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The hierarchical structure of the clause and the typology of perception-verb complements*

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Abstract

In this paper it is argued that the differences between perception-verb complements can be understood in terms of the hierarchical clause structure used in FG to represent utterances. The different layers of this structure, in combination with the appropriate operators, constitute a typology of complements, which, applied to the complements of perception verbs, yields a description of these complements which accounts for the many subtle semantic differences between them.

Introduction

Recent developments in functional grammar (FG; Dik 1981 [1978], 1989; Hengeveld 1989), in particular the adoption of a layered-clause model, have created new possibilities for the analysis of complements. This paper explores these possibilities and then goes on to study a particularly interesting group of complements: those which occur with perception verbs. Perception verbs often allow several types of complement (for example, finite and nonfinite), with corresponding differences in meaning and use. These differences will be interpreted in terms of the layered approach to clause structure.

The paper is organized as follows: section 1 gives a brief sketch of the hierarchical sentence model as developed within FG and shows its general implications for the treatment of complements. In section 2 a typology of complements based on the layered-clause model is proposed. In section 3 we turn our attention to the complements of perception verbs and try to interpret the differences between these complements in terms of the typology given in section 2. In section 4 we present our conclusions.

The distinction between propositional contents, or potential facts, and states of affairs can be found as early as Vendler's (1967) pioneering paper on 'facts and events'. Vendler starts from the following examples, which had figured in a philosophical discussion between J. L. Austin and P. F. Strawson:

- (3) a. The collapse of the Germans was an event.
b. The collapse of the Germans was a fact.

Against Strawson, who maintained that 'facts are not in the world', Austin argues that if X is an event, and events are in the world, and X is also a fact, then one cannot say that facts are NOT in the world.

What Vendler demonstrates, however, is that the same expression *the collapse of the Germans* may designate different things, and does designate different things in (3). He does so by showing that a context such as '... was an event' accepts a different class of subjects than the context '... was a fact', although there is a certain amount of overlap, as in (3). An event context requires event complements (where 'event' includes processes and actions; in other words Vendler's 'event' equals our 'state of affairs'), while a fact context requires fact complements. In the conclusion to his paper Vendler takes the following position with respect to first-order, second-order, and third-order entities: first-order entities (his 'objects') are primarily in space, secondarily in time; second-order entities (his 'events') are primarily in time, secondarily in space; third-order entities (his 'facts') are neither in space nor in time.

2. Complementation³

The representation in (1) tries to capture the structure of simple clauses, that is, clauses in which all argument and satellite positions are filled with terms with a nominal head, most of which refer to first-order entities. In order to account for complex clauses one has to allow for arguments and satellites which can themselves be analyzed as complex structures referring to higher-order entities. The question that arises here is what kind of structure it is that occupies an argument or satellite slot in a complex clause.

In Hengeveld (1988, 1989, 1990b), Dik (1989), and Bolkestein (1990) it is argued, in line with Foley and Van Valin (1984) and Lehmann (1988) (i) that each layer (including all layers of lower complexity that it contains) may be turned into the complement of a matrix predicate, (ii) that the particular layer chosen is dependent upon the class of matrix predicates involved, and (iii) that differences between complement types can be

accounted for in terms of the differences between the layers underlying them. Thus predicate frames would be of the following general format:

- (4) $\text{Pred}_\beta \dots (\alpha_n) \dots$

where α is a variable ranging over x, e, X, and E. Consider the following Nama examples (Khoisan: Hagman 1974; Rust 1965):

- (5) 'Oo-s ke //'iisà //xaápá kè míí
then-3sg decl she again rem.past say
/'úú-ta 'a tí.
not.know-1sg pres quote
'She said again, "I don't know".'
- (6) //'íp ke 'am'a-se kèrè =/om /'aé//amsà
he decl true-adv rem.past believe Windhoek
xuú-kxm /xií hàà !xáísà.
from-1du come pf that
'He really believed that we had come from Windhoek.'
- (7) !gû-s ke káise a !gomba te
go-nmlztn decl very pres difficult to.me
'It's very difficult for me to go.'

Utterance predicates used for direct-speech reports, as in (5), have a fourth-order complement, the quoted speech act. In Nama these predicates take a finite complement provided with the quote particle *ti*. Belief predicates, as in (6), have a third-order argument, the believed propositional content (see Hengeveld 1988). In Nama these predicates may take finite complements provided with the complementizer *!xáísà*. Commentative predicates, such as *!gomba* 'difficult' in (7) have a second-order argument, the state of affairs commented upon. In Nama these predicates take complements nominalized by means of the suffix *-s*.

On the basis of the layers available in (1) and listed in (2) three types of complement can be postulated:

- (8) Complement types
- | | |
|--|-----------------------|
| <i>Format</i> | <i>Designation</i> |
| (E ₁ : clause (E ₁)) | speech act |
| (X ₁ : proposition (X ₁)) | propositional content |
| (e ₁ : predication (e ₁)) | state of affairs |

This classification accounts for many differences between complements, such as those illustrated by means of the Nama examples, but also leaves several facts unexplained. Consider for instance the following pairs of Spanish examples:

- (9) Antonio no se.daba.cuenta que
 Antonio neg realize.ind.past.impf.3sg comp
 estaba /*estuviera enfermo.
 be.ind.past.impf.3sg/ be.sub.past.impf.3sg ill
 'Antonio didn't realize that he was/would be ill.'
- (10) Antonio no creía que
 Antonio neg believe.ind.past.impf.3sg.comp
 estaba /estuviera enfermo.
 be.ind.past.impf.3sg/be.sub.past.impf.3sg ill
 'Antonio didn't believe that he was/would be ill.'

