Chapter 3
Semantic Roles in Grammatical Description

3.1 Semantic Roles and Sentence Constituents

The notion of **semantic role**, or analogous ones, is generally admitted to be essential to grammatical description, but its precise definition varies somewhat (as does the name: semantic role, thematic role, theta-role, frame element...). Therefore, I begin this chapter with a short introduction, aimed chiefly at distinguishing the notion used here from related notions current in the literature.

A semantic role, as used here, expresses the semantic relation between the main constituents of a sentence and its verb.[1] Thus, in a sentence we may have an Agent, a Patient, an Instrument, a Location, and so on. The form of the complement bearing each of these roles is not relevant to its definition: we are speaking of perceived meaning relations, which belong to the semantic space. For example, the Patient may be expressed by an NP or by a prepositional phrase, as in

[1] O cara espancou o cachorro. 'the guy spanked the dog'
NP

[2] O cara bateu no cachorro. 'id.'[2]
PrepP: *em*+NP

In spite of the syntactic difference, the semantic relation between the underlined phrase and the verb is exactly the same in the two sentences[3]; we name this kind of relation **semantic role**. The relation cannot be defined according to the form of the syntactic element, like saying that "only NPs can have semantic roles", because this

[1] Or other governing words, as is well known. Here I limit the exposition to examples with a governing verb. In fact, the relation is with the cognitive "mental landscape" evoked by the sentence, but for our purposes it is adequate to speak of relation with the verb.

[2] *No* is the agglutination of the preposition *em* + the article *o*.

[3] They are basically synonymous; the difference in meaning is only that *espancar* seems to involve more violence than *bater* (cf. English *hit* vs. *spank*).

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amounts to defining semantic roles in partially syntactic terms, and defeats the main objective of grammatical analysis, that is, making explicit the relation between form and meaning.

By the same token, the difference between complements and adjuncts (however it is to be established) is not taken into account for purposes of identifying the semantic role. For instance, suppose we analyze *em Belém* as a complement in [3], and as an adjunct in [4]:

[3] Gomes morou em Belém. 'Gomes lived in Belém'

[4] Gomes morreu em Belém. 'Gomes died in Belém'

The semantic role is Location in both cases, since the relation perceived between the locative phrase and the verb is the same. The fact that, for many linguists, one example is a complement and the other an adjunct is irrelevant.

Finally, we shall speak of the semantic role of prepositional phrases, like *por causa de você* 'because of you'—this phrase has always the role Cause. This is not to deny that the determining element is the semantics of the preposition *por causa de* 'because of'. We speak of the semantic role of the whole phrase because we are positioning ourselves at the sentence level: we are concerned with the relations between the verb and its accompanying phrases, not with the relation between the preposition and its accompanying NP. Describing the semantic potential of *por causa de você* 'because of you' in terms of the role Cause assigned to *você* 'you' by the preposition strikes me as an unnecessary detour, and I prefer the more direct assertion that *por causa de você* 'because of you' is a phrase with the semantic role Cause. Intraphrasal relations are, of course, also worthy of attention, but they are not studied here.

This notion of semantic role is not an innovation. Although not always explicitly admitted, it is essentially what is found in the basis of valency dictionary and databases. It corresponds to FrameNet's **frame elements**: for instance, the ROBBERY frame is analyzed as including the frame element Place (here, Location), often expressed by a prepositional phrase, as in their example *they robbed a bank in North Berkeley*. Here we have a peripheral element, expressed by a phrase which would be traditionally analyzed as an adjunct; yet it bears a Place relation with the verb. The ADESSE system also admits semantic roles attached to prepositional phrases and expressed by adjuncts: the verb *llegar* 'arrive' is analyzed as including among its arguments Finalidad 'purpose', normally conveyed by a phrase introduced by the preposition *para* 'in order to': *hemos llegado a Madrid para hacer las paces* [...] 'we arrived to Madrid in order to make peace'. None of these systems has any compunction about assigning semantic roles to prepositional phrases and/or adjuncts.

