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# Morphosyntactic Expression in Functional Grammar

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# Dynamic expression in Functional Discourse Grammar

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## 1. Introduction

The aim of this paper is to investigate to what extent the idea of a dynamic expression model, as proposed in Bakker (1999, 2001, this volume) in the context of Functional Grammar, can be applied within Functional Discourse Grammar (FDG) (Hengeveld 2004a, 2004b; Mackenzie & Gómez-González 2004)[1]. The conclusion will be that a dynamic implementation, proposed by Bakker for the expression rule component, is not only relevant to the expression rule component as such, but can be integrated into the model of the grammar as a whole, i.e. including both the process of formulating underlying pragmatic and semantic representations and the process of converting these into morphosyntactic and phonological representations. These four types of representation distinguished within FDG thus all engage in a single dynamic implementation of the grammar. This point will be illustrated through the analysis of three different one-word utterances.

The paper is organized as follows. In section 2 I describe the main properties of FDG that distinguish it from Functional Grammar (FG) (Dik 1997). A significantly updated version of the general architecture of FDG exhibiting these properties is presented in section 3. Subsequently, section 4 defines a number of general principles for the dynamic implementation of FDG, which are then illustrated for the aforementioned one-word utterances in section 5. The paper is rounded off with some general conclusions in section 6.

## 2.   From FG to FDG

### 2.1.   Introduction

Functional Discourse Grammar is a new version of Functional Grammar. FDG shares its functional-typological orientation with FG but differs from it with respect to a number of important basic properties, which are discussed in the following sections: FDG has a top-down organization (2.2); FDG takes the discourse act as the basic unit of analysis (2.3); FDG systematically interacts with a conceptual, a contextual, and an output component (2.4); FDG includes morphosyntactic and phonological representations as part of its underlying structure, rather than as the output of the grammar (2.5).

### 2.2.   Top-down

FDG incorporates the layered hierarchical structure of the clause characteristic of FG, but at the same time is radically different, in the sense that in generating utterances it starts with the encoding of the speaker's intention and then works down to articulation. FG, on the other hand, starts with the selection of lexical items and then gradually expands the underlying structure of the clause. This radical shift is motivated by the assumption that a model of grammar will be more effective the more its organization resembles language processing in the individual. Psycholinguistic studies (e.g. Levelt 1989) clearly show that language production is a top-down process, which starts with intentions and ends with the articulation of the actual linguistic expression. The grammatical production model reflects this process and is organized in a top-down fashion. This does not mean that FDG is a model of the speaker: FDG is a theory about grammar, but one that tries to make use of psycholinguistic evidence in its basic architecture.

Two major operations have to be distinguished in the top-down construction of utterances: FORMULATION and ENCODING. Formulation concerns the rules that determine what constitute valid underlying pragmatic and semantic representations in a language. The rules involved in formulation may be called MAPPING RULES. Encoding concerns the rules that convert these pragmatic and semantic representations into morphosyntactic and phonological ones. The rules involved in encoding may be called EXPRESSION RULES. Encoding in FDG thus roughly corresponds to the

expression rule component in FG. Formulation in FDG has no counterpart in FG, since in FG the validity of underlying representations is generally presupposed.

The top-down organization of the model is a precondition for a grammatical theory that aims at describing discourse units rather than sentences. In a discourse-oriented model the sentence is just one of the options that the speaker has to contribute to the ongoing discourse, hence mapping rules have to precede expression rules. This is the topic of the next section.

### 2.3.   Discourse grammar

#### 2.3.1.   *Units larger than a sentence*

There are many grammatical phenomena that can only be interpreted in terms of units larger than the individual clause or sentence. Examples of this are narrative constructions, the use of discourse particles, anaphorical chains, and tail-head linkage.[2] By way of example, consider the following instance of tail-head linkage in Tidore:

(1)   Tidore (van Staden 2000: 275)
   *... turus   jafa   cahi           saloi   ena=ge       turus*
   ... then   Jafa   carry.on.the.back   basket   3.NH=there   then
   *ena=ge       paka   ine.   Ine   una   oka   koi...*
   3.NH=there   ascend   upwards   upwards   3.SG.M   pick   banana
   '...then Jafa carried the saloi and went upwards. Went upwards he picked the bananas ...'

In many Indo-Pacific languages there are several grammatical phenomena that are a faithful and direct reflection of discourse organization. In Foley's (1986: 176) words: "A text is a coherent linking of clauses and sentences, and this coherence is achieved by rules of the language which state how clauses and sentences can be joined". Example (1) illustrates one of these linking devices offered by the grammar of Tidore. Episodes within stories are often realized as single sentences containing strings of clauses. The sentences (or rather: the episodes contained within them) are linked to each other by means of tail-head linkage: the last verb of the one sentence is repeated as the first verb of the next sentence, as illustrated in (1).[3]

The crucial point here is that, as stated in the quote from Foley (1986), phenomena such as tail-head linkage are governed by rules of the language and thus form part of the grammatical system as it applies to narratives. Grammatical phenomena like these thus clearly show the need for a grammatical model that allows for the treatment of units larger than the individual sentence and of the (discourse) relations that obtain between and within these units.

### 2.3.2. *Units smaller than a sentence*

As argued in Mackenzie (1998), the need for a discourse-oriented grammar also becomes apparent when units smaller than a sentence are considered. The following examples illustrate some types of non-sentential utterances, or HOLOPHRASES:

(2)    *(What are you eating?) A donut.*
(3)    *Congratulations!*
(4)    *Oh John!*

The answer in (2), the exclamation in (3), and the vocative expression in (4) all take a non-sentential form. Yet in the appropriate circumstances they all count as full and complete contributions to the discourse. In fact, any further elaboration of e.g. (2) would lead to an unnatural exchange. Given that in FG (and FDG) the deletion of specified material is disallowed, each of these utterances has to be taken as non-sentential at the level of the underlying representation too, and cannot be interpreted as the reduced version of an underlying complete sentence. The model should thus find a way of dealing with non-sentential utterances which recognizes the fact that they constitute fully grammatical discourse units.

### 2.3.3. *The discourse act*

The conclusion that I draw from the preceding discussion is that the basic unit of discourse is not the sentence but the discourse act. Discourse acts combine into moves, which in turn may enter into larger discourse structures. These larger structures account for the units larger than the individual clause or sentence discussed in 2.3.1 above. On the other hand, dis-

course acts may be manifested in language as sentences, but also as fully grammatical sentence fragments, phrases or words. This is the way in which the units smaller than the individual sentence discussed in 2.3.2 can be handled. The latter point is a crucial one: it requires the grammatical model to be capable of mapping the unit of discourse act onto morphosyntactic units of various kinds. This mapping procedure in turn requires a top-down approach.

Moves and discourse acts are notoriously difficult to define. I here stick to the definitions offered in Kroon (1995: 65-66), who, following Sinclair & Coulthard (1975) defines a move as 'the minimal free unit of discourse that is able to enter into an exchange structure' and a discourse act as 'the smallest identifiable units of communicative behaviour'. Note that a move consists of a single central act, which may be supported by one or more subsidiary acts. For an extensive discussion of the notion of discourse act see Hannay & Kroon (fc.).

### 2.4. Conceptual, contextual and output components

The grammatical component of FDG is linked to a conceptual component, an output component, and a contextual component.

