

What psych verbs and other verbs disclose about the role of Semantic Prominence and Thematic Hierarchy in affixal selection

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ABSTRACT.

This paper analyses the construction of deverbal adjectives in European Portuguese, focusing on the interface between morphology and semantics, specifically on the role of Thematic Hierarchy and Semantic Prominence on affixal selection.

Supported by paradigmatic morphology, the paper shows that suffixes that work in macro-paradigms of deverbal adjectives establish a relationship with specific semantic features of the lexical-semantic structure of the base verb in order to construct the derivative. The analysis concludes that suffixes are sensitive to thematic hierarchy, which is based on the semantic prominence of features of the verbs' theta-roles at work in the paradigm. Data from psych verbs is highly relevant to this finding.

The paper is dedicated to Professor Ana Maria Brito, who has always been keenly aware that scientific knowledge is not confined to a specific theory.

KEYWORDS.

Deverbal adjectives; affixal selection; word formation; Semantic Prominence; Thematic Hierarchy.

1. Introduction

I was very fortunate to have had Professor Ana Maria Brito on several examination boards of the academic degrees I have earned. In all these situations, I admired her capacity to deeply understand and accept theoretical approaches which were hugely different from her own. This paper is my way of thanking her, focusing on a linguistic object of her interest albeit employing an approach that does not coincide with hers. This may seem

like a contradiction. However, Professor Ana Maria Brito has always been keenly aware that scientific knowledge is not confined to a specific theory and she seems to enjoy it.

This paper intends to contribute to better understanding the sensitivity of affixes in terms of semantic prominence, which supports the thematic hierarchy of the bases in word-formation paradigms. The study analyses the behaviour of suffixes in the formation of Portuguese deverbal adjectives with the suffixes *-vel*, *-os(o)* and *-nt(e)*, regarding their relationship with semantic features contained in the lexical-semantic structure of the verbal bases. We found that the semantic features which play a role in forming adjectives coincide with those of the thematic hierarchy (e.g., Levin & Rappaport Hovav 2005; Levin & Grafmiller 2013). The analysis of adjectives correlated with psych verbs is relevant to these conclusions.

Our theoretical basis is a paradigmatic approach to word formation (Bonami & Strnadová 2019) and the semantic approach to affixal selection formulated in Lieber (2004; 2006) and Rodrigues (2008; 2014). The analysis of derivatives that correlate with verbal bases requires an approach to thematic hierarchy and semantic prominence (Fillmore 1968; 1971; 1977; Belletti & Rizzi 1988; Bresnan & Kanerva 1989; Dik 1978; Givón 1984; Jackendoff 1990; Van Valin 1990), as well as to argument structure that is strongly rooted in Lexical-Functional Grammar (Levin & Rappaport Hovav 2005; Levin & Grafmiller 2013; Bresnan 2001; Börjars et al. 2019; Dalrymple et al. 2019).

The most common use of thematic hierarchy and semantic prominence is, perhaps, argument realisation (e.g., Levin & Rappaport Hovav 2005). In this paper, we use thematic hierarchy and semantic prominence to explain word-formation micro-paradigms. Micro-paradigms constitute small-scale paradigms within categorial macro-paradigms. Rodrigues & Rodrigues (2018) define macro-paradigms according to the “relationship between the syntactic and the semantic categories [...] of the involved members of the pairs of the paradigm”. The same authors propose that micro-paradigms are the result of specialisations (Lindsay & Aronoff 2013, Aronoff & Lindsay 2014, 2015, Aronoff 2016, Rodrigues 2019) and selectional restrictions that permeate the relationships between the pairs of the categorial macro-paradigm. This study analyses the micro-paradigms in European Portuguese

that correspond to deverbal adjectives constituted by the suffixes *-vel*, *-nt(e)* and *-os(o)*, which occur within the categorial macro-paradigm of deverbal adjectives.

The paper is organised as follows: After the Introduction (section 1), section 2 focuses on the main theoretical considerations. Section 3 analyses the behaviour of the suffixes in terms of semantic prominence and thematic hierarchy. Section 4 is dedicated to the conclusions.

The notation is as follows: when needed, each predication is structured into lexical-semantic structure, argument structure, and syntactic structure. These structures are inside square brackets. Arguments are notated with *x* and *y*, while internal arguments are placed inside chevrons and external arguments are underlined.

2. Theoretical considerations

The relationship between individual (agent, locative, instrument, etc.) deverbal nouns and adjectives and their verbal bases has been described through different approaches, from syntactic and semantic ones to argument structures (cf. Rodrigues (2008: 105-133) and Lieber (2006) for a discussion). Argument structure-driven approaches postulate a relationship between the derivative and one of the arguments predicted in the argument structure of the base verb in the level of argument structure *in se* (e.g., Rappaport Hovav & Levin 1992; Booij 1986; Rappaport Hovav et al. 1993). A finer-grained observation of the relationships built between the affix and the base leads to the conclusion that affixal selection is based on semantic features that have a structural relationship with thematic hierarchy and semantic prominence that goes beyond the level of argument structure (Rodrigues 2008; Lieber 2004; 2006). This approach is strengthened in this study.

