The Noun Phrase and the Generative Lexicon

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A New Approach of the Semantic Interpretation

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INTRODUCTION

The purpose of this paper is to analyse **the noun phrase from a new perspective, that of the generative lexicon**. The theory of the generative lexicon is essentially a theory of the semantic structure of lexical units and, at the same time, a theory of the possibilities of combining these units.

The element of novelty that the theory of the generative lexicon brings is that it proposes a richer and better structured representation of the lexical meaning than other theories (in particular, the transformational semantics with which it resembles in many respects).

At the same time, the theory of the generative lexicon proposes rules of semantic combination that explain combinations that other rules (for example, the rules of selective restriction from transformational semantics) cannot explain as precisely as the generative lexicon.

The reason we have chosen this topic is that the theory we want to use, the generative lexicon, seems to open up new analytical perspectives in the analysis of the noun phrase. The usefulness of this field of investigation is noted by the fact that it does not apply to a single language, but it can be applied to all existing languages.

There are two perspectives to approach this subject: a descriptive and an analytical one. The descriptive perspective has a theoretical character and aims at defining and delineating the sphere of investigation of the approached subject. It concerns the first part of the paper, the introductory one. The analytical perspective has an applicative character and presents the actual results obtained following the investigation carried out. It concerns the second part of the paper.

The paper is structured in two parts comprising the eight chapters of the paper. The first part, entitled *The generative lexicon and the noun phrase*, is descriptive and includes the first three chapters.

Chapter 1, *Lexical semantics before the generative lexicon*, has the role of highlighting the theories that led to the appearance of the generative lexicon: transformational semantics, semantic roles and the theory of lexical aspect.

Chapter 2, *The structure of the generative lexicon*, presents the building blocks of a theory of the lexicon based on James Pustejovsky's work known as *The generative lexicon*. This new model of lexical

description stands out for a richer representation of the meaning of the word than the usual ones.

Chapter 3, *The generative lexicon and the structure of the noun phrase*, proposes a version of the structure of the noun phrase similar to that assumed by modern current grammars[1]: next to the head-noun there are subjects, complements, specifiers and adjuncts. Although being similar to that in the GB, this model of noun phrase organization is close to the HPSG[2] analysis of the noun phrase.

The second part, entitled *The semantic interpretation of the noun phrase* is analytical and includes the last five chapters. This section aims to illustrate the following:

(1) The subject, the complements and adjuncts in the noun phrase are significantly sub-determined in their syntactic realization by the semantics of the nominal head and by the semantics of the dependent.

(2) This relation between the semantics of the components of the noun phrase and their syntax is *naturally* clarified by the semantic perspective proposed by the generative lexicon. In this context, "*naturally*" implies that, given a nominal lexical head, its possible projections (subject, complements or adjuncts) can be anticipated without specific provisions from the semantic representation associated with that lexical head in the generative lexicon.

This framework will serve as the foundation for the analysis in each chapter. By applying a semantic analysis to the nominal head from the perspective of the generative lexicon (GL), we will explain how each meaning of the attribute can be derived from the GL semantic representation assigned to the nominal head. This process implies predicting the projection of the noun phrase, once we have the GL semantics of the nominal lexical head.

Chapter 4, *The semantic interpretation of the noun phrase with prepositional phrase as adjunct*, presents the meanings of the prepositional noun attribute;

Chapter 5, *The semantic interpretation of the noun phrase with non-finite verbal adjuncts*, presents the meanings of the verbal attribute;

Chapter 6, *The semantic interpretation of the noun phrase with genitival adjuncts*, presents the meanings of the genitival noun attribute;

Chapter 7*, The semantic interpretation of medical noun phrases*, introduces a new challenge of examining specialized languages through the

[1] For example, Government and Binding.
[2] See Pollard and Sag (1994, 363).

perspective of the generative lexicon. This chapter will focus on studying the prevalent nominal structures in medical terminology.

Chapter 8, *The semantic interpretation of nominal metaphors*, poses another challenge, involving the analysis of metaphors that can be expounded by using the generative lexicon approach.

