

Origins and development of adjectival passives in Spanish: A corpus study

Cristina Marco and Rafael Marín

Abstract

So far it has been assumed that most uses of Spanish *estar* ‘be.LOC’ arise some time after *ser* ‘be’, and that the former eventually takes over most uses of the latter. Previous analyses of change in *estar* claim that this verb generalizes its usage as a result of some reanalysis or grammaticalization change, presumably taking over the result state and locative uses of *ser*. In this paper we want to go one step further and investigate the questions of how adjectival passive *estar* + participle emerges in Spanish, and how it extends its usage taking over *ser*, based on the empirical analysis of data coming from a large corpus of Spanish containing texts from the 12th to the 20th century. In this paper, we propose that the first and most frequent uses of *estar* determine the way the participial construction emerges and further extends, eventually taking over *ser*, and that the language change mechanism which drives this development is analogy. More specifically, we argue that this development is driven by the analogical relations established between participles appearing with this verb and locative prepositional phrases.

Keywords: Analogy, Copula, Language change, Locative, Adjectival Passives

1 Introduction

This paper addresses the origins and development of adjectival passives expressed by *estar* ‘be.LOC’ plus past participles in current Spanish, as in (1).

- (1) Esta asociación posee una jerga particular, no comprendida por otro mortal alguno,
this association possesses a jargon special not understood by other mortal some
y en ella están escritas todas sus leyes.
and in it are.LOC written all its laws
‘This association has a special jargon, which is not understood by any other human,
and its laws are written in this language.’ (*Lexesp*)

Spanish, unlike English, formally distinguishes between adjectival and verbal passives: in adjectival passives the past participle is combined with an inflected form of *estar* ‘be.LOC’, in verbal passives with *ser* ‘be’. However, historical and synchronic evidence indicate that this situation has gradually arisen over the past centuries. In the earliest centuries *estar* plus past participle (henceforth *estar* + PP) shared the passive domain with *ser* ‘be’ in combination with past participles (*ser* + PP), which in current Spanish only expresses verbal passives. In the 13th century, both *estar* and *ser* were possible in adjectival passives, see (2-a) and (2-b) (taken from Batllori and Roca (2011)).

- (2) b. et está ligado de su onbligo (*Calila e Dimna*: 117)
‘And he is tied up by his navel’
a. El libro es acabado (*Calila e Dimna*: 355)
‘The book is (already) finished’

* This work has been supported by a grant to the project FFI2010-15006 from the Spanish Ministry of Economy and Competitiveness and the European Science Foundation Research Networking Programme NetWordS. We thank two anonymous reviewers for helpful comments on earlier versions of this paper.

Diachronic developments since then have created a two-way passive system analogous to other Indoeuropean languages, such as Greek, German and Hebrew. In this paper we provide quantitative evidence for this change, and explore how it occurred and which language change mechanisms might have driven it.

Previous analyses of change in *estar* claim that the participial construction formed with this verb generalizes its usage as a result of some reanalysis or grammaticalization change, presumably taking over the result state and locative uses of *ser* ‘be’, as in (2-b) and (3); cf. Bouzet (1953), Mendeloff (1964), Pountain (1985) and, more recently, Batllori and Roca (2011).

- (3) a. Hya salieron al campo do eran los moiones (*Çid*, v. 3588)
(they) already went to-the field where were the boundary-stones
‘They already went to the field, where the boundary stones were’
b. et el caño era del pozo Çerca (*Calila e Dimna*: 111)
and the spout was of-the well near
‘and the spout was near the well’

In this paper we argue that the first and most frequent uses of *estar* determine the way the participial construction emerges and further extends eventually taking over *ser*, and that this change is influenced by the analogical relations established between locative prepositional phrases and the past participles combining with *estar*. We provide corpus evidence for these ideas from a large diachronic corpus of Spanish, which will also allow us to explore the complete period of development from the 12th to the 20th century. One of the main ideas we want to argue for is that the semantics of *estar* in the earliest centuries influenced the way it later extended as an adjectival passive.

The paper is structured as follows. Section 2 describes the realization of adjectival passives in current and Old Spanish. Section 3 presents our account to the origins and development of adjectival passives in Spanish. Section 4 presents the corpus and quantitative evidence from the corpus to provide evidence for this change. Finally, section 5 provides further evidence from some examples from the corpus and Section 6 concludes.

