THE ROLE OF LOW HEADS IN THE CAUSATIVE INTERPRETATION IN BRAZILIAN PORTUGUESE: SOME NOTES ON EVENT COMPOSITION, F-SEQ AND NANOSYNTAX

Thayse Letícia FERREIRA [*]
Valdilena RAMMÉ [**]

- ABSTRACT: In this paper, we investigate the causativization process in Brazilian Portuguese in order to understand the constraints and generalizations that allow us to explain the apparently chaotic data in this language. We explore the hypothetico-deductive method and hypothesize that there are elements from the Aktionsarten domain that determine the verbal behavior in relation with a causative meaning. Consequently, we present a theoretical review of aspectual classes, employing the tools of a recent approach to the architecture of grammar named Nanosyntax (STARKE, 2009). Thereby, it will be possible to understand the finer-grained constraints that the classes of 'states' and 'accomplishments', for instance, impose for the causativization, taking into account 'nano' syntactic and semantic features, such as Initiation, Process, Result and Boundness. We conclude, therefore, that for a predicate to be interpreted as a causative one, the event denoted by it needs to be dynamic in its nature. In addition, we show that the functional sequence (F-seq), in the way it is proposed within the nanosyntactic model, allows us to explain the possible association of more than one syntactic node with the same verbal argument, as well as its underassociation and consequent identification with a null causative nucleus, as it happens to be the case in Brazilian Portuguese causativization.

- KEYWORDS: Causativization. Event composition. Aktionsarten. Nanosyntax. Functional hierarchy of the verbal domain.

Introduction

Since the mid-1960s, it has been recognized in linguistics the need to assume the existence of elements in our ontology that are related to broader concepts of human perception about the world. In this sense, certain components that integrate the spatial and temporal domains, for example, appear as syntactic-semantic features that work

[*] Universidade Federal de São Carlos (UFSCar), Centro de Educação e Ciências Humanas, São Carlos – SP – Brazil. tleticiaf@gmail.com. ORCID: 0000-0003-2883-8721

[**] Universidade Federal da Integração Latino-americana (UNILA). Foz do Iguaçu – PR – Brazil. Departamento de Linguística e Letras Modernas. val.ramme@gmail.com. ORCID: 0000-0003-1794-3278.

on the construction of natural language grammars in a systematic way. Although there is currently a consensus that elements such as path, manner and causality are relevant for the construction of sentences in natural languages, the debate about the exact *locus* of these elements is still unsettled (RAMCHAND; SVENONIUS, 2014).

Considering such framework, in this paper we intend to investigate phenomena related to the expression of causality in natural languages, aiming mainly to understand (i) one of the many ways in which the different languages of the world can convey this type of relation and (ii) the role of different grammar modules in the construction of a causative meaning. In particular, we will investigate the phenomenon of causativization, which consists roughly of a process that allows for the attribution of a causative interpretation to predicates or constructions that do not convey causality inherently, as it can be seen in the sentence pairs below, where (a) marks the non-causative version of the predicates '*pular'* ('to jump') and '*emagrecer'* ('to lose weight') and (b) the causative counterpart of the same structures.

(1) a. *O menino pulou pela cerca*.
the.M boy.SBJ jumped.3SG-PST over-the.F fence
b. *A mãe pulou o menino pela cerca*.
the.F mother.SBJ jumped.3SG-PST the.M boy.OBJ over-the.F fence

(2) a. *João emagreceu*.
João.SBJ got slim.3SG-PST.
b. *O remédio emagreceu o João*.
The medicine.SBJ lose-weight.3SG-PST João.OBJ.

In sentences (1a) and (2a), the processes described by the predicates '*pular'* and '*emagrecer'* occur in a "natural" or "spontaneous" way, i.e. our interpretation for these sentences is simply that there was an event in which "the boy jumped" and "John got slim". In both (b) sentences, on the other hand, we have a rather unexpected configuration, since in these cases we interpret the processes denoted by '*pular'* and '*emagrecer'* as not happening naturally; instead, these processes were caused by the argument located in the position of the syntactic subject. That is, it is understood in (1b) that the mother somehow made the boy jump over the fence and, in (2b), the medicine made John lose weight. In these sentences, therefore, the event denoted by the predicate is, in fact, the result of another event (a causative one) performed by the subject.

This process seems to be quite pervasive throughout natural languages (RAMCHAND, 2008; HORVATH; SILONI, 2011; LYUTIKOVA; TATEVOSOV, 2012). However, it is important to realize that: (i) not all the predicates of a given language can convey a causal relation between two events (see the contrast between sentences (1) and (3)); (ii) there seems to be some language specific constraints that block the incidence of causality on its verbs (cf. sentences (3) and (4), respectively);

and (iii) the possibility of conveying a causative relationship applies to a certain set of verbs only in some contexts (see sentences in (5))[1].

(3) a. *As crianças riram*.
the.F-PL kids laughed.
b. **O palhaço riu as crianças*.
the.M clown laughed the.F-PL kids.

(4) a. Sami naura-tti tyttö-jä.
Sami.NOM laugh.CAUSE-PST girls.OBJ
"Sami laughed the girls" (= Sami made the girls laugh)
(Adapted from PYLKKÄNEN, 2008)

(5) a. *Pedro caiu de cima do muro*.
Pedro.SBJ fell.3SG.PST off the.M wall.
b. **Joana caiu Pedro de cima do muro*.
*Joana.SBJ fell.3SG Pedro.OBJ off the.M wall.
c. *O Brasil caiu o índice de analfabetismo*.
the.M Brasil fell.3SG the.M illiteracy rate off.

After contrasting the data shown in examples (1) to (5), we can ask ourselves which is the source of the observed asymmetries regarding causativization. Why is that not all verbs (intra or crosslinguistically) can be interpreted as causative in any given situation? Considering, for instance, the contrast between the sentences (1) and (3), on the one hand, and (3) and (4), on the other hand, the phenomenon under discussion becomes even more interesting. Since both the predicates '*pular'* (jumping) and '*rir'* (laughing) belong to the class of unergative verbs and denote semelfactive events (ROTHSTEIN, 2004), why do the former can be causativized in Brazilian Portuguese (BrP), with no harms to interpretation, whereas the second one is systematically blocked to causativize in that language? In other words, why do verbs that seem to share the same set of syntactic-semantic features exhibit an irregular behavior in relation to the incidence of causality?

In order to answer the questions above, we aim to find some finer grained syntactic-semantic properties of BrP verbs and the events they denote that may contribute

[1] As an anonymous reviewer noticed, it is important to highlight the fact that there is no interdialectal uniformity in relation to the well-formed judgments of causative sentences. Moreover, in some cases the causative structure is very similar to a topic-subject construction. Despite this fact, we defend that the sentences discussed here legitimately exhibit a causative interpretation, associated with the fact that there is a new argument in the structure that causes the effect. The main argument to defend a causal reading for these sentences comes precisely from its meaning, which can be paraphrased by "x made VP". It should be noted that (5c) can be paraphrased by "*o Brasil fez o índice de analfabetismo cair*" ("Brazil made the illiteracy rate fall"), while in a topic-subject construction such as "*o relógio caiu o ponteiro do minuto*" ("the clock dropped the minute hand") or "*o carro faltou o freio*"("the car lacked the brake") the same paraphrase does not apply: "**o relógio fez o ponteiro do minuto cair*" and "**o carro fez o freio faltar*".

to the understanding of the causativization process. To do so, we work with the hypothetical-deductive method as a means of investigation and we hypothesize that the factor which constrains the possibility of a given predicate from being interpreted as causative in our language is the architecture of the functional sequence (*f-seq*) segment that corresponds to the domain of event composition ("little-v"). In order to investigate our hypothesis and reach the goals outlined, this research is within the theoretical framework of Nanosyntax (STARKE, 2009), considering that, by integrating Minimalism and Cartography assumptions, this model offers us a very rich, elegant and predictive machinery that allows us to look at the smallest atoms of linguistic composition, thus providing a fine understanding of the structure and engine of the event composition domain and its intimate relationship with generalizations about the argument structure.

In the next section, we present the process of causativization, discussing the main problems that we find in the understanding of this phenomenon. Next, we will present the more general framework of Nanosyntax (STARKE, 2009; RAMCHAND, 2008; CAHA, 2009) and the main assumptions of the theory underlying our analysis. In the section "Investigating causativization in BrP within Nanosyntax", we confront our given hypothesis with causativized sentences of BrP that will have their structure translated into the nanosyntactic terminology. In exploring the data, which appear to corroborate our initial assumption, we argue that the elements located in the lowest positions of the functional hierarchy seem to be the ones that make a difference in the verbal behavior regarding the incidence of causality. In addition, we explain, using nanosyntactic operation rules, how a causative meaning can be achieved and how the verbal structure is rearranged for both. We then show that there are distinct grammatical modules acting to construct a causative meaning. Finally, we draw some remarks about the ideas discussed in this paper. With this presentation, we hope to contribute to the description of Brazilian Portuguese and with the studies on the expression of causality in natural languages, also opening a new perspective for the investigation of causativization.

