Abstract: This paper examines the semantic and morphosyntactic complementation patterns of perception verbs in Brazilian Portuguese. Using the framework of Functional Discourse Grammar, five semantic complement types are identified. It is subsequently shown that these five types are in an implicational relationship, such that the set of semantic complement types that a certain perception verb in Brazilian Portuguese may take occupies a contiguous segment on a hierarchy of semantic complement types. The morphosyntactic complements of perception verbs in Brazilian Portuguese include noun phrases, finite, and non-finite clauses, the latter comprising progressive1 and infinitival forms. The second part of the study shows that the choice for one of these types can to a high extent be predicted from the semantics of the complements, using the same hierarchy of semantic complement types.

Keywords: Perception verbs, Complement clauses, Functional Discourse Grammar, Brazilian Portuguese

1 Introduction

The aim of this paper is to give a systematic description of the complementation patterns exhibited, both semantically and morphosyntactically, by perception verbs in Brazilian Portuguese within the framework of Functional Discourse Grammar (FDG, Hengeveld & Mackenzie 2008). To this end, we will first, in Section 2, give a brief outline of FDG. We then move to its treatment of perception verbs in Section 3. From this treatment a number of predictions follow, which are given in Section 4. The predictions concern the distribution of semantic complement types with perception verbs on the one hand, and the way in which the morphosyntactic complement types of perception verbs may be predicted from their semantics on the other. These predictions are tested in Sections 5 through 8. We round off the paper with our conclusions in Section 9.

1 We use the term ‘progressive verb form’ for the gerúndio in Brazilian Portuguese
2 Functional Discourse Grammar

2.1 Introduction

Functional Discourse Grammar (Hengeveld & Mackenzie 2008, 2010; Keizer 2015) is a theory of language structure with a strong typological basis. The overall FDG model is given in Figure 1, which shows the various levels of analysis that are recognized within the grammar: the Interpersonal, the Representational, the Morphosyntactic, and the Phonological Levels. Each level is hierarchically ordered in layers of increasing scope.

Figure 1. Outline of FDG

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2 This section is partly based on Bastos et al. (2007).

3 Technical terms specific for FDG are capitalized throughout the text.
2.2 Levels

The Interpersonal, Representational, and Morphosyntactic Levels of linguistic organization are constructed using different sets of primitives. Underlying the Interpersonal and Representational Levels of organization are pragmatic and semantic frames, which serve as hosts for lexemes and primary operators (operators that are defined in terms of their meaning). Underlying the Morphosyntactic Level are morphosyntactic templates, which receive, apart from lexical material from the preceding levels, grammatical words and morphosyntactic secondary operators (i.e. operators anticipating bound grammatical expressions). The Phonological Level is based on prosodic patterns, which host the lexical material handed over from the preceding levels, together with bound morphemes and possibly tertiary operators (i.e. operators anticipating the acoustic expression of the utterance).

Levels are related to each other through operations, represented with ovals in Figure 1. There is a crucial difference between Formulation on the one hand, and Encoding on the other. The process of Formulation deals with specifying the pragmatic and semantic configurations that can be encoded within the language. As far as Formulation is concerned, there may be differences between languages as regards the pragmatic and semantic functions that are necessary to describe their grammatical system. The process of Encoding deals with the morphosyntactic and phonological form pragmatic/semantic configurations take in a language. As far as Encoding is concerned, there may be differences between languages as regards their word order, phoneme inventory, morphological type, etc.

The levels that are most relevant for the current paper are the Interpersonal Level and the Representational Level. These will therefore be presented in somewhat more detail.

The Interpersonal Level is organized hierarchically as indicated in (1):

(1) \((M_1: (A_1: [(F_1) (P_1) S (P_2) A (C_1: [(T_1) (R_1) ... (C_1)]) (A_1)]) (M_1))\)

The highest unit of analysis at the Interpersonal Level is the Move (M), which may contain one or more Discourse Acts (A). The central organizing unit within the Discourse Act is the basic Illocution (F), which takes the speech act Participants (P, the speaker S and the addressee A) and the Communicated Content (C) as its arguments. The Communicated Content itself is built up on the basis of a varying number of Ascriptive (T) and Referential (R) Subacts. The latter two units are operative at the same layer, which means that there is no hierarchical relation between them. The Interpersonal Level is thus an actional level, at which units are analysed in terms of their communicative function.

The Representational Level is organized hierarchically as indicated in (2):

(2) \((p_1: (ep_1: (e_1: [(f_1) (x_1)]) (ep_1)) (p_1))\)

The linguistic units that are relevant at this level are categorized in terms of the semantic categories they designate. Propositional Contents (p) are mental constructs, only existing in the mind; Episodes (ep) are thematically coherent combinations of States-of-Affairs, where the States-of-Affairs show unity or continuity in time, space, and participants; States-of-Affairs (e) themselves are events or states, which have a temporal reality; Individuals (x) are concrete, tangible entities that exist in space; and Properties (f) are special in that they only exist when they are applied to some other semantic category. Properties (f) occur both as units characterizing States-of-Affairs (the Configurational (c) Property (f_c) in (2)), and as an independent unit (the Lexical (l) Property (f_l)) within the Configurational Property. The units (f_1) and (x_1) in (2) are operative at the same layer, which means that there is no hierarchical relation between them.
2.3 Layering

Each level is organized hierarchically in terms of several layers. Higher layers contain lower layers. All layers at the Interpersonal and Representational Levels have the following general structure, where $\alpha$ ranges over all variables:

\[(3) \quad (\pi \alpha; [(\text{complex}) \text{head}] \ (\alpha_1); \sigma \ (\alpha_1))_\phi\]

Lexical and grammatical means are used to build up each unit. Lexical means are the heads and optional modifiers ($\alpha$), where the head is shown as the first restrictor and the modifier as a non-first restrictor. Grammatical means are operators ($\pi$) and functions ($\phi$). Operators specify non-relational properties expressed grammatically, functions specify relational properties expressed grammatically.

The most important semantic domains of operators and modifiers for each of the layers of the Interpersonal and Representational Levels are given in Table 1. They are illustrated with examples of modifiers, as these will play an important role below.

Table 1. Semantic domains of operators and modifiers

| Interpersonal level |
|---------------------|
| M  | Communicative status of the move (e.g. *in sum*) |
| A  | Communicative status of the act (e.g. *in addition*); Stylistic properties of the act (e.g. *briefly*) |
| F  | Illocutionary manner (e.g. *frankly*) |
| C  | Subjective attitude (e.g. *fortunately*); Reportativity (e.g. *reportedly*) |

| Representational level |
|------------------------|
| p  | Propositional attitude (e.g. *possibly*); Evidence (e.g. *apparently*) |
| ep | Order of episodes (e.g. *first*); Absolute time (e.g. *yesterday*) |
| e  | Relative time (e.g. *after that*); Reality status (e.g. *hardly*); Event quantification (e.g. *twice*) |
| f  | Manner (e.g. *beautifully*); Aspect (e.g. *continuously*) |

In order to illustrate the above, example (5), adapted from Hengeveld & Wanders (2007: 217) is formalized interpersonally (5) and representationally (6) below:

\[(4) \quad \text{Reportedly a man was slowly cutting himself with a knife yesterday.}\]
\[(5) \quad (A_i; [(F_i; \text{DECL} (F_j)) (P_{i,x}) (P_{i,y}) (C_x; [(T_i) (R_y) (R_y)] (C_y): \text{reportedly})] (A_j))\]
\[(6) \quad (P_i; (\text{past } e_p; (\sim e; (\text{progr } f_j; [[f; \text{cut}, f] \ (1 x; \text{man}_{h} (x))_q (x); \text{past}, f]) \ (F_i); (1 x; \text{knife}_{n} (x)_j) \ (e_j)) (e_p); \text{yesterday}_{h} (e_p) (p_i))\]

The different lexical modifiers (*reportedly, slowly, with a knife, yesterday*) are represented at their corresponding layers: *reportedly* modifies the C-layer at the Interpersonal Level in (5), *deliberately, with a knife*, and *yesterday* modify the $f_i$, $f_{ij}$, and $e_{p}$-layers of the Representational Level in (6). An aspectual and a temporal operator at the $f_{ij}$- and $e_{p}$-layer in (6) trigger the past progressive form of the verb.
2.4 Complementation

In the preceding paragraphs it was shown that layers may be qualified in similar ways by either operators or modifiers. In the same way, they may be used as arguments of complement-taking predicates, and these then again qualify the layers they take as their arguments in similar ways as operators and modifiers.

