

The perfect triggers plural event construals in Galician and English

Natalia Jardón^{1,2} and Eva Wittenberg²

¹ Department de Filologia Catalana, Universitat Autònoma de Barcelona, Spain

² Department of Cognitive Science, Central European University, Vienna, Austria

E-mail: natalia.jardon@uab.cat, wittenbergE@ceu.edu

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Abstract

In some languages, the reference to plural events is claimed to be grammatically encoded. While this phenomenon has been widely reported in relation to Aktionsart-changing morphology, pluractional readings have also been claimed to arise outside the verb phrase: For instance, it has been proposed that events expressed in the present perfect in English are necessarily repeatable in cases such as ‘I have travelled to Rome (before)’. The association of the perfect with readings of plural events appears to be fully systematic in other languages: In Galician, an understudied language spoken in Northwestern Spain, the perfect is claimed to even rule out single-event interpretations: *Teño ido a Roma* ‘I have travelled to Rome (*once)’. In two experiments, one in English and one in Galician, we investigated the psychological reality of these claims: How people think about which number of events to construe based on a simple sentence in the perfect (vs. past). Our findings reveal that the perfect leads people to imagine several events significantly more often than the past, in both languages, supporting the idea that pluractional event construals are reliably triggered by (semi)functional forms in typologically distant languages.

Keywords: pluractionality, perfect tense, Galician, quantification, event construal.

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1 Introduction

Language is ripe with underspecified meaning. For instance, when your friend tells you that she has seen many bats while on holiday in Spain, you may imagine a single evening in which a cauldron of bats, many at once, fluttered by her window. Given the absence of pluractional information, this might be the most plausible event construal. But perhaps what she really meant (and maybe this is in fact the more natural

construal) was that on several evenings during her Spanish sojourn, she could spot a bat or two.

Linguistic theory, as we will review below, has long been discussing and modeling the ambiguity between collective readings, where a group of bats appears together, and distributive readings, where the bats appear distributed over several occasions. However, what is missing from the literature is experimental evidence on the contribution of different factors to how

people think about which number of events to construe based on a linguistic utterance.

Here, we test whether utterances underspecified for quantification are understood as a collection of multiple events when presented in the perfect (have + perfect participle), as it has been proposed for several languages. In doing so, our study addresses a more general question regarding the psychological reality of pluractional language: Do people imagine plural events from specific predicative forms alone, or is the sense of plurality indirectly obtained in the presence of plural arguments and contextual cues?

Our paper is structured as follows: First, we review the theoretical literature on how plural event construals are thought to be formed across languages (1.1). We specifically focus on different morphological and lexical mechanisms driving pluractional interpretations. Then, we summarize claims on how, in contrast to the simple past, the present perfect encodes pluractionality across languages, from Galician, in which this relationship has been claimed to be fully systematic, to English, which has been claimed to carry a pluractional flavor in its perfect tense (1.2). We then outline the logic and predictions of our studies on Galician and English (1.3) before we present the experiments (sections 2a and 2b), followed by a discussion (3).

1.1 The construal of plural events in language

The conceptual distinction between one and more than one appears early in life (Barner et al. 2007; Dispaldro & Benelli 2012) and across species: Any baby, bird, or bee can discriminate between singular and plural sets of entities (Meck & Church 1983; Brannon & Terrace 1998; Hauser et al. 2000; Barner et al. 2008; Li et al. 2009; Agrillo 2015). Entities and how they quantify (1-2) have also been the focus of most linguistic work on plurality (see Link 1983; Verkuyl & van der Does 1991; Krifka 1996; Schwarzschild 1996; Corbett 2000).

(1) *Bat(s)*

(2) {Many/All/Each} *bat(s)*

The reference to plurality outside the nominal domain, and more specifically the reference to plural events, has been discussed significantly less. We can

identify several sources of multiple-event readings: the event itself (verbal pluractionality); event participants (distributivity); and event modifiers (sentential pluractionality).

For instance, in descriptive work in linguistics, we find reports of languages that are claimed to encode reference to multiple events at the verbal level: This can be due to the verb's lexical meaning in the case of semelfactive verbs such as knock, drip, blink, or cough (Comrie 1976), or it can arise as a result of a derivation process from a verbal base, a phenomenon that got the most attention in studies on pluractionality (Newman 1980). We illustrate this morphological process in different languages (3-5):

(3) *Tùna* 'remind' > *tuntùnā* 'remind often' Hausa (Newman 2000: 423–424)

(4) *Nere* 'eat' > *nerqaqluniq* 'eating now and then' Yup'ik (Jacobson 1984: 535)

(5) *Kysyä* 'ask' > *kysellä* 'ask repeatedly' Finnish (Karlsson 1999: 239)

In (3-5), the morphologically derived verb contains a pluractional marker that is said to contribute the reference to more than one event. This can be obtained through reduplicative morphemes in Hausa (3), frequentative postbases in Yup'ik (4), and iterative suffixes in Finnish (5), among many others.

However, reference to multiple events can also be obtained indirectly if distributed over multiple participants. This is known as distributivity (Hoeksema 1983; Gillon 1987; Landman 1996, 2000; a.o.). Distributivity, unlike pluractionality, may apply across categories (i.e., to entities, but also to events). It has two components, a key (K) and a share (S), that enter the following semantic relationship: 'parts of K satisfy S', where K is typically a noun, and S is typically a predicate (Champollion 2017).