The CONCEPTUAL COMPONENT is not part of the grammar but is the driving force behind the grammatical component as a whole. In fact, one way of interpreting the operation of formulation referred to in 2.2 is that it represents the conversion of a prelinguistic conceptual representation into the linguistically relevant semantic and pragmatic representations that are allowed by the grammar of the language concerned. The conceptual component is responsible for the development of both a communicative intention relevant for the current speech event and the associated conceptualizations with respect to the relevant events in the external real or imaginary world.

Depending on the modality chosen, the OUTPUT COMPONENT generates acoustic, signed, or orthographic expressions. It does so in the operation of ARTICULATION, which is external to the grammatical component as such, but is fully dependent on the information provided by the grammatical component. In the acoustic modality, the operation of articulation takes a phonological (both segmental and suprasegmental) representation as its input and converts this into an acoustic signal, applying the necessary phonological rules.

The CONTEXTUAL COMPONENT contains a description of the discourse domain as it has been built up during the current discourse to the extent that this is relevant to the form that subsequent utterances may take. It does not only contain a description of the content and form of the preceding discourse, but also of the actual perceivable setting in which the speech event takes place. In this way the contextual component helps trigger utterances like the following:

(5)    *I visited Peter in jail yesterday. **He had just been arrested.***

(6)    ***He did it** (pointing at suspect).*

Once a participant has been introduced into the discourse, it can be referred to anaphorically within the same episode. This is illustrated in (5). A participant present within the speech situation can be referred to deictically, as in (6). In both cases a specification of the participant involved is available in the contextual component: in the first case in the description of the preceding discourse, in the second case in the description of the setting of the speech event.

The contextual component is relevant for the description of all languages, but in some languages there are phenomena that demonstrate its relevance quite directly. Some random examples are the use of logophoric pronouns in many African languages, the distinction between anaphoric *ai* 'there' and deictic *'inā* 'there' in Samoan (Mosel & Hovdhaugen 1992: 133), and the use of narrative constructions of various types, reflecting chronological progress within a narrative, in many different languages. For a rather specific example of how the content of the contextual component may affect grammatical choices consider the following example from Spanish:

(7)    *¡Qué pálid-a      est-ás!*
       what  pale-F.SG   COP-IND.PRES.2.SG
       'How pale you look!'

The sentence in (7) is appropriate only when the addressee is female. Hence the contextual information about the identity of the speech participants is directly relevant to the form the predicative adjective takes.

## 2.5. Levels of representation

In FG, underlying structures contain an interpersonal (pragmatic) and a representational (semantic) level of representation. FDG adds additional structural and phonological levels to these underlying representations, which contain morphosyntactic and phonological representations, respectively. One of the reasons to do so is that anaphoric reference is possible to all of these levels of linguistic organization. This means that these levels should be available as potential antecedents in underlying representations. Consider the following examples:

Interpersonal level
(8)    A. *Get out of here!*
       B. *Don't talk to me like **that**!*

Representational level
(9)    A. *There are lots of traffic lights in this town.*
       B. *I didn't notice **that**.*

Structural level
(10)   A. *I had* chuletas de cordero *last night.*
       B. *Is **that** how you say 'lamb chops' in Spanish?*

Phonological level
(11)   A. *I had* /tʃuletɑs#de#kordero/ *last night.*
       B. *Shouldn't **that** be* /tʃuletɑs#de#θordero/?

In (8B) the anaphoric element *that* refers back to the communicative strategy chosen by A, which is indicative of the presence of an interpersonal level in the underlying representation of (8A). In (9B) *that* refers back to the situation in the external world that is described within (9A). This purely semantic reference shows that the underlying representation of (9A) contains a representational level of organization.

The anaphoric references in (10B) and (11B) are of a different nature since they are metalinguistic in nature. They are instances of REFLEXIVE LANGUAGE (Lucy ed. 1993) or MESSAGES ABOUT THE CODE (Jakobson 1971). In (10B) *that* does not refer to the entity described by *chuletas de cordero* but to the phrase 'chuletas de cordero' as such. This phrase is a morphosyntactic unit, hence the conclusion must be that this phrase is pre-

sent in underlying structure and can therefore function as an antecedent for anaphoric reference. A similar line of reasoning can be set up for the anaphoric reference in (11B), the only difference being that here the antecedent is a phonological rather than a morphosyntactic unit.

From these facts it may be concluded that the underlying representation of an utterance contains four levels of organization: an interpersonal (pragmatic), a representational (semantic), a structural (morphosyntactic), and a phonological level. Note that all these levels are purely linguistic in nature. This holds for the interpersonal and representational level too: these levels describe language in terms of its functions, but only in so far as these functions are encoded in the grammar of a language. Thus the interpersonal level represents a linguistic unit in terms of its communicative function, and the representational level in terms of its ontological status.

## 3.   General architecture of FDG

### 3.1.   Overall organization

The general architecture of FDG may now be represented as in figure 1 at page 61, in which the grammatical component is presented in the centre, the conceptual component at the top, the output component at the bottom, and the contextual component to the right.

Within the various components, circles contain OPERATIONS, boxes contain the PRIMITIVES used in operations, and rectangles contain the LEVELS OF REPRESENTATION produced by operations. In line with the top-down organization of FDG, I start my discussion of figure 1 at the top.

As mentioned in 2.4, at the prelinguistic conceptual level a communicative intention (e.g. issuing a warning) and the corresponding mental representations (e.g. of the event causing danger) are relevant. Through the operation of formulation these conceptual representations are translated into pragmatic and semantic representations at the interpersonal and representational level, respectively. The mapping rules (see 2.2) used in the operation of formulation are language-specific, i.e. FDG does not presuppose the existence of universal pragmatic and semantic notions. As a result, similar conceptual representations may receive different pragmatic and semantic representations in different languages. To give just one example: warnings
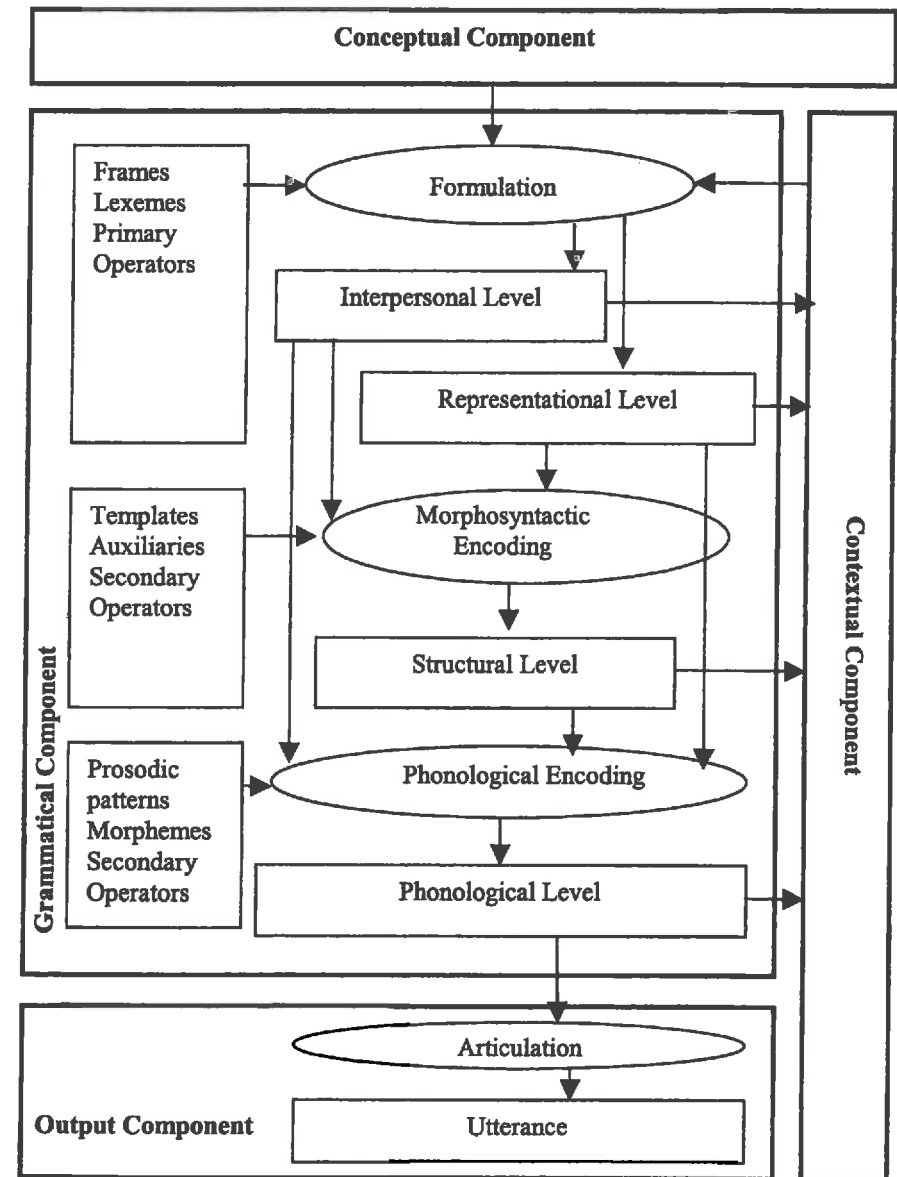
*Figure 1.* General layout of FDG