The paper concludes with a final chapter summarizing the findings of this study and proposing potential new research directions.

SYMBOLS AND ABBREVIATIONS

* = incorrect
$\wedge$ = and
$\vee$ = or
A = adjective
animate_ind = animate individual
ARG = argument
ARGSTR = argument structure
CONST = constitutive (role)
D = determiner
D-ARG = default argument
DP = determiner phrase
e = event
e.g. = for example
Engl. = English
etc. = etcetera
EVENSTR = event structure
HEAD = the focus of an event
HPSG = Head-driven Phrase Structure Grammar
GB = Government and Binding
GL = generative lexicon
i.e = id est, that is
instr. = instrument
IP = inflectional phrase
lcp = lexical conceptual paradigm
N = noun
NP = noun phrase
obj. = object
P = preposition
physobj = physical object
Poss = possessor
PP = prepositional phrase
proc = process
RESTR = restriction, constraint
S = sentence
S-ARG = shadow argument

SC = subordinate clause
SCF = Subcategorization framework
SEL = sense enumeration lexicon
Spec. = specifier
SPR = specifier
SUBJ = subject
T-ARG = true argument
V = verb
VP = verb phrase
vs. = versus
X^0 = lexical head
X' = the first projection of a lexical head
XP = maximal projection

PART I:

THE GENERATIVE LEXICON AND THE NOUN PHRASE

CHAPTER 1

LEXICAL SEMANTICS BEFORE THE GENERATIVE LEXICON

This chapter presents the sources of the generative lexicon, that is, the methods that were used in the semantic analysis of the word before the theory proposed by James Pustejovky. Before the generative lexicon, linguists have tried to use different methods in the semantic investigation of words in order to present the best semantic representation of words. These were the method of semantic markers, the method of aspectual structure and the method of semantic roles. The first method was used in transformational semantics (Katz and Fodor, 1963), the second one was used in the theory of lexical aspect (Vendler, 1967), the third one was used in the extended version of the extended generative theory of Chomsky (mainly Fillmore, 1968).

1.1. Transformational semantics

The first method, transformational semantics, describes the lexical meaning as a complex conceptual structure made up of three components: semantic markers, distinctive markers and selective restrictions.

1.1.1. Semantic markers

As far as the semantic markers are concerned, they represent the basic items that are used to describe the meaning of words. These are used to describe the meanings of several words and they are equivalent to semes of structural semantics. For example, for the words *sheep* and *goat*, the corresponding semantic markers are shown in (1):

(1) *sheep: animate, mammal, domestic, ruminant, adult, female.*
goat: animate, mammal, domestic, ruminant, adult, female.

1.1.2. Distinctive markers

Regarding the distinctive markers, they are used to describe the meaning of a single word and to highlight its semantic uniqueness. For example, the words *sheep* and *goat* have in common the semantic markers presented above (1). The difference between these two words is given by the distinctive marker *with wool* which appears in the description of *sheep* and by the distinctive marker *long-haired* which appears in the description of *goat*:

(2) *sheep: animate, mammal, domestic, ruminant, adult, female,* ***with wool***
goat: animate, mammal, domestic, ruminant, adult, female, ***long-haired***

1.1.3. Selective restrictions

As for selective restrictions, they offer information on the possibilities of semantic combination between two words. Thus, selective restrictions specify semantic subclasses selected by the lexical item. For instance, a verb such as *to bleat* requires a subject noun phrase [+ animate] while a verb such as *to paint* requires a subject noun phrase [+ human] and an object noun phrase that belongs to the category [+ picture]: landscape, portrait, etc.:

(3) *a. Sheep bleat.*
** Doors bleat.*
b. John is painting a house/a sheep.
** The pencil/*the fish is painting a house.*

Within the selective restrictions, both semantic and syntactic markers are present and enclosed in angle brackets. The selective restrictions of the verbs *to bloat* and *to paint* are presented in (4):