This being understood, we can proceed to examine the relevance of these semantic relations within the sentence. A clause is composed of a sequence of constituents of different types, which structure themselves in different ways. Some constituent types include direct reference to things, states and events of the real world (*the cat*, *linguistics*, *the city of London*, *is too fat*, *ate the pizza*), as opposed to

constituents with structural meaning (*in, which, not, as against*). This opposition is traditionally recognized under labels such as **lexical** vs. **grammatical** items[4]:

> The meaning of a sentence depends in part on the meanings of the lexical items it contains, in part on the way they are put together grammatically: on this basis we can distinguish between **lexical semantics** and **grammatical semantics**.
> (Huddleston 1984, p. 35)

Lexical items are vehicles of lexical semantics, while grammatical items (articles, prepositions, negation particle, etc.) are among the vehicles of grammatical semantics.[5] Lexical items are usually associated with open classes, grammatical items with closed classes.

This opposition, as has been often observed (see again Huddleston 1984, pp. 35–36), represents a simplified view of the facts; but it contains more than a little truth, and accordingly refuses to go away entirely. In particular, many phrases with a lexical head express semantic roles, whereas grammatical items have nothing similar in their semantics.

For example, in the sentence

[5] The cat did not eat the fish.

we have a semantic role for *the cat* (Agent) and for *the fish* (Patient). These semantic roles identify the participants of the scene denoted by the sentence, which in its turn depends on the schema evoked by the verb *eat*, that is, EAT. This schema includes two core participants, the entity that eats and the entity that is eaten.[6] These are the **variables** of the schema,[7] and are labeled by their semantic roles: one variable is labeled Agent and the other Patient. The variables are bound by other schemata, on the basis of information provided initially by lexical items present in the sentence: the Agent is the CAT, the Patient is the FISH. On the other hand, a word like *not* does not denote a participant in the scene, and has a very different semantic function. A sentence can then be (partially) analyzed as a sequence of phrases, some of which associate with semantic roles: this is the way contrived by the language to describe events and states. An immediate problem is how language users relate phrases and semantic roles during message production or reception, and which types of knowledge allow them to perform this task.

[4] Or **notional** vs. **relational** items, or, in an older terminology, **semantemes** vs. **morphemes**.

[5] Grammatical semantics includes other factors, such as word order, affixes, and intonational contours.

[6] The notion of **core** semantic relation (as opposed to **peripheral** semantic relation) is developed in Chap. 5.

[7] To use Rumelhart and Ortony's (1976) terms.

3.2 Semantic Roles and Conceptual Semantic Relations (CSRs)

Before proceeding, let us pause for a moment to consider what it is that we are looking for, exactly. Defining and assigning semantic roles, that is, relating semantic features to morphosyntactic structures, is normally considered a grammatical question. This conception is found, for instance, in generative literature in general, and is thus stated by Levin and Hovav when they describe semantic role assignment:

> grammatically relevant facets of a verb's meaning are represented by a list of labels identifying the role that each of the verb's arguments plays in the event it denotes.
> (Levin and Hovav 2005, p. 35)

As seen, only grammatically significant facets are mentioned, and only in relation to the verb.[8] However, even if we limit ourselves to semantic relations, this view is only valid for part of the observed phenomena.[9] Semantic role assignment, it should be clear, is only one instrument towards a more general and more concrete goal: the connection between sensorially perceptible (phonetic) forms and semantic relations, which become ingredients of the mental landscape constructed by the receptor.[10] For instance, in a sentence like

[6] That boy is eating a cookie.

what we understand is not just an Agent, but rather an entity that performs a specific action, that is, puts something in the mouth and swallows it for feeding purposes—something very different from what the boy does in

[7] That boy is tearing my shirt.

These highly individual relations—**conceptual semantic relations** (**CSRs**) are part of the schema (frame) evoked by the verb, respectively EAT and TEAR, and they end up being integrated into the final mental landscape. The aim of the description, as far as we are concerned, is to establish a connection between each CSR and its formal expression—for instance, the CSR "eater" with the phrase *the boy* in a subject function. This connection is what constitutes the **sign**, the

[8] In this passage, Levin and Hovav refer only to the sentence; within other types of constituent a nominal, an adverb, etc. can be the determining element—for instance, in an NP the nominal head determines the semantic roles of the other constituents.

[9] This is not news: there are important mentions in recent works, e.g., Jackendoff (2002), Culicover and Jackendoff (2005), as well as in the cognitivist literature.

