http://dx.doi.org/10.1590/0102-445079408678625808

Modularity and derivation in Functional Discourse Grammar

Modularidade e derivação na Gramática Discursivo-Funcional

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ABSTRACT

Functional Discourse Grammar (FDG) is a typologically-based theory of language structure which is organized in levels, layers and components. In this paper, I will claim that FDG is modular in Sadock's sense, as it presents four independent levels of representation with their own linguistic primitives each. For modular grammars, the relation between the different levels (more technically, the nature of the interfaces) is a central issue. It will be shown that FDG is a top-down grammar which follows two basic principles in its dynamic implementation: Depth-first and Maximal depth. Together with external constraints, these principles conspire to create linguistic representations which are psychologically adequate and which allow levels to be circumvented if necessary, thus simplifying representations and creating mismatches among them.

Key-words: *Functional Discourse Grammar; modularity; mismatch; derivation.*

RESUMO

A Gramática Discursivo-Funcional (GDF) é uma teoria tipologicamente fundamentada da estrutura linguística organizada em níveis, camadas e componentes. Neste trabalho, defendo que a GDF é uma teoria modular no sentido proposto por Sadock, uma vez que apresenta quatro níveis independentes de representação, cada qual com seus primitivos linguísticos. Nas gramáticas modulares, a relação entre os diferentes níveis (mais especificamente, a natureza das interfaces) é uma questão central. Assim, pretendo demonstrar que a GDF é uma gramática descendente que segue dois princípios básicos para sua implementação dinâmica: profundidade primeiro e profundidade máxima. Juntamente a restrições externas, esses princípios colaboram para criar representações linguísticas que são psicologicamente adequadas e possibilitam evitar níveis se necessário, simplificando as representações e permitindo seu não alinhamento.

Palavras-chave: *Gramática Discursivo-Funcional; modularidade; não alinhamento; derivação.*

1. Introduction[1]

Sadock (2012: 4) formulates the *Modularity of Grammar Hypothesis*, which states that "grammatical rules of different informational types do not interact". Grammars which comply with this principle are modular *sensu stricto*, since they are organized in independent generative systems which offer different linguistic representations (i.e. semantic, syntactic, phonological, etc.) for a given linguistic expression.

Non-modular theories may also contain different levels of linguistic analysis, but, crucially, they are not independent, as key aspects of one may be derived from the application of principles pertaining to another. Sadock (2012: 7) further argues that, apart from his own Autolexical Syntax, Jackendoff's Parallel Architecture is "the only one […] framework I am aware of" that is also modular in that sense.

1. I am grateful to two anonymous reviewers for useful comments and suggestions.

Functional Discourse Grammar (FDG; Hengeveld and Mackenzie 2008) is a typologically-based theory of language structure which is organized in levels, layers and components. In this paper, I will claim that FDG is also modular in Sadock's sense, as it is organized in four independent levels of representation with their own linguistic primitives each. For modular grammars, the relation between the different levels (more technically, the nature of the interfaces) is a central issue. It will be shown that FDG is a top-down grammar which follows two basic principles in its dynamic implementation: *depth first* and *maximal depth*. These two principles conspire to create linguistic representations which are psychologically adequate and which allow levels to be circumvented if necessary, thus simplifying representations and creating mismatches among them (Contreras-García 2013).

This article is organized as follows. In section 2 I present a brief characterization of the architecture of Functional Discourse Grammar, with special reference to those aspects which will be relevant in the present discussion. Section 3 centres on the notion of modularity and the different interpretations it has received in the linguistic literature. Section 4 argues that FDG is a modular grammar in Sadock's sense, but also notes a crucial difference with both Autolexical Syntax and the Parallel Architecture, namely, the fact that FDG is a directional grammar. Finally, section 5 examines several linguistic phenomena in FDG terms and shows how its directional modular architecture works in analytical practice.

2. Functional Discourse Grammar: general architecture

FDG is committed to the analysis of language from a functional perspective and therefore views language as an instrument of social interaction which must be studied within the context of the strategies which govern its communicative function. In the architecture of the theory, the functionalist stance is reflected in the top-down orientation of the model and in taking the *Discourse Act* (DA) as the basic unit of analysis, which is defined as "the smallest identifiable units of communicative behaviour" (Kroon 1997: 20). It is important to stress that DAs do not correspond to a particular structural unit, as fully communicative utterances may consist of fragments of different sorts.

