A polysemy account of alternating verbs of creation in Brazilian Portuguese

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Abstract: Verbs of creation such as write and paint, in English and in other languages, occur in two distinct types of sentences: transitive or intransitive (the teacher wrote the letter/the teacher wrote (a lot) and the artist painted a picture/the artist painted (a lot)). In this paper, we provide an analysis of such syntactic alternation, drawing on data from Brazilian Portuguese. We argue that this syntactic phenomenon is triggered by a semantic process of polysemy, and not by an argument alternation, as is assumed by some authors. We show evidence to support our proposal, namely, the distinct aspeclcal interpretations of the different sentences with verbs of creation, the distinct prefixation with re- in the transitive and intransitive forms, and the polysemy found in the nominalizations of the analyzed verbs. In order to formalize our semantic account, we propose a type of representation, a predicate decomposition structure enriched by a simple truth-conditional semantics of the root.

Key words: verbs of creation; verbal polysemy; Brazilian Portuguese.

1 Alternating verbs of creation: a problem for semantic analysis

Verbs of creation are traditionally defined as verbs denoting eventualities in which a physical or abstract entity is created by means of the action named by the verb (Dowty 1979; Levin 1993; Piñón 2008, Piñón 2010; Stechow 2001). In both English (Dowty 1979; Van Valin 2005; Grimshaw 2005) and Brazilian Portuguese (henceforth BP), some of these verbs occur in two types of syntactic structure: a transitive one, with an agent argument in subject position
and a patient/created/result argument\(^1\) in direct object position, and an intransitive one, with the agent argument in subject position. We show some examples from BP below:\(^2\)

\[(1) \quad \text{O professor escreveu a carta.} \quad \text{The teacher wrote the letter.}\]
\[(2) \quad \text{O professor escreveu.} \quad \text{The teacher wrote.}\]
\[(3) \quad \text{Adriana pintou um quadro.} \quad \text{Adriana painted a picture.}\]
\[(4) \quad \text{Adriana pintou.} \quad \text{Adriana painted.}\]

This syntactic behavior poses an interesting problem for the semantic analysis of verbs of creation. If these verbs lexically entail (Dowty 1991) the creation of an entity, why is it possible for them to occur in a perfectly grammatical sentence like the ones exemplified in (2) and (4)? According to Levin (1993, 1999), verbs of creation such as the English examples *write* and *paint* participate in an argument alternation named “unspecified object alternation”, which is a common property of transitive activity verbs. This phenomenon can be exemplified, in a more typical case, by the following pair of sentences:

\[(5) \quad \text{a. Brian was wiping the counter.} \]
\[\quad \text{b. Brian was wiping.}\]

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\(^1\) Many thematic roles are proposed in the literature for the internal argument of verbs of creation (see Van Valin [2005] and Dowty [1991]). Here, we mention thematic roles only as a descriptive tool to identify arguments, with no theoretical implications.

\(^2\) For the realization of this research, 21 BP verbs of creation were analyzed (taken from Amaral [2013]). Among those, only 11 have intransitive forms: bordar ‘embroider’, colorir ‘color’, costurar ‘sew’, datilografar ‘type (in typing machine)’, desenhar ‘draw’, digitar ‘type (in computer)’, escrever ‘write’, esculpir ‘sculpt’, pintar ‘paint’, tecer ‘weave’, and tricô ‘knit’. Some examples of verbs that occur only in the transitive form are confeccionar ‘confection’, construir ‘build’, elaborar ‘elaborate’, fabricar ‘manufacture’, and redigir ‘write’. 

Transitive activity verbs, such as *wipe*, describe the manner in which an action is performed by the agent, and not the result of this action on the patient (Rappaport Hovav and Levin 2010). Thus, the omission of the second argument in these cases occurs naturally (Levin 1999). The problem of assuming this analysis for *write* and *paint* is that these verbs are not activity verbs, but denote accomplishments in their transitive form (Dowty 1979; Rothstein 2004; Van Valin 2005; Grimshaw 2005). Rappaport Hovav and Levin (2010) argue that accomplishment verbs describe and specify the result of the action, thus, it is not expected for them to occur without the direct object, which indicates the affected or created argument, the one that carries out the final result. Even when these verbs have an atelic interpretation with mass or bare plural internal arguments, they seem to specify the result of the action; thus, not even in these cases it would be expected for them to occur without direct objects. In this context, some questions are raised: how can we account for the occurrence of accomplishment/result verbs in a syntactic structure typical of activity/manner verbs? If these verbs denote accomplishments, specify the result of the action, how is it possible for them to occur without the direct object?

With these questions in mind, we hope to develop in this paper a satisfactory semantic account of verbs of creation in BP that could explain this odd behavior. Our hypothesis is that the syntactic shifts shown in examples (1)-(4) above are not the result of the unspecified object alternation, as assumed in Levin (1993); rather, they are the result of a process of polysemy. The aim of this paper is to support that hypothesis with evidence from BP. In order to make explicit the distinct senses of polysemous verbs and the similarities between related senses of the same verb, we also propose a type of lexical-semantic representation. In our analysis, each of these verbs has several distinct, but related, senses, and each sense is associated with a different syntactic structure and a different aspectual class.

If this analysis is correct, we do not need to assume that verbs of creation are accomplishments which have their direct object arguments deleted by some process of argument alternation, as activity verbs do. Rather, we can simply say that *paint* and *write* are polysemous. In one sense, the creation sense, they are result verbs, denote accomplishments, and are related to a transitive syntactic form, just like other accomplishment verbs. In another sense, which we can think of as the non-creation sense, for now, they are manner verbs, they

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3 This will be discussed in Section 3.
denote activities, and are related to an intransitive syntactic form, like other intransitive activity verbs. Levin and Rappaport Hovav (2013) make a similar claim, arguing that verbs like cut and climb, which seem to specify both the manner and the result of the action, are actually polysemous between a manner reading and a result reading.