2 The problem

2.1 Passives in current Spanish

In English, both adjectival and verbal passives are expressed by *be* in combination with past participles, leaving room for ambiguous interpretation in some contexts (4)¹, in Spanish this ambiguity is drastically reduced thanks to the distinction between the copulas *ser* and *estar*, see (5).

- (4) a. The swimming pool is closed.
b. The swimming pool has been closed.
- (5) a. La piscina *es/está cerrada.
the swimming pool is/is.LOC closed
‘The swimming pool is closed.’

¹ There is a longstanding debate in the literature on the categorization of (past) participles. In the generative tradition, at least since Wasow (1977), research has focused on trying to categorize past participles either as verbs or adjectives. In this paper we try to remain theoretically neutral. We refer the reader to the existing literature on adjectival and verbal passives, cf. Gehrke (2012) and references therein.

- b. La piscina ha sido/estado cerrada.
the swimming pool has been/been.LOC closed
'The swimming pool has been closed.'

As a general rule, in current Spanish the past participle in combination with *ser* forms verbal passives, whereas with *estar* it forms adjectival passives. In (5) there is no ambiguity between verbal and adjectival passives; thus the ability of the participle to refer to these two situations turns out to be clearer in Spanish than in English.

For the purposes of this paper, it is important to note that only participles from telic verbs show the kind of ambiguity illustrated in (4). In fact, these are the sole participles that can be constructed with both *ser* and *estar* in current Spanish. Participles from atelic verbs can only be combined with *ser* and, conversely, *estar* can only combine with participles from telic verbs (Luján, 1981; Bosque, 1990):

- (6) a. El gato ha sido/*estado acariciado/golpeado.
the cat has been/*been.LOC caressed/beaten
'The cat has been caressed/beaten.'
b. El carro ha sido/*estado empujado.
the car has been/*been.LOC pushed
'The car has been pushed.'

As we will see in the following section, passives were expressed quite differently in Old Spanish.

2.2 Passives (and perfects) in Old Spanish

In contrast to present-day Spanish, in earlier centuries past participles exclusively combined with *ser* to express both types of passives, (7). The verbal passive interpretation of (7a) is clear from the use of the adverb *apriessa* 'quickly' that describes how the eventuality unfolds over time; (7b) illustrates the adjectival passive with *ser*, where the adverbial *bien* 'well' modifies the consequent state expressed by the passive.

- (7) a. Eso fue apriessa fecho (*Çid*, v. 1506)
this was quickly made
'This was made quickly.'
b. Non se abre la puerta ca bien era çerrada.
not SE open the door because well was closed
'The door does not open because it was well closed.' (*Çid*, 12th c.)

It did not take long, however, before *estar* was used in adjectival passives as well. As early as the 13th century we can find both verbs in combination with past participles forming adjectival passives. A typical example from this century is the usage shown in (8), where the underlying predicate *enojar* 'to get angry' describes a psychological state of the entity referred to by the subject.

- (8) Et ellos tanto estauan enoiados que lo touieron por bien.
and they so were.LOC annoyed that it had.POSS for good
'And they were so annoyed that they took it well. (*Estoria de España*, Alfonso X el Sabio, 1280)

In the 13th century, *ser* could also appear in similar contexts with predicates such as *cansado* 'tired' in (9), where the predicate is also modified by the degree adverbial *muy* 'very' that can appear only

with adjectival passives (cf. Emonds 2005).

- (9) Pensaron de folgar; ca eran muy cansados.
thought of rest because were very tired
'They thought of resting, as they were very tired.' (*Libro de Alexandre*, 1240)

Similarly, in Old Spanish past participles in combination with *estar* could also express, though very rarely, verbal passives and perfects. (10) illustrates a verbal passive with *estar* + PP, where the predicate is modified by the temporal adverbial *contino* 'continuously', therefore leaving no doubt for the verbal interpretation.

- (10) passamos por una huerta para yr mas adelante hasta dar en una
pass.1PL for a garden to go more ahead until give in a
puerta que contino estava abierta por la gente caminante
door that continuously was.LOC opened by the people walking
'We went through a garden in order to get to a door that was continuously being
opened by the walking people' (*Cancionero de las obras de Juan del Encina*, 1496)

(11) shows an example of an unaccusative predicate, *llegar* 'to arrive', in combination with *estar* describing a perfect event.

- (11) Quando vieron los turcos aquellos vellacos que estauan ya llegados al muro vinieron
when saw the turks those wicked that were.LOC already come to the wall came
de todas partes
of all parts
'When the turks saw those wicked men who had already come to the wall, they came
from everywhere.' (*Gran conquista de Ultramar*, 1290)

Since the earliest centuries *ser* was also combined with intransitives describing change of location such as *entrar* 'to enter' in perfects, as in (12).