Phonological features also work in affixal selection, but they will not be addressed in this paper.

According to Lexical-Functional Grammar (Alsina 1996; Laczko 2000; Bresnan 2001; Laczko 2003; Mohanan & Mohanan 1998; Levin and Rappaport Hovav 1995, 2005; Levin & Grafmiller 2013; Börjars et al. 2019; Dalrymple et al. 2019), argument structure is the lexical representation

of an item that takes on arguments (especially verbs, but also adjectives, nouns and prepositions), which contains information about the number of arguments, their syntactic realisation and their semantic features.

We follow Levin & Rappaport Hovav (1995; 2005) in their formulation of argument structure. Specifically, we adopt their conception of unaccusative, unergative verbs and transitive causative verbs. Semantically, unergative verbs have an external argument that is filled by an internal cause. In transitive causative verbs, the external argument takes an external cause. Transitive causative verbs in the unaccusative construction delete the external cause. Unaccusative verbs that do not presume an alternation of a transitive verb have an internal cause.

Levin & Rappaport Hovav (1995: 91) consider that events have an internal cause if their occurrence depends on a semantic property that is inherent to one of the participants of the lexical-semantic structure of the verb. An internal cause may be agentive or non-agentive. If it is agentive, the cause has control over the event (e.g., the cause of the verb *to walk*). If it is non-agentive, the cause does not control the event (e.g., the cause of the verb *to shine*). Events have an external cause if they result from the action of an external cause that intervenes in the occurrence of the event.¹

Argument structure is an interface level between syntactic structure and semantic structure. Since the lexical-semantic structure of the predicate constrains the ordering and the kind of arguments in argument structure, lexical-functional grammar assumes there is a semantic component in the definition of external and internal arguments. According to Alsina (1996), those semantic constraints are proto-roles (Dowty 1991; Zaenen 1993), which correspond to clusters of more basic semantic features (e.g., [causative], [volitional], [human], [active], etc.). Thus, theta-roles are not primitives (Levin & Rappaport Hovav 2005; 2007). The proto-agent role is defined, among others, by the properties ‘causing an event or change of state in another participant’, ‘volitional involvement in the event or state’, and ‘sentience (and/or perception)’. The proto-patient role is defined, among others, by the

¹ According to Levin & Rappaport Hovav (1995: 98-99), “The distinction between internally and externally caused eventualities is a distinction in the way events are conceptualized and does not necessarily correspond to any real difference in the types of events found in the world. In general, the relation between the linguistic description of events and the events taking place in the real world is mediated by the human cognitive construal of events, which we take our lexical semantic representations to represent.”.

properties ‘incremental theme’, ‘undergoes change of state’ and ‘causally affected by another participant’ (Dowty 1991: 572; for a recent critique of Dowty 1991, see Levin 2019). According to Alsina (1996), proto-agent roles have a connection with the external argument; whilst proto-patient roles have a connection with the internal argument. We will not describe here the procedures of the linkage between those structures. See Ackerman & Moore (2013) and Her (2013) for some approaches on the integration of proto-property proposal and Lexical Mapping Theory.

The semantic features whose clusters constitute theta-roles are responsible for semantic prominence and thematic hierarchy (Fillmore 1968; 1971; 1977; Givón 1984; Jackendoff 1990; Van Valin 1990; Levin & Rappaport Hovav 2005; 2007; Levin & Grafmiller 2013). Thematic hierarchy is a ranking of theta-roles based on the semantic prominence relationship among them.² Thematic hierarchy depends on the relative ranking of the theta-roles of a verb (or of another item that takes arguments) and is not to be considered an absolute hierarchy. We agree with Fillmore (1977) in that the prominence of the roles is determined by finer-grained semantic features than the roles themselves. As explained by Mohanan (1994: 28), thematic hierarchy is a “cumulative result of interacting relative prominence relations among semantic entities”.

We will not analyse here the different proposals on the ranking of semantic features. However, we agree with the generalised idea that an [active] element is higher than an [nonactive] one; a [volitional] element is higher than a [non-volitional] one; and a [causative] element is higher than a [non-causative] one (Fillmore 1977; Dowty 1991). These features are important for the explanation of affixal selection described in the next section.

The analysis of different affixes that work in the macro-paradigm of deverbal adjectives aims to answer the following questions:

- a) Is it possible to consider each affix that works in the macro-paradigm as an operator that binds to a specific argument of the base?

If not,

- b) What kind of features of the base are the suffixes sensitive to?