(6) *I saw many bats.*

many bats = [K] = plural

seeing DP = S

→ parts of [K] distribute over S

Importantly, while there are semantic overlaps between distributivity and pluractionality, distributivity

requires a plurality of entities in its K (usually a plural object), whereas pluractionality does not (3-5). In this respect, Henderson (2019) notes the importance of distinguishing real pluractional markers (3-5) from other markers which may indirectly yield readings of multiple events. He calls these “forms of participant plurality” (Henderson 2019: 4). For instance, (6) can describe a single event where several bats were seen within the limits of a single occasion; or it can describe several occasions in which one or more bats were seen each. In other words, a plural event reading of (6) is not enforced as it would be if the predicate form was indeed pluractional.

A vast literature in psycholinguistics and language acquisition has been focused on collective compared to distributive readings of arguments (Kurtzman & MacDonald 1993; Frazier et al. 1999; Kaup et al. 2002; Syrett & Musolino 2013; Patson & Warren 2010; Feiman & Snedeker 2016; Marty et al. 2023; a.o.): For instance, Patson and Warren (2010) tested how people comprehend cases like those in (7). In contrast to (6), where the plural argument is in object position, in (7) the plural argument is in subject position (i.e., *the men*). But the effects are similar: (7a) can describe two potentially different situations; one in which all the men carried a box together (the collective reading, 7b), but also one in which each of the men carried a box (the distributive reading, 7c).

- (7) a. *The men carried a box*
(Ambiguous)
- b. *Together the men carried a box*
(Collective reading)
- c. *Each of the men carried a box*
(Distributed reading)

However, the question that motivated Patson and Warren’s (2010) study was not about the number of events that the sentences in (7) may evoke. Their question was whether a singular definite noun such as “the box” could be understood as conceptually plural in unambiguously distributed sentences (7c). The ambiguity remains as to whether (7c) maps onto a single event where several men carried one box each, or rather, whether it maps onto several events, where several men each carried a box at different times and/or

locations. This particular point about event number has not been addressed in any of the studies above.

Aside from distributive readings, and in contrast to approaches that regard pluractionality as a morphological process that takes place within the lexical verb (Cusic 1981; Lasersohn 1995; Wood 2007; Henderson 2019), of which we saw examples in (3-5), there are other views according to which pluractional interpretations emerge outside the lexical verb proper. This line of work places the pluractional semantics in prepositional phrases and adverbials that modify the event in question (Stump 1981; Van Geenhoven 2004). In (8) we have an example with a frequency adverb that involves temporal distribution.

- (8) *During the commercial, the fly occasionally landed on my foot* (Stump 1981: 221)

The word *occasionally* brings about the reading of multiple landings of the fly. Without that word, and in the absence of further context, the sentence would be taken to mean that the fly landed once. Similar observations have been made about certain prepositional phrases such as the durative for x (time) (Van Geenhoven 2004), which was initially only discussed in relation to (a)telicity (Dowty 1979; Krifka 1989). Several psycholinguistic studies (e.g. Brennan & Pylkkänen 2008; Piñango et al. 1999; Piñango et al. 2006; Bott 2010) have argued that punctual verbs like *jump* in combination with a durative adverbial (9) lead to representations of multiple events (e.g., multiple jumps) at the sentence level, as indicated by behavioral costs and brain activation data.

- (9) *Anna jumped for one hour.*

In sum, we have reviewed three sources that have been identified in the literature as triggers of event plurality: lexical verbs, nominal arguments, and adverbial modifiers. However, these do not seem to exhaust the list of possible triggers of plural event interpretations.

1.2 *The pluractional perfect*

Some studies have reported cases of (semi)functional verbs with pluractional semantics. An example is the verb *ter* in the Portuguese perfect tense (Schmitt 2001:

404), and *andar* in the aspectual periphrasis [*andar* + gerund] in Spanish (Laca 2006: 22). Sentences built with these forms allegedly cannot be used to describe single events:

- (10) *O João tem saído tarde*
 The João AUX-PRS.1SG exit.PTCP
 late
 ‘John has been leaving late’ / ‘John has often left late’ / * ‘John has once left late’
- (11) *María anda pensando en casarse*
 María keep-PRS.3SG thinking
 of marry-INF
 ‘Maria keeps thinking of marriage’ / ‘Maria has been thinking about marriage’ / * ‘Maria once thought about marriage’

Sentence (10) illustrates the experiential reading of the perfect (Comrie 1976). It describes the subject’s experience of some past event. In Galician, a regional language of Spain, the association of this perfect with multiple past events is claimed to be fully systematic, just like in Portuguese (Rojo 1974; Ferreiro 1996; Freixeiro Mato 1998; Álvarez & Xove 2002; Jardón 2021, 2022). Thus, the perfect in (12a) is claimed to be restricted to experiences that happened more than once: a pluractional perfect. By contrast, the simple past or preterit in Galician is taken to denote single events in the past (12b).

- (12) a. *Teño estado en Roma*
 AUX-PRS.1SG. be.PTCP in Rome
 ‘I have been to Rome (*once)’
- b. *Estiven en Roma*
 Be-PST.1SG. in Rome
 ‘I was (once) in Rome’

While Galician has been claimed to have fully systematized the mapping between perfect tense and pluractional interpretations, other languages have been

claimed to carry a similar semantic flavor in their perfect tense as well.