are in some languages encoded as a distinct type of speech act, whereas in others they receive the same treatment as orders. This type of crosslinguistic variation may be expected to be governed by typological hierarchies, just as morphosyntactic and phonological variation. Mapping rules make use of a set of primitives that contains frames, lexemes, and primary operators. Primitives will be discussed in more detail in 3.3. below.

The representations at the interpersonal and representational levels are translated into a morphosyntactic representation at the structural level through the operation of morphosyntactic encoding. The morphosyntactic expression rules draw on a set of primitives containing templates, auxiliaries, and (morphological) secondary operators (see 3.3). Similarly, the representations at the pragmatic, semantic, and structural level are translated into a phonological representation at the phonological level. The phonological expression rules draw on a set of primitives containing prosodic patterns, morphemes, and (phonological) secondary operators (see 3.3).

By organizing the grammatical component in this way, 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.

The phonological level of representation is the input to the operation of articulation, which, in the case of an acoustic output component, contains the phonological rules necessary for arriving at an adequate phonetic utterance. Articulation takes place outside the grammar proper.

The various levels of representation within the grammar feed into the contextual component, thus enabling subsequent reference to the various kinds of entity relevant at each of these levels once they are introduced into the discourse. The contextual component feeds into the operation of formulation, so that the availability of antecedents and visible referents may influence the composition of (subsequent) discourse acts. Note that the representation of these feeding relations in figure 1 is a simplification when looked at from the perspective of the language user. In order to create a contextual specification, the addressee has to reconstruct all the levels of representation within the grammar on the basis of the actual output of that grammar, i.e. the phonetic utterance. Since in this paper I restrict myself to the perspective of language production and concentrate on the grammatical component, I abstract away from this complication by provisionally assuming direct feeding relationships between the grammatical and the contextual components.

## 3.2. Levels and Layers

### 3.2.1. Introduction

Each of the levels of representation distinguished within the grammatical component in figure 1 is structured in its own way. What all the levels have in common is that they have a hierarchically ordered layered organization. They differ in the sense that at each level a linguistic expression is analyzed in terms of the distinctions relevant to that level. It should be stressed again that the representations at all levels are purely linguistic in nature, so that only those distinctions are provided that are actually reflected in the grammar of the language involved. Note furthermore that the representations below are not exhaustive: there are higher levels of linguistic organization not captured here.

### 3.2.2. The interpersonal level

At the interpersonal level the hierarchical structure given in figure 2 applies.

$$(M_1: [(A_1: [ILL (P_1)_S (P_2)_A (C_1: [...(T_1) (R_1)...] (C_1))] (A_1))] (M_1))$$

*Figure 2.* The interpersonal level

As argued in 2.3.3. one of the units of analysis at the interpersonal level is the move (M), which may contain one or more discourse acts (A). Each discourse act is organized on the basis of an illocutionary frame (ILL), which has two speech act participants (P, the speaker S and the addressee A) and the communicated content C as its arguments. The communicated content contains a varying number of ascriptive (T) and referential (R) acts. Note that the latter two units are operative at the same layer, i.e. there is no hierarchical relation between them. In general, then, at the interpersonal level units are analysed in terms of their communicative function.

### 3.2.3. *The representational level*

At the representational level the layers presented in figure 3 are relevant.

$$(ep_1: [(p_1: [(e_1: [(f_1) (x_1)] (e_1))] (p_1))] (ep_1))$$

*Figure 3*. The representational level

At this level of analysis linguistic units are described in terms of the entity type they designate (see Hengeveld 1989, 2004; Mackenzie fc.). These entity types are of different orders: third-order entities or propositional contents (p); second-order entities or states of affairs (e); first-order entities or individuals (x); and zero-order entities or properties (f). In narratives, propositions may furthermore be joined into episodes (ep). Note that first-order and zero-order entities belong to the same layer, i.e. there is no hierarchical relation between them.[4]

The nature of an entity type is not indicative of the way the linguistic unit describing that entity is used within a discourse act. Entity types are categories, not functions. The functional analysis is given at the pragmatic level. Thus, the same property (f) may be either ascribed (T) to an entity, or it may be referred to (R). The following examples illustrate this point:

(12)  a.  *Sheila is **tall**.*
          (Ascription of zero-order entity: T/f)
      b.  ***Tallness** impresses me.*
          (Reference to zero-order entity: R/f)

Similarly, a first-order entity type may be ascribed or referred to:

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

### 3.2.4. *The structural level*

The more one moves down through the model, the more language-specific the levels become. At the structural level, for instance, adpositional phrases will be relevant for some languages, but not for others; some languages will be of the isolating morphological type, others agglutinative. Figure 4 serves as an example of a simple constituent structure representation. In section 5 below some specific examples of morphosyntactic representations will be given.

$$[[[[\text{lexeme}_{Adj}]_{ModP} \text{lexeme}_N]_{RefP} [\text{lexeme}_V [\text{lexeme}_{Adv}]_{ModP}]_{PredP}]_{CL}]_S$$

*Figure 4*. The structural level (example)

There is no necessary one-to-one mapping between semantic and pragmatic units on the one hand and morphosyntactic units on the other. As argued earlier, discourse acts may be expressed as sentences, clauses, phrases, or words. To give another example: semantic predications consisting of a unit designating a (zero-order) relation and two units designating (first order) individuals may be realized in one language as a clause with three constituents and in others as a single word. Consider the following examples:

(14)  *I made shirts.*

(15)  Southern Tiwa (Gerdts 1998: 88)[5]
      *Te-shut-pe-ban.*
      1.SG>PL-shirt-make-PAST
      'I made (the) shirts.'