² There are two main perspectives to consider thematic hierarchy: one views thematic hierarchy as derived from event structure prominence (Baker 1996; Jackendoff 1990); the other one conceives it as the effect of the prominence of prototypical semantic features that constitute each one of the semantic roles (Fillmore 1977; Dowty 1991). For a critical view on different proposals on thematic hierarchy, see Levin & Rappaport Hovav (2005: 154-185).

3. Sensitivity of affixes to the features of the base

We will now analyse the behaviour of the affixes *-vel*, *-os(o)* and *-nt(e)* in relation to their verbal bases. The description of the suffixes and of their word-formation behaviour is rooted in Rodrigues (2008; 2016) and Rio-Torto (2020). Rodrigues (2008) presents a corpus of deverbal nouns and adjectives that provides a large amount of data.

3.1 The suffix *-vel*

The suffix *-vel* works with transitive verbs (*beber* ‘to drink’ ↔ *bebível* ‘drinkable’, *aceitar* ‘to accept’ ↔ *aceitável* ‘acceptable’) and unaccusative ones (*variar* ‘to vary’ ↔ *variável* ‘variable’, *nascer* ‘to be born’ ↔ *nascível* ‘that can be born’).³ There are no unergative verbs as bases of these adjectives. A specific argument structure is required for *-vel* selection: verbs must have an internal argument. If an unergative verb (e.g., *galopar* ‘to gallop’) has a transitive alternation, it is possible to construct a *-vel* adjective that corresponds to the internal argument, as exemplified in (1). In (1c) the adjective *galopável* ‘that may be galloped’ correlates with the internal argument of the transitive construction (1b) of the verb, which has a basic unergative construction (1a). In example (1c), a verbal base (_V), which defines a predication (PRED) constituted by an external argument (_x) and an internal argument (<_y>), correlates (1) with an adjective (_A) constituted by the suffix *-vel* which coindexes (_i) with the internal argument of the verb.

- (1) a. [PRED _x]_V
 O *cavalo galopa.*
 The-MASC horse gallops
 ‘The horse gallops.’

³ Although the verb *variar* displays a transitive construction in modern Portuguese, the intransitive construction is the basic one. Bluteau (1712-1728) only shows the unaccusative construction. Vieira (1871-1874) had already presented the transitive construction.

b. [PRED \bar{x} ; $\langle y \rangle$]V

O João galopa o cavalo.

The-MASC João gallops the-MASC horse

‘João gallops the horse.’

c. [PRED \bar{x} ; $\langle y \rangle$]V ↔ [[PRED \bar{x} ; $\langle y^i \rangle$]V [-vel]ⁱ]_A

É o único cavalo de baloiço

capaz de se transformar num “galopável”.₄

Be-3SING.PRES the-MASC only-MASC horse of rock

able of itself transform in.a-MASC gallop.SUFFIXvel.ADJ

‘It is the only rocking horse able to be transformed into a horse that can be galloped.’

Hitherto, suffix *-vel* selection seems to be easily described as binding the internal argument of the base. However, the analysis of *-vel* derivatives correlated with psych verbs complexifies this explanation.

A comparison between psych verbs with different argument structures and different linkages with syntactic structures (*abominar* ‘to abominate’, *amedrontar* ‘to frighten’, and *agradar* ‘to please’) sheds light on the way affixal selection works. In (2), the active construction of the verb *abominar* ‘to abominate’ is described. The experiencer corresponds to the external argument, which is realised as subject, and the stimulus corresponds to the internal argument, which is realised as object.

(2) a. *Ela abomina o monstro.*

She abominates the-MASC monster

‘She abominates the monster.’

⁴ In: <https://www.kidits.pt/brinquedos/chicco/rodeio>.

b. active construction

$$\left[\begin{array}{cc} \text{Experiencer;} & \text{Stimulus} \\ \text{Pred } \underline{x}; & < y > \\ \text{Subject;} & \text{Object} \end{array} \right]$$

In (3), the passive construction of *abominar* ‘to abominate’ reveals that the stimulus, corresponding with the internal argument, is realised as subject.

- (3) a. *O monstro é abominado por ela.*
The-MASC monster is abominated by her
‘The monster is abominated by her.’

b. passive construction

$$\left[\begin{array}{cc} \text{Experiencer;} & \text{Stimulus} \\ \text{Pred } \underline{x}; & < y > \\ \text{OBLIQUE. POR 'by';} & \text{Subject} \end{array} \right]_V$$

In (4), in an adjectival predicative construction with the copulative verb *ser* ‘to be’ and the adjective with the suffix *-vel*, we can see there is no change in the syntactic realisation of the internal argument that appears in the passive construction, since it is realised as subject. The adjective with the suffix *-vel* shows some correspondence with the stimulus, which is mapped into the internal argument.