This makes the sentence or the clause an inadequate basic unit of linguistic analysis.

This top-down directionality is also a reflection of the theory's commitment to cognitive adequacy and was strongly inspired by the psycholinguistic research of Levelt (1989). Figure 1 offers the general organization of FDG (Hengeveld and Mackenzie 2008: 13).

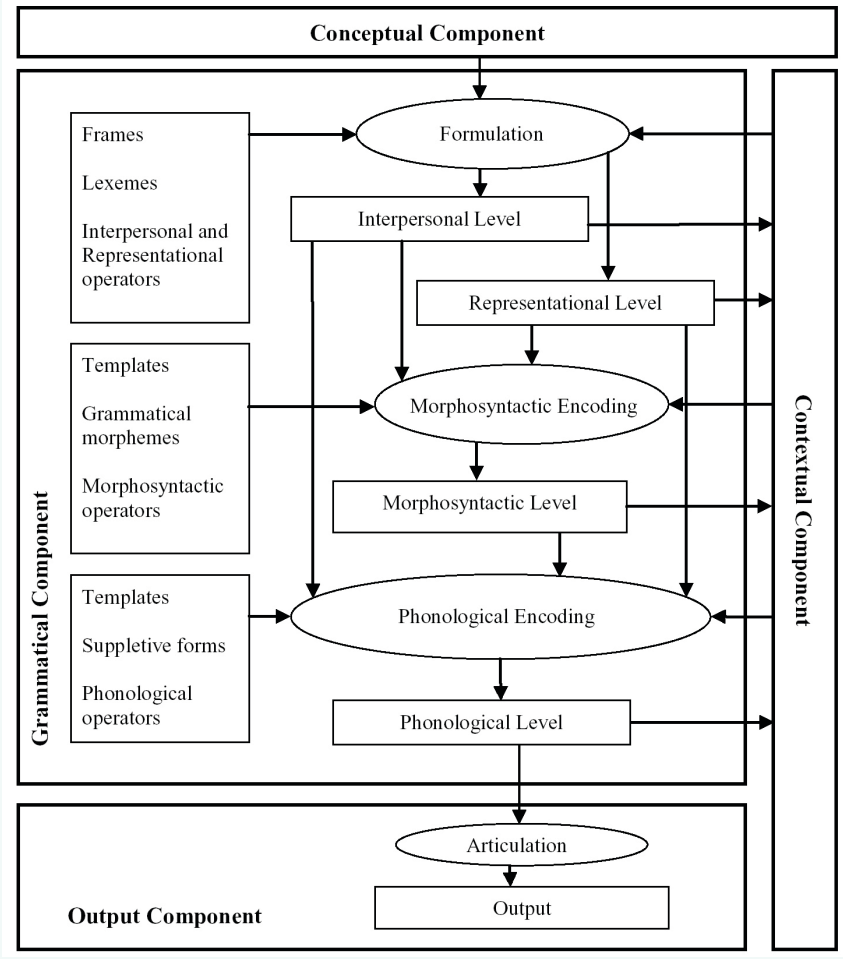

Figure 1 – FDG: general organization.

The rectangles in figure 1 indicate the levels of representation which are produced by the different processes, as represented by ovals. The ovals indicate the operations of *Formulation* and *Encoding* in the creation of a linguistic expression. *Formulation* is the process by means of which pragmatic and semantic representations are produced; at the two encoding stages morphosyntactic and phonological representations are created. The boxes on the left of the figure contain the primitives which are employed by the different operations. Each operation has its own set of primitives in the form of *frames*, *templates* and *operators* (among others).

It should be noted, however, that figure 1 presents a complete theory of verbal interaction of which FDG constitutes the grammatical component. Hence, the three adjacent components, the Conceptual, Contextual and the Output components, are not part of FDG proper, but are included in the theory in the belief that certain grammatical processes can be best explained if reference is made to these components. The Contextual 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 the process of Formulation into relevant representations at the Interpersonal and Representational Levels. Finally, the Output Component is responsible for the actual execution of a linguistic expression through the operation of articulation. Note that this articulation may be of different kinds (written, signed or spoken), depending on the medium of expression chosen.