The English sentence in (14) can be subdivided into three constituents corresponding to the three semantic units mentioned earlier: a unit designating a relation (*made*) and two units designating individuals (*I, shirts*). The same semantic configuration is expressed in Southern Tiwa as a single word. The Agent argument is expressed by means of a prefix on the verb and does not have to be expressed independently. The Patient argument is incorporated into the verb. The fact that the patient is cross-referenced on the verb shows that it is really an argument of that verb. These examples

thus clearly show that there are many possible mappings between the semantic and the structural level. I refer to Smit (this volume) for an in-depth discussion of noun incorporation in FDG, and to section 5 below for a full analysis of example (15).

### 3.2.5. *The phonological level*

The phonological level is equally language-specific, and contains both the segmental and the suprasegmental phonological representation of a construction. In figure 5 a simple example is given, which contains segments (x), accent positions (capitals) and an indication of the prosodic contour (\).

/ xxx#XXX#xxx#XXX \ /

*Figure 5.* The phonological level (example)

Again, there is no necessary one-to-one mapping between pragmatic, semantic, and morphosyntactic units on the one hand, and phonological units on the other. Thus, in some languages subordinate clauses are set off from the main clause by means of an intonation break, whereas in others they form a single intonation unit with the main clause. To give another and perhaps more pervasive example: the foot structure relevant at the phonological level does not respect word or constituent boundaries at the morphosyntactic level.

### 3.3. Primitives

### 3.3.1. Introduction

The various operations creating the levels just discussed make use of sets of primitives which serve as the building blocks for their respective levels of application. Together these sets of primitives constitute the FUND[6] of the grammar. The rules that constitute the operations within the grammar com-

bine these primitives in order to produce the various levels of representation.

### 3.3.2. *Primitives used in Formulation*

The operation of formulation has to produce two different levels of representation: the interpersonal and the representational levels. For each of these levels, similar primitives are relevant.

First of all, the set of primitives contains FRAMES which define the possible combinations of elements at the interpersonal and representational levels for a certain language. Despite their language-specific nature, the inventory of frames is expected to be partly predictable in terms of crosslinguistically valid typological hierarchies. Relevant distinctions captured by frames at the interpersonal level include coded illocutions and coded information structure configurations. At the representational level possible quantitative and qualitative valencies and possible modification structures are relevant, among others. These issues have been addressed briefly in 2.2.

Secondly, this set of primitives contains LEXEMES. Within the set of lexemes a distinction is made between those that function at the interpersonal level (e.g. interjections, proper names, illocutionary adverbs, performative expressions, etc.) and those that function at the representational level. Lexemes are not stored in predicate frames, as they are in FG, but are independent units that have to be associated with the aforementioned frames through their meaning definitions (see García Velasco & Hengeveld (2002) for further discussion of this issue). In the implementation of the grammar the frames are selected first, and only after that are lexemes inserted. This reflects the choice the speaker often has in describing one and the same entity through a variety of lexemes with different connotations and/or denotations.

Thirdly, this set of primitives contains PRIMARY OPERATORS, which represent grammatical expressions purely in terms of their pragmatic or semantic content. The classification of operators in terms of the layer at which they apply is common in FG, and is also relevant for FDG. The classification of these operators will be addressed extensively in Hengeveld & Mackenzie (fc.). Here it will suffice to give a number of examples. At the interpersonal level, MITIGATION is an operator at the level of the illocution, REPORTATIVE is an operator at the level of the communicated content,

APPROXIMATION ('sort-of') is an operator at the level of the ascriptive act, and DEFINITENESS operates at the level of the referential act. At the representational level, examples are SUBJECTIVE MODALITY at the third-order layer, OBJECTIVE MODALITY and TENSE at the second-order layer, NUMBER at the first-order layer and e.g. PHASAL ASPECT at the zero-order layer.

### 3.3.3. Primitives used in Morphosyntactic Encoding

The structural level is organized on the basis of templates for words, phrases, clauses, and sentences, which are stored as part of the set of primitives relevant for the operation of morphosyntactic encoding. The inventory of templates has to be specified for each language individually, although again the expectation is that cross-linguistically valid generalizations will make this inventory largely predictable on the basis of a limited number of parameters.

The second set of primitives relevant at the morphosyntactic level consists of free grammatical morphemes, i.e. words that express a grammatical meaning, such as auxiliaries and grammatical particles. These free grammatical morphemes have to be introduced at the structural level, since, unlike bound grammatical morphemes, they occupy slots in the syntactic configuration, which is determined at this level. For instance, in Dutch the main verb normally occurs in second position in a clause, but when an auxiliary verb is present, this auxiliary occupies the second position and the main verb occurs in final position, as illustrated in (15)-(16):

(15)  *Karel  won        de    wedstrijd.*
      Karel  win.PST.SG  DEF   game
      'Karel won the game.'

(16)  *Karel  heeft            de    wedstrijd  gewonnen.*
      Karel  have.PRS.3.SG    DEF   game       win.PST.PRT
      'Karel has won the game.'

Examples like these clearly show that it is impossible to determine the order of constituents without taking free grammatical morphemes into account.

The third set of primitives relevant at the structural level consists of (morphosyntactic) secondary operators.[7] These operators anticipate morphological means of expression, the form of which, in languages in which they are relevant, will eventually be selected at the phonological level. Morphosyntactic secondary operators are by their very nature not identical to primary operators. Often, various semantic distinctions captured by primary operators map onto a single morphosyntactic primary operator. For instance, the Accusative case in a certain language may be triggered by the semantic function patient, but also by various types of adjunct, or it may be lexically triggered by certain verbs or adpositions. The other way around, a single semantic category may map onto various morphosyntactic categories, as when the form of the accusative when expressing the Patient argument is dependent on the noun class of the head of that Patient argument. Secondary operators at the morphosyntactic level can thus be considered to be the names or addresses of actual forms or sets of forms. In assigning names to (sets of) forms I will follow the convention proposed in Comrie (1976), in which general semantic categories are written in lower case, whereas forms in specific languages start with a capital letter. Thus, the *imperfective past* is expressed in French by means of the *Imparfait*. It is important to realize that the names of forms could just as well be represented by numerical codes, like *581*, for the Imparfait First Person Plural. Since this would not enhance readability, more mnemonic labels are chosen, but this should not obscure the fact that at this level we are only interested in labelling specific forms.

### 3.3.4. Primitives used in Phonological Encoding

The first set of primitives relevant for the constitution of the phonological level consists of prosodic patterns, which organize the phonological information coming in from higher levels into coherent blocks.

The second set of primitives consists of the actual phonemic bound morphemes that correspond to the primary or secondary operators that have been specified at the higher levels of organization. Bound grammatical morphemes are introduced at the phonological level since in many languages the form of grammatical morphemes may be affected by the syntactic configuration in which they occur. Bakker (this volume) cites various examples of this phenomenon. I repeat his example (4) here as (17):

(17)   Yagua (Payne 1990:30)
    a. *Sa-juuy   Anita.*
       3SG-fall  Anita
       'Anita fell.'

    b. *Anita    ø-juuy.*
       Anita    3.SG-fall
       'Anita fell.'

In Yagua, the subject-agreement prefix on the verb is *sa-* when the subject term occurs in postverbal position (17a), but it is Ø- when the subject occurs in preverbal position (17b). This means that in this language the form of the secondary operator Subj.3.Sg can only be determined after establishing the constituent order of the sentence.