Licensing a causative interpretation for non-causative predicates: the causativization phenomenon

Causality has been a constant research topic in linguistics. As can be observed in seminal texts such as Dowty (1979), Parsons (1990), Levin and Rappaport-Hovav (2005), Kratzer (2005), Ramchand (2008) and Higginbotham (2009), this relation seems to be central to our understanding of aktionsarten and of the interface between syntax and semantics. According to Copley and Wolff (2014, p.11), "[...] much of the phrasal structure is organized around events (or entities similar to events, such as situations) and their causal relations." As a consequence of this statement, based on empirical observations, we can say that investigating the mechanisms used by

different languages to express causality is an important step towards understanding various phenomena.

Causality here can be understood as a relation between two events: a *cause* and an *effect* (DAVIDSON, 1967; LEWIS, 1973b), organized in such a way that the *effect* should not naturally precede the *cause*. That is, unless we deal with time travel or quantum events, cases in which the sequence of events is explicitly manipulated, the natural ordering of causal relations is given by "*cause → effect"*. If, for example, we admit that a sentence like "Joan broke the window" expresses a causal relationship, then we must understand that Joan did something at t_1 that resulted in "the breaking of the window" at t_2. That is, it does not matter whether Joan threw a stone at the window or hammered it; given a *cause* event, its occurrence must be prior to the *effect*, made explicit in this case by "the breaking of the window". This fact, although presented briefly, compels us to insert a temporal parameter in the definition of what is causality, in consonance with the works of Aguiar (2003), Schaffer (2016) and Neeleman and van de Koot (2012)[2].

In linguistics, the causal relation is usually represented by the predicate CAUSE (JACKENDOFF, 1983; PINKER, 1989) and the temporal ordering between its events can be guaranteed by an ordered pair such as <*cause, effect*>. Thus, when one speaks about a causative interpretation of a certain sentence, it is assumed that an element of the type CAUSE<*cause, effect*> integrates the set of items that compose its structure. When the causativization process occurs, therefore, it is this entire component that is then computed into the overall meaning of the sentence. As we discussed in the introduction, not all the verbs of a given language can be interpreted as causative, that is, not every verb allows the insertion of an element CAUSE<*cause, effect*> in its structure. Considering this fact, let us examine the sentences below to understand some of the problems found in the causativization analysis in BrP.

(6) a. *Joana acordou.*
Joana.SBJ wake-up.3SG-PST.
b. *O despertador/Pedro acordou a Joana*.
the.M alarm clock/Pedro.SBJ wake-up.3SG-PST the.F Joana.OBJ.

(7) a. *A nota do programa subiu*.
the.F rating of-the-program.SBJ rise-up.3SG-PST.
b. *Os professores subiram a nota do programa*.
the.M.PL professors.SBJ rise-up.3PL-PS the.F rating-of-the-program.OBJ.

[2] Some authors admit that the causal relation also depends on a counterfactual parameter, given that time seems to be a necessary but not a sufficient condition to define this relation. By manipulating a possible world parameter, it is understood that if the cause does not occur, the effect event also does not occur (¬O(c) □→ ¬O(e)). In this paper, we do not explore the counterfactuality, however we refer the interested reader to the works of Dowty (1979), Eckardt (2000) and Kratzer (2005).

The predicates ‘acordar’ (waking up) and ‘subir’ (rise up) belong to the class of unaccusative verbs, since they allow for adjectival use in past participle constructions (PPA constructions) (SILVA, 2009) (see (8) below) and block the formation of nominalizations (cf. (9) below), a mechanism that operates freely on unergative predicates, which display in their structure a single external argument, usually associated with a role of agentivity in the unfolding of the event.

(8) a. *A Joana acordada fica muito irritada*.
the.F Joana.SBJ awake.ADJ gets very annoyed.ADJ.
b. *Os arquivos subidos pelos usuários são criptografados*.
the.M-PL files.SBJ uploaded by-the.M-PL users are.COP encrypted.ADJ.

(9) a. **Pedro é acordador de gente preguiçosa*.
Pedro.SBJ is.COP awakener.NMLZ of lazy people.OBJ.
b. **Os subidores de arquivo chegaram*[3].
the.M-PL file uploaders.NMLZ arrive.3PL-PST.

These tests indicate that the only argument these verbs have in their structure ((6a) and (7a)) is a direct object, an internal argument of the VP layer. When these sentences are causativized, however, a new argument arises in the sentence in the position of the syntactic subject. We could, in principle, theorize that the unaccusative verbs causativize because they have a syntactic head available to receive a new argument ([spec-vP] or [voiceP]), thus triggering an interpretation of causality. However, this is not always the case, since not all unaccusative predicates can causativize (see (10)). Moreover, unergative verbs which already contain an argument in the position of spec-vP or voiceP can license the process in question, as it is shown in the sentences (11) with the verb ‘mergulhar’ (dive)[4].

(10) a. *Joana saiu de casa*.
Joana.SBJ leave.3SG-PST home.
b. **Alice saiu Joana de casa*.
*Alice.SBJ leave.3SG-PST Joana.OBJ home.

[3] In a quick search on Google, it is possible to find some uses of ‘subidor’. However, it is important to realize that speakers typically use this word with quote markers, which indicates that the use in question is done through a conscious manipulation of some underlying rules of the language. An example of such an occurrence may be given by “[a] capacitação é voltada para *os ‘subidores’* de coqueiro [...]”, available at: http: //www.alagoas24horas.com.br/709551/workers- trained-for-coconut-collection. In this case, it is also interesting to note that the use of ‘subir’ resembles that of an unergative verb, in which the subject acts with intentionality and control over her actions or, more specifically, the individual who initiates the event is the same which is affected by it.

[4] To argue that the verb ‘*mergulhar*’ is truly an unergative predicate, it is possible to use the nominalization task. Since this verb allows the creation of a noun in ‘-(d)or’, as ‘*mergulhador’*, and block the formation of an adjectival past participle, as in “**a criança mergulhada sorriu*”, ‘*mergulhar’* cannot be an unnacusative predicate.

(11) a. *A criança mergulhou no rio*.
the.F child.SBJ dive.3SG-PST into-the.M river.
b. *Tétis mergulhou a criança no rio*.
Thetis.SBJ dive.3SG-PST the.F child.OBJ into-the.M river.

From the examples above, explaining the causativization of unergative verbs seems to be somewhat more complicated than the causativization of unaccusative predicates, since there is a transparent reorganization of the predicate-argument structure in the former case: in (11b), with the appearance of the new argument 'Thetis' in the sentence, the original argument of the verb, 'the child', is somehow shifted to the direct object position, which is allegedly a functional space that is not available for this kind of predicate[5]. Furthermore, in this case, the argument no longer plays an agentive role in the event but is affected in some way by the event played out by the new subject.

What the examples from (8) to (11) show, therefore, is that although causation seems to involve some kind of argument alternation, what we have is, in fact, a distinct phenomenon, independent of the intrinsic argument grid of verbs. In spite of this fact, we cannot deny that the phenomenon under analysis clearly presents a problem for the argument structure, because when causativization is allowed, there is not only the insertion of a new event in the structure, interpreted as the *cause* that leads to the event denoted by the predicate; but also (i) a new argument arises with the role of "causer" or "initiator" of the eventuality described by the main predicate, which is associated with the *cause* event; and as a consequence of the appearance of this other argument, (ii) some atypical thematic relations are established between the subject and the direct object. How can we explain the existence of all these new relations when a given predicate is causativized?

In Brazilian Portuguese, some previous work have already tried to answer this same question. However, in spite of isolating some descriptive properties of the causativization process in this language, they do not reach a real explanatory level, especially for the relations observed here (AMARAL, 2009; CAMBRUSSI, 2009; SILVA, 2009; FERREIRA; RAMMÉ, 2014). The research developed by Cambrussi (2009, 2011) and Amaral (2009), for instance, both elaborated in the framework of lexicon-conceptual semantics (JACKENDOFF, 1983; LEVIN; RAPPAPORT-HOVAV, 2005), highlight certain thematic properties as being responsible for the behaviour of BrP verbs regarding causativization, but they do not demonstrate the necessary rules for a causative interpretation to be reached in such framework. As an example, we can take the work of Cambrussi (2009, 2015) as a benchmark for this kind of research: when investigating the causativization of unergatives, the author proposes that only the verbs that denote an *internally caused state* allowing an external induction can be interpreted as causative, as long as the event keep the semantic relation of initiator between the verb and its single argument in the intransitive predicate. However, in

[5] For a opposite view to the idea that unergatives have a single external argument, see Hale and Keyser (1993).

addition to the existence of counterexamples for the suggested constraint, as the sentences below illustrate, Cambrussi (2009, 2015) does not discuss which rules can explain the manipulation by which the unergative predicate pass so it could acquire a structure that will be interpreted as causative, which is, in our view, essential to understand the phenomenon of causativization in its completeness.