In Spanish, complements of semifactive⁴ predicates such as *darse cuenta* 'realize' (lit. 'give oneself account') never occur with a subjunctive verb form. The complements of nonfactive predicates, such as *creer* 'believe', may occur with both the indicative and the subjunctive. Within such complements the speaker may choose whether he wants to commit himself to the truth of the complement, in which case he uses the indicative, or does not want to commit himself to the truth of the complement, in which case he uses the subjunctive. In the case of semifactive predicates the speaker has already made this choice when selecting the semifactive predicate, which forces him to commit himself to the truth of the complement. Similar examples could have been given for French and Italian.

These and comparable differences between complements can be accounted for when operators are taken into account in the classification of complements (see Hengeveld 1988, 1990a; Dik forthcoming b). A distinction can be made between a layer+the full set of operators corresponding to that layer, on the one hand, and a layer+the obligatory application of a single operator, on the other. In the case of the semifactive and nonfactive predicates exemplified above the complement of the nonfactive predicate *creer* has a position for proposition operators for which the speaker can make his own selection, whereas the complement of the semifactive predicate *darse cuenta* has a prepared operator position which contains a *certainty* operator, as listed in (11):

- (11) $darse_cuenta_V (x_1)_{po} (cert X_1)_{go}$
 $creer_V (x_1)_{po} (\pi_3 X_1)_{go}$

The distinction between complements in which there is a free choice of operators and complements in which the choice of operators is predetermined by the matrix predicate leads to a large number of different complement types. In the following overview the complement type is given in the first column and the class of matrix predicates (as listed in Noonan 1985)⁵ which takes this kind of complement in the second column:

- (12) A classification of complements
- | | |
|--------------------|---|
| <i>Complement</i> | <i>Matrix predicate class</i> (see Noonan 1985) |
| E_1 | utterance (direct speech) |
| $\pi_3 X_1$ | utterance (indirect speech), pretence,
propositional attitude, fearing |
| cert X_1 | knowledge |
| des X_1 | desiderative (hoping and wishing) |
| $\pi_2 e_1$ | commentative |
| sim e_1 | immediate perception |
| subs e_1 | desiderative (wanting), manipulative |
| cert = certainty | sim = simultaneous ⁶ |
| des = desiderative | subs = subsequent |

3. Complements of perception verbs

3.1 Overview

In many languages the complements of perception verbs may take different forms, with corresponding differences in meaning. There are four different readings of perception verbs and their complements which have to be distinguished. These different readings can be interpreted in terms of the kind of entity that the complement refers to. We will first give a brief overview of the different possibilities⁷ and then give some facts which support the distinctions made.

3.1.1. *Immediate perception of individual.* The first reading concerns the immediate perception of one individual by another, as is illustrated in (13):

- (13) I saw your brother last night.

In this example the verb *see* specifies a relation between the perceiving first-order entity *I* and the perceived first-order entity *your brother*, which are both individuals, that is, touchable, locatable entities.

The predicate frame for perception verbs in this reading is given in (14), where PERCEIVE represents any perception verb:

- (14) PERCEIVE $(x_1)_{proc} (x_2)_{go}$

3.1.2. *Immediate perception of state of affairs.* The second reading concerns the immediate perception of a state of affairs by an individual, which is illustrated in (15):

(15) I saw him walk down the street.

In these examples the verb *see* specifies a relation between the perceiving first-order entity *I*, an individual, and the perceived second-order entity (*him*) *walk down the street*, a state of affairs.

The predicate frame for perception verbs in this reading is

(16) PERCEIVE (x_1)_{proc} (sim e_1)_{go}

where the temporal operator *sim* on e_1 indicates that the state of affairs described in the complement has to be interpreted as simultaneous with the state of affairs described in the matrix predication.

3.1.3. *Mental perception of propositional content.* The third reading concerns the acquisition of knowledge through one of the senses by an individual, which is illustrated in (17):

(17) I saw that Mary had been crying.

In this example the verb *see* specifies a relation between the perceiving first-order entity *I*, an individual, and the acquired third-order entity *Mary has been crying*, a propositional content.

The predicate frame for perception verbs in the MP readings is

(18) PERCEIVE (x_1)_{proc} (cert X_1)_{go}

3.1.4. *Reception of the propositional content of a speech act.* The fourth reading occurs with predicates of hearing and seeing (in the sense of 'reading') only and concerns the reception of the content of a speech act by an individual, which is illustrated in (19):

(19) I hear you will probably sing in the Royal Albert Hall next week.

In this example the verb *hear* specifies a relation between the receiving first-order entity *I*, an individual, and the received third-order entity *you will probably sing in the Royal Albert Hall*, a propositional content brought forward by a third party.

The predicate frame for perception verbs in this reading is

(20) PERCEIVE (x_1)_{proc} (π_3 X_1)_{go}

3.1.5. *Summing up.* The following types of perception and their corresponding predicate frames can be distinguished:⁸

(i) Immediate perception of individual (IPI):
PERCEIVE (x_1)_{proc} (x_2)_{go}

- (ii) Immediate perception of state of affairs (IPSoA):
PERCEIVE (x_1)_{proc} (sim e_1)_{go}
- (iii) Mental perception of propositional content (MP):
PERCEIVE (x_1)_{proc} (cert X_1)_{go}
- (iv) Reception of propositional content of speech act (RP):
PERCEIVE (x_1)_{proc} (π_3 X_1)_{go}

In the following sections we will discuss these constructions two by two. In each case we first discuss the differences between the constructions, then give some examples of languages which make some formal distinction between the two constructions, and finally provide FG representations which capture the observed differences. The pairs of constructions are discussed in the following way:

Immediate perception of individual (IPI)	_____	3.4
Immediate perception of state of affairs (IPSoA)	_____	3.2
Mental perception of propositional content (MP)	_____	3.3
Reception of propositional content of speech act (RP)	_____	

3.2. *Immediate perception of state of affairs vs. mental perception of propositional content*

The contrast between the IPSoA and MP readings of perception verbs has attracted the attention of many linguists. It is this difference in meaning that is often coded in different construction types. The distinction corresponds to what is often called 'immediate' or 'direct' perception vs. 'indirect' perception, but what we will call here *immediate perception of state of affairs* (IPSoA) vs. *mental perception* (MP).

