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ADVERBIAL CLAUSES, FUNCTIONAL GRAMMAR, AND THE CHANGE FROM SENTENCE GRAMMAR TO DISCOURSE-TEXT GRAMMAR

KWEE Tjoe Liong

Universiteit van Amsterdam

T L Kwee at hum uva nl

Abstract

Constructions commonly called adverbial clauses in traditional grammar are seen in Functional Grammar (FG) as expressions of satellites. FG's multi-layered model of the abstract underlying clause structure assumes each single layer consists of a certain kernel structure plus some (possibly zero) appropriate operators and satellites. Each complete layer (except the top one) is embedded as the subsequent kernel at the next layer up. At each layer, operators and satellites are said to have scope over the corresponding kernel, and, thus, over all lower operators and satellites which are contained in that kernel.

This paper discusses adverbial clauses which are assumed to occur as satellites at the second layer of the FG model, sometimes called circumstantials elsewhere, but in FG predication satellites, or, alternatively, level 2 satellites. It is shown that the scope of such adverbial clauses raises a problem which can't be solved within the currently accepted model of FG and thus risks remaining a refractory case for the theoretical framework. While I don't strive for very radical changes, and take as much as possible for granted, I prefer a different view found elsewhere which offers an elegant solution for the problem indicated here. The view in question is rejected by Dik (1997), however, and I explain why that is a regrettable mistake.

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1 Problem statement : the scope of adverbial clauses

In traditional grammar, the class of subordinate clauses is divided into three subclasses : relative, complement, and adverbial clauses. In FG it is assumed that the underlying structures of such subordinate clauses are predications (or, sometimes, propositions). In case of a relative clause, this predication (proposition) is embedded as a verbal restrictor in a term schema. In case of a complement or an adverbial, the structure is embedded in a predicational (propositional) term which occupies an obligatory argument position or optional satellite position, respectively.

Each construction type in turn can contain any of these three different constructions, in a recursive fashion. But what about the superordinate constructions that such subordinates are embedded in ? Every term schema with a number of restrictors can absorb an additional one, since restrictors are just stacked onto each other. Only practical reasons will keep us from going very far. On the other hand, sometimes a frame that already has a predicational (propositional) term at an argument position may take another one at another argument position, although such frames are rather rare. As all frames have a restricted number of argument terms, however, here we will always have an intrinsic limit.

The present paper concentrates on the last of the three cases, adverbial clauses, considered in FG forms that express underlying satellite terms. The above question, then, correspondingly amounts to an investigation whether an adverbial clause can be subordinated or not to a complex construction that already contains another adverbial clause, or, put in more FG-like terms, an inquiry into the precise nature of the structures to which a predicational (propositional) term can be added as a satellite.

1.1 Adverbial clauses in the original underlying predication

This is what the original, pre-1989 version of the theory tells us about satellites (Dik 1978:17-18) :

> Any nuclear predication can be extended by means of 'satellites' which specify further properties of the nuclear state of affairs as a whole. [...] Satellites have the same functional status as arguments [... and ...] the same internal structure as terms. The principles for associating satellites with nuclear predications provide us with the full set of (extended) predications underlying the linguistic expressions of a language.

Adverbial expressions are sometimes distinguished into adverbials in the narrow sense (pertaining to a verbal predicate), and adsententials, which relate to an entire sentence, or, to put it in the FG terminology cited above, specify further properties of a state of affairs as a whole. The question now is, what is exactly intended by an *entire sentence*, or, equivalently, by a *state of affairs as a whole* ? The issue probably is best described as a matter of scope. (We will say that a satellite *has scope over* something if it 'relates to', in the sense of modifies, or further specifies, that something. Conversely, for instance, a head *is in the scope* of a modifier.) This may be illustrated by the pair of sentences (1a) and (1b). It is obvious that, in spite of their superficial similarity, these two sentences don't have the same global structural analysis. They have to be interpreted as (2a) and (2b), respectively. It is clear that FG in its original version will recognise, and produce, complex sentences with structure (2a), but not sentences with structure (2b). The *state of affairs as a whole* is explicitly meant to be a *nuclear state of affairs as a whole*, not just any arbitrary state of affairs possibly already specified by another satellite.

(1a) *The prince had lost all hopes of seeing Cinderella again because she fled from the ball in a hurry before he could enquire about her name.*

(1b) *The prince had lost all hopes of seeing Cinderella again because she fled from the ball in a hurry before he found her slipper on the stairs.*

(2a) global analysis : [(S1) because [(S2) before (S3)]]
shorthand : S1 because [S2 before S3]
formula : [S1 + [S2 + S3]]

(2b) global analysis : [[(S1) because (S2)] before (S3)]
shorthand : [S1 because S2] before S3
formula : [[S1 + S2] + S3]

Global structure (2a) can be generated, and equally well be analysed, since it conforms to the rules : the nuclear state of affairs specified by S1 = *The prince had lost all hopes of seeing Cinderella again* is further specified by (therefore : is in the scope of) the satellite [S2 + S3] = *she fled from the ball in a hurry before he could enquire about her*

name, which itself designates a complex state of affairs consisting of a nuclear state of affairs specified by S2 = *she fled from the ball in a hurry*, and further specified by (therefore : is in the scope of) a satellite S3 = *he could enquire about her name*. But global structure (2b) is excluded, as it can't be built up in the same way. For the time being, we see that something can be in the scope of (that is, be further specified by) a satellite, only if that something is a nuclear predication.

1.2 Adverbial clauses in the multi-layered clause structure

With the introduction of the multi-layered clause structure proposed by Hengeveld (1989) and soon incorporated into the revised and extended version of the FG model which was just about due after the first decade (Dik 1989), nowadays four different layers are assumed to be present on top of a nuclear predication, each of them being obtained by a further specification of the preceding layer by means of operators and satellites of the appropriate kind. It should be noted here that Hengeveld (1989) distinguishes two levels (representational and interpersonal), each with two layers, whereas (Dik 1989, 1997) often very loosely uses 'level' for either notion.

Predicate ('level 1') satellites further specify the state of affairs designated by the nuclear predication with additional terms for manner, means, and spatial orientation. Predication ('level 2') satellites locate this (core) state of affairs in spatial, temporal, and cognitive dimensions. The extended predication together with proposition ('level 3') satellites (evidential, and attitudinal, for speaker's evaluation and commitment) specify a propositional content. A propositional structure together with illocutionary ('level 4') satellites specify a speech act. At each layer, the kernel structure proper is said to be in the scope of the corresponding satellites. We now see that something can be in the scope of (be further specified by) a satellite, if that something and that satellite satisfy certain conditions defined by the multi-layered clause model. Everything that is said here in connection to the different satellites and layers likewise holds for operators. In fact, the main, if not only, difference is that satellites are expressed by lexical means, while operators are expressed by grammatical means.

The (external) type of a satellite term is defined by the layer at which the satellite position (with its associated semantic function) occurs, as described above. The internal complexity of a satellite term, on the other hand, is defined as its own type of structure

(that is, roughly speaking, whether it is predicational or propositional). Dik *et al.* (1990) discuss the combinations of external type and internal complexity of satellites, with a cross-classificatory table of examples (1990:62). They also discuss (1990:53) what they call

> the relative scope differences between the satellites in the sense that 'outer' or 'higher' satellites take 'inner' or 'lower' satellites in their scope.

This notion of 'relative scope difference' corresponds, in general, to what is illustrated in formula (2b) above. Note that in the formula notation of (2a) and (2b), a plus sign symbolises an adverbial subordinator that connects a left hand side main clause to a right hand side adverbial clause, in this order. In other words, it is a purely formal symbol, asymmetric by definition. Apart from functioning as satellites at a certain layer, predicational (propositional) terms themselves may be built up in several layers, and as such they can (recursively) contain yet other satellites in their own internal structure. This is illustrated in formula (2a) above.

In the multi-layered clause model it is still feasible, as a generalisation of what was already the case in the original version of the theory, to get complex sentences with a global structure [S1 + [S2 + S3]] as shown in (2a), provided that the complex adverbial clause [S2 + S3], regardless of its own internal structure, is of the appropriate external type with respect to the kernel structure S1. In addition, the hierarchy implied in the multi-layered clause model may now offer new perspectives on the issue whether a global structure [[S1 + S2] + S3] as shown in (2b) can be generated in FG or not (or parsed, for that matter). The answer to this question is : on condition that the complex kernel construction [S1 + S2] and the adverbial satellite S3 combine at such a layer that the latter is of the appropriate external type with respect to the former, yes, in such a case it will be possible to generate (and parse) constructions such as [[S1 + S2] + S3] from (2b).

As for the latter construction, it will be clear that, according to the rules of FG, a satellite S3 can have another satellite S2 in its direct scope only if the layer [[S1 + S2] + S3] is the next layer up in which the lower layer [S1 + S2] is embedded, that is, only if the external type of S3 is higher than that of S2. For sentence (1b), with global structure (2b), to be feasible in FG, therefore, the external type of a *before* satellite should be

higher than that of a *because* satellite. Having come to this conclusion I would now like to point to another pair of sentences, (3a) and (3b), where the conjunctions *before* and *because* have changed position as compared to the first pair, (1a) and (1b). As a result, the corresponding global structures now are as shown in (4a) and (4b), respectively.

(3a) *Cinderella lost her slipper on the stairs*
before she fled from the ball in her coach-and-horses
because she feared the clock would soon strike midnight.

(3b) *Cinderella lost her slipper on the stairs*
before she fled from the ball in her coach-and-horses
because she hoped the prince would find it sooner or later.

(4a) S1 before [S2 because S3]

(4b) [S1 before S2] because S3

From this we can conclude that, in order for sentence (3b), with global structure (4b) similar to (2b), to be recognised as grammatical in FG, a *before* satellite must be of a lower external type than a *because* satellite. But in (1b) we saw that a *before* satellite must be of a higher type than a *because* satellite. What, then, should be the proper hierarchical order of these adverbial clauses ?

1.3 Relative scope of *before* and *because* adverbial clauses

Above, I cited a brief description of the different satellite types, taken from Dik (1989, 1997) and Dik *et al.* (1990). According to these sources, a *before* adverbial clause specifies the temporal location of the state of affairs which is designated by a core predication. It is, therefore, a 'level 2' satellite. The case of a *because* adverbial clause is more complicated.

