



Jardón, Natalia & Marx, Elena & Wittenberg, Eva. 2025. Is there a perfect state? Experimental evidence from English and Spanish for the perfect-as-state hypothesis. *Glossa: a journal of general linguistics* 10(1). pp. 1–34. DOI: <https://doi.org/10.16995/glossa.18901>



Is there a perfect state? Experimental evidence from English and Spanish for the perfect-as-state hypothesis

Natalia Jardón, Universitat Autònoma de Barcelona; Central European University, Vienna, natalia.jardon@uab.cat

Elena Marx, Central European University, Vienna, marx_elena@phd.ceu.edu

Eva Wittenberg, Central European University, Vienna, wittenberge@ceu.edu

The distinction between past and perfect has been subject to theoretical debate for decades. Some of the most prominent accounts argue that the perfect turns the mental representation of a past event into the mental representation of a state, based on a past event: the perfect-as-state hypothesis. This subtle distinction is notoriously difficult to trace, and has only been argued for using linguistic tests. Here, we provide evidence from two psycholinguistic experiments (total N = 960), each in English and in Spanish, that operationalize stativity through event individuation. Our results show that compared to the past, the perfect leads to event construals that have more in common with states, both in English and in Spanish. These data constitute the first documentation of different event construals based on tenses that only differ in the subtlest of semantic distinctions.

Glossa: a journal of general linguistics is a peer-reviewed open access journal published by the Open Library of Humanities. © 2025 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>.

OPEN ACCESS



1 Introduction

In English, just as in many other languages (Dahl & Velupillai 2013a; b), speakers can use simple past tense (1) or perfect tense (2) to describe something that happened in the past:¹

- (1) Julius traveled to London.
- (2) Julius has traveled to London.

But what is the difference in meaning between the past (1) and the perfect (2)? In formal semantics, the debate has been centered around two approaches. On the one hand, the so-called *Extended Now* approach holds that the semantic contribution of the perfect is to introduce a time interval, known as the Perfect Time Span, that extends back from the present (Dowty 1979; von Stechow 1999; Iatridou et al. 2001; Pancheva 2003; a.o.). This interval of time does not necessarily specify whether an event is over (Klein & Vater 1998).

On the other hand, the *Result State* approach to the perfect argues that it turns reference to past events, like Julius' trip to London in (1), into reference to states derived from past events – in (2), Julius' state of having been to London (Moens 1987; Moens & Steedman 1988; Parsons 1990; Kamp & Reyle 1993; Katz 2003; de Swart 1998; 2003; Herweg 1991; Michaelis 2004). We call this theoretical analysis the 'perfect-as-state hypothesis': The perfect, unlike the past, introduces a stative situation that entails the existence of some previous event.² This situation, reminiscent of Parsons' *R-state*, is set to hold forever by virtue of the past event having taken place.

Under the first approach, the perfect denotes a previous event and a time that extends from/ to it, whereas under the second approach, the perfect denotes a situation with stative semantics, derived from a previous event. Therefore, only the latter, perfect-as-state approach predicts a different understanding of events in the perfect as opposed to the past, based on stativity.

In our investigation, we claim that the perfect and the past lead to different mental representations of an event, because the perfect is semantically unbounded (akin to mass nouns and durative events), while the past is bounded (akin to count nouns and punctual events). In that way, we incorporate tense distinctions into the well-known boundedness distinctions in objects and events.

In this paper, we follow three aims: to find psychological evidence that would indicate different event construals, depending on whether Julius' travels were described in perfect or past

¹ We are using the term "perfect tense" in a descriptive sense, to refer to a particular auxiliary construction in languages like English and Spanish. Our understanding of the category 'perfect' is semantically motivated in a Reichenbachian way (1947) as a reference point between two situations. While we look at the perfect from the point of view of meaning, our approach is nevertheless compatible with analyses that locate it in the aspectual domain of the clause (Klein 1994; von Stechow 1999; Pancheva 2003).

² We follow Kratzer's (2014) definition of *situation* as part of the semantic ontology, built on minimal event descriptions (see also Ramchand 2018).

tense; to ask whether this difference in tense would affect all events equally; and to study this phenomenon across language families with similar semantics for the perfect tense. We present two behavioral studies each manipulating tense in English, a Germanic language, and Spanish, a Romance language, that present the first empirical evidence for the perfect-as-state hypothesis, using people's judgments on event individuation as a measure.

1.1 The perfect-as-state hypothesis: Theoretical background

Historically, auxiliary constructions that would become the modern perfect in both Germanic and Romance languages denote three kinds of meanings, all of which are stative: stative possession (3), result states as consequences of previous telic events (4), and states of experience (5–6; all from the 13th century):

- (3) Spanish
 [los viejos] **han** los cuerpos ya muy **enfriados**
 the elderly have-PRS.3PL the body.PL already very cold.M.PL-PTCP
 'The elderly have their bodies cold'
 (Sánchez-Marco)

- (4) Mil hombres todos **huvieron cortadas** las
 Thousand men all have-PST.3PL cut.F.PL-PTCP the
 cabeças en el mercado de Roma
 head.PL in the market of Rome
 'A thousand of men had their heads cut in the Roman market'
 (Sánchez-Marco 2012 : 69)

- (5) Segun **hauedes oydo** ante desto
 As have-PST.PRF.2PL hear.M.SG.PTCP before of.this
 'As you have heard of this before'

- (6) De que **ouo andado** vn rrato por la çibdat
 Of that have-PST.PRF.3SG walk.PRF.PTCP a while around the city
 'After he had walked across the city for a while'
 (Sánchez-Marco 2012 : 48)

What is common to these different uses is the existence of a state whose nature changes across time; and these patterns are attested across a wide variety of languages, including English (e.g., Bybee et al. 1994; Dahl & Hedin 2000; Nicolle 2012). Importantly, unlike lexical states, the perfect states are intricately tied and layered on top of the event they are derived from, whether it is *enfriar(se)* 'to get cold', *cortar* 'to cut', *oír* 'to hear', or *andar* 'to walk'.

Today's tense system seems to reflect these historical roots. As illustrated in (1–2) above, it has been claimed that the basic semantic difference between the past and perfect tenses is that,

while the past tense merely signals the anteriority of a given event, the perfect tense asserts not only that the event occurred, but also, that there is a state that follows from it. Therefore, while the past tense refers to an event, the perfect refers to a state connected to a past event.³

There are cases where this derived state is intuitive, as in *I have broken my glasses*, built on telic predicates like *break*: The derived state is an immediate result state of the glasses being affected in a breaking event. In combination with atelic predicates, that is, predicates that do not have an inherent result, the nature of the state invoked by the perfect tense becomes more subtle, as in *Julius' having been to London* in (2). This led Parsons (1990) to propose the more inclusive notion of “R-state”: a state that results from having experienced the event, and that holds forever by virtue of the event having taken place.

The idea that the basic meaning of the perfect is to introduce a state is supported by its behavior in stativity tests (Dowty 1979; Katz 2003). The perfect patterns with state predicates in tests that were originally used to distinguish dynamic eventualities (e.g., *to kiss*) from states (e.g., *to love*) in English (Katz 2003); here, we apply them cross-linguistically to English and Spanish.

First, stative predicates, unlike eventive predicates, tend to be incompatible with progressive aspect (but see Granath & Wherrity 2014), both in English (7–8) and Spanish (9–10). The perfect in both languages not only patterns with states, but seems to be stricter than stative verbs in its incompatibility with the progressive (11–12):

(7) ?Tony is loving Martha

(8) Tony is kissing Martha

(9) *Tony está queriendo a Marta
Tony be-PRS.3SG love.GERUND ACC Marta

(10) Tony está besando a Marta
Tony be-PRS.3SG kiss.GERUND ACC Marta

(11) *Tony is having kissed Marta

(12) *Tony está habiendo besado a Marta
Tony be-PRS.3SG have.GERUND kiss.PRF.PTCP ACC Marta

Second, states are not accepted in *wh*-cleft constructions. This is true of English (13–14) and Spanish (15–16); and again, the perfect tense patterns with states (17–18):

³ This state should not be equated to result states of telic events: in a sentence such as *Julius has broken his glasses*, the glasses are broken as a result of the breaking event. However, the contribution of the perfect is similar in cases involving atelic activities, such as *Julius has watched The Godfather*, where there is no physical result per se, or even the more stative *Julius has been in love*. Under this view (e.g. Parsons 1990), the contribution of the perfect remains constant across predicate types and it can be phrased as: “Julius is in the state of having experienced X” (X = {breaking his glasses/watching The Godfather/being in love}).

- (13) ?What Mary did was know the answer
- (14) What Mary did was read some novels
- (15) *Lo que hizo María fue saber la respuesta
that what do-PST.3SG Mary be-PST.3SG know-INF the answer
- (16) Lo que hizo María fue leer algunas novelas
that what do-PST.3SG Mary be-PST.3SG read-INF some.PL novel.PL
- (17) *What Mary did was have read some novels
- (18) *Lo que hizo María fue haber leído algunas novelas
that what do-PST.3SG Mary be-PST.3SG have-INF read-PRF.PTCP some.PL novel.PL

Third, the default interpretation of states when embedded under *must* is an epistemic reading (19, 21), while the default interpretation of dynamic events is deontic (20, 22). According to our intuitions, to obtain an epistemic reading, they need contextual and prosodic support. Again, the perfect tense seems to follow states in this test (23–24):

- (19) Mary must know the answer
- (20) Mary must read some novels
- (21) María debe saber la respuesta
Mary must-PRS.3SG know-INF the answer
- (22) María debe leer algunas novelas
Mary must-PRS.3SG read-INF some.PL novels.PL
- (23) Mary must have read some novels
- (24) María debe haber leído algunas novelas
Mary must-PRS.3SG have-INF read-PRF.PTCP some.PL novels.PL

A fourth test claims that certain kinds of states (26, 28), unlike events (25, 27), are incompatible with the imperative (but see Lakoff 1966). As in the progressive test (11–12), perfect tense seems to be even less compatible with the imperative than stative verbs (29–30):

- (25) Kiss Martha!
- (26) ??Live in Spain!
- (27) ¡Besa a Marta!
Kiss-IMP.SG ACC Marta
- (28) ?? ¡Vive en España!
Live-IMP.SG in Spain
- (29) ?? Have kissed Martha!

- (30) ?? ¡He besado a Marta!
kiss-PRS.PRF.1SG ACC Marta

Lastly, states do not move the narrative time (31), whereas events (32) do (Dry 1983; Marx & Wittenberg 2024):

- (31) The sky is clear. Laura fears the journey.
(32) The sky is clear. Laura begins the journey.

In (31), the state of the sky being clear and that of Laura's experience of fear coincide, and we don't assume any change. In (32), however, while the sky is clear (no change), Laura's situation changes from not being on a journey to being on a journey. The perfect, just like a state, does not move the narrative either:

- (33) The sky is clear. Laura has left quietly.
(34) El cielo está despejado. Laura se ha ido sin hacer ruido.
The sky be-PRS.3SG clear Laura REFL leave.PRS.PRF.3SG without make-INF noise.