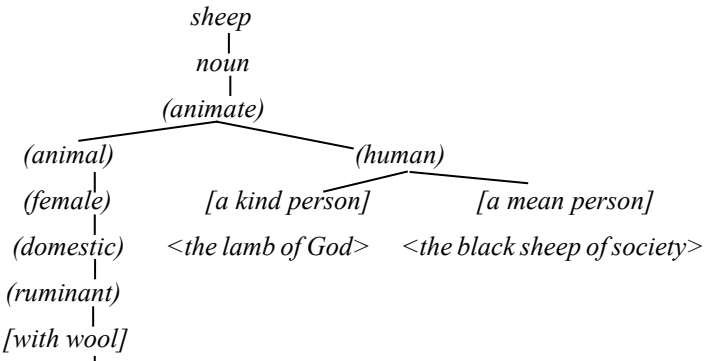
(4) *to bloat* < $N_{[+animate]}$, - >
to paint < $N_{[+human]}$, $N_{[+image]}$ >

Depending on these three components, the lexical unit will appear in the form of a complex symbol which presents several features. For example, the complex symbol *sheep* presents the following features:

(5) *sheep [+ N, + countable, + common, + animate, + animal, + domestic, + ruminant, + female, + wool].*

All these aspects regarding the description of the meaning of a word are illustrated below in the representation (of a tree) of the lexical meaning for the word *sheep* (6):

(6)



In the semantic representation, it is noted that both semantic markers and selective restrictions are mandatory, while distinctive markers may be missing. In the case of words with multiple meanings, such as the one in (6), the representation will have a number of ramifications directly proportional to the number of meanings.

In the description of the lexical meaning, in transformational semantics, the meaning components (especially the semantic markers) represent various aspects of the denoted word. They present aspects related to the structure of the denoted word, the way in which it appeared, its use and its belonging to a similar class of entities.

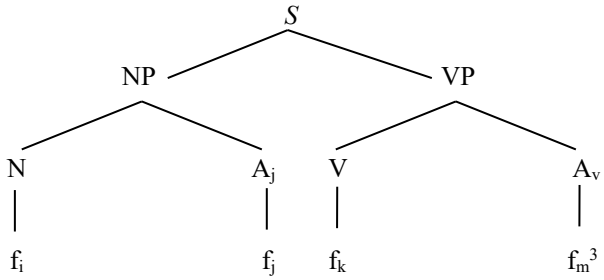
Therefore, in the case of the lexical items *sheep* and *house*, the information related to the structure of the denotation is: *head, legs, hooves, wool,* respectively *doors, walls, rooms, roof.* The information related to the way in which the two entities appeared is reproduced with the help of the semantic markers *which is born*, respectively *which is built*. In relation to their use, the specific semantic markers are *raised for meat, milk and wool*, respectively *built to be inhabited*. As for the last aspect of the denoted word, the specific semantic markers are *animate (domestic animal)* and *non-animate (artifact).*

Projection rules are required in order to represent the meaning of structures formed by combining two or more words. These rules are considered to be a link between semantics and syntax because they help in

understanding how words combine in order to form phrases or sentences. For example, the sentence in (7a), represented in the tree in (7b), may be interpreted as follows: the formative f_i combined semantically with f_j, and f_k combined semantically with f_m based on their selective restrictions.

(7) *a.* $f_i \wedge f_j \wedge f_k \wedge f_m$

b.



1.2. The theory of semantic (thematic) roles

Semantic roles represent another method used to characterize the meaning of words. Semantic roles describe the relation between the participants in an event and identify the arguments in terms of the semantic relation they have with the verb. A verb such as *to open* involves two participants who receive certain roles (Agent and Theme). Therefore, the verb *to open* requires two arguments (8):

(8) *John opened the window.*
(Agent) (Theme)
NP_1 NP_2

It was Fillmore (1968) who offered a simple lexical-semantic representation of a predicate conceived as a set of cases or semantic roles. According to him (Fillmore, 1968, 48), cases represent:

> "a set of universal, presumably innate concepts, which identify certain types of judgments that human beings are capable of making about the events that are going on around them, judgments about such matters as who did it, who it happened to, and who got changed".

