

# The interaction of semantic-syntactic context with “mental activity” interpretations of Italian verbs of visual perception

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## Abstract

This paper draws on a frame semantic analysis of Italian verbs of visual perception in order to discuss the distributional features of these verbs (e.g. the syntactic and semantic characteristics of their arguments, but also their lexical collocates) that cause them to have an interpretation in the domain of mental activity.

## 1 Introduction

This paper is a corpus-based study on the “mental activity” senses of three Italian verbs – *vedere* (see), *intravedere* (make out or glimpse), and *scorgere* (a near-synonym of *intravedere*). Much like the English verb *see*, these verbs may be used to describe experiences that are predominantly mental as well as the experience of visual perception, as examples (1 a) and (1 b) show.

- (1) (a) *Vedo un cane.*  
I see a dog.  
(b) *Vedo una difficoltà.*  
I see a difficulty.

The data are based on a frame semantic analysis of the verbs. This was carried out in the context of the Italian FrameNet project (Lenci et al., 2010), whose goal is to create a frame-based electronic lexicon similar to the original Berkeley FrameNet.<sup>1</sup> The main tenet of Frame Semantics (Fillmore, 1985; Fillmore and Atkins, 1992; Fillmore et al., 2003) is that each sense of a word evokes a semantic frame – a schematic representation of a situation or an event – in the mind of language users. Each frame is constituted by a group of participants in the situation, or Frame Elements (FEs); these are instantiated syntactically by the

frame-bearing word’s arguments (if it is a verb) or complements (if it is a noun or adjective). The information for individuating a language’s semantic frames is obtained by annotating corpus sentences with FEs (similar to semantic roles) and syntactic information.

Frame Semantics focuses prevalently on a static description of the syntax-semantics interface: a frame is devised to appropriately capture the meaning of a word in context, and then the semantic roles of its arguments (or complements) are described, along with any possible syntactic alternations. What I would like to discuss in this paper, however, are the dynamics of semantic interpretation: what are the distributional features of a word (in particular, of a verb) that cause it to have a certain meaning?

This subject has traditionally been the object of James Pustejovsky’s line of inquiry. In the Generative Lexicon (Pustejovsky, 1998), the mechanisms of coercion and co-composition show that a verb can influence the semantics of its arguments, but that the reverse is true, too: in some cases a verb can force the appropriate semantic type on its object, but in other cases it is the argument that picks out certain semantic features of its head verb (and excludes others).

A similar argument is developed in Hanks’ “Corpus Pattern Analysis” (CPA) approach (Hanks and Pustejovsky, 2005). According to CPA, words out of context have no specific meanings, but a «multifaceted *potential* to contribute to the meaning of an utterance» (Hanks and Pustejovsky, 2005, 64). The meaning of a word is influenced not only by the syntactic pattern it occurs in, but also by the semantic type of the words in that pattern. In fact, the combination of different semantic types in the same syntactic pattern often gives rise to different word senses: for example, *shoot* in the sentence *shoot a person* could conceivably be ambiguous, depending on

<sup>1</sup>See e.g. (Ruppenhofer et al., 2006). FrameNet may be consulted online at <http://framenet.icsi.berkeley.edu>

whether the subject of the sentence is an armed attacker or a film director (Hanks and Pustejovsky, 2005, 68). However, CPA does not just take the characteristics of a verb's arguments into account, but also any additional and recurrent collocates of the verb which act as «clues» to its interpretation, such as *dead* in *shoot a person dead*.

In this paper, I will put these positions to the test, using the distributional data afforded by our frame semantic analysis as a base. I will examine the semantic and syntactic characteristics of the FEs occurring with *vedere*, *intravedere*, and *scorgere*, as well as other significant elements in the linguistic context, in order to determine their effect on the interpretation of these verbs. As a result, I will present an overview of the contextual features that cause a “mental activity” interpretation, and how this comes about.