In Section 2, we explore the concept of verbal polysemy and show how it applies to the data presented; in Section 3, we show evidence to support our proposal; in Section 4, we delineate a semantic representation for the different senses of the verbs of creation; we present our final remarks in Section 5. This paper is based on a preliminary analysis of the class of verbs of creation in BP found in Amaral and Cançado (2014a).

2 The concept of verbal polysemy and how it applies to verbs of creation

2.1 Defining and diagnosing verbal polysemy

Polysemy is a lexical-semantic process which is very productive in natural languages. Traditionally, it is defined as a case of lexical ambiguity and it happens when a single word assumes several related senses. It differs from homonymy, the kind of lexical ambiguity in which different lexemes happen to have the same pronunciation. Polysemous words are generally analyzed as a single lexeme which has many distinguishable senses, related to each other (Panman 1982). Some examples are book (with the interpretations ‘physical entity made of paper with pages and a cover’, as in this book has 200 pages, and ‘content of physical entity made of paper with pages and a cover’, as in his book is about religion) and bank (with the interpretations ‘financial institution’, as in this bank makes a lot of money, and ‘building of financial institution’, as in this bank is very tall).

In more recent literature, the traditional definition of polysemy remains widely accepted (Pustejovsky and Boguraev 1996; Taylor 2003; Pinker 2008; Murphy 2010; Pustejovsky 2014; among others). However, it still raises a number of questions. Taylor (2003), for example, is concerned about how exactly could we identify different senses of a word, and if we manage to do so, how could we determine if these senses are truly related. It turns out that not all cases of polysemy are as clear-cut as the examples shown above (book and bank). Thus, based on work on lexical semantics, more specifically on Cançado et al. (2013) and Pustejovsky (2014), we identified two characteristics of polysemy, besides the intuitive meaning distinction, which can help us identify multiple senses in a single word. Based on Cann (1993) and Damasceno
(2006), we assume that distinct senses are related when they share at least one significant semantic feature. We focus our attention on verbal polysemy.

If a verb is polysemous, we can intuitively distinguish two or more related senses for it. In BP, for example, *subir* means ‘come up’, as in *ele subiu para o apartamento* ‘he came up to the apartment’, and ‘rise/raise’, as in *o salário subiu* ‘the salary rose’. According to Damasceno (2006), these senses are related, since ‘coming up’ is metaphorized into a more abstract sense of ‘rising/raising’. The author points out that the basic idea behind both senses (the common semantic feature) is to put something in a higher position in some kind of scale. Another example is *encer*, which means ‘fill’, as in *ele encheu o balde de água* ‘he filled the bucket with water’, and ‘annoy’, as in *ele encheu a sua mãe* ‘he annoyed his mother’. These two senses are also related, according to Damasceno (2006); the psychological verb *encer* is also a metaphorization of the physical meaning ‘fill’. The author notes that the relational idea between both senses is to put something inside; first in a physical sense, then, in a psychological sense.

Besides this first intuitive argument, there are other properties of polysemous verbs which help us provide a clearer analysis. One interesting fact about verbal polysemy is that it affects syntactic properties, like transitivity and the occurrence of the verbs in argument alternations, as argued for by Cançado et al. (2013) and Pustejovsky (2014). Levin and Rappaport Hovav (1995) argue that verbs with the same semantic properties behave alike in syntax. Verbs of change of state, for example, all occur in the causative-inchoative alternation. Since semantics determines syntax, a meaning shift caused by polysemy impacts syntactic structure, as also argued for by the authors. Cançado et al. (2013) show that the change of state verb *uniformizar* ‘make uniform’ occurs in the causative-inchoative alternation. However, this verb is polysemous and can also be interpreted as ‘put on uniform’. In this latter sense, it is not a change of state verb, but a locatum verb (Hale and Keyser, 2002), and does not participate in the causative-inchoative alternation. In fact, Iwata (2002) argues that verb classes, such as “change of state verbs” and “locatum verbs”, are not classes of verbs *per se*, but are classes of

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4 As Panman (1982) points out, not all semantic features can be used to relate two senses. For example, different senses of prototypical homonymous words such as *bar* (‘place to get drinks’ or ‘rigid piece of wood, metal, or similar material’) share the semantic feature [+physical object]. In fact, Panman (1982: 117) argues that “the distinction between relatedness versus unrelatedness of meaning appears to be rather a matter of degree than a simple dichotomy between presence and absence of similarity in meaning.”.

5 *Subir* can be translated into *rise*, in its intransitive form, or into *raise*, in its transitive form. BP has a single verb which encompasses the use of both *rise* and *raise* in English.

6 The causative-inchoative alternation can be exemplified by the pair of sentences *the boy broke the glass/the glass broke*. For a study of this alternation in BP, see Cançado et al. (2013). The authors present a study of several BP verb classes and alternations.
senses of verbs. Thus, a polysemous verb behaves differently in syntax and belongs to different classes, depending on the meaning assumed in a sentence. This property can be useful in distinguishing different senses of the same lexeme, as we exemplify below with *subir* and *encher*.

*Subir* meaning ‘come up’ belongs to the class of directed motion verbs (Levin 1993) and takes a subject and a complement PP headed by *para* ‘for’, which indicate the agent and goal arguments, respectively. We illustrate this meaning of *subir* with the repeated sentence in (6):

(6) Ele subiu para o apartamento.

he came.up for the apartment

‘He came up to the apartment.’

When the same verb means ‘rise/raise’, it denotes a kind of change and ceases to belong to the directed motion class, having different syntactic properties. The verb may take a subject which indicates the patient argument or the agent argument, in an alternation which is similar to the causative-inchoative alternation:

(7) O salário dos funcionários subiu./ O chefe subiu o salário dos funcionários.

the salary of.the employees rose / the boss raised the salary of.the employees

‘The employees’ salary rose.’/ ‘The boss raised the employees’ salaries.’