Thus, complement-taking verbs with meanings parallel to the ones listed in Table 1 for the Interpersonal and Representational Levels, take arguments with systematically decreasing internal complexity the lower the specific layer they embed. As a consequence, the layers listed in (7) and (8), taken from Hengeveld & Mackenzie (2008, chapter 4), may occur as arguments of complement-taking predicates:

(7) Interpersonal layers underlying subordinate clauses

|   |   |   |   |
|---|---|---|---|
| a | (Π M₁; [... (Π Cᵢ; [(Tᵢ) (Rᵢ)]) (Cᵢ); Σ (Cᵢ)] (Aᵢ); Σ (Aᵢ)) (M₁); Σ (M₁)) |
| b | (Π Aᵢ; [... (Π Cᵢ; [(Tᵢ) (Rᵢ)]) (Cᵢ); Σ (Cᵢ)] (Aᵢ); Σ (Aᵢ)) |
| c | (Π Cᵢ; [(Tᵢ) (Rᵢ)]) (Cᵢ); Σ (Cᵢ)) |

(8) Representational layers underlying subordinate clauses

|   |   |   |   |
|---|---|---|---|
| a | (π pᵢ; (π epᵢ; (π eᵢ; (π fᵢ; [(fᵢ) (xᵢ)] (fᵢ); σ (fᵢ)) (eᵢ); σ (eᵢ)) (epᵢ); σ (epᵢ)) (pᵢ)) |
| b | (π epᵢ; (π eᵢ; (π fᵢ; [(fᵢ) (xᵢ)] (fᵢ); σ (fᵢ)) (eᵢ); σ (eᵢ)) (epᵢ)) |
| c | (π eᵢ; (π fᵢ; [(fᵢ) (xᵢ)] (fᵢ); σ (fᵢ)) (eᵢ)) |
| d | (π fᵢ; [(fᵢ) (xᵢ)] (fᵢ)) |

Lower layers are contained within higher layers. Therefore, subordinate clauses may be classified in terms of the highest layer they contain. In addition, as a layer always brings along its particular set of operators and modifiers, it may be predicted that all the operators and modifiers qualifying the highest layer underlyng a certain type of subordinate clause, and all lower operators and modifiers, may be expressed in such a subordinate clause. On the other hand, modifiers and operators qualifying layers higher than the highest layer underlying a certain type of subordinate clause, are excluded from expression in such as subordinate clause.

The following examples (see also Hengeveld & Mackenzie 2008: 361-367) illustrate this for the Interpersonal Level:

(9) While it is difficult to make generalizations about such a diverse public, it is easy to conclude [that in sum, these actions have led to a net loss of vegetative cover relative to pre-settlement conditions, as well as a substantial change in the type of vegetation present. At the same time, public consciousness regarding the importance of urban vegetation has certainly risen in the last ten years, although how much of that awareness has translated into changed behavior vis a vis urban plants in Quito is an open question.] (Move)

\[(f₁; \text{conclude}_1 (f₁))\]
\[\langle x₁ \rangle_λ\]
\[\langle M₁; [(A₁, A₂) ...] (M₁); Σ (M₁)⟩_υ\]

(10) I might add that, frankly speaking (*in sum), you’re going to have bigger problems than just raising capital. (Discourse Act)

\[(f₁; \text{add}_1 (f₁))\]
\[\langle x₁ \rangle_λ\]
\[\langle A₁; [\text{ILL } (P₁)_A (P₂)_A (C₁; [...(Tᵢ) (Rᵢ)...] (Cᵢ))] (A₁); Σ (A₁)⟩_υ\]
They further stated that the members are reportedly (*frankly speaking, *in sum) considering to walk separate paths. (Communicated Content)

\[ (f_1: \text{state}_{\Sigma}(f_1)) \]
\[ (x_1)_A \]
\[ (C_1: \ldots (T_r) \ldots (C_r): \Sigma (C_r))_U \]

The complement-taking predicate conclude in (9) takes a summarizing Move in an argumentative series as its argument. This Move is represented as the Undergoer (U) argument M of the verb conclude and is itself built up as a series of Discourse Acts. We can now explain the presence of the modifier in sum in the subordinate clause, as this is an M-modifier. The complement-taking predicate add in (10) has a single Discourse Act A as its argument, and this explains why it is possible that the A-modifier frankly speaking but not an M-modifier may be expressed within it. Finally, the complement-taking predicate state in (11) takes the Communicated Content C as its argument, and therefore may contain the C-modifier reportedly, while the presence of an A-modifier or an M-modifier is not grammatical.

The same type of reasoning may be applied at the Representational Level. Consider the following examples and their underlying formalizations (Hengeveld & Mackenzie 2008: chapter 4):

He believed that I had possibly gone too far. (Propositional Content)

\[ (f_1: \text{believe}_{\Sigma}(f_1)) \]
\[ (x_1)_A \]
\[ (p_1: (e_1: ((f_2) \ldots (f_j) \ldots (f_1)) (e_1) \ldots (e_1)) (ep_1))_U \]

It ends with him (*possibly) breaking up with her and her running crying out into the hall when he returns from the war. (Episode)

\[ (f_1: \text{end}_{\Sigma}(f_1)) \]
\[ (ep_1: (e_1: ((f_2) \ldots (f_j) \ldots (f_1)) (e_1), (e_2: (f_2: ((f_2) \ldots (f_1)) (e_2))) \ldots (ep_1))_U \]

I saw her (*possibly) leave before dinner (*yesterday). (State-of-Affairs)

\[ (f_1: \text{see}_{\Sigma}(f_1)) \]
\[ (x_1)_A \]
\[ (e_1: ((f_2) \ldots (f_j) \ldots (f_1)) (e_1); \sigma (e_1))_U \]

He continued to cry uninterruptedly (*before dinner/*when he returns from the war/*possibly). (configurational property)

\[ (f_1: \text{continue}(f_1)) \]
\[ (x_1)_A \]
\[ (F_1: ((f_2) \ldots (f_j) \ldots (f_1)); \sigma (f_1))_U \]

The complement-taking predicate believe in (12) is the expression of a propositional attitude, and its argument therefore has to be a propositional content (p.). For this reason it may contain the modifier possibly, which expresses a propositional attitude. The complement-taking predicate end_with in (13) takes an argument (ep) that denotes the final episode of a story. It may therefore contain an absolute temporal modifier, in this case when he returns from the war, but a p-modifier is not grammatical. The complement-taking predicate see in (14) takes the witnessed State-of-Affairs (e.) as its argument. This explains the presence of the relative temporal modifier before dinner, and the fact that p-modifiers and ep-modifiers are not grammatical, at least not as modifiers of the subordinate clause. Finally, the complement-taking predicate continue in (15)
denotes the persisting presence of a property, and it therefore takes a Configurational Property \( f_c \) as its complement. The presence of this layer licenses the modification by the aspectual adverb *uninterruptedly*, while in the absence of higher layers p-modifiers, ep-modifiers, and e-modifiers are not grammatical, again when these are taken as modifiers of the subordinate rather than the main clause.

We conclude, then, that it is possible to classify complement clauses on the basis of the highest layer they contain. Since lower layers are included in higher layers, the presence of the highest layer predicts the presence of all lower layers as well as the operators and modifiers corresponding to them.

3 Perception verbs in Functional Discourse Grammar

3.1 Introduction

Perception verbs, like *see* and *hear*, specify a relation between an individual (the perceiving entity) and different kinds of the representational/interpersonal categories introduced above, according to the nature of what is perceived. In Dik and Hengeveld (1991), a description of the different kinds of perception verb complements is given within the Functional Grammar framework, accounting for the many subtle semantic differences between them. Drawing on earlier work by e.g. Kirsner & Thompson (1976), Holierhoek (1980), Barwise & Perry (1983), Noonan (1985), and van der Auwera (1985), the authors argue that perception verb complements can be understood in terms of the hierarchical clause structure used in Functional Grammar to represent utterances. In the same way, in this section we carry out the characterization of perception verbs and their complements, but now according to the FDG model, taking the previous description as our starting point. We will show that perception verbs can take five different types of complement: Properties \( f \), Individuals \( x \), States-of-Affairs \( e \), Episodes \( ep \), and Communicated Contents \( C \).

From this section onwards we will use Brazilian Portuguese examples. All these examples were obtained through internet searches using the Google search engine. They were subsequently checked for their grammaticality by the three authors of this paper that are native speakers of Brazilian Portuguese.

3.2 Perception of Property

A perception verb in this case describes the perception of a property by an individual. Since properties do not exist by themselves, the object of perception is a characteristic of another entity, as illustrated in (16):

\[
\text{(16) Nunca } \text{sentiram} \quad \text{o cheiro de comida estragada.}
\]

‘They never sensed the smell of spoiled food.’

The verb *sentir* ‘sense’ in (16) specifies a relation between the perceiving Individual \( x \), the understood subject ‘they’, and the perceived Property \( f \) \text{o cheiro de comida estragada} ‘the smell of spoiled food’.

