, as has been suggested in the analysis of *however* within the framework of SFG, the ill-defined and understudied category *Rheme* within the textual metafunction needs to be revised and refined in order to be able to appropriately account for the important discourse-pragmatic functions *however* fulfils in non-initial (i.e. non-thematic) positions. In view of Hengeveld and Mackenzie's (2008: 42) claim that future studies on the interfaces between the different levels of representation will be "[o]f particular interest for the further advancement of FDG", the analysis of meaning-to-form mismatches with regard to the English discourse connective *however* provided in the present paper has aimed to make its contribution to this enterprise. FDG's top-down, function-to-form approach has been shown to be particularly useful in explaining that in the case of *however* in English, mismatches at the interface between the levels of function and form are motivated by the speaker's communicative goals and thus allowed and tolerated by the rules of grammar.

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