

ATHEMATIC PARTICIPLE CHOICE IS PREDICTED BY ARGUMENT STRUCTURE

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ABSTRACT

This article presents two experimental studies that investigate the role of syntax in constraining morphological processes related to past participle forms in Brazilian Portuguese. Analyses within the autonomous approach to morphology have defended that diachronically and synchronically, Romance past participles reflect an inter-paradigmatic relation between participles and other verbal paradigms that remains completely oblivious to non-morphological information ARONOFF (1994), CHAGAS (2007). However, the results of two wug-tests conducted here point towards an integration between syntax and morphology in such forms, along the lines of LOBATO (1999) and CALABRESE (2014). Verbal argument structure plays a role in defining the participle form: the lighter the verbal argument structure, the heavier the preference for short-form participles.

RESUMO

Apresentamos dois estudos experimentais com vistas a investigar o papel da estrutura sintática na formação do particípio passado em português brasileiro, verificando a validade de diferentes análises para as formas curtas e longas. Na proposta da morfologia autônoma ARONOFF (1994) CHAGAS (2007), a formação de particípios baseia-se em relações inter-paradigmáticas que se apresentam como desvinculadas de outros componentes da gramática. Em contrapartida, análises como LOBATO (1999) e CALABRESE (2014) sugerem que a sintaxe interfere na formação dessas formas. Nossos resultados favorecem a segunda análise, demonstrando que a estrutura argumental do verbo de origem é fator decisivo na escolha da forma participial: quanto mais leve a estrutura argumental do verbo mais leve será sua forma participial.

KEYWORDS

Wug tests, short-form participles, argument structure, syntax-morphology interface

PALAVRAS-CHAVE

logatomas, participípios curtos, estrutura argumental, interface sintaxe-morfologia.

1 Introduction

Recently the interface between syntax and morphology has been subject to detailed investigation. Within the minimalist program this interface is viewed as a point in the derivation in which the output of syntax is delivered to morphology, which will, based on the properties of the syntactic output, apply operations and mechanisms to guarantee the convergence of the derivation on the PF side. This integrated architecture of the grammar is well developed within the Minimalist Program and the Distributed Morphology framework HALLE & MARANTZ (1993), HARLEY & NOYER (2000), EMBICK (2010), BOBALJIK (2011). Within these formalisms, morphology is intrinsically dependent on syntax, and there is only one computational system, which operates merging features at different structural levels, going from a zero level derivation within words to a maximal level derivation within phrases.

This integrated view is disputed, however. Since ARONOFF (1994), it has been proposed that morphology can be a completely independent component of the grammar. That is, the rules, operations and mechanisms used by morphology do not take into consideration information from other components - syntax, semantics and/or phonology ARONOFF (1994).

Research into Romance languages has presented a series of evidence in favor of this autonomous view of morphology. MAIDEN (2005), for instance, has defended that the subjunctive paradigm is a *morphome*, an autonomous morpheme. In his analysis, all the cells of the subjunctive paradigm piggyback on the 1Sg form of the indicative mood, forming what has been called the ‘L-Shaped morphome’, as shown in Table 1:

TABLE 1: The L-shaped morphome for verbs such as *ouvir* ‘to hear’: the same stem is shared among the 1sg present indicative and all forms of the subjunctive, to the exclusion of the 2sg/3sg indicative MAIDEN (2005).

	<i>Indicative</i>	<i>Subjunctive</i>
1sg	ouç-o	ouç-as
2sg	ouv-es	ouç-a
3sg	ouv-e	ouç-as

Along similar lines, it has been proposed that past participle forms (long vs. short) of the type found in Romance are also based on the 1sg of the indicative, constituting another example of morphome: a paradigm that emerges based solely on a morphological inter-paradigm relation with the 1sg cell of the indicative mood CHAGAS (2007).

The L-shaped paradigm as a productive base of formation for the subjunctive mood was contested by NEVINS & RODRIGUES (2013). The authors conducted a series of experiments using wug forms in different Romance language (European Portuguese, Spanish and Italian) and concluded that Romance speakers have a statistically significant preference to form the subjunctive paradigm by taking into consideration syntactic/formal features, such as person and mood, rather than arbitrary morphological geometric shapes within paradigms.

While L-shaped irregular verbs may have had a diachronic foothold in the language, they are no longer productive, arguably due to the fact that speakers have gradually refused to extend/transmit a pattern with no grounding in syntactic natural classes.

In the present article, we will present two experiments that employ a pseudoword (or ‘wug’) methodology, investigating past participle forms: long vs. short. The results show that the licensing of short forms depends heavily on the argument structure of the verb in question. The lighter the argument structure of verb, the higher the preference for short-form participles. Thus, it follows that the morphological process of forming past participles piggybacks on the syntactic and semantic information contained within the verbal root. This, together with the results of NEVINS & RODRIGUES on subjunctive formation, undermines the main evidence that researchers have presented within Romance languages to justify an autonomy of morphology.

The paper is organized as follows: in Section 2 we present data from Brazilian Portuguese, which displays innovative short-form participles. In Section 3, we discuss two different analyses for the phenomenon: Chagas’ proposal defending an autonomous morphology based analysis, and LOBATO/CALABRESE’S analysis, relating participle forms with syntactic structure. In Section 4, we present two experiments conducted in Brazilian Portuguese, testing the hypothesis that verbal argument structure plays a role in determining the form of participles. In these experiments four verbal classes were considered: unaccusatives, transitives, ditransitives and psych verbs. The results suggest a significant relation between verbal argument structure and past participle forms. Unaccusative verbs have a preference for short-form participles, whereas transitives and ditransitives do not. Psych verbs, on the other hand, prefer long participle forms. A theory based on the autonomy of morphology does not account for these results. Therefore, our conclusion (Section 5) shows that a theory along the lines proposed by Lobato/Calabrese

has a better chance to explain the formation of past participle forms, as morphology seems to be syntactically grounded.

2 Past Participles: short and long forms

Romance languages in general present regular and irregular past participle forms. As the Portuguese past participles in (1) illustrate, regular forms keep the thematic vowel of the original verb and add the morpheme *-d*, whereas irregular forms do not. Thus, regular forms are often called the long forms and the irregular forms are called ‘rhizotonic’, ‘athematic’, or simply short-form participles:

- (1) secado/seco, limpado/limpo, aceitado/aceito, acendido/aceso,
 dried, *clean,* *accepted,* *ignited*

However, not all verbs accept both forms. In European Portuguese and also in some dialects of Brazilian Portuguese, verbs like the ones in (2) accept only long participles, whereas others verbs (3) are compatible with short-form participles only.