(12) a. **Joana tossiu o bebê*.
*Joana.SBJ cough.3SG-PST the.M baby.OBJ.
b. **Pedro chorou o João*.
*Pedro.SBJ cry.3SG-PST the.M João.OBJ.

Considering that both '*tossir'* ('to cough') and '*chorar'* ('to cry') are unergative verbs denoting internally caused states because they are bodily processes, the role of initiating the event would necessarily be maintained for the original argument of the predicate. After all, for the events of 'coughing' and 'crying' to occur, it is obligatorily that the person who initiates and plays them out be the one who is 'coughing' and 'crying'. In other words, even though the sentences in (12) respect the properties listed by Cambrussi (2009) as sufficient and necessary for the licensing of causativization, the phenomenon is blocked for this type of predicate. Moreover, there is no explanation as to how a new argument can be inserted and computed in this type of structure, in which there is allegedly only one argument position to be filled.

In this paper, besides looking for finer grained properties of the event as being responsible for the behavior of verbs regarding causativization, which may not be related to the thematic properties of the verb, as defended by previous work (CAMBRUSSI, 2009, 2015; AMARAL, 2009), we intend to fill the explanatory gap regarding how the structure can be composed and interpreted as causative. We believe that mobilizing a theory that deals with events and the syntactic organization of verbal arguments, while considering a direct relation between semantics and syntax, may be more advantageous in helping us to clarify the running of causativization and understand why only a few verbs can license this phenomenon. The model explored in this research, to be discussed in the next section, can be presented as a promising model that will allow us to reach the goals outlined, since it has rules for the structure derivation, which are independently motivated, besides being a computational approach more economical in relation to the more classic models existing within the framework of generative syntax. As we shall see below, Nanosyntax (STARKE, 2009) displaces a number of auxiliary hypotheses from the generative framework, such as case and thematic theories, to the universal functional sequence (*f-seq*). Thus, as the model assumes the existence of a large set of ingredients for linguistic composition, we would be expected to find in natural languages as many structures as combinations of possible features. To avoid this overgeneration of structures, on the other hand, the model posits rigid rules for proper derivation of the hierarchy in an attempt to make the theory empirically adequate. In view of some

of the advantages of Nanosyntax as a grammar model, in the next section we present the theoretical framework in which this research is embedded.

The theoretical framework: Nanosyntax and event composition

Nanosyntax is a new theory about the architecture of grammar that searches in granular levels the different blocks of linguistic composition. The key question that led to the creation of this theory in the Center for Advanced Studies in Theoretical Linguistics (CASTL) at the University of Tromsø is the empirical observation that the syntactic representations developed in the last thirty years have used increasingly smaller elements in their composition, giving rise to ever larger and more articulated structures. According to Starke (2009), this fact contradicts one of the fundamental dogmas of the field, namely the conjecture that syntax is only a way of organizing the lexicon into complex structures. Thus, considering the existence of such a contradiction and the fact that several researches have shown in recent decades that syntax actually operates with non-lexical elements, smaller than a morpheme (HALLE; MARANTZ, 1993; MARANTZ, 1997; EMBICK, 2015, among others), Nanosyntax assumes that the nature of ingredients of linguistic composition is sub-morphemic.

It is important to note that the central idea of Nanosyntax is not a debut of the theory. Since the mid-1990s, the Cartography project developed by Rizzi (1997), Cinque (1999), Belleti (2004) and Cinque and Rizzi (2008) already worked with the same conception. Nanosyntax can be taken as a model of cartographic inspiration that ends up assuming as a working methodology the heuristic proposed by Kayne (2005), known by the maxim "a feature – a nucleus". This observation may lead one to believe that there is no advantage in using Nanosyntax for the investigation of linguistic phenomena, since this model is concerned with mapping the hierarchy of the functional nuclei that compose the most diverse linguistic domains, such as DP, CP , IP, vP and KP, analogously to the work developed in Cartography (SHLONSKY, 2010). However, the coincidence between the models is only apparent, since Nanosyntax (CAHA, 2009) goes beyond Cartography by proposing rigid derivation rules that will impose themselves on the universal functional hierarchy (*f-seq*). If methodologically both approaches are similar, when we think of the rules of structural composition, we find parallels between the nanosyntactic proposal and Distributed Morphology (HALLE; MARANTZ, 1993).

For Caha (2009), the main theoretical foundation of Nanosyntax is the idea that syntax is not only a way of constructing complex phrases and sentences based on a list of items stored in the lexicon (morphemes and words); on the contrary, the syntax is considered as the only and true generative component that uniformly applies the same rules to the sub-morphic features, morphemes, words and phrases, and can thus elegantly construct sentences in the natural language, using only a small machinery which guarantees the explanatory adequacy of the theory. As a consequence of this

centrality of syntax in the computation, Nanosyntax is, like Distributed Morphology (DM), a late insertion system, and it is for this reason that the technical parallels established between these two models are inevitable (CAHA, 2018). Despite these points in common, however, Nanosyntax is distinct from DM, roughly speaking, by excluding from the system the need to postulate rules and post-syntactic operations, such as fission, fusion, impoverishment and the deletion of traces, which makes the whole system simpler and economical from a computational point of view. In addition, the perspective of what the lexicon is is also distinct in these two models: while DM works with bundles of features distributed in different lists in the lexicon, Nanosyntax takes only the individually stored sub-morphemic features as its basic composition blocks. Since the syntax in this model constructs the morphemes, it turns out to be impossible to take a lot of morphemes stored in a pre-syntactic lexicon as the first composition input.

Most probably, the lexicon conception in Nanosyntax is the factor that can distinguish it the most from other well established models in generative syntax. According to Ramchand (2008), the lexicon becomes, in this theory, a locus of transmodular unification, since it does not have its own rules of derivation, as the lexicalist approach proposes (JACKENDOFF, 1983; PINKER, 1989; LEVIN; RAPPAPORT-HOVAV, 2005). The lexicon in Nanosyntax only stores information built on other components. Specifically, a lexical entry is an ordered triple of the type </phonological information/, structural information SMS, encyclopedic information>, the "SMS structural information" corresponding to pieces of the universal f-seq constructed by the syntax, such that the entry carries Syntactic (PP = preposition), Morphological (KP = case) and Semantic (EvtP = event) information. It should be noted that the fact that the lexicon is a repository of information (and not a dynamic component of grammar with its own composition rules) does not exclude its importance for derivation, since the information it stores must be compatible with the structure constructed by syntax so that a given item can identify a given sequence of functional nuclei in the structure. Since we are looking for properties of the event construction domain that may be relevant to the licensing of causativization, we can better understand how the derivation occurs in Nanosyntax and the role that the lexicon plays in this theory by first discussing the nanosyntactic hierarchy that has been proposed for this domain.

According to Tenny and Pustejovsky (2000), it was in the mid-1990s that the syntacticians began to worry about understanding the role of the event structure in the organization of the syntactic structure. In this context, works such as those of Travis (1994) and Ramchand (2008) argued that the aktionsarten was directly encoded in the syntactic structure and thus proposed that the meaning of the verbs could be constructed in a compositional way from primitives connected to the syntactic functional heads and to the verbal abstract roots (DÖLLING, HEYDE-ZYBATOW; SCHÄFER, 2007). Although this idea is widely accepted today, considering the central role of compositionality in the construction of natural language sentences and the existence

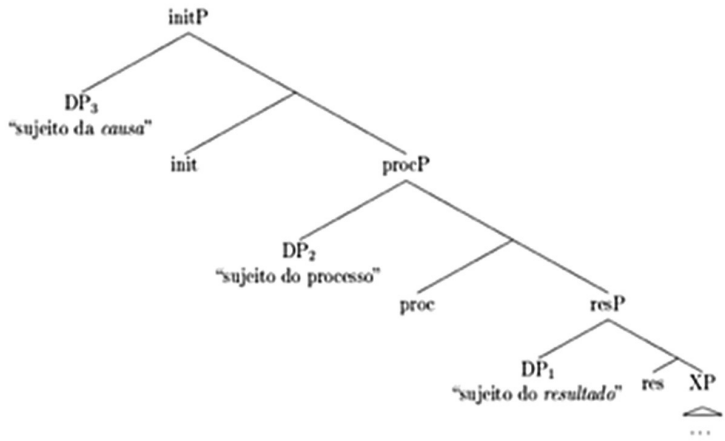
of a rigid functional hierarchy, there is still a great debate in the literature as to which elements of the event structure are to be represented in the syntactic structure, as functional heads, and which elements are to be seen either as an epiphenomenon of structural composition or as belonging to other domains of grammar and human cognition in a more general way.