For a correct interpretation of this terminology, it is important to note that two subtypes of mental perception have to be distinguished, primary and secondary mental perception. In this respect Barwise and Perry (1983: 194), following Dretske (1969), note with respect to visual perception,

In general *see*_{*t*}-reports [*see* with a *that* clause complement; SCD/KH] describe acquisition of knowledge through perception. A primary *see*_{*t*}-report is one that reports a direct acquisition of knowledge via perception. A secondary report is one that reports an acquisition of knowledge based on perception augmented by what one knows must be the case based on what one sees.

They then give the following examples to illustrate the two readings:

(21) (a) I saw that the tree was whipping around, (b) so I saw that the wind was blowing.

- (22) (a) Sue saw that Tanner Library was empty, (b) so she saw that Helen was not in the library.

In the most natural readings of (21)–(22) the (a) sentences describe primary, the (b) sentences secondary mental perception. Thus, primary mental perception concerns the acquisition of knowledge based on immediate perception, but this is not the same as immediate perception as such.

There is reason to assume, as we hope to show, that in the case of immediate perception the complement has the status of a predication, designating a state of affairs (a second-order entity), whereas in the case of mental perception the complement has the status of a proposition, designating a possible fact (a third-order entity).⁹

3.2.1. *Differences between IPSoA and MP constructions.* There are many differences in the behavior of IPSoA and MP constructions:

(i) IPSoA constructions require simultaneity of the complement state of affairs with the main-clause state of affairs,¹⁰ MP constructions do not:

- (23) We saw him leave/leaving (IPSoA).
 (24) *We saw him have left/having left.
 (25) We saw that he had left (MP).

The same requirement is reflected in the impossibility of adding temporal satellites to the complement in IPSoA constructions. In the following sentences the satellites can only be interpreted as modifying the main clause:

- (26) I heard Sally recite a poem yesterday.
 (27) At the same moment he heard a man entering the room.

(ii) IPSoA constructions require the complement states of affairs to be perceivable, MP constructions do not:

- (28) *We saw the discussion be/being useless.
 (29) We saw that the discussion was useless.

Correspondingly, MP constructions may occur with a complement concerning something which is missing:

- (30) We saw that one chair was missing.
 (31) *We saw one chair miss/missing.

(iii) As a more specific instantiation of the preceding restriction, IPSoA constructions do not allow the complement to be negated independently, whereas MP constructions do allow this type of negation:

- (32) a. He didn't see the girl cry/crying.
 b. *He saw the girl not cry/crying.
 c. *He didn't see the girl not cry/crying.
 (33) a. He didn't see that the girl cried.
 b. He saw that the girl didn't cry.
 c. He didn't see that the girl didn't cry.

(iv) There is an important difference between IPSoA constructions and MP constructions even in those cases in which the state of affairs described in the complement is (i) simultaneous with the state of affairs described in the main clause, (ii) perceivable, and (iii) positive. This difference has to do with the factivity of the constructions. IPSoA constructions are nonfactive, MP constructions are semifactive, that is, the speaker presupposes the truth of the complement in MP constructions, whereas he does not in IPSoA constructions. Compare the continuations of (34) and (35):

- (34) I didn't see Sally crying (and I know that she wasn't).
 (35) I didn't see that Sally was crying (*and I know that she wasn't).

This important semantic difference between the two constructions is due to the fact that the perception verb in (35) describes the way the speaker acquired the knowledge described in the complement, whereas in (34) it describes perception as such. This difference is also reflected in the possible paraphrases of *see* in the two readings involved. The predicate in (35) can be paraphrased as 'realize', whereas the predicate in (34) can be paraphrased as 'watch'.¹¹

- (36) I didn't watch Sally crying.
 (37) *I didn't watch that Sally was crying.
 (38) *I didn't realize Sally crying.
 (39) I didn't realize that Sally was crying.

Given these paraphrase possibilities, one expects, in those languages in which MP and IPSoA are coded in different constructions, MP constructions to make use of the expression format which is also used with other predicates of knowledge or acquisition of knowledge. Noonan (1985: 130–131) presents some facts to show just this. In English too this situation obtains: MP constructions make use of *that* complements and acc-cum-inf complements, just as knowledge predicates do:

- (40) a. I feel that he is growing rather hostile.
 b. I feel him to be growing rather hostile.
 (41) a. I know that he is growing rather hostile.
 b. I know him to be growing rather hostile.

Kirsner and Thompson (1976), in discussing examples (40a)–(40b), note

that these constitute 'an indirect report about, or a deducing of, a situation', rather than direct perception.

3.2.2. *The expression of IPSoA and MP constructions.* The distinction between IPSoA and MP constructions is reflected in the different forms that these constructions may take in many languages. The differences in form may concern (i) the complement type, in particular the form of the complement predicate; (ii) the complementizer.

3.2.2.1. Different complement types. In Fijian (Austronesian: Dixon 1988) perception verbs may take either a nominalized complement, as in (42), or a finite complement, as in (43):

(42) au aa rogo-ca a o-dra qaaqaa a cauravou yai.
1sg past hear-tr art cl-3pl win art youth dem
'I heard these youths winning.'

(43) au aa rogo-ca ni=ra qaaqaa a cauravou yai.
1sg past hear-tr comp=3pl win art youth dem
'I heard that these youths had won.'

According to Dixon (1988: 38, 268) the first sentence 'implies that I listened to a commentary over the radio', whereas the second sentence 'implies that I just heard the result', which can be interpreted as a difference between immediate and nonimmediate perception. In the first case the complement takes the form of a nominalization, introduced by the article *a*, in the second case the complement is introduced by the complementizer *ni*.

In Modern Greek (Indo-European: Joseph and Philippaki-Warburton 1987) perception verbs may take either an indicative or a subjunctive complement. The difference between the two complement types becomes apparent in negative contexts, as is illustrated in the following examples, taken from Joseph and Philippaki-Warburton (1987):

(44) den ton ida na koli(m)ba.
neg 3sg.acc see.1sg.past sub swim.3sg.pres
'I didn't see him swim.'