Table 1 summarizes the main results from the stativity tests, showing that the perfect exhibits semantic, syntactic, and discourse-related properties that are typically associated with states. At the same time, subtle differences observed with respect to lexical states, such as the more systematic incompatibility with the progressive, are to be expected since the state introduced by the perfect is of a different nature: it contains the reference to a past event.

Property	Events	States	Perfect (English & Spanish)
Compatible with the progressive	yes		no
Compatible with pseudo-cleft constructions	yes		no
Default deontic reading under <i>must</i>	yes		no
Compatible with imperative	yes		no
Ability to move the narrative	yes		no

Table 1: Stativity tests show similar grammatical behavior between stative verbs and perfect tense (Katz 2003).

Based on both the diachronic development of the perfect tense and arguments from these stativity tests, it has been proposed that the perfect tense renders reference to past events into reference to states derived from past events: In (1), we talk about the travelling event that Julius experienced; but in (2), we talk about Julius' acquired property of having been to London.⁴

⁴ One question in theoretical linguistics has been how much of the state inference is driven by pragmatics (Moens 1987; Portner 2003; Mittwoch 2008). We leave this question aside in the context of this paper.

The interpretive differences between (1) and (2) can be seen to reflect a difference in the semantic structure of these forms: Several different analyses assume that both forms refer to a previous, bounded event, but only the perfect introduces a reference situation (Stowell 1996; Giorgi & Pianesi 1997; Jardón 2021; Schmitt 2001; Ramchand 2018). Hence the perfect (36), unlike the past (35), features two distinct situations: an event description (s_0), and a derived, asserted state (s'):

(35) $\exists e [\text{travel-to-London}(e) \wedge \text{Exp}(e) = \text{Julius}]$

(36) $\lambda s' \lambda s_0 \exists e [[\text{travel-to-London}(e) \wedge \text{Exp}(e) = \text{Julius}] \wedge \text{Derived-State}(s_0) = s' \wedge \text{Holder}(s') = \text{Julius}]$

The denotation for the perfect in (36) takes an event description (35) and adds a situation s' in which someone holds a state derived from the occurrence of the initial event in s_0 . Consequently, the perfect incorporates the structure of the past representation (35), but also adds the semantics of non-eventive properties held by an individual (e.g. the property of being altruistic in (37)).⁵

(37) $\lambda P \exists s_0 [\text{'be-altruistic'}(s_0) \wedge \text{Property}(s_0) = P \wedge \text{Holder}(P) = \text{Julius}]$

In view of the diachronic evidence as well as the grammatical behavior, the linguistic literature has put forth predictions about the event construal evoked by the perfect: The claim that (1) has a subtly different meaning from (2) is a claim about different mental representations of a situation. But what is the evidence for such a difference in event construals?

The recent psycholinguistic literature is rich in experimental evidence for different event construals, but mostly based on aspect within the same tense. Imperfective aspect (usually, progressive) seems to lead to an event construal that focuses on the ongoing event, while perfective aspect directs the comprehenders' attention to the endpoint of an event. This results in different patterns of reference, priming of objects and locations, memory of events, and object representations (e.g., Ferretti et al. 2007; 2009; Madden & Zwaan 2003; Magliano & Schleich 2000; Misersky et al. 2021; Wampler & Wittenberg 2023; Zhou et al. 2014). In contrast to the effects of aspect on event representation, however, the question of how event construals differ depending on whether events are described in perfect tense or past tense, has not been addressed from a psycholinguistic perspective.

One reason for this is that the event construal corresponding to both past and perfect tense is derived from concluded events in the past. Therefore, the stative interpretation of the perfect tense necessarily also includes the event as it was ongoing (s_0 in 36); the difference in event

⁵ The exact nature of the perfect state remains to be explored, and it goes beyond the scope of this paper. So far, we treat it as a Davidsonian state in the sense of Parsons (1990); that is, a state with event implications. However, the connection of derived states to Kimian states (Maienborn 2008) is worth exploring, to the extent that they are in some sense property-denoting. For our current purposes, we adopt Ramchand's (2018) analysis, in many ways reminiscent of Portner's (2003), in which the perfect state is seen as an *evidential* state, allowing us to infer the existence and spatio-temporal location of the past eventuality.

construal between those two tense forms is thus arguably even subtler than in the case of aspectual differences: the stative interpretation is layered on top of an event interpretation. In order to test the perfect-as-state hypothesis as a hypothesis of mental representation, we therefore need a sensitive tool that distinguishes the construal of a completed event from a state, to measure the perfect's consequences on event construal.

In this paper, we use boundedness, and in consequence, individuability, as our tool: One important difference between the two construals of Julius' travels in (1) and (2) is that while the travels described in (1) find their end on the train back from London, the property described in (2) has no natural boundary: Julius will forever keep the property of having been to London. This property also does not fundamentally change if he goes back to London, because while we can count his trips as individual events, they all integrate into the state of having been to London: Tense affects our intuition about temporal boundedness.

1.2 Boundedness in verbs and nouns

Boundedness is not only a notion that applies to verbs. On the contrary, it has been a central concept in the discussion of nouns as well: For instance, atomic count nouns, such as *apple*, have referents with well-defined spatial boundaries, whereas the referents of non-atomic mass nouns, such as *applesauce*, are spatially unbounded. In consequence, atomic nouns can be counted and individuated (*I have three apples, my apple is different from yours*); but applesauce cannot – it needs the help of a classifier (*?three applesauces, but three cups of applesauce*).⁶ On the other hand, applesauce can be divided into arbitrary units and be added to indefinitely, and we can keep referring to it as *applesauce*. However, a piece of an apple cannot be called *an apple* anymore: It is *an apple slice, an apple core, or an apple peel* (Bale & Barner 2009; Rips & Hespos 2015, and many others).

The parallel between nouns and events has been an ongoing topic in linguistics, predominantly in the domain of lexical verb semantics (Bach 1986; Casati & Varzi 2008; Hale & Keyser 1993; Harley 2005; Jackendoff 1991; Krifka 1992; Quine 1960; Rothstein 2008; Verkuyl 1972). Usually, it has been used to explain why some events can be broken up and still count as the same event, and others cannot. For example, *running* can and does happen in fits and starts: If you go for a run tonight, you may stop to tie your laces, drink some water, and chat with friends you encounter along the way. Still, you could not claim that you have gone on more than one run today: Your run, interrupted or not, counts as one and the same event. Other events, in contrast, do not count as the same event when they are broken apart: A bedtime hug stops when mom unwraps her

⁶ Mass nouns can and do take the plural and quantifiers, but the resulting reading is one of sorts or portions: *Three applesauces* would refer to *Three different sorts of applesauce* or *Three portions of applesauce* (Barner and Snedeker 2005; 2006; Gordon 1985; Srinivasan & Rabagliati 2015; Krifka 1992; Wiese & Maling 2005).

arms from the child; if she re-wraps her arms, it counts as a second hug (Anderson, Garrod, & Sanford 1983; Hoepelman & Rohrer 1980; Carlson 1981; Magliano & Zacks 2011; Kiparsky 1998; Zacks & Tversky 2001; Wellwood et al. 2016).

Since these properties of individuation and boundedness correlate strongly with properties of verbal aspect and telicity (although these two are separate notions; Declerck 1989; Vanden Wyngaerd 2001), one of the fault lines to draw parallels between nouns and verbs has been between punctual and durative verbs.

There are several linguistic tests to distinguish punctual (35) from durative (36) verbs (Vendler 1957; Comrie 1976; Smith 1991), for instance by combining predicates with a temporal *for*-phrase to detect punctual events that trigger an iterated reading: While John's jumping in (38) is typically coerced into a repeated event, John's dancing in (39) is most naturally interpreted as a single prolonged event, without an iterative reading (but see for discussion Bott 2010; Wittenberg & Levy 2017; and many others).

(38) John jumped for two hours.

(39) John danced for two hours.

Based on this test, punctual verbs are inherently temporally bounded, while durative verbs are unbounded.⁷ Zooming out from dynamic events onto eventualities in general, we can draw another parallel, this time to the event-state distinction: As we have seen above, while events are bounded in time, states are unbounded.

The parallel to our example of Julius' travel is evident (also see Wittenberg & Levy 2017, for a different parallel in the event domain): A trip to London can be individuated, and it cannot be arbitrarily segmented. For instance, Julius' trip was not a trip to London if the train got stuck in the Eurostar tunnel and never reached its destination; and it counts as a new, second trip if Julius travels again next year.

The state of having been to London, in contrast, cannot be individuated anymore: Its representation (36) has parallels to the representation of a property being held by someone, like 'altruistic' (37), although it can easily be supplemented by a new trip which adds to the event representations which the state of having been to London is derived from (it is an open phenomenological question whether this state could be segmented somehow). In addition, this state of having been to London is unbounded: It does not end when Julius boards the train back to the continent; he will keep this property until the day he dies.

⁷ This default in boundedness can be overwritten (Krifka 1992; Kiparsky 1998), for instance by aspectual morphology (*Nils was jumping* describes a repeated but unbounded event, overriding the boundedness of *to jump*) or by combination with syntactic arguments (*Nils danced a mazurka* is bounded by the count noun *mazurka*).

In consequence, mass nouns, durative verbs, and states share the lack of boundedness and possibility of being individuated. We have also seen above that the perfect tense has been argued to parallel states, according to linguistic tests and diachronic evidence, giving rise to the perfect-as-state hypothesis. Therefore, we argue that the parallel from nouns to verbs can be extended into the tense system (**Table 2**). We argue that the parallels provide an entry point into asking the question: How do event construals based on past tense and perfect tense differ?

	+ individuation + boundedness	– individuation – boundedness
nominal syntax	count nouns	mass nouns
event type	punctual verbs	durative verbs
eventualities	event	state
tense	past tense	perfect tense

Table 2: Parallels with regard to boundedness and individuation, in the domain of nominal syntax, verb semantics, and eventualities. We argue that this parallel can be extended to tense (shaded).

1.3 The current studies: Measuring individuation to understand the perfect tense

The current studies investigate whether describing events using perfect, as opposed to past, affects event construal: The perfect-as-state hypothesis would predict that while past tense gives rise to the construal of a past event, perfect tense elicits the construal of a state that is derived from that past event, and layered around it. This is in contrast to a null hypothesis expected from the Extended Now analysis of the perfect, which would not predict stative properties in the perfect.

To our knowledge, the foundational prediction of the perfect-as-state analysis, shared by several different approaches, has never been tested beyond the linguistic evidence described above, even though this analysis predicts that the tense difference should map onto different representations in people’s minds. Therefore, in order to test the perfect-as-state hypothesis, we need to target mental construals in addition to linguistic judgments such as the syntactic and semantic tests above.

Our solution is to approximate this prediction by using event individuation as a tool. We argue that perfect tense, durative verbs, as well as mass nouns, all have in common that their referents cannot be as readily individuated as opposed to the referents of past tense, punctual verbs, and count nouns. With the perfect, we make an indirect assertion about the core eventuality⁸: The

⁸ There is a qualitative difference between the perfect-as-state analysis adopted here, and other analyses of the perfect (mainly, the Extended-Now and the Indefinite Past analyses): while in these two theories the event is directly asserted, the perfect-as-state analysis speaks about a bi-situational structure. We are grateful to an anonymous reviewer for pointing this out.

stative nature of this assertion predicts a more unbounded or undivided interpretation of the event in question, regardless of predicate type.