The agent plays the most important semantic role (8) and it is the initiator or the one who performs the action. It is characterized by the

[3] The examples in (7) are presented in Ionescu (2011, 181).

features /+animate/, /+intention/, /+responsibility/. The theme (9a) is associated with verbs of motion or location. In the case of verbs of motion, the theme represents what moves (9a1), and in the case of verbs of location, the theme is the entity whose location is described (9a2). The patient (9b) is the entity that undergoes a change. The experiencer (9c) is the entity that experiences a psychological state or event. The beneficiary (9d) is the entity that benefits from an action. The instrument (9e) is the object that initiated the action. The location (9f) presents the place of action. The purpose (9g) is the entity to which something leaves, the source (9h) is the entity from which something leaves and the path (9i) is the trajectory of an object.

(9) *a.1.* ***The book*** *fell.*
2. ***The book*** *is on the desk.*
b. John broke ***the window****.*
c. ***John*** *is happy.*
d. I cooked ***for you****.*
e. John cut the tree ***with an axe****.*
f. John put the book ***on the desk****.*
g. John went ***to school****.*
h. John comes ***from England****.*
i. John ran ***through the tunnel****.*

As shown in (9), this selection is relevant for the classification of verbs. Thus, for a verb such as *to break*, we will have the following lexical description:

(10) ***to break <(Agent), Patient, (Instrument)>***
John broke the balloon with a pin. <Agent, Patient, Instrument>
The pin broke the balloon. <Instrument, Patient>
The balloon broke. <Patient>

Semantic roles are closely related to the subcategorization rules:

(11) *John broke the balloon with a pin.* *<Agent, Patient, Instrument>*
[NP PP]

1.3. The theory of lexical aspect

While Fillmore focuses on the description of participants involved in an event, Vendler (1967) and Dowty (1979) focus on the description of events. They present events in terms of aspect, that is, the way in which the

speaker perceives the event: as complete or incomplete, as started or finished, as repetitive or unique. Given the aspectual value of events, the following classes of verbs result: states (12a), activities (12b), achievements (12c) and accomplishments (12d).

(12) *a. to know, to believe, to love*
b. to run, to walk, to swim
c. to find, to recognize, to lose
d. to paint a picture, to make a chair, to draw a circle[4]

The example in (13) shows that each class presents unique features: *+/- dynamic*, *+/- durative*, *+/- telic*.

(13)

States	***Activities***	***Achievements***	***Accomplishments***
[-dynamic]	*[+dynamic]*	*[+dynamic]*	*[+dynamic]*
[+durative]	*[+durative]*	*[-durative]*	*[+durative]*
[-telic]	*[-telic]*	*[+telic]*	*[+telic]*

In addition to these features, the four classes of verbs also present some differences. According to Dowty (1979), states cannot occur in the imperative mood, they cannot be used with the adverbs *deliberately* and *carefully* and they cannot be the complements of the verbs *to force* and *to persuade*:

(14) **Know the answer!*
**John deliberately knew the answer.*
** John forced Marry to know the answer.*[5]

Moreover, activities cannot appear with time adverbials that start with the preposition *in*:

(15) **John walked in an hour. vs. John walked (for) an hour*[6].

Dowty (1979, 58-59) also states that achievements cannot combine with durative time adverbials or with adverbs such as *deliberately, carefully, alert, obedient* and cannot be the complements of the verb *to finish*:

[4] (Dowty, 1979, 54)
[5] (Dowty, 1979, 55)
[6] (Dowty, 1979, 56)

(16) **John found the mistake an hour.*
** John deliberately found the mistake.*
** John finished finding the mistake.*

As far as the accomplishments are concerned, they become ambiguous when they appear next to the adverb *almost*. In (17), we have two interpretations: 1) John had the intention to paint a picture, but he changed his mind and did something else and 2) John began to paint and he almost finished.

(17) *John almost painted a picture*[7].

The category of aspect plays an important role in the description of both the verbs and the nouns that derive from them. The importance of aspect consists of highlighting the link between verbs and deverbal nouns. For example, state verbs such as *to love* have as their corresponding state the noun *love*, activity verbs such as *to dance* have as their corresponding activity the noun *dance*, achievement verbs *to lose* have as their correspondent the noun *loss* and accomplishment verbs such as *to build* have their correspondent the noun *building*.