The same change in syntactic properties occurs with *encher*. *Encher* meaning ‘fill’ has a third argument, the object which fills the container (a complement PP headed by *de* ‘of’) and is a change of state verb, so it participates in the causative-inchoative alternation, as we illustrate below (Cançado et al. 2013):

(8) Ele encheu o balde de água./ O balde se=encehou de água.

he filled the bucket of water/ the bucket REF=filled of water

‘He filled the bucket with water.’/‘The bucket filled with water.’
In the same way, *encher* meaning ‘annoy’ is a change of state verb, so it occurs in the causative-inchoative alternation:

(9) \[
\begin{align*}
\text{Ele } & \text{ encheu sua mãe./ Sua mãe se}=\text{ encheu.} \\
\text{he } & \text{ annoyed his mother/ his mother } \text{ REFL=} \text{ annoyed}
\end{align*}
\]

‘He annoyed his mother.’/’His mother annoyed.’

However, in this latter sense, the verb does not take a third argument:

(10) \[
\begin{align*}
* \text{ Ele } & \text{ encheu sua mãe } \text{ de algo.} \\
\text{he } & \text{ annoyed his mother } \text{ of something}
\end{align*}
\]

With these examples, we can identify the characteristic of polysemous verbs we have cited above (Cançado et al. 2013, Pustejovsky, 2014): for each sense of these ambiguous lexical items, there may be distinct syntactic properties.

Another important characteristic of verbal polysemy is that it is idiosyncratic in one sense, as also argued for by Cançado et al. (2013). There are cases of what is called regular or systematic polysemy (Apresjan 1974; Pustejovsky 1995; Copestake and Briscoe 1996; Pinker 2008; among others), but this regularity is related to semantic fields and to the fact that words in the same semantic field tend to go through the same process of polysemy, assuming similar senses. Murphy (2010) exemplifies these cases with the words *box* and *bottle*, which, being in the same semantic field, have the same polysemous meanings: ‘container’, as in *we put the milk in the box/bottle*, and ‘content’, as in *we drank a box/bottle of milk*. However, when it comes to verbal polysemy, we cannot generalize that the same process will occur with all the verbs in a class, since classes are not defined by semantic fields, but by semantic properties that impact syntactic structure, such as change of state, agency, motion, and others (Levin 1993). This characteristic can also be useful in identifying polysemous verbs. In the case of the examples presented, not all directed motion verbs like *subir* go through the same polysemy process, denoting some kind of change. Some examples are *entrar* ‘enter’ and *descer* ‘come down’. In the same way, not all verbs that belong to the same class as *encher* will be polysemous in the same way, having a psychological meaning. Some examples include *molhar* ‘wet’ and *cobrir* ‘cover’. Thus, in relation to verb classes, polysemy is idiosyncratic, since it picks out individual members of a class.
This characteristic of polysemy is crucial in distinguishing it from argument alternations. According to Levin (1993), Levin and Rappaport Hovav (1995), and many subsequent work by the authors, syntactic argument realization is unequivocally a common property of all verbs in the same class. Taking the examples given above, although *encer*, *molhar*, and *cobrir* are not polysemous in the same way, all of them have the same syntactic argument realization, as we show in the examples below (assuming the sense of ‘fill’ of the verb *encer*):

(11) Ele encheu o balde de água. / O balde se=encehou de água. 

he filled the bucket of water/ the bucket REFL=filled of water

‘He filled the bucket with water.’ / ‘The bucket filled with water.’

(12) Ele molhou o chão de vinho. / O chão se=molhou de vinho. 

he wet the floor of wine/ the floor REFL=wet of wine

‘He wet the floor with wine.’ / ‘The floor got wet with wine.’

(13) Ele cobriu a casa de folhas. / A casa se=cobriu de folhas. 

he covered the house of leaves/ the house REFL=covered of leaves

‘He covered the house with leaves.’ / ‘The house got covered with leaves.’

The same happens with directed motion verbs. Although *subir*, *entrar*, and *descer* are not polysemous in the same way, they share the same syntactic argument realization (assuming the sense of ‘come up’ of the verb *subir*), as they belong to the same class:

(14) Ele subiu para o apartamento. 

he came.up for the apartment

‘He came up to the apartment.’

(15) Ele entrou para a sala de aula. 

he entered for the room of class

‘He entered the classroom.’

(16) Ele desceu para o primeiro andar. 

he came.down for the first floor

‘He came down to the first floor.’
Based on the examples presented and on Cançado et al. (2013) and Pustejovsky (2014), we conclude that there are three characteristics of verbal polysemy, which can be used as diagnostic tests for this semantic process. The first is the existence of different (but related) senses assumed by a verb; the second is the occurrence of the same verb in different syntactic structures, depending on the meaning assumed; and the third is the idiosyncratic nature of the process, which picks out only individual verbs within a class. The relation between the senses can be captured by the existence of common semantic features. As follows, we analyze the BP verbs of creation *pintar* ‘paint’ and *escrever* ‘write’ in relation to these characteristics.

2.2 Diagnosing polysemous verbs of creation

Let us first repeat the examples shown in Section 1:

(17) O professor escreveu a carta.
    the teacher wrote the letter
    ‘The teacher wrote the letter.’
(18) O professor escreveu.
    the teacher wrote
    ‘The teacher wrote.’
(19) Adriana pintou um quadro.
    Adriana painted a picture
    ‘Adriana painted a picture.’
(20) Adriana pintou.
    Adriana painted
    ‘Adriana painted.’