3.3 Perception of Individual

In this use of perception verbs what is described is the perception of one individual by another, as illustrated in (17):

\[
\text{(17) Nunca } \text{ouviram} \quad \text{o som de um gato.}
\]

‘They never heard the sound of a cat.’
(17) Eu vi o passarinho.
1sg see.pst.1sg the bird.dim
'I saw the little bird.'

In this case, the verb ver ‘see’ specifies a relation between two semantic categories of the same type: a perceiving Individual (x) eu ‘I’ and a perceived Individual (x) o passarinho ‘the little bird’, both individuals, and, consequently, concrete and tangible entities.

3.4 Perception of State-of-Affairs

This reading concerns the direct perception of a state-of-affairs by an individual, as the following example shows:

(18) Eu vi o carro bater numa bike.
1sg see.pst.1sg the car crash.inf in.a bicycle
'I saw the car crash into a bicycle.'

In (18), the verb ver ‘see’ specifies a relation between the Individual (x) category eu ‘I’ and a directly perceived State-of-Affairs (e) um carro batendo numa bike ‘a car crashing into a bicycle’.

3.5 Perception of Episode

The fourth possible reading concerns the deduction of a piece of knowledge by means of perception through one of the senses, as illustrated in the following sentence:

(19) Eu vi que o carro tinha batido numa bike.
1sg see.pst.1sg that the car have.pst crash.ptcp in.a bike
'I saw that the car had crashed into a bicycle.'

As is clear from the tenses used, in this example the first person subject did not witness a car crashing into a bicycle directly, as in (18). Rather, he/she comes to the conclusion that the crash has taken place on the basis of visual evidence. The difference with (18) is that in (18) the complement clause represents the state-of-affairs witnessed directly and is thus of the e-type, while in (19) it represents the conclusion the speaker arrived at.

Dik & Hengeveld (1991) call this type ‘perception of propositional content’. We here choose, however, to classify it as the perception of Episodes, following Hengeveld & Hattner (2015). These authors situate the evidential category of deduction at the layer of the Episode, on the basis of the fact that ‘deduction necessarily involves at least two related states-of-affairs: the perceived one and the deduced one. The speaker deduces the occurrence of one state-of-affairs, the deduced one, on the basis of another state-of-affairs, the perceived one’ (Hengeveld & Hattner 2015: 486). As it is within the Episode that the relation between States-of-Affairs is specified, deduction must then be situated at that layer.

The connection between the two States-of-Affairs within the Episode is also shown in the fact that there has to be a (relative) temporal connection between the perceived and the deduced events, as illustrated in (20) (Hengeveld & Hattner 2015: 490-491):

Note that perception of a Propositional Content is at stake in expressions such as I see what you mean.
(20) a. I smell that he has been cooking.
   b. *I smell that he had been cooking.

The temporal specification in the complement clause in (20a) expresses relative tense, which connects
the perceiving event with the deduced event. In (20b) the complement clause contains an expression of
absolute tense, and thereby disconnects the perceiving event from the deduced event, which leads to
ungrammaticity. Given the requirement of a temporal connection, the two events must be within a single
Episode.

There are a number of grammatical differences between constructions that express the perception of
a State-of-Affairs and those that express the perception of an Episode that allow us to distinguish them,
as shown in Dik and Hengeveld (1991). These are: (i) the simultaneity of the e-complement with the main
clause; (ii) the impossibility to negate the e-complement independently; and (iii) non-factivity, i.e., the
absence of a presupposition on the part of the speaker that the e-category took place.

The first property is shown in (21):

(21) *Eu vi o carro ter batido numa bike.
    1sg see.pst.1sg the car have.INF crash.PTCP into.a bicycle
    'I saw the car having crashed into a bicycle.'

While the use of the past tense is fine in (19), it leads to ungrammaticality in (21). This is because direct
perception requires simultaneity of the perceiving and the perceived State-of-Affairs.

The examples in (22) show that a State-of-affairs complement cannot be negated, while an Episode
complement can:

(22) a  *Eu vi o carro não bater numa bike.
       1sg see.pst.1sg the car not crash.inf in.a bicycle
       'I saw the car not crash into a bicycle.'
   b   Eu vi que o carro não tinha batido numa bike.
       1sg see.pst.1sg that the car not have.pst.3sg crash.ptcp in.a bicycle
       'I saw that the car had not crashed into a bicycle.'

While negation of the complement is fine in (22b), it is not in (22a). The reason is that something that does
not happen cannot be perceived directly.

Finally, the examples in (23) demonstrate that the truth of Episode complements is presupposed, while
that of State-of-Affairs complements is not:

(23) a   Eu não vi o carro
       1sg not see.pst.1sg the car
       bater numa bike. (e eu sei que ele não bateu)
       crash.inf in.a bicycle
       'I did not see the car crash into a bicycle.' (and I know that it didn’t)
   b   Eu não vi que o carro bateu numa bike.
       1sg not see.pst.1sg that the car crash.pst.3sg in.a bicycle
       (*e eu sei que ele não bateu)
       'I did not see that the car crashed into a bicycle.' (and I know that it didn’t)
When the verb *ver* ‘see’ takes an Episode as its complement, it describes acquisition of knowledge. Predicates of acquisition of knowledge are semi-factive, that is, the speaker presupposes that the complement describes a fact. For this reason, the continuation in (23b) is ungrammatical.

### 3.6 Perception of Communicated Content

This reading is only possible with predicates of hearing and seeing (in the sense of ‘reading’) when used by the speaker to relay words or thoughts of someone else, as illustrated in (24):

(24) *Ontem vi no jornal que um jovem de 21 anos matou o irmão de 22.*

Yesterday see.pst.1sg in.the newspaper that a boy of 21 years kill.pst.3sg the brother of 22.

‘Yesterday I saw in the newspaper that a 21-year-old boy killed his 22-year-old brother.’

In (24), the verb *ver* ‘see’ specifies a relation between the first person singular perceiving x-type subject ‘I’ and the perceived Communicated Content *que um jovem de 21 anos matou o irmão de 22* ‘that a 21 years old boy killed his brother of 22’, which represents a piece of information claimed by a third party.

The grammatical expression of the perception of a Communicated Content is different from that of an Episode. As shown in (24), in the former case the source of the information, here *o jornal* ‘the newspaper’, may be specified. In the latter case, this is not possible, as shown in (25):

(25) *Percebi que ela é uma pessoa muito legal.*

noted.pst.1sg that 3sg cop.prs.3sg a person very nice

‘I noted that she is a very nice person.’

### 3.7 The representation of perception verbs in FDG

Constructions with perception verbs, like the ones presented in 3.2 to 3.6, are used to express the subject’s perception of an aspect of the extralinguistic world. In this way, this kind of construction is dealt with at the Representational Level in the FDG model. In this subsection we will present the underlying representations for the constructions with perception verbs presented so far. As shown before, perception verbs can have different representational or interpersonal categories as their complement, and these are represented by different variables. We may therefore formalize the differences between them exploiting the variables introduced earlier. ‘PV’ is shorthand for ‘perception verb’.

(i) perception of Property:

(26) $[(f_{i}: PV (f_{j})) (x_{i}) (f_{j})]$

   e.g. ‘I (x_{i}) saw (f) the redness of her eyes (f).’

(ii) perception of Individual:

(27) $[(f_{i}: PV (f_{j})) (x_{i}) (x_{i})]$

   e.g. ‘I (x_{i}) saw (f) your brother (x).’

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6 This is even so when the complement designates a Communicated Content, a unit at the Interpersonal Level. When Interpersonal units are being talked about, they enter the Representational Level, as described in Hengeveld & Mackenzie 2008: 275-277.
(iii) perception of State-of-Affairs:

\[(f; PV (f)) (x_i) (e_i)\]

e.g. 'I (x_i) saw (f) him arrive (e_i).'

(iv) perception of Episode

\[(f; PV (f)) (x_i) (ep_i)\]

e.g. 'I (x_i) saw (f) that he had arrived (ep_i).'

(v) perception of Communicated Content

\[(f; PV (f)) (x_i) (CI)\]

e.g. 'I (x_i) hear (f) you were fired (CI).'

In the representations from (26) to (29), the variables representing the perception verb complement pertain to the Representational Level. In (30), it belongs to the Interpersonal Level. This is due to the fact that, in this reading of perception verbs, the complement of the verb is the Communicated Content produced by a different speaker in an interpersonal act.

4 Predictions

After introducing the theoretical background and the classification of the complement types of perception verbs that follows from it, we now may formulate two predictions concerning the distribution of semantic complement types and their morphosyntactic expression.