The subordinating conjunction *because* may express different semantic functions, such as, for instance, Cause and Reason, which are predication ('level 2') satellites that locate a state of affairs in cognitive dimensions. A Reason satellite is even cognitive in a stricter sense in that it provides a motivation for the occurrence of a state of affairs that is necessarily [+control], thereby ascribing the motivation to the controller, whereas a Cause satellite provides a motivation which is not ascribed to any of the participants in the intended state of affairs. More precisely, Cause is said to specify the setting of a state of affairs relative to other states of affairs, just like Condition, Result, and

Circumstance (Dik *et al.* 1990:33). This 'level 2' Cause, moreover, is to be distinguished from Inner Cause, a 'level 1' satellite specifying the force that instigates a process (as in *He died of hunger*). But *because* may also introduce a proposition ('level 3') satellite which further specifies the propositional content by providing an explanation (sometimes called Evidence or Motivation), or even an illocutionary ('level 4') satellite that further specifies the speech act as a whole by providing a speaker's justification for saying what is actually being said (sometimes called Evidence or Motivation as well) (Dik 1997 TFG1:244-245, 295-296, 305 ; Dik *et al.* 1990:34-35, 37-38, 39).

After this brief theoretical clarification of the various types of *because* adverbial clauses, I would like to return to the problematic sentences (1b) and (3b). There is indeed a subtle difference between the two. In (1b), *because* expresses a Cause, since *lose all hopes* is not a [+control] predicate. In (3b) it expresses a Reason, as *lose* certainly is a [+control] predicate here, if it is interpreted as *lose on purpose* (as it should in fact be in this context), just like a couple of its paraphrases such as *leave* or *drop*. It seems, therefore, on the basis of these examples, that the type of Reason is higher than that of Time, and the latter higher than that of Cause. In reply to this provisional conclusion, however, other sentences can be adduced, either the pair (5a) and (5b), or the pair (6a) and (6b), which represent two possible reactions that go in different directions.

The first pair, (5a) and (5b), eliminates the influence of one of the three types, and restricts the problem to just the two of Reason and Time. The second pair, (6a) and (6b), takes the ordered triple of Reason, Time, and Cause, for granted, but inverts their mutual order, and thus leads to the very opposite conclusion that the type of Reason is lower than that of Time, and the latter lower than the type of Cause.

(5a) *I bought a new umbrella*
because I couldn't find my old one
before I realised that I forgot it on the train.

(5b) *I bought a new umbrella*
before I left for London
because the rate of the pound was rather high.

(6a) *I bought an umbrella*
because some information leaflet advised us to have one

before I discovered that it was from the previous conference.

(6b) *I bought an umbrella*
before I read the advice in the information leaflet
because the organising committee hadn't yet distributed it.

1.4 A persistent problem

According to our source texts, the Cause, Reason, and Time as dealt with here are all 'level 2' satellites (for *because* doesn't express a 'level 3' or a 'level 4' satellite in any of the given examples), which is a reasonable consequence of the apparently conflicting conclusions reached above. The old problem caused by FG's first ('flat') version's not being able to distinguish from each other the global structures (2a) and (2b), or (4a) and (4b) for that matter, turns out to persist in the currently accepted multi-layered model of the clause structure, only now transposed to the specific layer of predication ('level 2') satellites.

The original problem may have been solved in part (that is, only with respect to other types of adverbial satellites than the ones discussed here) by the distinction of various layers, but it is useless to pursue a complete solution by introducing more and more sublayers, or even by stipulating a priority rule, or hierarchy, for subtypes at the same layer. It is of no avail at all to try and refine the multi-layered model in view of possible scopes of satellites that are still considered to belong to the same external type. Another distinction, that between restrictive satellites and non-restrictive satellites (Dik *et al.* 1990:63), which

> restrict the nature of the SoA through providing it with time/space coordinates [and] provide additional information to the SoA as already defined [respectively]

a distinction which is relevant only at the second layer, is not helpful either, given the two specific structures (2b) and (4b) above.

1.5 Additional remarks

A couple of minor remarks should be added to the above observations. Note, first of all, that it is only the external type of a satellite (also called its 'level', that is, the layer at

which it occurs) that is important for the problem of the relative scope of adverbial clauses, and not its internal complexity (also called its order, that is, the order of the entity to which the satellite term is referring, either a state of affairs, or a propositional content, or a speech act). It is the latter, the internal order of satellites, that is discussed by Hengeveld and Wanders (1997) in their treatment of the use of subjunctive and indicative verb-forms in adverbial clauses.

Secondly, up to now all example sentences have involved only constructions with no more than two adverbial clauses. Deliberately so, as I want to make clear what the problem exactly is. More complex sentences can be adduced, of course, but they wouldn't change anything essential, and would only risk distracting the reader's attention. To satisfy any curiosity that may have arisen, a simple illustration will suffice: see (7a) and (7b).

(7a) *The prince had lost all hopes of seeing Cinderella again*
after she had fled from the ball in a hurry
because he had forgotten to enquire about her name,
until he found her slipper on the stairs.

(7b) [[[S1 after S2] because S3] until S4]

Finally, a warning is in order as to the terminology used in this paper. The label 'clause' is almost always used here in the informal, traditional sense, as understood in descriptive, traditional ('school') grammars (as in 'main clause', 'subordinate clause', 'adverbial clause', and so on). The technical FG notion is referred to as 'underlying clause' or as 'clause structure'. The label 'structure' is used here in various senses, mostly for abstract, theoretically postulated, underlying FG structures, such as term structures, predications, propositions, or clause structures, but also for the 'global' structure (overall analysis) of a sentence, in the sense of a 'parse'. Specific (types of) concrete, observational strings-of-words are referred to as 'constructions' or 'construction types'. Next to a distinction between abstract FG structures and such observational strings-of-words (phrases, clauses, sentences), another distinction must be made between FG structures and the associated 'ontological' entities which are specified (described, designated), or else being referred to, by such FG structures. In my usage, 'scope' pertains, strictly speaking, to (a relation between) abstract structures, but sometimes it is

used (in a very loose way, as a kind of shorthand) for the corresponding concrete expressions (strings-of-words) or even the associated entities (states of affairs, propositional contents, speech acts) alike. The last note for now concerns the abbreviation 'adverbial', which stands for longer expressions such as 'adverbial clause', or more general, 'adverbial construction'.

2 FG-internal views on adverbial clauses

The original problem of the scope of adverbial clauses in general is now transposed to that of the scope of adverbial satellites at the same, second layer. The source of this persistent problem remains unaltered, as I will show shortly. After that, I go on to investigate indications for possible solutions. In this section, I remain within the established FG framework, looking also at what I think is a similar phenomenon. In the next section I review some more or less cognate approaches from outside FG, to see whether the issue at hand is recognised at all, and, if so, how it is handled, and what this may suggest for an adequate treatment within FG.

2.1 Satellites in the representation of higher layers

According to the theory, all satellite term positions are characterised by semantic functions, but these functions are not involved in any scope hierarchy within a single layer. I disregard 'level 1' satellites in the sequel, as they occupy optional term positions within a predicate frame and as such refer to optional participants within a state of affairs (ad-verbials in the narrow sense, as opposed to ad-sententials) but don't co-specify a state of affairs as a whole, as 'level 2' satellites do.The situation with 'higher level' satellites is different, for satellites at a single layer higher than the lowest one can be considered to be added at one sweep, as an unordered set, to the kernel structure with which they co-specify the entity in question (state of affairs, propositional content, speech act), as will become clear from Dik's explanation of the layering mechanism (1997 TFG1:65-67, slightly different from the 1989 edition) :

> Core predications can now be further specified by Level 2 operators and satellites : — Predication operators π_2. These are Level 2 operators which represent the grammatical means by which the SoA can be located with respect to temporal, spatial, and cognitive coordinates. These are therefore operators which leave the internal structure of the SoA intact, but locate it with respect to the different dimensions mentioned. [...] — Predication satellites σ_2. These represent the lexical means by which an SoA can be located with respect

> to the parameters mentioned. [...] These further specifications result in the extended predication, which can now be represented as follows :
>
> (25) extended predication = π_2 e_i : [core predication] σ_2.
>
> [...] / We are now at the level at which fully developed extended predications [...] have been specified. These can in turn be built into a propositional structure, in which the extended predication is used to specify a possible fact, [...] The propositional structure (or briefly 'proposition') can be represented as follows :
>
> (27) proposition = π_3 X_i : [extended predication] σ_3.
>
> In this structure, then, the extended predication is used as a predicate over a variable X_i, which symbolizes the possible fact involved. This structure can again be extended by two types of elements, which operate at Level 3 : — Proposition operators π_3. [...] All these operators thus relate the content of the proposition to the subjective world of the speaker. — Proposition satellites σ_3. [...] / The proposition, in turn, can be built into a schema for the full clause. [...] As a first approximation, we can thus write [...] The proposition now acts as a predicate over the speech act variable E_i. And at this level, again, the clause structure can be modified and specified by operators π_4 and satellites σ_4 [...] The full clause structure can thus be represented as follows :
>
> (31) clause = π_4 E_i : [proposition] σ_4.

It follows from this description that at each layer from the second one onward, a schema is being postulated for the corresponding structure (in my interpretation, as a kind of generalised higher order frame). This schema involves a certain kernel structure, in fact just the next lower layer, plus appropriate operators and satellites. Schemas, or generalised frames, for extended predications (propositions, clause structures) differ from lexical predicate frames for nuclear and core predications in that they always involve a single (higher order) variable. Generalised higher frames, abstracted from Dik's (25), (27), and (31) above, but using Dik's (1989:57-60) notation — for the difference in notation between the two editions see Dik (1997 TFG1:62-64) — can be represented as :

(8) π=operators variable : [[kernel structure] (σ=satellites)] (variable)

When such a schema is filled with elements of the appropriate kind, the resulting structure designates (describes) an entity of the corresponding type. When such a description is applied to a variable of the appropriate type, the whole can be seen as a generalised term structure, which may then be used to refer to an entity of that type, and can also be inserted at a any term position having the corresponding selection

restrictions (Dik 1997 TFG2:94).

More specifically, in the standard view (Dik 1997 TFG1:235-236, 291-292), 'level 2' satellites modify the whole state of affairs (nuclear if without optional participants, else core if with optional participants), and 'co-specify' its parameters. The abbreviated notation by a single greek letter sigma (σ) for the entire set of satellites leaves room for two interpretations to be sketched here. If there is more than one satellite, they can either follow the kernel collectively, that is, be taken together as a set, or they can follow the kernel individually, one after another, just as argument terms follow a predicate, indeed exactly as 'level 1' satellites do (but recall that schema (8) only holds for the second layer and higher). As I see it, the standard view tends towards a 'collective' interpretation in the case of satellites at higher layers. If so, sentences (1b) and (3b) would get the analyses (9a) and (9b), respectively, which, however, don't differ from each other in any essential way.

(1b) *The prince had lost all hopes of seeing Cinderella again*
because she fled from the ball in a hurry
before he found her slipper on the stairs.

(3b) *Cinderella lost her slipper on the stairs*
before she fled from the ball in her coach-and-horses
because she hoped the prince would find it sooner or later.