The grammar component in Figure 1 posits four levels of representation: the Representational Level (RL), the Interpersonal Level (IL), the Morphosyntactic Level (ML) and the Phonological level (PL). These four levels of representation are independently organized but are related to one another, as indicated by the relevant 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: the theory posits a number of layers at each level 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) $(\pi_1\ v_1\text{: [head } (v_1)_\Phi\text{]: [}\sigma\ (v_1)_\Phi\text{]})_\Phi$

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 arguments, in this case the variable of the relevant layer. Finally, 'Φ' represents the function (syntactic, pragmatic or semantic) which a given unit realizes.

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: /i: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.

Once the basic properties of FDG have been introduced, I now turn to examining the notion of modularity in linguistics in order to

evaluate if it can be adequately applied to Hengeveld and Mackenzie's model.

3. What do we mean by modularity?

There are at least two senses of *modularity* which are relevant in the linguistic literature. On the one hand, the grammar component may be seen as an autonomous system whose working principles are independent of those relevant in other cognitive components. This provides a view of the human mind as a modular object, and consequently argues for an interpretation of linguistic competence as a specific object non-reducible to other existing capacities. This perspective is inspired in Fodor's (1983) influential work *The Modularity of Mind* in which he argued that independent modules are defined, among others, by the following essential properties:

- Domain specificity: modules only operate on certain kinds of inputs–they are specialised.
- Informational encapsulation: modules need not refer to other psychological systems in order to operate.

The modularity of the mind hypothesis is fully consistent with the Chomskyan view on language, in which the grammar is autonomous as its organizational principles and properties are in no significant way derived from semantic and/or pragmatic principles. As noted by Newmeyer (1998), formalist models which accept the autonomy of syntax hypothesis also accept the autonomy of grammar by definition, and thus the existence of a specialized linguistic mental module is a natural conclusion.

Cognitive-functional models, by contrast, tend to adopt an integrative approach and typically reject the modularity of the mind hypothesis. Consider the following quote from Langacker (1987: 13):

> Language is an integral part of human cognition. An account of linguistic structure should therefore articulate with what is known about cognitive processing in general, regardless of whether one posits a special language "module" (Fodor 1983). If such a faculty exists, it is nevertheless embedded

> in the general psychological matrix, for it represents the evolution and fixation of structures having a less specialized origin. (…) Thus we have no valid reason to anticipate a sharp dichotomy between linguistic ability and other aspects of cognitive processing.

However, it is certainly possible to accept the autonomy of grammar without accepting the autonomy of the syntax component (within grammar), so it is not the case that all functional models reject the modularity of the mind downright. Newmeyer (1998: 25) cites Van Valin's Role and Reference Grammar and Dik's Functional Grammar as such theories, given that they propose a "semiotic system (…) in which there is no clear separation of semantic and syntactic primitives".

As mentioned earlier, FDG is defined as the grammatical component of a wider theory of verbal interaction. The outer components (Contextual, Conceptual and Output) are non-linguistic, that is, they do NOT belong to FDG proper. Consequently, FDG seems to assume that grammar is an independent module or at least the theory remains agnostic about the issue.

A second sense of modularity pertains to the organization of grammar in independent internal components, which can be seen as autonomous objects within the entire grammatical system. This interpretation of modularity is explicitly formulated by Sadock (2012: 4) with the following principle which defines the fundamental property of a modular grammar architecture:

The Modularity of Grammar Hypothesis

Grammatical rules of different informational types do not interact.

Sadock himself notes that "[t]his extends Jerry Fodor's (1983) modularity of mind hypothesis to one of his modules: the language faculty."

According to Sadock, then, the essence of a modular grammar is that it should provide a set of independent representations for each linguistic expression. Two extant models, Jackendoff's (1997, 2002)

Parallel Architecture (first named Representational Modularity), and Sadock's (2012) Autolexical Syntax, adopt this architecture. Both Jackendoff and Sadock agree that phonology, syntax and semantics are independent generative systems. In the words of Jackendoff (1997: 40):

> Representational Modularity therefore posits that the architecture of the mind/brain devotes separate modules to these two encodings. Each of these modules is domain-specific (phonology and syntax respectively); and (…) each is informationally encapsulated in Fodor's (1983) sense.

Additionally, Jackendoff (1997: 38) claims that interface modules are crucially needed to check the compatibility of the parallel representations.

> We can regard a full grammatical derivation, then, as three independent and parallel derivations, one in each component, with the derivations imposing mutual constraints through the interfaces.