- (2) matado/*mato, apaixonado/*apaixono, fechado/*fecho
 killed, *impassioned,* *closed*

- (3) *abrido/aberto, *escrevido/escrito, *dizido/dito
 opened, *written,* *said*

Romance speakers in general seem to have a strong preference for long forms. This is clearly observed during the acquisition process of Portuguese, a period in which long forms for the verbs in (3) are readily found. Adults might also have this preference; TUCKER (2000) shows that Italian adult speakers, when introduced to unfamiliar Italian

verbs, have a strong preference for forming long participles based on the infinitive. Nevertheless, an interesting current development in non-standard dialects of Brazilian Portuguese (henceforth BP) involves the spreading of short forms for past participles that historically have only long forms. For example, although the short-form participles in (4) are unacceptable in European Portuguese and Standard Brazilian Portuguese, they are found in many varieties of colloquial BP. In the present discussion, we restrict ourselves to varieties spoken in Rio de Janeiro & Minas Gerais.

- (4) *chego, trago, compro*
arrived, brought, bought
 (cf. *chegado, trazido, comprado*)

The short and long forms seem to be accepted in both passive and past perfect contexts, as shown in (5). The short form, however, doesn't look like the corresponding infinitive form, as in the passive and perfect in (5b), the perfect in (6c), and optionally the passive and the perfect in (5d).

(5)

<i>Infinitive</i>	<i>1SgInd Past</i>	<i>1SgInd Pres</i>	<i>Passive</i>	<i>Past Perfect</i>
a. <i>apagar</i> <i>extinguish</i>	apaguei	apago	ser apagado	ter apagado
b. <i>acender</i> <i>ignite</i>	acendi	acendo	ser aceso	ter aceso
c. <i>frigor</i> <i>fry</i>	frigi	frijo	ser frigido	ter frito
d. <i>comprar</i> <i>buy</i>	comprei	compro	ser compro/ comprado	ter compro/ comprado

Forms like (5b) *acender/aceso* are largely frozen, though examples of this sort are widely found in Italian (e.g. *mettere/messo* ‘to put’). Throughout the Romance languages most of these doubled forms reflect diachronic developments from the so-called *t*-stems inherited from Latin (see BACHRACH & NEVINS, 2008 for an overview of approaches to this phenomenon). Notably, the irregular/short participles can be called *athematic*, as they lack the theme vowel (preserved in *apagado* but lost in *aceso*). In LOBATO (1999), it is suggested that these innovative participles involve an alternative spell-out, without the theme vowel and the participial *-d-* morpheme (the nature of which has seen various proposals across the Romance languages, e.g. deverbaler, resultative, etc).

What is largely unique to contemporary BP (although apparently parallels are found in Sicilian Italian; cf. MAIDEN, 2013) is the emergence of athematic participles that do not reflect this diachronic inheritance, and indeed, some of which are considered substandard or variant, but are nonetheless increasing in attestation. This may be a result of the grammaticalization and generalization of sporadic hypercorrective tendencies that are found in a ‘diglossic’ situation such as BP, in which the prescriptive norm is rather distant from the colloquial forms and in which speakers across all class levels often feel uncertain about ‘correct’ usage. Given the stigmatized usage of overregularized and ‘natural’ productions such as % *foi abrido* instead of *foi aberto* ‘was open’, it may be that speakers come to treat athematic short-forms as ‘correct’, paving the way for extension and innovation of short-forms to etymologically novel contexts. Nonetheless, our central emphasis in this paper is to raise the point that even hypercorrection often submits to grammatically-based generalizations, and, as a result, the ‘sporadic’ tendency to produce short-forms may not apply equally across-the-board.

Whatever the source of the innovation (which, to our mind, must be grounded in independent conditions specific to BP, given its limited

attestation elsewhere in Romance), at the present moment, forms such as *ter pagado* and *ter pago* are both acceptable, standing in marked contrast to the more entrenched cases such as *ter frito*, alongside which **ter frigido* is unacceptable. In many cases, doublets involve ‘irregular’ short-forms, so that the innovative pairs (e.g. *ter trazido*/*ter trago* ‘to have brought’ and *ter perdido*/*ter perco* ‘to have lost’) are both acceptable, in contrast to the entrenched ones. This latter set of data lends initial plausibility to CHAGAS (2007) hypothesis that these innovative participles are based on the 1sg, as indeed *trago* and *perco* are the 1sg.ind forms. However, cases such as *eu pego* ‘I grab’ and *eu tinha pego* ‘I had grabbed’ show different vowels: the former is pronounced with the [-ATR] lax vowel [ɛ], while the latter with the [+ATR] tense vowel [e]. Similarly, for verbs such as *construir* ‘to construct’ with 1sg *construo*, the short-form participle, if anything, would be *tenho construto*, and definitely not **tenho construo*.

Interestingly, for some verbs, the passive particle favors the short-form while the perfect favors the long form (e.g. *imprimir* ‘to print’, with *ser impresso*, *ter imprimido*; see SCHER et al. (2014) for detailed discussion). This preference for either the short or the long form might indicate that these forms are near doublets in the sense of KROCH (1994). The contrast in (6), for example, suggests that they do not have the same syntactic distribution, and might not have the same meaning (7), as discussed in PIRES (1998), LOBATO (1999), BOECHAT (2008) and RODRIGUES (2008).¹

- (6) a. Ele foi cegado/*cego pela bala do revólver
he was blinded/ blind by.the bullet of.the gun
‘He was blinded by the gun bullet’

¹ Data from RODRIGUES (2008).

- b. Ele ficou cego/*cegado depois da cirurgia
he got blind/blinded after of.the surgery
 ‘He went/became blind after the surgery’

(7)

- a. Secados os pratos, coloque-os sobre a mesa (Eventive reading)
dried the dishes put-them on the table
 ‘Having dried the dishes, put them on the table’
- b. Secos os pratos, coloque-os na mesa (Resultative reading)
dry the dishes put-them on.the table
 ‘The dishes having become dry, put them on the table’

Indeed, some of these differences may be akin to EMBICK’S (2004) distinction between participial forms in English such as *an open door* and *an opened door*, and MAIDEN (2013: 509) explicitly suggests such an interpretive difference for Sicilian short-form vs long-form participles such as *apìartu/graputu* ‘open/opened’. While these potential syntactic and semantic differences merit further exploration, in this paper we will focus on testing different classes of verbs to verify if argument structure plays any role in defining the form of the past participle. Although we will not pursue them in this paper, the syntactic and semantic differences above might follow from our conclusion that the form of the derived participle depends on the internal argument structure of the original verb.