For instance, the perfect in English has also been related to event quantification and repeatability, as opposed to the simple past. Almost a hundred years ago, Zandvoort (1932: 13) analyzed it as “iterative”, because, according to him, the perfect can be interpreted as denoting a plural number of experiences. This analysis was initially only applied to complex sentences introduced by a when-clause, such as (13), but then extended to simple sentences.

- (13) *When I have asked a singer whether he sang a particular song, I have (often) received the reply...*

The idea is that (13) describes several events of asking and receiving, even without the help of the frequency adverbial in brackets. Even though most of the examples given by Zandvoort as evidence of the “iterative” nature of the perfect can be explained away as forms of participant plurality, or as a result of adverbial modification, Zandvoort’s thesis didn’t go unnoticed.

Throughout the years, iterativity and repeatability continued to be identified as a definitional property of the perfect in English (McCawley 1971; Inoue 1978; Dahl 1985; Michaelis 1994; Katz 2003; Mittwoch 2008). For instance, McCawley (1971: 104) states that in sentences such as (14) the perfect “indicates the existence of past events” precisely because of its compatibility with a plural adverbial, and that the experiential reading of (15) is that both Max and Fred have been fired on occasion, thus arguably possibly more than once, even though they might be employed again now. Notice how the descriptive meanings of (14–15) are given in terms of event pluralities (“past events” and “on occasion”).

- (14) *I have read Principia Mathematica five times.*

- (15) *Max has been fired, and so has Fred.*

Inoue (1978) argues that the present perfect carries with it a condition of repeatability of the proposition that is being expressed, at the time that the sentence is uttered. Her arguments come from discourse: the kinds

of situations the speaker may be talking about that would license the perfect.

Inoue claims that the perfect is not licensed when the situation being talked about necessarily refers to a unique event. She identifies two cases: The first is the case of creative accomplishments: To illustrate this point, she compares the following two sentences, one with an activity verb (*paint*, (16)), and a similar one with an accomplishment verb (*build*, (17)).

(16) *I have painted this bicycle*

(17) *I have built this bicycle*

Although (16) and (17) may look similar, they differ in the kinds of discourse situations that can be associated to each of them individually. In particular, while both can be used to talk about the subject's engaging in activities ('Lately, I've {painted/built} this bicycle, I've fixed the car, I've bought the tickets, etc. '), only (16) can be used to talk about people painting a specific bicycle in different occasions (pluractional reading). This is because the event of 'building this bicycle' in (17) denotes a unique act of creation: "once the bicycle is built, it cannot be built again" (Inoue 1978: 581). And in order for this event to be expressed in the perfect, the idea is that it must be in a pluractional discourse situation.

Inoue's second case is represented by cognitive events of discovery, undertaken by a specific individual (18):

(18) *Alexander Fleming has discovered penicillin.*

What makes (18) odd, according to Inoue, is that it does not satisfy the condition that the event is repeatable at the present time. This is not only because Fleming is dead, and therefore not able to engage in any activity anymore, but also because of the nature of the action: Discovery only happens once. This is different from (19), where, despite Goethe being also dead, the perfect is acceptable. But it is so as long as we talk about the old folktale (19b), which has been the base for other (multiple) writings, including Goethe's.

(19) *Goethe has written Faust.*

a. Discourse topic: *Goethe

b. Discourse topic: writing about Faust (Christopher Marlowe also did)

Mittwoch (2008: 326) defines the experiential perfect as "simply quantificational", where there is at least one event of the type denoted by the base sentence. A distinction is made between singular events in the simple past (20a) and result states of singular events in the perfect (20b), vs. quantified events in the perfect of experience (21):

(20) a. *Two years ago, in Tokio, I lost my passport*

b. *I have lost my passport, I don't know where it is*

(21) *I have lost my passport* (at least once, before)

Sentences like (21), out of context, are ambiguous between a resultative and an experiential interpretation. However, the two senses differ in singularity: In the resultative reading, the state of the passport being lost now was necessarily caused by a single losing event. This does not apply to the experiential reading. Therefore, when singularity is ruled out with the addition of a quantified temporal adverbial, only the experiential reading survives:

(22) *I have lost my passport three times*
(*Resultative/ ✓Experiential)

Mittwoch also discusses a series of sentence internal clues favouring the experiential reading. What they all have in common is that they point to an event plurality, or the possibility thereof: one is repeatability, in the terms already laid out in Inoue (1978). A second clue is compatibility of the experiential perfect with adverbs of quantification (22) or quantified DPs (23).

(23) *Many people have complained*
(several complaining events)

A third clue is given by the possibility of making phrasal conjuncts in the perfect to refer to a series of events of the same kind, or situations that have something in common. Again, in reference to pluralities, (24) tends to trigger a sequential, multi-situation reading, while (25) likely evokes a reading in which all the jobs were held simultaneously:

(24) *Mary has been a waitress, a fire fighter, and a company director.*

(25) *Mary was a waitress, a fire fighter, and a company director.*

One last property that points towards the quantificational nature of the perfect is the fact that, when combined with temporal adverbials that may convey definite times for singular events elsewhere (26, 28), the same adverbials acquire a (potentially) iterated meaning of frequency and/or habituality.