This is in contrast to a null hypothesis expected from the Extended Now analysis of the perfect, which would not predict stative properties in the perfect. The unboundedness of the perfect according to the Extended Now analysis (see, e.g., Pancheva 2003), is computed from the combination of a predicate's lexical type (telic/atelic) and a particular morphology (progressive/non progressive): to get an unbounded construal of a telic predicate like *jump*, one would have to add the progressive morphology: *I have been jumping* (vs. *I have jumped*).

In our studies, however, we control for morphology (we never show the perfect progressive). Furthermore, the Extended Now theory predicts a more unbounded interpretation of the perfect only in combination with punctual/telic predicates like *jump*, not durative/atelic ones like *dance*: The idea is that, while the perfect can form a derived durative from a punctual event, it would necessarily leave the temporal properties of durative predicates unaffected.

We build our experiments on a previous study on event individuation. Barner, Wagner, and Snedeker (2008) used a quantity judgment task on event nouns, in which they manipulated nominal syntax (count vs. mass) and event type (durative vs. punctual). They presented participants with a set of vignettes, all in past tense, describing two characters performing actions that were prototypically unbounded and durative, such as *dancing*, and prototypically bounded and punctual, such as *jumping*. Participants were asked “*Who did more ___?*”. This question was phrased using a light verb construction, either in mass syntax (e.g., *Who did more dancing/jumping*) or count syntax (e.g., *Who did more dances/jumps*). To answer this question, participants had two choices: One character did more of the action in number of times, and the other character did more of the action in a different, pre-tested dimension (e.g., jumping higher, dancing longer). The number-based choice therefore served as a measure of individuation. Barner et al. (2008) found that punctual events (e.g., *jumping/jumps*) were very likely to be individuated, regardless of the syntax on the event noun. In durative events, mass syntax (e.g., *dancing*) corresponded to lower individuation rates than count syntax (e.g., *dances*).

In a first step (Experiment 1; see **Table 3** for an overview of the current studies in relation to Barner et al. 2008), we replicated Barner et al.'s (2008) study in English, and extended it in two ways: First, we crossed language families by including European Spanish. In order to make meaningful comparisons, we used a language in which both the past and the perfect tense match the English meaning, unlike, for instance, French, which has a past and a perfect tense, but they map to different meanings (Squartini & Bertinetto 2000; Stowell 2008). For this reason, we decided on Spanish, a language in which the past/perfect distinction is assumed to operate in a similar fashion as in English (Martínez Atienza 2008; RAE-ASALE 2009).

In line with Barner et al.'s (2008) results, we predicted an effect of nominal syntax: Punctual events (e.g., *jumping/jumps/saltar/saltos*) should tend to be individuated, irrespective of nominal

syntax. Durative events should show lower individuation rates in mass syntax (e.g., *dancing/bailar*), compared to count syntax (e.g., *dances/bailas*).

In a second extension to Barner et al. (2008), to prepare the question whether perfect tense leads to state interpretations, we added tense as a manipulation in Experiment 1: Half of our participants judged vignettes in past tense, and half, in perfect tense. The predictions for this tense manipulation were modest, based both on Barner et al.'s (2008) results as well on other previous work on eventive mass/count distinctions (Wittenberg & Levy 2017): Nominal syntax is a powerful mechanism to introduce or suppress individuation, whereas, as discussed above, the difference in event construal between past tense and perfect tense should be quite subtle: after all, both past and perfect include a reference to concluded events in the past. The effect of tense is therefore predicted to be comparatively smaller than the more straightforward effect of nominal syntax on individuation.

With Experiment 1 serving as a conceptual replication, we then moved on to Experiment 2, in which we tested the effect of tense on individuation without the modulation through nominal syntax, in both English and Spanish. Instead of using light verb constructions, such as asking *Who did more jumps?*, we used full verb forms in past tense (e.g., *Who jumped/danced more?* *¿Quién saltó/bailó más?*) and perfect tense (e.g., *Who has jumped/danced more?* *¿Quién ha saltado/ bailado más?*).

Our prediction for Experiment 2 was that if perfect tense leads to stative interpretations, then perfect should lead to less individuation than past tense, based on the properties of boundedness described above. With the number-based choice serving as a measure of individuation, the prediction from the Perfect-as-State analysis is that the perfect would lead to more unbounded readings of events, measured by participants' choice of dimensions other than number: these include duration, but also distance, weight, length, or height.⁹

In addition, however, our study also addresses a question that Barner et al. (2008) could not: Namely, what the default individuation patterns are, depending on event type, without the factor of nominal syntax. Barner et al. (2008) interpreted their findings in line with the 'Number Asymmetry Hypothesis' (Barner & Snedeker 2006): According to this hypothesis, count syntax specifies individuation, while mass syntax is underspecified.¹⁰

⁹ Contrary to the Extended Now view of the perfect, the Perfect-as-state analysis predicts that the stative nature of the assertion expressed through the perfect would lead to a preference for unbounded readings of events in any dimension, not only in the temporal domain. This sense of unboundedness is predicted to arise in different dimensions, in contrast to number (e.g., weight, height, length, and distance, along with duration, which, being temporal, is the only one relevant according to the Extended Now analysis).

¹⁰ The studies in Barner et al. (2008) were primarily designed to decide between the adequateness of two different theories of mass/count syntax: The Number Asymmetry Hypothesis on the one side, and Quine's (1960) account on the other side, according to which individuated readings are driven by morphosyntax, and more specifically, by count syntax (see also e.g., Bloom 1994; Gordon 1985; Link 1983). This question is not in the scope of the current paper.

However, an alternative interpretation of their results is imaginable: Namely, that event type (durative vs. punctual) leads to different baseline individuation rates. That is, either mass syntax reduces individuation for duratives; in this case, we should find high individuation rates in the absence of a nominal syntax manipulation. Alternatively, count syntax introduces individuation to duratives; in that case, in the absence of nominal syntax, we should find low individuation in durative events. This is in line with the logic of **Table 2**: Duratives are by default unbounded and unindividuated, like mass nouns, states, and the perfect tense.

Manipulated variables		Experiment 1	Experiment 2	Barner et al. (2008)
event type	punctual	jump saltar		jump
	durative	dance bailar		dance
nominal syntax	mass	<i>jumping/dancing</i> <i>saltar/bailar</i>		<i>jumping/dancing</i>
	count	<i>jumps/dances</i> <i>saltos/bailes</i>		<i>jumps/dances</i>
tense	past	<i>Who did more...?</i> <i>¿Quién hizo más?</i>	<i>Who jumped/ danced more?</i> <i>¿Quién saltó/ bailó más?</i>	
	perfect	<i>Who has done more...?</i> <i>¿Quién ha dado más?</i>	<i>Who has jumped/ danced more?</i> <i>¿Quién ha saltado/ bail- ado más?</i>	

Table 3: Overview of manipulated variables in our Experiment 1, Experiment 2, and Barner et al. (2008).

2 Experiment 1

Experiment 1 served as our baseline experiment. We replicated and extended Barner et al. (2008)'s paradigm, in which the dependent variable was whether people quantified events described in mass/count syntax based on individuation or other dimensions, adding tense as a manipulated variable, and extending it to Spanish.

2.1 Methods

2.1.1 Participants

Participants were 240 self-declared native English speakers for the English version of the experiment, and 240 self-declared native speakers of European Spanish for the Spanish version, all recruited through Prolific (<https://prolific.co>).¹¹ We excluded an additional 14 native English and 20 native Spanish speakers from the statistical analysis as they did not pass our preregistered inclusion criterion (answering 5 out of 8 control trials correctly). The experiments were programmed in *PsychoPy*, conducted online at *Pavlovio.org*, and lasted approximately 10 minutes.

2.1.2 Materials and Procedure

Participants were allocated to one of eight conditions in a between-subjects design according to the classification in **Table 4**.¹² Each participant read several short vignettes describing two characters performing actions. They were then asked to make a quantity judgement, indicating which of the two characters performed more of the relevant action. For each critical action, the vignettes provided two possible dimensions on which participants could base their quantity judgments: individuation (i.e., number of events) and a second dimension in line with Barner et al.'s (2008) design (dependent on the critical action, e.g., distance, volume, height).

Crucially, one character always performed more of the action based on individuation, and the other character performed more based on the second dimension. For example, in (40), Sam slept four times, but for only one hour in total, while Luke slept only twice, but for seven hours in total. The dependent variable was how often participants choose individuation (number of events, here Sam) as opposed to the alternative dimension for quantifying actions (here, Luke).

(40) Sam and Luke sleep a lot, even during the day. Yesterday, they slept as follows:

Sam slept four times:
After breakfast (20 minutes)
After lunch (10 minutes)

¹¹ We preregistered 64 participants in Spanish, but a power analysis showed that our study was severely underpowered. We therefore decided to use the same sample size as in English ($N = 240$), which resulted in 86.4% estimated power for the interaction between nominal syntax and event type ($\beta = .59$), using G*Power version 3.1.9.6 (Faul et al. 2007), with $\alpha = .05$, two-tailed, in Spanish.

¹² We used a between subject-design to test our predictions because, in practical terms, Experiment 1 was a conceptual replication of Barner et al.'s (2008) study so that we wanted to keep the experimental design as close to the original as possible. Furthermore, from a linguistic point of view, switching past and perfect within one experimental context might have interfered with the pragmatics of the entire experiment in uncontrollable ways. Finally, we reasoned that although between-subjects designs usually have less statistical power, a larger sample size would counteract this limitation, as confirmed by the power analysis described in the previous footnote.

At his desk at work (20 minutes)
On the train home from work (10 minutes)

Luke slept two times:
After breakfast (3 hours)
Before dinner (4 hours)

Question: Overall, who has taken more sleeps?

(41) A Sara y a Lucas les gusta salir a pasear. La última semana pasearon así:

Sara paseó dos días:
El miércoles (20 kilómetros)
El viernes (15 kilómetros)

Lucas paseó cuatro días:
El lunes (1 kilómetro)
El martes (3 kilómetros)
El jueves (2 kilómetros)
El sábado (1 kilómetro)

Pregunta: paseos, ¿quién ha dado más?

Vignettes were a subset of the ones used in Barner et al. (2008): out of 30 actions used in the original study (15 durative and 15 punctual, identified as such in a previous norming study), we selected 12 of each type, starting with the ones that had obtained the higher ratings in their category. The vignettes remained the same across conditions, only the quantity judgment questions differed (see **Table 4**).

To create the Spanish stimuli, we performed a norming study, like Barner et al.'s (2008) first experiment, to isolate a list of prototypically punctual verbs, and a list of prototypically durative verbs that had corresponding event nouns in count and mass syntax for the quantity judgment task (Appendix A, accessible in the OSF repository). Among those, we selected the 12 most often judged punctual and the 12 most often judged durative. Spanish punctual verbs were rated as repeated 82% of the time (compared to 84% in Barner et al. 2008), and Spanish durative verbs were rated as repeated 25% of the time (compared to 9% in Barner et al., 2008). The complete list of verbs used in Experiment 1 can be found in Appendix B.