[10] The mental landscape is what Castelfranchi and Parisi (1980) call **rete di conoscenze** 'net of knowledge'. I do not use their term because it suggests reference to permanent knowledge in semantic memory, but here we deal with the interpretation of an individual utterance, and the mental landscape is stored only as part of the understanding of the current text. That is, each utterance calls for the construction of a new mental landscape. It is also sometimes called the **cognitive map**.

description of which was singled out by Saussure (1916) as the main object of linguistics. Note that when we connect the acoustic image *that boy* and the CSR "eater" (as in [6]) we are dealing with concrete entities: one is ultimately a phonetic sequence, and the other is a concept. It is held here that these concepts are entities or relations directly accessible to the language user, and as such are part of the evidence; in principle, I see no problem with the use of introspection as a source of data.[11]

The number of CSRs is naturally immense: practically every verb defines its own set, to the point of distinguishing, say, the "licker", the "biter" and the "kisser" according to which part of the mouth is brought into action. If we want to define CSRs as concrete relations, we cannot escape this fact. But how can this tremendous complexity be integrated into a lexico-grammatical description?

What we observe is that a language defines sets of CSRs to be treated as if they were the same relation (which in fact they are not), apparently by selecting some key features common to each set of CSRs. Thus, *that boy* is normally analyzed as Agent in both [6] and [7]. This analysis is certainly correct, but it is important to stress that marking *that boy* as the Agent is only a step in a longer process, namely specifying the relation that the boy (an entity of the conceptual world) has with the action of tearing the shirt or eating the cookie. The initial semantic role is eventually elaborated on the basis of the semantics of the verb, plus other factors including features of the context and world knowledge, into the highly particularized CSRs which make up the mental landscape constructed by the receptor on the basis of the sentence. But it is important to note that these elaborated CSRs are not, in themselves, grammatically relevant—they are the end product of an elaboration process.

There are therefore strong linguistic reasons to postulate generalized (schematic) semantic roles such as Agent, Patient, and the like. On the other hand, the connection between forms and schemata does not follow a unique road, with semantic roles as a necessary stopover. What we call semantic role assignment is a complex phenomenon, resorting to a variety of ways to achieve a task which is essential to comprehension, the connection between form and meaning. The whole system seems to be geared to an objective, and it does not much matter how it reaches it: it works in opportunistic fashion, and uses the most convenient among available mechanisms, syntactic, semantic, and also pragmatic. One aim of this book is to unravel some important aspects of this complex system.

[11] Without disregarding the serious methodological problems involved. Of course, not all linguists agree as to the possibility, and need, for the use of introspective data—Sampson (2001, pp. 2–5) illustrates a dissenting view. I beg to differ; see discussion in Perini and Othero (2011). See also Talmy's (2007) very interesting discussion on the use of introspection in linguistic analysis.

3.3 Semantics

The main reason semantic roles are important to grammatical description is that they determine a central ingredient in interpretation, namely certain semantic relations between sentence constituents. A purely formal description of sentence structure, without mentioning semantic roles, is possible, and was carried out, for instance, by Allerton (1982), but it leaves a lot to be desired.[12] Allerton's description provides a list of all category sequences and their syntactic functions, but it leaves untouched the question of the relation between concept and acoustic image. For instance, Allerton gives, in his list, the following construction:

SUBJECT + V Fido barked
(Allerton 1982, p. 145)

This is the only construction of the form **subject V** in his list. But this syntactic structure may correspond to different semantic structures, according to the semantic role expressed by the subject, e.g.

[8] Fido barked. [subject Agent]

[9] Fido froze. [subject Patient]

In certain cases the subject is the Agent and there is a Patient, understood as schematic:

[10] Fido has eaten.

And there are cases in which an unexpressed Patient is understood to have specific reference:

[11] Jane's husband drinks. [subject Agent; Patient: alcoholic beverage]

None of these differences can be expressed in Allerton's syntactic notation which, although not incorrect, is little informative. It is a fact that there are sentences composed only of subject and verb, but this leaves many important things to be said. His list is, correspondingly, brief: only 31 constructions. Now, if we consider semantic roles and their syntactic coding, we shall certainly have many more.[13]

That is, one important fact not expressible in Allerton's terms is illustrated by the fact that occurrence in the constructions

[9] Fido froze.

