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Prefix allomorphy in complex verbs of Brazilian Portuguese

Alomorfia prefixal em verbos complexos do português brasileiro

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Abstract: This paper investigates the empirical properties of morphologically complex verbs of change in Brazilian Portuguese. Its main goal is to find out whether there are (not) correlations between prefix morphophonological form, root semantics and verb argument structure. All verbs analyzed denote events in which the internal argument is the undergoer of a change, and a classification in four semantic subclasses according to their root meaning is proposed: state, place, transfer of possession (either abstract or concrete) and reconfiguration. Contrary to what previous literature has suggested, fine-grained investigation within each of these classes has shown that it is not possible to exclusively associate morphological forms to specific root semantics or morphosyntactic behavior, although it is possible to observe general tendencies. To provide an analysis to account for the robust homogenous structural properties and general semantics behavior across the class, in face of the morphological variation in what regards prefix choice among the forms *a-*, *en-* and *es-*, it is proposed that prefixes are the phonological realizations of a functional head in the lower domain of the verb (labeled R, Relational) whose choice is given in terms of contextual allomorphy. It is shown that vocabulary insertion at R is guided by locality with the root. The theory of allomorphy proposed in Embick (2010), which is based on locality and linearity, was efficient in accounting for the selection of allomorphs of R, *v* and Th (Theme Vowel) heads.

Keywords: complex verbs; prefixes; allomorphy; Brazilian Portuguese; Distributed Morphology.

Resumo: Esse artigo investiga as propriedades empíricas de verbos de mudança morfologicamente complexos do português brasileiro. Seu objetivo principal é descobrir se há ou não correlações entre a forma morfofonológica do prefixo, a semântica da raiz e a estrutura argumental do verbo. Todos verbos analisados denotam eventos em que o argumento interno é o objeto afetado de uma mudança, e uma classificação

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em quatro subclasses semânticas de acordo com o significado atribuído à raiz é proposta: estado, lugar, transferência de posse (abstrata ou concreta), e reconfiguração. Contrariamente ao que foi sugerido pela literatura anterior, a investigação detalhada dentro de cada uma dessas classes mostrou que não é possível associar exclusivamente as formas morfológicas prefixais à semântica específica da raiz ou ao comportamento morfossintático do verbo, embora seja possível observar tendências gerais. Para fornecer uma análise para explicar as robustas e homogêneas propriedades estruturais e o comportamento semântico geral em toda a classe em face da variação morfológica em relação à escolha do prefixo entre as formas *a-*, *en-* e *es-*, propõe-se que os prefixos sejam realizações fonológicas de um núcleo funcional no domínio baixo do verbo (rotulado como R, de Relacional) cuja escolha é dada em termos de alomorfia contextual. Mostra-se que a inserção de vocabulário em R é orientada por localidade com a raiz. A teoria de alomorfia prospota em Embick (2010), baseada em localidade e linearidade, se mostra efetiva para analisar a escolha dos alomorfes dos núcleos R (relacionador), *v* e Th (Vogal temática).

Palavras-chave: verbos complexos; prefixos; alomorfia; português brasileiro; Morfologia Distribuída.

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1 Introduction

Verb formation in Brazilian Portuguese (hereafter, BP) is a process that may involve phonologically realized morphemes: in its morphological form it is possible to recognize a prefix, a base (root, noun or adjective), and an optionally overt suffix, to a lesser degree, and a theme vowel, besides of the person/number and tense/mood affixes in the inflectional domain. In what regards argument structure, verbs containing these prefixes always require a complement, being: i) unaccusative verbs, that can possibly be provided with external arguments,[1] or ii) transitive verbs, but they will never behave as unergative verbs:

[1] It is not critical for the scope of the present paper to discuss external argument realization. Bassani (2013, 2018) proposes an empirical classification and analysis of 136 change of state verbs into six event types (Inchoative, Causative, Causative underspecified for the type of external argument - agent or cause-, Totally underspecified,

(1) a. **a**-madur-**ec**-e-r
PREF-ripe-SUF-TV-INF
'to ripen'

b. A fruta amadureceu.
'The fruit ripened'.

c. O calor amadureceu a fruta.
'The heat ripened the fruit'.

d. *O calor amadureceu.[2]
'The heat ripened'.

(2) a. **en**-garraf-ø-a-r
PREF-bottle-SUF-TV-INF
'to bottle'

b. Eu **en**garrafei o vinho.
'I bottled the wine'.

c. *O vinho **en**garrafou.
'The wine bottled'.

d. *Eu **en**garrafei.
'I bottled'.

(3) a. **es**-vazi-a-r
PREF-empty-TV-INF
'to empty'

b. O tanque **es**vaziou.
'The tank emptied'.

Strictly Agentive Causative, and Strictly Causative with voice) based on their behavior, in face of the following tests: formation of transitive sentences with agents, transitives with cause arguments, intransitives and passives. We also refer the reader to Cançado *et al.* (2013) for a systematic classification.

[2] Data in c. can only be grammatical on a null object interpretation.

c. Eu **es**vaziei o tanque.
'I emptied the tank'.

d. *Eu **es**vaziei.
'I emptied'.

(4) a. **es**-trip-ø-a-r
PREF-bowel-SUF-TV-INF
'to disembowel'.

b. O chefe **es**tripou o peixe.
'The chef disembowed the fish'.

c. *O peixe **es**tripou.
'The fish disembowed'.

d. *O chefe **es**tripou.
'The chef disembowed'.

According to the literature, direction in time and space and ingressive semantics can be seen in data like (2), inchoative aspect in data like (1) and (3), external direction, egressive aspect and end of or repeated action in data like (4). Table 1 below summarizes the main semantic descriptions assigned to the most frequent prefixes present in this kind of formation: *a-*, *en-* and *es-*[3] (SAID ALI, 1966; BOSSIER, 1998; RIO-TORTO, 2004; PEREIRA, 2007).

[3] These prefixes are diachronically related to Latin directional prefixes in the following way: *a-* is historically related to prefix *ad-,* which denoted approximation; *en-* is related to prefix *in-,* which denoted inward movement; *es-* is related to prefix *ex-,* which denoted outward movement or removal. Prefix *en-* may present phonological allomorphs (/en/, /em/ and /e/) and prefix *es-* can also be ortographically represented as "ex".

TABLE 1 – Traditional descriptions

Prefix	Semantic description(s)
a-	✓Direction in time and space; approximation ✓Inchoative aspect
en-	✓Direction in time and space; locative ✓Ingressive aspect
es-	✓External direction ✓Egressive aspect ✓End of action or repeated action

However, the assumption that the verb general behavior can be derived solely from intrinsic properties of these prefixes does not hold upon closer inspection. Detailed investigation will make clear that the behavior of these affixes is quite complex, challenging superficial classifications, especially the ones that assume they carry specific semantic properties, such as directionality. We hope to make clear the fact that the final behavior of the verb must be derived structurally. Thus, the descriptive questions to be answered in this paper are the following:

i. What is the contribution (if any) of these prefixes to the final verb?

ii. What is the base contribution to the final verb?

iii. When (and if) prefixes are allomorphs, what guides the choice of their phonological form?

iv. Is there any morphophonological dependency between prefix and suffix forms when they co-occur in a verb?

The paper is organized as follows: in the remaining of section 1 we briefly present the methodology of data selection. In section 2, there is a general proposal for the treatment of the lower structure of all verbs of change and the empirical evidences for the suggested analysis. In section 3, verb classes are fully investigated in what regards their root semantics and in special the morphophonology of prefixes. Section 4 provides a morphophonological analysis for the distribution of prefixes based on locality conditions. Section 5 concludes the paper.

1.1. Methods

The descriptive results of this research are based on an initial *corpus* of 380 verbs. The methodology for collecting these data followed several steps, summarized below:

a. **Initial Selection** of verbs started by *a-*, *ad-*, *en-*, *e-*, *em-*, *in-*, *es-*, *ex-* from the 2007 edition of the digital database of *Dicionário Houaiss da Língua Portuguesa* (HOUAISS; VILLAR, 2007), resulting in 5.173 occurrences;

b. **Frequency extraction**: verbs were ranked according to their Google frequency (in 2010) and only those with more than 10.000 hits were conducted to the next step. The frequency was automatically extracted and the Language filter for Brazilian Portuguese was used. This lead to 1.471 occurrences;

c. **Data cleaning**: was composed of the following substeps, and lead to a total of 380 verbs:
   - Exclusion of verbs for which these sound sequences were mere initial parts of roots or prefixes denoting negation (*in-*) (e.g. *amar* 'to love', *alterar* 'to alter', *entrar* 'enter', *invalidar* 'to invalidate');
   - Exclusion of adjectives ending in *-ar* (e.g. *escolar* 'academic');
   - Exclusion of verbs that, even with a number of frequency greater than 10.000, seemed extremely old fashioned or were completely unfamiliar[4] (e.g. *aquinhoar* 'to distribute', *arregimentar* 'to regiment').