(45) den ton ida oti koli(m)buise.
neg 3sg.acc see.1sg.past comp swim.3sg.impf.past
'I didn't see that he was swimming.'

Joseph and Philippaki-Warburton (1987: 182) note that in (44) 'the implication is that he may have swum but he may have not', whereas in (45) 'the implication is that he did swim but the act was not witnessed by the speaker'. This suggests that in (44) the immediate perception of the

swimming event by the speaker is negated (and therefore it may or may not have happened as far as the speaker is concerned), whereas in (45) it is negated that the speaker acquired the knowledge concerning the swimming event through the visual channel. Like other predicates designating acquisition of knowledge, the perception verb is semifactive under the second reading.

The MP use of perception verbs with indicative complements is further corroborated by the fact that this construction type can be used for the description of acquisition of knowledge through one of the senses concerning a nonperceivable state of affairs, as in

(46) esthánthike pos itane i sizítisi perittí.
feel.3sg.past comp be.3sg.past art discussion useless
'He felt that the discussion was useless.'

3.2.2.2. Different complementizers. Complements of matrix verbs in Japanese (Altaic: Kuno 1973) can take three 'complementizers': *no*, *koto*, and *to*. There is a grammatical distinction between *no/koto* on the one hand, and *to* on the other: the former turn the complement into a nominal term, which then takes the postpositions usual for such terms. *To* does not have this nominalizing effect. Compare the following:

(47) John wa nihongo ga muzukasii to itta.
John top Japanese subj difficult TO said
'John said that Japanese is difficult.'

(48) Watakusi wa nihongo ga muzukasii koto o mananda.
I top Japanese subj difficult KOTO obj learned
'I learned that Japanese is difficult.'

(49) Watakusi wa John ga Mary o butu no o mita.
I top John subj Mary obj hit NO obj saw
'I saw John hit Mary.'

Thus, *to* is similar to a subordinator such as *that* in English, whereas *no/koto* behave like head nouns specified by the full preceding clause. (48) could be paraphrased as 'I learned the fact defined by Japanese being difficult', and (49) as 'I saw the event consisting of John hitting Mary.'

The complementizing elements in (47)–(49) cannot be substituted for one another. In other occurrences two or even all three of them may occur, but with concomitant semantic differences. This, plus the paraphrases given above, already suggests that different semantic complementation types are involved. The basic differences in meaning and usage between the three elements are described by Kuno (1973) as follows: *no* is used for representing concrete events which can be perceived by the

senses; *koto* is used for 'nominalizing a proposition and forming an abstract concept out of the proposition' (1973: 221), and in most of its occurrences it is associated with a factive presupposition; *to* 'was originally a particle for reporting someone else's statement' (1973: 215), and it is used to represent a propositional content without committing the speaker in any way to the truth of that content. In cases where an opposition with *koto* is possible, the usage of *to* strongly suggests that the propositional content might not be/come true.

In terms of the distinctions made in this paper, we may hypothesize that the three elements basically signal the following elements:

- (50) NO (sim e)
 KOTO (cert X)
 TO (π_3 X)

Especially *no* and *koto* almost literally 'spell out' the variables e and X, which are then specified by the whole embedded predication and proposition respectively.

Immediate-perception verbs in Japanese take *no* complements, as in (49) above, and in the following examples:

- (51) Watakusi wa John ga piano o hiku no o kiita.
 I top John subj piano obj play NO obj heard
 'I heard John play(ing) the piano.'
 (52) Watakusi wa sesuzi ga samuku naru no o kanzita.
 I top spine subj cold get NO obj felt
 'I felt my spine getting cold' = 'I felt a cold shiver running down my spine.'

Kuno adds, however, that sentence (51) with *koto*

would be acceptable, but it would no longer be a statement of perception by any of the five senses: it would mean: 'I heard that John plays the piano'. Similarly, *kanziru* 'to feel' can take a *koto* clause, but then it would mean no longer 'to feel by five senses', but 'to think' (1973: 220).

It is clear that we would interpret such cases as examples of mental perception, where the perception verb takes a propositional complement. This is fully consistent with the interpretation of the three complementizing elements given in (50) above.

Noonan (1985: 131) notes that in Russian the complements of perception verbs may occur with two different complementizers:

- (53) Ja videl kak Boris čitaet knigu.
 Isg saw comp Boris read.ind book
 'I saw Boris reading a book.'

- (54) Ja videl čto Boris čitaet knigu.
 Isg saw comp Boris read.ind book
 'I saw that Boris read a book.'

In both cases the complement contains a finite indicative verb form. In the first sentence, with the complementizer *kak*, the main predicate designates IPSoA, in the second sentence, with the complementizer *čto*, it designates MP.

3.2.3. *The representation of IPSoA and MP constructions.* We have given a preliminary representation of perception verbs in their IPSoA and MP readings. More elaborate representations, including the internal structure of the complements, are given here. We will start with IPSoA:

- (55) Immediate perception of state of affairs:
 PERCEIVE (x_1)_{proc} (simpos e_1 : [π_1 Pred _{β} (x_1) ... (x_n)] (e_1))_{go}

This representation accounts for the fact that the complement cannot be specified independently for tense and negation, since the fixed operators for simultaneity (sim) and positive polarity (pos) block specification of other temporal and polar operators. The underlying structure of the complement predicts, however, that π_1 operators can be expressed within the complement. That this is indeed the case can be derived from the following examples, discussed in Kirsner and Thompson (1976):

- (56) I heard Sally recite a poem.
 (57) I heard Sally reciting a poem.