[10] Fido has eaten.

[12] A similar formal analysis is found in Emons (1978), for English. For Portuguese, see Barros (1992); Perini and Fulgêncio (1987).

[13] In the VVP list, which considers only diatheses (not all sentential constructions in the language), there are 256 as of February, 2015.

splits a large subset of all verbs into two groups, according to the semantic effect of the absence of object. With *freeze*, absence of object causes the subject to be assigned the role Patient: compare *Fido froze* with *that nasty boy froze Fido*. But with verbs like *eat* lack of object does not change the role of the subject, which is always Agent. This alternation has been often observed, and is something of a classic.[14]

The purely syntactic analysis also fails in cases of sentences of the form

SUBJECT + V + OBJECT Fido saw me.
(Allerton 1982, p. 145)

If we understand that **object** in the formula means a nonsubject NP, there is another construction of the form **subject V NP**:

SUBJECT + V + OBJOID Fido weighed 30 kilograms/resembled the sheepdog/had a long tail.
(Allerton 1982, p. 145)

The difference between an object and an objoid is defined by several syntactic criteria, such as the possibility of becoming subject of a passive sentence. But it is interesting to note that objoids have an exclusive set of semantic roles: for instance, they can never be Patient.[15]

The system recognizes, then, only two constructions of the form **subject V NP**. But if we take into account the semantic roles of the two NPs in the construction, it becomes clear that there is a significantly greater number of possibilities, as for instance[16]

[12] Fido ate the banana. [Agent—Patient]
[13] The crowd left the stadium. [Theme—Source]
[14] Everyone loved the party. [Experiencer—Stimulus]
[15] My cousin has two cars. [Possessor—Possessed.thing]
[16] Dick became a werewolf. [Theme+αRef—Goal+αRef]
[17] She weighed a hundred kilos. [Located.thing—Measure]
[18] The proposal pleased the chief. [Stimulus—Experiencer]
[19] The alpinists reached the peak. [Theme+Agent—Goal]
[20] The politician accepted the money. [Goal+Agent—Theme]
[21] The politician received a message. [Goal (*not* Agent)—Theme]

We have here ten sentences, all of the form **subject V NP**, but with important differences in the semantic relations between subject and (object) NP, on one hand, and the verb, on the other. To pick an example, take the difference between [20] and

[14] It goes back at least to Jespersen (1914–1929); see also Fillmore (1970a), Smith (1970). Levin (1993, p. 27ff) gives many examples and references.

[15] In the present analysis there is no need to distinguish objects from objoids. I only distinguish subjects from other NPs, the latter being sometimes referred to as **objects**, which is a convenient term to avoid using the more cumbersome **nonsubject NP**.

[16] Several of these semantic roles are poorly defined at present; here it is enough to note the great variety of semantic relations expressible by the syntactic structure **VSubj V NP**.

[21]: in [20] the subject is a Goal, and also an Agent, since the politician is understood as an active participant in the transference of the money, whereas in [21] the subject is a Goal but not an Agent, because the message came to the politician independently of any initiative on his part. All sentences in the list show comparable differences in semantic relations—yet in Allerton's system they would all be represented as elaborations of only two constructions, **subject V object** and **subject V objoid**.

It is important to stress that we are dealing here with knowledge available to any speaker; knowledge, in fact, essential for the correct use of the language. A list of formally defined constructions is useful as a first step in the description, but it must be complemented with semantic information. In the 1980s this was possibly a difficult thing to do; now we have a tolerable start in the theory of semantic roles, and the task can be taken a step forward.

3.4 Symbolic Relations

Cognitive semantic relations (CSRs) are part of the meaning of the verb they associate with; for instance, knowing the meaning of *kill* entails knowing that the schema KILL has two participants, a killer and a fatal victim. If there is no killer, we may have a death, but not KILL; if there is no fatal victim, there is no death and therefore no KILL. This is information necessarily bound to the semantics of the lexical item *kill*, and does not have to be specified elsewhere. On the other hand, something that does not appear in the semantics of *kill* is the fact that the killer is coded as the subject and the victim as a nonsubject NP. This must be stated with reference to the **lexical item** *kill*, and is **symbolic** information,[17] expressing a connection between a linguistic unit or relation and a cognitive schema (a frame).

