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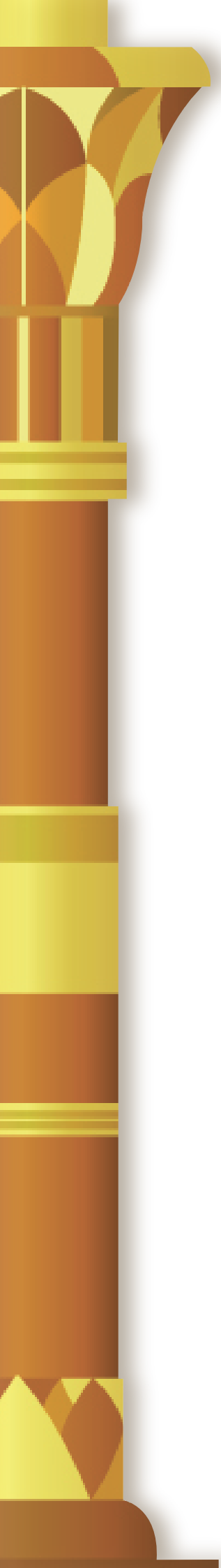

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Lenguas modernas y antiguas
Diferencias y similitudes en el estudio de la semántica verbal

Editado por

Carlos Gracia Zamacona y Josué Santos Saavedra

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ÍNDICE

Il faut toujours dire ce que l’on voit :
surtout il faut toujours, ce qui est plus difficile, voir ce que l’on voit.

Charles Péguy

PREFACIO

En diciembre de 2020, un grupo de investigadores de la semántica verbal de distintas lenguas modernas y antiguas nos reunimos online para compartir y comparar información sobre nuestros métodos y técnicas de investigación. Como resultado de ello, grabamos unos vídeos en el sitio web de la *Red Iberoamericana de Investigadores en Próximo Oriente Antiguo* (*RIIPOA*), donde se pueden ver.[1]

Esta es la primera actividad de la *Red Iberoamericana de Investigadores en Próximo Oriente Antiguo* (*RIIPOA*), que reúne a una treintena de investigadores de larga trayectoria en los estudios de la antigüedad en el oriente mediterráneo, procedentes de universidades iberoamericanas o que desarrollan en ellas su actividad.

El siguiente paso era convertir aquella reunión informal en un libro colectivo, lo cual ocurre ahora con este primer volumen de la serie *Estudios Orientales – Monografías RIIPOA*, recién creada.[2]

Es para mí un doble honor el formar parte de *RIIPOA* y editar este volumen en su serie de monografías. En particular, quiero agradecer a Roxana Flammini su entusiasmo y dedicación para articular la Red y la serie de publicaciones: es un privilegio trabajar contigo, Roxana.

Aprovecho la ocasión también para agradecer a todos los miembros de la Red su disposición e interés. En particular, quiero dar las gracias a Juan Manuel Tebes por multitud de ayudas en diversos asuntos relativos a la Red; a los editores temáticos de la serie, José Virgilio García Trabazo, Abraham Fernández Pichel y Amparo Mateo Donet, por su tiempo y ganas de colaborar; a Catarina Apolinário de Almeida, por sus traducciones al portugués y su empeño en difundir la Red; al equipo editorial y a los revisores, por su magnífico y desinteresado trabajo; y a Christophe Rico, por su interesantísma ponencia en el taller del pasado diciembre.

Por último, es un placer agradecer a los autores de este volumen sus contribuciones: sin ellos, por supuesto, no existiría este libro.

Carlos Gracia Zamacona

En Alcalá de Henares, a 7 de septiembre de 2021

[1] https://www.riipoa.com/actividades/.
[2] https://www.riipoa.com/publicaciones/.

VERBOWEB

Syntactic-semantic analysis of Brazilian Portuguese verb classes

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Abstract: The study of verbs and their classification is an important aspect of the investigation of language grammars, because it allows generalizations about sentence structures. In this sense, we propose to study the verbal lexicon of Brazilian Portuguese, with the wide-ranging objective of building generalizations about the sentence structure of this language, while considering the properties in common between the different lexical items investigated. The research carried out aims more specifically to present a classification and a broad list of verbs in Brazilian Portuguese that are classified and analyzed according to their common semantic properties which have impact on the sentential structures in which these items occur. Verbs are distributed into classes and subclasses, according to their argument structure morphosyntactic properties and their semantic properties related to event structure. For this, data gathering and theoretical analyses are made based on Syntax-Lexical Semantic Interface theories. The research culminates in the creation of the VerboWeb lexical database. Currently, VerboWeb presents a broad analysis of over 1500 verbs, divided into 19 classes, and 8 subclasses. The aim of this paper is to present the research project VerboWeb.

Resumo: O estudo dos verbos e de sua classificação é um importante aspecto da investigação das gramáticas das línguas, uma vez que são esses agrupamentos que permitem generalizações sobre as estruturas sentenciais. Nesse sentido, nos propomos a estudar o léxico verbal do português brasileiro, tendo como objetivo mais amplo a construção de generalizações sobre a estrutura sentencial dessa língua a partir de propriedades comuns dos diferentes itens lexicais investigados. A pesquisa realizada tem como objetivo específico apresentar uma classificação e uma ampla listagem dos verbos do português brasileiro, classificados e analisados de acordo com suas propriedades semânticas comuns que têm impacto nas estruturas sentenciais em que esses itens ocorrem. Os verbos são distribuídos em classes e subclasses, de acordo com suas propriedades morfossintáticas de estrutura argumental e com suas propriedades semânticas relacionadas à estrutura dos eventos. Para isso, são feitas coletas de dados e análises teóricas, com base em

teorias da Interface Sintaxe-Semântica Lexical. A pesquisa culmina na construção do banco de dados lexicais VerboWeb. Atualmente, o VerboWeb apresenta uma ampla análise de mais de 1500 verbos, distribuídos em 19 classes e 8 subclasses. O objetivo deste artigo é apresentar o projeto VerboWeb.

Keywords: verbs, Brazilian Portuguese, lexical semantics, argument structure, VerboWeb.

Palavras-chave: verbos, português brasileiro, semântica lexical, estrutura argumental, VerboWeb.

1. INTRODUCING THE RESEARCH: A GENERAL VIEW OF VERBOWEB

The study of verbal semantics (or Lexical Semantics) is an important part of the Linguistics research agenda.[1] Since Fillmore's seminal work,[2] it has been acknowledged that the specific meanings of components of verbal semantics are keys to important linguistic generalizations. Fillmore, for example, has shown that the so-called "change of state verbs", such as *break*, can occur in a transitive form [1a] and in an intransitive form [1b], in the phenomenon known as causative alternation.[3] However, verbs which do not have the semantic component "change of state", such as *hit*, do not occur in such alternation:[4]

[1] a. John broke the stick.
b. The stick broke.

[2] a. John hit the tree (with a rock).
b. *The tree hit.

This type of generalization has led lexical semanticists to propose the existence of verb classes, as in Levin's important foundational work:[5]

[3] Break verbs: *break*, *crack*, *rip*, *shatter*, *snap*, . . .