The Spanish stimuli diverged from their English counterparts in three respects: First, some of the verbs differed; also, to make the critical questions sound as natural as possible, we adjusted word order such that the nominal item was always fronted; and lastly, in the mass syntax conditions, we used infinitival rather than progressive forms, and inserted a clitic (i.e., *lo* 'it') referring to the infinitival form (see **Table 4**).

In the beginning of the experiment, participants completed two practice trials that followed the same logic as the critical trials, familiarizing them with the task. One practice trial contained

English	Spanish	Condition
<i>Who took more jumps?</i>	<i>Salto, ¿quién dio más?</i>	punctual-past-count
<i>Who has taken more jumps?</i>	<i>Salto, ¿quién ha dado más?</i>	punctual-perfect-count
<i>Who did more jumping?</i>	<i>Saltar, ¿quién lo hizo más?</i>	punctual-past-mass
<i>Who has done more jumping?</i>	<i>Saltar, ¿quién lo ha hecho más?</i>	punctual-perfect-mass
<i>Who took more dances?</i>	<i>Baile, ¿quién hizo más?</i>	durative-past-count
<i>Who has done more dances?</i>	<i>Baile, ¿quién ha hecho más?</i>	durative-perfect-count
<i>Who did more dancing?</i>	<i>Bailar, ¿quién lo hizo más?</i>	durative-past-mass
<i>Who has done more dancing?</i>	<i>Bailar, ¿quién lo ha hecho más?</i>	durative-perfect-mass

Table 4: Examples of critical questions in each condition (Experiment 1).

a count noun object (e.g., English *dogs*/Spanish *perros*), which should always be individuated based on number, and the other one contained a mass noun substance (e.g., English *milk*/Spanish *leche*), which should never be judged on number, but on the second dimension given, for instance, volume, weight, etc.

After practice, participants completed 12 critical trials and 8 control trials. The control trials were similar to the practice trials in that participants judged the quantity of either objects in count syntax (*dog/perro*, *house/casa*, *plate/plato*, *glass/copa*), or substances in mass syntax (*milk/leche*, *butter/mantequilla*, *toothpaste/pasta de dientes*, *ketchup*). Control trials were used as sanity checks.

2.1.3 Statistical Analysis

All statistical analyses were preregistered on OSF (see section on Data Availability). For each language separately, we performed three different statistical analyses: First, we fitted a logistic regression model in the R statistical environment (i.e., *glmer* from the stats package, R Core Team, 2014) and assessed model significance using likelihood ratio tests between the full and reduced models with the same random-effects structure (Barr, Levy, Scheepers, & Tily 2013), but individually excluding fixed predictors and interactions. In our full model, we included event type (durative vs. punctual), nominal syntax (count vs. mass), and tense (past vs. perfect) as sum-contrast coded predictor variables (i.e., coding levels of each variable either as 1 or -1). Item was included as a random intercept in all of our models to control for potential variance due to specifics of the vignettes. We used a minimal intercept-only structure (i.e., no random slopes) to ensure model convergence. The dependent variable was whether people quantified events based on individuation.

Second, a logistic regression analysis was performed separately within each verb type (i.e., durative vs. punctual), with the main effects of nominal syntax (count vs. mass) and tense (past vs. perfect) as well as the interaction between these two sum-contrast coded predictors. The

random-effects structure was the same as in the analysis described above: Item was included as a random intercept, but no random slopes for reasons of model convergence.

Third, we conducted a series of planned pairwise comparisons to assess the interactions of the regression models more thoroughly. However, to reduce the likelihood of a Type I error, we preregistered only pairwise comparisons that related to the effect of tense within each verb type to assess the overall support of our data for the hypothesis that perfect renders events more state-like. While we preregistered these pairwise comparisons without using adjusted p -values, we also provide Bonferroni-adjusted p -values for clarity in square brackets, based on the number of preregistered comparisons.

2.2 Results

Overall, 95.5% of the control trials were judged correct in English and 95.8% in Spanish, indicating that the task was easily understood. Participants' mean responses are shown in **Figure 1**: In both English and Spanish, we replicated Barner et al.'s (2008) results, specifically, the strong asymmetry between mass and count syntax.

In English (**Figure 1, left**), when the quantity judgment questions used count syntax (e.g., *jumps/dances*), participants were more likely to judge quantity based on the number of times an action was performed than based on the other dimensions provided ($M_{\text{COUNT}} = 0.95$, $SD = 0.23$). In short, they were more likely to individuate the critical action events. In contrast, when the quantity judgment question contained mass syntax (e.g., *jumping/dancing*), participants individuated less, judging quantity based on the other dimensions more often than on number ($M_{\text{MASS}} = 0.40$, $SD_{\text{MASS}} = 0.49$). This asymmetry was statistically confirmed as a main effect of nominal syntax ($Df = 1$, $\chi^2 = 481.49$, $p < 0.001$).

As Barner et al. (2008), we found a main effect of event type ($Df = 1$, $\chi^2 = 368.89$, $p < 0.001$): Vignettes with punctual action events (e.g., *jump*, $M_{\text{PUNCTUAL}} = 0.94$, $SD_{\text{PUNCTUAL}} = 0.24$) led to significantly more individuation judgments than vignettes with durative action events (e.g., *dance*, $M_{\text{DURATIVE}} = 0.46$, $SD_{\text{DURATIVE}} = 0.50$).

Furthermore, the interaction between event type and nominal syntax was significant ($Df = 1$, $\chi^2 = 118.36$, $p < 0.001$): In mass syntax conditions, quantity judgments were mostly based on number when combined with punctual events ($M_{\text{MASS-PUNCTUAL}} = 0.88$, $SD_{\text{MASS-PUNCTUAL}} = 0.32$), but not when combined with durative events ($M_{\text{MASS-DURATIVE}} = 0.06$, $SD_{\text{MASS-DURATIVE}} = 0.23$). For count syntax conditions, on the other hand, there was no difference between punctual and durative events ($M_{\text{COUNT-PUNCTUAL}} = 0.97$, $SD_{\text{COUNT-PUNCTUAL}} = 0.17$, $M_{\text{COUNT-DURATIVE}} = 0.91$, $SD_{\text{COUNT-DURATIVE}} = 0.28$).

Crucially, with regard to the effect of tense, differences were only numerical, with perfect tense leading to slightly lower individuation rates ($M_{\text{PERFECT}} = 0.69$, $SD_{\text{PERFECT}} = 0.46$ vs. $M_{\text{PAST}} = 0.72$, $SD_{\text{PAST}} = 0.45$). However, this was not statistically reliable: Participants judged quantity

based on nominal syntax, or event type, or a combination of the two, regardless of whether the question was phrased in the simple past or perfect. Therefore, neither did the main effect of tense ($Df = 1$, $\chi^2 = 2.29$, $p = 0.13$) reach significance, nor did tense interact with any of the other predictor variables ($Dfs = 1$, $\chi^2s < 1.44$, $ps > 0.23$).

This pattern of results did not change when testing the main effects of tense and nominal syntax separately within each verb type (no main effects of tense: $Dfs = 1$, $\chi^2s < 2.49$, $ps > 0.11$, interactions: $Dfs = 1$, $\chi^2s < 1.53$, $ps > 0.22$). Here, we also only found main effects of nominal syntax ($Dfs = 1$, $\chi^2s > 42.85$, $ps < 0.001$).

Finally, planned pairwise comparisons did not reveal significant differences between tenses within each combination of verb type and nominal syntax ($\betas > -0.03$, $ts > -0.97$, $ps > 0.33$ [$ps = 1$]). There was only a marginal difference between simple past and perfect tense in the mass durative condition ($\beta = -0.03$, $t = -1.88$, $p = 0.06$ [$p = 0.24$]).

Barner et al.'s (2008) original overall pattern of results was replicated by the Spanish experiment as well (see **Figure 1, right**): Participants were more likely to individuate for count syntax ($M_{\text{COUNT}} = 0.79$, $SD_{\text{COUNT}} = 0.41$), than for mass syntax ($M_{\text{MASS}} = 0.40$, $SD_{\text{MASS}} = 0.49$; main effect of nominal syntax: $Df = 1$, $\chi^2 = 492.82$, $p < 0.001$). Furthermore, individuation was driven by punctual events ($M_{\text{PUNCTUAL}} = 0.74$, $SD_{\text{PUNCTUAL}} = 0.44$), but less so by durative events ($M_{\text{DURATIVE}} = 0.42$, $SD_{\text{DURATIVE}} = 0.49$; main effect of event type: $Df = 1$, $\chi^2 = 251.55$, $p < 0.001$). For durative events, participants were only more likely to judge quantity based on number when quantity judgment questions used count syntax ($M_{\text{COUNT-DURATIVE}} = 0.76$, $SD_{\text{COUNT-DURATIVE}} = 0.43$), rather than mass syntax ($M_{\text{MASS-DURATIVE}} = 0.15$, $SD_{\text{MASS-DURATIVE}} = 0.35$). For punctual events, this asymmetry was less pronounced ($M_{\text{COUNT-PUNCTUAL}} = 0.81$, $SD_{\text{COUNT-PUNCTUAL}} = 0.39$ vs. $M_{\text{MASS-PUNCTUAL}} = 0.66$, $SD_{\text{MASS-PUNCTUAL}} = 0.47$). This was also reflected by a significant interaction between the two predictor variables ($Df = 1$, $\chi^2 = 142.57$, $p < 0.001$).

Contrary to the English experiment, tense had a significant effect on people's quantity judgments (main effect of tense: $Df = 1$, $\chi^2 = 4.42$, $p = 0.04$): Across event types and nominal syntax, participants individuated less in the perfect condition ($M_{\text{PERFECT}} = 0.56$, $SD_{\text{PERFECT}} = 0.50$ vs. $M_{\text{PAST}} = 0.61$, $SD_{\text{PAST}} = 0.49$). This was more pronounced in count syntax, as reflected by the marginally significant interaction between nominal syntax and tense ($Df = 1$, $\chi^2 = 3.42$, $p = 0.06$).