In the scope of Nanosyntax, it is the work of Ramchand (2008, 2011, 2017) that seeks a solution to the problems listed above. Based on the observation that the phrasal layer "verb" is actually an abbreviation for a much richer functional structure (D'ALESSANDRO; FRANCO; GALLEGO, 2017), Ramchand (2008) proposes the existence of a more articulated structure for the verbal domain (vP), which is, according to the author, "the part of the representation of natural language that corresponds to [...] the *core of event building domain"* (Ramchand, 2017, p. 233, author's emphasis). The vP structure engineered by Ramchand (2008) is thus configured as a model for the event-building domain, referred to by the author as "First Phase Syntax", since there is a logical priority for the portion of the event construction denoted by a proposition regarding the computation of other elements, such as agreement and case marking, for example.

In the First Phase, selective generalizations are seen as submissive to the representation in terms of an articulated syntax with a systematic semantic interpretation. Since this system is developed based on nanosyntactic assumptions, there is a radical simplification of the grammar architecture, considering that the lexicon is eliminated as an independent module with its own rules and operations, and the computational core is shifted integrally to the syntax, a fact that limits the flexibility of the verbal item and its generalizations to this single component. We can thus say that linguistic competence is represented by a unique combinatorial system from which sentences are constructed with only a set of primitive features and a set of operations.

According to Ramchand (2017), the task of apprehending adequately which items make up this set of formal features must be semantically based, after all, the computational core of human language not only concatenates phrases that respect the specific syntactic ordering of particular languages, but there is an interpretation component that acts strongly over this core, establishing above all a relation between the linguistic processing prescribed by the universal grammar (GU) and the facts of the world. Because of this, the author proposes that the sub-representational features must be based on the notion of causation. According to the author, as speakers perceive the events in terms of an initiator that causes a process which, in turn, culminates in a result, it's safe to assume that the features of the verbal domain configuration is a generalization of that intuition, based on force dynamics (TALMY, 2000). Hence, Ramchand (2008) proposes three fundamental elements for the eventive composition: initiation [init], process [proc] and result [res], which are organized hierarchically in a syntactic representation, as shown in the Figure 1.

Figure 1 – The Nanosyntax of the Event Domain



Source: Ramchand (2008, p. 39).

This representation is, as we said earlier, an articulated feature geometry for the event-building domain[6]. The features [init], [proc] and [res] and their projections are analogous to the different "flavors of v"; the vP denotation thus can be given by a set of events represented by the phrases "InitP", "procP" and "resP". The initP projection labels any given initial state or cause event that can trigger a process, described by procP, the core of a dynamic predicate, which expresses a property change. When this change can lead to the existence of a final state (which is a necessary consequence of the process in question), the structure can also be identified by the phrase resP.

Considering that the semantic-conceptual motivation is fundamental, but does not stand alone, Ramchand (2008) also discusses morphosyntactic evidence from unrelated languages to support her proposal and promote the features presented. According to the author, a syntactic motivation for the initiation feature [init] would be found in the transitivity alternations that are licensed by certain verbs. For example, verbs such as 'quebrar' ('to break') allow a transitive (13a) and an intransitive (13b) version, while verbs such as 'jogar' ('to play') block the structure in which the process initiation information [init] would be absent, as (14b) below:

[6] According to Ramchand (2008, 2019), this internal complexity of events is motivated and supported by the works of Vendler (1957), Parsons (1990), Pustejovsky (1991), Krifka (1998) and Higginbotham (2009). These surveys seek to highlight the existence of finer features in the composition of each event class, such as [± dynamic], [±duration], and [±telic].

(13) a. *Joana quebrou o pauzinho*.
Joana.SBJ break.3SG-PST the.M little-stick.OBJ.
b. *O pauzinho quebrou*.
the.M little-stick.SBJ break.3SG-PST.

(14) a. *Joana jogou o pauzinho*.
Joana.SBJ throw.3SG-PST the.M little-stick.OBJ.
b. **O pauzinho jogou*.
*the.M little-stick.SBJ throw.3SG-PST.

In addition, Ramchand (2008) presents data from Hindi in which we observe how the sense of cause/initiation can be added to an event by the syntactic realization of a morpheme that carries the [Init] feature near the root of the verb, even if a new argument is not necessarily included in the equation:

(15) a. *makaan ban-aa*
house make-PRF.M.SG
'The house was built.'
b. *anjum-ne (*mazdur˜o-se) makaan ban-**aa**-yaa*
Anjum.ERG (*labourers.INS) house make-aa.PRF-M-SG
'Anjum built a house.'
c. *anjum-ne (mazdur˜o-se) makaan ban-**vaa**-yaa*
Anjum-ERG house make-vaa.PRF-M-SG
'Anjum had a house built (by the labourers).'

On the other hand, the morphosyntactic motivation for the existence of a so-called process sub-event is found in the different possibilities of modification that certain dynamic predicates allow, as evidenced by, for example, the test of adjunct insertion "for x-time" into a structure, which makes the interpretation of an event that unfolds over time possible:

(16) *Joana dançou por 2 horas.*
Joana.SBJ dance.3SG-PST for 2 hours.

(17) **Joana soube por 2 horas*.
*Joana.SBJ know.3SG-PST for 2 hours.

Finally, one of the morphosyntactic evidence for the proposal of a resP projection below procP comes from languages such as English, in which there are morphemes or particles that, when added to dynamic events, indicate that the limit or final state of an event was necessarily achieved. In the index sentences (b) below, for example, the

"up" particle indicates that the table was completely cleaned or that the cheesecake was eaten in its entirety.

(18) a. Joana cleaned the table.
b. Joana cleaned the table up.

(19) a. Joana ate the cheesecake.
b. Joana ate the cheesecake up.

In addition to the tripartite event structure presented above, it is possible that the predicates also present complements that act as modifiers of the central projections, although they do not carry an eventive content (aktionsart), such as [init], [proc] and [res]. These modifiers, which act on the structure as part of the description of the event, can be of two types, according to Ramchand (2008): [path] and [rheme]. The first head can be found as a complement to the dynamic component (procP) and is interpreted as a property that determines the path of change by which the procP argument goes through, thus establishing a mereological relation (part-whole) with the event. The second can appear as a complement to the projections [init] and [res], adding to the structure properties that are related to the initial or final state of the object that carries or undergoes the state/process denoted by the verb.

Since, in this paper, we only explore the complements of procP, we will leave aside, due to space, the further development of the morphosyntactic and semantic motives for the modifier [rheme][7]. However, it is important to highlight the characteristics of the path argument, once it occupies the position of procP modifier. For Ramchand (2008), the existence of [path] is justified by the need to distinguish between complements of dynamic verbs that sometimes can be labeled as procP arguments and sometimes as pathP arguments, since both can be found in the same sentence, besides being interpreted, systematically, in a different way. Thus, in (20) below, we observe that while "Joana" is the argument that *undergoes* the process denoted by the verb 'nadar' ('to swim'), the direct object "two pools" is interpreted as a path that relates homomorphically to the UNDERGOER argument (Joana) and defines, therefore, the time and space of the event:

(20) *Joana nadou duas piscinas*.
Joana.SBJ swim.3SG-PST two pools.OBJ.

Having presented and empirically motivated the elements that make up the aktionsarten domain, the tests that can capture the presence of these features in the

[7] The distinction between 'path' and 'rheme' consists in the type of nucleus with which these elements can be combined. The 'path' element can come into composition with dynamic predicates, which display [proc] in their structure; whereas 'rheme' is a kind of non-dynamic modifier [init, res], which brings new information that complements the meaning of the event, but is not necessary for its construction. The lowest part of the structure, therefore, can be filled only by adjuncts that can modify events. For more details on this distinction, we suggest the reading of Ramchand (2008, 2017), which elaborates in detail the ideas presented here.

event structure are those recognized in the tense-aspectual literature: since the states represent the only non-dynamic class [-process] in the event typology, this is the only class that is incompatible with the expression 'to do the same' (BASSO, 2007) and generates agramatical sentences with the aspectual verb 'to continue' (LUNGUINHO, 2005), as can be observed in the sentences below[8]. Consequently, in Nanosyntax, states only contain the initiation feature, which may have a non-dynamic complement of the rheme type, and all other dynamic events carry the process head [proc], suitably captured by the suggested tests.