Some native speakers have the intuition that (8a) is better than (8b), which in turn is better than (8c). Importantly, the main difference between these examples is the argument structure of verbs. In (8a) the participle comes from an unaccusative verb, whereas in (8b) and (8c) it comes from a transitive and a ditransitive verb.

(8)

- a. Eu tenho chego tarde para as reuniões
I have arrived.short-form late for the meetings
 ‘I have arrived late for the meeting’
- b. ?* Eu tenho pago as contas todo mês
I have paid.short-form the bills every month
 ‘I have paid the bills every month’
- c. * Eu tenho apresento o João para o pessoal
I have introduced.short-form the João to the people
 ‘I have introduced João to the folks’

Thus, it is in principle worthwhile investigating a potential relation between argument structure and participle forms. If this is on the right track, the general conclusion about the architecture of grammar is that there is a close integration between syntax and morphology, contrary to the autonomous morphology proposal.

3 Autonomous morphology or syntactically-grounded morphology?

Given the data in (5), one tempting generalization that can be contemplated is that the innovative participle short-forms are ‘imitations’ of the 1sg.ind forms. While this is not the case for the entrenched forms in (5a-c), CHAGAS (2007) puts forth an analysis that short-forms are the result of an inter-paradigmatic relation: BP innovative short-form participles are formed based on the 1sg of the indicative mood. According to this author, this relation is what licenses the increase in productivity of short-form participles in BP.

This inter-paradigmatic relation, however, is not so easily conceived as the 1sg.ind in particular has no privileged morphosyntactic closeness to participle forms that would not be shared by other inflected

person/mood combinations. In other words, for CHAGAS' analysis to be correct, short-form participles would have to be morphemes - independent productive pieces of morphology that are truly arbitrarily learned inflectional mappings between 1sg.ind and short-form participles - resulting from 'purely morphological correspondences', showing no sensitivity to syntactic properties of the original verbs.

In contrast with CHAGAS' proposal, under analyses such as LOBATO'S (1999), the short-forms are alternative spell-outs of a syntactic structure, and no matter which details of that structure one may adopt, the intuition is that shorter forms reflect lesser structure. As such, the syntax of the verbs in question comes to be relevant in understanding the morphophonological form of past participles.

Observations such as Lobato's are echoed in formal analyses of related phenomena within Distributed Morphology (e.g. EMBICK, 2004 and CALABRESE, 2014). CALABRESE, for instance, proposes that the absence of the theme vowels in past participles allows for locality between the verbal root and Tense, enabling contextual allomorphs such as *perso* 'lost' in Italian (cf. infinitive *perdere*) and *eleito* 'elected' in Portuguese (cf. infinitive *eleger*). That is, the theme vowel projects a head that blocks a structural relation between T and the verbal root, and therefore, short-form participles, which lack the theme vowel, are lighter in structure than long forms (which have the extra functional head projected by the theme vowel). If indeed short forms reflect less syntactic structure, we conclude that past participle forms are not morphemes at all, as syntax and morphology work together in determining their shape.²

Under a theory in which the relation between short-form participles' spell-out and the word-internal syntax of participle expressions is directly reflected, properties such as argument structure and event structure can

² Other approaches to the phenomena (eg. SCHER et al. 2014) treat participle forms as largely a matter of post-syntactic operations that prune the morphological structure. Hence, they also predict that syntactic information should not constrain the formation of past participles.

play potential roles in conditioning the acceptability of such forms. Thus, it is relevant to mention that of the extant innovative short-forms, very few are found with ditransitives and psych-verbs such as *agradar* ‘to please’, *aborrever* ‘to annoy’, and *temer* ‘to fear’. Nonetheless, this may be related to token frequency in the language or other grammar-external factors. Thus, to test the hypothesis that argument structure plays a role in the formation of past participles without having the interference of external variables, wug-testing presents itself as extremely useful, as wugs have a token frequency of zero, allowing participants to rely on the phonological form, the syntactic environment, or neither of the above, in rating the goodness of short-form participles given a particular infinitive and 1sg.ind form.

4 Testing the role of argument structure in defining past participle forms

We present two experiments designed to test whether short-form participles are productively extended to novel ‘wug’ verbs, and the extent to which verb class membership can differentially modulate the preference for short-forms. Experiment 1 tests four major classes of verbs, and Experiment 2 presents a follow-up specifically within the class of psych-verbs.

4.1 Experiment 1: verbal classes vs. preference for short-form participles

In this experiment we tested participles formed based in verbs from four lexical semantic structure classes: inherent and non-inherent unaccusatives (9a,b), non-alternating transitives (10), ditransitives (11) and psych verbs (12).³

³ For a detailed description of these classes, see LEVIN (1993).

- (9) a. As crianças chegaram atrasadas
 the children arrived late
 ‘The children arrived late’
 b. O vaso quebrou
 the vase broke
 ‘The vase broke’
- (10) As mulheres esfregaram as roupas
 the women scrubbed the clothes
 ‘The women scrubbed the clothes’
- (11) Os ricos doaram computadores aos órfãos
 the rich-pl donated computers to.the orphans
 ‘The rich people donated computers to the orphans’
- (12) A peça comoveu o público
 The play moved the audience
 ‘The play moved the audience’

This brings us directly to the hypothesis under evaluation in (13):

- (13) Verbs with less argument structure will display a stronger preference for short-form participles.

This hypothesis predicts then that unaccusative verbs, which have arguably less lexical structure than transitive, ditransitives and psych verbs CHOMSKY (1995), HALE & KEYSER (1993) will be more prone to realization via short-form participles, in accordance with the speakers’ intuitions presented in (8).

4.1.1 Material, design and participants

The use of wugs was necessary to avoid the interference of non-related variables, such as token frequency, and the entrenchedness or diachronic ‘frozenness’ of particular forms. In addition, as sometimes BP speakers are too aware of right vs. wrong in terms of traditional grammar and at times they can be quite sensitive to ‘wrong’ participle forms, we opted for using wugs in order to minimize these issues.