A first major classification was proposed in order to separate one group of semantically compositional and morphologically transparent verbs from two other groups: morphologically opaque and semantically non-compositional verbs,[5] leading to 276 verbs from which 259 are verbs

[4] The exclusion of the following verbs was based on my intuition as a researcher and native speaker of BP*: amuar, amontar, anuviar, apainelar, apiedar, apoucar, aprovisionar, aquinhoar, arregimentar, arregalar, acantoar, embeiçar, encabar, abancar, encarniçar, atucanar, emparceirar, encapelar, abaratar, arruar, avultar, atraiçoar, arrimar, entroncar, encordoar, abaciar, encampar, aventar, acautelar, arruar, enjeitar*.

[5] We refer the reader to Bassani (2015) for this first classification.

of change and result. In this paper, we will explore these 259 data. A list of these verbs organized by frequency is available in the appendix.

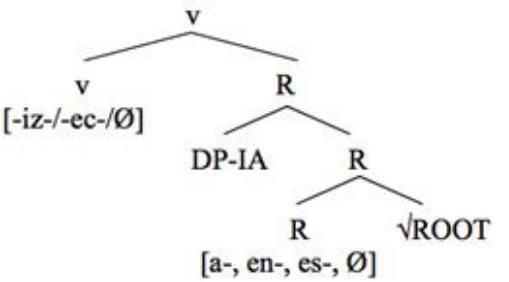
2 General description and proposal

The major class of semantically compositional and morphologically transparent verbs treated in this paper can be classified as Change or Result verbs (RAPPAPORT-HOVAV; LEVIN, 1998, 2010; ALEXIADOU, 2014). These verbs denote an event in which the internal argument is the undergoer of a change, and the result of this change is somehow related to the root semantics. Although all these verbs can ultimately be classified as verbs of change, the idiosyncratic meaning of the root specifies the kind of change affecting the internal argument: some roots denote/are related to states, places, entities and by-products of the event. Then, structurally, the unifying characteristic of these verb subclasses is the obligatoriness of an internal argument, which is interpreted as the affected object of the change expressed by the event (theme or experiencer, to a lesser degree). In relation to the morphophonological properties of the data, it is evident that most of the verbs present overt prefixes (*a-, en-, es-)* but most do not present overt suffixes (when they appear, the forms are *-iz* and *-ec*). There are also verbs of change and result that do not present affixes. Below we propose a general syntactic lower structure for this class and the empirical evidences for it, and in the next section we describe four (root) semantic subclasses to be examined in detail in what regards their argument structure, lexical semantics and the morphophonological form of affixes.

We propose that morphologically complex verbs of change present morphological evidence for a syntactic decomposition of the event (along the lines of Marantz (1997); Alexiadou *et al*. (2006)). In broad terms, prefixes can be analyzed as the realization of a functional head in the result state clause and suffixes are the realization of *v*, which take that result phrase as complement. We propose that there is a formal requirement in Portuguese in order for the internal argument to enter the derivation in a position where it is able to be interpreted as the affected argument of the change: for the argument to relate to the root semantics there must be the mediation of a functional head that is prepositional/ relational in nature. Then, we assume that the prefix is the phonological realization of a head that introduces the internal argument in the structure

and relates it to the root, as in the representation in (5) below. Our analysis go against approaches in which the root can directly take a complement, such as Marantz (1997), Embick (2004), Harley (2014), since the evidence to be presented shows that the root fails to take a complement without the mediation of a functional category.[6] We assign the label R for Relational head, and IA stands for Internal Argument.

(5) Syntactic structure



In the structure in (5), prefixes are the phonological realization of an inner and active functional head attaching outside the Root domain, but not above the first Categorizer/Cyclic Head (EMBICK; MARANTZ, 2008; EMBICK, 2010), which is *v*. In what regards R status, we assume, based on empirical evidence to be presented below, that it is a kind of predicational head, which is part of the verbal domain, however it is a non-cyclic head and is therefore a subword level morpheme. It can be phonologically realized as *a-*, *en-* or *es-*. It is in fact the category *v* that is responsible for the categorization of the Root and the formation of a M-word (EMBICK; NOYER, 2006). The head *v* in these verbs can be phonologically realized by *-e-*, *-ec-* [es] and *-iz-* or can be null.

2.1 Empirical evidences for the proposed structure

Following several empirical evidences presented in Bassani (2012), we assume that R is a functional head in the verbal domain

[6] As we will not be able to fully explore the contributions of these data to the fruitful debate on whether roots can or cannot take complements (cf. HARLEY, 2014; ALEXIADOU, 2014), we refer the reader to Bassani and Minussi (2015).

attached to the root and complement of *v*. First, if we compare the bases to which these prefixes attach to the verbs they form, we find that they seem to be interfering with, or, in fact, being responsible for, the introduction of an extra argument. For example, a noun like *garrafa* 'bottle' in (6), an adjective like *vazio* 'empty' (7) cannot take arguments by themselves. Although it is clear that an adjective like *vazio* is predicative and needs an entity to be composed with, it cannot do this by itself in all languages, as Hale and Keyser (2002) have already observed. In addition, the examples in b. below show that it is impossible to derive a verbal structure for these Roots without the phonological realization of a prefix.

(6) a. *Garrafa$_{(n)}$ o vinho.
'bottle$_{(n)}$ the wine'.

b. *Garrafar$_{(v)}$ o vinho.
'to bottle the wine'.

c. **En**garrafar$_{(v)}$ o vinho.
'to bottle the wine'.

(7) a. *Vazia$_{(a)}$ a caixa.
'empty$_{(a)}$ the box'.

b. *Vaziar$_{(v)}$ a caixa.
'to empty the box'.

c. **Es**vaziar$_{(v)}$ a caixa.
'to empty the box'

Finally, their presence is restricted to verbs: they only occur with nouns and adjectives in case they are derived from verbs, like in derived eventive nominalizations with suffixes *-ção* and *-mento* (i), to a lesser degree in back derivations (ii), and widely in resultative participles (iii):

i. Eventive Nominalizations

(8) a. Proveito (n) 'advantage'
b. **A**proveitar (v) 'to take advantage'
c. ***A**proveito (n) 'advantage'
d. **A**proveitamento (n) 'utilization'

(9) a. Caderno (n) ‘notebook’
b. **En**cadernar (v) ‘to bind’
c. ***En**caderno (n) ‘binding (of materials)’
d. **En**cadernação (n) ‘binding (of materials)’

(10) a. claro (a) ‘clear’
b. **es**clarecer (v) ‘clarify’
c. ***es**claro (n) ‘clarification’
d. **es**clareci**mento** (n) ‘clarification’

ii. Back derivations

(11) a. Laço (n) ‘loop’
b. **En**laçar (v) ‘to enlace’
c. *Enlaço (n) ‘loop’
d. **En**lace (n) ‘union’

(12) a. Caixa (n) ‘box’
b. **En**caixar (v) ‘to fit’
c. *Encaixa (n) ‘box’
d. **En**caixe (n) ‘fit’

iii. Resultative Participles

(13) a. vermelho (a) ‘red’
b. Camisa vermelha (a) ‘red shirt’
c. Camisa ***a**vermelha (a) ‘red/reddish shirt’
d. Camisa **a**vermelh**ada** (a-prt) ‘reddish shirt’ (result state)

(14) a. manhã (n) ‘morning’
b. amanhecer (v) ‘to dawn’
c. pão ***a**manhal/***a**matinal/matinal (a) ‘morning bread’
d. pão **a**manhec**ido** (a-prt) ‘stale bread’

(15) a. quente (a) ‘warm’
b. esquentar (v) ‘to warm (up)’
c. pão quente/***es**quente (a) ‘warm bread’
d. pão **es**quent**ado** (a-prt) ‘warmed/heated up bread’

The ungrammaticality of the data in c. from (8) through (15) above and the exclusive occurrence within verb domains is also evidence that the prefixes are not able to categorize a structure alone, and this is due to the fact that they are non-cyclic heads depending on *v*. In addition, these prefixes can co-occur with (open) verbal categorizers ((16) to (18)), which shows that they cannot be the phonological realization of *v*, as was suggested by Oltra-Massuet (2000) for similar Catalan verbs like *enrikir* and *aprofundir*:

(16) **a**-terror-**iz**-a-r
PREF-√terror-SUF-TV-INF
‘to terrorize’

(17) **en**-riqu-**ec**-e-r
PREF-√weak-SUF-TV-INF
‘to enrich’

(18) **es**-faqu-**e**-a-r
PREF-√knife-SUF-TV-INF
‘to stab’

Having presented evidence for the structure of the lower part of this general verb class, we turn now to specific details of subclasses according to the root semantics and the morphophonological form of the affixes. Our challenge is to account for its consistency in relation to the general structural properties and semantics of change but its variety when it comes to the choice of morphemes.

3 Verb Classes and root types

In what follows we investigate possible correlations between the pieces of morphology, root semantics and argument structure.