Kirsner and Thompson's hypothesis is that the infinitival complement signals 'SoA is Bounded in Time' (circumscribed), whereas the participial complement signals 'SoA is Not Bounded in Time' (not circumscribed). We interpret this difference in terms of perfective (= bounded) and imperfective (= unbounded) aspect.¹² The following representation can thus be given for (56):

- (58) Hear_v (x_i : I (x_i))_{proc} (sim e_i : [pf Recite_v (x_j : Sally (x_j))_{Ag} (x_k : poem (x_k))_{go}] (e_i))_{go}

It is not immediately clear from the underlying representation of IPSoA constructions why it is that temporal satellites cannot be added to the complement, since the position needed for these satellites is available in underlying structure. The solution that we think should be given to this problem is that the operator for simultaneousness blocks the insertion of temporal satellites: a temporal satellite designating a nonsimultaneous interval would contradict the sim operator; a temporal satellite designating a simultaneous interval would be redundant. Compare the following:

- (59) *I hear [Sally recite a poem three hours ago] (incompatible).
 (60) *I hear [Sally recite a poem at this very moment] (redundant).

In other cases too the selection of temporal satellites has to be made dependent upon the tense operator, for example in order to avoid the combination of a future tense with the adverb *yesterday*. Satellites of level 2 cannot be categorically excluded, since locative (61) and quantificational (62) satellites can be added to the complement without any problem:

- (61) I heard Sally recite a poem in the bathroom.
 (62) I heard Sally recite a poem repeatedly.

Note that these sentences are ambiguous, since the satellites in these examples can also be interpreted as modifying the main clause.

MP constructions can be represented in the following way:

- (63) Mental perception:
 PERCEIVE (x_1)_{proc} (cert X_1 : ($[\pi_2 e_1$: [π_1 Pred _{β} (x_1)_n] (e_1))] (X_1))_{go}

The fixed operator for certainty accounts for the semifactive nature of perception verbs in this reading. This can once more be illustrated by means of the following examples:

- (64) I hear that he had sung (for example, I deduced this from his hoarse voice).
 (65) I didn't hear that he had sung (but now I know he had).

The underlying structure of the complement predicts that π_2 operators (for example, for tense and negation) can be expressed within the complement. That this is indeed the case can be derived from the following:

- (66) I heard that he would sing (for example, I deduced this from his clearing his throat).
 (67) I heard that he hadn't sung (for example, I deduced this from his voice not being hoarse).

The following underlying structure may be assumed for (64):

- (68) Hear_v (x_i : I (x_1))_{proc} (cert X_1 : ([past e_j : [pf Sing_v (x_j : he (x_j))_{Ag}] (e_i))] (X_1))_{go}

The representation of MP constructions also makes clear why it is that the states of affairs in their complements need not be perceivable: it is not the state of affairs itself, but the proposition concerning this state of affairs that is (mentally) perceived. The perceivability of the state of affairs that this proposition has a bearing on is immaterial.

3.3. Mental perception of propositional content vs. reception of the propositional content of a speech act

The difference between mental perception of a propositional content (MP) and reception of the propositional content of a speech act (RP) is less clear-cut than the previous one. MP and RP differ in that in the case of RP the perceived entity is of a linguistic nature, whereas in the case of MP it is not. Consider the following example:

- (69) I hear that Jane has caught a cold.

This sentence may be interpreted in two ways: (i) the speaker deduces Jane's having caught a cold from, for example, the sound of her voice. In this case the sentence can be paraphrased as 'I infer that Jane has caught a cold'; (ii) the speaker has been told by someone else that Jane has caught a cold. In this case the sentence can be paraphrased as 'I've been told that Jane has caught a cold'. Replacement of the complement by a noun phrase like 'the news', as in 'I've heard the news' is only possible under the second reading (see Holierhoek 1980: 45). Under the first interpretation (69) is a MP construction, under the second interpretation it is a RP construction. In both cases the complement represents a propositional content, but in the first case this propositional content originates with the speaker, whereas in the second case it originates with someone else. It is this distinguishing feature that is responsible for the differences between the two constructions. RP constructions are possible with predicates of hearing and seeing (the latter only in the sense of 'reading', as in [71] below). MP constructions are possible with all perception verbs.

3.3.1. Differences between MP and RP constructions. Since in both the MP and the RP construction the complement is a proposition, coding differences are less likely to occur. Nevertheless there are some differences which justify a separate treatment of the two constructions.

(i) In RP constructions the original speaker or a written source can be specified as the source of the propositional content (see Holierhoek 1980: 86-88):

- (70) I heard *from John* that Peter had been fighting.
 (71) I saw *in the newspaper* that Peter had been fighting.

In the MP construction the source of inference of the propositional content can be specified:

- (72) I could hear *from her quivering voice* that Peter had been fighting.
 (73) I saw *on her face* that Peter had been fighting.

(ii) In MP constructions, but not in RP constructions, the perception verb can be (and often is) accompanied by a modal verb (Lachlan Mackenzie, personal communication). Thus (70) can be interpreted as a MP construction only. Specification of the source of the propositional content is ungrammatical:

(74) I could hear *(from John) that Jane had caught a cold.

(iii) MP constructions are semifactive, as shown in the previous section; RP constructions are nonfactive:

(75) I could taste that the toast was burnt (*but it turns out that it wasn't).

(76) I heard (from John) that Mary had caught a cold (but it turns out that she hadn't).

The MP construction in (75) is semifactive: the speaker is committed to the truth of the complement. The RP construction (76) is nonfactive: the speaker is not committed to the truth of the complement.

(iv) The complements in RP constructions may contain operators specifying a propositional attitude, the complements in MP constructions generally may not:

(77) Mary heard from John that Peter might have been fighting/had probably been fighting.

(78) *Mary tasted that the toast might be burnt/was probably burnt.

This difference follows from the fact that the complement in (78) designates a propositional content which originates with the speaker, whereas the complement in (77) designates a reported propositional content which originates with a third party, whose propositional attitude may be part of the report.

3.3.2. *The expression of MP and RP constructions.* The distinction between MP and RP constructions is formally marked in some languages. Again the differences in form may concern (i) the complement type, in particular the form of the complement predicate; (ii) the complementizer.