We did not look for contextual allomorphs, such *eleger/eleito* ‘to elect (inf./participle)’, i.e. short-form participles with distinct stem allomorphs, as we concentrated on testing the role of argument structure (L-syntax, in HALE & KEYSER’S, 1993) terms) in defining short-form and long-form participles differing only in the presence/absence of the thematic vowel and the *-d-* morpheme, such as *chego/chegado* ‘arrived (short.form/long.form)’.

Participants were exposed to 24 wug forms: 6 wugs for each argument structure class. The wugs were also equally distributed in the three verbal conjugation paradigms, with two wugs per conjugation. This is illustrated below:

TABLE 2: Wugs for transitive verbs.

<i>1st Conjugation</i>	<i>2nd Conjugation</i>	<i>3rd Conjugation</i>
pandar	biver	gutir
lasar	lufer	labir

The wugs were created taking into consideration the phonotactics of BP. They all had two syllables, and they were created so as to minimize resemblance with existing verbs of BP from the same verb class. A full list of stimuli is included in Appendix 1.

Filler trials, 30 in total, were also wugs and involved unrelated morphophonological alternations such as the diminutive *-inbo* and

-*zinho*, nominalizations with *-ção* vs. *-mento*, and other nominally-based productivity-related alternations.

The target items, as well as the fillers, were presented in frames, which were intended to be transparent with respect to the argument structure of the artificial form. As exemplified below, the frames were constructed such that the infinitive (e.g. *pandar*) was presented in the first clause, and the 1sg.ind (e.g. *pando*) in a later clause. It is not possible to test inherent unaccusatives in a passive context. Thus, we elicited the participle forms using the analytic perfect in combination with the auxiliary *ter*. The well-formedness of the short-form vs. long-form participles were judged by speakers using a scale from one to five, and their appearance (shown first vs. shown last) was equally counterbalanced within the experiment.

(14) *Frame for a transitive verb*

Eu acho que *pandar* a casa todos os dias é importante para manter tudo limpo. Eu *pando* a minha casa bem, mas minha mãe, que é mineira, tem um capricho incrível e *panda* muito bem. No ano novo, depois que ela tinha _____ (*pando/pandado*) toda a casa, ficou um cheiro delicioso.

I think that to *pandar* the house every day is important in order to keep everything clean. I *pando* my house very well, but my mom, who is from Minas, has an incredible knack and *panda* very well. On New Year's Eve, after she had _____ (*pando/pandado*) the house, it smelled wonderful.'

(15) *Frame for a ditransitive verb*

Malir dinheiro para familiares é muito perigoso. Eu nunca *malo* grana para ninguém, mas o Fernando vai ficar na miséria. Ele *male* toda a grana que ele tem para os primos. Se eu fosse ele, eu não teria _____

(*malido/ malo*) 40,000 Reais para aquele primo esquisito dele que mora na Alemanha.

‘To *malir* money to relatives can be dangerous. I never *malo* funds to anyone, but poor Fernando might end up penniless. He *males* all his money to his cousins. If I were him, I wouldn’t have _____ (*malido/ malo*) 40,000 bucks to that weird cousin of his living in Germany.’

A scale 1-5 was used to indicate relative preference for the form on the left (1 indicating absolute preference for the form on the left; 5 indicating absolute preference for the form on the right; 3 indicating equal preference, and 2 and 4 indicating stronger but not absolute preference for one of the forms).

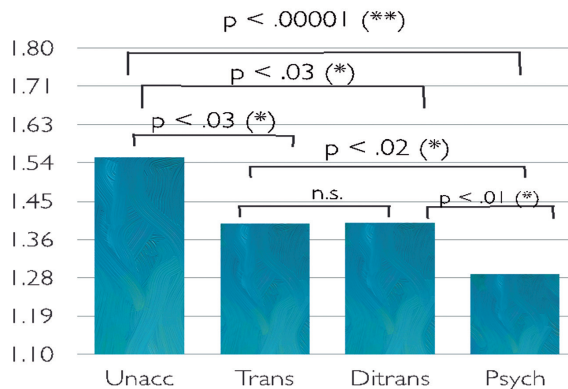
All participants saw all items and fillers, presented in randomized order.

The experiment was conducted with the research platform *online pesquisa* (<https://www.onlinepesquisa.com>), and took around 10 minutes to be completed. 186 participants logged in; however, only 98 of them completed the experiment. We did not control for social variance among the participants (e.g. age, educational background and native dialect). While these variables may play a role in defining past participle forms, there is no reason to think that such factors would specifically interact with the independent variables of interest, namely these four classes of verbs. While one particular speaker may overall favor short-form participles more than another speaker, nothing in their extralinguistic demographics per se should cause such a preference to emerge more in some verb classes than in others.

4.1.2 Results

The results ($n=98$) were statistically analyzed using the open-source software R. The analysis conducted, in a within-subjects design, tested the effects of type of argument structure on short vs. long participle forms. The graphic in Figure 1 crosses the types of argument structure considered in Experiment 1 with the relative preference for short-form participles, where a higher rating indicates a greater tolerance for short-form participles. Pairwise comparisons were conducted with two-tailed paired t-tests between each comparison of interest. As shown, unaccusatives have a statistically significant preference for short participle forms when compared with transitives, ditransitive and psych verbs. The comparison between transitives and ditransitives resulted in no significant difference for short forms. In turn, psych-verbs displayed a statistically significant dispreference for short forms, and differed from unaccusatives, transitives and ditransitives.

FIGURE 1: Experiment 1 results with means by verb class ($n=98$), on a scale of 1 to 5, where higher numbers represent a greater preference for the athematic participle (e.g. *pando*) as opposed to the long-form (e.g. *pandado*). Comparisons among means are represented by p-values or by n.s. (not significant).



4.1.3 Discussion

These results demonstrate a clear sensitivity to syntactic aspects of the lexical structure of the verbs from which participles are formed. Speakers pay attention to phrasal aspects of the verb in question in determining whether a theme vowel and the *-d-* of the corresponding participle form are omissible or not.