A third set of primitives potentially relevant at the phonological level consists of (phonological) secondary operators. These anticipate acoustic (signed, orthographic) means of expression that are not a direct reflection of a primary operator. A good example of the kind of phenomenon for which such secondary operators are necessary is unit accentuation in Danish noun incorporation (Nedergaard Thomsen 1992). In cases of noun incorporation in Danish the last element retains its inherent stress ('), but the first element is realized with reduced stress (ₒ), as in the following example:

(18)   Danish (Nedergaard Thomsen 1992: 182)
    *De      ₒfangede      'SOMMERFLUGE*
    they    catch.PAST   butterfly.PL
    'They caught butterflies.'

This example shows that the process of syntactic noun incorporation has phonological effects. These effects are captured by means of the introduction of (phonological) secondary operators at the phonological level.

### 3.3.5. Generalizations

There are certain correspondences across the three sets of primitives. Within each set there is a subset of units with a structuring function: the frames used in formulation, the templates in morphosyntactic encoding,

and the prosodic patterns used in phonological encoding all serve the purpose of providing an overall organizing structure for their respective levels. Within each set of primitives there is furthermore a subset of units in phonemic form: the lexemes used in formulation, the auxiliaries used in morphosyntactic encoding, and the bound morphemes used in phonological encoding all contribute to the cumulative segmental specification of the underlying representations. Finally, within each set of primitives there is a subset of operators: primary operators are relevant to the operation of formulation, secondary operators to the operation of encoding.

### 3.4.   Levels and primitives

For a simple illustration of how a single constituent gets different representations at each level, using different sets of primitives, consider the example in (19). The constituent *these apples* is represented in four different ways within FDG, as indicated in (20).

(19)   (I like) these apples.

(20)   a.  (id $R_I$)
    b.  (prox m $x_i$: /æpl/$_N$ ($x_i$))
    c.  [[/ðɪs/-Plural]$_{Det}$ [/æpl/-Plural]$_N$]$_{RefPhr}$
    d.  /ði:z#æplz/

At the interpersonal level (20a), the constituent is characterized as having a referential function (R). The referent is furthermore assumed to be identifiable (id) by the addressee. At the representational level (20b) the constituent is characterized as designating a first-order entity (x) located near the speech location (prox), and consisting of more than one unit (m). The nominal (N) lexeme /æpl/ specifies a basic property of this entity. At the structural level the constituent is characterized as being a Referential Phrase (RefPhr), which consists of a determiner (Det) and a head noun (N). At this level the free grammatical morpheme /ðɪs/ is introduced, since it has to occupy a syntactic slot. The primary operator m is converted into the secondary operator Plural, which occurs twice, since it has to be expressed on each of the two words making up the Referential Phrase. At the phonological level the appropriate Plural forms of the words are introduced, in

the case of the noun by adding the plural suffix, in the case of the determiner by selecting the appropriate suppletive form.

## 3.5. Functions

In FG functions play an important role: semantic functions are part of FG predicate frames, pragmatic and syntactic functions are assigned to constituents. In FDG functions are part of the various structuring devices mentioned in the previous paragraph: pragmatic functions are part of interpersonal frames, semantic functions are included in representational frames, and syntactic functions, in languages in which they are relevant, are part of the morphosyntactic clause templates. Syntactic functions are thus no longer considered to be perspectivizing in nature, as they are in FG. Rather, they are matched to pragmatic and semantic units as part of the encoding operation. The pivotal nature of syntactic functions can thus be attributed to the semantic and pragmatic factors that trigger their occurrence.

## 4. Dynamic implementation

### 4.1. Introduction

The idea of a dynamic implementation of the grammar, as proposed in Bakker (2001, this volume) is highly compatible with the basic architecture of Functional Discourse Grammar, particularly its top-down organization. I propose that in a dynamic implementation of FDG the two principles described in the following sections be taken into account. These principles are not sufficient to account for the entire process of language generation, but I focus on these principles here since they are specific to FDG.

### 4.2. Depth first

The depth-first principle was proposed in Bakker (1999) but gets a somewhat different interpretation in FDG. In defining its role within the grammar, recall that a basic assumption in FDG is that a grammatical production model will be more efficient the more it resembles language production in the individual. In accordance with this assumption, informa-

tion from a certain level is sent down to a lower level as soon as the necessary input information for that lower level is complete. The grammar would slow down considerably if first the interpersonal level had to be fully specified, and then the representational level had to be filled in completely, so that only then could the morphosyntactic configuration be determined, which after that would be mapped onto a phonological configuration. This is not how language production in the individual works, and it would therefore, given the basic assumption mentioned above, not lead to a very efficient model of grammar either.

As an example, consider the effect of specifying an illocutionary value at the interpersonal level. As soon as an imperative (IMP) frame has been selected for the discourse act, there are potentially important consequences at all subsequent levels of representation: (i) at the representational level, the event frame will have to designate a controlled event, and the first argument will have to include the addressee; (ii) at the structural level, in some languages a specific constituent order is used, or there may be special imperative auxiliaries or morphological markers; (iii) at the phonological level, there may be specific prosodic patterns that are used with imperatives. All this means that the selection of an imperative frame at the interpersonal level may trigger a whole range of specifications at subsequent levels, both in terms of formulation and of encoding, irrespective of the specification of further elements at the interpersonal and lower levels.

### 4.3. Maximal depth

The principle of maximal depth states that only those levels of representation that are relevant for the building-up of (a certain aspect of) an utterance are used in the production of that (aspect of the) utterance. This principle, too, is meant to speed up the implementation of the grammar. It avoids the vacuous specification of levels of representation that are irrelevant to the production of the utterance at hand.

Following up on the example in the previous section, this means that in a certain language there may be a direct connection, circumventing the representational level, between the interpersonal and the structural levels in those cases in which the imperative frame has to be mapped onto a specific clausal template. Similarly, there may be a direct connection, circumventing the representational and the structural level, between the interpersonal and the phonological levels when the imperative frame is mapped onto a

specific prosodic pattern. In this way, superfluous steps in passing on information within the top-down procedure are avoided. Looking at this from a bottom-up perspective, it means that the expression of underlying structures is potentially based on information from all higher levels, not just from the next higher one.

## 4.4. Pathways through the grammar

In view of the principles discussed in the preceding sections, the pathways through the grammar may be represented as in figure 6 at page 75. The horizontal arrows 1, 8, and 11 concern the consultation of the sets of primitives by the various operations. The dynamic implementation of the model is shown vertically. Examples of possible (partial) pathways through the grammar are the following.

$1 \rightarrow 2 \rightarrow 5 \rightarrow 11 \rightarrow 12$:
This pathway will be used when, for instance, the illocutionary value of a discourse act is expressed through prosodic means. Note that in this case the representational and structural levels do not play a role in the generation process.

$1 \rightarrow 2 \rightarrow 4 \rightarrow 8 \rightarrow 9 \rightarrow 10$:
Similarly, this pathway is used to map the illocutionary value of a discourse act onto a specific morphosyntactic sentence template. In this case the representational level is circumvented.

$1 \rightarrow 3 \rightarrow 6 \rightarrow 8 \rightarrow 9 \rightarrow 10$:
This partial pathway will for instance be used when a two-place predication frame has to be mapped onto a transitive clause template. Here the interpersonal level is irrelevant.