Analyzing the data separately for each verb type, there were main effects of syntax ($Dfs = 1$, $\chi^2s > 56.26$, $ps < 0.001$). The split analysis furthermore revealed a main effect of tense which was significant for punctual events ($Df = 1$, $\chi^2 = 4.32$, $p = 0.04$), but not for durative events ($Df = 1$, $\chi^2 = 0.92$, $p = 0.34$): In the punctual conditions, perfect reduced people's tendency to individuate, so that quantity judgments were more often based on dimensions other than number than in the past tense conditions. However, likely due to reduced power in the planned

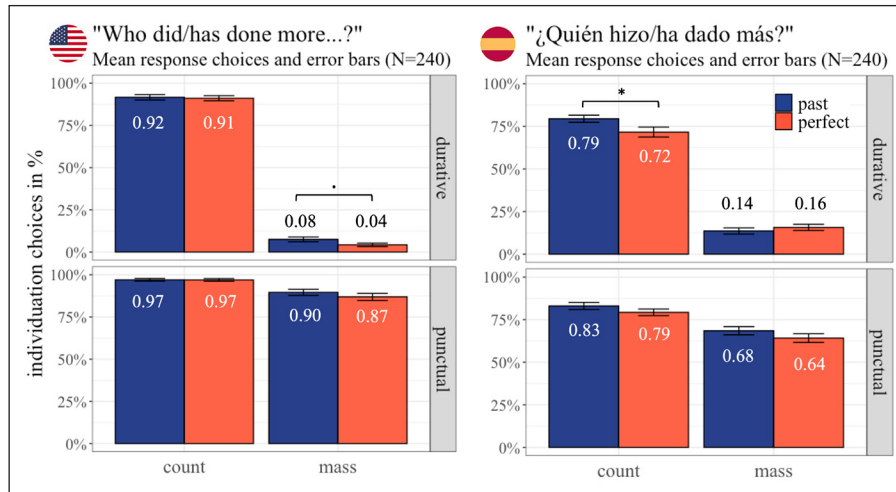


Figure 1: Mean individuation responses for English (left) and Spanish (right). In both English and Spanish, we replicated Barner et al.'s (2008) findings. For visual clarity, we only illustrate the significant effects of pairwise comparisons (* = significant; • = marginally significant); for other results, please refer to the text. Error bars represent Standard Errors.

pairwise comparisons, this difference was neither significant for the count-punctual conditions ($\beta = -0.04$, $t = -1.30$, $p = 0.19$ [$p = 0.76$]), nor for the mass punctual conditions ($\beta = -0.044$, $t = -1.25$, $p = 0.21$ [$p = 0.84$]). The only significant difference between tenses was in the count-durative conditions ($\beta = -0.08$, $t = -2.20$, $p = 0.03$ [$p = 0.12$]) which yielded a significant interaction between nominal syntax and tense in the durative conditions ($Df = 1$, $\chi^2 = 4.79$, $p = 0.03$), not in the punctual conditions ($Df = 1$, $\chi^2 = 0.07$, $p = 0.79$).

2.3 Discussion of Experiment 1

In Experiment 1, we successfully replicated Barner et al. (2008)'s results in two languages, finding that both English and Spanish speakers quantified events in count syntax more than in mass syntax. This was primarily driven by event type, as significant interactions of nominal syntax and event type showed: Punctual events (e.g., *jumping/jumps/saltar/saltos*) resulted in high individuation rates, regardless of nominal syntax, but in durative events, mass syntax (e.g., *dancing/bailar*) corresponded to lower individuation rates than count syntax (e.g., *dances/bailes*). These results extend the empirical basis for the Number Asymmetry Hypothesis further, into Spanish.

There was a significant effect of tense in Spanish, while the English trend was only numerical. However, they both pointed into the predicted direction: less individuation in the perfect tense, compared to the past tense. The feebleness of the effect in English is in line with previous works that highlight the strong influence of nominal syntax on event individuation, possibly drowning out an effect of tense. Recall the prediction from Section 1.3 that the difference in event construal between past and perfect should be quite subtle in comparison.

The findings in Spanish, however, seem to go in a different direction, questioning the role of nominal syntax in that language. In the absence of further investigation, this might have been due to divergent morphosyntactic factors between the two languages: for example, the use of infinitives in lieu of *-ing* nominals in the mass conditions, or the fronting of the nominal in all target questions in Spanish. We will come back to these language-specific differences and how they may have affected the results in the General Discussion.

With Experiment 1 providing the empirical baseline, we removed nominal syntax in Experiment 2. In Experiment 1, we did not preregister a statistical comparison between English and Spanish because, theoretically, there was no reason to predict one: Spanish and English have been analyzed as having similar meanings for the past/perfect distinction (Squartini & Bertinetto 2000; Martínez Atienza 2008; RAE-ASALE 2009). However, visual inspection of our data suggested that Spanish participants were less likely to individuate overall. Since Experiment 2 also eliminated the differences in morphosyntactic framing necessary in Experiment 1 (e.g. *Who did more jumps?* vs. *Saltos, ¿quién dio más?*, i.e., *Jumps: who did more?*), we preregistered a cross-linguistic comparison.

3 Experiment 2

Experiment 2 tests the effect of tense on individuation in both English and Spanish using simple verb forms in past tense (*Who jumped/danced more? ¿Quién saltó/bailó más?*) and perfect tense (*Who has jumped/danced more? ¿Quién ha saltado/ bailado más?*). If perfect tense leads to stative interpretations, then the perfect should trigger less individuation than past tense overall, according to the perfect-as-state analysis; by contrast, the Extended Now analyses, which take the perfect to introduce an extended temporal interval, would only predict a more unbounded interpretation of the perfect in combination with punctual/telic predicates.

Experiment 2 will also answer how default individuation occurs in each event type, without the factor of nominal syntax: Does mass syntax reduce individuation, or does count syntax introduce individuation for durative events? By removing nominal syntax as a factor, we can observe how durative events are individuated by default.

With regard to the pre-registered cross-linguistic comparison, we predicted an interaction between tense and language: As a pro-drop language, Spanish speaking participants oftentimes entirely rely on the on the morphosyntactic form of the verb to form an event construal, potentially increasing their focus on the verb, compared to English speakers (see, for instance, evidence from Japanese where processing cost on the verb increases in pro-drop sentences, Wolff, 2010). We therefore had preregistered a prediction that tense would have stronger effects on individuation in Spanish than in English.

3.1 Methods

3.1.1 Participants

We recruited 240 self-declared native English speakers for the English version of the experiment, and 240 self-declared native Spanish speakers for the Spanish version, both via Prolific. 24 additional English and 16 additional Spanish participants were excluded from the statistical analysis because they failed our preregistered inclusion criterion (i.e., 5 out of 8 correctly judged control trials).

3.1.2 Materials and Procedure

As in Experiment 1, participants read vignettes about two characters engaged in an event and subsequently judged who did more of the relevant action, either based on individuation (i.e., number of events) or on a second dimension mentioned in the vignettes (e.g., distance, volume, height). Like in the previous experiment, vignettes either described punctual or durative events, and quantity judgment questions were either phrased in past or perfect tense. However, in Experiment 2, we excluded nominal syntax from the design, yielding four different conditions (see Table 5).

English	Spanish	Condition
<i>Who jumped more?</i>	<i>¿Quién saltó más?</i>	Punctual-past
<i>Who has jumped more?</i>	<i>¿Quién ha saltado más?</i>	Punctual-perfect
<i>Who danced more?</i>	<i>¿Quién bailó más?</i>	Durative-past
<i>Who has danced more?</i>	<i>¿Quién ha bailado más?</i>	Durative-perfect

Table 5: Examples of critical questions in each condition (Experiment 2).

The procedure was the same as in Experiment 1: Participants were assigned to one of the conditions, and completed two practice trials, followed by 12 critical trials and 8 control trials, which served as a sanity check.

3.2 Statistical Analysis

The statistical analyses were preregistered on OSF (see section on Data Availability). As in Experiment 1, we first set up a logistic regression model in the R statistical environment (i.e., *glmer* from the stats package, R Core Team, 2014) and performed model comparisons to assess the significance of the full model. Event type (i.e., durative vs. punctual) and tense (i.e., past vs. perfect) were sum-contrast coded as predictor variables (i.e., levels: 1/−1) and item as random intercept, using a minimal intercept-only structure to ensure model convergence (i.e., no random

slopes). We used people's quantity judgments based on individuation as the dependent variable. Second, we conducted planned pairwise comparisons between tenses across event types.

In addition, we conducted a cross-linguistic analysis by including language (English vs. Spanish) as a contrast-coded predictor variable in the logistic regression model as described above. To test the cross-linguistic predictions, planned pairwise comparisons assessed only the effects of language in each tense and event type condition (Bonferroni-corrections based on this number of comparisons are bracketed).

3.3 Results

Similar to Experiment 1, accuracy in the control trials was at ceiling: 97.6% of the English and 97.9% of the Spanish control trials were judged correctly. Participants' mean judgment responses in Experiment 2 are shown in **Figure 2**: For the English data (left), participants judged quantity more often based on number in combination with punctual events than with durative events. That is, across tense conditions, vignettes with punctual predicates yielded a higher amount of individuation ($M_{\text{PUNCTUAL}} = 0.82$, $SD_{\text{PUNCTUAL}} = 0.38$) than vignettes with durative predicates ($M_{\text{DURATIVE}} = 0.15$, $SD_{\text{DURATIVE}} = 0.36$), as reflected by a main effect of event type ($Df = 1$, $\chi^2 = 1139.80$, $p < 0.001$).

Furthermore, participants were less likely to judge quantity in terms of the number of times an action was performed in the perfect conditions ($M_{\text{PERFECT}} = 0.45$, $SD_{\text{PERFECT}} = 0.50$) than in the simple past conditions ($M_{\text{PAST}} = 0.52$, $SD_{\text{PAST}} = 0.50$), as reflected statistically in a main effect of tense ($Df = 1$, $\chi^2 = 10.97$, $p = 0.001$). While the interaction between event type and tense was not significant ($Df = 1$, $\chi^2 = 1.47$, $p = 0.22$), pairwise comparisons revealed that the effects of tense were stronger combined with durative events ($SD_{\text{PAST-DURATIVE}} = 0.39$ vs. $SD_{\text{PERFECT-DURATIVE}} = 0.33$; $\beta = 0.03$, $t = 3.06$, $p = 0.002$ [$p = 0.004$]), whereas the difference between simple past and perfect was not significant for punctual events ($SD_{\text{PAST-PUNCTUAL}} = 0.37$ vs. $SD_{\text{PERFECT-PUNCTUAL}} = 0.40$; $\beta = 0.02$, $t = 1.52$, $p = 0.13$ [$p = 0.26$]).

In the Spanish data (**Figure 2, right**), we similarly found a main effect of event type such that, across tenses, vignettes reporting punctual events were more individuated ($M_{\text{PUNCTUAL}} = 0.54$, $SD_{\text{PUNCTUAL}} = 0.50$) than vignettes reporting durative events ($M_{\text{DURATIVE}} = 0.12$, $SD_{\text{DURATIVE}} = 0.33$; $Df = 1$, $\chi^2 = 689.12$, $p < 0.001$). In contrast to the English data, there was no main effect of tense ($M_{\text{PERFECT}} = 0.31$, $SD_{\text{PERFECT}} = 0.46$ vs. $M_{\text{PAST}} = 0.39$, $SD_{\text{PAST}} = 0.49$; $Df = 1$, $\chi^2 = 1.10$, $p = 0.30$), but the interaction between the two predictor variables was significant ($Df = 1$, $\chi^2 = 11.93$, $p < 0.001$): Only in the punctual condition did the perfect tense lead to fewer number-based judgments than in the past tense, as pairwise comparisons showed ($SD_{\text{PAST-PUNCTUAL}} = 0.49$ vs. $SD_{\text{PERFECT-PUNCTUAL}} = 0.50$; $\beta = 0.05$, $t = 3.78$, $p < 0.001$ [$p < 0.002$]). There was no significant difference between tenses in the durative conditions ($SD_{\text{PAST-DURATIVE}} = 0.31$ vs. $SD_{\text{PERFECT-DURATIVE}} = 0.34$; $\beta = -0.01$, $t = -1.33$, $p = 0.18$ [$p = 0.36$]).