(21) **Joana sabe inglês e Pedro faz o mesmo*. [*estado*]
*Joana.SBJ know.3SG-PRS English and Pedro does too.

(22) *Joana corre no parque e Maria faz o mesmo*. [*atividade*]
Joana.SBJ run.3SG-PRS in the park and Maria does too.

(23) **Joana continuou a saber inglês.* *[estado]*
*Joana.SBJ continue.3SG to know English.

(24) *Joana continuou a construir a casa.* *[accomplishment]*
Joana.SBJ continue.3SG to build the house.

The durability feature, related to the absence of the result head [res], can be captured by another test, namely, the insertion of an adjunct as 'for x time' (BASSO, 2007; BASSO; PIRES DE OLIVEIRA, 2011) in the sentence:

(25) *#Pedro caiu por 10 minutos.* *[achievement]*[9]
#Pedro.SBJ fall.3SG-PST for 10 minutes.

(26) *Pedro estudou por 10 minutos.* *[atividade]*
Pedro.SBJ study.3Sg-PST for 10 minutes.

Regarding the telicity feature, Ramchand (2008) does not propose a specific position in the hierarchy for this terminal. In fact, in the author's work, [res] performs a dual function within the structure, being responsible for sometimes conveying the event telicity and sometimes conveying the idea of punctuality existent in achievement and semelfactive predicates. The author's proposal explicitly carries three problems: (i) the semelfactive events are actually atelic (SMITH, 1997) (see "*Maria coughed in ten minutes"), (ii) it is impossible to know when the terminal [res] conveys

[8] All the tests presented are made using the perfective aspect and singular objects. The composition, for example, of adjuncts like 'in x time' in imperfective sentences and with plural objects leads to a series of other interpretations for the event structure that are not the matter of investigation in this paper.

[9] There is a possible interpretation for the sentence (25), in which the adverb operates over a kind of resulting phase of the event, which captures the idea that "*Pedro caiu e ficou caído por 10 minutos*". This possible reading for a non-durative sentence with 'for x time' was observed by Basso (2007, p.147).

exclusively telicity and when it conveys exclusively punctuality and (iii) considering that Nanosyntax is a branch of Cartography (CINQUE, 1999), the assumption that the same head carries two features ([+telic] and [+ punctual]) contradicts the maxim "one feature, one head", which is central to the development of hierarchies. Due to these facts, in this paper we propose a small modification of Ramchand's structure (2008) and insert the [bound] feature in the event hierarchy[10], just below the [res] feature, which maps the hierarchy shown in (27) and can be captured by the adjunct test 'in x time' (BASSO, 2007).

(27) initP > procP > resP > boundP

Theoretically, this proposal fits to the nanosyntactic concern to represent each relevant element to the linguistic composition as an independent functional head and, empirically, it accommodates the existence of a series of morphemes found in different languages that introduce telicity into the sentence (PIÑON, 2001; RAMCHAND, 2008; BORER, 2005; among others), such as '-z' in Polish, certain light verbs like 'jana' in Hindi (BHATT; PANTCHEVA, 2005) and '-eci' in Korean (LIM; ZUBIZARRETA, 2012). Thus, it is possible to explain, for example, why predicates that denote *degree achievements* can sometimes display telicity and sometimes not (see sentences in (27)).

(27) a. *A roupa secou por duas horas*. [atelic]
the.F laundry.SBJ dry.3SG-PST for two hours.
b. *A roupa secou em duas horas*. [telic]
the.F laundry.SBJ dry.3SG-PST in two hours.

The presented phenomenon can be justified as Nanosyntax assuming a "light" version of cartography, thus allowing some terminals to be ignored in the computation as long as a series of strict rules of the Spell-out process is respected. The rule that would explain the omission of [+bound] in the structure is called "Anchor Condition", which establishes that the lowest trace of a given hierarchy acts as the anchor of the structure and must necessarily be identified during Spell-out (CAHA, 2009, PANTCHEVA, 2011). This condition can be easily observed in the different meanings attributed to the light verb '*dar'* (to give), exemplified below. During the Spell-out of some structures, it is possible to hide the higher heads, which will result in different interpretations, but not the lowest, which will make sentence (29) agramatical.

[10] Labeling this head as "bound" rather than "telicity" is not a free maneuver, since paths and scales present (similarly to telicity) an upper bound.

(28) a. *Joana deu um chute na porta*. [init > proc > res]
Joana.SBJ give.3SG-PST a kick at-the.F door.OBJ.
b. *10 menos 2 dá 8*. [proc > res]
10-less-2.SBJ give.3SG-PRS 8.OBJ.
c. *Deu duas horas*. [res]
(it) give.3SG-PST two-hours.OBJ.

(29) **10 menos 2 dá*. [proc]
*10-less-2 give.3SG-PST.

Allegedly, the lowest feature of a degree achievement event would be the [scale] head, also present in dimensional adjectives such as 'high' and 'low'. Therefore, this head cannot be left out during derivation. In other words, [scale] must be performed obligatorily, which allows [bound] to be hidden. This operation that ignores features in the derivation is called *underassociation* (RAMCHAND, 2008) and will be explored in the explanation of the causativization phenomenon in BrP.

As we said earlier, in Nanosyntax, some auxiliary hypotheses of classic gerativism, such as the thematic role theory, are shifted to the *f-seq*. Therefore, the presented architecture is also designed to capture structurally a set of semantic roles which identify the function that each argument plays in the unfolding of the event. According to Ramchand (2017), generalizations about aktionsart and the thematic structure converge, so this fact would be a real conspiracy if both types of generalization did not follow from the same facts about the syntactic structure. Taking that into consideration, the author proposes that the roles that one argument plays in the event should be assigned locally, depending on the structural position that it occupies. Hence, the initiation (initP), process (procP), and result (resP) projections form their own predicational structure, with the specifier positions being filled by the argument of the sub-event (INITIATOR, UNDERGOER and RESULTEE respectively) and the complement position being saturated by the phrase that describes ("offers the content of") such a sub-event.

These predicational roles can be accumulated by a single argument and this possibility arises as a consequence of another nanosyntactic rule: the *Phrasal Spell-Out* operation that also distinguishes Nanosyntax from models such as Cartography and Distributed Morphology. The *Phrasal Spell-Out* predicts that non-terminal nodes are also targeted by the Spell-Out process. The motivation for the postulation of such an operation is the existence of languages in which a single morpheme carries the information of different functional heads, as it happens with the verbal inflection in Brazilian Portuguese, in which all the structural information '[time] > [aspect] > [mode]' is performed by means of a single suffix. Another example is the Mongolian morpheme '-lüü', which carries the spatial terminals of '[scale] > [goal] > [place] > [AxPart]' (PANTCHEVA, 2011, p.98). Thinking about the aktionsarten composition, in unergative activity events, for example, the verbal argument not only initiates the event denoted by the predicate, but also undergoes it. Thus, in a sentence like "Joana ran"

Joana would be labeled with the complementary roles of [INITIATOR$_i$, UNDERGOER$_i$]. On the other hand, in an achievement event, such as "Joana broke the vase", Joana is responsible for initiating the eventuality, however, it is "the vase" that undergoes a change that culminates in a final state, usually understood as "broken". In this case, the direct object receives the role of [UNDERGOER$_i$, RESULTEE$_i$].

It is possible to recognize from this exposition about the First Phase Syntax that the nanosyntactic theory offers us a very elegant system to deal with issues of the event domain as well as with the relationship between events and the argument structure, eliminating, for example, the need to postulate semantic relations in the lexicon and linking rules from this level of grammar to the superficial syntax. Thus, based on what has been discussed so far, we can derive the aspectual classes by means of the following structures[11]:

A) States: [initP {HOLDER}];
B) Activities: [initP {INITIATOR$_i$} > procP {UNDERGOER$_i$} > pathP];
C) Achievements: [(initP {INITIATOR}) > procP {UNDERGOER$_i$} > resP {RESULTEE$_i$} > boundP];
D) Degree achievements: [(initP {INITIATOR}) > procP {UNDERGOER} > boundP > scale];
E) Accomplishments: [initP {INITIATOR} > procP {UNDERGOER$_i$} > boundP > pathP];
F) Semelfactive: [initP {INITIATOR$_i$} > procP {UNDERGOER$_i$} > resP {RESULTEE$_i$}].

Before moving on to investigating causativization in BrP, a final question must be raised about the arrangement of vocabulary items and how can these elements be inserted into the structure. Following Starke (2009), we can say that the trees constructed by syntax, exemplified by the different configurations of the aspectual classes presented above, are stored in the lexicon and paired with phonological and conceptual information, which corresponds to the encyclopedic content or world knowledge. A verb like 'correr' (to run), for example, that belongs to the activity class, would have a lexical entry like </koRer/, [initP > procP > pathP], motion mode>.