- (12) E desde fue llegado ala Çibdat ellos non qujsieron y entrar
and since was come to the city they not want there come
'And since he had arrived in the city, they did not want to go in there.' (*Crónica de Alfonso X*, Alfonso X el Sabio, 1280)

This contrasts with current Spanish, when only auxiliary *haber* is used to form perfects. Both (11) and (12) are ungrammatical to native ears nowadays; the corresponding grammatical sentences are as follows (where the spelling and syntax have been adapted to current Spanish), (13) and (14).

- (13) Cuando los turcos vieron a aquellos vellacos que habían llegado
when the turks saw to those wicked that had arriven
ya al muro, vinieron de todas partes.
already to the wall came of all parts
'When the turks saw those wicked men who had already come to the wall, they came
from everywhere.'
- (14) Y desde que hubo llegado a la ciudad, ellos no quisieron entrar.
and since that had arriven to the city they not wanted go in
'And since he had arrived in the city, they did not want to go in there.'

To sum up, Table 1 illustrates the readings of participial constructions formed with both copulas in

Old Spanish. In the earliest centuries, both *estar* and *ser* in combination with past participles could express adjectival passives, verbal passives and perfects.

In contrast with such variation in the expression of passives in Old Spanish, in current Spanish (as summarised in Table 2) we have an unambiguous two-way system where *ser* is used in verbal passives and *estar* in adjectival passives.²

	Adjectival Passive	Verbal Passive	Perfect
<i>estar</i> + PP	+	+	+
<i>ser</i> + PP	+	+	+

Table 1. Readings of *estar* + PP and *ser* + PP in Old Spanish.

	Adjectival Passive	Verbal Passive	Perfect
<i>estar</i> + PP	+		
<i>ser</i> + PP		+	

Table 2. Readings of *estar* + PP and *ser* + PP in current Spanish.

It seems that over time there was a change whereby *estar* + PP became the only expression of adjectival passives, whereas *ser* + PP only describes verbal passives. The question that we aim to answer in this paper, using both quantitative and qualitative data, is how this change occurred over time.

3 Elements for an account

In order to understand the origins and development of adjectival passives with *estar* in Spanish, it is important to consider the other uses of this verb in the earliest centuries. Furthermore, in passives and perfects, Old Spanish *estar* could also appear in combination with adjectives, gerunds and prepositional phrases.

3.1 Other uses of *estar* and *ser* in Old Spanish

It is well known that in current Spanish *estar* and *ser* are combined with stage level and individual level adjectives, respectively (Arche, 2006). This division was only partly clear in Old Spanish. Since the earliest centuries, individual level adjectives are only found with *ser*, (15), and not with *estar*.

- (15) ella que era mortal et tomo todos los sacramentos dela santa elesia
 she who was mortal and took all the sacraments of the saint church
 ‘She, who was mortal, took all the sacraments in the Saint Church.’ (*Grant cronica de Espanya III*, Fernández de Heredia, 1270)

Moreover, only *ser* is found with stage level adjectives in the 12th century. The first examples of *estar* with stage level adjectives appear in the 13th century, (16).

- (16) Ca el logar frontero & guerrero de vn dia se camja de vn estado a otro
 because the place borderline and warlike of a day SE changes from a state to another

² Perfects would eventually be expressed by *haber* + PP, but an investigation of the perfect would go beyond the scope of this paper, and thus we refer the reader to Mateu (2009) and Rodríguez Molina (2010).

Ca el vn dia estara vazio de gente & otro estara muy lleno
 because the one day will be empty of people & another will be.LOC very full
 ‘Because the borderline and warlike place of a day changes from a state to another.
 Because one day it will be empty of people and another day it will be very full.’
 (*Castigos y documentos*, 1293)

However, in this century, cases of *ser* with this type of adjectives are not uncommon, even in the same document, (18).

- (17) E por eso dixo daujd el profeta dela mjsericordia del señor es llena la tierra
 and for that said David the prophet of-the mercy of-the lord is full the earth
 ‘And for this reason, said David the prophet, the earth is full of Lord’s mercy.’
 (*Castigos y documentos*, 1293)

Since the earliest centuries *estar* could combine with gerunds to form progressives, (18), which is the standard in current Spanish.