- (4) a. *O monstro é abominável.*
The-MASC monster is abominable
‘The monster is abominable.’

b. Adjectival predicative construction

$$\left[\begin{array}{cc} \text{Experiencer;} & \text{Stimulus} \\ \text{Pred } \underline{x}; & < y > \\ \text{Ø;} & \text{Subject} \end{array} \right]_V$$

Now we will observe psych verbs with a stimulus-subject. In (5), the active construction of the verb *amedrontar* 'to frighten' reveals that the stimulus, which maps into the external argument, is realised as subject, and the experiencer, which maps into the internal argument, is realised as object.

- (5) a. *O monstro amedrontou-a.*
 the-MASC monster frightened her-

PRON3SING.FEM.ACCUSATIVE

'The monster frightened her.'

- b. active construction

$$\left[\begin{array}{cc} \text{Stimulus;} & \text{Experiencer} \\ \text{Pred } \underline{x}; & < y > \\ \text{Subject;} & \text{Object} \end{array} \right]_v$$

The passive construction of the verb *amedrontar* 'to frighten' is represented in (6).

- (6) a. *Ela foi amedrontada pelo monstro.*
 She was frightened-FEM by.the-MASC monster

'She was frightened by the monster.'

- b. passive construction

$$\left[\begin{array}{cc} \text{Stimulus;} & \text{Experiencer} \\ \text{Pred } \underline{x}; & < y > \\ \text{OBLIQUE. POR 'by';} & \text{Subject} \end{array} \right]_v$$

The adjectival predicative construction with the adjective with the suffix *-vel* maintains the passive structure (7), in which the internal argument is realised as subject. The adjective with *-vel* has a degree of correspondence with the experiencer.

(7) a. *Ela é amedrontável.*

She is frighten.able

‘She is easy to frighten.’

b. adjectival predicative construction

	Stimulus;	Experiencer
Pred	\underline{x} ;	$< y >$
	\emptyset ;	Subject

Hitherto, data coming from psych verbs is in accordance with data coming from transitive, unaccusative and unergative verbs (example 1), in that the suffix *-vel* binds the internal argument of the verb. Data also show that the suffix is not sensitive to the theta-role, because with experiencer-subject (external argument) psych verbs, the suffix *-vel* corresponds with the stimulus, whilst with stimulus-subject (external argument) psych verbs, the suffix corresponds with the experiencer, as shown in examples (4) and (7).

Notwithstanding, psych verbs such as *agradar* ‘to please’ show different argument and syntactic structures, which leads to a reanalysis of the behaviour of the suffix *-vel*. Example (8) displays the behaviour of *agradar*. In the interface between lexical-semantic structure and syntactic structure, the stimulus in *agradar* is syntactically realised as subject, and the experiencer is marked with DATIVE as indirect object (8).

(8) a. *O livro agrada- lhe.*

The-MASC book pleases him/her.PRON3SING.DATIVE

‘The book pleases her/him.’

b.

	Stimulus;	Experiencer
Pred	$< x >$;	$y >$
	Subject;	Object. DATIVE

Alsina (1996: 175-177) considers that verbs such as *agradar* ‘to please’ are dyadic predicates with two internal arguments. In this case, the experiencer is assigned the feature $[+ \text{DATIVE}]$ (DAT), which is the marked case, because the experiencer is the highest of the two internal arguments. The logical subject is the experiencer. This is proved by the control it assumes in relation to

the “unexpressed subject of the adverbial clause.” (Alsina 1996: 177) (see example 9).

- (9) *O livro agrada-lhe sem saber porquê.*
 The-MASC book pleases him/her.PRON3SING.DATIVE without
 know[ing] why
 ‘The book pleases her/him without knowing why.’

This is in accordance with Alsina’s case assignment convention: “A direct function (one that has the feature [obl –]) must take the marked feature value [DAT +] if it is mapped onto an argument that is either thematically a goal or more prominent than another argument expressed as a nondative function and if it is not the expression of the external argument.” (Alsina 1996: 175).

Although it is not our aim to draw capital conclusions about the argument structure of the verb *agradar*, the analysis of the resultative passive construction (10) and adjectival predicative construction (11) may shed light on the argument that both arguments of the verb *agradar* are internal.

In a resultative passive construction with the verb *ficar* ‘to stay’ (10), the experiencer, corresponding to internal argument <y>, is realised as subject.

- (10) a. *Ele ficou agradado com o livro.*
 The-MASC became pleased with the-MASC book
 ‘He became pleased with the book.’
 b. resultative passive construction
- | |
|---|
| $\left[\begin{array}{cc} \text{Stimulus;} & \text{Experiencer} \\ \text{Pred} < x; & y > \\ \text{OBLIQUE.COM 'with';} & \text{Subject} \end{array} \right]_V$ |
|---|

What is interesting is that in a predicative construction with the adjective with the suffix *-vel*, the adjective *agradável* (example 11) does not align with the past participle of the resultative passive construction (example 10).