Not all perception verbs may occur with all five semantic complement types introduced above. For instance, the verb *ver* 'see' was used above to illustrate all five complement types, as it is compatible with all of them. Other verbs, however, such as *provar* 'taste' have a much more limited range of possibilities. This particular verb only occurs with f-complements and x-complements, shown in (31):

\[
\begin{align*}
\text{a. } & \text{Provamos} \quad \text{o sabor de doce de leite.} \\
& \text{taste.pst.3pl the taste of sweet of milk} \\
& \text{We tasted the taste of sweet condensed milk.}
\end{align*}
\]

\[
\begin{align*}
\text{b. } & \text{Provamos} \quad \text{a famosa torta do Café Sacher.} \\
& \text{taste.pst.3pl the famous cake of the Café Sacher} \\
& \text{We tasted the famous cake of Café Sacher.}
\end{align*}
\]

The question is now whether there is any systematicity in the distribution of semantic complement types across perception verbs. We expect that there is. Our prediction is that it is likely for perception verbs to take complements based on lower layers, while it becomes more unlikely for them to take complements based on higher layers. The reason is that basic perception is a physical process, and that the higher one gets in terms of layering, the less concrete and the more abstract the layers become. We thus predict that individual perception verbs will take semantic complement types according to the following implicational hierarchy:

\[(f \subset x \subset e \subset ep \subset CI)\]

That is, if a certain perception verb allows a complement of, say, the ep-type, it will also allow all the complement types to the left of ep in the hierarchy. And if it does not allow, for instance, a complement of the x-type, it won't allow all the complement types to the right of x either. There may be a diachronic
dimension to this as well, as it might be that perception verbs start out with lower layer complements and expand the range of complements over time passing along the hierarchy.

Turning now to the morphosyntactic expression of perception verb complements, the question is whether we can also predict how the different morphosyntactic types of complement are distributed across the different semantic types. As has become clear in the various examples shown above, complements may take the form of noun phrases, non-finite clauses (infinitival and progressive), and finite clauses. As shown in earlier work (Hengeveld 1998), the higher the layer a subordinate clause contains, the more likely it is to be expressed by a finite construction. The reason for this is that, as the number of layers increases, the number of grammatical categories to be expressed also increases. We may thus expect the following mapping between the semantic types of complement represented in (32) and their morphosyntactic expression:

\[(33) \ (f \subset x) \subset e \subset ep \subset C \]
\[
\text{non-finite} \subset \text{finite}
\]

As f-complements and x-complements may only be expressed by noun phrases, they are not relevant categories to test this prediction. For the remaining types of semantic complement (33) predicts two things. First, finite complements are more likely to be found to the right of the hierarchy and non-finite complements are more likely to be found to the left of the hierarchy. And secondly, when a category to the right in the hierarchy is expressed by non-finite forms, then the categories to the left of it are also expressed by these forms; and when a category to the left in the hierarchy is expressed by finite forms, then the categories to the right of it are also expressed by these forms.

In the following we go into the semantics of perception verbs and their complements in Section 5 before testing the first prediction in Section 6. We then describe the morphosyntax of perception verb complements in Section 7, and test the second prediction in Section 8.

5 The semantics of perception verbs and their complements in Brazilian Portuguese

The Brazilian Portuguese perception verbs investigated in this paper are the following:

(i) visual perception: olhar ‘look’, avistar ‘catch sight of’, visualizar ‘visualize’, ver ‘see’, perceber ‘perceive’, observar ‘observe’, and notar ‘notice’;
(ii) auditory perception: escutar ‘listen’, ouvir ‘hear’, ver ‘see’, perceber ‘perceive’, observar ‘observe’, notar ‘notice’;
(iii) olfactory perception: cheirar ‘smell’, perceber ‘perceive’, sentir ‘sense’, experimentar ‘try’.
(iv) gustatory perception: experimentar ‘try’, degustar ‘taste’, provar ‘try/taste, saborear ‘savor’, sentir ‘sense’, perceber ‘perceive’;
(v) tactile perception: tocar ‘touch’, apalpar ‘touch’, palpar ‘touch’, sentir ‘feel’, tatear ‘touch’, perceber ‘perceive’;

As can be noted in this listing, there are quite a number of perception verbs that can be used to express perception through various senses. For instance, the verb experimentar ‘try’ can be used for olfactory and gustatory perception, the verb perceber ‘perceive’ for all five senses. The distribution of the perceptual modalities covered by these verbs does not seem to be random, as Table 2 shows.

Especially remarkable is that in three cases the same verb may be used to express visual and auditory perception. A typological study by Viberg (1984) shows that it is uncommon for languages to not express visual perception by a separate lexical item, a situation which occurs in only three of his 53 languages. In

7 Earlier work on perception verbs in Brazilian Portuguese includes Barros (1977), Carvalho (2004), and Vendrame (2010).
none of Viberg’s three cases does the polysemy exhibited concern just visual and auditory perception. Aikhenvald & Storch (2013: 16) already noted a number of cases like these, and in Brazilian Portuguese this type of polysemy is found as well, though it is restricted to the perception of properties. Examples (34)-(36) show the use of ver ‘see’, observar ‘observe’, and notar ‘note’ to express visual perception:

(34) Vião verde dos teus olhos
see.pst.1sg the green of 2sg.poss eyes
‘I saw the green of your eyes.’

(35) Logo no momento em que foi servida, observei a cor cristalina.
then in.the moment in that serve.ptcp, observe.pst.1sg the colour crystalline
‘Then at the moment that the food was served, I noticed the crystalline colour.’

(36) Já notaram a cor do biquini?
already note.pst.2pl the colour of.the bikini?
‘Did you already note the colour of the bikini?’

Examples (37)-(39) show the use of those same verbs to express auditory perception:

(37) Viou um barulho de carro.
see.pst.1sg a noise of car
‘I heard the noise of a car.’

(38) Observei um barulho na transmissão.
observe.pst.1sg a noise in.the transmission
‘I observed a noise in the transmission.’

(39) Assim que notei o barulho, com 500km,
such that note.pst.1sg the noise, after 500km,
levei o carro na concessionária.
take.pst.1sg the car in.the dealer
‘As soon as I noted the noise, after 500 km, I took the car to the dealer.’

Given the extensive amount of polysemy observed, where necessary we will indicate with a superscript which reading of a perception verb is intended. Thus ver\textsuperscript{A} will mean that the verb ver ‘see’ is used in its auditory reading.\footnote{The abbreviations used are A for auditory, G for gustatory, O for olfactory, T for tactile, and V for visual.}

### 6 The distribution of semantic complement types

In Section 4 we predicted that perception verbs take different sets of semantic complement types according to the following hierarchy:

\[(40) \quad f \subset x \subset e \subset ep \subset c \subset c \]

\footnote{For the question of polysemy in perception verbs, see also the discussion in Gisborne (2010).}
This hierarchy predicts that semantic complement types more to the left of the hierarchy are implied by
the presence of semantic complement types more to the right of the hierarchy. Table 3 shows that this
prediction is fully borne out by the data. The data on which this table is based are all given in Appendix 1.
Note that a '+' in Table 3 indicates that a particular complement type is attested, while a blank indicates
that it was not attested.

At the top of Table 3 the perception verbs with the widest range of semantic complement types are
given, at the bottom those with the narrowest range are given. The verbs at the top combine with all possible
complement types, the ones at the bottom only with the property denoting complement type, the lowest one
on the hierarchy. All intermediate cases show systematic decreasing combinatorial possibilities following
the various steps in hierarchy (40).

The verbs highest on the hierarchy are verbs of visual and auditory perception taking a C-complement.
This is not surprising, as linguistic units can only be perceived through reading and listening, i.e. through
visual and auditory perception. At the other end of the hierarchy we find verbs with a primary visual
reading being used in an auditory sense. We do not see an evident explanation for this fact. In between we
find other sets of combinations of perception verbs with semantic complement types, but importantly these
always obey the hierarchy in (40). Our first prediction is thus fully borne out.