3.1 Change of State Verbs

3.1.1 Root Semantics and argument structure

These verbs denote a change of state undergone by the internal argument, which can be a physical state (*alisar X* 'to smoothen X') or a psychological state (as in *acalmar X* 'calm down X'). From (19) to (21), there are typical examples of change of state verbs:

(19) **a**-vermelh-a-r
PREF-√red-TV-INF
'to redden'

(20) **en**-fraqu-**ec**-e-r
PREF-√weak-SUF-TV-INF
'to weaken'

(21) **es**-vazi-a-r
PREF-√empty-TV-INF
'to empty'

Closely observing this class, it is clear that the (supposed) categorical status of the base is not relevant to the formation of a change of state verb: both nouns and adjectives could be part of these verbs, provided that they or their root can denote state properties/characteristics acquired by the internal argument as a result of the event of change. Thus, the split into deadjectival and denominal verbs in this class is totally unnecessary. Formally, there are two kinds of bases to derive the verbs: bare roots and derived adjectives and nouns denoting states. A simple entailment test can split the two kinds of bases: while the result state from verbs formed from bare roots can be expressed by simple adjectives (often scale adjectives) (22), the result state from verbs with derived nouns can only be expressed by adjectival participles or prepositional phrases (23):

(22) Result entailments with verbs from bare roots:

a. Adoçar > ficar (mais) doce
'to sweeten > to get (more) sweet'

b. Enfraquecer > ficar (mais) fraco
'to weaken > to get (more) weak'

c. Esfriar > ficar (mais) frio
'to cool down > to get (more) cool'

(23) Result entailments with verbs from nouns:

a. Abrasileirar > ficar brasileirado / como brasileiro / *brasil
'to brazilianize > to get brazilianized / like (a) Brazilian / *brazil

b. Envergonhar > ficar envergonhado / com vergonha / *vergonha
'to embarass > to get embarrassed / with shame / *shame

Although adjectival participles can be also used as entailments in change of state verbs with stative bare roots (*ficar adoçado / enfraquecido / esfriado* 'to get sweetened/weakened/cooled down'), it reveals, in this case, the outcome of the event (resulting state) as a whole and not the result of the change in the innermost layer of the inchoate subevent (one in the RP projection). Moreover, the interpretation of the auxiliary *ficar* ('to get') is closer to the meaning of changing and remaining in the state, more than just denoting the punctual change of state. So the most natural paraphrase for this type is indeed the one made with the simple adjective.

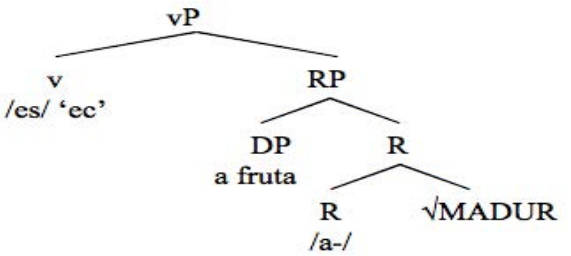
Derived state data leads to an important theoretical discussion, the one of structural licensing. It seems clear that it is not the state root that projects a change of state verb (or adjectives, as in many lexicalist proposals, including Hale and Keyser (2002) and even in Distributed Morphology approaches (such as HARLEY, 2014)), but this type of root is licensed in the event structure if it is compatible with it (cf. MARANTZ, 2013). An extra piece of evidence that corroborates this fact was found among the data: roots that prototypically denote entities, with no possibility of lexical projection, or "assignment of thematic roles" can nevertheless form change of state verbs as long as it has some specific property that can be highlighted as a proper licensing. For example, for

the root that forms *pedra* (‘stone’) to become part of the verb *empedrar* (‘to pave’), what is relevant is its property of being solid, hard, and not any other characteristics of the noun *pedra* (‘stone’).

(24) *O que fazer quando o leite empedra*?
What to do when the milk PREF-√stone-PRS.3SG
‘what to do when the milk becomes like stone’?[7]

So whenever a root or an XP (X Phrase) denoting a state is licensed, (by intrinsic properties or coercion, as in the example above), as the complement of an R that introduces an internal argument, the whole structure will be interpreted as a change of state structure. As an illustration, we present in (25) the analysis for the lower part of a change of state monoargumental structure resulting in the formation of the verb *amadurecer* (‘to ripen’):

(25) Amadurecer a fruta (to ripen the fruit).



In this structure, the head R allows the introduction of an internal argument and relates it to the Root. Then a small clause denoting a result state is formed, which in combination with a *v* head generates the interpretation of an event of change and result.

3.1.2 Morphology

The first question to be answered regarding the morphology-semantics relation is whether there is any correlation between the form

[7] This context regards breast engorgement in breastfeeding.

of the prefix and this subclass. Acedo-Matellán (p.c.) points out that, in Catalan, the prefix *en-/em-* conveys the meaning of change of place while the prefix *a-* conveys change of state.[8] For BP such a division of labor between *a-* and *en-* is not empirically attested. In BP, the prefix *en-* has wide occurrence within the class of change of state verbs: 53 out of 136, co-occurring or not with suffixes. The prefix *a-* is still the most numerous, with 75 occurrences. The prefix *es-* shows up in 8 verbs only.

TABLE 2 – Change of State verbs and its prefix forms

Prefix		**Examples**
a-	75	*agravar, apodrecer, atemorizar, alisar, amadurecer*
		to worsen, to rot, to make afraid, to smooth, to ripen
en-	53	*encurtar, enfraquecer, encolerizar, empobrecer, engordar*
		to shorten, to weaken, to make angry, to impoverish, to fatten
es-	8	*esvaziar, esclarecer, esverdear, esquentar*
		To empty, to clarify, to turn green, to warm-up
Total	**136**	

Regarding the morphology of suffixes, the most evident general characteristic in this subclass is the exclusive presence of the suffix *-ec* (cf. (17)). The suffix *-iz* is also present: of the three occurrences in the whole corpus, two belong to this class. However, the suffix *-iz* occurs very rarely concomitantly with the presence of prefixes, a defining feature of our corpus. So, the most certain conclusion is that the presence of *-ec* suffix is correlated with this subclass. However, two observations are in order. First, *-ec* must be the phonological realization of a verbal categorizer since it is in complementary distribution with other verb suffixes. Second, such a correlation is not two-way: it is not true that in order to derive a change of state verb the suffix *-ec* must be present. Thus, we must conclude that *-ec* could be one of the phonological realizations

[8] In Acedo-Matellán (2006), the author presents the verb *enriquir* ('enrich') and *aclarir* ('clear') as change of state verbs (canvi d'estat), which points out that *en-* may occur in this class even in Catalan.

of *v*. Within this class, the suffixes are distributed as follows (table 3): 136 verbs, 39 with *-ec*, two with *-iz*, two with *-e* and most of the verbs do not have overt suffixes (93 verbs).[9]

TABLE 3 – Change of State verbs and its suffixes

Suffix		**Examples**
-e	2	*esverdear, assenhorear* to turn green, to become a (old) lady
-ec	39	*amanhecer, empobrecer, esclarecer* to dawn, to impoverish, to clarify
-iz	2	*atemorizar, encolerizar* To make afraid, to make angry
Ø	93	*adoçar, engrossar, esvaziar* to sweeten, to thicken, to empty
Total	**136**	

The next question to be answered is whether there is such a strong correlation between suffixes and prefixes in these verbs that makes them circumfixes rather than individual affixes, as assumed by Rio-Torto (2004) and Pereira (2007). According to this analysis, the realization of the prefix *en-* in a change of state verb would be the result of its dependence on the suffix *-ec*. Again, our data show that this is not empirically attested: *-ec* suffix co-occurs with the three prefix forms, as shown in table 4 below. Although it does co-occur more frequently with *en-*, we must address this fact as a numerical trend and not as empirical evidence for the postulation of a circumfix. Moreover, this would be the only case of circumfixation in the whole language system.

[9] Bassani (2013) discusses possible correlations between specific suffixes (phonological exponents of *v*) and subtypes of change of state verbs identified by different types of possible external arguments. As these correlations are irrelevant to the discussion made in this paper, which focus on prefix realization, we leave it aside for the moment.

TABLE 4 – Co-occurrence of prefixes and suffixes in Change of State verbs

	Suffix				
Prefix	-e	-ec	-iz	Ø	**Total**
a-	1	10	1	63	75
en-	0	27	1	25	53
es-	1	2	0	5	8
Total	**2**	**39**	**2**	**93**	**136**

A critical fact in this subclass refers to the total lack of semantics of directionality that is supposedly related to the presence of *a-*, *en-* and *es-* prefixes. More importantly, as this is the numerically larger class among the verb classes with the presence of prefixes, the classification of such morphemes as directional elements (see table 1) seems highly problematic. By observing the behavior of the next (minor) classes of verbs, we can return to this topic and draw more robust conclusions based on the data. In order to do this, we turn now to the description of general patterns of Change of Location verbs.