(9a) S1 [(because S2) and (before S3)]

(9b) S1 [(before S2) and (because S3)]

One might argue that (9a) or (9b) is a possible analysis for the examples (1b) and (3b) (although [[S1 + S2] & [S1 + S3]], the 'individual' unordered reading, is not to be excluded either). With these specific sentences, the view is not untenable that, loosely speaking, S2 and S3 both modify S1, regardless of whether they do so collectively or separately. The analysis is incorrect, however, for the other examples repeated below where it would simply make no sense at all : ((5a) and (6a) can't be analysed as (9a) or (9b), but must be analysed as (2b), *[[S1 because S2] before S3]*, and (5b) and (6b) must be analysed as (4b), *[[S1 before S2] because S3]*. Inevitably so, since in these cases, while S1 is modified by S2, it is the entire combination of S1 plus S2 that is modified

by S3, and not S1 on its own.

(5a) *I bought a new umbrella*
because I couldn't find my old one
before I realised that I forgot it on the train .

(6a) *I bought an umbrella*
because some information leaflet advised us to have one
before I discovered that it was from the previous conference .

(5b) *I bought a new umbrella*
before I left for London
because the rate of the pound was rather high .

(6b) *I bought an umbrella*
before I read the advice in the information leaflet
because the organising committee hadn't yet distributed it .

2.2. Satellites compared to term restrictors

Hengeveld (1989), in proposing the multi-layered clause model for FG, refers to Vet (1986), who suggests representing satellites which specify Time and Location as secondary restrictors of the variable *e*. (As Wanders (*personal communication*) points out, this variable *e* is meant to stand for a space-time region, but Hengeveld (1989) and Dik (1989) treat it as an event variable, or use it for states of affairs (SoAs), and this will lead to notational problems, which, however, we shall pass over here.) Vet's (1986:2) notation (10a) is explicitly based on the term schema (10b).

(10a) OP e : PREDICATION (e) : ADVERBIAL (e)

(10b) (ω=operators x : φ_1(x) : φ_2(x) : ... : φ_n(x))

Here, I may assume it to be sufficiently known how Dik (1978: 56-59, 1997 TFG1:132-136) explains that the structure of terms is represented in (10b) by a sequence of restrictors ('open' predications) which are said to be 'stacked' onto each other, such that each following restrictor gives a further specification of (that is, a restriction on) the set of intended referents. I come back to term restrictors shortly, to elaborate on their use and their position in the underlying term schema.

Hengeveld also refers to Vester (1983), who uses the same notation for a special type of subordinate construction called 'secondary predication' (as *walking down the street* in : *I saw him walking down the street*). Although the latter construction is not directly related to the problem of the scope of adverbial clauses, the notation itself is noticeable. The same three scholars referred to here, together with Dik, treat the subject of adverbial satellites at length and in depth in a joint paper. It is there that, one would hope, the issue of the scope of adverbial clauses at the same layer should be discussed, but this hope is false, as their last but one paragraph (Dik *et al.* 1990:64) reads :

> Many problems concerning the place of satellites in the layered model of the clause remain to be explored. For one thing, we have hardly touched the problem of the relations between different satellites at the same layer (e.g., the relation between Temporal and Local satellites, both predication satellites). Also, certain theoretical issues have been left unresolved. For example, the question whether satellites can be analysed as predicates over the units they take in their scope (as proposed in Vet 1986), or should be regarded as some type of modifiers different from predicators (as in Dik 1989).

Dik (1997 TFG1:235) mentions Vet's 'restrictor' idea, but he rejects the representation (10a) in favour of the representation (8). His dictum

> I do agree that locative and temporal satellites *can* function as predicates over SoAs [...] . But I find it more difficult to see a simple predication [...] as a kind of referential expression which can be restricted in precisely the same way as a term phrase. The primary function of the predication is not to refer, but to predicate something, and thus create some state of affairs, which once it has been created, can then be referred to.

causes much puzzlement. I am not sure whether I quite understand it, but it seems to be an unnecessarily complicating factor. In my view, an excellent opportunity is being missed here to remedy the problem of the scope of adverbial clauses. On many occasions, and by several authors, parallels between the structures of terms and predications have been drawn, and are still being drawn. When introducing variables for states of affairs Dik could have cited his entire section on the structure of terms (1997 TFG1:132-136), where he not only argues that

> [t]he whole term [(d1x : *elephant*(x) : *old*(x))] can be spelled out as follows :
>
> (12) 'definite singular entity x
> such that the property *elephant* applies to x such that the property *old* applies to x'

but also that

> restrictors are successively 'stacked' onto each other through the relation ':' [(which can be read as 'such that')], rather than being conjoined with each other. This is different from what

> is usually done in logic, where expressions of this type [(such as *old elephant*)] are analysed in terms of conjunctions of predicates, as in :
>
> (15) *old elephant*(x) ≡ *old*(x) & *elephant*(x)

and, furthermore, shows how

> certain ambiguities can be resolved by means of the difference between conjunction and stacking of restrictors :
>
> (25a) *beautiful old houses*
> 'old houses which are beautiful'
> (x : *house* : *old* : *beautiful*)
>
> (25b) *beautiful, old houses*
> 'houses which are old and beautiful'
> (x : *house* : *beautiful*, *old*)

As I see it, the same line of argument as applied to *old elephant* and to *beautiful old houses* can be continued, and equally well be applied to an ordered sequence of adverbial satellites at the same layer. In my view, as opposed to Dik's view, an adverbial satellite modifies the description of a state of affairs, that is, a higher order entity, in just the same way as a restrictor modifies the description of a first order entity. As to the role of a term phrase for referring, that is another issue (which I don't want to touch upon here), but the situation of the scope of a sequence of restrictors to the same head is similar to that of the scope of adverbial satellites at the same layer which modify a single kernel structure. The latter gives rise to problems for FG in the standard approach, as shown above. The former is analysed in a satisfactory way in FG, as I will show below with the help of a handful of examples.

2.3 Term restrictors and scope

Term restrictors beyond the first (the head) occur in different guises, attributive adjectives, relative clauses, adpositional phrases, and so on. For a term with two or more additional restrictors, the underlying order in the FG term structure should be distinguished from the surface order in the expression, because there is no unique mapping between them.

Restrictors of different categorial types are put in a surface order that is established by the standard patterns for a complex noun phrase in the language at hand. Restrictors of a single specific category are, in general, either all preceding (prefield), or all following (postfield) the head noun. For restrictors of the same category, expressed on the same side of the head, the rule is : the further they restrict the set of potential referents, the

greater distance they will have from the term's head, that is, what is added later on in the structure, is added at the outskirts of the complex. Thus, an *old strong elephant* is not the same as a *strong old elephant*. In cases that deviate from this general rule, a marked intonation should indicate the intended underlying order, with the result that (11c) is not the same as (11b), but as (11a). Restrictors of different categories (*a fortiori* those occurring on opposite sides of the head noun) give rise to ambiguities if there is no marked intonation, as shown in (12) and (13).

(11a) *the strong old elephant* = (d1x : *elephant* : *old* : *strong*)
(11b) *the old strong elephant* = (d1x : *elephant* : *strong* : *old*)
(11c) *the old stróng elephant* = (d1x : *elephant* : *old* : *strong*)

(12a) *Mary's red coat*
(12b) (d1x : coat : red : Mary's) = *Máry's red coat* [not Ann's]
(12c) (d1x : coat : Mary's : red) = *Mary's réd coat* [not her green one]

(13a) *the blue book on complex constructions*

(13b) (d1x : book : on complex constructions : blue)
the blúe book on complex constructions
[not the brown one]

(13c) (d1x : book : blue : on complex constructions)
the blue book on cómplex constrúctions
[not the one on the structure of the clause]

Here are some more examples of the general (unstressed) case in which the surface order of term restrictors on the same side of the head noun is a true image of their stacking order in the underlying term structure.

(14a) *the book they recommended which you bought yesterday*
(d1x : book : [recommend pl3 x] : [buy sg2 x yesterday])

(14b) *the book you bought yesterday which they recommended*
(d1x : book : [buy sg2 x yesterday] : [recommend pl3 x])

(15a) *languages spoken in Central Asia with a future perfect*
(imx : language : [speak z x $(\text{Central Asia})_{\text{in}}$] : $(\text{future perfect})_{\text{with}}$)

(15b) *languages with a future perfect spoken in Central Asia*

(imx : language : (future perfect)$_{with}$: [speak z x (Central Asia)$_{in}$])

(16a) *languages that we have investigated that have a future perfect*
(imx : language : [investigate pl1 x] : [have x (future perfect)])

(16b) *languages that have a future perfect that we have investigated*
(imx : language : [have x (future perfect)] : [investigate pl1 x])

(17a) *the house on the hill with the telescope*

(17b) *the house with the telescope on the hill*

Both noun phrases of the last pair show a kind of structural ambiguity which is a well-known, not to say notorious, phenomenon in linguistics. It is often referred to as the problem of PP-attachment (PP-adjunction). Not always does such a structural ambiguity lead to a realistic semantic ambiguity, though. That of the first one, (17a), does, with readings (18a) and (18b), but the second one, (17b), has only one reasonable reading, (18c) (in a slightly different way, (15a), (15b), (16b), are structurally ambiguous as well, with one of the two structures being semantically anomalous). The difference between the readings (18a) and (18b) is similar to the difference in scope of adverbial clauses, that is, between (2a) and (2b), or between (4a) and (4b). PP-adjunction to a noun phrase, which is clearly a matter of scope, is perfectly amenable in FG, however, while in the case of adjunction of adverbial clauses at the same layer, the issue of scope continues to cause serious problems for the theory.

(18a) *the house on* [*the hill with the telescope*]
(d1x : house : (d1y : hill : (d1z : telescope)$_{with}$)$_{on}$)

(18b) [*the house on the hill*] *with the telescope*
(d1x : house : (d1y : hill)$_{on}$: (d1z : telescope)$_{with}$)

(18c) [*the house with the telescope*] *on the hill*
(d1x : house : (d1z : telescope)$_{with}$: (d1y : hill)$_{on}$)

2.4 Term restrictors and recursion

From a purely theoretical and conceptual point of view, FG is perfectly capable of distinguishing, in the case of term restrictors, between two readings such as (18a) and (18b) shown above, as Dik (1997 TFG2:32) explicitly points out in one of the chapters

on relative clauses.

> The underlying structure which we assume for terms is such that restrictors can be 'stacked' onto one another (as expressed by ':' in [the term schema] above), thus progressively limiting the ensemble of potential referents of a term.
> Note that 'stacking' applies to a series of restrictors, related through ':', such that each following restrictor applies to the same term variable.
> This should be distinguished from recursion within [verbal restrictors], as in :
>
> (28) *the dog [that chased the cat [that caught the mouse]]*

This fragment probably is crucial in offering insight into where the FG problem with the scope of adverbial clauses may be rooted, especially in combination with Dik's own computational ProfGlot system that, as claimed (Dik 1992:19),

> implements the theory of Functional Grammar (FG) in the version described in Dik (1989) [... and ...] has led to modifications, simplifications, and substantial improvements in the Functional Grammar formalism.