## 2 “Mental activity” interpretations of *vedere*, *intravedere*, and *scorgere*

### 2.1 The epistemic interpretation

Many linguistic and philosophical studies on verbs of perception (both in Italian and English) focus on these verbs' so-called “epistemic” interpretation.<sup>2</sup> A verb of perception is said to be used epistemically when it does not express an experience of perception, but an act of deduction or reasoning, possibly based on perceivable objects. For example, in the sentence “I see John playing tennis”, the speaker is relating a direct perceptual experience: s/he is in fact seeing John in the act of playing tennis at the moment of the utterance. If s/he says “I see that John is playing tennis”, on the other hand, this does not necessarily mean that s/he can see him playing (although this interpretation is also possible). S/he might have simply noticed that his racket and tennis shoes are missing from the usual place where he keeps them, and made a deduction based on that perceptual data. There are also cases where the verb loses its perceptual meaning entirely: in a sentence like “I can see that the economical situation is difficult”, it is not implied that the speaker has reached this knowledge through direct observation (in fact, it is fairly unlikely). While important, these studies miss the wider scope of the polysemy of verbs of perception, which does not just include a “perceptual” and an “epistemic” interpretation. In addition,

most of these studies focus on the difference between *that*-clauses and perception verb-specific complements, such as NP followed by a naked infinitive or an *-ing* form in English, and do not take the wider variety of syntactic constructions that these verbs can occur with into consideration. An exception to this is (Baker, 1999), a study on the polysemy of the verb *see* based on Frame Semantics, which includes a detailed description of the various syntactic patterns that occur with this verb.

### 2.2 A frame semantic analysis

As mentioned above, a frame semantic analysis of a word begins with the study of corpus data. A sample of sentences that is deemed representative of the word's most typical FE combinations and their syntactic realizations is extracted from the corpus. Each sentence is assigned an appropriate frame, representing the meaning of the frame-bearing word; then, it is annotated with information on the FEs.<sup>3</sup> The data for this analysis were extracted from *La Repubblica* (Baroni et al., 2004), one of the largest corpora for Italian (ca. 390 million tokens), composed of newspaper texts.

The representative sample of sentences for each verb featured about 15 syntactic patterns, and included instances both of perception-related senses and mental activity ones. I found that the interpretations related to mental activity accounted for about half of the instances in each sample. Since the selection was not random, but based on syntactic patterns, the figure is not statistically significant, but it is still interesting.

Assigning the appropriate frame to the mental activity senses was not a simple task. For a first approximation, I paraphrased each instance with a verb of mental activity (e.g. *think*, *believe*, *consider*) and selected from the FrameNet inventory the frame that was evoked by that verb. I then checked whether the meaning of the whole sentence was compatible with that frame and its FE structure. At the end of this process, I identified three main senses, expressed by the frames AWARENESS, EXPECTATION, and CATEGORIZATION.

Since standard FrameNet frames are fairly general, this procedure had the effect of downplaying the differences in meaning between *vedere* on the one hand and *intravedere* and *scorgere* on the

<sup>2</sup>See for example (Barwise, 1981; Declerck, 1981; Guasti, 1993; Higginbotham, 1983; Kirsner and Thompson, 1976).

<sup>3</sup>For more information on the methodology of our analysis, see (Lenci et al., 2010).

other. While *vedere* expresses an experience of perception without specifying anything about its circumstances, *intravedere* and *scorgere* describe an experience which is either fleeting and transitory in nature, or made difficult and uncertain by obstacles to vision. This element of meaning is generally carried over in mental activity interpretations as well, with the result that the subject of the verb is less certain of the validity of the cognitive content s/he is entertaining. This element is lost in the analysis that I am presenting here. On the other hand, the similarities in behavior among these three verbs are quite striking: they all occur with the same syntactic patterns and nearly with the same senses (apart from the distinction that I just made).

One more thing that must be noted is that each sense had realizations that were metaphorical and ones that were not. I rely here on the definition of metaphor proposed by Lakoff and Johnson (Lakoff and Johnson, 1980): a mapping between two conceptual domains that enables us to interpret one in terms of the other. There were sentences where two domains seemed to be activated at the same time – one related to perception and one to mental activity – and sentences where the verb the perceptual meaning of the verb seemed entirely absent. I will discuss typical syntactic patterns both for metaphorical and non-metaphorical realizations.