Turning to Portuguese data, it is also symbolic information (in particular, its syntactic part) that distinguishes *espancar* from *bater* (both verbs mean 'spank, hit'): *espancar* has a subject Agent and an object Patient; *bater* also has an Agent and a Patient, but it expresses the Patient as a prepositional phrase:

[22] O cara espancou o cachorro. 'the guy hit the dog'
the guy hit the dog

[23] O cara bateu no cachorro. 'the guy hit the dog' [*no* = *em*+*o*]
the guy hit (on) the dog

The relation between semantic role and syntactic function shows in the statement of verb valencies. Since it crucially involves syntactic functions, valency cannot be derived from the semantics of the governing lexical item, nor from the corresponding schema. One of our tasks is to find a way of marking all verbs for their valency, so that they fit correctly into the constructions of the language.

[17] A better term might be **signic**, to keep the connection with the sign, but the term **symbolic** is in general use, and will be used here.

Valency statements, then, do not include a list of CSRs associating with the verb, since that list must appear in any case in the schema evoked by the verb. The semantic relations associated with each schema (that is, Rumelhart and Ortony's **variables**) are nongrammatical information, part of our knowledge of the world and of the way we categorize entities, relations, states, and events. The grammatical aspect of the phenomenon is the morphosyntactic coding of conceptual relations which we associate with each verb—and here we have to refer to each *verb*, not to each predicate or schema, since there are practically synonymous verbs with different valencies, as seen in the case of *espancar* and *bater* given above. This is the basic consideration in the discussion that follows. It is important to stress this point: what really matters in grammatical description is not semantic roles per se, but their distribution among the constituents of a sentence.

3.5 Constructions as Descriptive Tools

As Goldberg (2006, p. 1) points out, the notion of construction has been present in some form in grammatical studies since ancient times, and can be viewed, preliminarily, as a conventionalized form-meaning pairing. Within that rather loose definition,[18] a construction can be understood—for the purposes of valency description—as a sequence of categories and their syntactic functions, associated with certain aspects of the corresponding semantic representation. A construction as used in this book is a morphosyntactically defined structure, plus the semantic roles associated with each of the relevant constituents. The result is simpler than the units with which Goldberg works, but it is, I believe, compatible with her conception of construction (see Sect. 1.1).

Given a sentence like

[24] The boy had killed the mosquito.

there is naturally a great number of semantic aspects to be eventually described. We can, for instance, focus on tense and aspect, which are expressed by the verb form. Or we can characterize semantically the object (here, the Patient), which must denote a being liable to be killed: *the boy had killed the table* can be understood only metaphorically. These are Chomsky's (1965, p. 95) **selectional restrictions**, and are not included in valencies, following Jackendoff's position that

> Selectional restrictions are general semantic restrictions on arguments, which may go into much more detail than merely the conceptual category. [. . .] the appropriate linguistic level for stating them is conceptual structure and not syntax or a putative level of argument structure.
>
> (Jackendoff 1990, pp. 51–52)

[18] Which Goldberg greatly elaborates later in her book.

All those aspects are important to the final result, of course, but they are excluded from the analysis of constructions, such as applied here, in favor of other aspects, which are relevant to the description of verb valencies. These are constituent classes, syntactic functions, and semantic relations (semantic roles and CSRs). Constituent classes (NP, AdjP, V, etc.) relate intimately with syntactic structure and also with a kind of schematic semantic representation, as when we say that an NP can denote a "thing". Syntactic functions have a somewhat restricted role in valency description, but they are still necessary because the **subject** must be functionally distinguished from other NPs, which I propose to call **objects**; and constituent order can also be considered a kind of syntactic function. Finally, semantic relations are relevant for several reasons, among which the need to distinguish sentences like

[8] My dog barked. [subject Agent]

[9] My dog froze. [subject Patient]

Each construction is expressed by means of a very simple notation. For instance, the sentence

[25] O leite congelou.
the milk froze

is seen as an elaboration of the construction which is defined thus:

[26] VSubj>*Patient* V

This is not the only possible way to represent the construction exemplified in [26]; there are much richer and more complex ways to notate it. But here I envisage the construction not only as a theoretical construct (which it is, inevitably), but also as a descriptive resource, directed at the immediate objective of building a dictionary of verb valencies. Thus, for us it is enough to say that *congelar* 'freeze' occurs in construction [26], and also in a construction with a subject Agent and an object Patient:

[27] O cozinheiro congelou o leite.
the cook froze the milk

This new construction can be notated as

[28] VSubj>*Agent* V NP>*Patient*

These two constructions (and perhaps others) belong to the valency of the verb *congelar* 'freeze', being two of its diatheses.