A straightforward interpretation of these facts emerges rather easily, once the literature on the verbal classes is considered. Specifically, under the hypothesis that unaccusatives have no little *v*, (di)transitives have a little *v*, and psych verbs little *v* plus Causer (e.g. PESETSKY 1995), the ranking of the three levels of omissibility in short-forms directly corresponds to the amount of structure: those verbs with the least amount of heads tolerate short-forms the most, while those with a richer structure prefer to expone it using the long form. Suppressability of *-d-* thus corresponds to amount of structure, and this parallels a great deal of existing work on the way that morphological marking reflects additional syntactic structure building, in a way potentially related to the Monotonicity Hypothesis of KOONTZ-GARBODEN (2008).⁴

⁴ Koontz-Garboden's hypothesis asserts that "word formation operations do not remove operators from lexical semantic representations". This makes the prediction that a verb of non-causative changes of state (e.g. unaccusatives) cannot be derived from a verb of causative changes of state (e.g. transitive), because that would involve a morphological operation to *delete* the cause operator from the lexical representation of the verb. This is indeed visible in Quechua, where less morphology is equal to intransitivization and more is equal to transitivity:

(i)	hatun-ya	hatun-ya-chi
	<i>enlarge-intr</i>	<i>enlarge-trans</i>

At first sight, this correspondence seems not to be true universally, as examples from other languages (e.g. Pima, Spanish) suggest the opposite. KOONTZ-GARBODEN presents, however, a series of evidence that in these languages the causer operator is not deleted from the lexical conceptual structure of the verb in its intransitive version. Our research on athematic participles goes in the same basic direction, showing that, similarly to the data in (i), the *short* vs. *long* forms of past participles in Portuguese suggest differences in argument structure. Under the assumption that lexical semantic representations are mapped onto syntactic structure (e.g. HALE and KEYSER, 1993), one can entertain the hypothesis that less syntactic structure requires less morphology.

The relevance of structure may not be limited to simply counting the number of arguments (although this works surprisingly well); in addition, event-structural properties of the verbs (as diagnosed by the relative admissibility of telic-oriented adverbs such as *in two hours* and *get*-passives) pair along with the well-formedness of short-form passives in the set below.

(16) *Unaccusatives*

- a. The vase broke *for/in two hours
- b. The vase got broken

(17) *Transitives*

- a. John cleaned the house in/for two hours
- b. The house got cleaned

(18) *Ditransitives:*

- a. John sent the document to Mary in/?for two hours
- b. The document got sent to Mary

(19) *Psych-verbs*

- a. John feared the situation *in/for two hours
- b. *John got feared

Ditransitives patterned similarly to transitives in BP, as shown in Figure 1. This may be related to the fact that BP ditransitives are all of the *put*-type (involving a direct object NP and a goal PP), and none are of the *send*-type (involving a double object structure with a higher goal NP) that would involve an applicative structure MARANTZ (1993) and thereby an additional argument-introducing functional head.

With respect to psych verbs, a more fine-grained investigation seems to be necessary as different classes of psych-verbs behave different syntactically. For example, while verbs that place the experiencer in the

external argument position [spec, vP] (SubjExp verbs), such as *fear* in (19), are unable to form *get-passives*, verbs that maps the experiencer onto the internal argument position (ObjExp verbs), such as *worry* and *excite*, are able to do so:

(20)

- a. I got worried with Karl's decision
- b. I got excited by the news

In addition, while SubjExp verbs do not exhibit an intransitive alternation in terms of middle formation (21a), while ObjExp verbs do, as shown in (21b):

(21)

- a. *The truth respects easily
(cf. John respects the truth)
- b. Children bore easily
(cf. Your story bored the children)

Notice, however, that although ObjExp verbs can display a middle alternation, they are incompatible with a fully unaccusative frame (22). This might be related to the fact that ObjExp verbs must project an extra layer of argument structure, which is related to the external participant of the event - a Causer in PESETSKY'S (1995) terms. ObjExps are permitted in middle structures, however, given that the latter involve a mapping of the external argument onto the syntactic structure HOEKSTRA & ROBERTS (1993), KEYSER & ROEPER (1992), STROIK (1992) among others.

(22)

- a. *The children bored with your story
- b. *John annoyed with your behavior

At any rate, although all psych verbs might display an equally complex argument structure, they do display syntactic differences. Thus, it is in principle possible that they pattern differently with respect to past participle formation. In Experiment 1 we did not control for SubjExp vs. ObjExp psych verbs. Therefore, we decided to launch a second experiment to verify if there is any difference between these two classes of verbs with respect to the formation of short-form participles.

4.2 Experiment 2: Subject Experiencer vs. Object Experiencer psych verbs.

BELLETTI & RIZZI (1998) observed the existence of three natural classes of psych verbs in Italian: *temere* ‘to fear’, *preoccupare* ‘to worry’ and *piacere* ‘to please’. Although according to these authors, *preoccupare* and *piacere* are different structurally,⁵ they have in common the fact that both of them map the experiencer onto a position within the VP domain, whereas *temere* maps the experiencer onto a position outside the VP domain. For that reason, verbs of the class of *temere* are called Subject Experiencer (SubjExp) verbs, and verbs of the class of *preoccupare* and *piacere* are called Object Experiencer (ObjExp) verbs.

Having granted the BELLETTI & RIZZI classes of two psych-verbs, we designed a second experiment to investigate the following question:

- (23) Do SubjExp and ObjExp psych verbs behave differently with respect to the licensing of short-form participles?

4.2.1 Material, design and participants

Similarly to Experiment 1, in Experiment 2 we used wug psych-verbs

⁵ In their analysis, *preoccupare* maps the experiencer to the direct object position, a sister of V, receiving accusative Case. With *piacere*, on the other hand, the experiencer is mapped onto an adjunct position, sister of VP, being marked with dative case.

to probe participants’ preference for short-form participles. Suppletive participle forms (e.g. *confundir/confuso* ‘confuse.inf/confused.participle’) were not considered. There were 12 target wug forms: 6 wugs for each class of psych-verbs, equally distributed within the three verbal conjugation paradigms (2 for each conjugation). In Table 3, we include the SubjExp verbal wugs and in Table 4 the ObjExp verbal wugs that were tested. As shown, all wugs respected the phonotactic constraints of BP and they all had three syllables.

TABLE 3: Wugs for SubjExp verbs

<i>1st Conjugation</i>	<i>2nd Conjugation</i>	<i>3rd Conjugation</i>
limadar	mebuler	atulir
jatular	sapider	feradir

TABLE 4: Wugs for ObjExp verbs

<i>1st Conjugation</i>	<i>2nd Conjugation</i>	<i>3rd Conjugation</i>
jolatar	teliner	valumir
todomar	jelider	botunir

Filler trials (24 in total) were also wugs involving noun formation with alternations such as the diminutive *-inbo* and *-xinbo*, nominalizations with *-ção* vs. *-mento*, and other nominally-based productivity-related alternations.