1.4. Conclusion on lexical semantics before the appearance of the generative lexicon

The presentation of the three theories in this chapter is not accidental: each of the three theories is valued in the project of generative lexicon, but in different forms and with different values.

The importance of the project proposed by Pustejovsky does not reside only in the synthesis that the generative lexicon achieves. The purpose of the generative lexicon is different from that of the theories on lexical-semantic structure. The generative lexicon intends to solve issues that the above-mentioned theories could not have solved because there was not even the awareness that such issues even existed.

[7] This example is found in Dowty (1979, 58).

PART II:

THE SEMANTIC INTERPRETATIONS OF THE NOUN PHRASE

CHAPTER 2

THE STRUCTURE OF THE GENERATIVE LEXICON

This chapter synthesizes the theory of the generative lexicon proposed by Pustejovsky in 1995 in order to acquaint the reader with the theory from which we will start in the analysis of the nominal structures in the following chapters.

The theory of the generative lexicon was proposed by James Pustejovsky in his book entitled *The generative lexicon*[8]. It has emerged as a critique of the way in which the lexicon, as part of a general linguistic theory, was commonly understood. For Pustejovsky, the current understanding of the lexicon is:

> "a static set of word senses, tagged with features for syntactic, morphological, and semantic information" and thus, "different word senses have been generally associated with distinct lexical items"[9].

Pustejovsky points out two issues that have not been taken into account in the description of the lexicon and which are crucial for him: *the creative use of words in new contexts* and *the evaluation of lexical - semantic patterns based on compositionality*[10]. Both of them define what Pustejovsky considers to be the generative aspect of the lexicon.

The generative lexicon is defined as:

> "a core set of word senses, typically with greater internal structure than is assumed in previous theories, is used to generate a larger set of word senses when individual lexical items are combined with others in phrases and clauses"[11].

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[8] See Pustejovsky (1995).
[9] See Pustejovsky (1995,1).
[10] See Pustejovsky (1995,1).
[11] See Pustejovsky (1995, 2).

The operations that generate these extended senses are called generative mechanisms and include operations such as type coercion, selective binding and co-composition.

Pustejovsky proved that the current theories do not adequately address the richness of natural language semantics, by discussing the current methods of analysing the types of ambiguity. From his point of view, all these methods have in common the "sense enumeration technique".

2.1. The ambiguity and its types

When expressing an idea, one cannot choose a word randomly, but one must take into account its lexical meaning as well as certain restrictions. In order to prove that, we will take two verbs that are synonyms, but which cannot be used in the same context: *to have* and *to contain.* Although it is known that these verbs are quasi-synonyms, they cannot be both used in the context (18) below, where only the verb *to have* is appropriate:

(18) *That person has/*contains an interesting idea about Freud.*

In contrast, in context (19), only the verb *to contain* is appropriate:

(19) *That book *has/contains an interesting idea about Freud.*

In the case of the adjective *red*, the contrast between a word and a context is even more visible as the examples below demonstrate: it presents a characteristic typical of physical objects (20a) and not of abstract ones such as rumours (20b) or numbers (20c). Thus, a statement such as *Number two is red* is meaningless, unless the context allows for this interpretation.

(20) *a. That book is red.*
b. # That rumour is red.
c. # Number two is red[12].

These examples emphasize a more general idea: the adequacy of a word to a particular linguistic context is determined to a large extent by the semantic *type* of the word in question (Asher, 2007). Types are general concepts such as physical or abstract objects, countable or uncountable nouns, verbs that express states, activities or achievements. These concepts

[12] The examples (19)-(20) are given by Asher (2007, 10).

are of great importance because they allow us to assess whether the sentences are formed correctly from a semantic perspective.

There may be cases in which it is difficult to correctly identify the meaning of a structure and this is due to what we call ambiguity. It characterizes not only simple words, but also phrases. For example, in (21a), the meaning of the adjective *big* can refer to height or age. In example (21b), *Parkinson's* may refer to the person who discovered the disease (the agent) or to the person who suffered from the disease (the experiencer).