3.2 Change of Location Verbs

3.2.1 Root Semantics and argument structure

Another pattern found among the general class of verbs of change is what we call verbs of change of location. In sum, they result from structures where there is a change of the internal argument for the place denoted by the root. Some examples are provided below:

(26) **a**-prision-a-r
PREF-√prison-TV-INF
'to imprison'

(27) **en**-garraf-a-r
PREF-√bottle-TV-INF
'to bottle'

(28) **ex-**patri-a-r
PREF-√country-TV-INF
'to send out of country'

Three facts discriminate this subclass from the previous: the root denotes a place rather than a state, there is an apparent directional semantic contribution of the prefix, and they present distinct behavior in face of syntactic tests that reveal inchoative events: they are transitive and do not present alternation patterns. This happens because such verbs denote a complex event in which the external argument must cause the transfer of what is denoted by the internal argument towards what is denoted by the root. In other words, they cannot configure spontaneous internally caused events like some change of state verbs can (e.g. *amadurecer* 'to ripen').

3.2.2 Morphology

As just said, one important factor that potentially contrasts change of state and change of place verbs is a possible directional contribution of the prefixes in the latter class. Pereira (2007) states that in European Portuguese, depending on the denotation of the base, the change of location may be of the type i) 'get close to Noun' and is realized by *a- (*as in *aterrar* 'land', *alunar* 'land on the moon'*)*; ii) 'get in(side) Noun' and is realized by *en-* (as in *engarrafar* 'to bottle', *ensacar* 'to bag') or iii) 'take of Noun' and is realized by es-/ex-(as in *espipar* 'extract', *expatriar* 'expatriate'). Looking closely at the BP data, the situation seems more complex, especially when we consider *a-* and *en-*.

In order to situate the discussion, we present the following summarizing tables, showing that the most numerous form in this class is the prefix *en-,* being present in 25 out of 36 verbs, followed by *a-* with 9 occurrences. The fact that the form *es-* in only present in 2 verbs with some directional meaning, added to the fact that this piece has no independent status as preposition in the language (different from the other two) and that it is present in most verbs considered as reanalyzed as simple forms by Bassani (2015), lead us to concluded that its status as a vocabulary item in the BP Vocabulary inventory is not stable.

TABLE 5 – Change of location verbs and its prefix forms

Prefix		**Examples**
a-	09	aprisionar, acampar
		to imprison, to camp
en-	25	engarrafar, enjaular
		to bottle, to cage
es-	2	expatriar, exorbitar
		to expatriate, to exorbitate
Total	**36**	

First, in descriptive terms, there is a semantic correlation between the root and the prefix. In general, *a-* combines with roots that denote places of the type *space* and *en-* combines with places of the type *container*. We observed that the prefix *en-* has a more homogeneous and specific behavior; its occurrence is associated with roots that denote container places, and its often interpreted as a directional piece meaning inside. What seems is that *a-* is associated with an underspecified semantics of directionality, negotiating with the roots its final interpretation. In this sense, formations with *a-* seem to have semantically lighter directionality than *en-*.

A key question that arises now is whether, in fact, the prefixes originally carry specific directional semantic features (we can hypothesize [‘inside’] for *en-*, [‘outside’] for *es-*, [‘near’] for *a-*) and are licensed in compatibility with the roots or have their directional features completely underspecified and its interpretation is contextually given when they are concatenated with the roots.

As we saw in the previous subsection, directional meanings are completely absent when the roots / XPs complements of R denote states, indicating that the locality of attachment and the denotation of the root play a fundamental role in the interpretation of (non)directionality in the result phrase. Before deciding on what is the best analysis for the features of R and its vocabulary insertion process, we shall examine two other semantic classes found in the data.

3.3 Change of Possession Verbs

3.3.1 Root semantics and argument structure

The third type does not express neither a change of state or a change of the location of the internal argument. In this verb class there is a change of possession or localization of an entity denoted by the root that targets the object denoted by the internal argument. Some examples of prefix verbs from BP belonging to this class are provided below. It can be seen that the entity denoted by the root can be a concrete, as in (29) and (31), or an abstract one, as in (30) and (32).

(29) **a**-carpet-a-r
PREF-√carpet-TV-INF
'to carpet'

(30) **a**-conselh-a-r
PREF-√advice-TV-INF
'to advice'

(31) **e**-moldur-a-r
PREF-√frame-TV-INF
'to frame'

(32) **en**-feitiç-a-r
PREF-√spell-TV-INF
'to bewitch'

Cançado and Godoy (2012) classify these verbs as verbs of change of possession and divide them into two types, according to the denotation of the root: when there are roots that denote concrete objects, such as *manteiga* and *carpete* ('butter' and 'carpet') verbs are called Locatum verbs, and for roots that denote abstract entities to be transferred, such as *benção* e *conselho* ('blessing' and 'advice'), verbs are called Benefactive verbs. However, as verbs like *amaldiçoar* ('to curse'), *enfeitiçar* ('to bewitch'), *castigar* ('to punish'), with malefactive internal arguments rather than benefactives, fit in the classification of this last subclass, we prefer the terms change of concrete and abstract possession verbs.

Comparing change of concrete possession and change of place verbs, we observe that the transfer of the entity denoted by the root to the internal argument does not imply the expression of a specific directionality (inside, near, out). In change of concrete possession structures, the head R appears to mediate a directional abstract relation between the root and the internal argument since there is a physical transfer. It seems incorrect to assume that directional features of the type [‘inside’] or [‘out’] are marked for some distinction within this class. Going further, if we compare change of place verbs and change of possession verbs on one hand and change of state verbs in another hand, we see that in the latter case, not even an unmarked directionality is found. Again, in this last class, the idea of transfer and direction is completely absent.

3.3.2 Morphology

Below we can see the tables regarding prefixes in change of concrete and abstract possession. As happens with verbs of change of place, in the first subgroup there is a predominance of occurrence of *en-* prefix, followed by *a-*.

TABLE 6 – Change of concrete possession verbs and its prefix forms

Prefix		**Examples**
a-	11	amordaçar, acorrentar, afivelar
		to muzzle, to chain, to buckle
en-	25	enlaçar, emborrachar, engessar
		to lace up, to rubber, to plaster
es-	1	Estripar
		to disembowel
Total	**37**	

What we have observed so far with respect to morphology is that the lower the expression of directionality (what implies that there is no physical transfer and movement), the greater the occurrence of *a-*. In change of state verbs, for example, *a-* occurs more frequently (76 out of 139 cases). Change of possession data seems to support this idea. In

cases of concrete change, where the entities denoted by the root have physical nature, the transfer implies some directionality (but a not specific one), but when the entity to be transferred has no physical nature, there is no need for expression of directionality and most of them contain the prefix *a-,* as we see in the following table:

TABLE 7 – Change of abstract possession verbs and its prefix forms

Prefix		**Examples**
a-	14	aconselhar, acompanhar, apoderar
		to advice, to accompany, to take possession
en-	9	encorajar, empossar, enfeitiçar
		to encourage, to induct, to bewitch
es-	0	-
Total	23	

We now turn to the last subgroup identified among the data.

3.4 Change of Configuration Verbs

3.4.1 Root semantics and argument structure

We name Change of Configuration Verbs the last subclass proposed in our study. A verb belongs to this class if its root denotes an entity that is created in the event. Additionally, these entities must be created from the reorganization or reconfiguration of the material denoted by the internal argument. In (34), for example, the entity denoted by the root √pile is a product of the reconfiguration of the material in the internal argument, *the books*.

(33) **a**-grup-a-r (os alunos)
PREF-√group-TV-INF (the students)
'to group the students'

(34) **em**-pilh-a-r (os livros)
PREF-√pile-TV-INF (the books)
'to pile the books'

(35) **es**-farel-a-r (a bolacha)
PREF-√crumble-TV-INF (the cookie)
'to crumble the cookie'

As in change of state and possession verbs, there is no directionality expressed in the change undergone by the internal argument for the new configuration expressed by the root.[10]

3.4.2 Morphology

In this subclass, 15 verbs have prefix *en-*, 6 verbs have prefix *a-* and 6 verbs are formed by prefix *-es*. We first notice that the presence of *-es* more representative here than in the other three previous subclasses.

TABLE 8 – Change of configuration verbs and its prefixes

Prefix		**Examples**
a-	6	Agrupar, alistar
		To group, to (en)list
en-	15	Empilhar, encadear
		To pile, to chain
es-	6	Esfarelar, esmigalhar
		To crumble, to shatter
Total	**27**	

The presence of the prefix *es-* appears to be related to a semantic compatibility with the type of entity denoted by the root. Everytime *es-* is present in this type of verb, the reconfiguration of the internal argument implies a division in parts of an entity (36) or multiple entities (37),

[10] See Levinson (2014) for a treatment of root creation verbs.

which is not expressed by verbs with *en-* and *a-*, where only one entity (whole, of concrete or abstract nature) is created (ex. list, group, pile).

(36) esmigalhar (a bolacha) > criação de migalhas de bolacha
'crumble (the cookie)' > creation of cookie crumbs

(37) esburacar (o solo) > criação de buracos no solo
'to make holes in the ground' > creation of holes in the ground

Some studies consider *-es* as an aspectual prefix of iterative value in these verbs. Again, we believe that the idea of producing parts may be correlated to the presence of this piece, but it is not exclusive or inherent in it, since there are verbs which behave exactly like the verbs above, such as *fatiar* ('to slice'), and do not have affixes. On the other hand and in the same line of arguments, there are verbs with *-es* without the expression of iterative semantics (e.g. *esverdear* 'to turn green' and *estripar* 'to disembowel'). Once more we argue for the final semantics as a result of the root semantics and the locality of attachment of the prefix with it and not as a property of the morphological piece by itself.