(26) *Were you in Paris in the spring?*
(on May 3rd, the last spring)

(27) *Have you been to Paris in the spring?*
(in any spring season, ever)

(28) *I taught at eight in the morning*
(yesterday, once)

(29) *I have taught at eight in the morning*
(every week, one semester)

In sum, many theoretical analyses of the perfect report a more or less systematic link between the expression of past experiences and the accessibility of multiple event readings: Intuitively, it would appear as if recalling a past experience through the perfect allowed us to access a set of experiences (events) of the same kind, whether these are realized or just conceptually entertained. In other words, we use the perfect to talk about experiences that are actually iterated, or that have the potential to iterate.

This prediction has been tested by, as far as we can see, only one set of recent experiments (O’Gara 2024), which measured reading times to critical words (always the object, as in 30b), presented after context sentences in the perfect (30a). The subject in the context sentence as well as the object in the critical sentence varied across conditions (plural and non-plural).

(30) a. {Sally/Two chefs/Bill and Sally/Two students and two chefs} {has/have} *baked a cake.*

b. {She/They/Bill/...} *gave the* {cake/cakes} *to Evan on Wednesday.*

Reading times were used to measure representational consistency between context and critical

sentences, taking longer reading times to indicate that some aspect of the representation of the critical sentence is inconsistent with the comprehender’s previous event model built based on the context sentence. In O’Gara’s study, such an inconsistency was defined as a mismatch in event number, determined by participant plurality (subject and/or object). O’Gara (2024) found that participants read plural continuations (*cakes*) significantly faster than nonplural ones (*cake*) across conditions, even with singular subjects in the context sentence (*Sally has baked a cake*). This result was interpreted as supporting the idea that people had multiple, distributed events in mind when they are presented with a sentence in the present perfect, independently of participant pluralities.

This interpretation of reading times, however, could be argued to be quite tenuous; it is possible that the relative slowdown of *cake* compared to *cakes* was due to the fact that in some conditions, the subject number changed: In one of the conditions, the plural subject *Bill and Sally* was followed by a subset of this plural singular subject *Sally*. The naturalness ratings presented in O’Gara (2024) may indicate that it could be this switch, rather than an unavailability of the singular construal, that increased people’s reading times (whole sentence reading times are not given).

Therefore, the jury is still out about whether the perfect has a pluractional flavor in English; and even for Galician, we lack evidence for plural event construals from native speakers in a tightly controlled experimental setting.

1.3 The present study and predictions

The cross-linguistic differences observed on the capacity of the perfect to trigger pluractional readings pose interesting questions about the relationship between one form (the perfect) and one or more associated meanings.

We have seen that, while the quantificational component of the English perfect has been analyzed in terms of potentialities, where the event can in principle be interpreted as plural but such interpretation is not fixed, in other languages, like Galician, the perfect should systematically map onto representations of multiple events.

In our investigation, we use Galician to test whether the theoretically proposed automatic interpretation of the perfect as pluractional holds in people's event construals (Experiment 1): Do people imagine plural events from the perfect, without relying on other sources such as participant plurality? Additionally, we test the long-standing prediction that also the English perfect has a pluractional flavor (Experiment 2).

To answer these questions, we use a two-alternative forced choice task, in which participants read a sentence and then answer questions that target the quantificational nature of the event construal (e.g., *How many times have you seen dogs?*). Our dependent variable is the proportion of pluractional answers chosen (several times) as opposed to singular answers (once).

As a baseline, we use the past tense for comparison against the perfect, since the past has generally been claimed to simply situate an event in a time prior to the now (Prior 1967; Rojo 1974; Klein 1994; etc.), regardless of number, in both languages.

Our predictions are as follows: In Galician, the perfect tense should systematically map to pluractional event construals. That is, the perfect should lead to reliable pluractional inferences in both non-plural and plural object sentences; we might expect also an effect of object such that even in the past, plural objects may elicit more pluractional interpretations than non-plural objects, but these effects are likely to be minor. We have no strong predictions about the interaction in Galician, because of expected floor and ceiling effects for the past and perfect, respectively.

For English, we expect effects that are miniscule compared to Galician, since there is no systematic mapping between the perfect and pluractionality, only occasional reports and some evidence in the literature, amounting to a sprinkling of a pluractional flavor, not a full-on semantic ingredient that carries truth-conditional value.

The first difference between Galician and English therefore will be the number of participants we will need in order to obtain enough statistical power, based on a power analysis conducted on pilot data. We expect this number, corresponding to our prediction of a much smaller effect size, to be orders of magnitudes higher in English than the number needed in Galician.

In contrast to Galician, we expect a main effect of object plurality in English: Events with plural objects (*saw many bats*) should result in a higher rate of pluractional readings than events with singular objects (*fixed the bicycle*). However, if there really is a pluractional flavor in the English perfect, we should also expect an interaction, and a main effect of tense.

2. Experiment 1: Galician

Experiment 1 was designed to test whether the perfect in Galician is indeed a pluractional marker; in other words, whether sentences in the perfect (with *ter*) lead people to systematically imagine multiple events.

Participants

Seventeen self-declared native speakers of Galician participated in this experiment. They were volunteers, recruited through different channels: some were students and personnel from the Universities of Santiago de Compostela and Vigo; others were recruited by word of mouth on social media. Based on pre-existing pilot data (N=8), a calculation using *GPower* resulted in a recommended sample size of 12 participants to achieve $\geq 95\%$ power. We did not put a stopping rule in place, given the small language size and difficulty to recruit speakers. Participants gave informed consent according to the Central European University's research ethics commission (PREBO), and the study was approved by our ethical research board.