Following the design of the first experiment, all the wugs (target items and fillers) were presented in frames, which were intended to be transparent with respect to the argument structure of the artificial form. In the frames, the 1sg.pres.ind was presented first, followed by the infinitive form, then by the 1sg.past.ind. This repetition of the 1sg was intended to make the counter-hypothesis (i.e. short forms are formed

based on 1sg – autonomous morphology) stronger. The participle forms were elicited in the context of 3sg perfect tense in combination with the auxiliary. The judgments about short vs. long form were elicited using a scale from one to five along the lines described above for Experiment 1, and the appearance of the short-form (shown first vs. shown last) was equally counterbalanced within the experiment.

(24) *Frame for a SubjExp verbal wug*

Eu *mebulo* muitíssimo meu filho. Acho que *mebuler* um filho é inerente a todas as mães. Mas eu sempre fui assim, pois eu *mebuli* muito meus pais também. Mas minha irmã era bem diferente de mim. Eu acho que ela nunca tinha _____ (*mebulido/mebulo*) ninguém antes de ter tido um filho.

‘I really *mebulo* my son. I think that to *mebular* a child is inherent to all mothers. But I was always like this, as I *mebuled* my parents a lot as well. My sister was very different from me. I think she had never _____ (*mebulido/mebulo*) anyone before having a child.’

(25) *Frame for an ObjExp verbal wug*

Eu nunca *jolato* alguém da minha família com meus próprios problemas. *Jolatar* alguém com seus problemas não é legal. Outro dia, eu vi que eu jolatei meu pai falando das minhas questões emocionais e ele ficou muito triste. Isso ficou pior porque minha irmã já o tinha _____ (*jolatado/jolato*) com o mesmo tipo de problema.

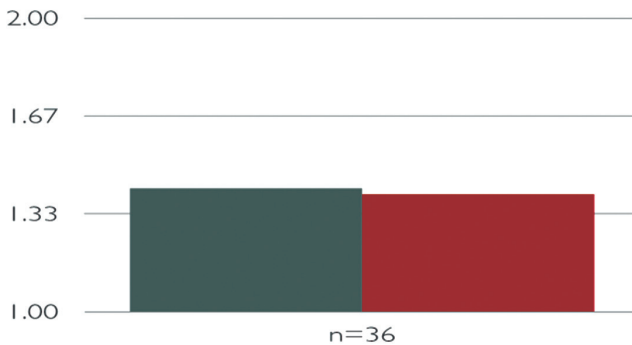
‘I never *jolato* members of my family with my own problems. To *jolatar* someone with your problems is not right. The other day, I noticed that I *jolated* my father by talking about my emotional issues and he got really sad. This is even worse because my sister had already _____ (*jolatado/jolato*) him with the same type of problem.’

A complete list of the frames presented in Experiment 2 is included in Appendix 2, with the accompanying extant psych-verbs presented along side the intended frame/wug combination. The experiment was again conducted with the research platform *online pesquisa* (<https://www.onlinepesquisa.com>), and it took around 10 minutes to be completed. 52 participants logged in, but only 36 completed the experiment. All participants saw all items, with a randomized order of presentation.

4.2.2 Results

The results ($n=36$) were statistically analyzed using the open-source software R. In a within-subjects design, we tested the effects of type of argument structure (SubjExp vs. ObjExp) on short vs. long participle forms. As shown in Figure 2 and measured by a two-tailed paired t-test, there was no statistical significance difference between the classes of psych-verbs with respect to preference for short participle forms.

FIGURE 2: Experiment 2 results with means by verb class ($n=36$), on a scale of 1 to 5, where higher numbers represent a greater preference for the athematic participle (e.g. *pando*) as opposed to the long-form (e.g. *pandado*). The difference between Subject Experiencer verbs (left) and Object Experiencer verbs (right) was not significant.



4.2.3 Discussion

The result suggests that speakers do not consider the difference in argument structure between SubjExp and ObjExp while computing past participle forms. These results are expected if the argument structure of both SubjExp and ObjExp involves an extra head responsible for projection of the external argument, as proposed by PESETSKY (1995). That is, both types of verbs possess a heavy lexical structure, in which the VP layer is dominated by another argument taking head. Therefore, the results are in accordance with our initial hypothesis.

There is, however, an issue that has to be considered. First, it is unclear that every sentence designed to contain a wug psych-verb indeed receives a psych interpretation. ARAD (1998) has argued that a sentence containing one of BELLETTI & RIZZI'S ObjExp psych verbs can receive two different readings: agentive and stative. The agentive reading, she argues, does not deliver a psych-reading, and only stative readings are truly psychological readings. All the syntactic properties attributed by BELLETTI & RIZZI to ObjExp psych-verbs are observed in stative readings, but not in agentive readings, which behave syntactically like regular transitive agentive predicates. From Arad's argumentation, we can thus conclude that psych-verbs are better tested using stative predicates. This was not controlled in the experiments we conducted.

A priori it might be then that BELLETTI & RIZZI'S dual classification of psych-verbs is not fine grained enough for the purpose of our current investigation. In fact, the inner aspect of the event described by the verb (state vs. event) might emerge as an important issue to be considered in general, as it seems that habitual readings favor short participles. For example, according to some speakers' intuitions, in the examples below, the habitually-framed sentence (a) sounds a bit better than episodic sentence (b):

(26)

- a. Eu tenho chego atrasada todos os dias
I have arrived late all the days
 'I have arrived late every day'
- b. % Eu tinha chego atrasada na festa
I had arrived late in.the party
 'I had arrived late at the party'

Thus internal as well as external aspect might play a role in defining the past participle forms of the verb. This should inform all future work on this topic.

For now, let us emphasize that our current results show that given BELLETTI and RIZZI'S categorization of psych-verbs, there is no significant difference between Subject Experiencer and Object Experiencer verbs with respect to their preference for short past participle forms. Given that the same methodology, employed in Experiments 1 and 2, was sensitive enough to detect differences in the former, we contend that the null result in the latter may stem from either a 'ceiling effect' whereby both SubjExp and ObjExp verbs, despite their differences, are both too syntactically heavy to tolerate short-form participles, or may indeed result from too coarse-grained a classification of these verb types, whereby factors such as stativeness and habitualness were not sufficiently controlled within the frames to render the ObjExp verbs truly distinct.