According to Sadock, if a grammatical theory has an interpretive component in its architecture, it violates *The Modularity of Grammar Hypothesis* given that the operation of one level of representation depends on the previous construction of another. This is the case of Government and Binding theory as presented in Chomsky (1981), whose general architecture is given in Figure 2:

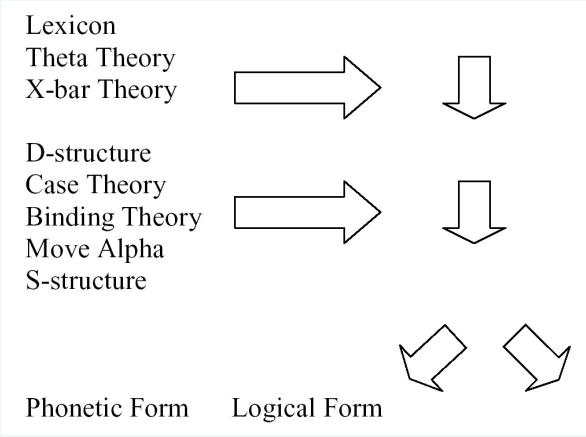

Figure 2 – Government and Binding Theory.

In this model, Phonetic Form (PF) and Logical Form (LF) are interpretive components which operate on previously constructed syntactic representations. Logical Form cannot operate without the previous specification of a syntactic representation and, what is more, the semantic interpretation that LF contributes to the sentence crucially relies on the position of constituents in that syntactic representation.

However, as Escribano (1992) notes, any grammatical theory is modular to some extent, since they all propose the existence of levels and components which, in different ways, deal with the main areas of linguistic analysis (syntax, semantics, etc.). The key factor in his view 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, which allows one of them to overgenerate as long as the rest of them conspire to eliminate ill-formed representations. Figure 2 shows the different sub-theories within GB which impose restrictions on GB derivations. Unlike Sadock, Escribano views this strategy as truly modular given that the different subtheories interact multidimensionally. Models in which modules generate parallel representations are defined by Escribano as "grammars of components".

One consequence of the multidimensional relation between modules is that grammars become more abstract given that the principles they formulate apply to subcomponents whose representations are more distant from observable linguistic forms. The benefit of this strategy, in Escribano's opinion, is that these grammars are more versatile, natural and learnable. The advantage of grammars of components, in turn, is that they produce representations which are simpler and more faithful to actual observable facts. Sadock (2012: 7) adds the following three advantages of the Modularity Hypothesis:

(i) Formalizability

Given that each component or module deals with a different type of information, each representation becomes simpler, which results in an overall simplification of linguistic analyses.

(ii) Concreteness

The facts described by each component are observable, or can be confirmed from intuition (see discussion on Escribano 1992 above).

(iii) Plausibility

A modular approach to grammar is arguably more attractive with respect to psychological adequacy. This is also explicitly advocated by Jackendoff (2002: 196), who claims that "the parallel architecture offers a theoretical perspective that unifies linguistics with psycholinguistics more satisfactorily than has been previously possible."

In the following section, I will examine the extent to which FDG can be considered a modular grammar as characterized in this section.

4. FDG as a modular grammar

In this section, I examine the extent to which FDG complies with Sadock's Modularity Hypothesis and, in particular, whether the FDG architecture is indeed motivated by the desire to meet the advantages which Sadock attributes to modular grammars.

As far as formalizability is concerned, it is probably right to say that each of the four levels of representation that FDG poses deals with its own type of information. The coincidence with Sadock's approach to grammar is explicitly acknowledged by Hengeveld and Mackenzie (2008: 31) who claim that Autolexical Syntax shares "our rejection of a derivational model, our commitment to multiple orthogonal representations of linguistic phenomena, and our interest in mismatches between the levels". In other words, by rejecting a derivational model, Hengeveld and Mackenzie reject the possibility of levels being derived from one another and hence implicitly argue for the independence of representations. The existence of autonomous levels thus allows for the creation of mismatches between representations. Consequently, each level of representation operates with information and units of its own type and cannot affect information from other levels. This is particularly obvious in the distinction between Formulation and Encoding (see section 2). Formulation refers to the process by which relevant semantic

and pragmatic representations are constructed, whereas Encoding relates to the conversion of those into relevant Morphosyntactic and Phonological representations. By definition encoding operations cannot change the semantic and pragmatic properties of expressions, as their role in the grammar is the mere codification of those. As Hengeveld and Mackenzie (2008: 282) observe:

> To some considerable extent, the Morphosyntactic Level is dependent on its input: the input structures provide information to which the Morphosyntactic Level applies its own principles of organization. It must pass on to the Phonological Level an exact coverage of that information, such that an interpreter will be able to reconstruct the input structures exactly. In other words the Morphosyntactic Level cannot add or subtract semantic or pragmatic information.