Although the theory of FG conceptually leaves room for complex terms with structures such as (18b), ProfGlot lacks this theoretical capacity. As I point out in my comments on ProfGlot (Kwee 1996:45-46), it can only generate and recognise (parse) terms with a structure such as (18a), but not as (18b) or (18c), and hence it can't correctly parse complex terms such as (17b), but gives only a semantically anomalous parse for them.

The distinction between stacking of, and recursion within, restrictors, as made by Dik (1997 TFG2:32) in the fragment cited just above, is not only comparable, but even identical to that between the readings (18b) and (18a), and that between the global structures (2b) and (2a), or (4b) and (4a). The crux is that what Dik calls 'stacking' of term restrictors is nothing else than another form of recursion, as will be explained below.

The notions recursive, recursiveness, recursivity, recursion, all deal with repetition. If a structure is repeated in itself, it is not yet said where, or when, this repeating occurs. Structures with an aspect of linearity, that is, which can be considered to have a beginning, a middle part, and an end (without necessarily being linear or flat structures — branching, such as in tree diagrams, is still possible), may be represented from left to right (a common usage in Western tradition). In a first crude classification, therefore, there are at least three forms of recursion, depending on the place, or moment, of repetition : left, middle, and right recursion. Note that left and right are formal notions here, linked to abstract structures rather than to concrete expressions (recall the order of

term restrictors in a term schema as compared to that of their respective expressions).

In Dik's (1992:91, 183) ProfGlot system, it turns out, recursion is taken to be right recursion, in generation as well as in analysis, while left recursion is completely overlooked. The notion of restrictors being stacked onto each other (from left to right in a term schema) can easily be described as left recursion, but apparently it isn't recognised as such, for this type of recursion is not mentioned at all in the accompanying (descriptive and explicative) text (Dik 1992:36-37), not even in a footnote.

It will become clear that stacking of restrictors in a term schema is just a kind of (left) recursion, when it is described in the format of rewriting rules such as (19a) and (19b) (which practically look like actual prolog code), read as : (a) *a term is a series of operators followed by a specification*, and : (b) *a specification either is a head, or it is a specification followed by a restrictor*, respectively. As we were only concerned with adpositional restrictors in (18a) and (18b), and disregard other restrictor types, we need only one more rule, (19c), plus an additional set of lexical rules for the various prepositions, (19d).

(19a) term → operators, specification
(19b) specification → head ; specification, restrictor
(19c) restrictor → preposition, term
(19d) preposition → at ; by ; for ; from ; in ; of ; on ; to ; with ; ...

When the 'term' in rule (19c) is a simplex term (without any restrictors of its own), we get a structure such as (18b) and (18c), which, indeed, represents the typical case of successive stacking of ('plain') restrictors. When the 'term' in (19c) does take restrictors of its own, however, we get the phenomenon of right recursion illustrated in (18a), that is, PP-attachment to an NP which is itself part of another PP. Only structures such as the latter (18a), but not the simpler type (18b) and (18c), are possible according to the grammar modelled in Dik's ProfGlot system.

In the same vein as sketched here, I have suggested elsewhere (Kwee 1994:248) that the global structure of extended predications could be described with the help of left

recursive rewriting rules such as (20a) (the counterpart of (19b)), which should be complemented with another rule (20b) (the counterpart of (19c)) that, in combination with (20a), accounts for the case of right recursion, and, finally, of course, a lexical insertion rule, or, in a more FG-like style, expression rules for specific semantic functions associated with the various satellites, as in (20c) (the counterpart of (19d)).

(20a) extended predication → core predication ; extended predication, level 2 satellite
(20b) level 2 satellite → level 2 subordinator, extended predication
(20c) level 2 subordinator → after ; because ; before ; until ; while ; ...

2.5 Conclusions so far

In this section I reviewed the standard FG approach to adverbial clauses and compared it to the treatment of a similar phenomenon, that of term restrictors in general and adpositional term restrictors in particular. The similarity may suggest a uniform treatment of satellites and restrictors, especially if one thinks of work in FG by various other researchers who point to the correspondence between the structure of terms and that of predications, an issue that is not discussed here. Another issue which is left aside is 'the referential use of descriptive structures' (to put it in an informal way). The debate on that topic has recently arisen in FG circles, and it seems to be a fast growing focus of attention (not to say concern).

My principal aim until now was to indicate a hitherto neglected problem in FG raised by the scope of adverbial clauses (the first section), and to look within FG, if not for what possibly could lead to its solution, then at least for what probably might be seen as its roots (this second section).

As regards possible solutions to the problem, unlike Dik I feel inclined to opt for the restrictor approach as originally proposed by Vet (1986). The tools are available, known from elsewhere within FG, and the model of the underlying clause would need no radical changes, only relatively slight adaptations. Connolly (1994, 1995), who applies Vet's formalism to temporal satellite terms in English, seems to share my opinion.

As for probable sources of the blind spot, I believe I have located them in Dik's restricted conception of the notion of recursivity. Left recursion as such goes unrecognised, since recursion is equated to right recursion, both in the theory and in

Dik's own computational system, where the theoretical concept of the stacking of term restrictors (which essentially is identical to left recursion) is totally ignored in the case of attributive adpositional modifiers as well as of relative clauses (1992:26, 36-37), and called 'iteration' in the case of attributive adjectives and participles (with the note that *no iteration [...] has been allowed so far* (1992:26)), but in my eyes mistakenly so, as 'iteration' would rather be identifiable with conjunction, the phenomenon that Dik (1997 TFG1:136) illustrates with the example of *beautiful, old houses* which should be interpreted as 'houses which are old and beautiful', as opposed to *beautiful old houses*, which must be interpreted as 'old houses which are beautiful'.

For the rest, Dik's incomplete treatment of term restrictors in ProfGlot is, as far as I can see, the very spot where FG brushes past the solution to the problem under consideration, as it is here that adverbial clauses and the various attributive modifiers are put next to each other in one section (Dik 1992:36-37). Had he been able to program stacking of term restrictors, he might have become aware of the phenomenon of relative scope differences between adverbial satellites of the same type.

3 FG-external views on adverbial clauses

The treatment of adverbial clauses in most traditional grammars is not very clear. It is often said that what is left if an adverbial clause (as a part of a complex sentence) is taken out of the whole, still is a complete, independent, and (grammatically) correct sentence. When examples are given to illustrate this, the remaining sentence is practically always just a simple clause. Sometimes an adverbial clause is said to be subordinate to (dependent on) the remaining sentence (clause), and sometimes, that it is subordinate to the entire sentence of which it is an (embedded) part, that is, a constituent. In both cases, the superordinate is called the 'main', or the 'matrix', clause. Another shortcoming found in traditional descriptions is that adverbials are not distinguished from (subject or object) complement clauses, but for this difference that the latter can't be taken out without damage. As to the recursive nature of the sentence (clause) notion, if it is mentioned at all, it is remarked that 'subordinate clauses themselves can, of course, be complex sentences (clauses) again, and so on and so further'. On the 'remaining' part (the independent clause) intended above, nothing is said in this respect.

In the first section I observed that a certain phenomenon, dubbed the 'scope of adverbial clauses', raises a problem for FG, in that the theory can't account for complex constructions such as those illustrated by a handful of sentences. In the previous section I tried to trace this FG problem back to its roots, investigating why and how it might have arisen, and how it could be remedied in the current framework with the help of the available tools. Having come so far, in this third section I review some approaches from outside FG to the issue at hand.

3.1 Logico-semantic : relational adverbials

Outside FG, the scope of adverbials is known, and has been studied and treated, for a fairly long time already. Adsententials are a type on their own in Categorial Grammar / Montague Grammar, and expressions that belong to this type map propositions onto propositions. Bartsch (1972, 1976:102), in another logico-semantic approach, distinguishes sentence adverbials from relational adverbials. The latter

> do not characterize processes, states or facts [... but] establish a relation between an event or a circumstance and another event or circumstance. [...] The relations between events or circumstances are characterized by the content of the relation (causative, final, concessive, adversative, temporal, relations of analogy or parallelism, etc.).

What is most relevant here, next to the binary character of the relation, is that combination of relational adverbials is possible, and that there are two ways of doing so, in Bartsch's (1976:257-258) terminology, adjunction and subordination, represented by the following formulas :

(21) Adjunction : $\varphi_c^{\,i}\,(\varphi_c^{\,j}\,(s_1, s_2), s_3)$
Subordination : $\varphi_c^{\,i}\,(s_1, \varphi_c^{\,j}\,(s_2, s_3))$

where i,j = causative, temporal, concessive, adversative or conditional sentence connective.

The above notation is borrowed by Bartsch (1976:101, 106) from Harris (1968). Bartsch's own notation is used in parallel, but I will skip it here (it is dependent on word order in the language at hand, either English or German, while the latter also has different constituent orders for main clauses and subordinate clauses, so it would rather complicate the analysis and the comparison of example sentences here).

We find, in fact, exactly what I was so eagerly looking for : the formulas in Harrisian notation (Bartsch 1976:259-261) cited here as (22a), (22b), (22c), and (22d) correspond

to our global structures given earlier (in a different order, to wit (4b), (2a), (2b), and (4a), respectively), with s_1, s_2, s_3 matching S1, S2, S3, that is, the first item in each pair φ(x, y) or [x + y] is the kernel (the main, or independent, part), and the second item is the adverbial (the subordinate, or dependent, part).

(22a)	$\varphi_c^{because}(\varphi_c^{before}(s_1, s_2), s_3)$	=	(4b)	[S1	before	S2]	because S3	
(22b)	$\varphi_c^{because}(s_1, \varphi_c^{before}(s_2, s_3))$	=	(2a)	S1	because	[S2	before S3]	
(22c)	$\varphi_c^{before}(\varphi_c^{because}(s_1, s_2), s_3)$	=	(2b)	[S1	because	S2]	before S3	
(22d)	$\varphi_c^{before}(s_1, \varphi_c^{because}(s_2, s_3))$	=	(4a)	S1	before	[S2	because S3]	

Thus, the scope differences illustrated by our first example sentences, which were explained as resulting from two different types of recursion, can easily be accounted for in Bartsch's 'relational' approach as well, with the two ways of combining defined in (21) above.