[4] Hit verbs: *bash*, *hit*, *kick*, *pound*, *tap*, *whack*, . . .

De Clerck, Colleman and Willems point out that such classifications are "fueled by the discovery that verbs with a similar meaning show a tendency toward displaying

[1] Levin – Rappaport Hovav 2005; Croft 2012; Pustejovsky – Batiukova 2019.
[2] Fillmore 2003 (originally published in 1970).
[3] Fillmore 2003.
[4] Data from Fillmore 2003: 126-128.
[5] Levin 1993: 7.

the same syntactic behavior".[6] Those classes account for many grammatical generalizations, as in the case of the causative alternation exemplified above, and many other phenomena. Verb classes are thus defined as groups of verbs which share semantic properties and grammatical behavior, more specifically the syntactic realization of argument structure.[7]

Assuming that the description and theoretical analysis of verb classes is an important part of uncovering the grammar of a language, the research project VerboWeb[8] aims at describing and analyzing the Brazilian Portuguese verb classes. Inspired by Levin's work,[9] VerboWeb investigates the verbal lexicon of Brazilian Portuguese (hereafter BP), separating verbs into classes according to their syntactic and semantic properties. Currently, VerboWeb presents a broad analysis of over 1500 verbs, divided into 19 classes, and 8 subclasses, which we will present throughout this paper. Many other verbs, classes, and subclasses are under investigation, such as: agentive result verbs (*assassinar* 'murder', *amputar* 'amputate'), transfer verbs (*enviar* 'send', *lançar* 'throw'), creation verbs (*construir* 'build', *criar* 'create'), editing verbs (*editar* 'edit', *revisar* 'revise'), verbs of ingesting (*comer* 'eat', *beber* 'drink'), among others.

VerboWeb is developed by the Research Group on Lexical Semantics[10] from the Faculty of Languages, Literature, and Linguistics (FALE) of the Federal University of Minas Gerais (UFMG); the project's main researchers are the authors of this chapter.

The aim of this paper is to present the research project VerboWeb. Thus, in the next sections, we show the theoretical perspective which forms the basis of our verbal classification, the methodology for the gathering of linguistic data, and, finally, the results we have reached so far. The final section offers a few remarks.

2. A THEORY OF VERB CLASSIFICATION

Verb classes are defined as groups of verbs which share the same argument structure properties.[11] The argument structure of a verb is assumed in VerboWeb to contain both lexical-semantic and syntactic information.[12] It has been argued in the literature on Lexical Semantics that such syntactic information is determined by the verb's lexical-semantics; specifically, the event structure lexicalized by the verb.[13] Thus, the general hypothesis of the semantic determination of syntax is assumed, and syntactically coherent classes are also semantically coherent classes, and all classes share the same argument structure properties.

However, only certain parts of the verbs' lexical-semantics are relevant for classification, and consequently are part of their argument structure. For example, as we

[6] De Clerck – Colleman – Willems 2013: 669.
[7] Levin 1993.
[8] Cançado – Amaral – Meirelles (2017), available at www.letras.ufmg.br/verboweb.
[9] Levin 1993.
[10] More information about our research group can be found at www.letras.ufmg.br/nucleos/nupes.
[11] Levin 1993.
[12] Following Rappaport Hovav – Levin 1988; Rappaport Hovav – Laughren – Levin 1993; Grimshaw 1990; 2005; Cançado – Amaral 2016.
[13] Levin – Rappaport Hovav 2005; Beavers 2010; Croft 2012; Pustejovsky – Batiukova 2019.

have shown above, Fillmore argues that change of state is a semantic property of verbs which can predict grammatical behavior (the causative alternation).[14] Thus, this property distinguishes verbs of the *break* class from verbs of the *hit* class. Jackendoff also shows that agentivity and intentionality are relevant for passivization.[15] So, this will also be a relevant property for verb classification. In VerboWeb, for instance, there are two types of change of state verbs. The optionally agentive change of state verbs, such as *quebrar* 'break', can take agentive subjects and, consequently, can form passives. Contrarily, the non-agentive change of state verbs, such as *fatigar* 'tire', do not allow agentive subjects and also do not normally passivize. As examples of semantic properties which do not determine verb classification, Grimshaw mentions color verbs (*paint*, *color*, *fade*)[16] and Pesetsky mentions the distinction between verbs denoting the emission of loud sounds and verbs denoting the emission of low sounds (*scream*, *howl* x *whisper*, *murmur*).[17] These properties do not determine syntactic argument realization, and thus are not relevant for classification.

The properties which determine syntactic argument realization are the so called grammatically relevant semantic properties.[18] As is largely assumed in the literature, grammatically relevant semantic properties are the event structure properties of verbs, which we turn to next.

Event structure properties are associated with the general contour found across specific situations described by specific verbs. Main event structure properties analyzed so far comprise lexical aspect, thematic roles, and event complexity (or causation), which are correlated with each other. Specific semantic components of verbs, which distinguish different items with the same event structure, are associated with the idiosyncratic meaning of the verb, called the root.[19] In VerboWeb these facets of the situation described by a verb are taken into consideration in the determination of verb classes. Thus, in the next subsections, we present the notions of lexical aspect, thematic role and predicate decomposition, in order to explain the theoretical framework that underlies our proposal for verbal classification.

2.1. Lexical Aspect

Lexical aspect (or *Aktionsart*) has been an important semantic characteristic for verb classification, since Vendler's first proposal.[20] This property is associated to the internal temporal characteristics of the situation described by the verb. Vendler proposed a quadripartite classification of verbs, based on three specific characteristics of the temporal development of situations: dynamicity, duration, and telicity. Dynamic situations (also called events) are those which involve a type of motion or force that

[14] Fillmore 2003.
[15] Jackendoff 1972.
[16] Grimshaw 2005.
[17] Pesetsky 1995.
[18] De Clerck – Colleman – Willems 2013; Cançado – Amaral 2016.
[19] Levin – Rappaport Hovav 2005.
[20] Vendler 1957.

takes place; non-dynamic situations (or states) are static and do not suffer changes over the course of time. Durative situations last over time, being composed of many intervals, while non-durative (or punctual) situations occur in a single moment, and lack distinct temporal intervals. Finally, telic situations have a result or ending point, while atelic situations do not. The values for each one of these properties give rise to four classes of verbs: activities, accomplishments, achievements, and states. These classes and their respective aspectual values are represented in **Table 1**:

Class	Dynamic	Intervals	Telic
States	-	+	-
Activities	+	+	-
Accomplishments	+	+	+
Achievements	+	-	+

Table 1. Aspectual classes, according to Vendler's classification[21]

Stative verbs are thus the only ones which describe non-dynamic (static) situations. These situations are also durative and atelic. Examples are *amar* 'love', *preocupar* 'worry', and *odiar* 'hate'. Activity verbs are those which describe dynamic, durative, and atelic situations, as *dançar* 'dance', *beijar* 'kiss', and *lavar* 'wash'. Accomplishment verbs also describe dynamic and durative situations, but, as opposed to activities, accomplishments are telic. Examples of these verbs are *amassar* 'crumple' (in transitive form), *pendurar* 'hang', and *premiar* 'reward'. Finally, achievement verbs describe dynamic, punctual, and telic situations, as *corar* 'blush', *cair* 'fall', and *adoecer* 'sicken'.