Materials and Procedure

Participants were assigned to one of two lists in a within-subject design. After giving informed consent, participants read 16 critical sentences, presented either in the past or in the perfect, and always with first person singular subjects. 8 of the 16 sentences portrayed transitive events with quantified plural objects (*{Vi/Teño visto} moitos cans* 'I saw/I have seen many dogs'). The other 8 sentences portrayed events with singular or prepositional objects (*{Discutín/Teño discutido} coa veciña* 'I argued/I have argued with my neighbour'). In addition, we included 18 filler sentences, presented either in the present or the past tense.

All sentences were followed by a two-alternative choice question. In the critical trials, the question targeted plural construals of the event (*How many times...?*), whereas in the filler trials the question targeted the number of entities involved (*How many Xs...?*). The choice of answer given was always quantificational, but different: While in the critical trials the choice was between one and several, in the filler trials the choice was between two numbers, from one to ten. The dependent variable was the number of pluractional answers (selecting several). The order in which fillers and critical trials were presented during the experiment was randomized anew for each participant.

Analysis

The data was analyzed using the lme4 package (Baayen et al. 2008; Bates et al. 2012) in R statistics environment (R Core Team 2014). We fitted a linear mixed-effects regression model with auxiliary and object (contrast-coded) as fixed effects, and items and participants as random intercepts. For pairwise comparisons, we report Chi-Square tests. All material is accessible at <https://osf.io/dhm9a/>.

Results

Accuracy rates in the filler trials were high (>95%), meaning that people understood the task. Participants'

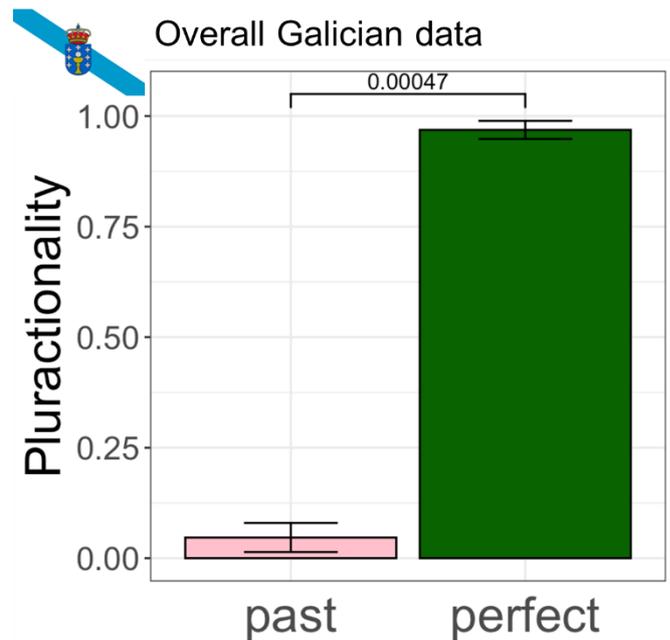


Figure 1: Mean of pluractional answers for Experiment 1. Responses for past condition are shown on the left side in pink, and those for the perfect on the right in green. Error bars denote Standard Errors.

mean responses for the critical trials are shown in Figure 1: the percentage of pluractional answers to sentences in the perfect (97%) contrasts with that in the past (8%). Thus, as predicted, the perfect led to a significantly higher number of pluractional answers, compared to the past ($\beta=0.889$, $t>19.5$, $p<.0001$).

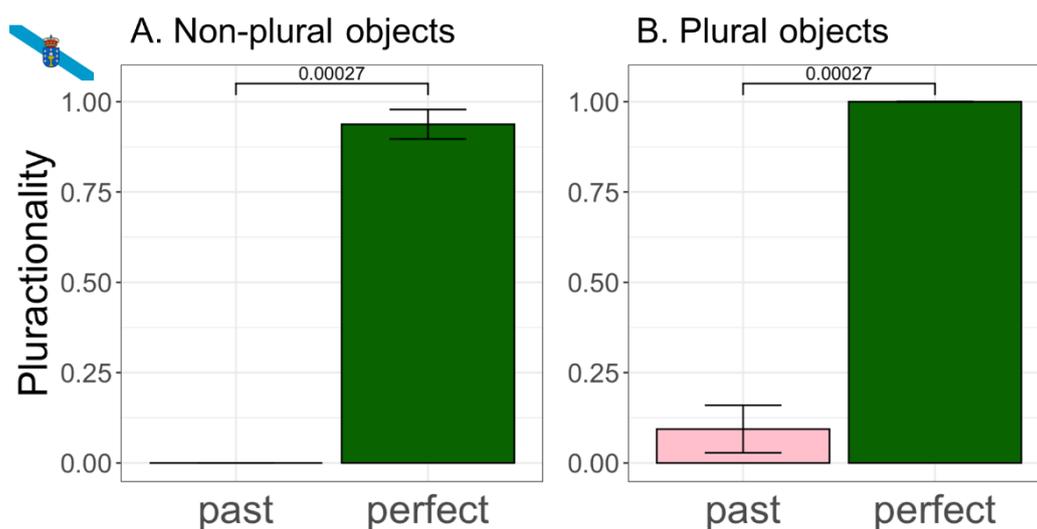


Figure 2: Mean proportion of pluractional answers for non-plural objects (2A) and for plural objects (2B) in Experiment 1. Responses for past are shown on the left side in pink, and those for the perfect on the right in green. Error bars denote Standard Errors.