- (18) a. Myo Çid don Rodrigo en Valençia esta folgando
 Mio Çid don Rodrigo in Valencia is.LOC enjoying
 ‘Myo Çid Mister Rodrigo is enjoying in Valencia’ (*Çid*, v. 2090)

Examples of *ser* with gerunds, as in (19), are also found in our corpus, albeit very rarely.³

- (19) E si fuere el sennor del ascendente caydo de angulo maguer que
 and if were.LOC the lord of the ascendant fallen of angle although that
 sea llegando a planeta que sea en angulo...
 is arriving to planet that is in angle
 ‘And if the Lord were fallen angular from the ascendant despite the fact that He is
 arriving to the a planet which is angular...’ (*Judizios de las estrellas*, Alfonso X el
 Sabio, 1250)

In locative sentences, both *ser* and *estar* were also found since the earliest documented data, (20) (taken from Batllori and Roca, 2011).

- (20) a. Hya salieron al campo do eran los moiones (*Çid*, v. 3588)
 ‘They already went to the field, where the boundary stones were’
 b. Aqui esta con myo Çid el obispo don Iheronimo (*Çid*, v. 2512)
 ‘Here he is with myo Çid, the bishop Mister Iheronimo’

The two verbs also appear in locative sentences in the 13th century. This coexistence is especially clear in sentences where the predicate is exactly the same, as in (21).

- (21) a. et el caño era del pozo Çerca (*Calila e Dimna*: 111)
 ‘and the spout was near the well’
 b. el caño que está Çerca del pozo (*Calila e Dimna*: 111)
 ‘The spout was near the well’

³ Batllori and Roca (2011) do not document examples of the progressive periphrasis with *ser*. In progressive sentences, only *estar* (as in current Spanish) and certain forms of *sedere* are attested in the earliest centuries, (i).

- (i) a. Myo Çid don Rodrigo en Valençia esta folgando (*Çid*, v. 2090)
 ‘Myo Çid Mister Rodrigo is being at leisure in Valencia’
 b. Ala puerta dela eclesia sediellos sperando (*Çid*, v. 2239)
 ‘He was waiting for them at the church door’

Tables 3 and 4 summarize the other uses of *ser* and *estar* in Old and current Spanish, respectively. As can be seen from these tables, *estar* eventually becomes the only verb that can combine with stage level adjectives and to form the progressive.

	Progressive	IL-adjectives	SL-adjectives	Locative PPs
<i>estar</i>	+		+	+
<i>ser</i>	(+)	+	+	+

Table 3. Other contexts of use of *estar* and *ser* in Old Spanish.

	Progressive	IL-adjectives	SL-adjectives	Locative PPs
<i>estar</i>	+		+	+
<i>ser</i>		+		(+)

Table 4. Other contexts of use of *estar* and *ser* in current Spanish.⁴

Given this variation, which extends beyond the adjectival vs. verbal passive dichotomy, one wonders whether there is a coherent explanation for all these changes. In this paper we argue that it is not simply by chance that *estar* became the only verb used to form adjectival passives in Spanish, but that *estar* in combination with locative prepositional phrases condition how *estar* + PP extended to become the only means to express adjectival passives.

Let us now provide our account to explain how *estar* + PP became the only expression for adjectival passives.

3.2 The theoretical account

The development of *estar* + PP as adjectival passive in Spanish takes place in three stages. First, *estar* becomes a light verb. Secondly, it begins to be combined with past participles. Lastly, past participles in combination with *estar* extend to eventually be the only expression of adjectival passives.

To understand the change of *estar* into a light verb, it is important to remember that this verb derives historically from Latin verb *sto* ‘to remain, to stand’, which was an intransitive verb used either in combination with prepositional phrases to express the location of some entity in space, as in (22a), or to describe the continuation of some state of affairs, as in (22b) (examples taken from Batllori and Roca, 2011).

- (22) a. Sto ad ianuam.
am.1SG in front of door
‘I am in front of the door’
b. Pugna stetit.
battle continued
‘The battle continued’

Despite the fact that the development of participial morphology remains a mystery, the change of verbs describing sitting or staying to copular functions is well documented. The origins and

⁴ As is well known, in current Spanish *ser* is used for the location of events: *El concierto es en el anfiteatro* ‘The concert is.SER in the amphitheater’.

development of passives from copulas have been explored in typological or crosslinguistic studies; see Haspelmath (1990), Heine and Kuteva (2002) and McWhorter (1994), among others. Heine and Kuteva (2002) document this change in Latin, and also in the Indonesian language Imonda, the African Creole language Sango and the Australian language Jiwari (see also Coromines, 1954; Seiler, 1985; Thornell, 1997; and Austin, 1998; respectively, for the original sources).