First of all, it is possible to intuitively distinguish for the verbs *escrever* and *pintar* two different but related senses in the sentences exemplified above. In (17) and (19), the verbs have their canonical creation sense. *Escrever* means ‘create something by means of marking a surface with letters’ and *pintar* means ‘create something by means of coloring a surface with paint’. Differently, in (18) and (20), the verbs do not denote actual creations; rather, they describe abilities, habits or activities of the agents. In this sense, *escrever* means ‘have the ability or habit of marking a surface with letters’ and *pintar* means ‘have the ability or habit of coloring
a surface with paint’. The two senses of each verb are related, but are not identical. We conclude that BP verbs of creation can be considered polysemous verbs regarding the first characteristic of polysemy we presented.

Besides, as we have shown, in cases of verbal polysemy, each sense is related to a distinct syntactic form. This second characteristic of polysemy is also present in the case of BP verbs of creation. The creation sense of *escrever* and *pintar* is related to the transitive forms of these verbs and the activity/ability sense is related to the intransitive forms. Also, we can point out another syntactic property that is licensed by one sense but not by the other. With the creation sense, *escrever* and *pintar* obligatorily have agent arguments in subject position; however, with the activity/ability reading the subject position can be occupied by instruments which have the conditions to perform the event denoted by the verb (Borba 1990). We show some examples below:

(21) * A caneta azul escreveu a carta.
the pen blue wrote the letter

(22) A caneta azul escrevia direito.
the pen blue used.to.write well
‘?The blue pen used to write well.’

(23) * O pincel de Adriana pintou um quadro.
the brush of Adriana painted a picture

(24) O pincel de Adriana pintava bem.
the brush of Adriana used.to.paint well
‘?Adriana’s brush used to paint well.’

Finally, the third characteristic of polysemy we have pointed out, the fact that it is idiosyncratic in relation to verb classes, also seems to be present in the case of verbs of creation. As we have argued, verbs in the same class behave similarly in relation to syntactic argument realization. So, if the two syntactic forms of verbs of creation were the result of an argument alternation, we would expect all members of this class to behave the same in this respect. However, in BP many of these verbs do not have an intransitive counterpart:

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7 The definitions proposed are just descriptive. In Section 4, we show a more formalized analysis of the meaning of these verbs.
One could argue that construir ‘build’ and fabricar ‘manufacture’ belong to a different class and have different syntactic argument realization properties. However, this analysis would still leave us with the problem of having to account for a syntactic property characteristic of activity verbs that occurs with accomplishment verbs (as we have discussed in Section 1). We prefer to assume here that the four verbs, escrever, pintar, construir, and fabricar, belong to the same class. Since polysemy is idiosyncratic, picking out individual verbs within a class, only escrever and pintar are polysemous in this way.

To conclude, in this section, we have explored the concept of verbal polysemy, arguing that this semantic process can be characterized by three basic properties (Cançado et al. 2013; Pustejovsky 2014): the existence of multiple related senses for a single verb, the impact on syntactic argument realization (each sense may have distinct syntactic properties), and the idiosyncrasy (the process occurs with individual verbs, not with classes). We have shown that the analyzed BP data have the properties outlined above and, thus, verbs such as escrever and pintar can be considered polysemous lexemes. We were able to intuitively distinguish two related senses for each verb, the distinct senses seem to be linked to distinct syntactic forms, and the process analyzed here does not occur uniformly with all verbs of creation. With this argumentation, we reaffirm, then, our proposal: the occurrence of some verbs of creation in two different syntactic forms in BP is the result of a process of polysemy.

3 Evidence to support a polysemy account of Brazilian Portuguese alternating verbs of creation

The first evidence we provide for our proposal is the aspectual difference between the transitive and intransitive forms of verbs of creation. As we have already mentioned, the
transitive sentences denote accomplishments, while the intransitive ones denote activities. Using one of Vendler’s (1967) diagnostic tests for aspectual classes, we can confirm that this is in fact the case. According to the author, with activities, a sentence with the progressive entails that the denoted event had actually taken place; differently, with accomplishments, the same entailment relation does not hold. A typical activity verb such as run in the progressive (someone is running) entails that the running event had taken place (someone ran). A typical accomplishment verb such as build with the same aspectual marker (someone is building something) does not entail that the building event had taken place (someone built something).

Let us take a look at the behavior of the verbs escrever ‘write’ and pintar ‘paint’ in this diagnostic test:

(29) O professor estava escrevendo a carta.
    the teacher was writing the letter
    ‘The teacher was writing the letter.’
(30) Adriana estava pintando um quadro.
    Adriana was painting a picture
    ‘Adriana was painting a picture.’
(31) O professor estava escrevendo.
    the teacher was writing
    ‘The teacher was writing.’
(32) Adriana estava pintando.
    Adriana was painting
    ‘Adriana was painting.’

Sentences (29) and (30) are formed with the verbs escrever and pintar in their transitive form and in the progressive. Neither of those sentences entail that the event denoted by the verb had taken place: o professor estava escrevendo a carta ‘the teacher was writing the letter’ does not entail o professor escreveu a carta ‘the teacher wrote the letter’; Adriana estava pintando um quadro ‘Adriana was painting a picture’ does not entail Adriana pintou um quadro ‘Adriana painted a picture’. Thus, we can affirm, together with many authors (Dowty 1979; Rothstein 2004; Van Valin 2005; Grimshaw 2005), that verbs of creation such as escrever and pintar in fact denote accomplishments in their transitive form.

Sentences (31) and (32) are also formed with the verbs escrever and pintar in the progressive, but in these cases the verbs are in their intransitive forms. Unlike the examples in
(29) and (30), both intransitive sentences entail that the event denoted by the verb had taken place: *o professor estava escrevendo* ‘the teacher was writing’ entails *o professor escreveu* ‘the teacher wrote’; *Adriana estava pintando* ‘Adriana was painting’ entails *Adriana pintou* ‘Adriana painted’. Thus, we can also affirm, as do Grimshaw (2005) and Van Valin (2005), that verbs of creation in fact denote activities in their intransitive forms.