3.3.2.1. *Different complement types.* A language which marks the distinction between MP and RP through different complement types is German.¹³ Compare the following sentences:

(79) Er hört sie kommen.
3sg.masc hear.pres.3sg 3sg.fem come.inf
'He hears her come.'

(80) Er hört dass sie kommt.
3sg.masc hear.pres.3sg comp 3sg.fem come.pres.ind.3sg.
'He hears that she is coming.'

(81) Er hört dass sie komme.
3sg.masc hear.pres.3sg comp 3sg.fem come.pres.subj.3sg
'He hears that she is coming.'

Example (79) expresses IPSoA; example (80), MP or RP; example (81), RP. In German the subjunctive can be used in reported complement clauses (see Palmer 1986: 138–139), which is what happens in (81). The use of the indicative or subjunctive in reported complements corresponds with a higher or lower degree of commitment of the speaker. The fact that (81) can only be used as a RP construction, whereas (80) can be used as a MP or RP construction, can be demonstrated by means of the following sentences:

(82) Er hört an ihren Schritten/von Peter
3sg.masc hear.pres.3sg from her footsteps/from Peter
dass sie kommt.
comp 3sg.fem come.pres.ind.3sg
'He hears from her footsteps / from Peter that she is coming.'

(83) Er hört *an ihren Schritten / von Peter
3sg.masc hear.pres.3sg from her footsteps / from Peter
dass sie komme.
comp 3sg.fem come.pres.subj.3sg
'He hears from her footsteps / from Peter that she is coming.'

The addition of satellites specifying the source of the information contained in the complement shows that in the case of subjunctive complements this source can only be a reported third party.

3.3.2.2. *Different complementizers.* Sango (Pasch and Givón 1988) provides examples of what may be interpreted as the expression of the distinction between MP and RP through complementizers. Among other possibilities, Sango shows the following complements with the verb *ma* 'hear' (1988: 90):

(84) Kosi à-ma Pepe à-ga.
Kosi SM-hear Pepe SM-come
'Kosi heard that Pepe came/Kosi heard of Pepe's coming.'

(85) Kosi à-ma à-tènè Pepe à-ga.
Kosi SM-hear SM-say Pepe SM-come
'Kosi heard that Pepe would come/Kosi heard that Pepe might come.'

In (85) the complementizer *à-tènè* appears, a frozen finite form of the verb 'say' with the impersonal pronoun *à-* as its subject. In (84) this complementizer is absent. Sentence (84) is used to express either certainty or factivity.¹⁴ Sentence (85) is used to express inference or uncertainty. This seems to correlate well with our distinction between MP and RP.

3.3.3. *The representation of RP constructions.* The following representation may be given to RP constructions:

- (86) Reception of propositional content of speech act
 PERCEIVE (x_1)_{proc} (π_3 X_1 : [π_2 e_1 : [π_1 Pred _{β} (x_1) ... (x_n)] (e_1)] (X_1)_{go}

The open position for π_3 operators is justified by the fact that the complement may contain operators specifying a propositional attitude, as illustrated above. This is the only difference between MP and RP constructions in underlying structure.

3.4. *Immediate perception of state of affairs vs. immediate perception of individual*

In section 3.1 we made a preliminary distinction between 'immediate perception of individual' (IPI) and 'immediate perception of state of affairs' (IPSoA), as exemplified in (87a) and (88a), with their predicate schemas as in (87b) and (88b):

- (87) a. I saw your brother last night.
 b. PERCEIVE (x_1)_{proc} (x_2)_{go}
 (88) a. I saw your brother walk down the street.
 b. PERCEIVE (x_1)_{proc} (sim e_1)_{go}

This distinction is not as straightforward as it may seem to be. First of all, there have been alternative proposals for the predicate frame underlying constructions of type (88a) (such as Dik 1981). Second, many languages have constructions which might be interpreted as intermediate between (87) and (88), and as 'links' between the two construction types in a systematic and perhaps even in a historical sense. Because of these intermediate cases, we discuss the relevant construction types starting from clear IPI cases such as (87) and ending up with clear IPSoA cases such as (88).

3.4.1. *Differences between IPSoA and IPI constructions.* The IPI frame as such is uncontroversial. It takes terms designating first-order entities for its second argument. Obviously, the entities must be such that they can be perceived by the particular kind of perception involved. Such first-

order terms can obviously be modified by adjectival, participial, and other types of attributive restrictors:

- (89) a. I saw the naked wrestler.
 b. I saw the running wrestler.

More interestingly, many languages also allow constructions of the following form:

- (90) a. I saw the wrestler naked.
 b. I saw the wrestler running.

Such constructions raise the problem of how precisely they should be interpreted. The first question to be posed is whether, given such constructions, the following entailments hold:

- (91) a. I saw the wrestler naked.
 Therefore, I saw the wrestler.
 b. I saw the wrestler running.
 Therefore, I saw the wrestler.

Let us suppose that these entailments do indeed hold in the given language. We then have reason for still regarding [the wrestler] as the first-order argument of *see*, and of interpreting [naked] and [running] as 'predicative adjuncts' to this argument. In such conditions, the analysis should be along the lines of (92a) rather than (92b):

- (92) a. I saw [the wrestler]_{go} [naked]_{PredAdjunct}
 b. I saw [the wrestler naked]_{go}

The question which is to be answered then is, how do we analyze the construction with the predicative adjunct (92a) in terms of FG? In answering this question we try to account for the traditional view that in one sense a predicative adjunct is an adjunct to the verb or the predication, while in another sense it is an attribute to the noun or term it goes with (in this case, [the wrestler]). This can be done by exploiting the following paraphrases:

- (93) a. I saw the wrestler naked.
 b. I saw the wrestler while he was naked.
 c. I saw the wrestler in the circumstance that he was naked.