After Vendler's first classification, many linguistics described new aspectual classes and the compositional nature of aspect, proposing more complex ways to analyze verbs in terms of their aspectual properties.[22] Dowty, for example, showed that many verbs classified as achievements actually describe events which occur over time, such as *cool* or *freeze*.[23] He called these events degree achievements. He also pointed out that accomplishments are complex situations, composed of two subevents. Cançado and Amaral,[24] following Travaglia and Smith,[25] argue that the temporal punctuality of achievements does not mean the absence of duration in time, but the absence of temporal intervals in the described event, and also the absence of a complex structure composed of subevents. So, these verbs are not punctual in the sense that they are instantaneous, but in the sense that they occur in a single moment in time (even if this moment has a certain duration) and also that they describe simple monoeventive situations. Besides degree achievements, other types of aspectual classifications were

[21] Adapted from Cançado – Amaral 2016: 167.
[22] Dowty 1979; Verkuyl 1989; Smith 1997; Van Valin 2005; Harley 2005; Rothstein 2004; Croft 2012; among others.
[23] Dowty 1979.
[24] Cançado – Amaral 2016.
[25] Travaglia 1985; Smith 1997.

proposed. Smith, for example, shows that some activities are made up of a series of repetitions of punctual situations, such as *jump* or *blink*.[26] These types of situations came to be known as semelfactives. Moreover, Arad and Pylkkänen note that some types of states —considered primitives in the composition of aspect— can be themselves complex, composed of other stative subeventualities.[27]

In VerboWeb, lexical aspect is the basis for the first major division of lexical items. We propose that verb classes fall into four broad aspectual categories, which we call activity, causation, culmination, and state. Activity and state verbs refer to the verbs that present the lexical aspects of activity (including semelfactives) and simple state, respectively. Culmination verbs refer to verbs that denote different types of achievements, while causation verbs mostly refer to verbs denoting accomplishments, with the exception of complex state verbs (e.g., *preocupar* 'worry'). The classification proposed in VerboWeb will be presented in more detail in section 4.

2.2. Thematic roles

Thematic roles are a second type of lexical-semantic property of verbs which has been very useful for verb classification, since the first proposals made by Halliday, Fillmore, Chafe and Jackendoff.[28] Thematic roles are semantic functions assigned by the verb to its arguments. These roles can be seen as generalizations over the roles of individual participants in individual situations described by verbs.[29] For instance, for the group of verbs *dançar* 'dance', *beijar* 'kiss', and *lavar* 'wash' the subject argument can be characterized as an Agent (a role which bears the semantic components common across the roles of individual participants: the dancer, the kisser, and the washer; it is the volitional trigger of an action). Besides the Agent role, in VerboWeb, the following labels are used to describe the argument structure of the analyzed classes. The list and the definitions are based on the work published by Cançado and Amaral in 2016:[30]

- Cause: the non-volitional trigger of an event (the non-volitional subject of verbs such as *amassar* 'crumple' in a transitive sentence);
- Patient: the entity which suffers the effect of an action, going through a change of state (the object of *amassar* 'crumple' in a transitive sentence, the subject of *corar* 'blush' and *adoecer* 'sicken' in an intransitive sentence);
- Affected Object: the entity which suffers the effect of an action, without going through a change of state (the object of *lavar* 'wash');
- Instrument: an instrument used by an agent to carry out the action (the oblique headed by *com* 'with' in sentences such as *a mulher lavou as roupas com sabão* 'the woman washed the clothes with soap');

[26] Smith 1997.
[27] Arad 1998; Pylkkänen 2000.
[28] Halliday 1966; Fillmore 1968; Chafe 1970; Jackendoff 1983; 1990.
[29] Dowty 1991.
[30] Cançado – Amaral 2016.

- Locative: place where something is situated (the oblique argument of verbs such as *pendurar* 'hang' and *cair* 'fall');
- Target: place to where something is being transferred, physically or metaphorically (the object argument of verbs such as *premiar* 'reward');
- Theme: the entity which is transferred by an action (the subject of *cair* 'fall');
- Stimulus: state which causally triggers a psychological experience in an Experiencer (the subject of verbs such as *preocupar* 'worry');
- Experiencer: animate being who is or comes to be in a specific mental, perceptual or psychological state (the object of verbs such as *preocupar* 'worry' and the subject of verbs such as *amar* 'love' and *odiar* 'hate');
- Stative Object: entity or situation to which reference is made, and which does not trigger or is affected by an action (the object of verbs such as *amar* 'love' and *odiar* 'hate').

The above list is not complete, and also there are many issues in adopting such roles as a theory of Lexical Semantics. For example, many roles cannot cooccur, such as Patient and Affected Object. This means that a single verb will not be able to have two arguments with the roles Patient and Affected Object, respectively. Also, in some cases it is difficult to single out a unique thematic role for an argument. For example, arguments of agentive motion verbs, such as *run*, can be seen as Agents or Themes, because they act volitionally but also change location. These types of issues indicate that thematic roles are not primitives, but are composed of more specific properties. Roles such as Patient and Affected Object share specific properties of their composition and, thus, do not cooccur. Also, a single verb may have an argument with thematic properties of two or more thematic roles, which makes it difficult to decide in which label it can be adequately placed.

Cançado and Amaral, following Dowty and Cançado,[31] argue that thematic roles can be analyzed as composed of a group of properties.[32] The most important thematic properties for argument realization are trigger, affected, and stative. Levin and Rappaport Hovav have shown that thematic roles are derived from other properties of verbs and cannot be assumed to be primitives of a semantic theory.[33] In fact, they can even be related to temporal properties, in the sense that aspectual classes can be correlated with certain types of thematic roles, which shows that they are in fact derived notions. The Stative Object role is related to states, for example, while the Agent role is related to activities, and the Cause role is related to accomplishments.

Considering these issues, thematic roles are used in VerboWeb as descriptive tools to represent in a broad way the argument structure of the classes. We assume, following Cançado, Godoy and Amaral,[34] that both aspect and thematic roles are

[31] Dowty 1991; Cançado 2005.
[32] Cançado – Amaral 2016.
[33] Levin – Rappaport Hovav 2005.
[34] Cançado – Godoy – Amaral 2013.

properties which can be derived from more primitive elements of the event structure, to which we turn as follows.

2.3. Predicate decomposition

Characteristics of the temporal contour and the roles played by each argument are actually derived from the primitive components of the event structure, which have also been characterized through the complexity of events described by a verb. Event complexity is related to causation and to the fact that verb meaning is not atomic, but compositional. It has been recognized in Lexical Semantics literature that the meaning of verbs is composed of a predicate-argument structure, built from smaller and more primitive semantic elements.[35] Different types of evidence had been given to corroborate this assumption, which are explained in more detail below.