The independence of levels relevant at Formulation from those relevant at Encoding would seem intuitively obvious, but the autonomy of semantic and pragmatic representations within Formulation requires further argumentation. Hengeveld and Mackenzie (2008: 16) use the following example to illustrate the issue:

(4) a. Sheila is *my best friend.*
(Ascription of Individual entity: T/x)
b. *My best friend* visited me last night.
(Reference to Individual: R/x)

The examples in (4) show that the same semantic unit can be used in two different interpersonal functions, Ascription and Reference. The authors conclude that "[e]xamples like these show that, though there are regular correspondences between the Interpersonal Level and the Representational Level, the two are basically independent of each other, allowing for a wide variety of interactions between them."

Hengeveld and Mackenzie further argue that the postulation of four levels of linguistic analysis allows the anaphoric reference to linguistic information of the four different kinds, which again justifies the analysis of linguistic expressions in terms of independent representations (Hengeveld and Mackenzie 2008: 5).

The notion of "concreteness" in FDG should be understood within the context of the theory's interest in meeting the standard of

psychological adequacy, which also motivates the general top-down architecture of the model. In various passages throughout their book, the authors emphasize that the different levels of representations are linguistic in nature in that they reflect functions and units which are linguistically encoded in the grammar of languages. This, by definition, serves to keep analytical abstraction to the minimum required in linguistic description.

In Functional Grammar, Dik (1997: 18) had warned against what he defined as a "non-empirical attitude towards linguistic analysis" in which it is implicitly assumed that languages are imperfect objects that conceal rather than reveal linguistic structure. Observable differences in languages should be analysed from the starting point that they have some functionality in the system and not from the perspective that they can be reduced to pre-established categories at some abstract level of representation.

Hengeveld and Mackenzie (2008: 40-41) explicitly follow this approach:

> A further crucial aspect of FDG methodology, inherited from its predecessor FG, is that it constrains potential analyses of linguistic phenomena to those that do not involve the postulation of transformations and filters. (…) These two restrictions ensure that no underlying structures arise that are later discarded (…) in this way underlying structures are 'recoverable from their outward manifestations' (Dik 1997a: 23).

Indeed, as a non-derivational theory, FDG does not postulate the existence of hidden-levels of analysis (Jackendoff and Culicover 2005), empty categories, or destructive operations like filters (Dik 1997: 21). In García Velasco et al (2012: 496) we read:

> [FDG] has championed a wysiwyg [what you see is what you get] view of linguistic structure according to which a Linguistic Expression can consist of one or more elements of any unit at the ML and expresses IL and RL representations which do not contain more information than is justified by the actual form under analysis.

Finally, Sadock's notion of "plausibility" is directly touched upon by Mackenzie (2012: 422): "A distinctive advance in the architecture of

FDG is a quite explicit attempt to construct a theory that plausibly lines up with work in the psycholinguistics of language production (…)."

As discussed in section 2, FDG is inspired by the psycholinguistic work of Level (1989). Levelt himself notes that processing components are 'relatively autonomous specialists' in that "a component's input is of maximally restricted sort" and "a component's mode of operation is minimally affected by the output of other components". Levelt matches these restrictions with Fodor's (1983) notion of 'information encapsulation', which again provides indirect evidence to view FDG's levels of representation as autonomous entities.

It would thus seem that the advantages Sadock attributes to modular grammars are in different ways reflected in the FDG architecture and underlie the motivation that led to the postulation of the theory. However, there is one significant difference between FDG on the one hand and Sadock's Autolexical Syntax and Jackendoff's Parallel Architecture on the other. This relates to the notion of "directionality". FDG, it has been said, is a non-derivational grammar, but it has a top-down orientation. Escribano (1992) notes that directionality is a key notion to distinguishing modular from non-modular grammars. If a modular grammar (or grammar of components in his terminology) is one in which different modules interact massively, directionality imposes a restriction on those interactions since by definition it presupposes that one module cannot operate until another module, previous in the implementation, has been constructed. Indeed, in FDG, the operation of Encoding necessarily operates after Formulation processes have taken place (but see section 5). This constrasts with the situation we find in the PA. 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!