Figure 2 shows answers split by object plurality, which had a significant effect in the overall analysis, with more pluractional answers to plural compared to singular objects ($\beta=0.016$, $t>4.28$, $p<0.001$). The interaction between both factors was not significant ($\beta=-0.010$, $t=-1.928$, $p>0.05$).

The significant effect of tense also appeared in pairwise comparisons across objects (Figure 2A-B): Both in the non-plural object condition (Fig. 2A, $Df=1$, $\chi^2=120.89$, $p<0.001$), and in the plural object condition (Fig. 2B, $Df=1$, $\chi^2=98.127$, $p<0.001$), the perfect elicited more pluractional answers. This difference is highlighted in the non-plural condition, where no pluractional answer was given to sentences in the past tense, in contrast to the 94% of pluractional answers given to perfect sentences. In the plural object condition, the past elicited some pluractional answers, but only up to 16% of the total number of responses. On the contrary, all the answers given to sentences in the perfect were pluractional when the event portrayed a quantified plural object.

Discussion of Experiment 1

Experiment 1 was designed to test the psychological evidence behind the claim that in Galician there is a fixed association between the use of the perfect and the building of plural event construals.

The results clearly demonstrate that such an association is fully systematic, even across object plurality: The perfect, but not the past, reliably leads people to imagine events that happened more than once.

3. Experiment 2: English

Experiment 2 was designed to test the extent to which the perfect in English facilitates a pluractional understanding of the experienced event, as it has been claimed in a number of theoretical studies. Ultimately, we wanted to know whether the contribution of the perfect in building plural event representations may be more or less systematic across languages.

Participants

The number of English-speaking participants was determined by a power analysis on pilot data ($N=24$), and using the pairwise contrast in the non-plural objects condition as a reference. We used this contrast because based on the literature on English participant plurality, we would expect any effect of interest to appear in the non-plural object condition. A calculation using GPower resulted in a recommended sample size of 500 to achieve $\geq 85\%$ power.

Therefore, five hundred self-declared native speakers of English were recruited online through *Prolific* (*prolific.com*), and paid £1.50 for participation. *Prolific's* recruitment mechanism resulted in actually 502 participants, none of whom were excluded. Participants gave informed consent according to the Central European University's research ethics commission (PREBO), and the study was approved by our ethical research board. Given the well-known variation in the use of the perfect across varieties of English, we only recruited participants with an IP address in the United Kingdom to make sure we were dealing with fairly similar grammatical systems.

Materials and Procedure

The design, procedure and analysis were the same as in Experiment 1, but the materials were presented in English. All materials, data, and scripts are also accessible at a public repository under <https://osf.io/dhm9a/>.

Results

Accuracy rates in the filler trials was high ($>94\%$), meaning that people understood the task. Participants' mean responses for the critical trials are shown in Figure 3: 47% of pluractional answers were given to sentences in the perfect, in contrast to 36% given to sentences in the past tense. This difference was statistically significant: ($Df=1$, $\chi^2=91.13$, $p<0.001$): Like in Galician, the perfect in English led to a significantly higher number of pluractional choices, as compared to the past.

There was a main effect of object type ($Df=1$, $\chi^2=4098.5$, $p<0.001$), such that sentences with plural

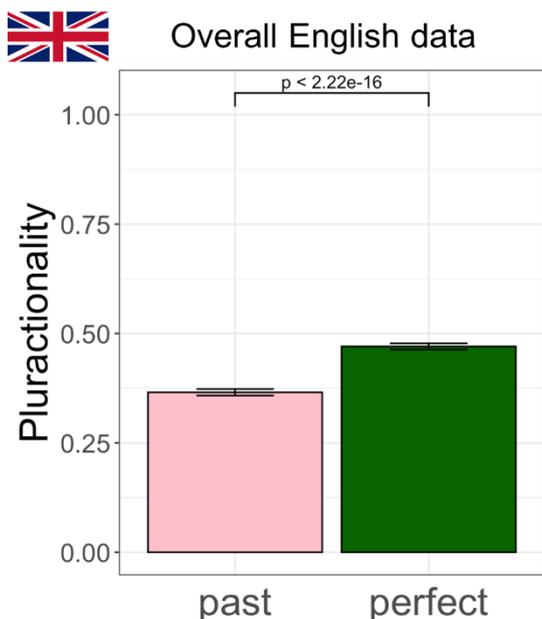


Figure 4: Mean of pluractional answers for Experiment 2. Responses for past condition are shown on the left side in pink, and those for the perfect condition on the right side in green. The Error bars represent Standard Errors.

objects elicited more pluractional answers than sentences with nonplural objects. The interaction between both factors (tense and object) was also significant ($\beta=0.062$, $t=4.124$, $p<0.001$).

Crucially, the tense difference was significant across conditions (Figure 4a-b): In the non-plural object condition, both past and perfect led primarily to

singular event choices, but the perfect led to significantly more pluractional answers ($Df=1$, $\chi^2=88.80$, $p<0.001$). In the plural object condition, pluractional answers for both tenses were all above 50%, but the perfect once again elicited pluractional answers significantly more often ($Df=1$, $\chi^2=105.69$, $p<0.001$), above 80% of the time, unlike the past, which only reached 72% of pluractional answers overall.

Discussion of Experiment 2

Experiment 2 tested the prediction from theoretical analyses that the perfect in English has a pluractional flavor. We tested whether this sense of pluractionality arises from the perfect itself, or whether it is only obtained indirectly given a discourse context, or in combination with plural arguments.