5 General conclusion

The present results point to the fact that morphological realization *can* make reference to the amount of hierarchical syntactic structure underlying it (*pace* models such as ANDERSON, 1992). In sum, suppression of the theme vowel and *-d-* in the short-form participles is not simply a morphomic generalization based on analogical reasoning

stemming from Latin *t*-stems (*acendido/aceso*). Instead, speakers reliably show tolerance for short-forms when they correspond to smaller amounts of argument structure. While the growing emergence of these innovative participles in BP may be the result of the complex ‘diglossic’ situation of hypercorrection and metalinguistic awareness of ‘correct’ short forms in the suppletive cases, our central point in this paper is to show that reference to ‘morphology by itself’ is not enough to explain the effects of independent variables (verb classes, as defined by argument structure and event structure) on the dependent variables, namely the acceptability of athematic participles. The sporadic omission of the theme vowel and *-d-* found in BP (and rarely found to this productive extent in other Romance languages) certainly may result from social and educational factors, but the differential modulation of their application by verb classes implicates a undeniable role for the syntax.

Appendix 1: Stimuli for Experiment 1

Transitivos

- 1) Eu acho que pandar a casa todos os dias é importante para manter tudo limpo. Eu pando a minha casa bem, mas minha mãe, que é mineira, tem um capricho incrível e panda muito bem. No ano novo, depois que ela tinha _____ (pando/pandado) toda a casa, ficou um cheiro delicioso por todos os lados.

- 2) Lasar livros no prazo é muito difícil. Eu nunca laso os meus livros no prazo. Então, eu sempre pago multas. Meus amigos lasam seus livros sempre no prazo, mas esse semestre, eles têm _____ (lasado/laso) livros com atrasado e estão pagando multa.

- 3) Biver o cabelo para festas deixa muitas mulheres mais bonitas. Quando eu bivo meu cabelo com arranjos de flores, chamo muita atenção. Minha irmã bive o cabelo toda semana. Por exemplo, na festa de sábado ela tinha _____ (bivo/bivido) o cabelo dela na sexta.
- 4) Lufer as plantas do jardim pode ser uma tarefa muito agradável. Todo dia, eu lufo minhas plantas. Quando não tenho tempo, meus filhos lufam elas para mim. E eles adoram fazer isso. Ontem a tarde, eles já tinham _____ (lufido/lufo) as rosas e as samambaias quando eu cheguei em casa.
- 5) O meu irmão sempre inventa de gutir o quarto dele de noite. Eu nunca guto as minhas coisas a noite. Sempre faço isso durante o dia. Mas ele guta o quarto dele até de madrugada. Ontem a noite, ele fez muito barulho e, só depois que ele tinha _____ (guto/gutido) todo o guarda-roupa, foi que minha mãe pediu para ele parar.
- 6) Atualmente, as crianças adoram labir os brinquedos. Eu nunca labo os meus, mas minha irmã labe todos. Não importa se o brinquedo é dela ou não. Ontem depois que ela tinha _____ (labido/labou) a boneca da minha prima, foi que ela se deu conta de que a boneca não era dela.

Bitransitivos

- 1) Bilar alguma coisa para alguém é algo que me dá muito prazer. Eu sempre bilo dinheiro para mendigos. Minha mãe não bila nada para ninguém. Semana passada, ela me deu uma bronca porque eu tinha _____(bilo/bilada) os 100 Reais para uma criança de rua.

- 2) Sular uma língua estrangeira para uma criança é um avanço na educação dela. Eu sulo inglês para meu filho. As minhas irmãs também sulam inglês para os filhos delas. Minha irmã mais velha já tinha _____(sulado/sulo) francês para a filha dela antes.

- 3) Caper uma carta para alguém distante é muito divertido. Eu capo cartas para meus amigos na França. Meu pai cape uma carta para a minha irmã que mora na Holanda de vez em quando. Nos últimos tempos, ele tem _____(capo/capido) uma carta para ela toda semana.

- 4) Noder palavrões para a Maria sem necessidade foi um ato cruel do João. Eu nunca nodo coisas pesadas para ninguém. Minhas amigas nodem coisas terríveis para os namorados delas. Outro dia, a Matilde tinha _____(nodido/nodo) uns palavrões para o namorado dela e ele se chateou.

- 5) Asir algo para alguém pode ser um problema. Por isso, eu não aso as minhas coisas para ninguém. Minha irmã ase tudo para as amigas. Um dia desses, ela já tinha _____ (aso/asido) um livro para uma amiga, quando se lembrou que iria precisar dele na escola.

- 6) Malir dinheiro para familiares é muito perigoso. Eu nunca malo grana para ninguém, mas o Fernando vai ficar na miséria. Ele male toda a grana que ele tem para os primos. Se eu fosse ele, eu tinha _____ (malido/malo) 40.000 Reais para aquele primo esquisito dele que mora na Alemanha.

Inacusativos

- 1) Dupar uma peça que a gente gosta dá muita tristeza, mas acontece quando a gente muda de casa. Toda vez que eu mudo, eu dupo alguma coisa. O fato é que cristal dupa muito fácil. As peças de cristal que eu tinha _____ (dupo/dupado) na mudança anterior foram todas para o lixo.
- 2) Fompar roupas é fácil nos dias de hoje, já que temos muitos produtos para isso. Quase todos os dias eu frompo roupas de festa aqui na lavanderia. Essas roupas de hoje frompam super fácil. Acho que ontem na hora de ir embora, eu já tinha _____ (fompado/fompo) uns 10 ternos.
- 3) Sager um bolo pode acontecer se você não sabe em qual temperatura colocar o forno. Eu sago muito bolo aqui em casa porque meu forno está desregulado, mas também porque esses bolos de caixinha sagem fácil. Ultimamente, eu tenho _____ (sago/sagido) um bolo por semana.
- 4) Feser um cachorro é um prazer na vida de uma pessoa velha. Eu feso o meu vira-lata todas as tardes. Ele adora sair de casa. Mas, meu puddle fese muito fácil porque ele é um cachorrinho muito bonzinho. Ontem, eu já tinha _____ (fesado/feso) ele de manhã antes de vir para a aula de italiano.

- 5) Lomir feijão pode dar um trabalhão, mas todos os dias eu lomo feijão aqui em casa. Feijão roxinho lome mais rápido se você deixá-lo de molho na água antes. Meus filhos adoram feijão. Ontem, minha filha queria saber se eu tinha _____ (lomo/ lomido) feijão para o jantar.