It could thus be argued that FDG's encoding levels (Morphosyntax and Phonology) are interpretive in the weak sense that they require formulation

levels be specified in order to operate. This gives the possibilities illustrated in table 1 for the models discussed in this work.

Table 1 – Modularity and directionality in four grammars

	Modular	Directional	Interpretive modules	Destructive interaction
AS	+	-	-	-
PA	+	-	-	-
FDG	+	+	+	-
GB	-	+	+	+

As table 1 indicates, FDG shares with AS and PA its compatibility with Sadock's Modularity Hypothesis, but it differs in that its top-down directionality makes models not fully independent in the dynamic implementation of the grammar. This is the issue to which I turn in the following section.

5. The Dynamic implementation of FDG: Mismatches

Although FDG is presented as a model of encoded patterns and intentions, the theory also holds that the grammar is implemented dynamically. This, however, does not mean that the grammar should be seen as a process model, but, as discussed by Mackenzie (2014: 251), as a reflection of the dynamic sequence of steps taken by the analyst in order to "clarify the logic of the relations among the layers, levels and components and not to mimic the sequence in the real time of language production". There are two principles which operate in this dynamic interpretation of FDG analytical practice and which are relevant to understanding the relation among the different levels of representations. These are the principles of Depth-first and Maximal depth, which are defined as follows:

> • Depth-first: "Information from a certain level is sent down to a lower level as soon as the necessary input for that lower level is complete" (Hengeveld and Mackenzie 2008: 24).

The rationale behind this principle is that it is probably not realistic to assume that the grammar creates or specifies levels of representation

orderly such that one level can not start being constructed until another one has been fully specified.

> • Maximal depth: "The principle of maximal depth states that 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 […] It avoids the vacuous specification of levels of representation that are irrelevant to the production of the utterance at hand". (Hengeveld and Mackenzie 2008: 25)

Ideally, the relations between levels should be isomorphic, so that one unit at a given level correlates with another one at each of the rest of levels. Indeed, there are default relations between layers across levels, as in, for example, the tendency for a Discourse Act to correspond to a State-of-Affairs at RL, a Clause at ML and an Intonational Phrase at PL. The principle of maximal depth, however, states that it is possible to have representations for linguistic utterances in which some levels are not activated (see below).

Additionally, the relations among levels may be affected by external constraints. Hengeveld and Mackenzie (2008: 283) discuss the relation between the Interpersonal and Representational Levels and the Morphosyntactic Level. This relation is governed by three general principles: Iconicity, Domain Integrity and Functional stability.

Iconicity is defined by Newmeyer (1998: 114) as "the idea that the form, length, complexity, or interrelationship of elements in a linguistic representation reflects the form, length, complexity or interrelationship of elements in the concept, experience or communicative strategy that that the representation encodes".

There are different ways in which iconicity manifests itself in linguistic structure, but the most obvious is probably the tendency for clauses to be juxtaposed in accordance with the chronological order of the events they portray. The following example, taken from the advertising campaign for the film "Green card", purposely produces an anomalous effect since the order of the clauses does not meet the expected order of events in real life:

(5) The story of two people who got married, met and then fell in love

Domain Integrity is formulated in Dik (1997: 402) as follows:

The Principle of Domain Integrity

Constituents prefer to remain within their proper domain: domains prefer not to be interrupted by constituents from other domains.

In FDG terms, this principle entails that units that belong together at the IL and RL will tend to be "juxtaposed to one another at the Morphosyntactic Level" (Hengeveld and Mackenzie 2008: 283). Consider the following English examples:

(6) a. a *suitable* actor
b. an actor *suitable for the part*
c. *a *suitable for the part* actor

In (6a) the modifier 'suitable' appears next to the head noun it modifies. There is thus a direct correspondence between the RL and the ML in this example and Domain Integrity is respected. In (6b) 'suitable' is modified by the PP "for the part" and this complex adjectival phrase is placed postnominally. This ensures that Domain Integrity is respected in both domains (the Np and the Ap). The ungrammaticality of (6c) is therefore due to the interruption of the Np, as the adjective is separated from the noun it modifies.