4 Deriving the morphophonological form

In the previous section, we have offered a description of prefixes occurrence in transparent and compositional complex verbs, and we also have suggested a general analysis of its lower structure. In Distributed Morphology, each affix is potentially the phonological realization of a head. In technical terms, an affix form is potentially a vocabulary item inserted in a terminal node, which is composed of (a set of) features. In this section, we will investigate the principles that guide the specification and manipulation of features and the insertion of vocabulary items at the terminal node R mainly. As this paper focuses on the prefix realization, we will not discuss in detail vocabulary insertion at *v* and *Th* (theme vowel) heads, we leave it aside for future work. The analysis to be outlined below relies on the localist theory of allomorphy outlined in Embick (2010), which presents a version of Distributed Morphology theory called C1-LIN. This theory proposes that contextual allomorphy patterns are constrained by notions of locality based on the ideas of linearity (linear adjacency) and phase-cyclicality. It is a serialist view of morphological

and syntactic derivation, where each "step" of the derivation serves as input to the next and therefore can influence it, since they are in the same domain. Contextual allomorphy (or lexically conditioned allomorphy) for Distributed Morphology is determined during the process of vocabulary insertion, i.e., when terminal nodes receive phonological content. Compatible vocabulary items compete for insertion at a terminal node and the most specific is inserted. The allomorphy determined by this type of operation is always a form of suppletion, since it is not possible to derive one form from the other only by phonological operations, for example.

Furthermore, the theory assumes a syntactic derivation by phases (CHOMSKY, 2001) with cyclic spell-outs, which restrict the amount of information that is available in a given cycle of the derivation and the possible allomorphic interactions. Objects can interact only if they are active in the same computational cycle. The heads that trigger spell out are phase heads within the word, i.e., categorizers, always represented by lowercase letters.

The notion that categorizers define cyclic phases is very important for the analysis we will outline to the verbs in study. As pointed out in Marantz (2008), and also in Embick and Marantz (2008), there is a difference in the expected results in terms of semantic and phonological terms depending on the place of attachment of the affix and the head type. The first syntactic (categorial) heads that merge with bare roots define categories of words. The first categorizer head is in the inner domain of word formation, domain that seems to allow a special relation in terms of sound and meaning. The main generalizations that follow from the cyclic part of the theory are:

Considering that categorizers (*a*,*n*,*v*) are cyclic heads:

a. Allomorphy: For Root-attached x, special allomorphy for x may be determined by properties of the Root. A head x in the outer domain is not in a local relationship with the Root and thus cannot have its allomorphy determined by the Root.

b. Interpretation: The combination of Root-attached x and the Root might yield a special interpretation. When attached in the outer domain, the x heads yield predictable interpretations.

However, there is evidence to show that such a combination is very restrictive because elements in the external domain can suffer

root-conditioned allomorphy, provided that they are in certain structural configurations outlined below.

i. Allomorphic interactions occur based on locality factors defined by **cyclic** and **linear** domains (EMBICK, 2010, p.16-17):

a. . . . *a] x] Z] are concatenated, Z being a non-cyclic head, Generalization: Non-cyclic Z may show contextual allomorphy determined by a (and by x), as long as x is not overt.*

b. . . . *a] x] y] are concatenated, y being a cyclic head, Generalization: Cyclic y may not show contextual allomorphy determined by a, even if x is not overt.*

These two generalizations are based on two main hypotheses:

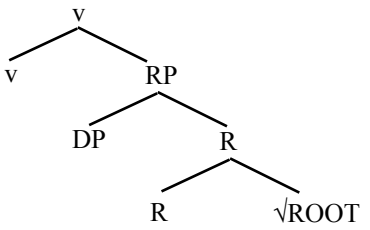
(H1) Contextual allomorphy is possible only with elements that are concatenated.

(H2) Cyclic Spell-Out domains define which nodes are present in a given cycle of PF computation and thus potentially ‘‘active’’ (capable of being referred to) for the purposes of contextual allomorphy. In some cases, superficially adjacent nodes cannot influence each other allomorphically because in terms of cyclic Spell-Out, they are not active in the same PF cycle.

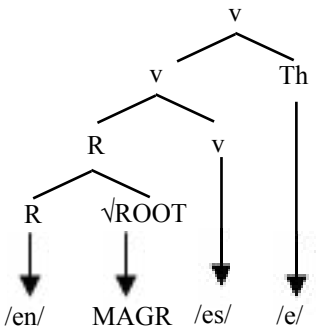
Returning to the analysis of BP data, we suggest that the lower syntactic structure associated with a complex prefix verb necessarily consists of four elements: the root, functional head R, *v* and *Th*. These structures may be provided latter in the derivation with *Voice* and other inflectional heads, which are not under investigation at this point (BASSANI, 2013, 2015). The following structure, which is central to all verbs of change, represents a complex head which proceeds to linearization / morphological reorganization after the syntax output. The head R is specified to precede the root, taking place superficially as a prefix, and *Th* is inserted after syntax (OLTRA-MASSUET, 2000).[11]

[11] At this point, we will not investigate the role of the DP (Determiner Phrase) internal argument in the interaction of terminal nodes. It is possible that the formation of the zero level *v* head occurs in some parallel way such that the phrasal phrase DP does not interfere with the linearization of inner heads of this projection.

(38) Syntactic structure



(39) Complex head



Complex verb *emagrecer* 'to lose weight'

The relevant predictions of C1-LIN theory to the interaction of morphemes in the structure (39) are as follows:

a. The root can contextually determine the form of R and *v*;

b. R cannot have its form determined by *v* and *Th* since the insertion occurs from the inner to the outer node;

c. *v* cannot have its form contextually determined by R because the root will never be phonologically null.

If proved that R insertion is contextually determined by the root, we will be contributing to an important theoretical discussion of Distributed Morphology theory about the nature of roots. Insertion at R occurs before a possible vocabulary insertion at the root node, since linearization is a morphological operation that must apply before vocabulary insertion, and which, in this case, places R linearly before the root. If it is proved that the insertion of R depends on the root, we must assume that the root has to be provided with phonological material before the first vocabulary insertion of the whole structure, at R. If there were late insertion for roots, there would be no material to determine the insertion of R. In the following sections we test and discuss the relevant predictions.

4.1 Vocabulary insertion at R: one or many prefixes?

We propose that the prefixes *a-*, *en-* and *es-* are vocabulary items that realize the functional head R, which minimally contains a purely functional relational feature [+ r]. We have seen that change of state, abstract possession and configuration verbs do not imply any physical transfer (PT below) and there is no directionality encoded in the formation (DIR), we have also seen that in change of concrete possession verbs there is some notion of physical transfer without specification of directionality and that in change of place verbs, there is apparently a directionally specified by the nature of the root (source of directionality - SDIR). The table below shows that in every subclass of verbs of change there is variation in the phonological form that realizes R, with some numerical trends:

TABLE 9 – Semantic class vs. prefix form vs. directionality expression

	Prefix						Directionality		
Semantic type	a-		en-		es-		PT	DIR	SDIR
Change of place	9	8%	**25**	20%	2	12%	✓	✓	ROOT
Change of concrete possession	11	10%	**25**	20%	1	6%	✓	×	-
Change of state	**75**	65%	53	42%	8	47%	×	×	-
Change of abstract possession	**14**	12%	9	7%	0	0%	×	×	-
Change of configuration	6	5%	**15**	12%	6	35%	×	×	-
Total	115	100%	127	100%	17	100%			

Being attested that the same prefix form can occur in classes where there is no expression of physical transfer or directionality and that it can also occur on a smaller scale correlated to these interpretations, the questions that arise are: how are the features of R specified? Does R carry directional features? There are two logical possibilities, that we will call analysis by total specification (A1) and analysis by underspecification (A2).

(A1) Total specification: for every node R there is a specific set of syntactic-semantic features that are realized by specific vocabulary items.

(A2) Underspecification: for every node R there are multiple syntactic-semantic features configurations depending on the element to which it attaches and there are multiple vocabulary items may be inserted in R.

The analysis by total specification is that in which R has a specific and predetermined set of features since List 1, and there are specific vocabulary items matching these nodes. The implication of this analysis is the assumption that there are three types of Rs, different but similar, and each set of features in each terminal node must have a corresponding vocabulary item in perfect compatibility as represented in sequence:

(A1) Analysis by total specification

TABLE 10 – Vocabulary items in A1

Node label	Node Features	Compatible Vocabulary Items
R1	[+r, +dir {near}]	/a/ ↔ [+r, +dir {near}]
R2	[+r, +dir {inside}]	/en/ ↔ [+r, +dir {inside}]
R3	[+r, +dir {out}]	/es/ ↔ [+r, +dir {out}]

This alternative is not empirically supported. The observation of the data shows us that the feature [+ dir], which represents general directionality, and its possible specifications {near}, {inside} and {out}, are rarely interpreted and depend crucially on the semantic type of the root.