$1 \rightarrow 3 \rightarrow 7 \rightarrow 11 \rightarrow 12$:
This pathway will be used in those cases in which a semantic distinction is expressed through a distinct prosodic pattern.
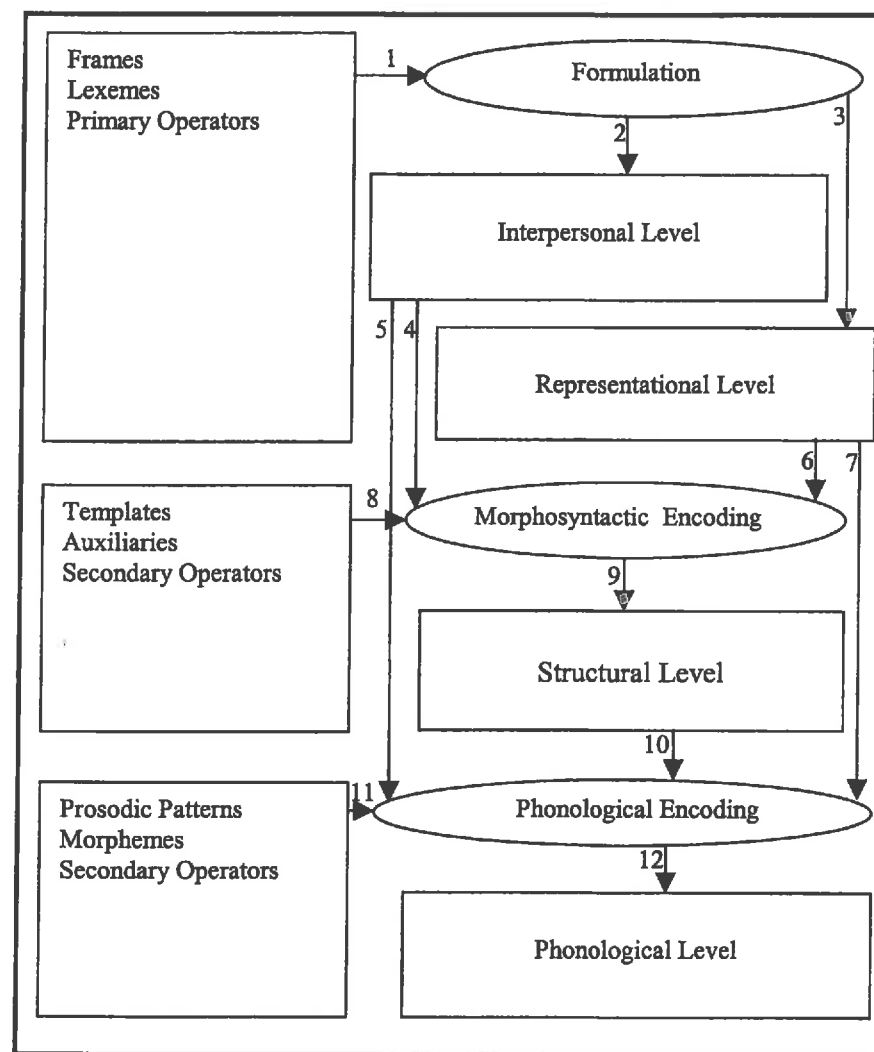
*Figure 6.* Pathways through the grammar

## 5.  One-word utterances in FDG

### 5.1.  Introduction

Let me now turn to the analysis of some concrete examples. The ones I present below have in common that they all consist of a single word: a verb form constituting a full main clause in Spanish (5.2); a verb form with incorporated object constituting a full main clause in Southern Tiwa; and an interjection constituting an independent utterance in English.

### 5.2.  Spanish

Spanish is a language with a strong tendency towards morphological fusion. The subject of a sentence does not have to be expressed lexically when it is topical in nature. It is, however, expressed on the verb, often in a portmanteau expression together with mood, tense and aspect. These properties are illustrated in (21).

(21)  *Lleg-ó.*
      arrive-IND.PAST.PF.3.SG
      'He/she/it arrived.'

Note that the suffix *-o* in (21) is special in the sense that it attracts word stress.

The main challenges here are (i) the fact that two semantic constituents are expressed in a single syntactic constituent, (ii) the fusional nature of the suffix, and (iii) the stress pattern.

Figure 7 at page 77 is a static representation of the various steps that have to be taken in order to generate (21). In a dynamic description of figure 7, the following steps may be distinguished.[8]

$1 \rightarrow 2$:
Selection and insertion of the declarative act frame with topical R. Such a predefined frame is relevant for Spanish given the effects topicality has on the expression of the subject.
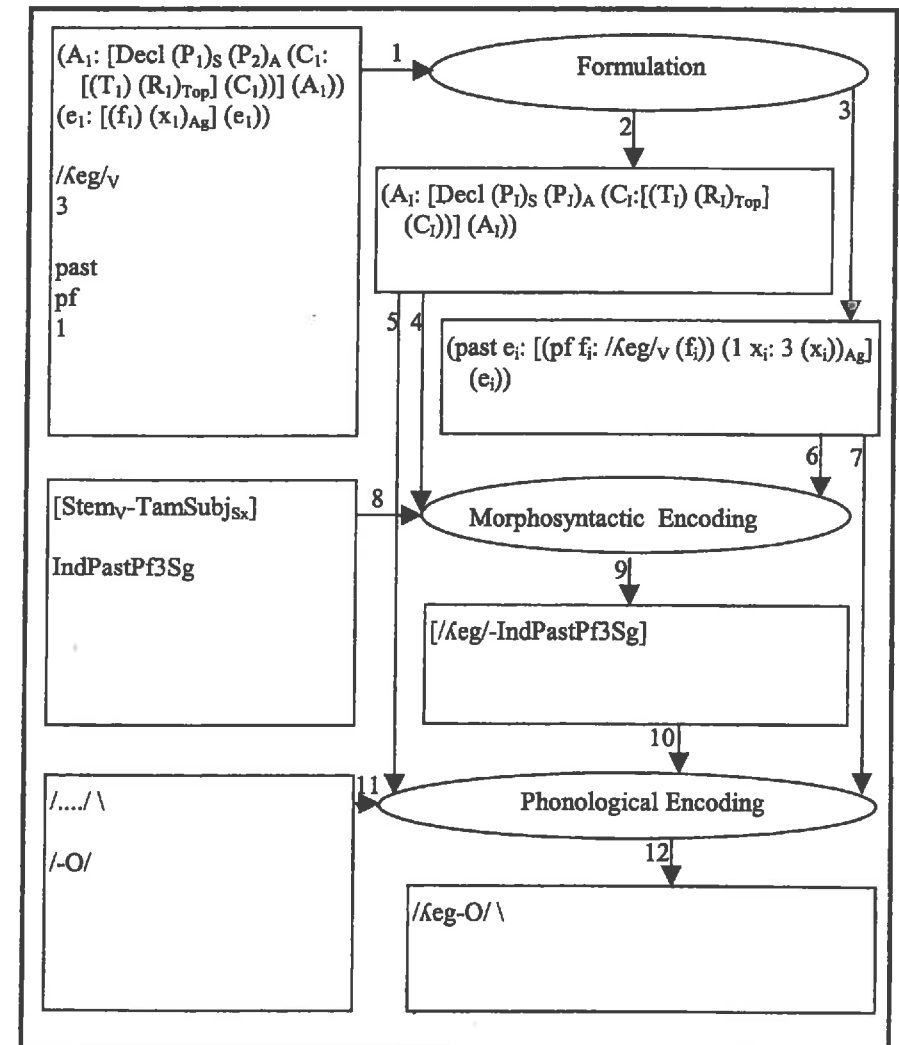
*Figure 7*. Analysis of example (21)

$5 \rightarrow 11 \rightarrow 12$:
Selection and insertion of the prosodic pattern with falling intonation used for declarative sentences, triggered by the presence of the declarative frame at the interpersonal level.