The principle of Functional Stability is characterized as "the requirement that constituents with the same specification, be it interpersonal or representational, be placed in the same position relative to other categories." (Hengeveld and Mackenzie (2008: 286)

These three principles contribute to the notion of grammatical transparency which is characterized as follows (García Velasco et al. 2012: 494):

> Transparency is a variable property of languages or subsystems of languages. Complete transparency is present when, in an FDG analysis, there are one-to-one (or biunique) relations between the component parts of each of the four levels. (…) Nevertheless, in actual fact, languages tend to display various degrees of non-transparency or opacity for various reasons. For example, dummy elements introduced at the ML (such as the existential marker *there*

> in English or the dummy auxiliary *izan* in Basque) reduce the transparency of the relation between ML and the formulation levels, since the elements in question have no meaning and therefore correspond to nothing at the IL or the RL.

In other words, when transparency is not respected, the system produces a mismatch between the levels of representation. This is a crucial question in the implementation of the theory, as Hengeveld and Mackenzie (2008: 42) themselves note:

> Of particular interest for the further advancement of FDG will be future studies on the interface issue, the question of how best to connect the four concurrent representations that characterize the current model. It is to be expected that mismatches across the various levels will be of particular importance in this enterprise.

A recent contribution to this question is to be found in the work of Contreras-García (2013: 87), who defines a mismatch in the following way: "A mismatch arises if the same linguistic element is represented across levels in such a way that a non-isomorphic relation is to be seen."

A mismatch then involves a 'discrepancy' between levels and contributes to a non-transparent relation between them. In the present context, it is crucial to note that for a mismatch to arise, levels necessarily have to be autonomous, which supports the view that FDG is a modular grammar in Sadock's sense. From the previous discussion, it can be proposed that there are, at least, two types of mismatches in FDG: (i) unnecessary levels and (ii) non-biunique relations across levels.

As for levels, the principle of Maximal depth discussed above entails that levels may not be activated if they are unnecessary in the analysis of a particular expression. This means that information from one level of representation may not find a direct correlate in another level. It is difficult to think of a linguistic expression in which one encoding level does not contain any information at all given that an addressee would always need some linguistic form to decode a communicative act. However, it is possible to have linguistic

expressions with no semantic content but with a communicative or interpersonal value only. This is the case of expressives and interactives as in the following examples:

(7) *Ouch!*
$(A_I: [(F_I: /aʊtʃ/_{Int} (F_I)) (P_I)_S] (A_I))$

Congratulations!
$(A_I: [(F_I: /kəŋgrætjuleɪʃnz/(F_I)) (P_I)_S (P_j)_A] (A_I))$

These expressions serve a communicative function, but do not convey literal or denotational meaning of the kind that is captured at the RL. Therefore, the IL as represented in (7) circumvents both the RL and the ML and is directly linked to the Phonological Level.

Non-biunique relations across levels form a second type of mismatch, which relates to the existence of a unit at one level which does not find a direct correlate at another level of representation. Consider the following example:

(8) We've seen him

At the ML, we find the following representation, in which each lexical unit is analysed independently:

(9) $(Cl_i: [(Np_i: we (Np_i)) (Vp_i: [(Gw_i: have (Gw_i))$
$(Vw_i: seen (Vw_i))] (Vp_i)) (Np_i: him (Np_i))] (Cl_i)$

However, in actual speech, it is natural to pronounce the entire sequence as one phonological unit. This is represented in (10) in which (8) appears as one Phonological word (Pw):

(10) $(U_i: [(Pw_i: wɪv'si:nɪm (Pw_i))] (U_i)$

Consequently, morphosyntactic units such as Np, Vp, etc. in (9) are not reflected in a corresponding phonological unit in (10).