3.2 Typological-descriptive : core, periphery, nucleus, base, margin

In Role and Reference Grammar (RRG), the grammatical theory which is by far the most cognate to FG, adverbial clauses are analysed as a case of clausal subordination, in what is called nexus-juncture (linkage types of syntactic units) terminology, that is, they are peripheral modifiers of a sentence core. On several occasions (Van Valin 1993:123, Van Valin and LaPolla 1997:492-493, 498) it is remarked that a structural parallel exists between adverbial clauses and restrictive relative clauses, but I haven't been able to find an answer to the problem at issue. In the RRG layered structure, a clause is defined as a core plus the periphery, and a core as the nucleus (predicate) plus its arguments. This seems to imply that for yet more complex structures with several adverbial clauses, it is only possible to have analyses which have recursion via a periphery, as in the global structures (2a) and (4a) shown above, but not via a non-peripheral part, as in (2b) and (4b), exactly as in FG.

Let us now look at some more descriptive treatments of the question of adverbial

clauses. The situation presented by Thompson and Longacre (1985), and Longacre (1985), in the overall framework of a typological approach (Shopen ed. 1985), is not quite clear. In the first, joint, paper (consisting of two distinct halves, each one primarily the responsibility of one of the two authors), Thompson starts observing that

> [i]t appears that all languages have a set of two-clause constructions in which one clause can be said to modify the other in a way similar to the way in which an adverb modifies a proposition. (171)

The individual constituents of such a two-clause construction are called main clause and subordinate clause, but the main clause notion is not elaborated any further. In the second half of the joint paper, Longacre refers to his own separate other paper

> [which] mentions that for many languages sentences can be considered to consist of a nucleus with structural units called sentence margins draped around the edges. Sentence margins are considered to be functional slots whose fillers are typically adverbial clauses but which may be embedded sentences of complex internal structure. (206)

Apart from the confusing plural *margins* (which may remind us of the set of satellites in the generalised higher frame shown earlier in (8)), when a margin may be complex, this is again the case of right recursion, whereas it is left recursion that has our special interest, because it is at the heart of the problem of the scope of adverbial clauses in FG.

The other paper, Longacre (1985), however, a descriptive-typological survey, opens some perspectives in the intended direction :

> The sentence is considered here not as a unit consisting of a predicate and nouns related to it (a simple clause), but rather as a combination of such units (clauses) into still larger structures of a sort here summarized. This chapter describes the notions encoded in these combinations of clauses and goes on to describe and illustrate the formal features of these sentences in languages around the world. [...] Three useful terms in distinguishing the parts of a sentence are : 'nucleus', 'base', and 'margin'. (235)

> The nucleus of a sentence is its most characteristic part, and is, furthermore, independent of the margin. The margin, on the contrary, goes with a variety of nuclei and is thus non-characteristic and, in addition, it is subordinated to the rest of the sentence. (236)

Examples of three kinds of sentence nuclei are given :

> with medial *and*, *but*, and *so ... that*.

Note the different uses of 'nucleus' in FG, in RRG, and by Longacre. What is a periphery in RGG is a margin for Longacre, who, moreover, adds in a footnote :

> Besides the sentence nucleus and its margins there is also a sentence periphery, which consists of such functional elements as exclamations. vocatives, and sentence adverbs. (284)

That isn't very helpful. We must delve deeper into the sentence nucleus.

A glimpse (but not more than that) of the view I hoped to encounter might be found in the introductory section from which the following quote is extracted.

> The parts of a sentence nucleus consist of (a) a conjunction and (b) bases (although conjunctions are not present in all types). The term 'base' is here used to describe a functional subpart of a nucleus. [...] The term 'base' is needed because a functional part of a nucleus need not be a single clause.
>
> [A first example ...] Here each base of the nucleus is filled by an embedded sentence of coordinate structure [...] The *but* separates the two main parts of the nucleus ; each subpart has its own sentential structure. Such recursive occurrence of sentence within sentence is endemic in the sentence structure of most languages around the world.
>
> [A second,] more extreme example [...] To begin with, this sentence is a bipartite structure hinging on the word *but*, each part being a base. In turn, however, the first base of this *but* sentence is itself complex : it is a contrafactual sentence [...] whose first part is a conditional margin which is also complex : an *or* sentence. So we see that not only may a nucleus be complex but a margin may be complex as well, i.e., we may in effect subordinate a sentence rather than simply a clause. (236-237)

The first example, which would be represented in a shorthand formula as *[[[S2 and S3] but [S4, S5 and S6]] when S1]*, might have suggested that a nucleus can be a coordination of bases which themselves may at most be coordinate structures. The second ('more extreme') example reveals that a base may also be complex, that is, may have a margin : here, the first base is a contrafactual sentence with a conditional margin. (Note the addition of *which is also complex* — it is unfortunate that the complexity of the margin gets so much stress : it is the complexity of the base that is remarkable here ; complexity of margins is, again, right recursion, easily obtainable in FG.) The complexity of the first base in this second example suggests that in Longacre's view left recursion is possible, via a part of the nucleus. It is regrettable that this feature is hidden in the elucidation of a single (and 'more extreme') example, and that Longacre's definitions are not explicit enough. The 'conjunction' in the above definition of 'nucleus', for instance, is not specified, either as only a coordinating conjunction, or as also possibly a subordinating one, which it probably should be, as witness the *so ... that* example given a short while ago (it struck me that Longacre speaks of 'complex', and never of 'compound' sentences).

The title of this Longacre paper, *Sentences as combinations of clauses*, meanwhile, points in a promising direction. Before continuing that track, however, I would like to

round off this excursion into more descriptive areas with a brief reference to some standard works in the field.

Recent, massive and impressive, survey collections especially devoted to adverbial constructions, in particular in the various languages of Europe (Kortmann 1997, van der Auwera ed. 1998), to begin with, don't contain any mention of the problematic construction under consideration, as far as I could gather. Another handbook, a fairly long-standing authority in the description of English, is reviewed in the next subsection.

3.3 Purely descriptive : subordinates

The most comprehensive English grammar of recent times (Quirk *et al.* 1985) discusses the issue only in passing, and in a very confusing way : subordinates are treated as if they were a single category, adverbial clauses being indiscriminately mixed with complements and relatives.

In Chapter 14, *The complex sentence*, in a section *Sentence complexity and comprehensibility*, we find item 14.37, *Combining subordination devices within a sentence*. Almost all examples suffer from the mixture of different kinds of subordinates just referred to, and the only example that has no other subordinates than just adverbials is given a structure that I don't agree with (I will come back to this in a later section). On that example sentence, shown here in my lay-out (spread over four separate lines), in fact, Quirk *et al.* (1985:1035-1037) remark

> clauses [B], [C], and [D] are all adverbials that are immediately subordinate to the complex sentence [A].
>
> [A [B To keep dirt roads even marginally useful, B]
> barrier gates are swung shut
> [C when drops begin to fall, C]
> [D lest the roads become churned into impassability. D] A]

The last item of the chapter, 14.41 *Structural ambiguity*, tells us (1042) :

> Ambiguities may arise in complex sentences when two interpretations are plausible. If a complex sentence contains two final subordinate clauses, as in (1), the last [one] may be interpreted as subordinate (a) to the sentence as a whole or (b) to the preceding [one]. The two paraphrases are given in (1a) and (1b) [...]
>
> (1) I'll let you know whether I'll need you here when the doctor arrives.
> (1a) When the doctor arrives, I'll let you know whether I'll need you here.
> (1b) I'll let you know whether, when the doctor arrives, I'll need you here.

The text on its own, without the example itself, inspires our hope that these paraphrases (a) and (b) will be similar to our global structures (2b) and (2a), but in reality they are not : sentence (1) above doesn't contain two adverbials but a complement and an adverbial, a case in which FG also recognises two structures (only in theory, not in Dik's ProfGlot parser, which requires all subordinates to be sentence-final, and, therefore, will miss all parses that correspond with the above paraphrase (a) (Kwee 1996:46)). These two items are all we can find in Quirk *et al.* (1985) on the question at hand.

A recent competitor to the above grammar (Greenbaum 1996) suffers on the whole from the same shortcomings as regards subordinate clauses, but one gets the impression that it gives more attention to slightly subtler structural distinctions. Not enough, though, to offer cues to a satisfactory approach to the phenomenon under consideration, except for the notion, or rather the term, of a clause cluster, or clause complex, different from the concept of a sentence (Greenbaum 1996:322-324). But maybe this is only an observation in retrospect, the next subsection may clarify why.

3.4 Clause combining : grammaticalisation of text relations

As I hinted above, Longacre's title *Sentences as combinations of clauses* points in a direction in which I think the most adequate solution to the problem lies. In the book *Clause combining in grammar and discourse* (Haiman and Thompson eds), Matthiessen and Thompson's (1988) paper discusses the relations between discourse structure and 'subordination'. Disregarding all other things worthy of consideration in that paper, and all of them connected to the issue at hand, and which also motivate and explain the approach taken and the terminology used by the authors, I focus on the elements that offer a straightforward and elegant solution to the issue of the scope of adverbial clauses. It is impossible to do full justice to the authors' argumentation in an account such as that given below.

I found the class of example sentences they start from (and which can indeed be called circumstantials) to be identical to what I discuss in the present paper. I must emphasise here that Matthiessen and Thompson (1988) start with a particular grammatical construction type which they characterise *by exemplification*, and then

> are proposing an answer to the question 'What discourse function motivates the grammar of hypotaxis ?' (276)

First of all, the authors distinguish grammatical class from grammatical function. They avoid the label of adverbial subordinate clauses. Instead, they take a functional approach, distinguishing, as for functional clause relations, between embedding and clause combining, and also observe :

> The examples we listed [...] have generally been treated as cases of embedding : One clause is said to be embedded within another clause as an adverbial (or adjunct) ; they are often referred to as adverbial clauses. We find this approach in many traditional grammars [... but also] more recently in e.g. Quirk *et al* (1985) and in Foley & Van Valin (1984). A few linguists have taken a different view : Longacre and Halliday [...] have treated examples of the kind listed [...] not as embeddings but as clause combinations. We are in agreement with this approach. (279-280)

What strikes me as most fundamental is the following observation :

> Clauses may combine with clause combinations — When one clause combines with just one other clause, it may seem to function as an adverbial, although it does not. But when one clause combines with a combination of clauses, it is quite clear that there is no single clause it could be an embedded constituent part of. (280)

In clause combining, they distinguish between parataxis and hypotaxis, after which they concentrate on the subtype of enhancing hypotaxis. All example sentences of the class of clause combinations to be studied fall in this category.

> Enhancing hypotaxis refers to hypotactic clause combining involving some kind of circumstantial relation like condition, reason, purpose and other kinds of cause, time, space, manner, and means : One clause enhances another clause circumstantially. (283-284)

Secondly, the authors look at text relations in the structure of discourse, as defined in Rhetorical Structure Theory (RST).