Here are the frames I assigned to the mental activity readings of *vedere*, *intravedere* and *scorgere*.

### 2.3 AWARENESS

AWARENESS is the frame representing the verbs' epistemic interpretation. This frame refers to a situation where «a Cognizer has a piece of Content in their model of the world. The Content is not necessarily present due to immediate perception, but usually, rather, due to deduction from perceivables»,<sup>4</sup> which is very close to the definition I gave for epistemicity above. Other verbs that evoke this frame are *know*, *understand*, *be aware*, *believe*, and *think*.

The typical syntactic complement for epistemic uses of verbs of visual perception (and therefore for their AWARENESS sense) is the declarative *che* (that)-clause, which expresses the conceptual Content, as in sentence (2).

- (2) [*Con la tomografia MEANS*] *abbiamo potuto intravedere [che c'è una sedimentazione tra i due cervelli CONTENT]*.

Thanks to the CAT scan, we could glimpse that there is some sedimentation between the two brains.

In sentence (2), *con la tomografia* 'thanks to the CAT scan' expresses the Means by which awareness of the Content was achieved. Since a CAT scan provides perceptual data, which is the basis for the deduction expressed by the *che*-clause, *intravedere* retains some perceptual meaning, although the Content is actually a conclusion that must be believed or thought of. However, there are other cases that make no reference at all to physical perception (as shown in Section 2.2 above).

The AWARENESS sense also often emerges when the verb's direct object is an abstract noun, as in (3). The fact that the object of the verb is a non-perceivable entity reinforces the "mental activity" interpretation.

- (3) [*Elena COGNIZER*] *ha certo le conoscenze sufficienti per vedere [il senso della sua posizione CONTENT]*.

Helen certainly has enough knowledge to understand the meaning of her position.

Finally, another typical argument for verbs used in this sense is a complement headed by the preposition *da* (from), as in example (4).

- (4) [*Discendiamo dagli egiziani CONTENT*], *si vede [dal nostro viso, dal taglio degli occhi e dei capelli EVIDENCE]*.

We are descended from the Egyptians, you can see it from our faces, from the shape of our eyes and of our hair.

The *da*-complement represents the Evidence on which the awareness is based. This syntactic pattern is typical of other verbs that evoke this frame but do not have any readings associated with perception, such as *capire* (understand) and *dedurre* (deduce). This could be termed a case of exploitation, in Patrick Hanks' terms: a syntactic pattern that is the norm for other verbs is exploited in order to assign *vedere* and the others these verbs' meaning. The *da*-complement that expresses Evidence should not be confused with the locative complement introduced by the same preposition, which expresses the Location of Perceiver, as in *Ho visto i fuochi d'artificio [dal*

<sup>4</sup>The frame definitions are taken from the FrameNet website, <http://framenet.icsi.berkeley.edu>

*tetto* LOCATION OF PERCEIVER] (I saw the fireworks from the roof).

The main difference between the two seems to be that in the second case, the noun instantiating the Location of Perceiver must be a possible location. Otherwise, the argument is interpreted as Evidence. In this case, therefore, it is a combination between syntactic form and semantic type of the argument that triggers the AWARENESS interpretation.

The metaphorical patterns associated with AWARENESS are mostly constituted by a direct object and a locative expression introduced by *in* (in), *dietro* (behind), *oltre* (beyond), *attraverso* (through), and so on. These expressions create a spatial scene which reinforces the perceptual sense of the verb.

(5) [Surin COGNIZER] **intravede** [in Jeanne EVIDENCE] [le stesse passioni, gli stessi desideri dai quali è torturato lui CONTENT].  
Surin believes Jeanne has the very same passions and desires that he has always been tortured by.

(6) [Tanti COGNIZER] **scorgono** [dietro la sollevazione EVIDENCE] [una ricerca di dignità e autonomia CONTENT].  
Many believe there is a search for dignity and autonomy at the root of the rebellion.