(11) a. *O livro é agradável.*

The-MASC book is pleasant

‘The book is pleasant.’

b. predicative construction with adjective with *-vel*

$$\left[\begin{array}{cc} \text{Stimulus;} & \text{Experiencer} \\ \text{Pred} & < x; & y > \\ & \text{Subject;} & \emptyset \end{array} \right]_V$$

This is different from *abominável* (example 4) and *amedrontável* (example 7), whose adjectival predicative constructions with the suffix *-vel* align with the past participle in a passive construction. One possible explanation would be that both arguments of *agradar* are internal arguments and, thus, internal argument $<x>$ is realised as subject in the predicative construction with the adjective with the suffix *-vel* (example 11), and the internal argument $<y>$ is realised as subject in the resultative passive construction with the past participle (example 10). Another argument would be that this verb does not admit a canonical passive construction (**Ele é agradado pelo livro*. ‘He is pleased by the book.’), which is not expected, since the verb is not a direct transitive verb.

Summing up, in relation to psych verbs such as *agradar*, *-vel* shows correspondence with the internal argument (assuming Alsina is right) that expresses the stimulus, which is syntactically realised as subject (12).

(12) *agradar*

↔ *agradável*

$$\left[\begin{array}{cc} \text{Stimulus;} & \text{Experiencer} \\ \text{Pred} & < x; & y > \\ & \text{Subject;} & \text{Object. DATIVE} \end{array} \right]_V \leftrightarrow [[\text{PRED} < \text{Stimulus}^i; \text{Experiencer} >]_V [-vel]^i]_A$$

In relation to psych verbs such as *abominar*, *-vel* shows correspondence with the internal argument (assuming Alsina is right) that expresses the stimulus, which is syntactically realised as object (13).

$$(13) \quad abominar \quad \leftrightarrow \quad abominável$$

$$\left[\begin{array}{ccc} \text{Experiencer;} & \text{Stimulus} \\ \text{Pred} \quad \underline{x}; & < y > \\ \text{Subject;} & \text{Object} \end{array} \right]_V \leftrightarrow [[\text{Pred} \quad \underline{\text{Experiencer}}; <\text{Stimulus}^i>]_V [-vel]^i]_A$$

In relation to psych verbs such as *amedrontar*, *-vel* shows correspondence with the internal argument that expresses the experiencer, which is syntactically realised as object (14).

$$(14) \quad amedrontar \quad \leftrightarrow \quad amedrontável$$

$$\left[\begin{array}{ccc} \text{Stimulus;} & \text{Experiencer} \\ \text{Pred} \quad \underline{x}; & < y > \\ \text{Subject;} & \text{Object} \end{array} \right]_V \leftrightarrow [[\text{Pred} \quad \underline{\text{Stimulus}}; <\text{Experiencer}^i>]_V [-vel]^i]_A$$

If the verb *agradar* has two internal arguments, as proposed by Alsina (1996), explaining the selection of the suffix *-vel* as binding the internal argument leads to the question: which one of the internal arguments? Thus, a finer-grained analysis is required.⁵ The same stands for a syntactic explanation that would try to stablish a linkage between *-vel* and a syntactic function of the base. Finally, trying to find an exclusive correspondence between *-vel* and theta-roles does not lead to a satisfactory explanation as well.

A homogeneous explanation requires we go further into thematic hierarchy and semantic prominence. For this purpose, we need to bear in mind that theta-roles may be defined as proto-roles (Dowty 1991; Zaenen 1993) corresponding to semantic clusters of finer-grained features.

Levin & Grafmiller (2013) state that experiencer-object psych verbs such as *frighten* (or *amedrontar*) are causative and that experiencer-subject psych verbs such as *fear* are non-causative.

According to Levin & Grafmiller (2013: 29), *frighten* verbs have a stimulus (subject) that “evokes an emotion in the experiencer by his or her

⁵ To assume that Alsina is wrong, and that *agradar* has an external and an internal argument makes it difficult to explain how an experiencer, when it is higher than a stimulus (reminding us of the control it assumes towards the unexpressed subject of the adverbial clause) and which would be an external argument, is not syntactically linked with the subject. To consider the subject as the external argument would also be in contradiction with the same argumentation and would lead *-vel* to select internal and external arguments, which would require the same kind of further analysis we are developing here.

actions”, which makes the stimulus [+] causative.

In the analysis of Levin & Grafmiller (2013), in experiencer-subject psych verbs such as *fear* (or *abominar*), the stimulus (object) does not possess a causative character. According to Levin & Grafmiller (2013: 31), in *fear* verbs, “the experiencer’s mental state should be conceptualized as a disposition directed toward something, rather than a direct reaction to an immediate stimulus.”

Levin and Rappaport Hovav (2005: 23) also state that *fear* verbs are inherently non-causative psych verbs, which has an impact on thematic hierarchy and syntactic realisation.