> [A text is] broken down into components, which we will call (rhetorical) 'units', roughly coded as what most grammarians would call 'clauses', except that clausal subjects and complement and restrictive relative clauses represent units that are part of their matrix unit rather than separate units. (287)

> We have [...] seen that two types of [text relations in discourse] can be distinguished : those in which one member of the related pair is ancillary to the other ([drawn] with an arc from the ancillary portion to the central portion), and one in which neither member of the pair is ancillary to the other ([drawn] as descendents from a *List* node) [...] The first type we might call a *'Nucleus-Satellite' relation*, the second a *'List' relation*. We are suggesting, then, that all text can be described in terms of such hierarchical relations among its various parts. It is important to note that these relations are defined in terms of the functions of segments of text, [...] The rhetorical structure of texts, then, is claimed to be *composed of function-specific elements*. (289)

I will show one of their diagrams shortly, but here I simply report that the authors thereafter focus, in an initial specialisation, on the Nucleus-Satellite (as opposed to the

List) type, of which some twenty individual relations can be defined (291-299), but only after an explicit warning :

> [i]t should be clear that nuclearity and hypotaxis are quite distinct from each other : there are many Nucleus-Satellite relations which do not involve hypotaxis.

They ultimately seek to establish the analogy between clause combining and text relations in discourse. According to another important observation,

> a clause combination is organized like the rhetorical structure of a text, but it is not organized like a clause. (300)

This leads to the first version of a hypothesis, which, when in a further specialisation they focus on the subtype of enhancing Nucleus-Satellite relations, is narrowed down to a more specific second version.

> Hypothesis : Clause combining in grammar has evolved as a grammaticalization of the rhetorical units in discourse defined by rhetorical relations.
>
> Narrower hypothesis : Enhancing hypotactic clause combining has evolved as a grammaticalization of rhetorical relations in text of the enhancing Nucleus-Satellite kind. (301)

One of the predictions ensuing from this concerns the use of enhancing hypotactic constructions, and another prediction relates to their 'scope'.

> Whether a clause is enhanced through hypotaxis or not depends entirely on whether it is the nucleus in a Nucleus-Satellite relation or not. If there is a satellite to express, the clause may be hypotactically enhanced. There is nothing in the grammar of English that demands hypotactic enhancement. [...] However, [hypotaxis] is quite different from embedding, [...]
>
> Rhetorical units defined by an enhancing Nucleus-Satellite relation have only one satellite. This satellite may be realized by a list of rhetorical units, but it is still a single satellite. Consequently, we predict that the same characteristics will hold for enhancing hypotactic clause combinations. (302-303)

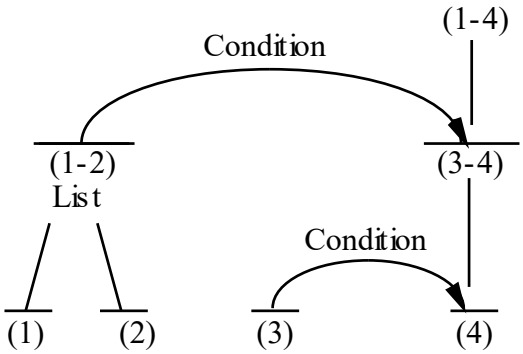
Their argument is supported by analyses of short text fragments, with the text units numbered for the sake of convenience, and diagrams that represent the rhetorical relations. The second prediction cited above is illustrated with a text fragment taken from Halliday (1985:200) and the corresponding diagram which is reproduced below in the intended form, that is, with arrows on the arcs, not shown in Figure 15 in the book,

but in accordance with similar diagrams in publications on RST, for instance, as explained by Thompson and Mann (1987:83) :

> a vertical line points to the nucleus [...], the arc points to the satellite [...], and the arrow shows the direction from satellite to nucleus.

The fragment and the accompanying diagram (303-304) are :

> Our teacher says that
> 1. if your neighbour has a new baby and
> 2. you don't know whether it's a he or a she,
> 3. if you call it 'it'
> 4. well then the neighbour will be very offended.



Relational structure of the 'Neighbour' text
(Matthiessen and Thompson 1988, Figure 15)

3.5 Recapitulation

Outside FG circles, the relative scope of what in FG are seen as adverbial satellites at the second layer (circumstantials, that is, which specify the setting of a state of affairs relative to other states of affairs (Dik *et al.* 1990:33)), a problem so far overlooked or neglected in FG or at least not discussed by Dik (1989, 1997 TFG) and also left aside by Dik *et al.* (1990), is scarcely recognised either. Sometimes, though, the binary character of the relation between an adverbial clause and its main clause is noticed.

Logico-semanticists, for whom the notion of scope is part of their daily bread, are a positive exception, so it seems. Thus, Bartsch (1972, 1976) readily distinguishes a binary (asymmetric) relation between a single circumstantial adverbial clause and a main clause unit, and, what is yet more important, the two different types of recursion that are actually at the heart of the question under consideration.

Thompson and Longacre (1985), in their typological survey, notice that all languages

have two-clause constructions that possess certain specific properties, but they don't elaborate this observation for the constituent parts of such a bipartition. When Longacre (1985:237) points out that

> recursive occurrence of sentence within sentence is endemic in the sentence structure of most languages around the world

I wonder whether the author intends *recursive occurrence* to equally hold both for the nucleus (or its base parts) and the margin part of the bipartition. If it is recognised only for the margin part then there is only right recursion, as in the standard FG view and in the treatment by Quirk *et al.* (1985), and in that case Longacre doesn't offer a solution to the problem. Further specific definitions are lacking, and the particular example that gives rise to the remark on recursiveness shows a nucleus that is not a complex sentence (with subordinates), as hoped for, but a compound one (a coordination). In summary, the issue remains unclear.

Quirk *et al.* (1985) treat all subordinates alike, in a manner that is yet more indiscriminate than the treatment of adverbial and complement clauses in FG under the common denominator of higher order terms that contain embedded constructions. When a single sentence contains more adverbial clauses, Quirk *et al.* treat them all as immediately subordinate to the entire complex (this corresponds to the standard FG approach to satellites at the same layer in what I called, in the previous section, the 'individual' view, as opposed to the 'collective' view). They also provide an example of structural ambiguity with, in one of its two readings, an adverbial clause and a complement clause which are both immediately subordinate to a single main clause. This is not exactly the same as, but nevertheless quite comparable to, the FG view, especially in the original, pre-1989, version in which all optional satellites are considered to occur on a par with the obligatory argument terms, as their sister nodes, with the predicate in the role of their common mother node.

Matthiessen and Thompson (1988) choose their theoretical foundations in the rhetorical organisation of discourse (text). A text fragment can be

> broken down into components, which we will call (rhetorical) units

and in a coherent discourse these units will assume functional rhetorical relations with one another (1988:287). Certain relations of the Nucleus-Satellite type may systematically, though not necessarily, be expressed in the form of certain functional grammatical relations called hypotactic clause combining (1988:301). I would like to point out that the authors sharply differentiate embedding from

> clause combining or clause complexing in Halliday's terms (1988:282)

with hypotaxis being a subtype of the latter. They also emphasise that

> Nucleus-Satellite relations are pervasive in texts independently of the grammar of clause combining. (1988:290)

The rhetorical as well as the grammatical relations that are focussed on are binary (and asymmetric), and all such combinations may repeatedly combine with other such combinations, over and again. Thus, both left and right recursion are accounted for in a natural fashion, and the scope problem with circumstantial adverbial clauses which is persistent in the current FG model is simply nonexistent. Exactly the same result is reached in Bartsch's (1972, 1976) approach, where left recursion is a matter of repeated adjunction and right recursion one of repeated subordination.

Neither from Matthiessen and Thompson's, nor from Bartsch's point of view are any difficulties encountered in the generation of global structures (2b), (4b), and (7b) from section 1 (nor, of course, in that of (2a) and (4a)). In both approaches, the first complex example sentence taken from Quirk *et al.*, cited in subsection 3.3 together with the analysis they give, as repeated here :

> [^{A} [^{B} To keep dirt roads even marginally useful, ^{B}]
> barrier gates are swung shut
> [^{C} when drops begin to fall, ^{C}]
> [^{D} lest the roads become churned into impassability. ^{D}] ^{A}]
>
> clauses [B], [C], and [D] are all ... immediately subordinate to the complex sentence [A]

is not analysed as shown, but, in the bracket notation introduced in section 1, as [[[A+C]+D]+B], with A the simple clause *barrier gates are swung shut*, and not the entire complex sentence. An alternative analysis would be, but this may be open to discussion, [[[A+C]+B]+D]. When [B] and [D] are more or less each other's paraphrase,

it is legitimate to consider either one to be a (redundant) repetition of the other. However, I prefer to give widest scope to [B], because of its '*to* + infinitive' form, different from the finite verb forms in [D], [C] and [A]. Another, and possibly stronger, argument in support of this decision is the more general character of [B] as compared to the more specific and momentaneous character of [D] (E.M. Tol-Verkuyl *personal communication*). My morpho-syntactic considerations, indeed, would fail in the following Dutch rendering of the above complex sentence :

> [[^{B} Opdat zandwegen nog enigzins bruikbaar blijven, ^{B}] [^{A} worden ... ^{A}] [^{C} zodra ..., ^{C}]
> [^{D} om te voorkomen dat de wegen in onbegaanbare modderpoelen veranderen. ^{D}]]

or, alternatively,

> [^{D} om de wegen niet in onbegaanbare modderpoelen te laten veranderen. ^{D}]]

An advantage of the Matthiessen and Thompson approach over Bartsch's logico-semantic treatment, though, is the particular discourse-text functional motivation they offer, expressed in the hypothesis they advance about the fundamental analogy between clause combining in grammar and rhetorical organisation of discourse as described in RST (Rhetorical Structure Theory). The logico-semantic treatment gives a correct analysis of the scope of adverbial clauses as such, explaining all actual and predicting all possible constructions. The discourse-text point of view provides the phenomenon in question with, in addition, not only a firm pragmatic-functional foundation but also, at the same time, a broader grammatical perspective.

4 Adverbial clauses, scope, recursion, and discourse-text FG

4.1 Summary and conclusions

Practically all grammars recognise, descriptively at least, the traditional division of subordinate clauses into adverbial, complement, and relative clauses. There is much less unanimity among descriptive or theoretical approaches on the place of subordinate clauses within the structure of complex sentences. A further, let's call it functional, distinction between subject and object clauses as obligatory arguments on the one hand, and relative and adverbial clauses as modifying constructions on the other hand, is widely, but not universally, accepted (for instance, not in FG). In FG, relative clauses

are typically open extended predications (that is, structures in which exactly one of the term positions is marked, but not filled by a term) occurring as verbal, second or further, restrictors in a term schema (Dik 1997 TFG2:28-29). Complement or adverbial clauses are not open, but closed structures (predications, propositions, clause structures), occurring in a complex term schema as the first, and only, restrictor of a higher order variable. At all appearances, they are seen as a kind of higher order predicate (Dik 1997 TFG2:94) :

> In general, a complex term such as (A : [Φ]) can be used to refer to an entity of type A, as specified by Φ. Φ will be said to be 'embedded' in the complex term structure. We can thus speak of *embedded clauses*, *embedded propositions*, and *embedded predications*. In general, we shall speak of *embedded constructions* : complex terms contain embedded constructions as restrictors.