With this diagnostic test we confirm the aspectual difference between the transitive and intransitive forms of *escrever* and *pintar*. We argue that this distinction supports a polysemy analysis of those items. Lexical aspect is a semantic property of verbs, related to how the event described develops along a timeline. Thus, if these verbs can be classified in two distinct aspectual classes, each of them denotes different types of eventualities and have, for that, distinct senses. Also, other types of verbs can in fact have their lexical aspect altered by polysemy, as is the case of *know*, which is a stative verb when it means ‘have knowledge’ (*I know math*) and an achievement verb in its polysemous sense of ‘recognize’ (*I knew him the minute I saw his eyes*).

However, some types of argument alternations can also cause aspectual shifts, as is the case of the causative-inchoative alternation, which derives an achievement (*the window broke*) from an accomplishment (*the kids broke the window*), or vice-versa. And, as is widely assumed in the literature, since the early works of Tenny (1987) and Verkuyl (1989), verbs such as *escrever* ‘write’ and *pintar* ‘paint’ may also have an atelic interpretation, when combined with bare plural or mass nouns in transitive sentences:

(33) *O professor estava escrevendo cartas.*
the teacher was writing letters
‘The teacher was writing letters.’

(34) *Adriana estava pintando quadros.*
Adriana was painting pictures
‘Adriana was painting pictures.’

The sentences above entail respectively *o professor escreveu cartas* ‘the teacher wrote letters’ and *Adriana pintou quadros* ‘Adriana painted pictures’. According to Hay, Kennedy, and Levin

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8 There are many proposals in the literature regarding the direction of the alternation. Some authors assume that the causative is basic (Levin and Rappaport Hovav 1995; Reinhart 2002), others assume that the inchoative is basic (Rappaport Hovav and Levin 2012), and still there are authors who argue that both counterparts are derived from a root (Piñón 2001). A discussion of these matters is beyond the purposes of this paper, so we do not assume a specific approach here.
(1999), mass and bare plural nouns denote a nonbounded quantity of stuff, so that no terminal (telic) point can be identified, and an atelic interpretation arises. Thus, telic\ity could be analyzed as being determined by the semantic nature of the verb’s internal argument.

Because of these two issues, we provide a second piece of evidence to support our analysis. We want to show that the aspectual shift shown in (29)-(32) is caused by polysemy, and not by an argument alternation or by the nature of the verbs’ arguments.

The second piece of evidence we present is the prefixation of re-, a morphological property which is related to lexical aspect. This prefix, which is similar in BP and in English, can only be attached to accomplishments and achievements (Dowty 1979; Meirelles and Cançado 2014), verbs which imply some sort of result (Lieber 2004; Rappaport Hovav and Levin 2010). Typical accomplishments such as build can form derived verbs with the prefix (rebuild); however, typical activities such as run cannot (*rerun). In the case of verbs of creation, this constraint is maintained: in the transitive form, where the verb is an accomplishment, re- prefixation is possible; in the intransitive form, where it is an activity, this morphological process is not allowed:

(35) O professor reescreveu a carta.
the teacher rewrote the letter
‘The teacher rewrote the letter.’

(36) Adriana repintou o quadro.
Adriana repainted the picture
‘Adriana repainted the picture.’

(37) * O professor reescreveu.
the teacher rewrote

(38) * Adriana repintou.
Adriana repainted

This distinction motivates our previous argument that the aspectual shift observed with verbs of creation derives from a polysemy process, and not from argument alternation. Actually, in argument alternations the prefixation options of a certain verb are not altered depending on the syntactic structure. Both transitive and intransitive forms of a verb which participates in the causative-inchoative alternation, for example, can be re- prefixed: the boy refroze the melted ice cream/ the melted ice cream refroze. Moreover, both transitive and
intransitive forms of a verb which participates in the unspecified object alternation cannot be re- prefixed: *Brian was rewiping the counter/ Brian was rewiping.*

The regularity of re- prefixation in both forms of an alternating verb can be explained by the fact that these syntactic argument alternations do not change the semantic characteristic of the verbs in terms of the presence or absence of a result of the action. *Melt* is a result verb and *wipe* is not, in both transitive and intransitive forms. Thus, in both cases, the constraints on re- prefixation are not altered by the argument alternation. Besides, argument alternations occur in syntax, consequently, they come after lexical derivation (Copestake and Briscoe 1996; Aronoff and Fudeman 2005), and cannot be responsible for constraining the morphological process. Unlike argument alternations, polysemy is a lexical semantic process, and for that, it can restrict an equally lexical morphological process.

Since re- prefixation is a derivational process, which occurs in the lexicon (Copestake and Briscoe 1996; Aronoff and Fudeman 2005), previous to the syntactic formation of the sentence, it cannot “see” aspectual properties derived compositionally. Going back to the sentences with unbounded direct objects (such as bare plurals and mass nouns), in spite of the atelic reading, Rothstein (2004) and Van Valin (2005) argue that these verbs are lexically accomplishments, and the atelic reading is derived compositionally from the meanings of the accomplishment and of its argument. This claim can be reinforced by the fact that re- prefixation is not affected by such aspectual properties derived compositionally, as pointed out by Lieber (2004). *Build* continues to allow re- prefixation even in an atelic reading, derived by a bare plural DP in direct object position (*the bricklayer rebuilds houses during the summer*). Also, *run* does not allow the same type of prefixation, even in a telic reading, derived by the addition of an endpoint to the event in the sentence (*the boy reran to the store*). As would be expected, then, verbs of creation can be re- prefixed in their transitive form, even in sentences with an atelic reading derived from bare plural DPs in direct object position. We can assume here that, even if these verbs denote activities in sentences like (39) and (40) below, they still specify the result of the action.