In the cross-linguistic analysis, we not only found main effects of event type ($Df = 1$, $\chi^2 = 2017.20$, $p < 0.001$), and tense ($Df = 1$, $\chi^2 = 8.97$, $p = 0.003$), but also a main effect of language ($Df = 1$, $\chi^2 = 149.61$, $p < 0.001$): That is, across conditions, Spanish participants were less likely to base their quantity judgments on number ($M_{\text{SPANISH}} = 0.35$, $SD_{\text{SPANISH}} = 0.48$) than English participants ($M_{\text{ENGLISH}} = 0.49$, $SD_{\text{ENGLISH}} = 0.50$).¹³

Furthermore, there was a significant interaction between event type and language ($Df = 1$, $\chi^2 = 65.08$, $p < 0.001$) such that punctual events got less individuated in Spanish ($M_{\text{SPANISH-PUNCTUAL}} = 0.54$, $SD_{\text{SPANISH-PUNCTUAL}} = 0.50$) than in English ($M_{\text{ENGLISH-PUNCTUAL}} = 0.82$, $SD_{\text{ENGLISH-PUNCTUAL}} = 0.38$), but durative events were more alike across languages ($M_{\text{SPANISH-DURATIVE}} = 0.12$, $SD_{\text{SPANISH-DURATIVE}} = 0.33$ vs. $M_{\text{ENGLISH-DURATIVE}} = 0.15$, $SD_{\text{ENGLISH-DURATIVE}} = 0.36$).

Finally, these language differences did not only weigh differently across event type, but also between tenses within each event type, as reflected by a significant three-way-interaction ($Df = 1$, $\chi^2 = 9.90$, $p = 0.002$): Planned pairwise comparisons between languages showed that, in Spanish, punctual events were individuated significantly less than in English, both in past ($\beta = 0.13$, $t = 11.40$, $p < 0.001$ [$p < 0.004$]) and perfect tense ($\beta = 0.16$, $t = 13.12$, $p < 0.001$ [$p < 0.004$]). For durative events, on the other hand, Spanish speakers individuated events less

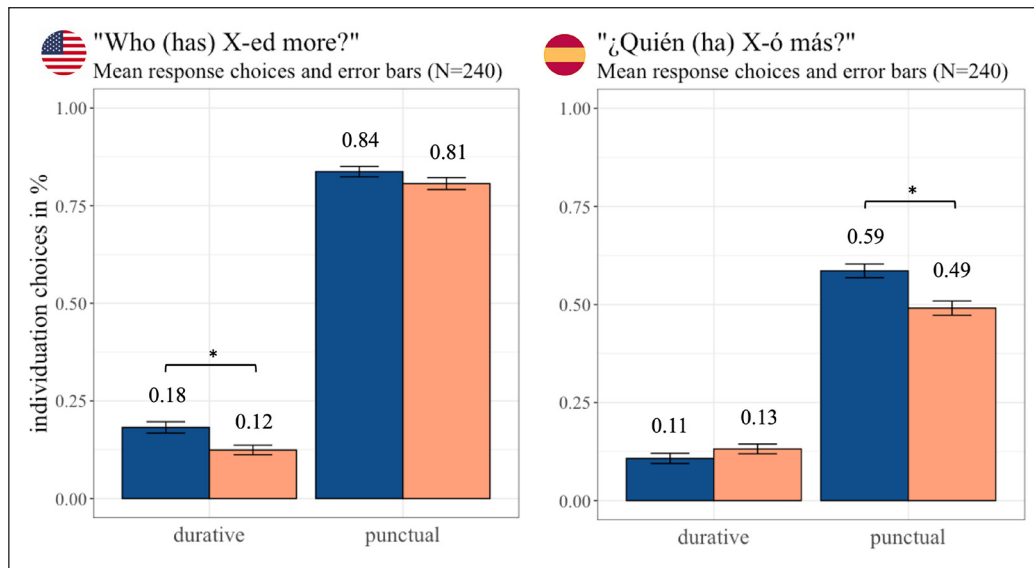


Figure 2: Mean individuation responses for English (left) and Spanish (right). For visual clarity, we only illustrate the significant effects of pairwise comparisons (* = significant; • = marginally significant); for other results, please refer to the text. Error bars represent Standard Errors

¹³ Visual inspection of the Spanish data showed that these lower individuation rates were not different between verbs that were unique to the Spanish experiments, and verbs that were shared across English and Spanish. Since this was a post-hoc analysis, we do not report it here, but it is documented on OSF (<https://osf.io/tkjaq/>).

often than English speakers only in the past condition ($\beta = 0.04$, $t = 3.75$, $p < 0.001$ [$p < 0.004$]), not in the perfect condition ($\beta = -0.003$, $t = -0.43$, $p = 0.67$ [$p = 1$]).

3.4 Discussion of Experiment 2

Experiment 2 tested the effect of tense on individuation in both English and Spanish using simple verb forms in past and perfect tense. As in Experiment 1, a main effect of event type confirmed that durative events give rise to less individuation than punctual events. This result indicates that the default behavior of durative verbs is not to give rise to individuated interpretation. We will return to this in the General Discussion.

Crucially, we also found an effect of tense, as predicted by the perfect-as-state hypothesis, but not the Extended Now hypothesis: Perfect tense led to less individuation across the board: This result manifested in English by a main effect of tense, and in Spanish, by an interaction between tense and event type; the absence of a main effect in Spanish is conceivably due to a floor effect in the durative condition, since Spanish speakers generally chose less individuation than their English peers: Comparisons across languages revealed that in Spanish, punctual events were individuated significantly less than in English, both in past and perfect tense, while Spanish speakers individuated durative events less often than English speakers only in the past condition, not in the perfect condition.

We also found a general difference between English and Spanish: Notably, across conditions, Spanish participants were less likely to individuate events compared to English participants. This difference between languages was more pronounced in punctual events than durative events.

4 General discussion

In this paper, we tested the psychological reality of a widely assumed theoretical claim in linguistics, which is that past tense morphology affects people's understanding of linguistically described events. Specifically, it has been proposed that perfect tense (*Julius has traveled to London*) refers to a state derived from a past event, whereas past tense (*Julius traveled to London*) refers to the past event itself. This intuition was spelled out in formal semantics as the perfect-as-state analysis (Moens 1987; Parsons 1990; Kamp & Reyle 1993), and supported by the behavior of the perfect in stativity tests and by diachronic facts.

Our solution to test this perfect-as-state hypothesis for its psychological reality in mental construals was to operationalize the notion of boundedness as individuation in two experiments. Since states, as well as durative predicates and mass nouns, are claimed to be semantically unbounded, we predicted to find reduced individuation patterns in perfect tense as it had been found both in durative predicates and mass nouns (Barner et al. 2008). Crucially, this prediction is not shared by other accounts of the perfect, namely the Extended Now hypothesis (Dowty

1979; von Stechow 1999; Iatridou et al. 2001; Pancheva 2003), according to which the sense of unboundedness is only indirectly obtained from the combination of a predicate type (telic/atelic) plus an specific morphology (progressive/non progressive).

In Experiment 1, we successfully replicated Barner et al.'s (2008) study, who found that English native speakers individuated punctual events (e.g., *jumping/jumps*), irrespective of nominal syntax, unlike durative events, which were individuated much more in count syntax (e.g., *dances*) than mass syntax (e.g., *dancing*). In addition, we found this effect in Spanish as well; and we found a tendency for events described by perfect tense to lead to less individuation in both languages, in line with the perfect-as-state hypothesis.

In the second experiment, we tested the effect of tense on individuation of events described in English and Spanish simple verbs, excluding nominal syntax as a manipulation from our design. Crucially, we found an effect of tense as predicted by the perfect-as-state hypothesis and contrary to the Extended Now accounts: Perfect leads to less individuation than past, in both languages, and this effect is not limited to punctual/telic predicates, nor it is driven by progressive morphology which was absent from our study.

As in Experiment 1, durative events were associated with less individuation than punctual events overall, even in the absence of nominal syntax. This speaks to a question that Barner et al.'s (2008) study design could not answer: Namely, in which direction mass and count syntax modified the individuation patterns in durative events.

According to Barner et al.'s (2008) interpretation, their findings corroborated the Number Asymmetry hypothesis (Barner & Snedeker 2006): Count syntax specifies individuation, while mass syntax is underspecified. Implicit in this hypothesis is the assumption that the default interpretation of durative events is that they are not individuated. But strictly speaking, this could not be inferred from the data of Barner et al. (2008) alone. Instead, there are two ways to interpret the pattern of results: Mass syntax may have reduced individuation for duratives, in which case we should have found high individuation rates in the absence of a nominal syntax manipulation in Experiment 2. Alternatively, count syntax may have introduced individuation for duratives. This would be in line with the argument that durative events are by default unbounded and unindividuated, like mass nouns, states, and the perfect. Indeed, we found low individuation rates in durative events in the absence of nominal syntax.

One unexpected result of our studies was that overall, Spanish participants individuated events less than their English peers. In Experiment 1, this may have been due to morphosyntactic factors that could not be aligned between the two languages: for example, the use of infinitival forms in Spanish to replace the English *-ing* nominals in the mass conditions (e.g., *bailar* vs *dancing*). Furthermore, Spanish word order made it impossible to use the same syntactic constructions

as in English; we placed the event-denoting word in initial position (*Salto, ¿quién dio más?*), as opposed to English, where it occurs in final position (*Who did more jumps?*).

However, morphosyntactic factors alone cannot account for our findings: The difference between Spanish and English speakers also emerged in Experiment 2, which used simple translation equivalents in past tense (*Who jumped/danced more?* vs. *¿Quién saltó/bailó más?*) and perfect tense (*Who has jumped/danced more?* vs. *¿Quién ha saltado/ bailado más?*), which allowed for a more direct comparison between the two languages.

One factor leading to this difference may have been lexical: Perhaps there was a lower initial individuation rate for the punctual verbs used in Spanish to begin with. While we do not rule out lexical differences explaining the lower individuation rates found in our Spanish data, we consider this explanation as relatively unlikely: For the Spanish experiment, we followed the same norming protocol as Barner et al. (2008) in order to select unambiguous cases of punctual and durative verbs. If anything, the rate of individuation in our norming study was slightly higher for the Spanish durative verbs than for the English ones.