The proposed change happened as follows. At some point *estar* required combination with locative prepositional phrases. Before this it was an intransitive verb without any arguments. Evidence for this are examples from the 12th century, when *estar* only appears in combination with prepositional phrases or adverbials describing the location of the entity described by the external argument, (23).⁵

- (23) a. Grado a ti sennor padre que estas en alto
thank you lord father who are.LOC in high
'I thank you Lord who are at high.' (*Çid*, 12th c.)
- b. prendo uuestro don Dios que esta en çielo
take your Don God who is.LOC in heaven
'I take your God who is in heaven.' (*Çid*, 12th c.)

As already observed by Bouzet (1953), most of these phrases describe a high location, which suggests that at that time the meaning of *estar* was still constrained such that it could only be combined with some prepositional phrases. Over time *estar* became a light verb and thus it does not longer required combination with prepositional phrases. As a light verb, *estar* can be used as an auxiliary or copula to form passives and, therefore, be combined with past participles.

Examples of the intermediate stage in this change of *estar* from an intransitive verb to a light verb are those where a past participle appears after the locative prepositional phrase, as a secondary predicate describing the subject. Examples of this type are frequent in the 13th century, (24).

- (24) a. Esta figura de vrion es muy mauillosa. ca es fecha como forma de omne que
this figure of Orion is very wonderfull because is done as form of man that
esta en pie uestido.
is.LOC in foot dressed
'This figure of Orion is (very) wonderful, because it is made in the form of a
man who is standing dressed.' (*Libros del saber de astonomia*, Alfonso X el
Sabio, 1277)
- b. E los que estauan en iherusalem encerrados eran partidos en tres uandos.
and the that were.LOC in Jerusalem locked were split in three groups
'And those who were confined in Jerusalem, were divided in three camps.'
(*Estoria de España*, Alfonso X el Sabio, 1280)

Soon after this, past participles with a semantics close to locative prepositional phrases, would begin to combine with *estar*, without the further requirement of a prepositional phrase. Finally, over time *estar* + PP extended as the only expression of adjectival passives, at the expense of *ser* + PP. We expect that this extension of *estar* + PP as the only expression of adjectival passives in Spanish took place before with some predicates, such as those describing psychological states or locations,

⁵ There are some examples of *estar* with gerunds in the 12th century, as in (i), but we assume in this paper that their development is not directly related to the change in adjectival passives with this verb.

(i) Mager los estan lamando ninguno non Responde (*Çid*, 12th c.)
although them are.LOC calling none not answer
'Although they are being called, nobody answers.'

similar in their meaning to (locative) prepositional phrases. The main mechanism to explain this change, we argue, is analogy.

Why is *estar* extended from locative constructions to adjectival passives? Our idea is that adjectival passives share a central part of their meaning with locatives: they both denote states which result from a change of state, that is, stage level (SL) states (Marín, to appear).

According to this account, the origins of *estar* + PP as adjectival passives are an innovation resulting from the analogical relation established through some mapping between the original uses of *estar* with locative PPs (source of the analogy) and *estar* with past participles (target).⁶ In the transfer phase, there is a restructuring (or reanalysis) in the target domain on the basis of the analogical relation established, which enables *estar* to be combined with participles. Reanalysis in the target domain also leads to the loss of some of the uses of *ser*, presumably as the result of some blocking effect motivated by the competition that eventually arises between both domains after the emergence of *estar* + PTCP. Analogical relations are built on the basis of both semantic and morphological similarities between locative prepositional phrases and past participles. The repetition of the innovative pattern (modelled through usage frequency) is essential for the extension of change.

From a synchronic point of view, the analogy between locations (expressed by *estar* in combination with prepositional phrases) and states (expressed by adjectival passives) has been suggested, among others, by Mateu (2002) and Mangialavori (2013).

Mangialavori (2013) proposes a unified semantic account of Spanish copular clauses with *estar* along the lines of the analogy between locations and states (Lyons, 1968, a.o.), supported by the so-called Localist Perspective on stative expressions (Gruber, 1965; Jackendoff, 1990). From the Localist Perspective, states are conceived as abstract or metaphorical locations in which an entity can be situated. In Mangialavori (2013)'s words:

“In view of this, the definition of *estar* clauses as temporary situations, originally posited by traditional studies only for locative utterances, can be argued to apply equally to the different constructions under discussion as long as they are understood as temporally bounded (abstract) situations. Accordingly, the stative utterance is assumed to be construed in full analogy with a spatial expression (to be in a certain position), which is also in agreement with those studies positing that the same conceptual functions we use when dealing with physical space can also be applied to our conception of abstract space (i.e. states).”