(39) O professor reescreveu cartas.
    the teacher rewrote letters

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9 In a lexicalist approach to grammar (Scalise and Guevara 2005), as we assume in this paper.

10 Smith (1997) argues for the opposite. According to the author, activity verbs in telic VPs can be prefixed with re-. She presents the following example (Smith 1997: 179): *they redanced the second number.* We believe, following Meirelles and Cançado (2014), that at least in BP, such forms are not possible, even in telic VPs: *eles redançaram o segundo número.*
‘The teacher rewrote letters.’

(40) Adriana repintou quadros.
Adriana repainted pictures
‘Adriana repainted pictures.’

This shows that the activity/ability sense of verbs of creation cannot be something that emerges in syntax, since it constrains a lexical derivational process, which occurs previous to syntactic derivation. If the atelic readings of verbs of creation, both transitive and intransitive, emerged in syntax, we would expect to have re- prefixation in both cases, and not just in the atelic transitive form. The ungrammaticality of (37) and (38) indicates that the verbs escrever and pintar are already lexically marked as activities, and for that, re- prefixation is not allowed in the intransitive forms. A similar constraint takes place in cases of -ful suffixation in English (Copestake and Briscoe, 1996). As we have mentioned in Section 2, the word bottle is polysemous, having a ‘container’ interpretation, as in we put the milk in the bottle, and a ‘content’ interpretation, as in we drank a bottle of milk. Similarly to the case of BP re-, the suffix -ful in English also seems to be restricted by polysemy: it can only be attached to bottle when this noun has the content interpretation: we put the milk in the *bottleful / we drank a bottleful of milk.

This difference in behavior in relation to re- prefixation is analyzed by us as evidence that verbs of creation are polysemous and that they hold different senses in transitive and intransitive sentences. With this argumentation, we conclude that both properties presented, the aspectual shift and the different behavior regarding re- prefixation, consistently corroborate our initial hypothesis.

The last piece of evidence we present is another morphological characteristic. Verbs of creation can be nominalized. Escrever can form the noun escrita ‘writing’ and pintar can form the noun pintura ‘painting’. The nouns resulting from nominalization hold the same arguments as the verbs. The evidence for a polysemy account of these verbs that arises from these facts is that for each form, transitive or intransitive, the derived nouns will have different meanings and different argument structures. If we take escrever and pintar with the creation sense, it is possible to form the nouns escrita and pintura with the two arguments of the verbs. The patient/created/result argument is introduced by de ‘of’ and the agent argument is introduced by por ‘by’. We show examples below:

(41) A escrita da carta pelo professor
the writing of the letter by the teacher
‘The letter’s writing by the teacher’

(42) A pintura do quadro por Adriana
the painting of the picture by Adriana
‘The picture’s painting by Adriana’

Differently, if we take the same verbs with the activity/ability sense, it is possible to form the nouns *escrita* and *pintura* with the sole argument of the verbs, the agent argument, which is introduced by *de* ‘of’. We show examples below:

(43) A escrita do professor
the writing of the teacher
‘The teacher’s writing’

(44) A pintura do artista
the painting of the artist
‘The artist’s painting’

Note that the prepositions heading the agent arguments are different in both cases, *por* ‘by’ in the transitive nominalizations and *de* ‘of’ in the intransitive nominalizations.

Moreover, the words *escrita* and *pintura* have distinct meanings in the DPs in (41)-(42) and in the DPs in (43)-(44). In (41)-(42) they denote an eventuality and in (43)-(44) they denote the characteristic manner in which someone acts (similarly to the distinct meanings we have suggested for the verbs in Section 2). To corroborate this argument, we show that only the DPs in (41)-(42) can be subject of the verb *durar* ‘last’:

(45) A escrita da carta pelo professor durou 2 horas.
the writing of the letter by the teacher lasted 2 hours
‘The letter’s writing by the teacher lasted 2 hours.’

(46) A pintura do quadro por Adriana durou 2 horas.
the painting of the picture by Adriana lasted 2 hours
‘The picture’s painting by Adriana lasted 2 hours.’

(47) * A escrita do professor durou 2 horas.
the writing of the teacher lasted 2 hours

(48) * A pintura do artista durou 2 horas.
the painting of the artist lasted 2 hours

Moen and Steedman (1988) argue that only eventualities (including states) can take time, in opposition to other ontological types, such as manners, places, instruments, etc. Thus, only DPs denoting eventualities can occupy the subject position of last. For example, sentences like the phone call/the fight/ the doctor’s appointment lasted 2 hours, in which the DPs in subject position denote eventualities, are perfectly grammatical. In opposition, sentences like *the kick/New York/the knife lasted 2 hours are not possible, since the DPs in subject position denote a manner, a place, and an instrument, respectively. Thus, the contrast we want to make explicit with the examples in (45)-(48) is between the denotations of the nouns in subject position. Escrita and pintura denote eventualities in (45)-(46), or can be ontologically classified as events; for that, DPs containing these nouns can be subject of durar. On the other hand, escrita and pintura in (47)-(48) denote a characteristic manner of acting, or can be ontologically classified as manners; for that, DPs containing these nouns cannot be subject of durar; unlike eventualities, manners do not take time. This ambiguity found in the nominalizations escrita and pintura supports the fact that the verbs which originate these nouns are also ambiguous.