According to Croft (1993), there is cross-linguistic variation in the argument realisation of non-causative psych verbs since they do not fit with transitivity. In causative verbs, the agent role is syntactically realised as subject and the theme role as object. However, *fear* verbs have a property of agent proto-role associated with one participant and another agent proto-role property associated with the other participant; i.e., [sentience] is associated with the experiencer, and [causation] with the stimulus. That is why there is variation in the linkage to subject and object (Dowty 1991: 579-580; 586-587; Levin & Rappaport Hovav 2005: 56). Verbs with no causal directionality link the experiencer with either the subject or the object (Croft 1993). According to Levin & Rappaport Hovav (2005: 159-160),

In formulations of the hierarchy that include an experiencer (Belletti and Rizzi 1988; Bresnan and Kanerva 1989; Grimshaw 1990; Speas 1990), the agent-like roles such as agent, instigator, effector, or cause are ranked the highest and thus have priority over the experiencer for expression as subject. In contrast, with the *fear* verbs, the nonexperiencer argument cannot be analyzed as bearing an agent-like role, but is better analyzed as bearing the stimulus (or theme) role. If experiencer is ranked above stimulus in the hierarchy (Belletti and Rizzi 1988; Grimshaw 1990; Van Valin 1990), *fear* verbs will have an experiencer subject.

Levin & Rappaport Hovav (2005: 159-160)

Our analysis of *-vel* derivatives supports the hypothesis of Levin & Grafmiller (2013), as well as the proposal of Dowty (1991) and of Zaenen

(1993) regarding proto-roles.

Comparing *-vel* derivatives correlated with different verb classes, we conclude that there is a relationship between *-vel* and a specific feature of theta-roles. The suffix *-vel* always binds with the element that is the less active of the two involved in the lexical-semantic structure of the verb (15).

$$(15) \quad [\text{PRED [more active]}; [\text{less active}]]_V \leftrightarrow [[\text{PRED [more active]}; [\text{less active}]]^i]_V [-vel]^i]_A$$

In terms of thematic hierarchy, *-vel* assumes the least prominent theta-role, which, despite the differences between different proposals of different thematic hierarchies, ranks an active element higher than a non-active one and a causative element higher than a non-causative one (e.g., Fillmore 1977: 102). Thus, we come to the following paradigm of *-vel* adjectives, with the suffix *-vel* binding the lower theta-role of the thematic hierarchy (16):

$$(16) \quad [\text{PRED higher } \theta\text{-role}; \text{lower } \theta\text{-role}]_V \leftrightarrow [[\text{PRED higher } \theta\text{-role}; \text{lower } \theta\text{-role}]^i]_V [-vel]^i]_A$$

This shows that *-vel* is neither sensitive to syntactic nor to argument structures, nor to theta-roles *in se*. It is sensitive to finer semantic features that intervene in semantic prominence and, consequently, in thematic hierarchy.

3.2 The suffix *-os(o)*

Data from derivatives with the suffix *-os(o)* also highlight the sensitivity of affixes to semantic prominence and thematic hierarchy.

The suffix *-os(o)* correlates with transitive (*injuriar* ‘to insult’ ↔ *injurioso* ‘insulting’; *amedrontar* ‘to frighten’ ↔ *amedrontoso* ‘frightening’), unergative (from *chorar* ‘to cry’ ↔ *choroso* ‘that has been crying’; from *suspirar* ‘to sigh’ ↔ *suspiroso* ‘that has been sighing’) and unaccusative verbs (*murchar* ‘to wither’ ↔ *murchoso* ‘of something that is about to wither’). Thus, no specific argument structure is required by *-os(o)*.

Some adjectives correspond with the external argument of transitive verbs (*injurioso*, *amedrontoso*) and of unergative verbs (*choroso*, *suspiroso*).

Other adjectives correspond with the internal argument of unaccusative verbs (*murchoso*).

Despite this random behaviour towards the argument structure of the base, the suffix *-os(o)* shows a preference for the theta-role that is the most prominent in the thematic hierarchy of the verb. This is proved by the analysis of *-os(o)* derivatives correlated with psych verbs. Example (17) provides derivatives correlated with psych verbs with stimulus-subject and experiencer-object. The derived adjective corresponds with the stimulus.

- (17) a.
$$\left[\begin{array}{cc} \text{Stimulus;} & \text{Experiencer} \\ \text{Pred } \underline{x}; & < y > \\ \text{Subject;} & \text{Object} \end{array} \right]_V \leftrightarrow [[\text{PRED } \underline{\text{Stimulus}}^i; < \text{Experiencer} >]_V [-\text{oso}]^i]_A$$
- afadigar* ‘to tire’ \leftrightarrow *afadigoso* ‘tiresome’
- embaraçar* ‘to embarrass’ \leftrightarrow *embaraçoso* ‘embarrassing’
- enfastiar* ‘to bore, to annoy’ \leftrightarrow *enfastioso* ‘boring, annoying’

When the base is an experiencer-subject psych verb, the derivative with *-os(o)* corresponds with the experiencer (18).