In this model, the lexicon can be accessed after the insertion of every feature in the structure (i.e., in the intermediate projections), which sets up a cycle. In this sense, the Spell-out operation is cyclical and governed by some rules. A vocabulary item, for example, can only match a particular terminal if it is compatible at different levels with that position: (i) the element must contain in its entrance a constituent that contains the target terminal, which may be a superset of the intended structure (contrary to what

[11] The concepts presented between braces ({}) correspond to the aspectual roles of each projection; the symbol '>' indicates that the element on the left is hierarchically higher than the one on its right and the keys simply delimit the structure.

is postulated in DM); (ii) every syntactic terminal must be lexicalized at the end of each cycle (*Exhaustive Lexicalization Principle*); and (iii) in the case of competition for spell-out, the item containing the least number of unused terminals is matched against the structure (*Minimize Junk Principle*). In addition, for Ramchand (2008), the encyclopedic content of the entry must be compatible with the content of the feature that it intends to lexicalize.

So far, we have a very simple machinery that allows us to thoroughly investigate the structures of different events in the natural language. This way, we can reach the subatomic elements of the aspectual classes and explore in this domain what are the factors that license a given predicate to receive an interpretation of causality. In the next section, we will investigate some BrP sentences based on the assumptions outlined here. We hope, therefore, to offer an interesting treatment for the causativization process in the BrP, that should isolate finer aktionsarten properties and allow us to explain a broad set of data.

Investigating the causativization in BrP within Nanosyntax

In this section, we will qualitatively investigate sentences that have gone through the causativization process from non-causal predicates. As we work with the hypothetico-deductive method, many of the sentences investigated were constructed by us, based on our intuition as BrP speakers. However, we also present some constructions coming from written Portuguese to ratify the existence of the phenomenon, since, according to the introduction of this work, we can find dialectical variation in relation to the judgments offered. Considering that, before we begin our discussion, it is important to recall the goals of this investigation: we intend to understand (i) the functioning of the causativization process; (ii) the role of different modules of grammar in the construction of a causative meaning; (iii) specific BrP constraints on this phenomenon; and (iv) the new and atypical relations that are unleashed between the subject and the object of the causative predicates in that language. To achieve the goals outlined above, let's examine the following sentences.

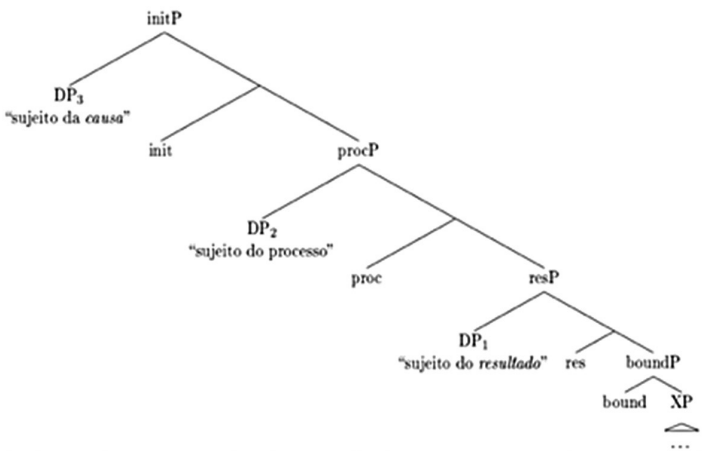
(30) *O piloto voou o avião por debaixo de uma camada de nuvens a cerca de 1.000 pés de altitude AGL e isto numa região montanhosa*[12].
the.M pilot.SBJ fly.3SG-PST the.M airplane.OBJ under a layer of clouds at about 1000 ft of altitude above-ground-level and this in-a region mountainous.

(31) *A agência desfilou suas melhores modelos em Paris*.
the.F agency.SBJ parade.3SG-PST its best models.OBJ in Paris.

[12] Available at: http://www.aopa.pt/52-operacional/cronicas-de-seguranca-aeronautica/726-seguranca-aeronautica-no357. Access on: 2 Sept. 2019.

In both sentences, the composition of the verb and its arguments denotes an activity event, which can be interpreted basically as a process of 'flying' and a process of 'parading' initiated by the argument in the subject position. Paraphrasing the meaning of the given sentences, in (30) we understand that "the pilot made the airplane fly", and this fact even seems to go against the expectations of the speaker, since the sentence is finished with the construction "and this happens in a mountainous region". This pragmatic observation can point to a clue about the context in which causativization can be licensed: the original argument of the verb seems to be forced to play out the event, even if it wasn't able to initiate or develop it alone. In (31), similarly, the possible interpretation is that "the agency made the models parade", that is, the INITIATOR argument affects, in some way, the UNDERGOER argument that is somehow compelled to play out the denoted event. From a semantic-conceptual point of view, both 'flying' and 'parading' are predicates that indicate a manner of motion. Considering the configuration of the nanosyntactic model, this information must necessarily be specified at the encyclopedic level. Thus, the lexical entry for 'fly' and 'parade' should be represented by the following generic triple, and only the phonological content would be distinct between both: </phonological information/, [initP > procP > pathP], manner of motion>. Since the verbs in question are unergatives, their structure would be distinct from that of the unaccusative verbs because the former have an initiation head [init], and besides that, the argument that initiates the event is the same that takes part in its process. For this reason, INITIATOR and UNDERGOER would be coindexed in the structure of these verbs, by means of the *Phrasal Spell-out* operation. Thus, based on this information, we can decompose the cited examples (in a simplified way) as follows.

Figure 2 – The Nanosyntax of the event domain



Source: Adapted from Ramchand (2008, p. 39).

Based on this structure, it is possible to explain some of the problems found, such as the insertion of a new argument. As we said in the previous section, the class of activity events is identified by the initiation, process and path phrases (initP > procP > pathP). In addition, we argue, following Ramchand (2008), that the roles of INITIATOR and UNDERGOER must be coindexed in the structure, since the argument that performs an unergative activity not only participates in the process denoted by the predicate, but also initiates or triggers this event. Thus, since the verbs in (30) and (31) are unergative predicates, in order for the causativization to happen, it is first necessary that the position of INITIATOR in these verb structures be free to receive a new argument that will act as the cause of the eventuality. This maneuver is allowed by means of the underassociation of the head related to this specifier, which must be independently identified within the phase. Since [init] is the highest terminal in the hierarchy, it can be ignored during the derivation without hurting the *Anchor Condition*. Hence, by underassociating the root initiation head, the entire initP structure is free for the Spell-out. In BrP, the *cause* event, represented in the First Phase Syntax by the initiation concept, is spelled out by a morphologically null item ($\square_{CAUSE}$), which languages such as Japanese and Finnish identify with morphemes overtly realized. Therefore, since the initiation head is matched against a null item in the spell-out process, considering the *Cyclic Exhaustive Lexicalization Principle*, its specifier position can also be filled by a new argument.

In other words, the causal relation between two events *cause* [init] and *effect* [proc] may emerge when initP is not identified by the same verbal root denoting the "*result*" of the *cause*, its *effect*. Thus, we are not claiming in any way that the process of causativization depends exclusively on the availability of a structural position for a causal argument. It is important to note that what is at discussion forefront is the initiation head identification, that is, the causativization process depends, mainly, on the insertion of a new event of the causal type in the structure, to which, by accident, BrP requires the association of a causative argument (INITIATOR). When we address, therefore, the causativization of predicates that traditionally already have an external argument (= INITIATOR), the impression that we have about the predicate "original" argument being shifted to the direct object position is, in fact, an illusion. After all, unless we are dealing with a state eventuality, whose only terminal of identification is [init], the single argument of an intransitive predicate will also be in the position of UNDERGOER, which is traditionally related to the verb direct object. In a nutshell, when the causativization process occurs, the single argument of an intransitive verb does not change its position in the syntactic structure, it only subtracts its highest initiation feature, when it is an unergative verb. In this way we can explain the argumental reorganization that seems to occur when a non-causative verb is interpreted as causal.

Having explained how a new argument can be inserted and computed in this type of structure, which would have only one external argument position to be filled, we did not clarify, however, what are the constraints for an unergative to causativize,

having simply demonstrated what happens in the syntax when such a phenomenon is licensed. In order to do that, we can investigate the structure of verbs belonging to this class that systematically block a causative interpretation. As the sentences below demonstrate, in a general way, predicates that specify in their lexicon-encyclopedic content some kind of motion or change, or that identify the [place] and [path] heads can license a causative interpretation, whereas predicates that do not denote these notions systematically block causativization, as it is the case for '*sorrir'* ('to smile'), '*tossir'* ('to cough') and '*piscar'* ('to blink'), which are all predicates denoting semelfactive events.