Table 3. The distribution of semantic complement types

| Verb   | Property | Individual | State-of-Affairs | Episode | Communicated content |
|--------|----------|------------|------------------|---------|-----------------------|
| Escutar | +        | +          | +                | +       | +                     |
| Ouvir  | +        | +          | +                | +       | +                     |
| Ver    | +        | +          | +                | +       | +                     |
| Avistar| +        | +          | +                | +       | +                     |
| Notar  | +        | +          | +                | +       | +                     |
| Observar | +      | +          | +                | +       | +                     |
| Perceber | +      | +          | +                | +       | +                     |
| Perceber | +      | +          | +                | +       | +                     |
| Perceber | +      | +          | +                | +       | +                     |
| Sentir  | +        | +          | +                | +       | +                     |
| Sentir  | +        | +          | +                | +       | +                     |
| Visualizar | +    | +          | +                | +       | +                     |
| Olhar  | +        | +          | +                |         | +                     |
| Ver    | +        | +          | +                |         | +                     |
| Experimentar | +   | +          | +                |         | +                     |
| Provar | +        | +          | +                |         | +                     |
| Degustar | +      | +          | +                |         | +                     |
| Saborear | +     | +          | +                |         | +                     |
| Tocar  | +        | +          | +                |         | +                     |
| Apalpar | +        | +          | +                |         | +                     |
| Palpar  | +        | +          | +                |         | +                     |
| Tatear | +        | +          | +                |         | +                     |
| Cheirar | +        | +          | +                |         | +                     |
| Experimentar | +   | +          | +                |         | +                     |
| Observar | +      | +          | +                |         | +                     |
| Notar  | +        | +          | +                |         | +                     |
| Perceber | +      | +          | +                |         | +                     |
7 The morphosyntax of perception verbs in Brazilian Portuguese

The perception verbs analyzed in this paper allow various types of morphosyntactic complement. The first division is between noun phrase complements and clausal complements. Within the group of clausal complements we find finite and non-finite clauses, and the latter group consists of progressive and infinitival clauses.

(41) Morposyntactic types of complement of perception verbs

| Noun phrase | Finite | Non-finite | Infinitival | Progressive |
|-------------|--------|------------|-------------|-------------|

Examples (42)-(45) illustrate the various types of complement: a noun phrase in (42), a finite clause in (43), infinitival complements in (44), and a progressive complement in (45).

(42) Vi o verde dos teus olhos.

see.PST.1SG the green of the 2SG.POSS eyes

‘I saw the green of your eyes.’

(43) Quando pego o telefone ouço que o modem não entra na linha.

when take.PRS.1SG the phone hear.PRS.1SG that the modem not enter.PRS.3SG in.the line

‘When I take the phone I hear that the modem doesn’t connect.’

(44) a Nem notaram o homem de paletó preto entrar apressado na sala.

not see.PST.3PL the man of suit dark enter. INF hurry. PTCP in.the room

‘They didn’t see the man in the dark suit hurry into the room.’

b Agora via as pessoas discutirem entre si.

Now see.PST.1SG the people argue. INF 3PL among refl.

‘Now I saw people argue among themselves.’

(45) Eu percebi eles fazendo força pra arrancar algo.

1SG see.PST.1SG 3PL do.PRG force to drag. INF something

‘I saw them using force to drag something along.’

Nominal complements may express all possible semantic complement types. In the following examples the complement designates a Property (46), an Individual (47), a State-of-Affairs (48), an Episode (49), and a Communicated Content (50):

(46) Eu vi o azul mais bonito.

1SG see.PST.1SG the blue most beautiful

‘I saw the most beautiful blue.’

(47) Vi uma menina na escola.

see.PST.1SG a girl in.the school

‘I saw a girl at school.’

(48) Nunca nem vi um acidente assim.

never not.even see.PST.1SG a accident such

Under certain circumstances, which are irrelevant to our purposes here, the infinitive may receive person inflection, as shown in (44b).
'I never saw an accident like that.'

(49) E então eu vi sua intenção.
'And then I saw your intention.'

(50) Vi uma mensagem no celular dele e acho que ele me traiu.
'I saw a message on his cell phone and I think he cheated on me.'

The other way round, complements designating a Property or an Individual cannot be expressed by clauses. They can of course be expressed by headless relatives, as in (51), but these are just another manifestation of noun phrases:

(51) Vi o que queria ver.
'I saw what I wanted to see.'

8 The distribution of morphosyntactic complement types

In Section 4 we predicted the following distribution of morphosyntactic complement types with perception verbs in Brazilian Portuguese:

(52) \( (f \subset x) \subset e \subset ep \subset C \)
\( \subset \) finite
\( \subset \) non-finite

This prediction follows from the idea that the higher the layer on which the semantic complement type is based, the more likely it is that this complement type will be expressed by a finite complement clause. The first two categories in the hierarchy are irrelevant for this prediction, as they can only be expressed by noun phrases.

As shown in the previous section, not all perception verbs allow all semantic complement types. In order to test the prediction in (52) we therefore have to limit ourselves to the perception verbs that allow a wide range of semantic complement types. The ones we have selected are those that allow at least an Episode as their semantic complement. Table 4 shows which perception verbs comply with this criterion. The data on which this table and later tables in this section are based are all given in Appendix 2.

| Table 4. Perception verbs exhibiting a wide range of semantic complement types |
|---|---|---|---|---|
| **Escutar** | Property | Individual | State-of-Affairs | Episode | Communicated content |
| **Ouvir** | + | + | + | + | + |
| **Ver** | + | + | + | + | + |
| **Avistar** | + | + | + | + | |
| **Notar** | + | + | + | + | |
| **Observar** | + | + | + | + | |
| **Perceber** | + | + | + | + | |
| **Sentir** | + | + | + | + | |
| **Visualizar** | + | + | + | + | |
Table 5 now shows the ways in which the complement types expressing States-of-Affairs, Episodes, and Communicated Contents are realized morphosyntactically in terms of finiteness. In this table a + indicates that a complement is finite, a – that it is non-finite, while ‘irr’ indicates that a slot is irrelevant.

**Table 5. Finiteness of complements**

|              | State-of-Affairs | Episode | Communicated content |
|--------------|-----------------|---------|----------------------|
| Escutar      | –               | –/+     | –/+                  |
| Ouvir        | –               | –/+     | –/+                  |
| Ver          | –               | –/+     | –/+                  |
| Avistar      | –               | –/+     | irr                  |
| Notar        | –               | –/+     | irr                  |
| Observar     | –               | –/+     | irr                  |
| Perceber     | –               | –/+     | irr                  |
| Sentir       | –               | –/+     | irr                  |
| Visualizar   | –               | –/+     | irr                  |

What is clear from Table 5 is that there is a clear split between complements designating States-of-Affairs on the one hand, and those designating Episodes and Communicated Contents on the other. The former are always expressed through non-finite forms, the latter through finite and non-finite forms.

A further generalization arises when we further distinguish between the two non-finite forms, progressive and infinitival forms, and consider their distribution across semantic complement types. This is shown in Table 6.

**Table 6. Progressive, infinitival, and finite complements**

|              | State-of-Affairs | Episode | Communicated content |
|--------------|-----------------|---------|----------------------|
| Escutar      | PROG/INF        | INF/FIN | INF/FIN              |
| Ouvir        | PROG/INF        | INF/FIN | INF/FIN              |
| Ver          | PROG/INF        | INF/FIN | INF/FIN              |
| Avistar      | PROG/INF        | INF/FIN | irr                  |
| Notar        | PROG/INF        | INF/FIN | irr                  |
| Observar     | PROG/INF        | INF/FIN | irr                  |
| Perceber     | PROG/INF        | INF/FIN | irr                  |
| Sentir       | PROG/INF        | INF/FIN | irr                  |
| Visualizar   | PROG/INF        | INF/FIN | irr                  |

Table 6 shows that progressive forms are only found in the expression of complements designating States-of-Affairs. A construction with an ep- or C-complement in the progressive form is ungrammatical, as shown in (53), or results in a State-of-Affairs reading, as in (54):

(53) Porém, **notamos** ser/*sendo comum no cerne dessas teorias a ideia de igualdade. ‘However, we **note** that the idea of equality is common to the core of those theories.’

(54) Durante a transmissão do jogo São Paulo x Boca Juniors ouvi que o Alex Dias para o ano que vem.
During the broadcast of the game between São Paulo and Boca Juniors I heard that Fla is negotiating with Alex Dias for next year. Together with the data in Table 5, this leads to the overall picture presented in Table 7.

| State-of-Affairs | Episode | Communicated Content |
|------------------|---------|----------------------|
| progressive      | +       |                      |
| infinitive       | +       | +                    |
| finite           | +       | +                    |

In all, and as predicted, we thus see a clear relationship between the semantic complement types on the one hand, and their morphosyntactic expression on the other.11

9 Conclusions

In this paper we have shown that the complements of perception verbs in Brazilian Portuguese can be classified semantically using the semantic and pragmatic categories proposed in Functional Discourse Grammar. Complements of perception verbs can be argued to express Properties (f), Individuals (x), States-of-Affairs (e), Episodes (ep), and Communicated Contents (C). This subdivision into complement types is relevant in two different respects. First of all, the set of semantic complement types that a perception verb can take is not random but follows a hierarchy, in which the categories mentioned above are ranked from lower to higher scope. If a perception verb can take a semantic complement type of a certain scope, it can also take all other semantic complement types with lower scope. And secondly, the morphosyntactic expression of complements of perception verbs in Brazilian Portuguese is closely linked to their semantic types: the higher a complement in the semantic hierarchy, the more likely it is to be expressed by finite forms. We furthermore found that progressive forms are limited to complements denoting States-of-Affairs. In all, this study thus has shown that the semantic categories of complements distinguished in FDG provide a useful categorization that helps to systematically describe the semantic and morphosyntactic behaviour of perception verbs in their many readings as well as their complements in their many formal manifestations.