Moreover, in such an analysis, the fact that we have the presence of prefixes *a-*, *en-* and *es-* in all semantic classes (except for *es-* in change of abstract possession) ends up as a simple case of homophony and, more generally, the analysis resembles a classic lexicalist one, resulting in a list of several homophonous prefixes organized by representativity, as exemplified below:

(40) For *a-:*

a-[1] = prefix of change of state;
a-[2] = prefix of change of abstract possession;
a-[3] = prefix of change of concrete possession;
a-[4] = prefix of change of place;
a-[5] = prefix of change of configuration;

(41) For *en-*:

en-[1] = prefix of change of state;
en-[2] = prefix of change of place;
en-[3] = prefix of change of concrete possession;
en-[4] = prefix of change of configuration;
en-[5] = prefix of change of abstract possession;

(42) For *es-*:

es-[1] = prefix of change of state;
es-[2] = prefix of change of configuration;
es-[3] = prefix of change of place;
es-[5] = prefix of change of concrete possession;

These lists are widely used in traditional grammars, but have no explanatory power. Moreover, they do not capture the semantic, morphological and structural similarities between the "many" homophones prefixes: it becomes a mere coincidence. Such complete homophony analysis applies well to cases such as the phonological form /a/ from Portuguese, for example, which is the phonological realization of a negative prefix (*anormal* 'abnormal'), can form verbs of change (*amaciar* 'to smooth') and is a definite feminine determiner (*a menina* 'the.FEM girl'). In this case, the set of features, the morphological and categorical environment of each of the forms are completely unrelated.

An analysis that works purely by locality of attachment is very attractive and compatible with DM and could also preserve the full specificity of R. However, it must also be discarded for the BP data based on empirical evidence. Svenonius (2004) argues that the division between lexical and superlexical prefixes should be analyzed in terms

of the different positions of the prefixes in a syntactic decomposition of the clausal structure. More precisely, he proposes that 'lexical' prefixes (with resultative, spatial and idiosyncratic meanings) are attached below the VP (Verb Phrase) and superlexical prefixes (with aspectual and quantificational meanings) are attached above VP. Let's look at the proposed structure for a Serbian word of that contains an inner prefix with resultative meaning (*iz-*) and an outer prefix with distributive meaning (*po-*):

(43) Po-iz-bac-i-va-ti
DSTR-*out-throw-v*-IMP-INF
'Throw out one by one' (SVENONIUS, 2004, p. 239)

We cannot pursue this type of analysis for our data because we have no empirical evidence to claim that possible different semantic contributions of prefixes *a-, en-* and *es-* are the result of different attachment *loci* in syntactic structure. As we have seen, evidence shows that they behave identically when it comes to argument structure and distributional properties and must be attached below *v*P.

(A2) Analysis by Underspecification

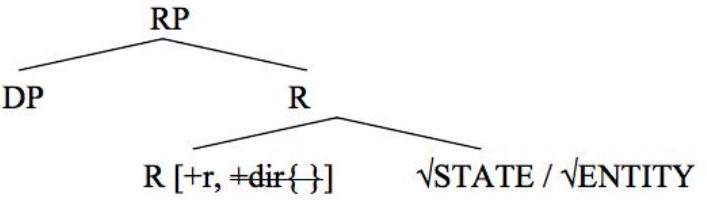
The facts that make us disregard (A1) lead us to conclude that the supposed prefix directionality is residual and structurally defined. It is residual because the heads realized by *-a*, *en-* and *es-* must have been intrinsic directional at some point in time, but it is not true for the majority of the cases now, and when it is present (in a minority of cases) it is structurally defined in the sense that it shows up only in combination with certain root types.

For these reasons, we propose here an analysis in which the directional features in the terminal node are deleted (or become opaque) from the syntax when the root is not able to "activate" them, and then it makes competition for vocabulary items possible at the moment of vocabulary insertion, causing contextual allomorphy. We have to assume a deleting operation other than classical Impoverishment, as proposed in Bonet (1991) and Halle and Marantz (1993), since when Impoverishment applies it causes post-syntactic deletion of features and do not prevent its interpretation at LF. As directional features are not interpreted when

relevant roots are not present, we propose their (non) activation in the syntax before spell-out and hence before vocabulary insertion.

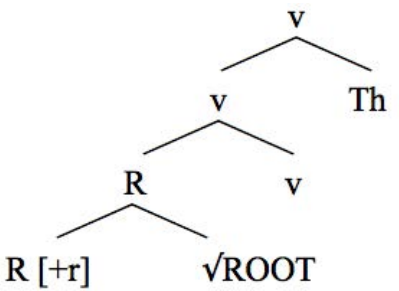
In the derivation of a change of state verb, a change of abstract possession verb, or a change of configuration verb the possible directional features of R are irrelevant and are thus not interpreted.

(44) Change of state / abstract possession / configuration RP clause



We propose the derivation of these subclasses happen in the following way: in the syntax, the R head merges with roots of the type state or entity. As these roots do not make any directional feature of the head R to be relevant, there is only one relational feature in R, represented by [+r]. After the complex head is linearized, the result is a complex verb head like the one below in the structure (45), and in (46) we represent the concatenation patterns derived from the structure:

(45) Complex verb after linearization



(46) R∩√ROOT∩v∩Th

During vocabulary insertion, the vocabulary items competing for insertion at R must be underspecified as proposed in (47).

(47) Eligible VIs for insertion
a. /a-/ ↔ [+r]
b. /en-/ ↔ [+r]
c. /es-/ ↔ [+r]

If they are fully specified as drafted in hypothesis A1, insertion will not be possible since there will be conflicting features between the VI and the terminal node in cases like this, where directional features are not present. Besides, the information that the VI to be inserted has affix nature has to be added so that prepositions, non-affix VIs, are not part of the competition for insertion in R as they possibly also have the feature [+r].

According to the subset principle as defined below (HALLE, 1997, p. 128), and considering the feature present in R and the eligible VIs, all items above have the same chances of insertion at R:

> Subset principle: The phonological exponent of a vocabulary item is inserted into a morpheme in the terminal string if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.

The first hypothesis to investigate is whether the insertion of R could be guided by purely phonological conditioning of the root, since they end up directly concatenated after syntax. That is, could the first segment of root or its prosodic form determine the choice among items a, b and c above? In fact there are two general phonological restrictions on prefix attachment: 1) only Roots started by consonants can be prefixed; when the Root is started by a vowel, only suffixation is available (with very few exceptions), as in (48), or the formation of a verb with no affixes, as in (49); 2) there are no cases of attachment of prefix *es-* to roots started by strident fricatives ([s], [ʒ], [ʃ]). In additional to the discussion made above, in a theoretical level, this phonological sensitivity to the root first

segment form is strong evidence that late insertion does not occur for Roots since it proceeds first in the prefix node.

(48)	a. ameno	'mild'
	b. *a/en/es.amen.ar	'to ease'
	c. amen.iz.ar	'to ease'
(49)	a. azul	'blue'
	b. *a/en/es.azul.ar	'to turn blue'
	c. azular	'to turn blue'

In other cases, the forms /a/, /en/ and /es/ can be attached before all consonants. Furthermore, although our research on this topic is brief, it does not seem that there are prosodic constraints for prefixation, since it occurs with bases of one, two and three syllables, and the position of the stress on the base also appears to have no influence in this respect. In this sense, we can disregard the hypothesis that phonology guides the choice among a, b and c. However, the phonological rules applying between the prefix and the Root serve as evidence for the proposed structure, with R attaching inside *v*P.

The second hypothesis to be investigated is whether the choice of the form of R may be guided by the form of *v*. Although this possibility is not predicted by C1-LIN theory, since they are not directly concatenated, it is worth empirical scrutiny, since positive results in this regard would be evidence to prove the existence of circumfixes (as assumed by Pereira (2007) and Rio-Torto (2004)). In the case of the verb *emagrecer* ("to lose weight"), for example, we would have to assume that the insertion in R and *v* occurs at the same time and that *en-x-ec* is a circumfix. There are two empirical arguments to discard this hypothesis, one of them has already have advanced in more general terms, and there is one extra theoretical argument.