(32) **O palhaço sorriu a plateia (com a piada).*
*the.M clown.SBJ smile.3SG-PST the.F audience.OBJ (with the joke).

(33) **O remédio tossiu a Joana*.
*the.M medicine.SBJ cough.3SG-PST the.F Joana.OBJ

(34) **Joana piscou sua filha*.
*Joana blink.3SG-PST her daughter.OBJ

The semelfactive events are identified by the hierarchy [initP > procP > resP], since they are initiated by the individual who performs the eventuality process and are punctual. Any durative reading that these eventualities may present is derived by s-summing (ROTHSTEIN, 2004). Structurally, the only distinction between the previously discussed class and the semelfactive activity verbs lies at the lowest head of each class: since there is a shifting from [path] to [res], this fact could lead us to believe that what prevents the predicates (32) to (34) from being causativizied is the result head, which contributes to the punctual interpretation of the event. However, we can find some semelfactives, which would have the [res] head, but license a causative interpretation anyway.

(35)*A mãe pulou a criança por cima do muro*.
the.F mother.SBJ jump.3SG-PST the.F child.OBJ over the.M wall.

(36) *A treinadora saltou o cavalo*.
the.F coach.SBJ jump.3SG-PST the.M horse.OBJ.

Despite the presence of [res], these sentences are legitimately interpreted as causative, as we can paraphrase them by "the mother made the child jump over the fence" and "the coach made the horse jump". Analogously to the activity sentences, these semelfactives present in their lexicon-encyclopedic content a notion of change in space (also associated with the path phrase 'over the wall') and manner of motion. That is, it seems that instead of a structural constraint related to some head of the *f-seq*, what is actually allowing the predicates under investigation to be causativized is an

element of the grammatical component that deals with our knowledge of the world. It is important to note that this type of information is also stored in the lexical entry of verbal predicates. In order to determine if this non-structural notion is indeed relevant for causativization to be licensed, let's examine a few more examples, this time with unaccusative predicates, which are identified nanosyntactically by not carrying the initiation head [init] and by denoting, usually, events of the achievement class.

(37) **Maria caiu o Pedro de cima do muro*.
*Maria.SBJ fall.3SG-PST the.M Pedro.OBJ off the wall.

(38) **Joana chegou Alice na festa*.
*Joana.SBJ arrive.3SG-PST Alice.OBJ at the party.

(39) **Saíram Alice da festa.*
(someone) leave.3SG-PST Alice.OBJ from the party.

Since these predicates denote achievements, that is, punctual and telic events, they carry the [(initP) > procP > resP > boundP][13] part of the f-seq, and, in addition, because they are motion events, they encode a conceptual information of the "change in space" type. What we observe with these examples, therefore, is that the feature [res] in the case of achievements systematically blocks causativization, which ends up happening even if these verbs display an encyclopedic information that seems relevant for the unergatives. Most likely, [res] does not allow achievements to be causativizied because this notion is incompatible with a definition of causality that takes into account an extensive temporal relationship between *cause* and *effect*. Unaccusative verbs that do not have the [res] head in their lexical entry allow the causativization freely:

(40) *Suco verde afina a cintura*.
Green juice.SBJ thin.3SG-PST the.F waist.OBJ

(41) *O próprio Sigma evoluiu o vírus*[14].
The.M Sigma.SBJ itself evolve.3SG-PST the virus.OBJ.

(42) *O corticóide engordou o Pedro.*
The.M corticoid.SBJ fatten.3SG-PST Pedro.OBJ.

All three verbs '*afinar'* (thin), '*evoluir'* (evolve) and '*engordar'* (fatten) denote gradual change events (they contain [scale], a notion derived from [path]), thus exhibiting the monotonicity property. In other words, each subpart of these eventualities is directly

[13] The initiation feature appears as optional because of the unaccusative structure. Note that Note achievements can compose transitive structures without further constraints.

[14] Available at: http://alvanista.com/solidrenan/posts/3022101-o-triste-mundo-protegido-por-x-e-zero-na-serie-megaman. Access on: 2 Sept. 2019.

related to a subpart of its internal argument and this relation produces a homomorphic mapping that can be triggered by an INITIATOR individual. The monotonicity property, however, is not enough to license these predicates to causativization, considering that the class of accomplishments, which also exhibits this property, related to the object's incrementability, does not causativize. Just think of the agrammaticity of sentences like "**Joana construiu Alice a casa*"[15] (= Joan made Alice build the house) and "**a mãe desenhou a criança um círculo*"[16] (= the mother made the child draw a circle). The achievements, which seem to systematically block causation, can however be interpreted as causative when the property of monotonicity is computed in the sentence from some element that can introduce the notion of scale, such as it occurs with degree achievements. The sentences below confirm this fact.

(43) *O Brasil caiu o índice de analfabetismo*
the.M Brasil.SBJ fall.3SG-PST the.M illiteracy-rate.OBJ

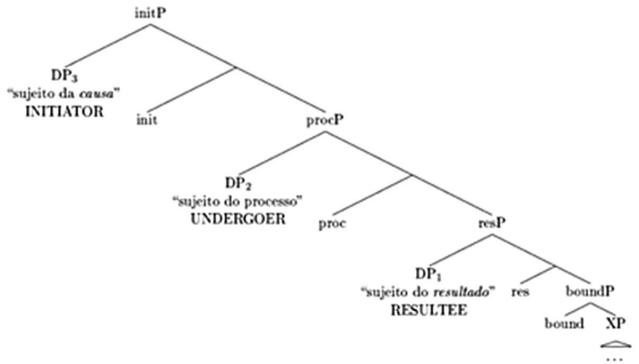
(44) *A alta do dólar despencou o número de viagens ao exterior*.
the.F rise of the dollar.SBJ plummet.3SG-PST the number-of-trips-abroad.OBJ

Even if the data seem rather chaotic, it is possible to think about some generalizations to understand the constraints of BrP for the process under investigation. To do so, it is important to remember that within Nanosyntax the lexicon does not project the structures, but is matched against them depending on their syntactic information and encyclopedic content, which are paired in the lexicon with phonological information. For this reason, we need to know what would be the minimum structure necessary to obtain a causative interpretation and then investigate which language items may be good candidates to achieve this interpretation. Considering the discussion conducted up to this point, we assume that causality can be interpreted based on the following tree, since causative events denote a causal relationship between a dynamic process of change triggered by an INITIATOR individual which is distinct from the UNDERGOER argument.

[15] "#Joana built Alice the house".

[16] "#the mother drew the child a circle".

Figure 3 – "Thematic" relations assigned to the arguments in spec-XP



Source: Authors' elaboration.

Since Nanosyntax assumes the *Superset Principle* (CAHA, 2009), any event that contains more projections than initiation and process could be a good candidate to be interpreted as causative. In other words, the first requirement for a given predicate to causativize is that the event denoted by it contain in its structure the hierarchy [initP > procP], or at least the [proc] head, since this is the original predicate contribution to the interpretation of causality: it should be noted that when a verb causativizes, as in "*Joana acordou Pedro*"[17], the individual who actually performs the process denoted by the event is the UNDERGOER argument, so that the *effect* brought about by the initiation event is necessarily associated with the causative verb root. As we have previously argued, the initiation [init] head can be identified by a null morpheme, so it can take part in the composition of events that do not identify it initially.

It is interesting to note that the existence of a null morpheme ($\square_{CAUSE}$) in the structure may even support our intuition that the nature of the initiation event – the *cause* – is not specified: we do not know what exactly the INITIATOR does to trigger the event played out by UNDERGOER. In the sentence given above, for example, Joana may have thrown some object at Peter or else she may have shouted for him to wake up. That is, what exactly the INITIATOR does is not relevant, the central question is that it does something that has an *effect* on the UNDERGOER, "forcing" it to play a part in the event denoted by the predicate. In view of these observations, we can predict that state verbs systematically block a causative interpretation because they only identify the initiation head of the structure stored in the lexicon. Furthermore, since this is the lowest hierarchy terminal in the case of this aspectual class, the underassociation operation would be blocked by the *Anchor Condition*, preventing a null causative head other than the one located in the verbal root from being inserted at that position. The sentences below exemplify the agrammaticality of causativized states.

[17] "Joana woke Pedro up".

(45) **Joana soube o Pedro matemática*. (= *Joana made Pedro know math*)
*Joana.SBJ know.3SG-PST the.M Pedro.OBJ math.

(46) **Pedro teve Maria uma casa*. (= *Pedro fez a Maria ter uma casa*)
*Pedro.SBJ have.3SG-PST Maria.OBJ a house.

(47) **Joana amou Alice a Maria*. (=*Joana fez Alice amar a Maria*)
*Joana love.3SG-PST Alice.OBJ the.F Maria.