(21) *a. big boy*
b. Parkinson's disease

According to Weinreich (1964)[13], there are two types of ambiguity: contrastive ambiguity and complementary polysemy. For the first type of ambiguity, which is in fact homonymy (22), Pustejovsky considers that the context is the most important for the disambiguation of homonyms.

(22) *a. The bank raised its interest rates yesterday.*
b. The store is next to the newly constructed bank.

Thus, in (22a) the word *rates* helps us associate the word *bank* with the meaning of "financial institution licenced to receive deposits and make loans", as it is known that in this type of institution such operations are performed. In (22b), the word *constructed* helps to convey the right meaning of the word *bank,* thus emphasizing the meaning of *building*.

In cases of contrastive ambiguity, disambiguation is performed not only by the context and the pragmatic information, but also by the predication relation in the sentence.

(23) *a. My favourite club is the five-iron.*
b. My favourite club is The One.

Hirst (1988) states that the appropriate sense for the noun *club* is determined by relying on sortal knowledge of the noun phrase that appears in the inverted subject position.

The second type of ambiguity pertains to lexical meanings which represent the basic meaning of the word that appears in different contexts. This ambiguity resembles the current notion of polysemy and it is called complementary polysemy:

[13] *Apud* Pustejovsky (1995, 27-28).

(24) *a. John painted the window.*
b. John jumped through the window.
c. This shop opened yesterday.
d. John is an open-minded person.

In (24), the polysemy presents two types: one in which the category is preserved (24a,b) and another in which the category is changed (24c,d).

As far as the first type of polysemy is concerned, Pustejovsky states that the ambiguity of nouns such as *window, door, room, gate, etc*. presents two meanings: *the opening* and *the physical object* used to frame this opening (Pustejovsky, 1995, 31). He mentions that this alternation of meaning is one of many nominal alternations that can be described as logical polysemy, where the noun seems to have systematically related meanings: countable/uncountable alternations (25), container/content (26), product/producer (27), process/result (28), place/people (29):

(25) *a. The rabbit is running on the field.*
b. John ate rabbit for dinner.
(26) *a. John broke the bottle.*
b. He drank the bottle.
(27) *a. The magazine fired its editor.*
b. John spilled coffee on the magazine.
(28) *a. The company's merger with Opel will begin next fall.*
b. The merger will produce machines.
(29) *a. John travelled to Bucharest.*
b. Bucharest appreciates the mayor.

According to Pustejovsky, in a logical polysemy, the correct sense is given by context. He also mentions that what distinguishes the senses in a logical polysemy from the contrastive cases is the way in which senses are related. Therefore, while contrastive senses are contradictory in nature (one sense is available only if the other sense is not available), in logical polysemy, both meanings are suitable for interpreting the noun, but one sense seems more adequate for a particular context.

Complementary polysemy is not exclusive to nouns, it also applies to adjectives. For instance, adjectives such as *good* have multiple meanings, depending on what they are modifying:

(30) *a. a good car*
b. a good meal
c. a good knife

As far as the verbs are concerned, the logical polysemy is reflected in the way in which verbs select multiple types of complements:

(31) *a. Mary began to read the novel.*
b. Mary began reading the novel.
c. Mary began the novel.

Pustejovsky asserts that verbs such as *to begin* are polysemantic because they must select a multiple number of syntactic and semantic contexts such as NP (Noun Phrase) or VP (Verb Phrase). The sense of the verb remains the same. However, it may vary slightly depending on the complement it selects. Another instance of verbal polysemy is illustrated by verbal alternations such as inchoative/causative alternations:

(32) *a. The bottle broke.*
b. John broke the bottle[14].

In (32), the sentences differ from the cases with contrastive ambiguity because the senses in the two sentences are similar, the sense in (32a) implies the sense in (32b).