$1 \rightarrow 3$:
Selection and insertion of one-place agentive event frame.

$1 \rightarrow 3$:
Selection and insertion of lexemes. Note that I use '3' as a shorthand representation of the abstract semantic content 'third person'. The formulator selects this abstract item rather than a lexical specification of $(x_i)$ in view of the topicality of R at the interpersonal level.

$1 \rightarrow 3$:
Selection and insertion of the primary operators for past tense (past), perfective aspect (pf) and singularity (1).

$6 \rightarrow 8 \rightarrow 9$:
Selection and insertion of the word template for verbs. Note that this template can only be selected at this stage, after the insertion of a verb rather than a non-verb in the property slot at the representational level, given that in Spanish verbal and non-verbal constructions have different formal properties.

$6 \rightarrow 9$:
Insertion of the verb specified at the representational level into the Stem slot in the word template for verb forms.

$4/6 \rightarrow 8 \rightarrow 9$:
Selection and insertion of the secondary operator IndPastPf3Sg into the TamSubj slot in the word template for verb forms, triggered by the decl illocution at the interpersonal level, the operators past, perfective, and singular at the representational level, and the third person specification of the single argument at the representational level. The fact that a whole range of pragmatic and semantic distinctions has to be mapped onto a single form characterizes fusional languages.

$10 \rightarrow 12$:
Insertion of the verb form into the prosodic pattern waiting to be filled at the phonological level.

$11 \rightarrow 12$:
Selection and insertion of the morpheme /-O/ into the suffix slot of the verb form. Note that this suffix brings along inherent stress, indicated by capitalization.

### 5.3.  Southern Tiwa

Southern Tiwa is a language that is both polysynthetic and agglutinating. The polysynthetic nature of the language is manifested, among other things, in the possibility of incorporating nouns into verb forms. Example (22) was discussed earlier in 3.2.4.

(22)    *Te-shut-pe-ban.*
        1.SG>PL-shirt-make-PAST
        'I made (the) shirts.'

The main challenge here is the fact that three semantic constituents are expressed as a single syntactic constituent. The various steps that have to be taken are indicated in figure 8 at page 80 and can be listed as follows.

$1 \rightarrow 2$:
Selection and insertion of declarative act frame with one ascriptive and two referential subacts.

$1 \rightarrow 3$:
Selection and insertion of the two-place agentive event frame.

$1 \rightarrow 3$:
Selection and insertion of lexemes. Note that I use S here as a shorthand representation for the first person.

$1 \rightarrow 3$:
Selection and insertion of the primary operators for past tense (past) and plurality (m).
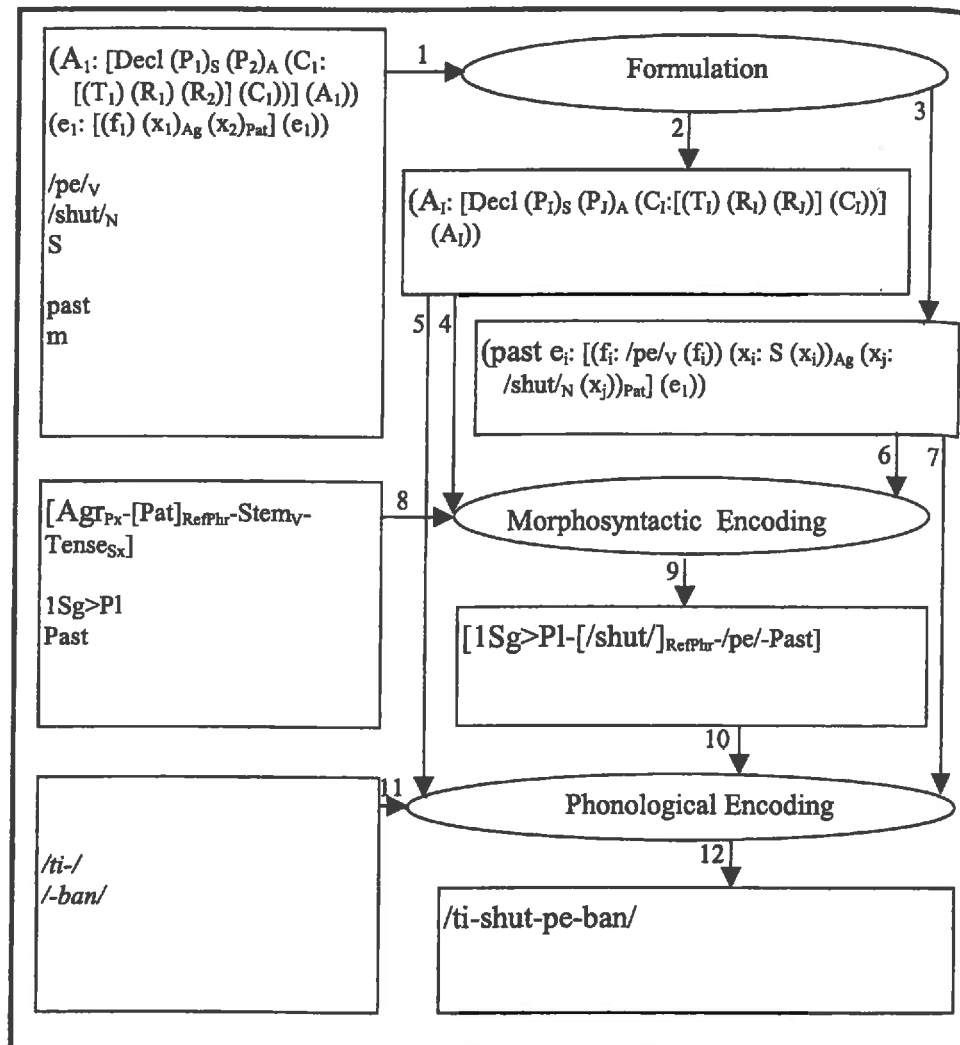
*Figure 8.* Analysis of example (22)

$6 \to 8 \to 9$:
Selection and insertion of the word template for verb forms with incorporated patient argument.

$6 \to 9$:
Insertion of the verb specified at the representational level into the Stem slot in the word template for verb forms, and of the patient argument at the representational level into the patient slot within the same template.

$6 \to 8 \to 9$:
Selection and insertion of the secondary operator 1Sg>Pl into the Agr slot and Past in the Tense slot within the word template for verb forms. The secondary operator 1Sg>Pl is triggered by the presence of a first singular agent argument and a plural patient argument at the representational level. The secondary operator past is triggered by the presence of a past operator at the representational level. Note that, unlike in Spanish, there is a straightforward matching between the primary operator past and the secondary operator Past. This characterizes agglutinating languages.

$10 \to 12$:
Insertion of the verb form into the prosodic pattern[9] waiting to be filled at the phonological level.

$11 \to 12$:
Selection and insertion of the morphemes /ti-/ and /-ban/ into the appropriate slots of the verb template.