The first empirical argument is based on the independent occurrence of such prefixes and suffixes. The data in table 11, below, show contexts in which prefixes occur either alone (column 2) or with different suffixes (columns 1 and 3). Furthermore, the same suffix occurs concomitantly with the three prefixes (column 1) and also with no prefixes (column 4) and the same prefix occurs in different contexts (rows 1, 2

and 3). Also, consider the data in column 1 in comparison with 2 and 3: the same prefix form co-occurs with different theme vowels.[12]

TABLE 11 – Evidence against circumfixes

	1		2		3		4
1	**a**-madur-**ec**-er	***vs.***	**a**-maci-**Ø**-ar	***vs.***	**a**-senhor-**e**-ar	***vs.***	rod-**e**-ar
	vs.		vs.		vs.		***vs.***
2	**en**-magr-**ec**-er	***vs.***	**en**-gord-**Ø**-ar	***vs.***	**en**-coler-**iz**-ar	***vs.***	cristal-**iz**-ar
	vs.		vs.		vs.		***vs.***
3	**es**-clar-**ec**-er	***vs.***	**es**-vazi-**Ø**-ar	***vs.***	**es**-quart-**ej**-ar	***vs.***	plan-**ej**-ar

The second empirical argument is based on the existence of doublets or morphological pairs like the following:

(50) Doublets

a. **en**-ric-Ø-ar *vs*. e**n**-riqu-**ec**-er ‘to enrich’

b. **en**-doid-Ø-ar *vs*. e**n**-doid-**ec**-er ‘to freak out’

If the prefix choice did in fact influence the suffix choice, or vice versa, these pairs should not have the same meaning, and they do. If the meanings were different, we could think of different (semantic) functional heads R and *v* and the contexts of insertion could be different, but this is not the case. In addition to the empirical arguments, we believe that the fact that there is no other case of circumfixation in Portuguese is also a valid theoretical argument to rule out this analysis.

After discarding phonological conditioning and contextual conditioning by *v*, the alternative left then is that the choice of the prefix form is purely idiosyncratic and depends on contextual allomorphy determined by the Root. This alternative is covered by C1-LIN theory and attests its predictions in the following way: it partially attests

[12] First column shows vowel *e* for second conjugation verbs and the other cells vowel *a* for first conjugation class. Third conjugation class vowel *i* is restricted to non-transparent complex verbs (BASSANI, 2015). We won’t be able to fully explore it in this paper, but theme vowel data shows that insertion at R is not influenced by Th and vice versa, as predicted by C1-LIN.

prediction a. and fully attests prediction b. reproduced below and, at the same time, presents itself as empirical evidence against the idea of late insertion for roots.

a. The root can contextually determine the form of R and *v*;

b. R cannot have its form determined by *v* and *Th* since the insertion occurs from the inner to the outer node;

The vocabulary items in (47) a, b and c above, which are equally eligible for insertion at R in all the structures below could generate *emagrecer, amagrecer, esmagrecer* as much as *aquartejar, enquartear, esquartejar* and *afeitiçar, enfeitiçar and esfeitiçar*.

(51) Rule 1 for insertion in [+r]

a. [+r] ↔ /a//__∩√LIST-A
(List-A: *amanhecer, amaciar, abençoar*...)

b. [+r] ↔ /en//__∩√LIST-B
(List-B: *emagrecer, empilhar, encolerizar*...)

c. [+r] ↔ /es//__∩√LIST-C
(List-C: *esvaziar, esquartejar, esclarecer*...)

Therefore, we must assume that there is contextual information specified in vocabulary items in the form of lists of roots, as shown above, in vocabulary insertion rules to be read as follows: a. the feature [+r] is phonologically realized as /a/ when concatenated with Roots from a list of Roots, say List A; the feature [+r] is phonologically realized as /en/ when concatenated with Roots from a list of Roots, say List B; the feature [+r] is realized phonologically as /es/ when concatenated with Roots from a list of Roots, say List C. The multiple realizations of the same feature by different phonological forms is a case of contextual allomorphy.

Our analysis of this kind of choice as idiosyncratic leads us to the predictions that this specification must be learned by native speakers and also during second language acquisition. We won't be able to investigate such predictions now, but it is expected that speakers produce mismatches during the acquisition of complex verbs, so that a different prefix is used instead of the expected one.

At this time, we can clearly distinguish two types of allomorphy defined by the components in which they are derived. In the case of contextual root conditioning, the allomorphy occurs at the moment of vocabulary insertion, different from phonologically conditioned allomorphy that is given in PF. Therefore, the allomorphy present in change of state verbs *amaciar* (to smooth), *emagrecer* (to lose weight) and *esvaziar* (to empty) is contextual while the allomorphy in *engordar* (to fatten) and *emagrecer* is phonological, since it is the alternation between /en/~/em/~/e/ caused by application of assimilation followed by deletion (dissimilation):

(52) en∩√magr-

a. /n/ → [m] / __ [+ bilabial] emmagr-

b. /m/ → Ø / __ [m] emagr-

The derivation of change of place and change of concrete possession have to be different from change of state, possession and configuration verbs since the former shows directionality influenced by the nature of the root, which is a place, and the latter have non-specified directionality also influenced by the specific concrete nature of the root. In the second case, there is only one physical transfer without specification of directionality of movement. In other words, the feature [+dir] needs to be interpreted at LF in these structures. We propose the next two structures to be derived for these cases along with examples resumed for clarity:

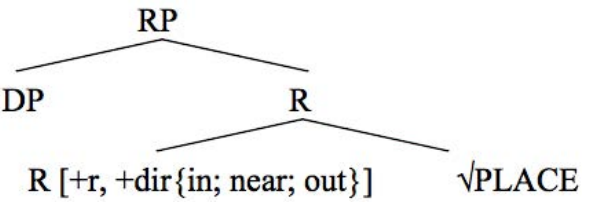
(53) Change of place verbs

c. **a**-prision-a-r
PREF-√prison-TV-INF
'to imprison'

d. **en**-garraf-a-r
PREF-√bottle-TV-INF
'to bottle'

e. **ex-**√patri-a-r
PREF-country-TV-INF
'to send out of country'

(54) Change of place verbs RP clause



Data suggests that in change of place verbs the piece *en-* is correlated to the feature [+dir {in}] while *a-* is less specified and *es-* is very residual. It seems like that *en-* is the only piece that still carries some kind of compatibility to be written in its insertion rule. However, it is a fact that this compatibility is not relevant when roots are properties of states, for example, and *en-* is still widely inserted (as in *enfraquecer* 'to weaken', *empobrecer* 'to impoverish', and *encurtar* 'to shorten').

For this reason, we are going to propose that there are two homophonous vocabulary items: the one described in (47)b and resumed in a. below is inserted in change of state, change of abstract possession and change of configuration verbs and the one in b. below is inserted in change of places verbs:

(55) Homophonous vocabulary items for -en:

a. /en-/ ↔ [+r]

b. /en-/ ↔ [+r, +dir{in}]

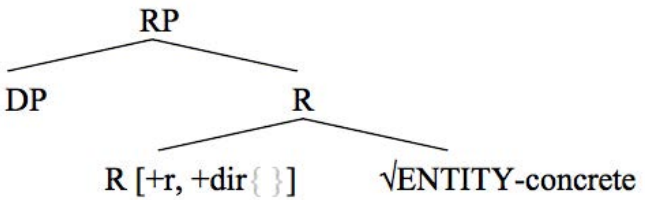
As *es-* is very residual, we don't have enough consistent evidence to propose a vocabulary item related to [+dir {out}]. Evidence for this comes from the fact that *es-* is not able to form new words. The feature out is only productively encoded in roots that form verbs like *tirar* ('take out'), *remover* ('take away, remove') and in *fora* ('out'). As the directionality encoded in verbs with *a-* is light and seems to be inserted in the general case, we can still use the same vocabulary item inserted in change of state, change of abstract possession and change of configuration verbs. For verbs of change of concrete possession, we assume that the nature of the root makes possible for the directional interpretation to remain visible, but do not further specify the directional feature. Then, we propose the following structure to be derived.

(56) Change of concrete possession verbs

a. **a**-carpet-a-r
PREF-√carpet-TV-INF
'to carpet'

b. **e**-moldur-a-r
PREF-√frame-TV-INF
'to frame'

(57) Change of concrete possession RP clause



In relation to insertion rules, we have seen that there are no requirements of compatibilities between the types of root and the pieces inserted. For this reason, we can use the same vocabulary items proposed in (47) for change of concrete and change of abstract possession verbs, and we will assume that the choice of the allomorph is idiosyncratic. The fact that *en-* is numerically greater than in this subclass *a-* remains as a coincidence.

We conclude that this lack of directional information encoded in the vocabulary items is due to the fact that encoded directionality in the verb in BP has decreased, and is perhaps fossilized information in the data analyzed. Evidence for this come from data like the ones from (58) through (63), which are apparent cases of redundancy in which the directionality previously encoded in the prefix within the verb happens to be encoded out of it, in a PP element. Bassani (2015, p. 124) presents data that shows that speakers do not interpret directionality in the fossilized prefixes ((58) to (61)):

(58) Extrair p(a)ra fora
Extract to out

(59) Inserir p(a)ra dentro
Insert to inside

(60) Atrair p(a)ra perto
Attract to near

(61) Expelir p(a)ra fora
Expel to out

(62) Subir p(a)ra cima
Move up to up

(63) Descer p(a)ra baixo
Come down to down

As this paper focuses on the study of prefixes it is not our primary concern to detail the analysis for the vocabulary insertion at *v*. However, we have evidence to conclude that the insertion at *v* can be contextually determined by the root or by a categorizer merged before *v* (n or a), so it is also defined by locality conditions. Within this scenario, the alleged prefix-suffix dependence in change verbs is an epiphenomenon derived from the fact that both vocabularies insertions at R and *v* occur in a context in which both are directly concatenated with the root, as in the representation in (46) resumed in (64).