Morgan shows that certain verbs have an ambiguous interpretation in a sentence modified by *almost*.[36] According to the author, the ambiguity is caused by the complexity of the event described by the verb. The adverb can have scope over either one of the two subevents which compose the complex event. Stechow[37] makes the same claim about the expression *wieder* 'again' in German. In BP, sentences such as *a menina quase fechou porta* 'the girl almost closed the door' or *a menina fechou a porta de novo* 'the girl closed the door again' are ambiguous. In the first case, the sentence can describe two different situations: one in which the girl thought about closing the door, but she actually takes no action in doing so (in which case the adverb has scope over the action subevent); and another in which the girl does something to close the door but the expected result is not reached (in which case the adverb has scope over the result subevent). With the adverb *again* the possible readings are as follows: in one, the girl does the action in order to close the door two or more times (in which case the adverb has scope over the action subevent); in the other, the girl does the action in order to close the door one time, but another participant had already closed the door before (in which case the adverb has scope over the result subevent).

Moreover, other authors show that the complex semantic structure of verbs can be made explicit by paraphrases corresponding to complex (thus compositional) phrases. Lakoff and Parsons, for instance, show that all change of state verbs can be paraphrased with a structure with the predicate *become* and a related adjective: *crumple = to become crumpled*. [38] Clark and Clark and Hale and Keyser show the same type of paraphrases for other groups of verbs, namely location and locatum verbs, such as *bottle* and *butter*, respectively.[39] The authors argue that *bottle* can be interpretated as *put something in a bottle*, while *butter* is equaled to *put butter into something*.[40]

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[35] Lakoff 1970; Clark – Clark 1979; Dowty 1979; Pinker 1989; Jackendoff 1990; Levin – Rappaport Hovav 1995; 2005; Hale – Keyser 2002; Wunderlich 2012; Cançado – Godoy – Amaral 2013.
[36] Morgan 1969.
[37] Stechow 1996.
[38] Lakoff 1970; Parsons 1990.
[39] Clark – Clark 1979; Hale – Keyser 2002.
[40] Or *provide something with butter* in Hale and Keyser's more refined paraphrase (Hale – Keyser 2002).

The scope ambiguities and the fact that a single lexical item can have its meaning equated to a complex expression indicate that the meaning of that single item is itself complex. So, assuming the compositionality of verb meaning, Levin and Rappaport Hovav argue that event complexity is the main determinant of argument realization.[41] Thus, the internal structure of the situations described by verbs —and the individual parts of the verbs' meanings— are responsible for determining syntactic properties of verbs. In this perspective, the representation of verb meaning which serves the purpose of verb classification must include a proper representation of the event structure.

Following Levin and Rappaport Hovav, predicate decomposition structures are such a type of representation.[42] According to the authors, predicate decomposition is a representation of verb meaning built from primitive predicative elements and their arguments and modifiers. We follow in VerboWeb Cançado, Godoy and Amaral's representations,[43] which refine and further develop Rappaport Hovav and Levin's structures,[44] considering data from BP. As follows, we exemplify the representation with the predicate decomposition structure for a change of state verb.

[5] *v*: [[X ACT] CAUSE [BECOME [Y <*STATE*>]]]

In the representation above, for the event structure of a change of state verb, primitive predicates are notated in upper case, variables are notated by letters X and Y and represent the arguments of the verb, the ontological category of the roots (which represents the idiosyncratic meaning of verbs) is notated in italics; square brackets are used to signal each predicate-argument subpart of the structure, and angled brackets are used to signal the root. CAUSE is a primitive predicate which takes two arguments, the subevents [X ACT] and [BECOME [Y <*STATE*>]]. The first subevent is the action which causes the change of state, and it is represented by the predicate ACT, which takes a single argument, the variable X. The second subevent is the result caused by the action, the change of state, and is represented by the complex structure [BECOME [Y <*STATE*>]]. In this complex structure <*STATE*> takes one argument, Y, and BECOME also takes one argument, the whole structure [Y <*STATE*>].

The example in [5] represents the event structure properties which are associated with the general contour found across specific situations described by change of state verbs. As already claimed, lexical aspect and thematic roles are derived from primitive elements comprised in the event structure, and are closely related to event complexity. Dowty associates the ambiguity of *almost* and *again* with the semantic structure of accomplishment verbs.[45] According to the author, an accomplishment is composed of an activity (the action) and an achievement (the result), which are causally related

[41] Levin – Rappaport Hovav 2005.
[42] Levin – Rappaport Hovav 2005.
[43] Cançado – Godoy – Amaral 2013.
[44] Rappaport Hovav – Levin 1998.
[45] Dowty 1979.

(CAUSE). Causation and the complexity of events have been intertwined notions since then.[46]

From that structure, it is possible to derive different types of properties of the described event, such as the thematic roles of the arguments and the lexical aspect, as already argued. Following Jackendoff and Dowty,[47] Cançado, Godoy and Amaral[48] propose that the X argument of the predicate ACT is a Cause, meaning the Agent is represented by the same structure modified by the VOLITION component: [X ACT volition] (modifiers are notated in lower case in VerboWeb), and that the Y argument of BECOME is a Patient. The causal relation between those subevents makes up the temporal contour of the situation: action predicates show their dynamic character, the complexity entails a certain amount of duration, and the result of the change of state shows the telic nature of the event. The structure is, thus, related to the accomplishment temporal contour.

Dowty also proposes that states are the fundamental building blocks of aspectual meaning, and they are combined with specific predicates to derive the other aspectual types.[49] However, more recently, some authors have proposed that states are also compositional, and can even be complex and include a causal relation.[50] Different types of stative verbs challenge Vendler's quadripartite classification.[51] We assume that there are at least two types of states: simple states and complex states (along with many other distinctions proposed in the literature, such as the individual-level and stage-level states). Besides, other aspectual distinctions have been proposed for the other three classes, such as the semelfactives[52] and the degree achievements.[53] The different types of aspectual interpretation are a consequence of the different types of components which make up the meaning of the verb.

Along with the general event structure shared with many verbs, the representation also includes the specific semantic components of specific verbs, which distinguish different items with the same general event structure. These specific semantic components are associated with the idiosyncratic meaning of the verb, or the root. In the general structure of the class, only the ontological type of the root is displayed. But specific verbs can also be represented, as the example below illustrates:

[6] *amassar* 'crumple': [[X ACT] CAUSE [BECOME [Y <*AMASSADO* 'CRUMPLED'>]]]

Predicate decomposition structures are adopted in VerboWeb to represent the meaning of each verb class. These representations have the advantage of making

[46] Pinker 1989; Stechow 1996; Pylkänen 1997; 2000; Arad 1998; Martin – Schäfer 2014.
[47] Jackendoff 1990; Dowty 1979.
[48] Cançado – Godoy – Amaral 2013.
[49] Dowty 1979.
[50] Pylkännen 1997; 2000; Arad 1998.
[51] Vendler 1967.
[52] Smith 1997.
[53] Dowty 1979.

explicit the internal components of the meaning of a verb, which can be used to derive thematic roles and lexical aspect and to make predictions about argument realization. A final advantage of the predicate decomposition structures is the possibility of proposing different levels of verb classes, depending on the granularity of the analysis. As we will show below, this is an important part of our analysis of the BP verbal lexicon.