2.2. The current treatment of ambiguity and its problems

Sense Enumeration Lexicon (SEL) is a very used method of semantic description of the lexicon. Pustejovsky (1995, 38) describes it as follows:

> *A lexicon* L *is a Sense Enumeration Lexicon if and only if for every word* w *in* L*, having multiple senses* $s_1,\ldots\ldots,s_n$ *associated with that word, then:*
> *i) if* $s_1,\ldots,s_n$ *are contrastive senses, the lexical entries expressing these senses are stored as* $w_{s1},\ldots, w_{sn}$.
> *ii) if* $s_1,\ldots,s_n$ *are complementary senses, the lexical entry expressing these senses is stored as* $w_{\{s1,\ldots, sn\}}$.
> *Every ambiguity is either represented by (i) or (ii) above.*

According to this method, all possible senses of a lexical item are enumerated in the lexicon as part of the lexical entry of that item. Therefore, each sense of the lexical entry of a word is specified.

According to Pustejovsky, this model is inadequate for the semantic description of a language due to several reasons. Firstly, it fails to

[14] The examples (30)-(32) are given by Pustejovsky (1995, 32-33).

acknowledge the essential property of words to be used creatively in context. Secondly, it overlooks a significant property of word senses, which Pustejovsky terms their permeability. Thirdly, it disregards the fact that the same sense of a word can be expressed through various syntactic constructions (Pustejovsky, 1995, 39). Following this, we will examine each critical argument advanced by Pustejovsky.

2.2.1. The creative use of words

Regarding the creative use of words, Pustejovsky comments on the case of the contextual meanings of adjectives, such as the adjective *good* in the examples below:

(33) *a. Mary finally bought a good umbrella.*
b. After two weeks on the road, John was looking for a good meal.
c. John is a good teacher.

In order to represent the different senses for an adjective such as *good*, the theory of *Sense Enumeration Lexicon* (which is the standard method of approaching polysemy) has to list the possible senses of the word: $good_1, good_2, ..., good_n$. Thus, the senses for the word *good* in (33) are:

(34) *good (1): to function well*
good (2): tasty;
good (3): to perform some act well [15].

However, listing all the senses for the word *good* is impossible because it is clear that they are more than the above-mentioned ones.

Given this case, which is not at all a particular and isolated case, Pustejovsky recommends a new alternative: to associate the use of *good* with a stable, but sufficiently flexible component of sense. This component of sense does not concern the semantic structure of the adjective, but that of the noun with which the adjective is combined. The semantic component in question is *the destination*. When expressing an appreciation in terms of value, *good* applies to various objects, but there is always taken into account the extent to which the object valued as *good* serves the destination for which it was intended to. For instance, *an umbrella* and *a beer* will both be *good*, but each will be good in terms of the specific destination it serves.

Similar principles apply to verbs as well:

[15] The examples (33) and (34) are given by Pustejovsky (1995, 43).

(35) *a. Mary wants another cigarette.*
b. Bill wants a beer.
c. Mary wants a job.

The only means through which the Sense Enumeration Lexicon (SEL) can encompass every use of the verb *to want* is by explicitly referring to the type of relation expressed by *want*.

(36) *want$_1$: to want to smoke;*
want$_2$: to want to drink;
want$_3$: to want to have[16].

Once again, the enumeration cannot exhaustively list all the senses that verbs acquire in new contexts.

2.2.2. The permeability of word senses

One of the challenges posed by the permeability of the senses is illustrated by the pair in examples (37a,b) below. The verb *to bake* has two senses expressed in each of the two contexts. It is not always straightforward to determine which sense of a word should be chosen in a given context.

(37) *a. John baked the potatoes. (change-of-state)*
b. Mary baked a cake. (creation)

The intriguing aspect of the polysemy of the verb *to bake* lies in the interconnectedness of its distinct senses: the sense related to the change of state includes that of creation, for one cannot envision a process of baking-creation without the process of baking-change of state. Pustejovsky highlights that for this type of polysemy, the Sense Enumeration Lexicon (SEL) theory is inadequate once again. Its inadequacy lies in its inability to establish connections between the distinct senses. The only mechanism available to the SEL theory to address this relation between senses is the mechanism of selective restrictions of the verb on its complement. Pustejovsky observes that this mechanism is not refined enough to elucidate the nature of the relations between meanings.