Constructions as used here represent, within their limited area, the way lexical and constructional semantics interact in order to ultimately yield the meaning of sentences. This interaction is rather complex, and it is one of the aims of this book to unravel part of its complexity, as far as possible given our current state of knowledge of the problem. For our immediate descriptive purposes, we deal with: (a) the meaning of each constituent; (b) the semantic role of each constituent (this is

the main contribution of constructional meaning to the meaning of the sentence); and (c) the relations between syntactic function and semantic role (for instance, the subject of *arrive* is a Theme, the subject of *eat* is an Agent, the object of *eat* is a Patient). The result is an essential portion of the global meaning of the sentence. There are several complications, to be discussed in detail in later chapters, but this is the basic picture.

The notation used here is not too different from the ones found in some valency lists. The ADESSE project (described in Appendix C), a valency list of Spanish verbs, enumerates constructions giving syntactic functions and semantic roles, as for example for *llegar* 'arrive':

[29] **LLEGAR$_{ACT}$** A1: ***MOV*** A3: ***DIR***
= SUJ **= a LOC**
[ADESSE, entry **LLEGAR** ('arrive')]

The first line gives the two "arguments", one with the semantic role **móvil** (the entity that undergoes motion, here Theme), and the other **dirección** (Goal). The second line provides the syntactic representation, respectively a subject (**SUJ**), and a phrase introduced by the preposition ***a*** 'to'. There are some differences with the notation proposed here, but they are comparatively minor[19]; in both cases the description is made up of a set of constructions, and each construction is defined by means of a syntactic representation coupled with the semantic roles that associate with each of the constituents. In the system adopted here, the construction seen in [29] is expressed thus:

[30] **chegar** ('arrive') VSubj>*Theme* V *a* NP>*Goal*

This is to be read as "the verb *chegar* 'arrive' can occur in the construction defined as:" (the description of the diathesis follows). [30] is one of the diatheses of *chegar*, realized in

[31] Alguns jogadores chegaram a Belo Horizonte.
some players arrived to Belo Horizonte

The system proposed here is not to be understood as a definitive description. Given our currently precarious grasp of the facts, I find it prudent to distinguish maximally between constructions, so that we may think of grouping them in one way or the other only in a second moment. I have already mentioned that there are relevant relations between different constructions (so-called **alternations**); another example is the alternation of prepositions: in Portuguese, constituents of the form ***a* NP** and ***em* NP** are probably semantically equivalent for purposes of expressing the semantic role Goal. Thus, the sentence *cheguei a Paris* and *cheguei em Paris* both

[19] In particular, I see no point in distinguishing the arguments by numbers (A1, A3), since they are already distinguished by their semantic roles.

mean 'I arrived to Paris', and are both in current use.[20] And there are also cases of idiosyncratic syntactic alternations such as the verb *(se) apaixonar* 'to fall in love', which may be followed by a phrase with *por* or *com* (in English, you always fall in love *with*).

In our list every formal and/or semantic distinction is represented by new diatheses whenever there is no well-grounded rule describing the same distinction. This decision multiplies the number of diatheses, but guarantees the descriptive value of the list. Of course, as soon as a really good rule is proposed, the distinction is removed from the list. Therefore, for us, and pending further research, *cheguei a Paris* 'I arrived to Paris' and *cheguei em Paris* 'id.'are two different diatheses of the verb *chegar* 'arrive'.

In short, the system I am trying to elaborate aims at expressing the facts in their initial complexity. At best, it will enable researchers to ask the right questions, which is a lot. When we take this cautious way to analyze the available facts, we are just avoiding hasty generalizations, which are one of the plagues of linguistic thought.

[20] The use of *em* to mark the Goal is condemned by traditional grammarians. Here, as elsewhere, people pay them no attention.