Any classification essentially depends on the criteria established for the definition of classes. As already pointed out, VerboWeb's classification is based on lexical-grammatical criteria, as defined by De Clerck, Colleman and Willems,[54] for the classification of verbs. However, the relationship between semantics and syntax is complex and can occur on different levels, thus not all grammatical phenomena are strictly related to an event structure template as illustrated in [5]. For that, we also assume that the classification can vary depending on the granularity of the analysis (the grain size), as we explain below.

2.3.1. *The grain size of verbal classification*

Cançado and Gonçalves,[55] based on Levin,[56] propose three levels of verb classification: coarse-grained, which corresponds to the most general level; medium-grained, which corresponds to an intermediate level; and fine-grained, which corresponds to the level associated with more specific and idiosyncratic properties of verbs. In VerboWeb, canonical verb classes correspond to the medium-grained level of analysis. Change of state verbs, as represented in [5], are an example. This verb class is composed of verbs which share the event structure in [5] and a group of syntactic properties, such as the causative alternation (the possibility of both a transitive and an intransitive form), passivization, and the possibility of an instrumental adjunct.

A coarse-grained analysis, in contrast, considers properties which are common in different medium-grained classes, and that are also relevant for grammatical properties. So, in a coarse-grained analysis, verbs are grouped together by properties which are common in distinct event structures. As an example, Cançado and Gonçalves cite the agentive verbs.[57] Agentivity is a property which crosscuts different event structures. And all agentive verbs share certain grammatical properties, such as passivization. Thus, considering such properties, a change of state verb such as *amassar* 'crumple' may be grouped with a transitive activity verb, such as *lavar* 'wash'.

Finally, a fine-grained analysis considers the specific idiosyncratic meaning of verbs, found in their roots in a predicate decomposition representation. Such properties motivate a fine-grained classification if they are relevant for grammatical properties and generalizations. Cançado and Gonçalves argue that reciprocal verbs can be classified together in a fine-grained analysis.[58] Within the change of state verb class, there are non-reciprocal verbs (such as *amassar* 'crumple'), but also reciprocal verbs (such as

[54] De Clerck – Colleman – Willems 2013.
[55] Cançado – Gonçalves 2016.
[56] Levin 2010.
[57] Cançado – Gonçalves 2016.
[58] Cançado – Gonçalves 2016.

misturar 'mix', *agrupar* 'group', and *colar* 'glue'). The specific meaning properties of reciprocal verbs predict their occurrence in a type of argument structure alternation.[59] In one form, the object can denote both participants of the reciprocal relation, as in *a cozinheira misturou os ingredientes* 'the cook mixed the ingredients'. In an alternate form, the object denotes a single participant, and the other participant of the reciprocal relation is denoted by an adjunct phrase, as in *a cozinheira misturou a manteiga com a farinha* 'the cook mixed butter with flour'. Cançado, Godoy and Amaral argue that reciprocal verbs do not compose a verb class in a medium-grained analysis because they share all other properties of change of state verbs.[60] And, besides, reciprocal verbs can be found in different classes. Reciprocal verbs with reciprocity in the object (such as *misturar* 'mix', *agrupar* 'group', and *colar* 'glue') are found within the change of state class, but reciprocal verbs with reciprocity in the subject (such as *conversar* 'talk', *flertar* 'flirt' and *lutar* 'fight') are found within the class of internally caused (unergative) verbs. Therefore, these verbs motivate a fine-grained analysis, which is used in VerboWeb to determine subclasses of verbs.

To sum up, VerboWeb adopts a theory of verb classification based on lexical-grammatical criteria. This means that verbs are grouped together according to their semantic properties which have impact on syntactic structure. As is well recognized in Lexical Semantics literature, these semantic properties are event structure properties, specifically the individual primitives which make up the event and its complexity. In order to represent the event structure of verbs, a predicate decomposition structure is proposed for each class and it is accompanied by aspectual and thematic properties derived from it. As the relation between semantic and syntax is complex, different levels of analysis are considered in the classification, following the granularity proposal of Cançado and Gonçalves.[61] As already pointed out, the authors' proposal is based on lexical-grammatical criteria for verb classification. Thus, independently of the granularity of the analysis, verb classification always takes into consideration the association between event structure properties and syntactic properties of verbs, or their argument structure.

3. METHODOLOGY: DATA AND ANALYSIS

The aim of VerboWeb is to present a broad and complete overview of the BP verbal lexicon. Thus, our methodological goal is to find, list, describe, analyze, and classify the BP verbs and verb classes as exhaustively as possible.

So, to start, and based on previous studies and hypotheses, a class is chosen to be analyzed (e.g., change of state verbs) and one determinant property of this class is singled out (e.g., causative alternation). Using this property as a guide, we collect data (single verbs) from Borba's verb dictionary.[62] This dictionary is the most complete

[59] Godoy 2008.
[60] Cançado – Godoy – Amaral 2013; 2017.
[61] Cançado – Gonçalves 2016.
[62] Borba 1990.

source of verbs available for BP, since it brings semantic classifications and examples from various corpora, together with the meaning of verbs. However, some verbs which were more recently incorporated into the BP lexicon are not presented in Borba's (1990) dictionary. In those cases, we use Houaiss electronic dictionary.[63] The search for data in dictionaries is done manually and individually by a researcher of our group. Each verb listed in Borba's verb dictionary is verified according to the guiding property. Those verbs which do have the property are collected to the point that we have a complete list (or as complete as possible) of the verbs of the target class.

Once the list of verbs is ready, each verb is individually analyzed. We take seriously the hypothesis that semantics determines syntax. So, as each verb is individually analyzed, different diagnostic tests are applied in order to verify the verb's syntactic and semantic properties. Some of these tests are aspectual tests, passivization, deletion of arguments, and types of adjunctions accepted by the verb, among others. Verbs are classified according to syntactic properties in common, which reflect a common semantic property. This also means that when a verb is polysemous, presenting multiple meanings, each meaning can be related to a different argument structure, and, consequently, to a different class. For example, the verb *uniformizar* can mean either 'make uniform' or 'to provide with uniform.' In the first sense it describes a change of state, and is classified together with *quebrar* 'break' and other verbs of change of state. An example sentence is *o pintor uniformizou a parede* 'the painter made the wall uniform'. In the second sense it describes a change of possession, and is classified together with *amanteigar* 'butter' and other verbs of change of possession (also known as locatum verbs). An example sentence is *o gerente uniformizou os funcionários* 'the manager provided the workers with uniforms'. Two senses of a polysemous verb can also be in the same class if the event structure is the same in both cases.

Based on examples given in the dictionaries, sentences are carefully crafted for each verb, both for exemplification and for testing specific properties. As pointed out by Laporte,[64] using carefully crafted sentences we can verify structures that are or are not allowed in the language, that is, we can deal with negative evidence, a factor whose importance has been recognized since Chomsky.[65] To ensure that the grammatical structures are actually part of the BP grammar, all the sentences are attested in language use data. This procedure is done by searching in the corpora made available by Linguateca's website, Corpus do Português, and also through searches in Google.[66]

The individual analysis of each verb and each class is carried out by the research team, based on the many individual research works previously developed. In weekly meetings, the researchers get together to analyze the sentences which exemplify each property of verbs, to discuss theoretical analyses, and to feed the database with new information.