- 6) Satir tapetes é o que eu mais gosto de fazer. Todo dia eu sato os tapetes da minha sala. Meu tapete persa é ótimo porque ele sate fácil e não fica todo torto. Sexta-feira passada às oito da manhã, eu já tinha _____ (satido/sato) todos os tapetes da casa inteira.

Verbos Psicológicos

- 1) Femar as tradições de um povo é uma prova de educação. Eu, como boa gaúcha, femo as tradições do meu rio grande. A minha família também fama as nossas tradições. Nos últimos anos, eu também tenho _____(femado/femo) as tradições de outros estados.

- 2) Legar o povo parece ser a meta do governo. Eu, por exemplo, me lego muito com a falta de emprego. Mas a inflação também lega a gente. No início desse ano tivemos esses protestos todos, mas se não fosse o controle do povo, o governo já tinha _____ (lego/legado) a gente muito mais.

- 3) Depois que conheci o Ricardo só sei o jesar. Eu o jeso pelo seu jeito gentil e pela capacidade que ele tem de me entender. Acho que ele também me jese pela mesma razão. Eu já tinha _____(jeso/jesado) o Ricardo desde aquele dia em que ele não nos deixou pagar a conta do restaurante.

- 4) Gurer crianças é uma covardia. Eu não guro meu filho, mas minha mãe gure todos os netos dela. Antes de deles irem dormir ela conta estória de mula sem cabeça e assombração para todos ele. Nos Estados Unidos, uma senhora que tinha _____ (guro/gurado) o filho foi presa.
- 5) Olir pessoas doentes deve ser a prioridade de todos os médicos. Eu tenho muita paciência e por isso olo os meus pacientes. A médica que trabalha comigo não ole ninguém. Outro dia ela me perguntou porque eu tinha _____ (olido/olo) uma das minhas pacientes.
- 6) Bojar-se com a morte é besteira. Eu na verdade não me bujo com muita coisa. Sou meio aventureira. Minha irmã se boje com tudo. Semana passada ela foi para o México e teve de tomar calmante. Acho que ela tinha se _____ (bojo/bojado) muito com a preparação para a viagem.

Appendix 2: Stimuli for Experiment 2

ObjExp

- 1) Eu nunca jolato alguém da minha família com meus próprios problemas. Jolar alguém com seus problemas não é legal. Outro dia, eu vi que eu jolatei meu pai falando das minhas questões emocionais e ele ficou muito triste. Isso ficou pior porque minha irmã já o tinha _____ (jolatado/jolato) com o mesmo tipo de problema.

- 2) Eu não todomo os meus netos com estórias de terror. Todomar crianças pode criar problemas psicológicos sérios. Eu todomei o filho mais velho com uma estória de assombração e hoje ele até hoje morre de medo de ficar sozinho. Quando eu vi o problema já era tarde demais. A estória já tinha _____ (todomo/todomado) o pobrezinho.

- 3) Eu acho que eu telino a minha mãe com minha falta de perspectiva para o futuro. Telineer pessoas da família com esse tipo de problema é muito ruim. O fato de eu não ter encontrado um emprego no ano passado telinou muito o meu irmão também. Até eu aprender a conviver com essa tipo de situação, isso já tinha me _____ (telinado/telino) demais também.

- 4) Eu jelido meus amigos sempre que eu posso. Saber jelider as pessoas é essencial no mundo de hoje. No meu último emprego, eu jelidi meu chefe o tempo inteiro com presentes e afagos, e ele me tinha em grande estima. O meu marido é muito esperto, ele tinha me _____ (jelido/ jelidido) antes mesmo de eu decidir namorar com ele.

- 5) Eu sou um bom líder do time porque eu sempre valumo os meus colegas. Se estamos perdendo uma partida, eu começo a valumir a equipe. Na nossa partida contra a Alemanha, eu sai do banco de reserva eu valumi os que estavam em campo. Antes disso, O Felipão tinha _____ (valumido/ valumo) todos nós no vestiário.

- 6) Como um bom psicólogo, eu botuno as pessoas. Sempre que chegam muito nervosos no consultório, eu começo a botunir meus pacientes. Outro dia eu botuni uma senhora que estava muito preocupada com a saúde do marido. A minha colega de trabalho também é boa nisso. Foi ela quem me ensinou, pois ela tinha _____ (botuno/botunido) e curado uma paciente com uma forte crise de pânico.

SubjExp

- 1) Eu limado muito a minha professora de inglês porque ela sabe muito, mas é muito modesta. Limadar uma pessoa como ela não é difícil. Eu a limadei assim que a conheci. O ano passado uma colega minha a tinha _____ (limadado/limado) pelo carinho com que ela nos trata.
- 2) Eu jatulo os meus pais, meus irmãos e todas as pessoas que gosto. Jatular o outro é essencial para a gente viver bem em comunidade. Eu sempre jatulei todas as pessoas que eu amo ou que trabalham comigo. A minha melhor amiga também é assim. Eu acho que ela tinha _____ (jatulo/jatulado) o nosso chefe mesmo antes de conhecê-lo
- 3) Eu mebulo muitíssimo meu filho. Acho que mebuler um filho é inerente a todas as mães. Mas eu sempre fui assim, pois eu mebuli muito meus pais também. Mas minha irmã era bem diferente de mim. Eu acho que ela nunca tinha _____ (mebulido/mebulo) ninguém antes de ter tido um filho.

- 4) Ultimamente eu sadipo jiló. Sapider algum tipo de comida é muito comum. Na infância, eu sadipi doce de leite. Nunca mais comi esse tipo de doce. Mas todo mundo é assim com jiló. Minha irmã mais nova me disse que nunca tinha _____ (sadipo/sadipido) nenhuma comida, só jiló.
- 5) Eu sou atulido pela minha namorada. Atulir-se com alguém hoje em dia é tão difícil porque as pessoas estão muito egoístas e fechadas. Mas eu me atuli por ela assim que eu a conheci. Com ela foi diferente. Ela não tinha se _____ (atulido/atulo) por mim antes de a gente se casar.
- 6) Eu ferado que a Dilma não seja eleita. Feradir a situação política do Brasil é algo comum desde sempre. Na época da eleição do Lula, eu feradi que algo errado fosse acontecer. Meu pai me contou, que na época da eleição para diretas já, a população do Brasil inteira tinha _____ (ferado/feradido) um novo golpe dos militares.

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