We shall, in other words, interpret the predicative adjunct as a circumstantial satellite to the predication.¹⁵ In terms of the layered model of the clause, circumstantial satellites can be interpreted as satellites which 'localize' the SoA designated by the core predication by relating it temporally to some other SoA. Therefore, they will belong to level 2.¹⁶ On the basis of these assumptions we can give the following analysis of (90a):

- (94) [Past e_i : [see_V (I)_{proc} (d1x_i: wrestler_N(x_i))_{go}] (e_i)] (sim e_j: [naked_A (x_i)_φ] (e_j))_{circ}

Note the following points about this analysis:

–the SoA e_i of my seeing the wrestler is related to a SoA e_j defined by this wrestler being naked.

–thus, [naked_A (x_i)_φ] modifies the core predication through the circumstantial satellite relation.

–at the same time [naked_A (x_i)_φ] is defined as a property of [the wrestler] through the referential index x_i .

–it is an intrinsic property of (this type of) predicative adjunct that it should be simultaneous with the temporal specification of the core predication. This is expressed by the fixed operator *sim*.

As long as the entailment condition illustrated in (91a) holds, constructions such as (90b), with a participial predicative adjunct, can be analyzed in the same way.

Van der Auwera (1985a) discusses the French construction which differs from (90a)–(90b) in having a relative clause rather than an adjective or participle in predicative position. Compare the following:

- (95) a. Je l'ai vu ivre.
I him have seen drunk
'I saw him drunk.'
b. Je l'ai vu qui mourait.
I him have seen who died
'I saw him dying.'

With a wealth of arguments Van der Auwera demonstrates that the relative construction *qui mourait* in (95b) is neither a restrictor nor a nonrestrictive (appositive) relative clause, but a 'predicative relative',¹⁷ such as we also find in

- (96) Il a les cheveux qui tombent.
he has the hairs which fall
'His hair is falling out.'

A particularly telling example for the parallelism with predicative adjectives is

- (97) Je voyais ... les amis de M., les uns célèbres, les autres qui allaient l'être.
I saw ... the friends of M. the ones famous the others who went it be
'I saw the friends of M., some famous, some on the point of becoming famous.'

Although we find Van der Auwera's interpretation of the French data convincing, our analysis is different from his in that we should like to use the schema independently needed for such constructions as (90a) and (90b) above. We would thus analyze (95b) as

- (98) [presperf e_i : [voir_V (d1x_i: p1 (x_i))_{proc} (d1x_j: p3 (x_j))_{go}] (e_i)] (sim e_j: [mourir_V (Rx_j)_{proc}] (e_j))_{circ}

Note that this analysis presupposes that the entailment condition holds. It appears that most of the characteristic properties of the construction (enumerated by Van der Auwera 1985a: 224ff.) can be accounted for in terms of this analysis. For example, consider the behaviour of the construction under subject assignment. Given structure (98) we expect subj assignment to the goal term to be possible; such subj assignment should not affect the circumstantial satellite, since this is completely outside the core predication. This is exactly what we find:

- (99) Ton frère a été vu qui volait son voisin.
your brother has been seen who robbed his neighbor
'Your brother has been seen robbing his neighbor.'
(100) *Ton frère qui volait son voisin a été vu.

In this analysis, then, (95b) is still a matter of 'perceiving a first-order individual', albeit 'an individual-as-involved-in-a-SoA'. Van der Auwera argues for a SoA analysis (which would nevertheless do justice to the relative-clause character of *qui mourait*), mainly on semantic grounds.

It should be stressed here, however, that the difference between the IPI and IPSOA readings, although important in principle, may become very subtle in practice. We are here in a borderline area in which reinterpretation of the IPI construction in terms of IPSOA could easily occur. Compare, for example,

- (101) a. We saw [a man] [falling off a ladder].
b. We saw [a man falling off a ladder].

In (101a) we have represented the 'entity reading', in (101b) the 'SoA reading' (see Hannay 1985), but the message is not that different in the two readings. This might explain how an IPI construction such as (101a) could develop into an IPSOA construction such as (101b), through a loosening of the entailment condition.

Consider, in this connection, the following English examples, adduced by Kirsner and Thompson (1976) and Noonan (1985):¹⁸

- (102) I smelled Hank spreading the muck.
[I didn't necessarily smell Hank.]

- (103) We heard the farmer slaughtering the pig.
[We didn't necessarily hear the farmer.]
- (104) We heard it thundering.
[We didn't hear 'it' in the circumstance that it was thundering.]

These examples show that the English construction with participle should be interpreted as IPSoA rather than IPI (see below). Note, however, that there is still the possibility that English has the two constructions side by side:

- (105) a. I heard [the children singing a song].
b. I heard [the children] [singing a song].

Finally, there is the construction with an infinitival complement, as in

- (106) I heard Sally sing a song.

In Dik (1981) this construction was analyzed in terms of a three-place predicate frame of the following form:

- (107) $see_v (x_1)_{proc} (x_2)_{go} (e_1: [\dots (x_2) \dots] (e_1))_{compl}$

This analysis was meant to account for the 'immediate perception' effect in terms of the FG means then available. But it disregarded the counterexamples against the entailment condition, as in (108)–(110) (compare [102]–[104]):

- (108) I smelled Hank spread the muck.
[I didn't necessarily smell Hank.]
- (109) We heard the farmer slaughter the pig.
[We didn't necessarily hear the farmer.]
- (110) We heard it thunder.
[We didn't hear 'it' in the circumstance that it was thundering.]

If these examples are taken into account, we have to conclude that these constructions, as well, represent cases of IPSoA. Therefore, we may conclude that constructions of type (108) to (110) are two-place after all and solidly represent the IPSoA case.

3.4.2. *The expression of IPSoA and IPI constructions.* In Modern Standard Arabic (and also in Egyptian Arabic; see Jelinek 1981) there is a particularly interesting way to distinguish the IPSoA construction from the IPI construction with a predicative adjunct. First consider the following sentence:

- (111) ra'aytu-hu qaahik-an
see.pf.1sg-3sg laugh.part-acc
'I saw him laughing.'