An additional parallelism between locations and states can be drawn from the claim that conceptual structure (Jackendoff, 1990) assigned to clauses like *El gato está feliz* ‘The cat is happy’ can be argued to contain a relational element introducing an abstract place which could be regarded as analogous to the (concrete) locative relation in *El gato está en el patio* ‘The cat is in the patio’. Also following the Jackendovian perspective, Mateu (2002) posits that a clause like *El gato está feliz* features) has the following locative structure, (25):

(25) [State BE [Thing CAT], [Place AT [Property HAPPY]]

This suggests that the locative semantic content of *estar* is not necessarily absent in attributive constructions. This possibility follows from the observation that the relational element featuring an

⁶ Existing cognitive models for analogy compute analogies as a 3-phase process (retrieval, generalization by mapping, and transfer) on the basis of a matching strategy between a source and a target domain that can be described by a set of formulas (e.g. Gentner 1988 and subsequent work; Schwering et. al. 2009). The generalized formulas constructed by this algorithm during the mapping process can be interpreted as a new domain of application of the original rules. This set of formulas is incrementally built by repeating the generalization step.

abstract place is not aspectually trivial: even in English, a local situation like *be at* is assumed to hold for a delimited period of time; i.e., it conveys a temporary (or temporally bounded) coincidence between the subject and the predicate. In other words, the aspectual properties featured by *estar* could also be accounted for on the basis of its original locative meaning, since temporal boundedness and contrastiveness are both results of the kind of local situation conveyed by *estar* (entailing a transitory position, thus rendering it equivalent to *be at* and not just *be*), as (26) succinctly summarizes (see also Mangialavori (2013)).

- (26) a. *estar* (= situation in a temporally bounded state of affairs) + A / PP → State
b. *estar* (= location in a temporally bounded state of affairs) + SP / Adv → Location

In fact, there is a unified way to explain the extension of *estar* at the expense of *ser*: *estar* has become the only auxiliar/copular verb used for expressing (temporally) bounded states. From its locative original meaning, *estar* started to express states by analogy as well. As we have seen these states are temporally bound, and in this sense they pattern with SL states (Marín, to appear); which is precisely what all the uses of *estar* have in common: the expression of SL states. This is why *estar* replaced *ser* in adjectival passives and in combination with SL adjectives.

The stative denotation of adjectival passives is commonly assumed (Gehrke, 2012). Here we want to emphasize that adjectival passives denote bounded states or SL states, as defined by Marín (to appear): states presupposing an initial boundary. This is precisely the case for resultant states: they presuppose an initial boundary, the one provided by the culmination of a previous, telic event. Observe that defining SL states this way allows us to simply account for otherwise problematic cases such as *estar muerto* ‘to be dead’, or other ‘once only’ verbs (Parsons, 1990) such as *estar cocido* ‘to be cooked’. This way, the relationship between adjectival passives and *estar* + SL adjectives is quite clear.

Let us turn now to the corpus study.

4 Corpus study

To provide quantitative evidence for this change, we conducted a corpus study of *estar* in a large diachronic corpus of Spanish. The corpus analysis of the development of *estar* + PP will proceed in three steps. First, we will present quantitative evidence for the reanalysis of *estar* as a light verb (section 4.2). Secondly, we will present evidence for the extension of *estar* + PP as the only expression of adjectival passives, and show how this change takes place first with some classes of verbs and later with others (section 4.3). But before presenting the corpus analysis we will briefly introduce the corpus and the strategies used to obtain the data from the corpus.

4.1 Corpus and data retrieval

The data for this study has been obtained from a diachronic corpus of Spanish containing documents from the 12th to the 20th century. This corpus consists of approximately 40 million words and comprises a wide variety of genres (both fiction and non-fiction). The documents in this corpus come from different sources. Data from the 12th century to the 1950s were collected from the electronic texts transcribed and compiled by the Hispanic Seminary of Medieval Studies (HSMS)⁷ (26 million words), *Project Gutenberg*⁸ (10 million words), and *Biblioteca Cervantes*⁹

⁷ Herrera et al. (1997), Nitti and Kasten (1997), Kasten et al. (1997), Corfis et al. (1997), Waltman (1999), O’Neill (1999), Sanchez et al. (2003).