In (5) and (6), the locative expression also represents the Evidence. It is by looking at Jeanne (or, in a broader sense, by talking to her, observing her behavior, coming into contact with her) that Surin comes to the (subjective) conclusion that she has the same passions and desires as him. Similarly, it is by studying the rebellion and investigating its context that many come to the conclusion that a search for dignity is at its root.

Once again, complements introduced by locative prepositions may be used to express FEs relative to the Perception experience frame, too. *In*-complements usually express the Ground and *dietro*-complements express the Direction of perception, as in **Ho visto un cane** [in giardino GROUND]/[dietro il cancello DIRECTION] (I saw a dog in the garden/behind the fence).

What causes the AWARENESS interpretation in (5) and (6)? On the one hand, the nouns in object position refer to abstract, non-perceivable entities. On the other, the locative complements must express an actual location if the literal interpretation

of the verb is to make any sense. Here, too, then, the combination between syntactic pattern and semantic features of the arguments motivates the semantic interpretation of the head verb.

The level of metaphoricity of these sentences is not always the same. Hanks maintains in (Hanks, 2007) that metaphoricity is gradable, depending on how different the two conceptual domains that are involved in the metaphor are. The fewer semantic features they share, the more metaphorical the expression. However, in these cases the “force” of the metaphor seems to derive from the complexity and definition of the spatial scene that is created in the sentence. If the only lexical element in the sentence referring to space is a preposition, the sentence reads as somewhat less metaphorical than cases where the context is more richly built up by other elements. See, for example, sentence (7).

(7) *C'è un'altra ipotesi che si intravede nel nebbione.*  
There is another hypothesis that we can glimpse among the fog.

In this sentence, *nel nebbione* (among the fog) absolutely cannot be interpreted as Evidence; it is, effectively, the Ground of perception. The visual “scene” is given more substance here, but the mental activity interpretation is maintained because *ipotesi* (hypothesis) is an entity that cannot be seen, but must be grasped conceptually.

## 2.4 EXPECTATION

The second frame that I selected is EXPECTATION. This refers to a situation where «a Cognizer believes that some Phenomenon will take place in the future». It is typically evoked by verbs such as *expect*, *foresee* and *predict*; I assigned it to *vedere*, *intravedere*, and *scorgere* in cases where they assume a “foreseeing” interpretation.

The EXPECTATION sense is not associated with any particular syntactic constructions. It may occur with a direct object or with a *che*-clause, but these are very widespread syntactic patterns. Furthermore, in some cases the sentences featuring the EXPECTATION sense are identical to AWARENESS sentences both for syntactic patterns and noun semantic types, except for one element which expresses a reference to the future. This can be a noun whose meaning has to do with the future, such as *futuro* (future), *prospettive* (possibilities), *rischio* (risk), *obiettivo* (goal). In sen-

tences (8)-(10), it is the direct object of the verb, but it can be any other element of the sentence. In (10), for instance, the EXPECTATION sense emerges because *previsioni economiche* (financial estimates) are mentioned. It is most plausible that an economist writing a financial estimate will not write merely about being aware of the economic recovery; rather, he or she will try to predict if it will happen. Finally, a reference to the future may also be made through the choice of verb tenses, as in sentence (11).

- (8) [*Che futuro*<sub>PHENOMENON</sub>] *lei vede per la Nato?*  
What kind of future do you foresee for Nato?
- (9) [*Che prospettive nuove*<sub>PHENOMENON</sub>] *intravede alla guida di uno stabile?*  
What new possibilities do you see, now that you are in charge of a theatre?
- (10) *Nelle previsioni economiche dell'anno scorso [la ripresa economica*<sub>PHENOMENON</sub>] *si intravedeva fra mille segnali contraddittori.*  
In last year's financial estimates, the economic recovery could only be glimpsed amongst a myriad of contradictory signals.
- (11) *Si può vedere con una certa sicurezza [quale sarà l'evoluzione futura del commercio estero americano*<sub>PHENOMENON</sub>].  
We can foresee with some certainty what the future evolution of American foreign trade will be.