- (18)
$$\left[\begin{array}{cc} \text{Experiencer;} & \text{Stimulus} \\ \text{Pred } \underline{x}; & < y > \\ \text{Subject;} & \text{Object} \end{array} \right]_V \leftrightarrow [[\text{PRED } \underline{\text{Experiencer}}^i; < \text{Stimulus} >]_V [-\text{oso}]^i]_A$$
- recear* ‘to be afraid of’ \leftrightarrow *receoso* ‘that is afraid of’
- suspeitar* ‘to suspect’ \leftrightarrow *suspeitoso* ‘that suspects of’
- necessitar* ‘to need’ \leftrightarrow *necessitoso* ‘needy’

In line with Levin & Grafmiller (2013), we should remember that the stimulus of experiencer-subject psych verbs is non-causative, which places the stimulus on a lower rank in the thematic hierarchy. Furthermore, the stimulus of experiencer-object psych verb is causative, which places it on a higher rank in thematic hierarchy. Thus, we can conclude that the suffix *-os(o)* is sensitive to the highest role of the thematic hierarchy (19).

- (19) [PRED higher θ -role; <lower θ -role>]_V ↔ [[PRED higher θ -roleⁱ; <lower θ -role >]_V [-oso]ⁱ]_A

recear ‘to be afraid’ ↔ *receoso* ‘that is afraid of’
embaraçar ‘to embarrass’ ↔ *embaraçoso* ‘embarrassing’

3.3 The suffix -nt(e)

The suffix -nt(e) works with transitive verbs (*dominar* ‘to dominate’ ↔ *dominante* ‘dominant’, *reconfortar* ‘to comfort’ ↔ *reconfortante* ‘comforting’), unaccusative verbs (*crescer* ‘to grow, to increase, to rise’ ↔ *crescente* ‘growing, increasing, rising’, *minguar* ‘to decrease’ ↔ *minguante* ‘decreasing’) and unergative verbs (*cavalgar* ‘to ride (on horseback)’ ↔ *cavalgante* ‘riding’, *brilhar* ‘to shine’ ↔ *brilhante* ‘shining’). In (20) we can see that -nt(e) does not require a specific argument to bind with, since it shows correspondence either with the external argument (x) of transitive (20a) and unergative verbs (20b) or with the internal argument (<y>) of unaccusative verbs (20c).

- (20) a. [PRED x; <y>]_V ↔ [[PRED xⁱ; <y>]_V [-nt(e)]ⁱ]_A
reconfortar ‘to comfort’ ↔ *reconfortante* ‘comforting’
 b. [PRED x]_V ↔ [[PRED xⁱ]_V [-nt(e)]ⁱ]_A
galopar ‘to gallop’ ↔ *gallop* ‘galloping’
 c. [PRED <y>]_V ↔ [[PRED <y>ⁱ]_V [-nt(e)]ⁱ]_A
minguar ‘to decrease’ ↔ *minguante* ‘decreasing’

From (20) we could conclude that the suffix -nt(e) selects the subject of the verbal base. However, a more accurate analysis of the data suggests a non-syntactical explanation for the behaviour of the suffix -nt(e). In fact, the selection exerted by the suffix -nt(e) is not syntactically, but rather semantically-based.

Notwithstanding the availability of -nt(e) to construct derivatives from unaccusative verbs (*crescente* ‘increasing, rising’, *minguante* ‘decreasing’, *nascente* ‘nascent’, *morrente* ‘dying’, *dormente* ‘dormant’, etc.), in relation to transitive verbs with unaccusative alternation, only the transitive construction is appropriate to -nt(e) formations (21a), not the unaccusative one (21b).

- (21) a. $[\text{PRED } \underline{x}; <y>]_V \leftrightarrow [[\text{PRED } \underline{x}^i; <y>]_V [-nt(e)]^i]_A$
- corar* ‘to colour’ \leftrightarrow *corante* ‘that causes colouring’
- congelar* ‘to freeze’ \leftrightarrow *congelante* ‘that causes freezing’
- coagular* ‘to coagulate’ \leftrightarrow *coagulante* ‘that causes coagulating’
- b. $\left[\begin{array}{l} \text{Pred } \underline{x}; <y> \\ \emptyset; \text{Subject} \end{array} \right]_V \leftrightarrow \emptyset$
- corar* ‘to blush’ $\leftrightarrow \emptyset$
- congelar* ‘to freeze’ $\leftrightarrow \emptyset$
- coagular* ‘to coagulate’ $\leftrightarrow \emptyset$

The examples in (21) indicate that *corante* ‘a substance that colours something’, *congelante* ‘a substance that freezes something’, and *coagulante* ‘a substance that coagulates something’ correspond with the external cause provided in the lexical-semantic structure. If the external cause is not syntactically realised – unaccusative alternation –, the suffix *-vel* will not bind the theme. This implies that the suffix *-nt(e)* does not simply correspond to the subject every time there is one. Otherwise, it would be compatible with the unaccusative construction of the abovementioned verbs. If we remember that *-nt(e)* is compatible with verbs that are inherently unaccusative (e.g., *nascer*) and are not an alternation of transitive ones, we propose that the suffix *-nt(e)* binds the most prominent role of the thematic hierarchy, that is, the one with the most active semantic component (Levin & Rappaport Hovav 2005: 154-185). If the external cause is implicit, i.e., not syntactically expressed, the suffix *-nt(e)* will not be licensed, since cause is more prominent than other roles. If the lexical-semantic structure does not predict an external cause, but rather an internal cause, this will correspond to the most prominent theta-role and, thus, will be bound by the suffix *-nt(e)* (22).