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11 This is all the more interesting, as similar results were obtained for noun complements in Brazilian Portuguese in Souza (2016).
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Appendix 1: Semantic complement types with Brazilian Portuguese perception verbs

Visual perception – Property

**Avistar**

Chegando em Itu, num belo sítio
arriving.PROG in Itu in.a beautiful farm
das árvores pintadas de branco na base, meias socket,
of.the trees painted of white in.the base, socks ankle
*avistei* see.pst.1sg o azul da piscina.

‘Arriving at Itu, in a beautiful farm with trees painted in white at the base, ankle socks, I saw the blue of the swimming pool.’

**Notar**

Eles já *notaram* a cor do biquini?
3pl already note.pst.3pl the color of.the bikini
É de encher os olhos: azul e branco.
cop.prs.3sg of fill.inf the eyes blue and white

‘Have they already noted the color of the bikini? It is a sight to see: blue and white.

**Observar**

Logo no momento em que foi servida,
immediately in.the moment in that cop.pst.3sg serve.ptcp
*observei* a cor cristalina,
note.pst.1sg the color crystalline
o brilho que a vodka representa e já gostei.
the brightness that the vodka represent.prs.3sg and immediately like.pst.1sg

‘As soon as the drink was served, I noticed the crystalline color, the brightness that vodka represents and I liked it immediately.’

**Olhar**

Olhei a cor daquel flor.
look.pst.1sg the color of.that flower

‘I looked at the color of that flower.’
Perceber

Muitas vezes emgolem a comida
many times swallow.PRS.3PL the food
sem sequer parar para sentir o sabor, perceber a cor.
without even stop.INF to feel.INF the flavor, perceive.INF the color
'Often they swallow the food without even stopping to feel the flavor, to perceive the color.'

Ver

Senti o teu cheiro perto de mim, o calor do teu corpo,
feel.PST.1SG the 2SG.Poss scent close of 1SG.OBL the heat of.the 2SG.Poss body
vi o verde dos teus olhos, mais brilhantes do que nunca.
see.PST.1SG the green of.the 2SG.Poss eyes more shiny of.the that never
'I felt your scent close to me, the heat of your body, I saw the green of your eyes, shinier than ever.'

Visualizar

Informe à gráfica em qual escala você visualizou a cor.
inform.IMP to.the printing.house in which scale 2SG visualize.PST.2SG the color
'Inform the printing house in which scale you visualized the color.'

Visual perception – Individual

Avistar

Antes que eu respondesse
before that 1SG answer.PST.SBJV.1SG
avistei o cavalo um pouco mais para baixo.
see.PST.1SG the horse a little more for down
'Before I answered I saw the horse a little more downward.'

Notar

 Então, provavelmente, vocês notaram o cachorro.
then probably 2PL notice.PST.2PL the dog
'And then, probably, you noticed the dog.'

Observar

Eles apenas observaram os animais, nada de tiros.
3PL only observe.PST.3PL the animals nothing of shots
'They only observed the animals, there were no shots.'
Olhar

Olhei o homem à minha esquerda.

'I looked at the man on my left.'

Perceber

Nesse momento, o apito do trem soava longe,

quando percebi uma mulher e duas meninhas.

'At this moment the train whistle sounded at a distance, when I noticed a woman and two little girls.'

Ver

Você viu aquela mulher da novela?

'Did you see that woman from the soap opera?'

Visualizar

Pensativo, o dono do (ex-)castelo visualizou seu pai.

'Thoughtful, the owner of the (ex-)castle visualized his father.'

Visual perception – State-of-Affairs

Avistar

Avistei ele vindo na minha direção todo lindo,

vestindo uma camisa branca, jaqueta azul e calça jeans.

'I saw him moving toward me looking all handsome, in a white shirt, blue jacket and jeans.'

Notar

Nem notaram o homem de paletó preto entrar apressado na sala.

'They didn't even notice the man in a black jacquet entering quickly in the room.'
**Observar**

Eu **observei** eles dormindo por mais um tempo e fui pra casa.

*I watched them sleeping for another while and then went home.*

**Olhar**

**Olhei** o homem louco tocando os sinos da igreja por quase uma hora.

*I looked at the crazy man ringing the church bells for almost an hour.*

**Perceber**

Eu **percebi** eles fazendo força pra arrancar algo.

*I noticed them striving to pull something out.*

**Ver**

Eu e um amigo **vimos** ele dando um empurrãozinho no antebraço.

*A friend and I saw him giving a little push on his forearm.*

**Visualizar**

Uma vez **visualizei** Deus pairando sobre a Terra.

*Once I visualized God hovering over the Earth.*

**Visual perception – Episode**

**Avistar**

Por um golpe de sorte, by a stroke of luck **avistei** que um dos carros estava deixando o “estacionamento oficial” da instituição.

*By a stroke of luck, I saw one of the cars leaving the official parking lot.*
abrindo, assim, a minha tão desejada vaguinha.

‘By a lucky fluke, I noticed that one of the cars was leaving the institution’s official parking lot, thus opening up my much-desired parking space.’

**Notar**

Notamos ser a espiritualidade

not.PRES.1PL COP.INF the spirituality

algo de suma importância para você.

something of great importance for 2SG

‘We note that spirituality is something of great importance to you.’

**Observar**

Ele, por ser médico,

3SG because COP.INF doctor

não precisou passar pela entrevista.

not need.PST.3SG pass.INF through.the interview

Sua esposa também não,

3SG.POSS wife as.well not

pois observaram ser uma união sem conflitos.

for observe.PST.3PL COP.INF a union without conflict

‘Because he is a doctor, he did not have to be interviewed. His wife did not either, for they observed it to be a union without conflict.’

**Perceber**

Percebo que o mundo está cansado de sonhadores!

perceive.PRES.1SG that the world COP.PRS.3SG tired of dreamers

‘I notice that the world is tired of dreamers!’

**Ver**

Analisando a situação econômica do país do réu,

analise.PROG the situation economic of.the country of.the defendant

vejo esta precária.

see.PRES.1SG COP.INF this precarious

‘Analyzing the economic situation of the defendant’s country, I see it is precarious.’

**Visualizar**

O presidente da Funai, Mércio Pereira Gomes,

the president of.the Funai Mércio Pereira Gomes

visualizou ser possível fazer valer

visualize.PST.3SG COP.INF possible do.INF assert.INF
os direitos das etnias indígenas
the rights of the ethnic groups indigenous
para o acesso ao ensino diferenciado.
to the access to the instruction differentiated

‘The president of Funai, Mércio Pereira Gomes, visualized that it is possible to assert the rights of indigenous ethnic groups to access differentiated instruction.

Visual perception – Communicated Content

Ver

Hoje mesmo eu vi no jornal que
today same 1sg see.pst.1sg in the newspaper that
Harry Potter já bateu a maior arrecadação de fim-de-semana
Harry Potter already hit.pst.3sg the highest box.office of weekend
com U$ 90 milhões nos EUA, batendo Jurassic Park.
with U$ 90 million in the USA overtake.prog Jurassic Park

‘Right today I saw in the newspaper that Harry Potter has already hit the highest weekend box office with $90 million in the USA, overtaking Jurassic Park.’

Auditory perception – Property

Escutar

Eu escuto sons.
1sg hear.prs.1sg sounds

‘I hear sounds.’

Notar

Assim que notei o barulho, com 500km, levei o carro na concessionária.
as soon that note.pst.1sg the noise with 500km took.pst.1sg the car to the dealer

‘As soon as I noticed the noise, after 500km, I took the car to the dealer.’

Observar

Observei um barulho na transmissão de marchas 2ª para 3ª em baixa aceleração.
notice.pst.1sg a noise in the transmission from gears 2nd to 3rd in low acceleration

‘I noticed a noise in the transmission from 2nd to 3rd gears in low acceleration.’
**Ouvir**

**Ouvi**

**Ouvir**

**Perceber**

**Comprei um cabo Stinger Hyperserie e após a instalação**

buy.pst.1sg a cabe Stinger Hyperserie and after the installation

**percebi**

**notice.pst.1sg**

**os ruídos quando ligava o motor [do carro]**

notice.pst.1sg the noises when turn on.pst.1sg the engine [of.the car]

‘I bought a Stinger Hyperserie cable and after the installation I **noticed** the noises when I turned on the engine.’