These data show a different pattern from the one we have seen until now. In the case of the EXPECTATION sense, the syntactic form and semantic type of verb arguments alone cannot be used to predict verb meaning. What we must do here in order to understand the interaction of the verb with its context is to study its collocates in a more general sense, and how they affect its meaning. We may therefore conclude that sometimes, the fine semantics of lexical collocates is crucial for interpreting a verb's meaning.

There are also metaphorical collocations for the EXPECTATION sense, such as *vedere nel futuro* (to see in the future) and *vedere all'orizzonte* (to see on the horizon). As with AWARENESS above, these sentences construct a spatial "scene" which recalls the perceptual interpretation of the verb, thus causing a metaphorical interpretation.

- (12) *Dottor Falcone, cosa è possibile intravedere nel futuro della mafia?*

Doctor Falcone, what can we foresee for the mafia's future?

- (13) *Non scorgiamo all'orizzonte alcun referendum.*

We do not foresee any referendum (in the near future).

## 2.5 CATEGORIZATION

Finally, the third frame I selected is CATEGORIZATION. In this frame, «a Cognizer construes an Item as belonging to a certain Category». It is typically evoked by verbs like *classify*, *consider*, and *regard* (as in, "I regard him as a brother"). This sense occurs only in connection with two specific syntactic patterns, in contrast to the other two frames which show such a wide variety of realizations. Collin Baker calls this sense a "semi-collocation": «semi-collocations are separate senses that tend to co-occur with a small number of lexical forms or syntactic patterns, but are not as fixed as real collocations; the range of words they require as part of their context is usually best described intensionally than extensionally» (Baker, 1999, 45). The patterns are exemplified in sentences (14) and (15).

- (14) *Un famoso critico scrisse una volta che [mi ITEM] vedeva [come un lanciatore di giavellotto che si volta indietro per fare arrivare il più lontano possibile la sua asta CATEGORY].*

A famous critic once wrote that he saw me as a javelin thrower, who turns backwards in order to throw his pole as far as possible.

- (15) *Nessuno, onestamente, può intravedere [nei vari segretari di partito messicani ITEM] [un Pancho Villa CATEGORY].*

No one, honestly, can see in the various Mexican party secretaries a new Pancho Villa.

In one case, the categorized Item is expressed as the direct object of the verb and the Category is expressed as a complement introduced by *come* (as); in the second case, the Item is expressed by a complement introduced by *in* and the Category is expressed by a direct object. The first pattern is unambiguous; the second can be confused with the metaphorical pattern for AWARENESS exemplified

in 5 above. The differences in semantic types are not particularly helpful here: the main criterion is that the direct object must be a category that the *in*-complement can fit into. In the case of CATEGORIZATION, this syntactic pattern is not metaphorical. The reason is probably that it is very highly conventionalized, so that even the idea of a spatial scene has been bleached out completely.

### 3 Conclusions

In this paper, I used data from a frame semantic analysis of the verbs *vedere*, *intravedere*, and *scorgere* to answer the question: what are the distributional features of these verbs that cause them to have a mental activity reading? The underlying goal was to represent semantic interpretation from a dynamic point of view, through the study of these verbs' interaction with linguistic context.

I found that the interaction of these verbs' meaning with their linguistic context is multifaceted and complex, involving three different factors: the syntactic patterns that the verbs occurred with, the semantic type of their arguments, and the semantic features of recurrent lexical collocates. In some cases, a typical syntactic pattern is enough to force a certain meaning, such as *Lo vedo come un amico* (I see him as a friend) in relation to the CATEGORIZATION sense. Often, however, a combination between syntactic pattern and semantic type is required for a specific sense to be triggered: see the difference between *Ho visto un cane in giardino* (I saw a dog in the garden) and *Vedo in te un grande coraggio* (I see great courage in you). As the discussion on the EXPECTATION sense shows, though, sometimes a certain meaning emerges through the interpretation of more subtle cues, related to the fine semantics of the verb's lexical collocates. These data are in keeping with Pustejovsky and Hanks' approaches to semantic interpretation, the Generative Lexicon and Corpus Pattern Analysis.

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