- (22) $[\text{PRED higher } \theta\text{-role}; \text{lower } \theta\text{-role}]_V \leftrightarrow [[\text{PRED higher } \theta\text{-role}^i; \text{lower } \theta\text{-role}]_V [-nt(e)]^i]_A$

The analysis of *-nt(e)* derivatives correlated with psych verbs are in accordance with the formulation in (22). Psych verbs with stimulus-subject such as *aliciar* ‘to entice’, *estimular* ‘to stimulate’ and *excitar* ‘to excite’ correlate with adjectives with *-nt(e)* by means of a co-indexation between the suffix and the stimulus, which, being [causative], is the most active of the theta-roles of the lexical-semantic structure of these verbs, and thus is more highly ranked than the experiencer (23).

$$(23) \left[\begin{array}{cc} \text{Stimulus;} & \text{Experiencer} \\ \text{Pred } \underline{x}; & < y > \\ \text{Subject;} & \text{Object} \end{array} \right]_v \leftrightarrow [[\text{PRED } \underline{\text{Stimulus}}^i; < \text{Experiencer} >]_v [-nt(e)]^i]_A$$

<i>aliciar</i> ‘to entice’	↔	<i>aliciante</i> ‘enticing’
<i>estimular</i> ‘to stimulate’	↔	<i>estimulante</i> ‘stimulating’
<i>excitar</i> ‘to excite’	↔	<i>excitante</i> ‘exciting’

Psych verbs with an experiencer-subject, such as *crer* ‘to believe’, *amar* ‘to love’, *descreer* ‘to disbelieve’ have the correspondent adjectives with *-nt(e)* correlating with the experiencer, which, when associated with a [non-causative] stimulus, is in a higher rank, because the experiencer in these kinds of verbs is the most active of the two (24).

$$(24) \left[\begin{array}{cc} \text{Experiencer;} & \text{Stimulus} \\ \text{Pred } \underline{x}; & < y > \\ \text{Subject;} & \text{Object} \end{array} \right]_v \leftrightarrow [[\text{PRED } \underline{\text{Experiencer}}^i; < \text{Stimulus} >]_v [-nt(e)]^i]_A$$

<i>crer</i> ‘to believe’	↔	<i>crente</i> ‘believing’
<i>amar</i> ‘to love’	↔	<i>amante</i> ‘loving’
<i>descreer</i> ‘to disbelieve’	↔	<i>descrente</i> ‘disbelieving’

Consequently, we have arrived at the synthesis of the behaviour of the suffix *-nt(e)* in (25).

$$(25) [\text{PRED higher } \theta\text{-role}; \text{lower } \theta\text{-role}]_v \leftrightarrow [[\text{PRED higher } \theta\text{-role}^i; \text{lower } \theta\text{-role}]_v [-nt(e)]^i]_A$$

4. Conclusions

The data analysed in this study show that semantic prominence and thematic hierarchy play a role in the formation of deverbal adjectives. That role depends on the sensitivity of the affix to semantic features of the lexical-semantic structure of the base, which build up theta-roles as clusters (Dowty 1991; Zaenen 1993). The analysis undertaken with the Portuguese deverbal adjectives *-os(o)*, *-nt(e)* and *-vel* add evidence to the hypothesis that affixal selection in word formation is neither sensitive to syntactic structure nor to argument structure *in se*, but rather to lexical-semantic structure. However, the sensitivity to lexical-semantic structure turns out to be situated not on the level of theta-roles as autonomous constructs, but rather on the level of finer-grained semantic properties that are important for the relative position each of the theta-roles occupies in the thematic hierarchy. The properties that revealed to be relevant for affix selection are [active] / [inactive], and [causative] / [non-causative]. Following the thematic hierarchy formulated by Fillmore (1977) and seconded by later proposals, an [active] element is higher ranked than an [inactive] one. The same holds true for a [causative] element confronted with a [non-causative] one. The suffixes *-nt(e)* and *-os(o)* turn out to be sensitive to the most prominent theta-role of the lexical-semantic structure of the verb, while the suffix *-vel* prefers the least prominent theta-role.

This paper proves that the importance of thematic hierarchy and semantic prominence regarding argument realisation and morphosyntactic processes can be extended to word formation.

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