⁸ <http://www.gutenberg.org/>

⁹ <http://www.cervantesvirtual.com/>

(0.4 million words). Additional texts from the years 1978 to 1995 were obtained from *Lexesp corpus* (5.6 million words) (Sebastián-Gallés, 2000). In order to facilitate the statistical analysis of the data, we divided the corpus into four main periods, following the customary division determined by external historical events: Middle Spanish (1100-1492), Modern Spanish (1493-1788), Contemporary Spanish (1789-1974), and Late Contemporary Spanish (1975-2000).

All the words in this corpus are enriched with lemma and part of speech information. *Lexesp corpus* was originally lemmatised and part-of-speech tagged, while texts coming from the other collections were automatically annotated with linguistic information using the open source language analyser FreeLing (Padró et al., 2010; Padró and Stanilovsky, 2012)¹⁰ by Cristina Marco. An Old Spanish tagger, which is an expanded version of the Freeling morphological analyzer for standard current Spanish, was used in order to annotate Old Spanish texts (Sánchez Marco et al., 2011; Sánchez Marco, 2012).

Sánchez Marco (2012) reports an accuracy of 96 percent for the class of word for the tagger used in this study to enrich Old Spanish texts with linguistic information of lemma and part-of-speech. This accuracy is close to state-of-the-art taggers which yield over 97 per cent (see, for example, Collins, 2002; Toutanova et al., 2003; Spoustová et al., 2009; Søgaard, 2010), and thus is sufficient to conduct quantitative analysis over corpus data.

Before analyzing the data, frequency counts of all occurrences of *ser* + PP, and *estar* + PP were obtained from the corpus. The frequency counts were obtained using *IMS Open Corpus Workbench*¹¹ and analyzed with the open source statistical software *R* (R-Development-Core-Team, 2010). In the queries used to obtain these occurrences we allowed a number and a variety of words to appear between *ser* and *estar* and past participles, and also different word orders of both elements. In addition, we also obtained frequency counts of *ser* and *estar* in combination with locative prepositional phrases introduced by *en* 'in'. In these cases *ser* and *estar* are immediately next to prepositional phrases, in order to keep the size of the corpus manageable.

4.2 The grammaticalization of *estar*

The results of the frequency study from the 12th to the 20th century for *ser* and *estar* (in any context) are illustrated in Figure 1. Each point in the graphs corresponds to a single text from the corpus, showing time of composition on the x-axis and the relative frequency of the corresponding construction on the y-axis.¹² The solid line in these graphs is a locally smoothed average emphasizing systematic trends hidden behind the random variation. This line was obtained using the lowess smoother function (available in R), based on locally-weighted polynomial regression (Cleveland, 1981).

As can be seen from the graphs in Figure 1 the frequency of *estar* notably increases from the 12th to the 20th century. This is expected from the change undergone by this verb from a verb describing the location of some entity in space to a light verb used in combination with (i) past participles to form adjectival passives, (ii) SL adjectives, (ii) prepositional phrases describing locations and (iii) gerunds to form the progressive (greater functional meaning). Conversely, as can be seen from the right graph, the frequency of *ser* decreases over time. This is expected as well based on the idea that *ser* loses the possibility to form perfects, adjectival passives, progressives and to combine with SL adjectives and locative adverbials over time. Changes in the frequencies of *estar* and *ser* are highly

¹⁰ <http://nlp.lsi.upc.edu/freeling/>

¹¹ <http://cwb.sourceforge.net/>

¹² Texts in *Lexesp corpus* do not have a specific date of composition. Hence, dates (x-axis) in the Late Contemporary period were randomized in order to plot relative frequencies from the part of the corpus coming from the *Lexesp* collection.

significant (Generalized Linear Model with binomial family and logit link, $p < .001$).