**Ver**

**Vi um barulho de carro. Seria a estrada?**

hear.pst.1sg a noise of car cop.cond.3sg the road

‘I heard the noise of a car. Would it be the road?’

**Auditory perception – Individual**

**Escutar**

**E eu escutei o passarinho.**

and 1sg hear.pst.1sg the little.bird

‘And I **heard** the little bird.’

**Ouvir**

**Eu ouvi o passarinho, às quatro da madrugada.**

1sg hear.pst.1sg the little.bird at four of.the morning

‘I **heard** the little bird at four in the morning.’

**Auditory perception – State-of-Affairs**

**Escutar**

**Escutávamos a galera gritando “Ronaldinho” direto.**

hear.pst.1pl the crowd shout.prog “Ronaldinho” constantly

‘We **heard** the crowd shouting “Ronaldinho” all the time.’
Ouvir

Eu ouvi o Diu dizendo que o serviço vai ser feito lá pelo pessoal do Rio.

'I heard Diu saying that the service will be done by the people from Rio.'

Auditory perception – Episode

Escutar

Tô dançando na balada e escuto que a próxima música é uma que eu amo.

'I'm dancing at a party and I hear that the next song is one I love.'

Ouvir

Quando pego o telefone ouço que o modem não entra na linha.

'When I take the phone, I hear the modem doesn't connect.'

Auditory perception – Communicated Content

Escutar

João estava indo para casa quando ligou o rádio e escutou que em uma cidade da Índia morreram três pessoas por causa de uma gripe desconhecida.

'John was going home when he turned on the radio and heard that in a city in India three people died of an unknown flu.'

Ouvir

Durante a transmissão do jogo São Paulo vs Boca Juniors ouvi que o Fla tá negociando com o Alex Dias para o ano que vem.

'During the broadcast of the game São Paulo vs Boca Juniors I heard that the Fla is negotiating with Alex Dias for the year that comes.'
'During the transmission of the match São Paulo vs. Boca Juniors I heard that Flamen(mego) is negotiating with Alex Dias for next year.'

**Olfactory perception – Property**

**Cheirar**

| Cheirei | o perfume | de seus cabelos. |
|---------|-----------|------------------|
| smell.pst.1sg | the perfume | of 3pl.poss hair |

‘I smelled the perfume of her hair.’

**Experimentar**

| Na verdade ainda estou em dúvida, eu experimentei umas três ou quatro fragrâncias nos braços. |
|-----------------------------------------------|-----------------------------------------------|
| in the truth still cop.prs.1sg in doubt 1sg try.pst.1sg some three or four fragrances in the arms |

‘In fact I’m still in doubt, I have tried three or four fragrances on my arms.’

**Perceber**

| Ontem percebi a suavidade do teu perfume. |
|------------------------------------------|------------------------------------------|
| yesterday perceive.pst.1sg the softness of the 2sg.poss perfume |

‘Yesterday I perceived the softness of your perfume.’

**Sentir**

| Eu senti cheiro de marmelo. |
|-----------------------------|-----------------------------|
| 1sg feel.pst.1sg smell of quince |

‘I felt the smell of quince.’

**Olfactory perception – Individual**

**Cheirar**

| Cheirei aquele homem de tão lindo, tão especial. |
|-----------------------------------------------|-----------------------------------------------|
| smell.pst.1sg that man of such handsome such special |

‘I smelled that handsome special man.’

**Experimentar**

| Experimentei o perfume, que é do meu namorado, e fiquei encantada com a fixação e com o cheiro. |
|-----------------------------------------------|-----------------------------------------------|
| try.pst.1sg the perfume which is of the my boyfriend and stay.pst.1sg delighted by the fixation and by the smell |

‘I tried the perfume, which is my boyfriend’s, and I was delighted by the fixation and the smell.’
Perceber

Não percebi o bolo queimando.

‘I did not notice the cake was burning.’

Olfactory perception – Episode

Logo percebi que a rosca estava queimando,

‘I soon realized that the doughnut was burning, but the baker did not notice.’
**Sentir**

Sentir me que o feijão estava queimando.

*I noticed that the beans were burning.*

**Gustatory perception – Property**

**Degustar**

Pedalei junto com vocês e degustei as delícias da comida espanhola.

*I cycled with you and tasted the joys of Spanish food.*

**Experimentar**

Já experimentamos o sabor romã com chocolate, que foi aprovadíssimo por todos.

*We have already tasted the pomegranate and chocolate flavor, which everyone very much liked.*

**Perceber**

Quando dei o primeiro gole percebi um gosto meio esquisito mas continuei bebendo até o final.

*When I took the first sip I noticed a strange taste but I kept on drinking until I finished.*

**Provar**

Com nossos sentidos, provamos sabores.

*Using our senses, we taste flavors.*

**Saborear**

Já saborearam o sabor adocicado do caju?

*Have you already tasted the sweet flavor of the cashew nuts?*
Sentir

Hoje nem senti o gosto da comida direito.

‘Today I haven’t tasted the food’s flavor very well.’

Gustatory perception – Individual

Degustar

Presidente Lula degusta frango

‘President Lula eats chicken after launching the Plan Against Avian Influenza.’

Experimentar

Experimentei a comida e era muito estranha.

‘I have tried the food and it was very strange.’

Perceber

Eu nunca percebi a comida com atenção.

‘I have never perceived food with much attention.’

Provar

Provamos a feijoada vegetariana com arroz de coentros.

‘We have tried vegetarian feijoada with coriander rice.’

Saborear

Equipe de socorristas da ONG Corpo Voluntário de Socorro e Resgate

Río Grande do Sul also tried a Melitta coffee.’
**Sentir**

Quando dei a primeira garfada senti a comida toda.

‘When I took the first bite I tasted the whole dish.’

**Gustatory perception – State-of-Affairs**

**Perceber**

Percebo a cerveja descer amarga na garganta.

‘I taste the beer going down bitter in my throat.’

**Sentir**

A massa é bem macia, mas ao morder você sente as nozes invadirem sua boca.

‘The dough is very soft, but when you bite it you notice the nuts invade your mouth.’

**Gustatory perception – Episode**

**Perceber**

Hoje, na hora do almoço, percebi que a comida estava sem gosto pra mim.

‘Today, at lunch time, I noticed the food was tasteless for me.’

**Sentir**

Sinto que o bolo fica um pouco mais seco do que no forno convencional mas não sei se é por causa do bolo de caixinha.

‘I notice that the cake is a bit drier than when it is baked in the traditional oven, but I don’t know if it is due to its prefabricated dough.’
Tactile perception – Property

Apalpar

**Apalpei**

*maciez* long of.*part* fleshy of.*bird*

'I touched the softness of the bird’s fleshy part.'

Palpar

**Palpou**

*maciez* of.*sheet* try.*touch* through of.*touch*

'turn the moment more real'

'He touched the sheet’s softness trying to turn the moment more real by means of touch.'

Perceber

**Percebi**

*rigidez* of.*muscles* when Keaton came to greet us.

'I noticed the stiffness of his muscles when Keaton came to greet us.'

Sentir

Dei another two steps

get.*close* and *feel* the softness of the skin sensual

'I took another two steps, getting closer, and I felt the softness of his sensual skin.'

Tatear

**Tateei**

*maciez* of.*stone* and *smile* nervous

'stand knowing that I couldn’t throw it at her.'

Tocar

**Quando te vi toquei**

*aspereza* of.*hands* when *see* the roughness of *hands*

'When I saw you, I touched the roughness of your hands.'
Tactile perception – Individual

**Apalpar**

Após o banho passei o creme pelo corpo e apalpei um caroço do lado esquerdo poucos centímetros atrás da orelha. ‘After taking a shower, I applied the body cream and touched a lump on the left side a few centimeters behind my ear.’

**Palpar**

Em setembro, depois da menstruação, palpei um caroço, fiz então um ultra som e lá estava o nódulo! ‘In September, after having my period, I touched a lump, an ultrasound was made and there it was, the lump.’

**Perceber**

Assustado, percebi o corpo de Guto abraçado ao meu. ‘Freaked out, I noticed Guto’s body hugging me.’

**Sentir**

Sentiu o corpo dela em seus braços, quente como o sol apesar do frio de Nova York. ‘He felt her body in his arms, hot like the sun, although it was cold in New York.’

**Tatear**

Quando estava quase morrendo de sede, tateei algo parecido com uma torneira. ‘When I was almost dying of thirst, I touched something similar to a tap.’
Tocar

Também toquei seu corpo quente.
'I also touched his hot body which had liquor flavor.'

Tactile perception – State-of-Affairs

Perceber

Estava tão amedrontada que nem percebi ele me abraçando e mexendo no meu cabelo.
'I was so scared that I didn’t notice he was embracing me and touching my hair.'