We found that the pluractional interpretation is indeed triggered from the perfect itself significantly more often compared to the past, even in the absence of plural objects.

Regarding the role of context, a by-item analysis in the nonplural object condition revealed that the difference between the two tenses remains highly significant even for events that, given our world knowledge, are very unlikely to happen more than once in a lifetime: e.g., *I have travelled across the French Riviera* (this material is accessible at the OSF repository). In other words, people imagined several

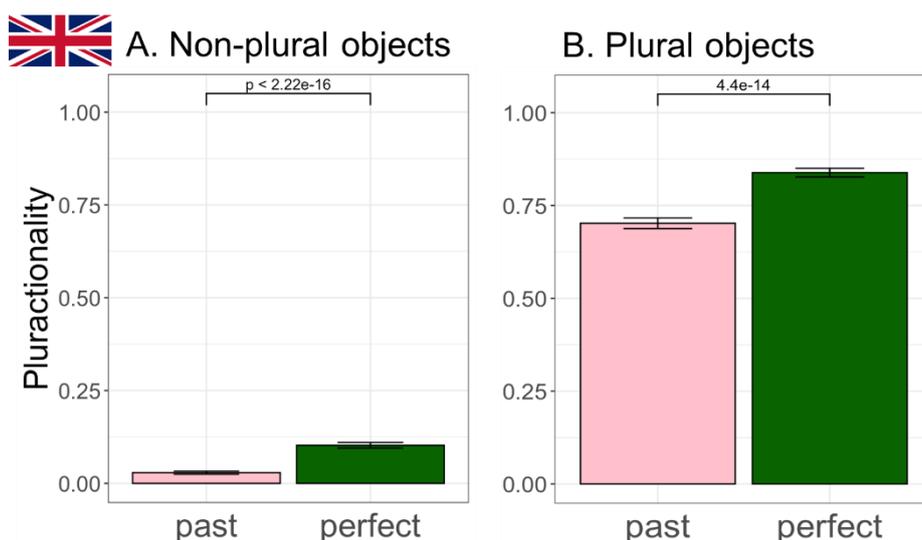


Figure 3: Mean proportion of pluractional answers for the nonplural object condition (4A) and for the plural object condition (4B) in Experiment 2. Responses for the past are shown on the left side in pink, and those for the perfect on the right side in green. The Error bars represent Standard Errors.

trips across the French Riviera when they read the perfect.

3. General Discussion

In this paper, we tested the mental construal of events on the dimension of quantification: How many events do people imagine? And what is the influence of tense on event construal? Experiment 1 tested Galician, a Romance language where the mapping between perfect tense and pluractional interpretations has been claimed to be fully systematized; Experiment 2 tested English, a Germanic language where the perfect is also argued to activate representations of plural events at different levels (semantics, discourse, pragmatics, etc.). In both languages, we tested whether linguistically encoded events are understood quantificationally as a collection of multiple events when presented in the present perfect (have danced), as opposed to the simple past (danced). To answer these questions, we conducted a forced choiced task, asking participants to judge, for each case, whether the event described happened once or more than once.

In both experiments, we found that sentences in the perfect elicited a significantly higher number of pluractional choices as compared to the past: In both languages, the perfect led people to imagine plural events significantly more often, and across conditions. Plural objects boosted pluractional interpretations overall, but crucially, the tense difference remained significant in both non-plural and plural object sentences.

While the perfect elicited significantly more pluractional answers both in Galician and in English across conditions, the results also reveal some cross-linguistic differences, not only in terms of how sensitive the languages were to participant plurality in the overall construal of pluractional events, but also, and more fundamentally, in terms of the sample sizes that were required to reach the desirable power in each language: twelve in Galician against 500 in English.

Sample sizes in psycholinguistics are often influenced by a range of non-scientific, logistic factors, such as the availability of participants, time constraints, financial resources, combination with other experiments, and access to testing facilities (e.g., Albert & Marx 2016; Arehalli & Wittenberg 2021). Had any of these

considerations been decisive in the present study, we would view our results with considerably greater caution.

In our case, however, sample sizes were determined on the basis of power analyses on pilot data in the terms described in Section 2 (Faul et al. 2007), that is, by estimating how many participants are required to ensure that an observed effect cannot be attributed to chance. For English, this procedure indicated that hundreds of participants were required, whereas for Galician the statistically required sample size was substantially smaller.

This difference is unsurprising when one considers that the statistical power of psycholinguistic experiments depends not only on the number of participants and the number of stimuli, but crucially also on the magnitude of the effect under investigation (Maxwell et al. 2008; Westfall et al. 2014). To give an intuitive example, fewer participants are needed to test whether humans can distinguish cats from dogs than to test their ability to individuate different Persian cats, since increased task difficulty introduces greater variability. The contrast between the past tense and the perfect in Galician appears to be as straightforward as distinguishing cats from dogs. In English, the difference between past and perfect with respect to pluractionality is considerably more subtle, necessitating a larger sample size.

This difference in power was furthermore part of our initial predictions. We believe that the divergent sample sizes speak to a difference in the systematicity to which the perfect brings about representations of plural events in the two languages: While in Galician the mapping is fully systematic, in English the association seems to be more subtle overall, and subject to higher degrees of variability depending on sentence structure and discourse context.