[63] Houaiss 2009.
[64] Laporte 2008.
[65] Chomsky 1957.
[66] Santos 2009 (https://www.linguateca.pt/); Davies 2016 (https://www.corpusdoportugues.org/web-dial/); Google Brasil (https://www.google.com.br).

4. BRAZILIAN PORTUGUESE VERB CLASSES

Assuming the theory of verb classification outlined in Section 2 and using the methodology outlined in Section 3, VerboWeb analyzes and classifies BP verbs according to their argument structure properties, that is, the event structure lexicalized by each verb and their syntactic properties related to argument realization.

As a first generalization, verbs are grouped together into four major aspectual categories:

- Activity: this category comprises verbs which lexicalize a single (simple) action event (activities, semelfactives);
- Causation: this category comprises verbs which lexicalize complex eventualities, composed of two subeventualities causally related (accomplishments, complex states);
- Culmination: this category comprises verbs which lexicalize a single (simple) result event (achievements);
- State: this category comprises verbs which lexicalize a single (simple) static eventuality (simple states).

These categories could be seen as a result of a coarse-grained analysis in Cançado and Gonçalves's terms.[67] However, they do not function as classes *per se*, because there is no syntactic property related to each group. These categories are gathered following the long-standing tradition of classifying verbs by their lexical aspect, for the relevance of such information in a verbal database, and also considering that lexical aspect is one of the properties derived from event structure. As we have already mentioned in subsection 2.1, the names (labels) for the major categories make reference to the event structure properties related to aspect. Thus, such categories are defined according to the compositional structure and the nature of the eventualities they describe, and aspectual properties of verbs are derived from this type of information.

Despite categorizing verbs in these four major groups, VerboWeb does not make use of coarse-grained classes. Classes in a coarse-grained analysis share only few properties (as agentivity and passivization, Cançado and Gonçalves's example).[68] Besides, those properties are associated with argument structure and will be part of the properties of classes defined in a medium-grained analysis. Passivization, for instance, is present in all classes of transitive agentive verbs.

Besides these general categories of verbs, actual classes are defined in a medium-grained analysis, taking into consideration more specific semantic content and the syntactic properties of verbs. Each group defined in the medium-grained analysis is considered a "verb class", in canonical terms. Up until now, nineteen classes have been

[67] Cançado – Gonçalves 2016.
[68] Cançado – Gonçalves 2016.

analyzed and are available in the database (many others are currently under investigation).[69]

The category of Activity verbs is divided into verb classes according to the types of actions described, the number of participants and the relationships found between event participants, specifically "contact" and "instruments" (in cases in which the situation has two or more participants).

There are six classes of activity verbs:

Activity Verbs		
Class	Description	Examples
Internally caused (unergative)	These verbs describe situations in which a single participant performs an event.	*dançar* 'dance' *sorrir* 'smile' *correr* 'run'
Internally caused with incorporated instrument	These verbs describe events in which a single participant acts with an instrument; the verb specifies the instrument.	*patinar* 'skate' *esquiar* 'ski' *pedalar* 'pedal'
Contact with incorporated instrument	These verbs describe events in which a participant acts on another with an instrument, which is specified by the verb. There is entailed physical contact between participants.	*martelar* 'hammer' *apedrejar* 'stone' *esfaquear* 'stab'
Contact mediated by instrument	These verbs describe events in which a participant acts on another with an instrument. There is entailed physical contact between participants.	*lavar* 'wash' *limpar* 'clean' *varrer* 'sweep'

[69] The works that give rise to the verb classes are dissertations, theses, and papers developed by the members of the Research Group on Lexical Semantics from the Faculty of Languages, Literature, and Linguistics (FALE) of the Federal University of Minas Gerais (UFMG). These publications can be found on the group's website: http://www.letras.ufmg.br/nucleos/nupes/.

Contact mediated by the body	These verbs describe events in which a participant acts on another using its own body. There is entailed physical contact between participants.	*beijar* 'kiss' *abraçar* 'hug' *lamber* 'lick'
Weather verbs	These verbs describe natural events which occur in a specific place.	*chover* 'rain' *ventar* 'wind' *nevar* 'snow'

Table 2. Classes of activity verbs in VerboWeb

Verbs of causation are divided into classes according to the nature of the "causally related subeventualities". There are eight classes of causation verbs:

Causation Verbs		
Class	Description	Examples
Optionally agentive change of state	These verbs describe events in which a trigger (volitionally or not) causes a change of state in another participant.	*amassar* 'crumple' *fechar* 'close' *quebrar* 'break'
Non-agentive change of state	These verbs describe events in which a non-volitional trigger causes a change of state in another participant.	*cansar* 'tire' *empobrecer* 'impoverish' *inibir* 'inhibit'
Change of locative state	These verbs describe events in which an agent causes a change in the state of another participant in relation to a location.	*pendurar* 'hang' *confinar* 'confine' *hospedar* 'lodge'
Change of possessive state	These verbs describe events in which an agent causes a change in the state of another participant in relation to its possessions.	*encher* 'fill' *cobrir* 'cover' *prover* 'provide'

Change of location / location verbs	These verbs describe events in which an agent causes a change in the place in which another participant is located. The new location is specified by the verb.	*engarrafar* 'bottle' *enjaular* 'cage' *encaixotar* 'box'
Change of possession / locatum verbs	These verbs describe events in which an agent causes a change in the possession of another participant. The new possession is specified by the verb.	*amanteigar* 'butter' *coroar* 'crown' *mobiliar* 'furnish'
Locatum transfer	These verbs describe events in which an agent transfers a physical or abstract object to another participant. The transferred object is specified by the verb.	*premiar* 'reward' *abençoar* 'bless' *presentear* 'gift'
Psychological (complex) state	These verbs describe complex states in which a stimulus causes the activation of a psychological state in another participant.	*preocupar* 'worry' *chocar* 'shock' *irritar* 'irritate'

Table 3. Classes of causation verbs in VerboWeb

The category of Culmination verbs is divided into classes by the nature of their result:

Culmination Verbs		
Class	Description	Examples
Change of state	These verbs describe simple events in which a participant suffers a change of state.	*adoecer* 'sicken' *corar* 'blush' *adormecer* 'fall asleep'

Change of place	These verbs describe simple events in which a participant suffers a change of location.	*chegar* 'arrive' *subir* 'go up' *cair* 'fall'
Change of mental state	These verbs describe simple events in which a human participant suffers a change of mental state.	*aprender* 'learn' *adivinhar* 'guess' *inferir* 'infer'

Table 4. Classes of culmination verbs in VerboWeb

Verbs of state are still being studied and we do not have yet a clear view of the specific properties of these verbs. Currently, only two classes are available in this category (recall that complex states are classified with Verbs of causation):

State Verbs		
Class	Description	Examples
Psychological (simple) state	These verbs describe a psych state of a human participant in relation to an object, situation or another person.	*amar* 'love' *temer* 'fear' *odiar* 'hate'
Existential state	These verbs describe an existential state of a participant in some specific place.	*existir* 'exist' *ter* 'there to be' *haver* 'there to be'

Table 5. Classes of state verbs in VerboWeb

Considering the medium-grained analysis presented above, verb classes in VerboWeb are defined by a set of five syntactic-semantic properties. These properties are called "structural properties", and each class is defined by a set of values for these five properties.