Sentir

Senti ela mexer de verdade.
'I felt her move for real.'

Tactile perception – Episode

Perceber

Percebi que Michele me abraçou apertado, não tinha jeito de escapar.
'I felt that Michele hugged me tightly, there was no way to escape.'

Sentir

Dai rolei escada abaixo.
'Then I fell down the stairs and I felt I had broken my neck but it didn’t hurt.'
Appendix 2: Morphosyntactic complement types with Brazilian Portuguese perception verbs

*Escutar – e – progressive*

Escutávamos a galera gritando “Ronaldinho” direto.

‘We *heard* the crowd shouting “Ronaldinho” all the time.’

*Escutar – e – infinitive*

Eu escutei ela cantar.

‘I *heard* her sing.’

*Escutar – ep – infinitive*

Sinto muito dificuldade de Warpar PsyTrance...

‘I have a lot of difficulty working with Warpar PsyTrance (Record Company). . . it does not look perfect. . . I *hear* the kick does not have that impact in some segments.’

*Escutar – ep – finite*

Tô dançando na balada e escuto que a próxima música é uma que eu amo.

‘I’m dancing at a party and I *hear* that the next song is one I love.’

*Escutar – C – infinitive*

Tem certas coisas horrorosas visualmente nos pés das mulheres, que após meu questionamento, escuto ser “extremamente confortável”.

‘There are certain horrible things on women’s feet, which upon my question, I *hear* to be “extremely comfortable.”’
Escutar – C– finite

João estava indo para casa cuando ligou o rádio e escutou que em uma cidade da Índia morreram três pessoas por causa de uma gripe desconhecida.

'John was going home when he turned on the radio and heard that in a city in India three people died because of an unknown flu.'

Ouvir – e – progressive

Eu ouvi o Diu dizendo que o serviço vai ser feito lá pelo pessoal do Rio.

'I heard Diu saying that the service will be done by the people from Rio.'

Ouvir – e – infinitive

Ouvi cantar o Ginguinhas numa taberna em Samora.

'I heard Ginguinhas sing in a tavern in Samora.'

Ouvir – ep – infinitive

Quando pego o telefone ouço o modem não entrar na linha.

'When I take the phone I hear the modem doesn’t connect.'

Ouvir – ep – finite

Quando pego o telefone ouço que o modem não entra na linha.

'When I take the phone I hear that the modem doesn’t connect.'

Ouvir – C – infinitive

Outro ponto que ouvi ser um ótimo ponto de vista.

'Another place I heard to be a great viewpoint.'
Ouvir – C – finite

Durante a transmissão do jogo São Paulo vs Boca Juniors durante the broadcast of the game São Paulo vs Boca Juniors ouvi que o Fla tá negociando hear.pst.1sg that the Fla COP.PRS.3SG negotiate.PROG com o Alex Dias para o ano que vem. with the Alex Dias for the year that come.PRES.3SG ‘During the transmission of the match São Paulo vs. Boca Juniors I heard that Fla(mengo) is negotiating with Alex Dias for next year.’

Ver – e – progressive

Eu e um amigo vimos 1sg and a friend see.PST.IPL ele dando um empurrãozinho no antebraço. 3sg give.PROG a push.DIM in.the forearm ‘A friend and I saw him giving a small push on his forearm.’

Ver – e – infinitive

Vi um carro bater. see.PST.1SG a car crash.INF ‘I saw a car crash.’

Ver – ep – infinitive

Analisando a situação econômica do país do réu, Analise.prog the situation economic of the country of the defendant vejo ser esta precária. see.PRS.1SG COP.INF this precarious ‘Analyzing the economic situation of the defendant’s country, I see it is precarious.’

Ver – ep – finite

Eu vi que o carro tinha batido numa bike. 1sg see.PST.1SG that the car have.pst.3sg crash.PTCP in a bicycle ‘I saw that the car had crashed into a bicycle.’

Ver – C – infinitive

Hoje mesmo eu vi no jornal hoje same 1sg see.PST.1SG in the newspaper Harry Potter já bater a maior arrecadação de fim-de-semana Harry Potter already hit.INF the highest box.office of weekend com US$ 90 milhões nos EUA, batendo Jurassic Park. with US$ 90 million in the US, beating Jurassic Park.
Today I saw in the newspaper that Harry Potter has already hit the highest weekend box office with $90 million in the USA, overtaking Jurassic Park.

I saw him moving toward me looking all handsome, in a white shirt, blue jacket and jeans.

We saw Rich leave the car.

By a lucky fluke, I noticed that one of the cars was leaving the institution's official parking lot.

Avistar – e – progressive

Avistamos Rich sair do carro.

Avistar – e – infinitive

Por fora já avistei ser um ambiente agradável.

Avistar – ep – infinitive

Por um golpe de sorte, avistei que um dos carros estava deixando o “estacionamento oficial” da instituição.

Avistar – ep – finite

Avistar – C – finite

Today I saw in the newspaper that Harry Potter has already hit the highest weekend box office with $90 million in the USA, overtaking Jurassic Park.

I saw him moving toward me looking all handsome, in a white shirt, blue jacket and jeans.

We saw Rich leave the car.

By a lucky fluke, I noticed that one of the cars was leaving the institution's official parking lot.
**Notar – e – progressive**

Notou uma fã cantando músicas do seu álbum.

‘He noticed a fan singing songs from his album.’

**Notar – e – infinitive**

Nem notaram o homem de paletó preto entrar apressado na sala.

‘They didn’t notice the man in a black jacquet entering quickly into the room.’

**Notar – ep – infinitive**

Notamos que a espiritualidade é algo de suma importância para você.

‘We noted that spirituality is something of great importance to you.’

**Notar – ep – finite**

Nas praias notamos que, em geral, durante o dia o vento vem do mar para a praia e à noite o vento vai da praia para o mar.

‘On the beaches we noted that, in general, during the day the wind comes from the sea to the beach and at night the wind goes from the beach to the sea.’

**Observar – e – progressive**

Eu observei eles dormindo por mais um tempo e fui pra casa.

‘I watched them sleeping for another while and went home.’

**Observar – e – infinitive**

Observamos a luz entrar no quarto.

‘We observed the light enter the room.’
Ele, por ser médico,
3sg because cop.inf doctor
não precisou passar pela entrevista.
not need.pst.3sg pass.inf by.the interview
Sua esposa também não,
3sg.Poss wife as.well não,
pois observaram ser uma união sem conflitos.
for observe.pst.3pl cop.inf a union without conflict
‘Because he is a doctor, he did not have to be interviewed. His wife did not either, for they observed it to be a union without conflict.’

Observamos que existe uma busca interminável do homem pela religião.
observe.pres.1pl that exist.prs a search endless of.the man for religion
‘We observe that there is an endless search of man for religion.’

Eu percebi eles fazendo força pra arrancar algo.
1.sg see.pst.1sg 3.pl do.prog force to drag.inf something
‘I saw them using force to drag something along.’

Percebo a cerveja descer amarga na garganta
taste.prs.1sg the beer go.down.inf bitter in.the throat
‘I taste the beer going down bitter in my throat.’

Percebemos ser essencial o conhecimento de como tais teorias se constroem
feel.pst.1pl cop.inf essential the knowledge of how such theories construct.3pl
‘We feel the knowledge of how these theories are constructed to be essential.’

Percebo que o mundo está cansado de sonhadores!
realize.prs.1sg that the world cop.prs.3sg tired of dreamers
‘I realize that the world is tired of dreamers!’
**Sentir – e – progressive**

*feel.pst.1sg something enter.prog inside of.the 1sg.poss body*

'I felt something entering my body.'

**Sentir – e – infinitive**

*The dough is very soft, but when you bite it you notice the nuts invade your mouth.*

**Sentir – ep – infinitive**

*Then I fell down the stairs and I felt I had broken my neck but it didn't hurt.*

**Sentir – ep – finite**

*I notice that the cake is a bit drier than when it is baked in the traditional oven, but I don't know if it is due to its prefabricated dough.*

**Visualizar – e – progressive**

*I visualized God hovering over the Earth.*

**Visualizar – e – infinitive**

*As he approached the vehicle in question, he saw a bag being thrown out of the window.*
O presidente da Funai, Mércio Pereira Gomes, visualizou ser possível fazer valer os direitos das etnias indígenas para o acesso ao ensino diferenciado.

‘The president of Funai, Mércio Pereira Gomes, visualized that it is possible to assert the rights of indigenous ethnic groups to access differentiated instruction.’

A autora visualizou que as mulheres de classes populares sempre estiveram no feminismo.

‘The author visualized that women of the popular classes always were feminists.’