In contrast, we think that one contribution to lower individuation rates in Spanish may be the fact that English and Spanish differ in the number of paradigmatic forms that are available to speakers to partition the conceptual space of tense and aspect. In addition to the simple past and the perfect, both English and Spanish speakers can also use the past progressive (e.g., *I was jumping*), which in Spanish maps onto the simple past (e.g., *estuve saltando*) as well as onto a third form with past tense meaning, that is, the *pasado imperfecto* (e.g., *estaba saltando*). While the *imperfecto* does not exist in English (García Fernández 2004), it can be found in other Romance languages like Italian (Bertinetto 1986), and generally denotes a period of time in which a state of affairs persists, without specifying its termination (Fábregas 2015 and references therein). It is an empirically open question to what extent the presence of the *imperfecto* in the Spanish tense-aspect paradigm may have reduced the rate of individuated responses among Spanish participants in our study series. We leave this matter open for future research.¹⁴

In this paper, we tested predictions made by different theories of the perfect. One of these theories, as discussed, is the Extended Now analysis. This analysis, as very astutely observed by a Reviewer, would predict that *only* under perfect progressive (“has been jumping”) an unbounded reading of punctive events is possible, but crucially, not under the perfect (“has jumped”). However, contrary to this prediction from the Extended Now hypothesis, and in line with the

¹⁴ Incidentally, the fact that Spanish distinguishes the simple past/preterit from the imperfective past, while English has an (arguably) underspecified simple past, might explain the fact that in Spanish the effect was stronger for punctual events: With previous experimental work suggesting that the Spanish simple past is more strongly perfective than the English simple past (Minor et al. 2022), and therefore more likely to individuate, perhaps this enhanced perfectivity of the Spanish simple past flourishes in combination with punctual events. We would like to thank an anonymous reviewer for bringing this to our attention.

perfect-as-state hypothesis, we did find unbounded readings of punctive events in the perfect (see Appendix D). The empirical coverage of our data therefore rejects the prediction made by the Extended Now hypothesis. That said, we agree that it would be an interesting question for future research whether the ‘state’ representation and an unbounded ‘interval’ representation could give rise to similar non-individuated construals in perfect progressive morphology.

In summary, this paper provides psycholinguistic evidence supporting the perfect-as-state hypothesis from two simple behavioral experiments. We tested this hypothesis in English and Spanish, carefully building up the chain of empirical arguments through replicating previous work on event individuation in mass and count syntax across different event types (Barner et al., 2008), and operationalizing stativity as individuation based on well-established linguistic tests. The patterns of results from four experiments clearly indicate: Compared to past tense, the perfect tense leads to event construals that are more common to states. To our knowledge, this is the first effort to trace the subtle semantic differences between past and perfect tense to behavioral differences, and we hope that it will inspire similar attempts across languages and tense systems.

Data availability

All preregistrations, appendices, data, code, and stimuli are available at the OSF repository: <https://osf.io/tkjaq/>.

Ethics and consent

We obtained informed consent from all participants according to Central European University's (CEU) guidelines. This study was approved by the Ethics committee of CEU, Study Approval #2022/37. Researchers have undergone certified human subjects training.

Competing interests

The authors have no competing interests to declare.

References

- Anderson, Anne & Garrod, Simon C. & Sanford, Anthony J. 1983. The accessibility of pronominal antecedents as a function of episode shifts in narrative text. *The Quarterly Journal of Experimental Psychology A: Human Experimental Psychology* 35(3-A). 427–440. DOI: <https://doi.org/10.1080/14640748308402480>
- Bach, Emond. 1986. The algebra of events. *Linguistics and Philosophy* 9. 5–16. DOI: <https://doi.org/10.1007/BF00627432>
- Bale, Alan C. & Barner, David. 2009. The interpretation of functional heads: Using comparatives to explore the mass/count distinction. *Journal of Semantics* 26(3). 217–252. DOI: <https://doi.org/10.1093/jos/ffp003>
- Barner, David & Snedeker, Jesse. 2005. Quantity judgements and individuation: Evidence that mass nouns count. *Cognition* 97. 41–46. DOI: <https://doi.org/10.1016/j.cognition.2004.06.009>
- Barner, David & Snedeker, Jesse. 2006. Children's early understanding of mass-count syntax: Individuation, lexical content, and the number asymmetry hypothesis. *Language Learning and Development* 2. 163–194. DOI: https://doi.org/10.1207/s15473341l1d0203_2
- Barner, David & Wagner, Laura & Snedeker, Jesse. 2008. Events and the ontology of individuals: Verbs as a source of individuating mass and count nouns. *Cognition* 106. 805–832. DOI: <https://doi.org/10.1016/j.cognition.2007.05.001>
- Barr, Dale J. & Levy, Roger & Scheepers, Christoph & Tily, Harry J. 2013. Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language* 68(3). 255–278. DOI: <https://doi.org/10.1016/j.jml.2012.11.001>
- Bertinetto, Pier M. 1986. *Tempo, aspetto e azione nel verbo italiano*. Firenze, Accademia della Crusca.

- Bloom, Paul. 1994. Semantic competence as an explanation for some transitions in language development. In Levi, Yonata (ed.), *Other children, other languages: theoretical issues in language development*, 41–75. Hillsdale NJ: Erlbaum.
- Bott, Oliver. 2010. *The processing of events*. Linguistik Aktuell/Linguistics Today 162. Amsterdam: John Benjamins. DOI: <https://doi.org/10.1075/la.162>
- Bybee, Joan L. & Perkins, Revere & Pagliuca, William. 1994. *The evolution of grammar: Tense, aspect and modality in the languages of the world*. Chicago: University of Chicago Press.
- Carlson, Lauri. 1981. Aspect and Quantification. *Syntax and Semantics* 14. 31–64. DOI: https://doi.org/10.1163/9789004373112_004
- Casati, Roberto & Varzi, Achille C. 2008. Event concepts. In Shipley, Thomas F. & Zacks, Jeffrey M. (eds.) *Understanding Events: From Perception to Action*, 31–54. New York: Oxford University Press. DOI: <https://doi.org/10.1093/acprof:oso/9780195188370.003.0002>
- Comrie, Bernard. 1976. *Aspect: An introduction to the study of verbal aspect and related problems*. Cambridge textbooks in linguistics: Cambridge University Press.
- Dahl, Östen & Hedin, Eva. 2000. Current relevance and event reference. In Dahl, Östen (ed.), *Tense and aspect in the languages of Europe (Empirical approaches to language typology 20–6)*, 385–401. Berlin: de Gruyter. DOI: <https://doi.org/10.1515/9783110197099.3.385>
- Dahl, Östen & Velupillai, Viveka. 2013a. The Past Tense. In Dryer, Matthew S. & Haspelmath, Martin (eds.), *WALS Online* (v2020.3) ch. 66.
- Dahl, Östen & Velupillai, Viveka. 2013b. The Perfect. In Dryer, Matthew S. & Haspelmath, Martin (eds.), *WALS Online* (v2020.3) ch. 68.
- de Swart, Henriette. 1998. Aspect shift and coercion. *Natural Language and Linguistic Theory* 16. 347–385. DOI: <https://doi.org/10.1023/A:1005916004600>
- de Swart, Henriette. 2003. Coercion in a cross-linguistic theory of aspect. In Francis, Elaine & Michaelis, Laura A. (eds.), *Mismatch: Form-function incongruity and the architecture of grammar*, 231–258. Stanford, CA: CSLI Publications.
- Declerck, Renaat. 1989. Tense in Complement Clauses. In Jaspers, Dany & Putseys, Yvan & Klooster, Wim & Seuren, Pieter (eds.) *Sentential Complementation and the Lexicon*, 97–111. Berlin, Boston: De Gruyter Mouton. DOI: <https://doi.org/10.1515/9783110878479>
- Dowty, David R. 1979. *Word meaning and Montague Grammar*. Dordrecht: Reidel. DOI: <https://doi.org/10.1007/978-94-009-9473-7>
- Dry, Helen A. 1983. The movement of narrative time. *Journal of Literary Semantics* 12(2). 19–53. DOI: <https://doi.org/10.1515/jlse.1983.12.2.19>
- Fábregas, Antonio. 2015. ‘Imperfecto’ and ‘indefinido’ in Spanish: What, where and how. *Borealis – An International Journal of Hispanic Linguistics* 4(2). 1–70. DOI: <https://doi.org/10.7557/1.4.2.3534>
- Faul, Franz & Erdfelder, Edgard & Lang, Albert-Georg & Buchner, Axel. 2007. G*Power 3: A Flexible Statistical Power Analysis Program for the Social, Behavioral, and Biomedical Sciences. *Behavior Research Method* 39. 175–191. DOI: <https://doi.org/10.3758/BF03193146>

- Ferretti, Todd R. & Kutas, Marta & McRae, Ken. 2007. Verb aspect and the activation of event knowledge. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 33(1). 182–196. DOI: <https://doi.org/10.1037/0278-7393.33.1.182>
- Ferretti, Todd R. & Rohde, Hannah & Kehler, Andrew & Crutchley, Melanie. 2009. Verb aspect, event structure, and coreferential processing. *Journal of Memory and Language* 61(2). 191–205. DOI: <https://doi.org/10.1016/j.jml.2009.04.001>
- García Fernández, Luis. 2004. El pretérito imperfecto: Repaso histórico y bibliográfico. In García Fernández, Luis & Camus, Bruno (eds.) *El pretérito imperfecto*, 13–69. Madrid: Gredos.
- Giorgi, Alessandra & Pianesi, Fabio. 1997. *Tense and Aspect. From Semantics to Morphosyntax*. New York/Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/oso/9780195091922.001.0001>
- Gordon, Peter. 1985. Evaluating the semantic categories hypothesis: The case of the mass/count distinction. *Cognition* 20. 209–242. DOI: [https://doi.org/10.1016/0010-0277\(85\)90009-5](https://doi.org/10.1016/0010-0277(85)90009-5)
- Granath, Solveig & Wherrity, Michael. 2014. “I’m loving you-and knowing it too”: Aspect and so-called stative verbs. *Rhesis: Linguistics and Philology* 4(1). 2–22.
- Hale, Ken & Keyser Samuel J. 1993. On Argument Structure and the Lexical Expression of Syntactic Relations. In Hale, Ken & Keyser, Samuel J. (eds.), *The View from Building 20: Essays in Linguistics in Honor of Sylvain Bromberger*, 53–109. MIT Press.
- Harley, Heidi. 2005. How do verbs get their names? Denominal verbs, manner incorporation, and the ontology of verb roots in English. In Erteschik-Shir, Nomi & Rapoport, Tova (eds.), *The syntax of aspect* 1(9). 42–65. Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/acprof:oso/9780199280445.003.0003>
- Herweg, Michael. 1991. Perfective and imperfective aspect and the theory of events and states. *Linguistics* 29. 969–1010. DOI: <https://doi.org/10.1515/ling.1991.29.6.969>
- Hoepelman, Jakob & Rohrer, Christian. 1980. On the Mass Count Distinction and the French Imparfait and Passe Simple. In Rohrer, Christian (ed.), *Time, Tense and Quantifiers*, 629–645. Tübingen: Niemeyer. DOI: <https://doi.org/10.1515/9783111346069.85>
- Iatridou, Sabine & Anagnostopoulou, Elena & Izvorsky, Roumyana. 2001. Observations about the form and meaning of the Perfect. In Kenstowicz, Michael (ed.), *Ken Hale: A Life in Language*, 189–238. Cambridge MA: MIT Press. DOI: <https://doi.org/10.7551/mitpress/4056.003.0009>
- Jackendoff, Ray. 1991. Parts and boundaries. *Cognition* 41(1–3). 9–45. DOI: [https://doi.org/10.1016/0010-0277\(91\)90031-X](https://doi.org/10.1016/0010-0277(91)90031-X)
- Jardón Pérez, Natalia. 2021. *Pluractional Perfects: Anatomy of a Construction in Eonavian Spanish*. Tromsø: University of Tromsø dissertation. DOI: <https://doi.org/10.1075/ihll.36.06jar>
- Kamps, Hans & Reyle, Uwe. 1993. *From discourse to logic: An introduction to model-theoretic semantics of natural language, formal logic, and discourse representation theory*. Dordrecht: Kluwer.
- Katz, Graham. 2003. On the stativity of the English Perfect. In Alexiadou, Artemis & Rathert, Monika & von Stechow, Arnim (eds.), *Perfect Explorations*, 205–234. Berlin: Mouton de Gruyter. DOI: <https://doi.org/10.1515/9783110902358.205>