This pattern of results is in line with previous theoretical accounts of the perfect, which is often described as a “unstable” category (Lindstedt 2000: 366). The perfect competes with the past across linguistic varieties (Michaelis 1994; Lindstedt 2000; Squartini & Bertinetto 2000), a competition which is due to an overlap of semantic functions: mainly the reference to events that have already happened. At this level of analysis, what we observe in both Galician and

English is a systematic association of past tense forms with readings of singular events in the past, an association that fades away in the perfect. The empirical difference between past and perfect is captured in some formal analyses by positing that, while the past refers to an event in the past, the perfect refers to a derived state in the present: a state that results from the occurrence of some previous event (Moens 1987; Moens & Steedman 1988; Parsons 1990; Kamp & Reyle 1993; Katz 2003; de Swart 1998; Herweg 1991; Michaelis 2004, 1994; Carrasco 2015).

Under this view, the split between Galician and English might be a matter of a second order meaning of the perfect, allowing the state to be derived in different ways: as an indefinite sum of events of the same kind (the Galician way); or as an unspecified representation of number that remains open-ended (the English way), unlike the past which is systematically tied to a single event. At this level of analysis, the variability observed might simply be a manifestation of linguistic gradience in the mapping between meaning and form (Bolinger 1961; Ross 1972; Corver & van Riemsdijk 2001; Denison 2001; Aarts 2004): a fluidity of conceptualizations arising from the more or less grammaticalized auxiliary constructions in both languages.

This variability leads to some distributional differences between the two languages with respect to the contexts in which the perfect may appear: For example, in English (31), but not in Galician (32), it is possible to use the perfect to refer to events that the speaker has not (yet) experienced.

(31) I have never visited Rome

(32) **Nunca teño ido a Roma*

Never AUX-PRS.1SG. go-PTCP to Rome

One way to think about this contrast is to say that, while the general semantic contribution of these perfects is to allow us to access a set of experiences (events) of the same kind, the English perfect can operate on sets that are only conceptually entertained ('visiting Rome', even if you have never done so), whereas the Galician perfect would only apply to events that are realized or existentially bounded.

We hypothesize that this might be related to the fact that, in the presence of certain adverbials, the perfect

in English is able to express a universal reading, as in *I have been sick since Monday*, describing a situation that started and runs continuously to the present time, whereas in Galician the perfect can only get an experiential meaning. We leave it to further research to explore the empirical bases and theoretical consequences of this observation.

In this paper, we addressed a more general issue at the interface of language and event construal: Do people imagine plural events also based on tense, or are readings of plural events only obtained in the presence of plural nouns? Our findings support the first alternative: plural event construals can be triggered by the perfect tense in the absence of nominal plurality, in both languages. Our results furthermore do not rule out the possibility of a cross-linguistic tendency to understand past experiences quantificationally. We hope to have laid the groundwork for a renewed interest in questions of event construal, bridging semantic theories and psycholinguistic investigation.

Author Statement

Conceptualization (J&W), Data curation (J), Formal Analysis (J&W), Funding acquisition (W), Investigation (J), Methodology (J&W), Project administration (W), Resources (W), Supervision (W), Writing-original draft (J&W), Writing-review&editing (J&W).

Roles defined according to the Contributor Role Taxonomy (CRediT)

<https://credit.niso.org/contributor-roles-defined/>

Data availability

The data and code is accessible in

<https://osf.io/dhm9a/>

Endnotes

1 We are using the term "event" to refer to occurrences in the world: chunks of experience involving participants which our mind categorizes as a unified and distinct whole, built around the notion of change or, more generally, built as a lead-to relation between two states (Ramchand 2018). Event information is prototypically expressed through verb forms (Vendler 1967).

2 In this paper, we leave aside the case of "macro-events", in reference to semelfactive verbs: In a knocking event, for example, this relates to the question of whether we identify the separate

knockings as multiple parts of the same (macro-)event. Following Cusic (1981), we would argue that this hangs on the notion of occasion. If John knocked three times in a single occasion, then the multiple knockings may be grouped together in a single macro-event, but not if his knocking occurred in spatio-temporally distributed occasions. We thank an anonymous reviewer for bringing this to our attention.

3 Here we are reporting Champollion's (2017) analysis, for whom *parts of many bats* is meant to represent distributed individuals. However, we agree with an anonymous reviewer that *parts of many bats* does not necessarily imply individual bats; it could also refer to parts of a single bat, such as wings or noses.

4 In English, the perfect has been claimed to have (at least) three interpretations (cf. McCawley 1971; Comrie 1976; Parsons 1990; Iatridou et al. 2001, among others): experiential, but also resultative, and universal. While resultative and experiential are closely related and have been grouped together under the label "existential perfect" (Mittwoch 2008), the universal (U) seems to be a derived reading, as it arises only when licensed by an appropriate temporal adverbial like since: compare *I have been sick since Monday* (U-reading: I started to be sick on Monday and I still am), with *I have been sick* (default reading: experiential). While our scope is limited to the existential perfect, the topic is brought up again in the General Discussion.

5 An anonymous reviewer suggests that (22) can be resultative in a context such as *and now I cannot apply for a new one*. However, in such a context, the perfect denotes 3 events of losing, regardless of the passport being currently lost. In fact, the sentence is compatible with a situation in which I lost the passport 3 times, then got a new one, and then got robbed. So ultimately, my passport is not currently lost, but stolen, and I can still say *I have lost my passport three times and now I cannot apply for a new one*.

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