Another case which illustrates this issue concerns the analysis of compounding in English. A sequence like, say, 'coffee maker' is

analysed at the RL as the combination of two lexical properties 'make' and 'coffee' within one individual 'x' frame. The entire unit would correspond to a Nominal word (Nw), but the lexical properties do not find a corresponding unit at ML. This is represented in (11):

(11) a. RL: (x_i: (f_i: [(f_j: make (f_j)) (x_j: -coffee- (x_j))$_U$] (f_i)) (x_i))
b. ML: (Nw_i: -coffee maker- (Nw_i))

A more complex case of structural mismatch is illustrated by the phenomenon called raising, which is studied within the context of FDG in García Velasco (2013). As an example of Subject-to-Subject raising, consider the following case:

(12) a. It seems that *the children* are allergic to something
b. *The children* seem to be allergic to something

The italicized subject of the embedded clause in (12a) takes on subject function of the matrix clause in (12b), and the embedded clause becomes infinitival. Morphosyntactically, *the children* behaves as the subject of *seem*, as shown by the fact that both agree in number and that this Np takes preverbal position, which in English is usually reserved for subjects. Semantically, however, it is an argument of the embedded predicate, as it is the predication *to be allergic to something* that imposes semantic restrictions (e.g. <+animate>) on the displaced subject. At the RL, therefore, it is assumed that both expressions present the same analysis (representations are given in simplified form):

(13) (p_i: [(Pres ep_i: [(e_i: [(f_k: [(f_i: seem (f_i))
(p_j: -the children are allergic …- (p_j))] (f_k))] (e_i))] (ep_i))] (p_i))

However, at the Morphosyntactic Level there is a structural mismatch as in (12b), 'the children', a unit which belongs into the embedded proposition at the RL, is now placed in a position external to the corresponding Clause (Cl_j), as shown in (14):

(14) (Cl_i: [(Np_i: -the children- (Np_i)) (Vp_i: seem (Vp_i))
(Cl_j: -to be allergic…- (Cl_j)] (Cl_i))

Raising is an extremely complex phenomenon in which different types of information from different dimensions interact in delicate

ways. This complexity can be illustrated with the situation in the Spanish language. Initially, Subject raising in Spanish would seem to show a pattern similar to the English one. Thus, the examples in (15) would receive a parallel analysis to those of the English examples in (12):

(15) a. Parece que los profesores beben vino
Seem.PRS.3SG that the teacher.PL drink.PRS.3PL wine
'It seems that the teachers drink wine'

b. Los profesores parecen beber vino
The teacher.PL seem.PRS.3PL drink.INF wine
'The teachers seem to drink wine'

However, the language shows one additional possibility, illustrated in example (16):

(16) Los profesores parece que beben vino
The teacher.PL seem.PRS.3SG that drink.PRS.3PL wine
'The teachers seem to drink wine'

In (16) the subject of the embedded clause ('los profesores') takes sentence-initial position, but it still agrees with the verb in the embedded domain. The displaced Np and the rest of the expression are not separated by an intonation break, which is taken by Dik (1981: 176ff.) as evidence against a left-dislocation analysis for parallel examples in European Portuguese. What we thus seem to have here is a mismatch between the ML and the PL. Under the assumption that the displaced Np is phonologically integrated within the main clause, the representation proposed consists of one Utterance (U) containing just one Intonational Phrase (IP):

(17) ((U_i: (IP_i: / los profesores parece que beben vino / (IP_i)) (U_i))

However, at the ML, the raised Np is placed outside the main clause, as it is not morphosyntactically integrated in it, but it appears within the same linguistic expression (Le).

(18) (Le_i: [(Np_i: -los profesores- (Np_i))
(Cl_i: -parece que beben vino- (Cl_i))] (Le_i)

This contrasts with the analysis shown in (14) in which the displaced Np is integrated in the main clause, given that it agrees with the main verb.

6. Conclusion

In this paper, I have examined the architectural organization of Functional Discourse Grammar in the light of Sadock's Modularity Hypothesis. I have claimed that FDG offers a modular architecture which is motivated by the desire to meet psychological plausibility and a self-imposed restriction on the degree of abstraction necessary in linguistic analysis. A crucial difference between FDG and other modular approaches, however, relates to the notion of directionality; whereas models such as Jackendoff's Parallel Architecture are explicitly described as non-directional, FDG is a top-down grammar, which necessarily implies that certain modules (encoding levels) cannot operate until pragmatic and/or semantic representations have been formulated.

A natural consequence of the modular organization of FDG is the existence of discrepancies or mismatches between the levels of representation. In the dynamic implementation of the theory this is also a consequence of the principle of Maximal depth and the complex interaction of external constraints like Iconicity, Domain Integrity and Functional Stability.

Recebido em novembro de 2014
Aprovado em setembro de 2015
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