(48) **Joana gostou a Maria de brigadeiro*. (=*Joana fez Maria gostar de brigadeiro*)
*Joana.SBJ like.3SG-PST the.F Maria.OBJ brigadeiro.

However, with the exception of states, all other aspectual classes are good candidates for causativization because they have the dynamicity [proc] terminal. However, the incidence of this phenomenon on activities, achievements, accomplishments, degree achievements and semelfactives seems to be quite irregular, depending on specific issues of each class. The activity verbs, that display the [pathP] terminal just below the [procP] head can cauzativize freely, though sometimes requiring a low-volitional UNDERGOER argument, as can be attested by the comparison between "*o piloto voou o avião até ao chão*"[18] and "**o piloto voou o passarinho*"[19]. Achievements, which are punctual events [resP], systematically block causativization unless a [scale] element enters the structure composition, shifting these events, to a certain extent, to the degree achievements class, which will allow causativization without any other restriction. The semelfactives, which, like the achievements, are punctual events, block cauzativization, unless the lexical-encyclopedic content of the predicate exhibit some notion of spatial change, such as we observed in sentences (35) and (36). The accomplishments, finally, do not allow a causative interpretation in any context, most likely because of their monotonicity relation, given by [path], depends more directly on the UNDERGOER properties, such as definiteness. The table below tries to summarize some of the properties we found that appear to be relevant for the functioning of causativization in Brazilian Portuguese[20].

[18] "the pilot flew the plane to the ground"

[19] "*the pilot flew the bird."

[20] Considering that the accomplishments are denoted by transitive verbs, we do not show them in the table. Anyway, this type of event does not license a causal interpretation in any context, as well as states.

Chart 1 – Relevant properties for the causativization process

	EVENT CLASS	NANOSYNTACTIC STRUCTURE	LICENSES CAUSATIVIZATION?
UNERGATIVE	ACTIVITIES	[init > proc > path]	YES
	SEMELFACTIVES	[init > proc > res]	only when denoting spatial motion
UNACCUSATIVE	ACHIEVEMENTS	[proc > res > bound]	only when denoting change along a certain scale
	DEGREE ACHIEVEMENTS	[proc > bound > scale]	YES

Source: Authors' elaboration.

Taking the data presented here, we can say in a nutshell that, within this proposal, unaccusatives and unergatives have nanostructures that are distinguished by the presence or not of [init]. Thus, unaccusative verbs would encode structures such as [procP {UNDERGOER$_i$} > resP {RESULTEE$_i$} > boundP] or [procP {UNDERGOER}> boundP > scale], while unergative verbs would encode structures like [initP {INITIATOR$_i$}> procP {UNDERGOER$_i$}> resP {RESULTEE$_i$}], when they belong to the semelfactives class, or [initP {INITIATOR$_i$} > procP {UNDERGOER$_i$}> pathP], when they belong to the activities class. The variation observed in the causativization cases concerning such classes could then be explained by the convergence of different characteristics: the absence of [init] in the verbal root of unaccusatives could explain these predicates greater facility to causativize; however, achievement verbs, which also belong to this class, do not causativize in any context, at least not in the way that degree achievements do. It is important to mention that it is the presence of the [res] head that seems to impose a strong restriction on the licensing of causativization for these predicates. Both the semelfactives and the achievements can only obtain a causative interpretation in a very specific context, related to somewhat different issues: semelfactives causativize when they denote in their encyclopedic level an event of spatial motion, probably also connected to some formal notion of path, while achievements causativize under a monotonicity property triggered by the presence of a [scale] head in the structure.

An explanation for the constraints we have encountered can be given considering the definition of causality exposed at the beginning of this paper. Given that a causal relationship requires a dynamic event, composed of a temporally related *cause* and *effect*, the presence of [res], which makes the event punctual, that is, without a temporal extension, is incompatible with a parameter required by causality. The activities and degree achievements, identified by the [path] and [scale] heads, causativize because they have heads that are compatible with the obligatory temporal parameter. Both [path] and [scale] somehow bring to the structure a homomorphic mapping between the direct

object and the event unfolding extension. Having clarified some of the restrictions for BrP causativization, we close this study, in the next section, discussing some of the problems that are left to be solved in future research.

Final remarks

In this paper, we investigated the causativization process in Brazilian Portuguese, in order to understand (i) how the structuring of a causative interpretation deriving from this phenomenon occurred; (ii) the role of different modules of grammar in the construction of a causative meaning; (iii) the specific BrP restrictions on causativization; (iv) how it would be possible to insert a new event into the structure, which would in turn be interpreted as the cause that leads to the event denoted by the predicate; (v) the emergence of a new argument associated with the cause event and carrying the role of "causer" or "initiator" of the eventuality described by the predicate; and (vi) the atypical thematic relations established between the verb subject and the direct object. To sketch an answer to these questions, we used the hypothetical-deductive method and assumed that elements of the event domain made the difference in the behavior of verbs in relation to the incidence of causality.

Based on the nanosyntactic theoretical machinery (STARKE, 2009; CAHA, 2009; PANTCHEVA, 2011; RAMCHAND, 2008, 2011, 2017), we have shown that for a predicate to be interpreted as causative it is necessary that the event denoted by it be of a dynamic nature, that is, it must present at least the nanosyntactic feature [proc]. The causality relation requires dynamicity and a connection between two sub-events identified by distinct verbal roots or by different arguments. Consequently, the state verbs class systematically blocks causation, which is certainly the most powerful generalization found in our analysis. Another interesting structural issue is that the cause event must be located at the initiation head position, so that when this position is already covered by the verbal root, it is necessary that the process of underassociation occur, leaving not only [init] free to receive an item that is identified as the cause event, but also a free INITIATOR specifier position to receive a causal argument. It is through the underassociation operation, therefore, that the thematic relations that appear to be atypical are triggered.

When we think of Brazilian Portuguese specific constraints for causativization, the picture seems to be somewhat confused and unsystematic. However, it is interesting to note that in fact some elements of the event domain seem to block or allow a causative interpretation for certain predicates, which corroborates our initial assumption. In addition, formal constraints (related to functional features) that are applied to specific event classes discussed in the previous section can be understood on the basis of a single generalization: the elements that license the process of causativization are the low heads of the *f-seq* that corresponds to the domain of event construction. The presence of the [path] terminal and the notion of [scale] widely allow predicates to be

interpreted as causative, while the [res] head systematically prevents the phenomenon of causativization from happening. Another element that interferes with the possibility of a predicate to causativize or not is the generic notion of change, present at the level of lexical-encyclopedic content, derived from the speakers world knowledge. In short, there are rules, structural elements and elements derived from the broader human cognition that, acting together, license the process of causativization in BrP.

We hope that this discussion may shed new light on the causativization phenomenon in general, which still lacks descriptive studies about specific languages, such as BrP, and on crosslinguistic studies that seek to systematize the differences between the causativization processes in different languages. In this sense, Nanosyntax presents us with a very interesting way of explaining the observed crosslinguistic differences, since different languages store different parts of the nanosyntactic structures in their verbs and morphemes. In a language like Portuguese, a verb like 'rir' (to laugh) can carry a structure [init > proc > res], whereas in Finnish, maybe the item labeled as 'laugh' will only carry [init > proc]. In order for the functioning of the causativization to be clarified and better systematized, we argue that it is necessary to adopt a theoretical and methodological approach that considers the articulation of syntax, semantics and world knowledge.

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- *RESUMO: neste trabalho, investigamos o processo de causativização no português brasileiro, buscando compreender as restrições e generalizações que permitem explicar os dados aparentemente caóticos de nossa língua. Para tal, utilizamos o método hipotético-dedutivo e partimos da tese de que são elementos do domínio acional que determinam o comportamento dos verbos em relação à incidência de causalidade. Como consequência, apresentamos neste artigo uma revisão teórica das classes acionais, utilizando ferramentas de um modelo decomposicionista recente denominado Nanossintaxe (Starke, 2009). Com isso, será possível entender as restrições mais rigorosas que as classes 'estado' e 'accomplishment', por exemplo, impõem para o fenômeno da causativização, levando em conta conceitos sintático-semânticos mais finos, como Iniciação, Processo, Resultado e Limite. Concluímos, deste modo, que para um*

predicado ser interpretado enquanto causativo faz-se necessário que o evento por ele denotado seja de natureza dinâmica. Além disso, demonstramos que a sequência funcional (f-seq) da forma como é proposta dentro do modelo nanossintático permite explicar a associação de mais de um nódulo sintático a um mesmo argumento verbal, assim como a sua desassociação e consequente identificação com um núcleo causativo nulo.

- *PALAVRAS-CHAVE: Causativização. Decomposição de eventos. Classes acionais. Nanossintaxe. Hierarquia funcional do domínio verbal.*

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