Such complex terms with embedded constructions are allowed at argument positions and satellite positions, where they are then called complement clauses and adverbial clauses, respectively. And as term structures they are used to refer to higher order entities (states of affairs, propositional contents, speech acts). Dik (1997 TFG2:95) doesn't discuss adverbial clauses in particular, but claims

> [t]here is no reason to assume [...] that they cannot be dealt with in terms of the parameters [presented] in the description of complex terms occupying argument positions.

And among those parameters we find the semantic functions of term positions and their corresponding selection restrictions, which, however, are not decisive for the scope of adverbial satellites at the same layer. Satellites are introduced in general at the start of the two-volume work (Dik 1989, 1997), in an overall exposition of the multi-layered clause structure, arguments, operators and satellites, and the different types of entities. The particularly detailed treatment of the various possible relations between operators and satellites that happen to have different scope and turn out to occur at different layers, a phenomenon adduced as strong evidence in support of the validity and theoretical power of the hierarchical model (Dik *et al.* 1990), contrasts with the fact that no attention at all is paid to the phenomenon of scope in connection to satellites that occur at the same layer.

The modifying (or further specifying) properties of adverbial satellites at the same, second, layer show, in my opinion (but not only in mine), a striking similarity to the modifying (or further specifying) properties of second and later restrictors in a term structure. Early attempts towards a uniform treatment of these specific phenomena haven't reached the stage of a generally accepted view, in spite of other, broader and more general proposals to equate term structures and predications which met with a more favourable reception within the FG research community.

The essential question discussed in this paper pertains to the scope of satellites at the second layer in the FG model of the underlying clause. In order to keep completely clear of all possible distracting side issues, therefore, I treat only those constructions in which such satellites not only are expressed in the form of finite adverbial clauses (avoiding all non-finite verbal forms such as infinitives, gerunds, and participles), but, also, occur in sentence-final position (abstracting from pragmatic factors such as the background-foreground distinction). I furthermore disregard related questions such as whether, and if so, how (some of) these satellites are different from, or might be expressed equally well by, a nominal higher order term, or a lexical adverb (such distinctions, in fact, are treated more than in passing by Thompson and Longacre (1985) and by Matthiessen and Thompson (1988)).

The question of the scope of satellites at a single layer is connected in a very essential way to the notion of recursion. In this respect, again, the situation of circumstantial satellites is similar to that of term restrictors. I have the impression that the full extent of the concept of recursion in its various guises has, so far, escaped attention in the theory of FG, in about the same way as stacking of term restrictors is overlooked in the practice of Dik's (1992) own computer realisation of FG. We briefly come back to the notion of recursion in linguistics in the next subsection.

If not only left recursion but also the problem of scope presented here are recognised as such, the former may indicate a satisfactory solution to the latter. I would, therefore, strongly recommend FG theoreticians to reconsider Vet's (1986) idea, and to elaborate it within the currently accepted multi-layered model of the underlying clause structure in FG. In my opinion, however, the Matthiessen and Thompson approach is the most appealing one among the various points of view discussed in this paper, in particular as

it appears to be the most cognate to the avowed functional principles of FG. It takes its starting point in the organisation of discourse, and radically departs from the current standard sentence model of FG. Granted that the question of the relative scope of adverbial clauses is of a logico-semantic nature, there is also a strong pragmatic side to it, a pragmatic flavour that is based, in a straightforward fashion, on a functional, discourse-text perspective. We will learn more about Dik's response to this in a later subsection.

4.2 On recursion

We might wonder what would be the most striking feature among the details met in our survey of the various treatments of adverbial clauses. There is the difference in 'arity' between different approaches, that is, the number of parts involved, in other words, whether only one adverbial at a time can be immediately subordinate to the same 'main' clause or more adverbials of the same kind (or, in FG terminology, at the same layer in the model of the clause) simultaneously. There is another difference, in the status of the subordinate part, that is, whether it is an embedded constituent of some 'main' clause, or an individual unit which is joined to, yet separate from it. And there are the different names for what we hitherto called here the 'main' part, of which we mention only 'matrix', 'superordinate', 'dominant' clause, 'kernel', 'core', and 'nucleus' (maybe also 'base'). I argue in this paper that we have a binary asymmetric grammatical relation between a dominant part and a dependent 'external' (that is, not a constituent) part, each of which can in turn be as complex as possible.

When linguists talk about recursion in general, it is the dependent part, the one joined to the dominant part, that recursion is applied to. The dominant part scarcely has another status than matrix, kernel, core, or nucleus, and is, therefore, practically always tacitly taken to be a simple structure. If it is not simple, then it hardly has a distinctive name. There is a connection between this and the fact that left recursion is so often overlooked in linguistics.

It is true that, in the early history of computational linguistics (CL), or rather, natural language processing (NLP), left recursion was ill-famed and seen as something that was to be avoided. It got this bad reputation in the application of formal phrase structure grammars in a certain technique called top-down depth-first left-to-right parsing, where

left recursive rewriting rules such as NP → NP + PP, or VP → VP + PP (see also (19b) and (20a) in section 2), led to infinite recursion, and thus caused the computer to go on forever (in theory), or to stop in an abrupt manner (in practice), in both cases without any, not even partial, results. Causing problems for a specific technique does not necessarily mean that left recursion is bad in itself, though, for the fault may be with the other party involved (here, the specific parsing strategy), or in the combination of the two.

What is meant in this paper by left recursion hinges in an essential way on the conventional left-to-right order of the dominant and dependent parts, for instance, such as in the pair 'head plus modifier'. 'Head' is not a very felicitous example, as most of the times the head is a simple unit. I contend that a dominant part itself can be as complex as possible, and that the entire complex dominant part is in the scope of the 'modifier'. What is not meant here is the opposition between left-branching and right-branching as observed by Allerton (1979:189-195), who states :

> Embedding involves the downgrading of an element from a higher to a lower status. [... It] takes place [...] when at a particular point in a linguistic structure we find not a typical straightforward constituent, but rather an element that might have occurred with a higher status. In the case under review this element has been downgraded to a constituent of the construction of which it is a specimen, or alternatively a constituent of a constituent of such a construction.

Two forms of embedding are illustrated, right-branching as in the first example (which, according to the accompanying diagram, is interpreted in the same way as our (18a)), and left-branching as in the second one :

> — *the house near the pub behind the church opposite the shops next to ...*
> — *her sister's husband's uncle's friend's daughter's house*

This leads to the conclusion :

> Thus, in principle at least, all embedding is recursive.

But both examples, when translated into FG notions, illustrate recursion within term restrictors, which is right recursion (only the surface orders in the respective expressions are different). As pointed out in section 2, stacking of term restrictors as postulated by Dik, on the other hand, is a prototypical case of left recursion, only not recognised as such in FG.

Allerton is right in stating that all embedding is recursive, but what I would like to emphasise here is that not all recursion is embedding, for recursion can take place in the dominant part as well. It is only very unfortunate that dominant parts are often called 'head', or 'matrix', as unfortunate as using indiscriminately the notion of embedding for cases that rather should be seen as combining.

4.3 Functional Grammar and clause combining

I have shown how FG so far has failed to recognise, and, therefore, to handle, the problem encountered with regard to the relative scope of adverbial clauses at the second layer (circumstantials), as opposed to the relative scope of satellites at different layers, treated by Dik *et al.* (1990). I have also shown that there are certainly possibilities within the FG paradigm and formalism to remedy this.

Outside of FG, there is much variety in approaches to the question of the scope of adverbial clauses. At least one view is capable of treating this grammatical phenomenon of scope at the level of clauses and sentences, in choosing its starting point in binary functional relations between rhetorical units at a higher level of discourse-text.

The final chapter of Dik's (1997) two volume work, entitled *Towards a functional grammar of discourse*, is a first step in attempting to expand into a larger discourse-text grammar what so far has been a sentence grammar. The Matthiessen and Thompson (1988) view is acknowledged, briefly summarised, and commented upon in a separate section devoted to it (Dik 1997 TFG2:431-432).

After his introductory observation that functional relations taken from Rhetorical Structure Theory (RST),

> may hold between basic units, but also between units of higher level which themselves can be ultimately decomposed into basic units

Dik gives several examples of such relations, but in doing so he never decomposes any of the units, and thus completely misses the conclusion that both right and left recursion are possible.

Towards the end, Dik observes :

> It is clear from these examples that the functional relations at discourse level overlap with the [FG] semantic relations of satellites at clause level. This is no coincidence, since the [RST] theory includes the idea that units which are usually regarded as subordinate clauses do indeed function at the discourse level.

We have a case of wishful thinking, I am afraid, in this rendering of the Matthiessen and Thompson approach. In his pursuit of extending the sentence grammar in upward direction into a discourse grammar, Dik, reversing the downward direction of Matthiessen and Thompson's view,

> believe[s] it is a good idea to assume that intra-clausal functional relations [...] can be projected onto the discourse level.

This is of course in perfect accordance with his goal, but it contradicts Matthiessen and Thompson's (1988:301) hypothesis, which speaks of a projection from rhetorical organisation (discourse) into clause combining (grammar), for it reads, as I have cited above :

> Enhancing hypotactic clause combining has evolved as a grammaticalization of rhetorical relations in text of the enhancing Nucleus-Satellite kind.

Apart from reversing the directions, and equating a rhetorical Nucleus-Satellite relation with a configuration of nucleus and satellites in the FG underlying clause structure, Dik also neglects the binary nature of the intended relations between a single Nucleus and a single Satellite, when he concludes :

> The general picture seems to be that all intraclausal nucleus-satellite relations can also be found at the interclausal level, where they can be extended with a number of functional relations which are specific to the discourse level. In this sense, again, the clause structure model can be taken as a partial model of the discourse as a whole.

Dik's reluctance to adopt the Matthiessen and Thompson view on the entire issue of subordination, embedding, clause combining or clause complexing, and hypotaxis :

> I do not go along with the idea that clausal, propositional and predicational satellites should not be treated as subordinate or embedded at the clause level

is to be considered a regrettable mistake, in that it leaves FG with the very problem of the scope of adverbial clauses at the same layer, which thus risks remaining a refractory case for the theory of FG.

Unlike Dik's *upward* projection of intraclausal functional relations onto the discourse level, Matthiessen and Thompson's hypothesis, involving a *downward* projection, is more in accordance with principles of the primacy, in language use, of pragmatics over semantics over syntax, and thus reflects much better the functional-communicative basis of FG. No claim of a fundamentally pragmatics based, discourse-text oriented grammatical theory of FG can be warranted, I contend, unless and until the sentence-centered fashion of analysing underlying clause structures is finally abandoned. I am eagerly awaiting further developments in the theoretical linguistic domain of Functional Grammar, in order that I may try and test new ideas related to this question (as far as they are formal enough to do so), as I have done in relation to the sentence grammar.