To conclude this section, we briefly summarize the evidence provided. We first showed a diagnostic test to confirm that the intransitive and transitive forms of verbs of creation have different lexical aspects, which suggests meaning distinctions between the two forms of the verbs. Then, we turned to morphological characteristics of the verbs. We showed that intransitive and transitive forms of verbs of creation behave differently in respect to re-prefixation. Since this process is restricted by aspectual properties, we also argued that it supports our first piece of evidence. We also showed that nouns derived from the verbs also seem to be polysemous. All these properties suggest that the same verb has distinct senses. Thus, we conclude that we have enough facts to support an analysis of verbs of creation such as escrever and pintar as polysemous. We can, then, assume that distinct syntactic structures arise with distinct senses, and that these verbs do not go through an argument alternation which deletes the direct object. We thus provide a straightforward explanation for why these accomplishment verbs apparently occur in an argument alternation characteristic of activity verbs.

4 Semantic representation
In order to formalize the meaning difference between the two senses of the verbs of creation, we propose semantic representations in the form of predicate decomposition structures (Rappaport Hovav and Levin 1998). Predicate decomposition is a metalanguage used to describe verb meaning, and the representations are predicate-argument structures built with primitive predicates (meaning components recurrent in the semantics of various verbs) and their arguments and modifiers. All the representations bear one root, which carries the idiosyncratic meaning of the verb (differing it from verbs with the same primitive predicates), and is ontologically classified (ontological types include state, manner, place, thing, event, instrument, etc.). In the structures, variables, such as X, Y, and Z, represent the arguments of the verb.

We have argued in Section 3 that the verbs escrever ‘write’ and pintar ‘paint’ have two distinct, but related, senses: a creation sense and an activity/ability sense. The first sense is related to a transitive syntactic form and to the accomplishment lexical aspect. For that, we assume that the predicate decomposition structure that represents this first sense of verbs of creation should have two variables, X and Y, and the primitive predicate CAUSE, which is related to accomplishment verbs (Dowty 1979; Rappaport Hovav and Levin 1998). CAUSE is a predicate that takes as arguments two subevents and accomplishments are complex eventualities, composed of two subevents. The agentivity of the external argument can be captured by a predicate such as ACT (Pinker 1989). Finally, we propose that the ontological type of these verbs’ roots is event, since the nominalization of the verbs denotes an event, as we have shown in (45)-(46) (Harley 2005). Thus, we propose that the first sense of the verbs of creation can be represented by the following predicate decomposition structure:

(49) $v$: $[[X \text{ ACT}] \text{ CAUSE } [\langle \text{EVENT} \rangle \text{ OF } Y]]$

In this representation, taken from Amaral and Cançado (2014a), CAUSE takes two arguments: $[X \text{ ACT}]$ and $[\langle \text{EVENT} \rangle \text{ OF } Y]$. ACT is monadic and takes X as argument. OF establishes the relation between the root of the verb, of the ontological type event, and the second argument Y. The formalized structure can be paraphrased as $x$ does an event of $y$.

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11 A similar argumentation can be found in Levin and Rappaport Hovav (2013). According to the authors, verbs with zero-related nominals which denote a result have result roots (for example, break/$a$ breaks and crack/$a$ cracks), and verbs with zero-related nominals which denote a manner have manner roots (for example, wipe/$a$ a wipe and kick/$a$ a kick). We extend their proposal to some types of derived nominals.

12 Predicates and variables are notated in capitals; square brackets delimit events and subevents; roots are notated in capitals, italics, and between angled brackets; modifiers are notated as subscripts.
Escrever can be paraphrased as *x faz a escrita de y* ‘*x does the writing of y*’ and *pintar* can be paraphrased as *x faz a pintura de y* ‘*x does the painting of y*’. The same kind of paraphrase is proposed by Piñón (2010), in his analysis of the verb of creation *draw*. The structures of the individual verbs are:

(50) *escrever*: [[X ACT] CAUSE [<ESCRITA> OF Y]]
(51) *pintar*: [[X ACT] CAUSE [<PINTURA> OF Y]]

Other verbs of creation, which only have the creation meaning, such as *construir* ‘build’ and *fabricar* ‘manufacture’, can also be represented in the same way.

For the second sense of these verbs, the activity/ability sense, we propose a different structure. In this case, the verbs denote activities, thus, the structure cannot have the predicate CAUSE. Besides, there is only one argument, so the structure has only one variable, X. We maintain the primitive predicate ACT, indicating agentivity. Taking into account the activity/ability reading of the verbs and of the nominalizations (which do not denote events, as we have shown in (47)-(48)), we propose that the roots’ ontological type is *manner*. Besides being monadic, ACT can be modified by a manner root (Rappaport Hovav and Levin 1998). Levin and Rappaport Hovav (2005) explicitly state that the same root may have more than one ontological type. Thus, we propose that the following structure represents the second sense of polysemous verbs of creation:

(52) \(v\): [X ACT\(_{\text{MANNER}}\)]

The representation in (52) is proposed by Pinker (1989) and is used by Rappaport Hovav and Levin (1998, and subsequent work) to represent agentive activity verbs.\(^{13}\) The structure can be paraphrased as *x acts in a certain manner*. Escrever can be paraphrased as *x age escrevendo* ‘*x acts writing*’ and *pintar* can be paraphrased as *x age pintando* ‘*x acts painting*’. The individual structures of these verbs are:

(53) *escrever*: [X ACT\(_{\text{ESCREVER}}\)]
(54) *pintar*: [X ACT\(_{\text{PINTAR}}\)]

\(^{13}\) An analysis of agentive activity verbs in BP and of the structure proposed by Pinker (1989) can be found in Amaral and Cançado (2014b).
The predicate decomposition structures proposed predict correctly that, in each sense, these verbs will have different syntactic behavior and lexical aspect. When they mean [[X ACT] CAUSE [<EVENT> OF Y]] they pattern like normal verbs of creation such as construir ‘build’; when they mean [X ACT<\text{MANNER}>] they pattern like normal intransitive activity verbs, such as run.