- Common semantic content in the class: The common semantic content in the class is the meaning which remains constant in all verbs of the class;
- Basic syntactic form: the basic syntactic form is the basic transitivity of the verbs;
- Thematic roles structure: the thematic roles structure gives a description of the argument structure of the class in terms of thematic roles;
- Predicate decomposition structure: the predicate decomposition structure provides a refined theoretical definition of the event structure of the class;

- Basic lexical aspect: finally, the basic lexical aspect outlines the aspectual class of the verbs within the analyzed class. This aspectual classification is always in agreement with the quadripartite general categorization of the verbs, but it is more specific.

As follows, we illustrate the structural properties for four classes, one in each major aspectual category. The properties for each one of the nineteen classes can be viewed on VerboWeb's webpage (www.letras.ufmg.br/verboweb).

Activity: internally caused verbs (unergative) Examples: *dançar* 'dance', *sorrir* 'smile', *correr* 'run'
- Common semantic content in the class: do / make an event - Basic syntactic form: [NP V] (intransitive verb) - Thematic roles structure: {Agent} - Predicate decomposition structure: [X DO <EVENT>] - Basic lexical aspect: activity
Causation: optionally agentive change of state verbs Examples: *amassar* 'crumple', *quebrar* 'break', *fechar* 'close'
- Common semantic content in the class: x acts and y comes to be in a specific state as a result - Basic syntactic form: [NP V NP] (transitive verb) - Thematic roles structure: {Cause or Agent, Patient} - Predicate decomposition structure: [[X ACT (volition)] CAUSE [BECOME [Y <STATE>]]] - Basic lexical aspect: accomplishment
Culmination: change of state verbs Examples: *corar* 'blush', *adoecer* 'sicken', *adormecer* 'fall asleep'

- Common semantic content in the class: y comes to be in a specific state - Basic syntactic form: [NP V] (intransitive verb) - Thematic roles structure: {Patient} - Predicate decomposition structure: [BECOME [Y <STATE>]] - Basic lexical aspect: achievement
State: psychological verbs Examples: *amar* 'love', *odiar* 'hate', *temer* 'fear'
- Common semantic content in the class: x is in a psych state in relation to an object - Basic syntactic form: [NP V NP or PP] (transitive verb) - Thematic roles structure: {Experiencer, Stative Object} - Predicate decomposition structure: [X <PSYCH-STATE> Y] - Basic lexical aspect: state

Table 6. Examples of structural properties for four classes

Besides structural properties, each verb class has its own unique morphosyntactic and semantic properties, called "class properties". Class properties can be predicted from the argument structure of the class, but comprise more specific phenomena, such as argument alternations, the combination of verbs with different types of modifiers, and entailments. Each class has its own unique set of class properties and all verbs in a class behave the same way regarding these properties. To illustrate, we show below the class properties of the four classes cited above (the complete sets of properties for all nineteen classes can be accessed at VerboWeb's webpage):

Activity: internally caused verbs (unergative) Examples: *dançar* 'dance', *sorrir* 'smile', *correr* 'run'
- Licenses cognate object: *A Dani dançou uma dança sensual* 'Dani danced a sexy dance' - Licenses an adjunct equivalent to the cognate object: *A Dani dançou sensualmente* 'Dani danced sensually'

Causation: optionally agentive change of state verbs Examples: *amassar* 'crumple', *quebrar* 'break', *abrir* 'open'
- Licenses causative-inchoative alternation with the clitic SE: *O vestido da menina (se) amassou* 'the girl's dress crumpled' - Licenses a cause adjunct in the inchoative form: *O vestido da menina (se) amassou com a brincadeira* 'the girl's dress crumpled because she played a lot' - Licenses process passive: *O vestido da menina foi amassado* 'the girl's dress was crumpled' - Licenses the resultative passive (become state): *O vestido da menina ficou amassado* 'the girl's dress got crumpled' - Licenses the stative passive (be state): *O vestido da menina está amassado* 'the girl's dress is crumpled'
Culmination: change of state verbs Examples: *corar* 'blush', *adoecer* 'sicken', *adormecer* 'fall asleep'
- Licenses inchoative-causative alternation: *A cena vergonhosa corou a Maria* 'the embarrassing scene caused Maria to blush' - Licenses indirect cause in adjunct position of the inchoative form: *A Maria corou com a cena vergonhosa* 'Maria blushed because of the embarrassing scene' - Licenses the resultative passive (become state): *A Maria ficou corada* 'Maria started to blush' - Licenses the stative passive (be state): *A Maria está corada* 'Maria is blushing' - Prohibits SE in the inchoative form: **A Maria se corou* Lit. 'the Maria herself blushed'
State: psychological verbs Examples: *amar* 'love', *odiar* 'hate', *temer* 'fear'

- Licenses factoring of the Stative Object argument: *O rapaz ama a namorada pelo seu jeito meigo* 'the guy loves his girlfriend because of her sweetness' - Licenses passivization: *A namorada é amada pelo rapaz* 'the girlfriend is loved by her boyfriend'

Table 7. Examples of Class Properties for four classes

Verb classes in VerboWeb are, thus, built from verbs with the same argument structure properties, which lexicalize the same type of event structure and have the same syntactic properties. The events described by verbs are complex entities, composed of different parts (subeventualities) and of the different types of relationships between event participants. The event structure lexicalized by the verb determines its argument realization properties. Each class is characterized by a set of five structural properties, and a set of class properties.

As already argued, however, verb classification according to lexical-grammatical criteria can take place in distinct levels of analysis.[70] De Clerck, Colleman and Willems discuss the importance of defining which is the most adequate granularity for verb classification in a given study, considering the research purposes.[71] For VerboWeb, which has as goal a broad analysis of a great number of verbs, in a complete investigation of the BP verbal lexicon, we believe that two levels of classification are essential in order not to miss any generalizations about the syntactic-semantic behavior of verbs: verb classes, defined in a medium-grained type of analysis, as we have already presented, and subclasses, which are defined in a fine-grained type of analysis.

Classes, as shown above, are defined as groups of verbs which share an argument structure; they are defined both by structural properties and by class properties. Thus, a class shares a significant amount of morphosyntactic and semantic characteristics. Subclasses, however, are not associated with the argument structure, but with specific morphosyntactic phenomena which are determined by idiosyncratic properties which are constant in a small group of verbs within a class. Each subclass is entirely contained in a specific class and the verbs in a specific subclass contain all the properties of the subclass plus all the properties of the class in which the subclass is contained.