(64) R∩√ROOT∩v∩Th

5 Concluding remarks

The main contributions of this paper are situated within the search of a better understanding about the internal structure associated with complex verbal heads, as part of the ongoing research program of Distributed Morphology, but which has been theme of discussion of many approaches, such as Lexical Semantics and Nanosyntax. For this, we have focused on prefixes in Brazilian Portuguese verbs of change. We have proposed that these prefixes are the phonological realization of an inner and active functional head labeled R attaching outside the Root domain, but not above the first Categorizer/Cyclic Head *v,* which

minimally contain the feature [+r]. We have also offered a detailed description of four semantic subclasses regarding the root meaning in order to investigate the correlations between the pieces of morphology, root semantics and argument structure. We came to the conclusion that the feature [+dir], which represents general directionality, and the possible specifications {near}, {inside} and {out} as dependent and specific features of [+dir], is rarely interpreted and depend crucially on the semantic type of the root. With this, we hope to have made clear the relevance of the root semantics in locality with the head R to derive the interpretation of the structures.

Concerning the prefix form, we have not found strong evidence associating a unique type of prefix to a particular Root or structure. We have evaluated two working hypothesis for the vocabulary insertion at R: total specification and underspecification. We have argued for an analysis by underspecification of the vocabulary items and made use of contextual conditioning of the root to explain the prefix choice, what characterizes a case of contextual allomorphy. We also have called attention to the fact that the apparent prefix-suffix dependence in change verbs is an epiphenomenon derived from the fact that both vocabularies insertions at R and *v* occur in a context in which both are directly concatenated with the root.

It may seem that our analysis for insertion at *v* and R is too idiosyncratic. However, it confirms in BP data the known fact that the choice of prefixes in Romance languages is widely idiosyncratic. This fact alone leads us to confirm that the choice of prefix and suffixes forms is, in fact, guided by idiosyncrasy and therefore is specific to each language. Observe the differences in the table below where we compare a small amount of verbs in Portuguese, Catalan, Spanish, French, Italian and Galician[13]. Even in Latin, in inchoative verbs, there are big prefix differences. Take for example the difference between *duresco* and *vesparesco* corresponding to *endurecer* (to harden) and *entardecer* (to become evening) respectively.

[13] An anonymous reviewer has pointed out that some translations and uses among the Romance verbs are not completely comparable and that English translations are not always exact. The comment is relevant and could lead to a fine-grained inspection, but the main objective of this table is to show in general terms that the realization of the prefixes may vary in form and sometimes are non-existent in somehow related verbs.

TABLE 12 – Comparison of (prefix) verbs in some Romance languages

	Portuguese	**Catalan**	**Spanish**	**French**	**Galician**	**Italian**	**English**
1	**a**doçar	**en**dolcir **en**dolçar **en**dulzar	**en**dulzar	sucrer **a**doucir	**a**doçar	**a**ddolcire	to sweeten
2	**a**molecer	**A**blanir **a**blandar	**a**blandar	**a**mollir	**a**molecer	mollificare	to soften
3	**a**noitecer	-	**a**nochecer	Faire nuite	**a**noitecer **a**nochecer	Fare notte	to become night
4	**en**tardecer	-	**a**tardecer	-	**a**tardecer **e**ntardecer	-	to become noon
5	**en**durecer	**en**durir	**en**durecer	durcir	**en**durecer	**in**durire	to harden
6	**en**ganchar	**en**ganxar	**en**ganchar	**a**ccrocher	**en**ganchar	**a**gganciare	to hook
7	**en**saboar	-	**en**jabonar	savoner	**en**saboar	**In**saponare	to soap
8	**en**sacar	-		**en**sacher	**en**sacar	**in**saccare	to bag
9	**es**clarecer	**a**clarir	**es**clarecer	éclaicir	**a**clarar	schiarare	to clarify
10	**es**friar	**Re**fredar **en**fredorir	**en**friar	**re**froidir	**a**rrefriar **es**friar	freddare	to cool down
11	**es**quartejar	-		écarteler	**es**quartejar	macellare	to quarter
12	**es**quentar	**es**calfar	calentar	échauffer	quentar	scaldáre	to heat
13	**es**vaziar	buidar	vaciar	vider	**es**vaziar	svuotare	to empty

We conclude then that despite the fact that the prefix phonological form is defined in idiosyncratic ways, its presence is deeply related to a certain syntactic configuration, giving support to constructionist approaches to word formation.

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Appendix

1. acompanhar	2. aproveitar	3. assegurar
4. apontar	5. aprimorar	6. amanhecer
7. acreditar	8. esclarecer	9. aproximar
10. apurar	11. acertar	12. alinhar
13. encher	14. ajustar	15. aperfeiçoar
16. encobertar	17. emagrecer	18. arriscar
19. associar	20. engravidar	21. apaixonar
22. aquecer	23. anular	24. incorporar
25. esquentar	26. enlouquecer	27. acalmar
28. enterrar	29. acomodar	30. esfriar
31. abaixar	32. abastecer	33. embarcar
34. acostumar	35. assustar	36. enriquecer
37. enquadrar	38. envelhecer	39. endurecer
40. engordar	41. agravar	42. agrupar
43. esvaziar	44. abençoar	45. anoitecer
46. afundar	47. alisar	48. encurtar
49. adentrar	50. ajuizar	51. alongar
52. aconselhar	53. acampar	54. apressar
55. emplacar	56. engrossar	57. aprontar
58. encorajar	59. atenuar	60. amadurecer
61. apropriar	62. embasar	63. afinar
64. apimentar	65. enfraquecer	66. envenenar
67. alargar	68. ajeitar	69. empacotar
70. emoldurar	71. embelezar	72. adormecer
73. arruinar	74. envergonhar	75. alagar
76. arrolar	77. aportar	78. alistar
79. engomar	80. atormentar	81. adoecer
82. apodrecer	83. afixar	84. empilhar
85. engrandecer	86. amaciar	87. amolecer

88. estremecer	89. abrandar	90. enfocar
91. apoderar	92. acondicionar	93. abrilhantar
94. amansar	95. evaporar	96. acobertar
97. adoçar	98. abreviar	99. encarecer
100. afrouxar	101. encenar	102. aterrar
103. ajuntar	104. aterriz(ss)ar	105. aprisionar
106. endividar	107. abrasar	108. endireitar
109. assemelhar	110. acasalar	111. empossar
112. amortecer	113. embolsar	114. arredondar
115. apossar	116. encapar	117. amaldiçoar
118. entristecer	119. encerar	120. afamar
121. enamorar	122. alumiar	123. acalentar
124. engraxar	125. ensacar	126. entortar
127. expropriar	128. apavorar	129. avivar
130. embebedar	131. amornar	132. intitular
133. acorrentar	134. aquietar	135. empobrecer
136. enturmar	137. engessar	138. encarcerar
139. esquartejar	140. agraciar	141. enfeitiçar
142. apadrinhar	143. encadernar	144. enlaçar
145. enraizar	146. aplainar/aplanar	147. encurralar
148. enrijecer	149. engarrafar	150. enferrujar
151. enredar	152. enfurecer	153. aninhar
154. envasar	155. amordaçar	156. abacalhoar
157. intoxicar	158. entorpecer	159. apenar
160. engavetar	161. encapsular	162. incandescer
163. ensaboar	164. acovardar	165. entalhar
166. adensar	167. envernizar	168. encadear
169. endeusar	170. atemorizar	171. empenar
172. encaixotar	173. esfarelar	174. aparafusar
175. enfileirar	176. enrugar	177. enovelar

178. emudecer	179. enformar	180. endoidar
181. endoidecer	182. embandeirar	183. enegrecer
184. enobrecer	185. encolerizar	186. agigantar
187. avolumar	188. empalidecer	189. exorbitar
190. emburrecer	191. enfeixar	192. enervar
193. enternecer	194. emparedar	195. enojar
196. inseminar	197. encaçapar	198. acamar
199. enfaixar	200. enfitar	201. assenhorear
202. esmigalhar	203. enlatar	204. enfarinhar
205. enlamear	206. avermelhar	207. enfurnar
208. enrubescer	209. esverdear	210. encapotar
211. enodoar	212. amesquinhar	213. abalizar
214. encurvar	215. entubar	216. acolchoar
217. empalhar	218. empapar	219. encrespar
220. embranquecer	221. enjaular	222. empedrar
223. afofar	224. incrustar	225. emprenhar
226. entrincheirar	227. enricar	228. enraivecer
229. aleitar	230. ensurdecer	231. afivelar
232. embrutecer	233. aferventar	234. aligeirar
235. enlutar	236. encaroçar	237. empoeirar
238. extenuar	239. empoleirar	240. aquartelar
241. emborrachar	242. assalariar	243. envidraçar
244. afervorar	245. esfarrapar	246. avassalar
247. encucar	248. encestar	249. enevoar
250. espedaçar	251. aculturar	252. esburacar
253. estripar	254. expatriar	255. atarraxar
256. abarrancar	257. engaiolar	258. embravecer
259. enviesar		