However, as pointed out by Pustejovsky (p.c.), the representations proposed above do not make the polysemy process explicit. The structures do not differentiate polysemy from homonymy, so the relation between the two senses of the verbs is lost. According to authors such as Panman (1982) and Pustejovsky (1995), this distinction is grammatically relevant. Moreover, psycholinguistic tests developed by Panman (1982) and Pylkkänen et al. (2006) have demonstrated that polysemy is also cognitively relevant, being perceived by speakers and cognitively differentiated from homonymy. For that, we propose to enrich the predicate decomposition structures with a very simple truth-conditional representation of the meaning of the roots, based on the works of Parsons (1990), Pustejovsky (1995), and Beavers (2014). Levin and Rappaport Hovav (1998) argue that different predicate decomposition structures can be related by virtue of containing a shared root. Thus, the relation between the two senses of the verbs will come from this truth-conditional representation, where the shared semantic properties of the polysemous verbs are made explicit. We propose that homonymous verbs do not share any part of the semantic representation. With this move, we want to show that both structures represent distinct senses on the same verb. Lexical entries of specific verbs would look like the following:

(55) escrever:
   i) [[X ACT] CAUSE [<\text{ESCRITA}> OF Y]] where
      \[\llangle \text{ESCRITA}\rrangle = \lambda x \lambda e \text{ [mark.surface (e) & actor (x) & instrument (letters)]}\]
   ii) [X ACT<\text{ESCREVER}>] where
      \[\llangle \text{ESCREVER}\rrangle = \lambda x \lambda e \text{ [mark.surface (e) & actor (x) & instrument (letters)]}\]

(56) pintar:
   i) [[X ACT] CAUSE [<\text{PINTURA} > OF Y]] where
      \[\llangle \text{PINTURA}\rrangle = \lambda x \lambda e \text{ [color.surface (e) & actor (x) & instrument (paint)]}\]
   ii) [X ACT<\text{PINTAR}>] where
      \[\llangle \text{PINTAR}\rrangle = \lambda x \lambda e \text{ [color.surface (e) & actor (x) & instrument (paint)]}\]
The content of the roots is the part of the polysemous verbs which remains equal in the polysemy process. For escrever, the formal representation of the roots can be read as *x is the actor of an event of marking a surface and letters are the instruments x uses to perform such action* and, for pintar, the formal representation of the roots can be read as *x is the actor of an event of coloring a surface and paint is the instrument x uses to perform such action*. The equal denotation of the roots in the two distinct predicate decomposition structures of a single verb is the link between the two senses which makes them part of a singular polysemous lexeme (Levin and Rappaport Hovav, 1998). This new enriched representation makes the polysemy process explicit, without missing the prediction about the syntactic behavior of the verbs. Also according to Levin and Rappaport Hovav (1998), when a single lexeme is associated with several predicate decomposition structures that are built from different primitive predicates but share the same root, each predicate decomposition structure is associated with a distinct argument realization.

It was not our objective in this paper to explain why and how this polysemy happens, but we hypothesize that the agentivity and the specification of the action carried out by the agent (including the specification of an instrument) are responsible for triggering the polysemy process. Verbs with more restricted subject arguments are more likely to pattern like activity verbs.

To sum up, we have argued in this section that two distinct predicate decomposition structures can be used to represent each sense of the polysemous verbs of creation. These distinct semantic structures account for the distinct behavior of the two senses of each verb. However, we needed to enrich the semantic representation in order to explicit not only what is different, but also what is similar. We have done that by proposing a simple truth-conditional representation of the contents of the verbs’ roots.

5 Final remarks

We have proposed in this paper that the occurrence of some verbs of creation in two different syntactic structures is the result of a process of polysemy, and not an argument alternation. We explored the concept of verbal polysemy, assuming that this semantic process impacts a verb’s syntactic argument structure and that it is idiosyncratic in the sense that it does not occur with all verbs within a class. The verbs of creation here analyzed have all the characteristics of polysemous verbs we described; the distinct meanings of the verbs seem to
be related to the distinct syntactic structures and the process does not affect all verbs in the class.

We also provided evidence to support our proposal. We showed that the distinct lexical aspect of the different sentences with verbs of creation indicates that a meaning difference, a polysemy, seems to be causing aspectual shift. We also showed that verbs of creation can be prefixed with re- only in the transitive form, what also suggests that there is a meaning difference between the transitive and intransitive forms of the verb. Finally, we argued that the nominalizations of the analyzed verbs are also polysemous. Nouns derived from verbs of creation can have two distinct argument structures, with the agent argument headed by por ‘by’ or by de ‘of’. Also, they seem to present more than one meaning, since only DPs formed by derived nouns with the agent argument headed by por ‘by’ can be subject of the verb durar ‘last’.

In Section 4 we proposed predicate decomposition structures in order to formalize the meaning difference present in polysemous verbs of creation. For the creation sense we assumed a predicate decomposition structure with two variables, X and Y, the primitive predicates ACT and CAUSE, and a root of the ontological type event: $v: [\text{X ACT}] \text{CAUSE} [\text{<EVENT> OF Y}]$. For the second sense of these verbs, the activity/ability sense, we proposed a structure with only one variable, X, the primitive predicate ACT, and a root of the ontological type manner: $v: [\text{X ACT}<\text{MANNER}>]$. The relation between the two structures lies on the content of the verbs’ roots, which have the same denotation, as we have shown by means of an enriched semantic representation of the verbs’ roots.

Since the argument alternation analysis of the different syntactic structures of verbs of creation is problematic, as we have shown in Section 1, we believe that our proposal is an interesting contribution to the study of this class of verbs and that it solves some problems related to them. For example, our proposal explains why not all verbs of creation occur in an intransitive form. With the evidence provided in Section 3, we hope to have properly confirmed our hypothesis.

References


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