Recalling Cançado and Gonçalves's example,[72] Reciprocal verbs (reciprocity in object) are a subclass of the class of Verbs of causation: optionally agentive change of state. Each one of those verbs has all the properties of optionally agentive change of state (as presented in **Table 6** and **Table 7**). Besides all those properties, those verbs share the specific semantic property related to reciprocity (the object argument has a plural denotation), and the syntactic properties related to the discontinuous form of the sentences. This refers to the possibility of the plural object to be factored into different

[70] Following Cançado – Gonçalves 2016.
[71] De Clerck – Colleman – Willems 2013.
[72] Cançado – Gonçalves 2016.

syntactic constituents,[73] as in *a cozinheira misturou os ingredientes* 'the cook mixed the ingredients' and *a cozinheira misturou a manteiga com a farinha* 'the cook mixed butter with flour'.

Thus far, including the subclass of Reciprocal verbs (reciprocity in object), eight subclasses have been analyzed (and others are under investigation):

- "Reciprocal verbs (reciprocity in object)" (e.g., *misturar* 'mix') belongs to the class "Causation: optionally agentive change of state verbs";
- "Reciprocal verbs (reciprocity in subject)" (e.g., *lutar* 'fight') belongs to the class "Activity: internally caused verbs (unergative)";
- "Verbs of expression (manner of speaking)" (e.g., *cantar* 'sing') belongs to the class "Activity: internally caused verbs (unergative)";
- "Instrumental verbs with two instruments" (e.g., *apedrejar* 'stone') belongs to the class "Activity: contact verbs with incorporated instrument";
- "Verbs of removal" (e.g., *apagar* 'erase') belongs to the class "Activity: instrument mediated contact verbs";
- "Verbs of image creation" (e.g., *tatuar* 'tattoo') belongs to the class "Causation: change of locative state verbs";
- "Contact verbs" (e.g., *amassar* 'crumple') belongs to the class "Causation: optionally agentive change of state verbs";
- "Container verbs" (e.g.. *abrigar* 'shelter') belongs to the class "Causation: change of locative state verbs".

Each subclass also has its own unique set of defining properties, which are called subclass properties, and all verbs in a subclass behave the same way regarding subclass properties. To illustrate, we show below the subclass properties for two subclasses, contained in classes from the activity and causation categories cited above. We have not yet found subclasses in the categories of culmination verbs and verbs of state. The complete sets of properties for all subclasses can be accessed at VerboWeb's webpage (www.letras.ufmg.br/verboweb).

[73] Godoy 2008; Meirelles 2018.

Verbs of expression (manner of speaking) (contained within the class of Activity: internally caused verbs [unergative]) Examples: *cantar* 'sing', *rezar* 'pray', *gritar* 'scream'
- Denotes a speech event - Licenses communicated message in object position: *O tenor cantava as mais belas músicas* 'the tenor sang the most beautiful songs' - Licenses message and addressee in object positions: *O tenor cantava as mais belas músicas para sua amada* 'the tenor sang the most beautiful songs to his loved one' - Licenses a sentential object: *O tenor cantava que seu amor pela donzela era infinito* 'the tenor sang that his love for the beautiful woman was infinite' - Licenses addressee in indirect object position: *O tenor cantava para sua amada* 'the tenor sang to his loved one'
Reciprocal verbs (reciprocity in object) (contained within the class of Causation: optionally agentive change of state verbs) Examples: *misturar* 'mix', *agrupar* 'group', and *colar* 'glue'
- The object argument has a plural denotation - Licenses the discontinuous form (argument factoring): *A criança / a queda da caixa misturou uma bolinha de gude com a outra* 'the child / dropping the box mixed one marble with the other' - Licenses the inchoative of the discontinuous form: *Uma bolinha de gude (se) misturou com outra (com a queda da caixa)* 'one marble got mixed with another (because someone dropped the box)' - Licenses process passive of the discontinuous form: *Uma bolinha de gude foi misturada com a outra* 'one marble was mixed with another' - Licenses resultative passive of the discontinuous form: *Uma bolinha de gude ficou misturada com a outra* 'one marble got mixed with another' - Licenses stative passive of the discontinuous form: *Uma bolinha de gude está misturada com a outra* 'one marble is mixed with another'

Table 8. Examples of Subclass Properties for two subclasses

Summing up, we propose that in order to provide a complete analysis of the verbal lexicon of a language at least two levels of analysis should be considered: classes and subclasses. The general aspectual categories which group distinct classes are also useful, but as those categories are not related to syntactic properties, they are not

considered classes, because they do not conform to the lexical-grammatical criteria for classification. According to these criteria, BP verbs in VerboWeb are grouped in classes and subclasses. Classes are defined by structural and class properties; subclasses are defined by subclass properties.

5. SOME FINAL REMARKS

VerboWeb presents a large list of BP verbs, together with a theoretical analysis and classification. Assuming the hypothesis that semantics determines syntax (following many authors in Lexical Semantics), we classify verbs according to their argument structure properties (relating their event structures with their morphosyntactic properties). It is a work in progress, with continuous addition and revision of data and analyses, but we have already a good image of what the BP verbal lexicon looks like.

Activity (277 verbs divided into 6 classes)	Internally caused (unergative), Internally caused with incorporated instrument, Contact with incorporated instrument, Contact mediated by instrument, Contact mediated by the body, Weather verbs
Causation (1034 verbs divided into 8 classes)	Optionally agentive change of state, Non-agentive change of state, Change of locative state, Change of possessive state, Change of location / location verbs, Change of possession / locatum verbs, Locatum transfer, Psychological state
Culmination (133 verbs divided into 3 classes)	Change of state, Change of place, Change of mental state
State (38 verbs divided into 2 classes)	Psychological state; Existential state

Table 9. Classes in VerboWeb

Some important conclusions have already emerged from this preliminary "X-Ray" of the BP verbal lexicon. For instance, the number of classes and the number of verbs in the classes indicate that the verbs of causation are the most numerous. This may reflect BP's tendency to lexicalize causative events (more specifically change of state). This pattern corroborates the claim that the causative event is the most prototypical one in human cognition[74] and also Talmy's claim that romance languages prefer the lexicalization of results over the lexicalization of manners.[75] Besides, regarding the activity verbs, an interesting generalization has emerged: those verbs are

[74] Langacker 1990; Croft 1991.
[75] Talmy 1978.

associated with the presence or absence of contact and instrument; thus, these two properties have proven to be relevant for grammatical generalizations.

Other properties which occur consistently throughout verb classes are psychological and mental states, physical state, location, and possession. These properties seem to be responsible for the division of classes within the major categories of verbs of causation, culmination verbs, and verbs of state. Although our present analysis does not show this pattern yet within culmination verbs and verbs of state, studies being carried out have indicated that those categories will also have classes related to psychological and mental states, physical state, location, and possession, analogously to verbs of causation.

Although we follow a lexical-semantics approach for the classification of verbs, the data and analyses presented can be useful for researchers from different theoretical perspectives who are interested either in the study of BP verbs or in the comparison with other languages. All verbs, sentences and properties can be accessed at http://www.letras.ufmg.br/verboweb/.

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7. Bibliography

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