- Klein, Wolfgang. 1994. *Time in Language*. London: Routledge.
- Klein, Wolfgang & Vater, Heinz. 1998. The perfect in English and German. In Kulikov, Leonid & Vater, Heinz (eds.), *Typology of Verbal Categories. Papers presented to Vladimir Nedjalkov on the occasion of his 70th birthday*, 215–235. Tübingen: Niemeyer. DOI: <https://doi.org/10.1515/9783110913750.215>
- Kiparsky, Paul. 1998. Partitive Case and Aspect. In Butt, Miriam & Geuder, Wilhem (eds.), *The Projection of Arguments: Lexical and Compositional Factors*. Stanford: CSLI.
- Kratzer, Angelika. 2014. Situations in natural language semantics. In Zalta, Edward N. (ed.), *Stanford encyclopedia of philosophy*. 2014 edition.
- Krifka, Manfred. 1992. Thematic Relations as Links between Nominal Reference and Temporal Constitution. In Sag, Ivan A. & Szabolcsi, Anna (eds.), *Lexical Matters*, 29–53. Stanford CA: Stanford University.
- Lakoff, George. 1966. *Stative adjectives and verbs in English*. (NSF Report no. 17.) Cambridge, MA: Computational Laboratory, Harvard University.
- Link, Godehard. 1983. The logical analysis of plural and mass terms: a lattice-theoretical approach. In Bauerle, Rainer & Schwarze, Christoph & von Stechow, Arnim (eds.) *Meaning, use, and interpretation of Language*, 302–323. Berlin: de Gruyter. DOI: <https://doi.org/10.1515/9783110852820.302>
- Madden, Carol J., & Zwaan, Rolf A. 2003. How does verb aspect constrain event representations? *Memory & Cognition* 31(5). 663–672. DOI: <https://doi.org/10.3758/BF03196106>
- Magliano, Joseph P. & Schlech, Michelle C. 2000. Verb aspect and situation models. *Discourse Processes* 29(2). 83–112. DOI: https://doi.org/10.1207/S15326950dp2902_1
- Magliano, Joseph P. & Zacks, Jeffrey M. 2011. The Impact of Continuity Editing in Narrative Film on Event Segmentation. *Cognitive Science* 35(8). 1489–1517. DOI: <https://doi.org/10.1111/j.1551-6709.2011.01202.x>
- Maienborn, Claudia. 2008. On Davidsonian and Kimian States. In Comorovski, Ileana & von Heusinger, Klaus (eds.) *Existence : Semantics and Syntax*. Studies in Linguistics and Philosophy, vol. 48. 107–130. Dordrecht: Springer. DOI: https://doi.org/10.1007/978-1-4020-6197-4_4
- Martínez Atienza, María. 2008. Dos formas de oposición en al ámbito románico entre el pretérito perfecto compuesto y el pretérito perfecto simple. In Carrasco Gutiérrez, Ángeles (ed.), *Tiempos compuestos y formas verbales complejas*, 203–229. Madrid-Frankfurt: Iberoamericana. DOI: <https://doi.org/10.31819/9783865278654-007>
- Marx, Elena & Wittenberg, Eva. 2024. Eventuality type predicts temporal order inferences in discourse comprehension. *Glossa Psycholinguistics* 3(1). DOI: <https://doi.org/10.5070/G60116579>
- Michaelis, Laura A. 2004. Type-shifting in construction grammar: A unified model of aspectual coercion. *Cognitive Linguistics* 15. 1–67. DOI: <https://doi.org/10.1515/cogl.2004.001>
- Minor, Sergey & Mitrofanova, Natalia & Guajardo, Gustavo & Vos, Myrte & Ramchand, Gillian. 2022. Temporal Information and Event Bounding Across Languages: Evidence from Visual World EyeTracking. *Semantics and Linguistic Theory* (SALT proceedings) 727–750. DOI: <https://doi.org/10.3765/salt.v1i0.5340>

- Misersky, Julia & Slivac, Ksenija & Hagoort, Peter & Flecken, Monique. 2021. The state of the onion: Grammatical aspect modulates object representation during event comprehension. *Cognition* 214. 104744. DOI: <https://doi.org/10.1016/j.cognition.2021.104744>
- Mittwoch, Anita. 2008. The English resultative perfect and its relationship to the experiential perfect and the simple past tense. *Linguistics and Philosophy* 31. 323–351. DOI: <https://doi.org/10.1007/s10988-008-9037-y>
- Moens, Marc. 1987. *Tense, aspect and temporal reference*. Edinburgh: University of Edinburgh dissertation.
- Moens, Marc & Steedman, Mark. 1988. Temporal ontology and temporal reference. *Computational Linguistics* 14(2). 15–28.
- Nicolle, Steve. 2012. Diachrony and grammaticalization. In Binnick, Robert (ed.), *The Oxford Handbook of Tense and Aspect*, 370–397. Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/oxfordhb/9780195381979.013.0012>
- Pancheva, Roumyana. 2003. The aspectual makeup of Perfect participles and the interpretation of the Perfect. In Alexiadou, Artemis & Rathert, Monika & von Stechow, Arnim (eds.), *Perfect Explorations*, 277–306. Berlin: Mouton de Gruyter. DOI: <https://doi.org/10.1515/9783110902358.277>
- Parsons, Terence. 1990. *Events in the Semantics of English*. MIT Press.
- Portner, Paul. 2003. The (temporal) semantics and (modal) pragmatics of the perfect. *Linguistics and philosophy* 26(4). 459–510. DOI: <https://doi.org/10.1023/A:1024697112760>
- Quine, Willard V. O. 1960. *Word and Object*. Cambridge, MA : MIT Press.
- R Core Team. 2014. *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org/>.
- RAE-ASALE. 2009. *Nueva gramática de la lengua Española*. Madrid: Real Academia Española. Espasa Calpe.
- Ramchand, Gillian. 2018. *Situations and Syntactic Structures*. Cambridge, MA: MIT Press. DOI: <https://doi.org/10.7551/mitpress/10911.001.0001>
- Reichenbach, Hans. 1947. The Tenses of Verbs. *Elements of Symbolic Logic*, 287–98. New York: The Macmillan Company.
- Rips, Lance J. & Hespos, Susan J. 2015. Divisions of the physical world: Concepts of objects and substances. *Psychological Bulletin* 141(4). 786–811. DOI: <https://doi.org/10.1037/bul0000011>
- Rothstein, Susan. 2008. *Structuring Events: A Study in the Semantics of Lexical Aspect*. Blackwell: Oxford.
- Schmitt, Cristina. 2001. Cross-linguistic variation and the present perfect: the case of Portuguese. *Natural Language and Linguistic Theory* 19. 403–453. DOI: <https://doi.org/10.1023/A:1010759911058>
- Smith, Carlota. 1991. *The Parameter of Aspect*. Dordrecht: Kluwer Academic. DOI: <https://doi.org/10.1007/978-94-015-7911-7>

- Sánchez-Marco, Cristina. 2012. *Tracing the development of Spanish participial constructions: an empirical study of semantic change*. Barcelona: Universitat Pompeu Fabra dissertation.
- Squartini, Mario & Bertinetto, Pier M. 2000. The simple and compound past in Romance languages. In Dahl, Östen (ed.), *Tense and aspect in the languages of Europe*, 405–475. Berlin: Mouton de Gruyter. DOI: <https://doi.org/10.1515/9783110197099.3.403>
- Srinivasan, Mahesh & Rabagliati, Hugh. 2015. How concepts and conventions structure the lexicon: cross-linguistic evidence from polysemy. *Lingua* 157. 124–152. DOI: <https://doi.org/10.1016/j.lingua.2014.12.004>
- Stowell, Tim. 1996. The phrase structure of tense. In Rooryck, Johan & Zaring, Laurie (eds.), *Phrase Structure and the Lexicon*, 277–291. Dordrecht: Kluwer. DOI: https://doi.org/10.1007/978-94-015-8617-7_10
- Stowell, Tim. 2008. Where the Past is in the Perfect. In Carrasco Gutiérrez, Ángeles (ed.), *Tiempos compuestos y formas verbales complejas*, 103–118. Madrid: Vervuet. DOI: <https://doi.org/10.31819/9783865278654-004>
- Vanden Wyngaerd, Guido. 2001. Measuring events. *Language* 77. 61–90. DOI: <https://doi.org/10.1353/lan.2001.0057>
- Vendler, Zeno. 1957. Verbs and Times. *The Philosophical Review* 66(2). 143–160. DOI: <https://doi.org/10.2307/2182371>
- Verkuyl, Henk J. 1972. *On the Compositional Nature of the Aspects*. Reidel: Dordrecht. DOI: <https://doi.org/10.1007/978-94-017-2478-4>
- von Stechow, Arnim. 1999. Eine Erweiterte Extended Now-Theorie für Perfekt und Futur [An Extended Now Theory for Perfect and Future Tenses]. *Zeitschrift für Literaturwissenschaft und Linguistik* 113. 86–118. DOI: <https://doi.org/10.1007/BF03379171>
- Wampler, Joshua & Wittenberg, Eva. 2023. Discourse structure affects reference resolution to events in English: Evidence from a new paradigm. In *Proceedings of the Annual Meeting of the Cognitive Science Society* (Vol. 45, No. 45).
- Wellwood, Alexis & Hespos, Susan J. & Rips, Lance. 2016. The object : substance :: event : process analogy. In Lombrozo Tania & Knobe, Joshua & Nichols, Shaun (eds.), *Oxford studies in experimental philosophy* 2, 183–212. Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/oso/9780198815259.003.0009>
- Wiese, Heike & Maling, Joan. 2005. Beers, Kaffi, and Schnaps: Different Grammatical Options for Restaurant Talk Coercions in Three Germanic Languages. *Journal of Germanic Linguistics* 17(1). 1–38. DOI: <https://doi.org/10.1017/S1470542705000012>
- Wittenberg, Eva & Levy, Roger. 2017. If you want a quick kiss, make it count: How choice of syntactic construction affects event construal. *Journal of Memory and Language* 94. 254–271. DOI: <https://doi.org/10.1016/j.jml.2016.12.001>
- Wolff, Susann. 2010. *The interplay of free word order and pro-drop in incremental sentence processing: Neurophysiological evidence from Japanese*. Leipzig: Max Planck Institute for Human Cognitive and Brain Science dissertation.

Zacks, Jeffrey M. & Tversky, Barbara. 2001. Event structure in perception and conception. *Psychological Bulletin* 127(1). 3–21. DOI: <https://doi.org/10.1037//0033-2909.127.1.3>

Zhou, Peng & Crain, Stephen & Zhan, Likan. 2014. Grammatical aspect and event recognition in children's online sentence comprehension. *Cognition* 133(1). 262–276. DOI: <https://doi.org/10.1016/j.cognition.2014.06.018>