### 5.4. English

The last example is quite the opposite of the two preceding ones. In the examples from Spanish and Southern Tiwa the challenge was to explain the complex internal structure of words, i.e. the fact that various pragmatic and semantic units are mapped onto a single word form. In this last example the challenge is to explain the fact that a word that is capable of functioning as a complete and independent discourse act has no internal complexity at all. The example is given in (23), and the analysis in figure 9.
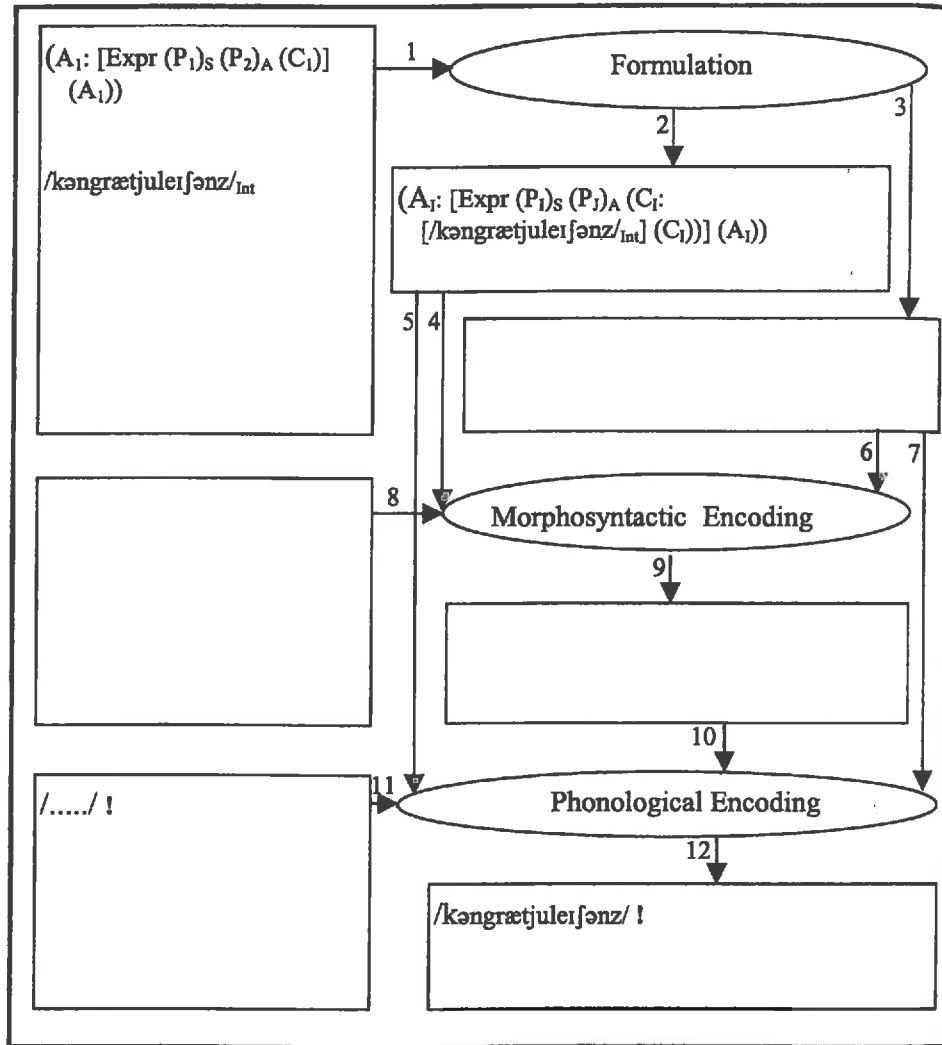
(23)   *Congratulations!*

*Figure 9.* Analysis of example (23)

In figure 9 at page 82 the following steps are represented.

$1 \rightarrow 2$:
Selection and insertion of an expressive act frame.

$5 \rightarrow 11 \rightarrow 12$:
Selection and insertion of the distinctive prosodic pattern that characterizes expressive discourse acts.

$1 \rightarrow 2$:
Selection and insertion of the lexeme /kəngrætjuleɪʃənz/ into the C slot of the act frame at the interpersonal level.

$5 \rightarrow 12$:
Insertion of this lexeme into the prosodic pattern. In this analysis interjections like congratulations are analyzed as ready-made lexical contents of discourse acts which do not have semantic content, only pragmatic content. Since they have no morphosyntactic structure either, this means that only the interpersonal and the phonological levels of representation are relevant for their analysis.

## 6.   Conclusion

In this paper, after giving an outline of an updated version of FDG, I have argued that the idea of a dynamic implementation, as proposed in Bakker (1999, 2001, this volume) within the context of FG, can be fruitfully applied within the context of FDG as well. An advantage of FDG over FG is that mismatches between pragmatic, semantic, morphosyntactic and phonological units of analysis can be handled relatively easily, due to its modular organization. In order to demonstrate this, I have analyzed a number of one-word utterances which illustrated various matches and mismatches between the various levels of linguistic organization in a dynamic implementation of FDG.

## Notes

1. I am grateful to Matthew Anstey, Lachlan Mackenzie and Gerry Wanders for comments on an earlier version of this paper.
2. For a more elaborate discussion of these constructions in the context of FG see Hengeveld (1997).
3. In several languages this construction type grammaticalizes further in the sense that a generic verb is used as the head of a new paragraph. See e.g. de Vries (1989: 207) on generic verb linkage in Kombai.
4. Although at the representational level there is a valency relation that is absent at the interpersonal level.
5. The gloss 1.SG>PL should be read as '1.SG acting on plural patient'.
6. The notion of 'fund' was introduced in the context of FG in Dik (1980), where it was used as a notion with a wider meaning than 'lexicon', including processes of term formation and predicate formation. Here the notion is stretched a bit further to include all building blocks relevant to the grammar of a particular language.
7. Secondary operators correspond to Dik's (1997) '$\mu$-operators' and de Groot's (1990) 'secondary triggers'.
8. Note that I follow the standard FG convention in which non-instantiated variables have a subscripted number, and instantiated variables a subscripted letter.
9. Since the actual prosodic patterns of Southern Tiwa are unknown to me, I refrain from representing it in figure 8.

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# Noun incorporation in Functional Discourse Grammar

## Niels Smit

## 1.   Introduction

A strictly modular view of grammar is hard to maintain[1]. A model in which lexicon, pragmatics, semantics, syntax and phonology are completely independent sub-systems that only process the completed output of one another, incapable of interaction, cannot account for many linguistic phenomena in a satisfactory manner.

This becomes especially clear in the study of noun incorporation (NI), where all modules interact to produce complex multilexemic words or word-like constructions. Previous research has mostly centred around the contribution of the syntactic module, leading to several formalist proposals for comprehensive treatment of incorporation phenomena (Baker 1988; 1996; Sadock 1985). Except for some isolated studies (Mithun 1984; Velázquez-Castillo 1995) which focus on the contribution of pragmatics and semantics, a comprehensive functional treatment of noun incorporation is a desideratum. In part, this is due to the lack of a suitable functional framework, capable of dealing with the intricate problems of multi-level analysis that the process calls for.

The present article aims to prove that Functional Discourse Grammar (FDG) might exactly be the 'tool' that functionalism needs to arrive at a comprehensive treatment of NI. By providing alternative analyses for the four types of deliberate NI mentioned in Mithun (1984), I will show that FDG offers a good way to capture their semantic and pragmatic peculiarities, attributing the various existing types, which involve different constituents at the semantic and pragmatic level, to interactions between different levels of the grammar. Moreover, it will become apparent that an alternative typology of incorporating constructions is called for, different from the one that Mithun proposes. Nevertheless, also this alternative typology