This sentence is ambiguous between an IPSoA and an IPI reading. In order to render the IPI reading unambiguously, the following construction is used:

- (112) ra'aytu-hu wa huwa qaahik-un
see.pf.1sg-3sg and he laugh.part-nom
'I saw him while he laughed.'

In this sentence the predicative adjunct is separated from the main clause, thus turning the main clause into a clear IPI construction.

Note, by the way, that (111) has a third reading, in which it is interpreted as a MP construction. In order to render this reading unambiguously, the following construction is used.

- (113) ra'aytu 'anna-hu qaahik-un
see.pf.1sg comp-3sg laugh.part-nom
'I saw that he was laughing.'

Here the complementizer 'anna indicates that the complement designates the mentally perceived propositional content.

3.4.3. *The representation of IPSoA and IPI constructions.* Summarizing, the following (rough) representations can be given for IPI constructions, IPI constructions with a predicative adjunct, and IPSoA constructions:

- (114) Immediate perception of individual
PERCEIVE $(x_1)_{proc} (x_2)_{go}$
- (115) Immediate perception of individual + pred. adjunct
PERCEIVE $(x_1)_{proc} (x_2)_{go} (sim e_i)_{circ}$
- (116) Immediate perception of state of affairs
PERCEIVE $(x_1)_{proc} (sim e_1)_{go}$

Both types of IPI construction have a first-order goal argument designating the perceived and perceivable individual. The only difference between the two is that a circumstantial satellite, designating a SoA in which this individual is involved, has been added in the second type. The circumstantial satellite may be left out without affecting the grammaticality of the construction.

In the IPSoA construction the constituent designating a SoA is the goal argument of the perception verb. This goal argument cannot be left out without affecting the grammaticality of the construction. It designates the perceived and perceivable event. The participants involved in this event may but need not be perceivable.

4. Conclusion

In this paper we have presented a typology of complements, based on the hierarchical clause structure used in FG to represent utterances, and applied this typology to the complements of perception verbs. In this way we have been able to account for many semantic, formal, and behavioral differences between these complements.

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Notes

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1. There are some differences between the representation proposed in Hengeveld (1989) and the one proposed in Dik (1989), but these are not important for our present concern.
2. The 'n' in this formula indicates that a predication may contain more than one term.
3. For a general view of the treatment of embedded constructions see Dik (forthcoming a).
4. Factive predicates presuppose the occurrence of the state of affairs described in the complement, semifactive predicates presuppose the commitment of the speaker to the truth of the complement, nonfactive predicates carry neither of these presuppositions. For a proposal concerning the treatment of (semi)factivity in FG see Hengeveld (1988).
5. The matrix-predicate classes listed in Noonan not included here are modal, achievement, phasal, negative, and conjunctive predicates.
6. For the operator *simultaneous*, see Vester (1983).
7. We refrain from discussing the nature of complements of true factive perception verbs such as *witness*.

8. Complements of perception verbs containing a question word, as discussed in, for instance, Vliegen (1986), are not treated separately, since they can be seen as subtypes of the general types presented here. Thus sentences such as *I saw how he did it* can be classified as IPSOA constructions, while sentences such as *I could see why he didn't want to go home* can be classified as MP constructions.
9. For comparable views in different frameworks see De Geest (1972) and Van der Leek (1989). The proposal of De Geest (1972) for the description of finite and nonfinite complements of perception verbs in Dutch involves the positing of different layers, which are syntactically rather than semantically defined. In Van der Leek (1989: 230f) it is argued that the difference between nonfinite and finite complements of Dutch *zien* 'see' is that in the first case both a visual experience and the resulting 'frame of mind' are attributed to the subject of the matrix clause, whereas in the second case only the visual experience is relevant. This characterization of the difference between the two constructions is compatible with our distinction between potential facts and states of affairs.
10. This requirement makes the present participle, which indicates simultaneity, very suitable for the expression of immediate perception (see Noonan 1985: 109).
11. In this respect Barwise and Perry (1983: 179) give the following elaborate example:

If you, as special prosecutor, had to convince a jury that Nixon saw Rose Mary Woods erase the crucial part of the Watergate tape, you would have a pretty good idea of the sort of evidence you would need. You would need to prove that Rose Mary Woods did indeed erase the crucial part of the tape and that Nixon saw it. For example, a film of Nixon watching Miss Woods erase that part of the tape would be pretty good evidence. But what if you had to prove that Nixon saw *that* Rose Mary Woods erased the crucial part of the Watergate tape? Your old evidence will no longer suffice, since Nixon could claim that he didn't know it was the Watergate tape, or that he didn't know that she was erasing it, or that he knew that she was erasing it but didn't know it was the crucial part. To prove the first (and weaker) claim, one has to show that Nixon had his eyes open and functioning, and that an event of a certain sort was taking place before him. To prove the stronger claim, one needs to prove something about what he recognized and what thoughts were going through his mind.

12. Although Kirsner and Thompson avoid the terms perfective (bounded) and imperfective (unbounded) for fear of equivocation, their characterization of the relevant difference is fully compatible with that aspectual distinction, if taken in the sense of, for example, Comrie (1976). Comrie does indeed discuss the difference between (56) and (57) in terms of perfective-imperfective.
13. For a similar phenomenon in Dutch see Holierhoek (1980: 87). For a detailed study of verbs of hearing in German see Vliegen (1986).
14. In order to express factivity Sango has the additional possibility of a nominalized complement.
15. See Vester (1983) for the problem, Pinkster (1983) for the phenomenology of predicative adjuncts in Latin, and Van der Auwera (1985a, 1985b) for detailed discussion of 'predicative relatives in French'. We return to Van der Auwera's analysis below.
16. See Dik et al. (1990).
17. In a later publication Van der Auwera (1990) prefers the term 'free appositive relative clause' for this construction type.
18. For this kind of argument see also De Geest (1970, 1972).

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