4.4 A programmer's proposal

Elsewhere, I have tentatively advanced that the quasi-productive model of the theory of FG as presented by Dik (1989, 1997 TFG1) be revised in that the bottom-up direction should be reversed (Kwee 1997, 1999). My proposal consists in giving primacy, intended here in the literal sense as priority in the generation process, to terms over predicate frames, and to the pragmatic functions (Topic, Focus) over the syntactic functions (Subject, Object). Selection of the predicate frame with its corresponding semantic functions is postponed to the last possible moment in the construction of the underlying structure. This proposal relates to a sentence grammar, as the idea has emerged in the course of the enterprise of modelling the theory of FG in a computer program. In a certain sense, it still is upward directed, for the terms (to be considered as the *dramatis personae*) are treated as atomic items that assume mutual relations with the help of an appropriately chosen predicate frame. There is a downward directed flavour in it as well, however, since terms are formed in view of their pragmatic functions, first the topics and then the focus. In line with this downward direction, it is also proposed that the illocutionary operator should get an early place in the generation process (Kwee 1999:24). This approach on the sentence level can be transposed to the discourse level without much difficulty, I assume. At the discourse-text level, the generation process would start with atomic items that are single states of affairs, completely in accordance with Matthiessen and Thompson's (1988:287) point of departure :

> [a text is] broken down into components, which we will called (rhetorical) 'units'.

Such units assume mutual relations by being put together in a coherent fragment of discourse-text. Just as (atomic) clauses are built up from below, starting with relevant terms (in their pragmatic roles) which are then put into an appropriate logico-semantic n-ary relation, a coherent text fragment (discourse) would be built up from below, starting with atomic units (states of affairs) which are then put into pragmatic binary rhetorical relations with each other, in a nice recursive fashion.

How such relations may be expressed at the level of complex sentences in a text fragment, then, is a matter of grammar. The rules which should apply would be comparable, I suppose, to the expression rules that map abstract underlying clause structures onto the surface strings commonly called linguistic expressions. The decision as to what would constitute a sentence (essentially a graphic unit that represents a clause cluster, or clause complex) resides in the same type of discourse expression rules. I do hope functional theoretical linguists will take the above proposal, including the concept of an extended discourse expression module, into consideration as a topic for research in grammatical theory at the level of discourse and text.

4.5 Short last notes

Background (mainly computational) — The first computer program designed to simulate a functional grammar for some fragment of English extended with a couple of other complex contruction types (Kwee 1979), has consistency of the given rules and grammaticality of every resulting output sentence as its main concern. The problem treated in the present paper just doesn't arise in such a context, as no special attention is given to the scope of adverbial clauses, and structural ambiguities such as illustrated by, for example, the global analyses (2a) and (2b), aren't especially looked for either. However, in another computational research project (Paris and Kwee 1985, Paris 1993), an attempt to apply the basic principles of FG to the generation of other, yet more complex sentences, dramatically fails. Combination of several adverbial clauses within a single complex sentence is revealed as a weak spot in the then current version of the theory (Kwee 1988). In the new, multi-layered model of the underlying clause, adopted only shortly afterwards (Dik 1989), this weak spot turns out to be a real, persistent problem (Kwee 1994).

Afterwards, in an altogether different environment of an FG reasearch group investigating the phenomenon of serial verb constructions and its various analyses, I encountered the book *Clause combining in grammar and discourse* (a collection of papers edited by Haiman and Thompson), and in it the chapter by Matthiessen and Thompson which shed much more light on the issue why the scope of adverbial clauses still is such a problem for FG. More or less at the same time, as a side effect of a critical assessment of several (not only technical computational but also theoretical linguistic) aspects of Dik's ProfGlot system and its explicit claims of *substantial improvements in the Functional Grammar formalism* (Dik 1992:19), it was brought to light that similarity between term restrictors and adverbial satellites, as noticed earlier by Vet (1986), had practical counterparts in the similarity of their respective neglect of the phenomenon of left recursion (Kwee 1996).

Textual concordance — References in the text to extracts from Dik (1997 TFG1) which can also be found in the 1989 edition are listed here for convenience with corresponding page numbers:

§ 1.3 satellites 1997:244-245, 295-296, 305 = 1989:207-208, 251, 259
§ 2.1 higher layers 1997:65-67 = 1989:57-60
§ 2.1 higher layers 1997:235-236, 291-292 = 1989:201-202, 247-248
§ 2.2 term schema 1997:132-136 = 1989:115-118
§ 2.2 'restrictor' idea 1997:235 = 1989:201
§ 2.2 structure of terms 1997:132-136 =1989:115-118

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References

Allerton, D. J.
1979 Essentials of grammatical theory. A consensus view of syntax and morphology. London : Routledge Kegan Paul.

Auwera, Johan van der (ed.) ; in collaboration with Dónall P. O'Baoill
1998 Adverbial constructions in the languages of Europe. Empirical approaches to language typology. Eurotyp 20-3. Berlin : Mouton de Gruyter.

Bartsch, Renate
1972 Adverbialsemantik. Frankfurt am Main : Athenäum Verlag.
1976 The grammar of adverbials. A study in the semantics and syntax of adverbial constructions. [English translation of Bartsch 1972.] Amsterdam : North-Holland.

Connolly, John H.
1994 On the generation of English temporal satellites. In : Elisabeth Engberg-Pedersen ; Lisbeth Falster Jakobsen ; Lone Schack Rasmussen (eds), Function and Expression in Functional Grammar. Berlin : Mouton de Gruyter. 303-315.
1995 On the generation of internally complex English temporal satellite terms. Working Papers in Functional Grammar 57. Amsterdam : IFOTT.

Dik, Simon C.
1978 Functional Grammar. Amsterdam : North-Holland. 3rd pr. 1981. Dordrecht : Foris.
1989 The theory of Functional Grammar. Part 1, The Structure of the Clause. Dordrecht : Foris.
1992 Functional Grammar in Prolog. An integrated implementation for English, French, and Dutch. Berlin : Mouton de Gruyter.
1997 The theory of Functional Grammar. [TFG] Ed. by Kees Hengeveld. Part 1, The Structure of the Clause (2nd rev. ed.) [TFG1] ; Part 2, Complex and Derived Constructions. [TFG2]. Berlin : Mouton de Gruyter.

Dik, Simon C. ; Hengeveld, Kees ; Vester, Elseline ; Vet, Co
1990 The hierarchical structure of the clause and the typology of adverbial satellites. In : Jan Nuyts ; A. Machtelt Bolkestein ; Co Vet (eds), Layers and levels of representation in language theory. Amsterdam : Benjamins. 25-70.

Greenbaum, Sidney
1996 The Oxford English grammar. Oxford : Oxford University Press.

Halliday, Michael A. K.
1985 An introduction to functional grammar. London : Edward Arnold. 2nd ed. 1994.

Harris, Zellig S.
1968 Mathematical Structures of Language. New York : Interscience.

Hengeveld, Kees
1989 Layers and operators. Journal of Linguistics 25:1, 127-157.

Hengeveld, Kees ; Wanders, Gerry
1997 On the use of subjunctive and indicative verb forms in adverbial clauses. In : Jadrandka Gvozdanovic (ed.), Language Change and Functional

Explanations. Typology and language change. Berlin : Mouton de Gruyter. 249-271.

Kortmann, Bernd
1997 Adverbial subordination. A typology and history of adverbial subordinators based on European languages. Empirical approaches to language typology 18. Berlin : Mouton de Gruyter.

Kwee Tjoe Liong
1979 A68-FG(3). Simon Dik's funktionele grammatika geschreven in algol 68 versie nr 03. Met supplement A68-FG(7), 1980. Publikaties van het Instituut voor Algemene Taalwetenschap 23. Amsterdam : Universiteit van Amsterdam.
1988 Natural language generation : one individual implementer's experience. In : Michael Zock ; Gérard Sabah (eds), Advances in natural language generation, an interdisciplinary perspective. 2 vols. London : Pinter. vol. 2, 98-120.
1994 Programmer's reflections on Functional Grammar. More exercises in computational theoretical linguistics. Amsterdam : IFOTT.
1996 Comments on some aspects of ProfGlot (explanatory notes and critical assessment). Working Papers in Functional Grammar 61. Amsterdam : IFOTT.
1997 On generation in Functional Grammar : towards an alternative, more discourse oriented approach. In : Chris S. Butler ; Richard A. Gatward ; John H. Connolly ; Roel M. Vismans (eds), A Fund of Ideas : recent developments in Functional Grammar. Amsterdam : IFOTT. 190-203.
1999 Questions in the quasi-productive mode of the Functional Grammar model. Working Papers in Functional Grammar 68. Amsterdam : IFOTT.

Longacre, Robert E.
1985 Sentences as combinations of clauses. In : Timothy Shopen (ed.), Language typology and syntactic description. Volume 2, Complex constructions. Cambridge : Cambridge University Press. 235-286.

Matthiessen, Christian ; Thompson, Sandra A.
1988 The Structure of Discourse and 'Subordination'. In : John Haiman ; Sandra A. Thompson (eds), Clause combining in grammar and discourse. Amsterdam : Benjamins. 275-329.

Paris, Cécile L.
1993 User modelling in text generation. London : Pinter.

Paris, Cécile L. ; Kwee Tjoe Liong
1985 Guide to the unification process and its implementation [and] Progress report on extending the grammar. Technical Report CUCS-208-85. New York : Columbia University.

Quirk, Randolph ; Greenbaum, Sidney ; Leech, Geoffrey ; Svartvik, Jan
1985 A Comprehensive Grammar of the English Language. London : Longman.

Thompson, Sandra A. ; Longacre, Robert E.
1985 Adverbial clauses. In : Timothy Shopen (ed.), Language typology and syntactic description. Volume 2, Complex constructions. Cambridge : Cambridge University Press. 171-234.

Thompson, Sandra A. ; Mann, William C.
1987 Rhetorical Structure Theory : A Framework for the Analysis of Texts. IPRA Papers in Pragmatics 1:1, 79-105.

Van Valin Jr, Robert D.
1993 A synopsis of Role and Reference Grammar. In : Robert D Van Valin Jr (ed.), Advances in Role and Reference Grammar. Amsterdam : Benjamins. 1-164.

Van Valin Jr, Robert D. ; LaPolla, Randy J.
1997 Syntax : Structure, Meaning and Function. Cambridge : Cambridge University Press.

Vester, Elseline
1983 Instrument and manner expressions in Latin. Assen : van Gorcum.

Vet, Co
1986 A pragmatic approach to tense in Functional Grammar. Working Papers in Functional Grammar 16. Amsterdam : IFOTT.