An issue similar to the previous one arises with the Sense Enumeration Lexicon regarding its lack of a conceptual mechanism to illustrate the logical relation between senses in cases of logical polysemy.

[16] The examples (35) and (36) are given by Pustejovsky (1995, 45-46).

This issue is exemplified by words like *window* and *door* where we encounter two senses: 1) *opening* and 2) *physical object*. SEL delineates between the two senses, listing them separately. However, in situations where *both senses* of the word are actualized, SEL struggles to represent or explain the actualization because the concept of the relation between the two senses is not expressed in SEL theories. Consequently, in (38), the word *window* encompasses both the sense of the physical object and the sense of the opening, contrary to instances where the word *window* refers solely to the physical object (24a) or only to the opening (24b).

(38) *John crawled through the broken window.*

Another illustration of the permeability of senses is evident in adjectives that exhibit complementary senses within well-defined contexts. This phenomenon is exemplified by psychological predicates that possess the ability to change their type: adjectives like *sad* and *happy* can refer to both individuals (39a) and (39b) as well as to nouns denoting events (39c):

(39) *a. The woman is* $\underline{sad_1}$.
b. a $\underline{sad_1}$ *woman*
c. a $\underline{sad_2}$ *day / event / occasion*[17]

A sad day is interpreted as referring to the one who assesses the events of that period as being sad.

2.2.3. The expression of multiple syntactic forms

The final argument against the Sense Enumeration Lexicon (SEL) method pertains to the sense of a word having multiple syntactic realizations. Pustejovsky illustrates this point by using the verb *to forget* and by demonstrating that the interpretation of the sentence hinges entirely on the syntactic realization of the complement of this verb:

(40) *a. Mary forgot that she locked the door (factive)*
b. Mary forgot to lock the door (non-factive)
c. She never forgets where she puts her keys. (embedded question)
d. What about friends who forget the password or never got it? (concealed question)

[17] This example is found in Pustejovsky (1995, 49).

e. He leaves, forgets his umbrella and comes back to get it. (ellipsed non-factive)

In (40a), the complement of the verb *to forget* is factual, indicating that the sentence with the role of complement is considered to be a fact. This implies that the action indeed occurred and the door was locked. Nevertheless, in (40b), the action did not occur (the door was not locked), rendering the complement of the verb non-factual. In (40c), the complement of the verb is a question, and in (40d) the complement of the verb can be transformed into a question through paraphrasing. For example, the phrase *forgets the password* can be rephrased as *forgets which is the password*. Similarly, the phrase *forgets the umbrella* in (40e) can be rephrased as follows: *forgets to take the umbrella*.

These interpretations are often perceived as different senses of the verb, leading to different lexical entries. However, the Sense Enumeration Lexicon (SEL) model alone cannot adequately capture the differences between these senses. Therefore, additional features, as depicted in (41)[18], are required:

(41)

a.
$$\begin{bmatrix} to & forget_1 \\ CAT & = & verb \\ SEM & = & R_2(\theta_1, \theta_2[-FACTIVE] \\ ARGSTR & = & \begin{bmatrix} ARG1 & = & NP \\ ARG2 & = & VP(+inf) \end{bmatrix} \end{bmatrix}$$

b.
$$\begin{bmatrix} to & forget_2 \\ CAT & = & verb \\ SEM & = & R_2(\theta_1, \theta_2[+FACTIVE] \\ ARGSTR & = & \begin{bmatrix} ARG1 & = & NP \\ ARG2 & = & S(+tns) \end{bmatrix} \end{bmatrix}$$

c.
$$\begin{bmatrix} to & forget_3 \\ CAT & = & verb \\ SEM & = & R_3(\theta_1, \theta_2) \\ ARGSTR & = & \begin{bmatrix} ARG1 & = & NP \\ ARG2 & = & NP \end{bmatrix} \end{bmatrix}$$

While analysing the examples from (40) and (41), it becomes evident that the Sense Enumeration Lexicon (SEL) method fails to provide a comprehensive description of the verb *to forget* because it overlooks various aspects. These aspects include the connection between (40a) and

[18] See Pustejovsky (1995, 51).