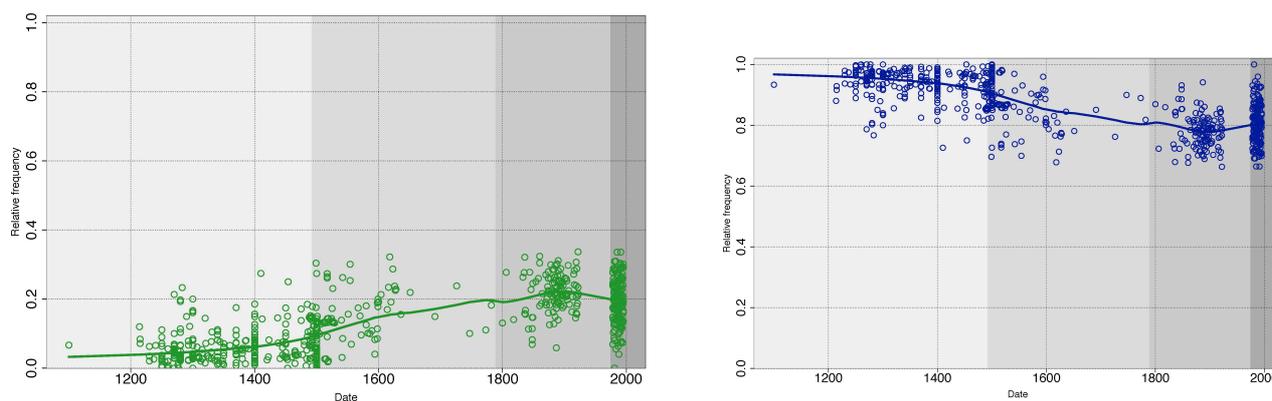


Figure 1: Relative frequency of *estar* (left) and *ser* (right) from the 12th to the 20th century.

Figure 2 illustrates the results of the frequency study from the 12th to the 20th century for *estar* and *ser* with prepositional phrases introduced by *en* ‘in’, as those typically appearing with *estar* since the earliest centuries, recall examples (23-b) and (24-b). As in Figure 1, the frequencies here are obtained by calculating the proportions of *ser* and *estar* in each document.

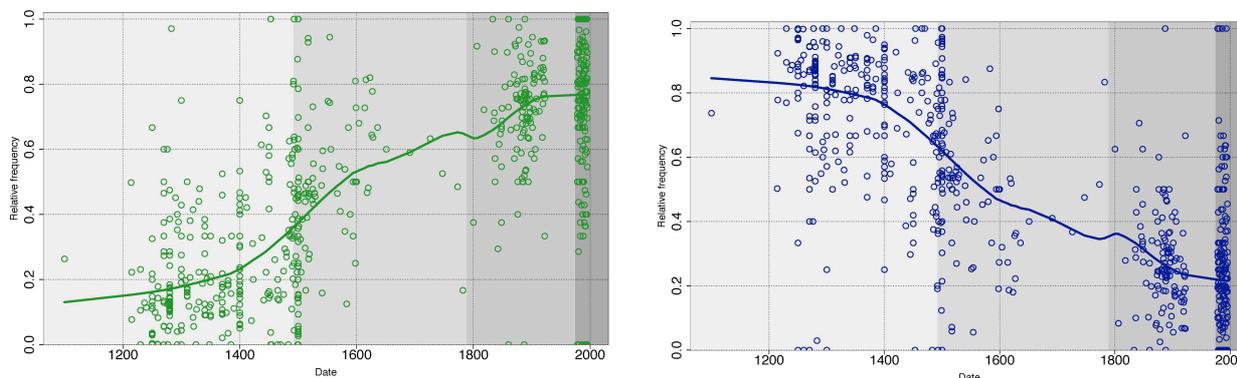


Figure 2: Relative frequency of *estar* with prepositional phrases introduced by *en* ‘in’ from the 12th to the 20th century.

It is clear from this graph that *estar* is frequent with *en*-phrases from the earliest documented century and that its usage frequency increases dramatically from 1400, whereas the frequency of *ser* with these phrases steadily decreases over time. In the 20th century *estar* is almost the only verb used in combination with these phrases.

4.3 The extension of *estar* + PP

Figure 3 illustrates the results of the frequency study from the 12th to the 20th century for *estar* (top graphs) and *estar* (bottom) in combination with past participles. The boxplots (right) compare pooled data for the four periods considered in the corpus, as presented in section 4.1. Boxplots

facilitate the statistical analysis of the data, as the size of the boxes gives a general impression of the dispersion of the frequency data. The lines in the boxplots show the median for each period.

As can be clearly seen from the top graphs in Figure 3, the frequency of *estar* with past participles dramatically increases from the 14th to the 19th century. From the 19th to the 20th century this frequency slightly decreases. In contrast, the frequency of *ser* + PP continuously decreases after the 15th century, which is expected under the assumption that this construction ceases to form adjectival passives and perfects over time.

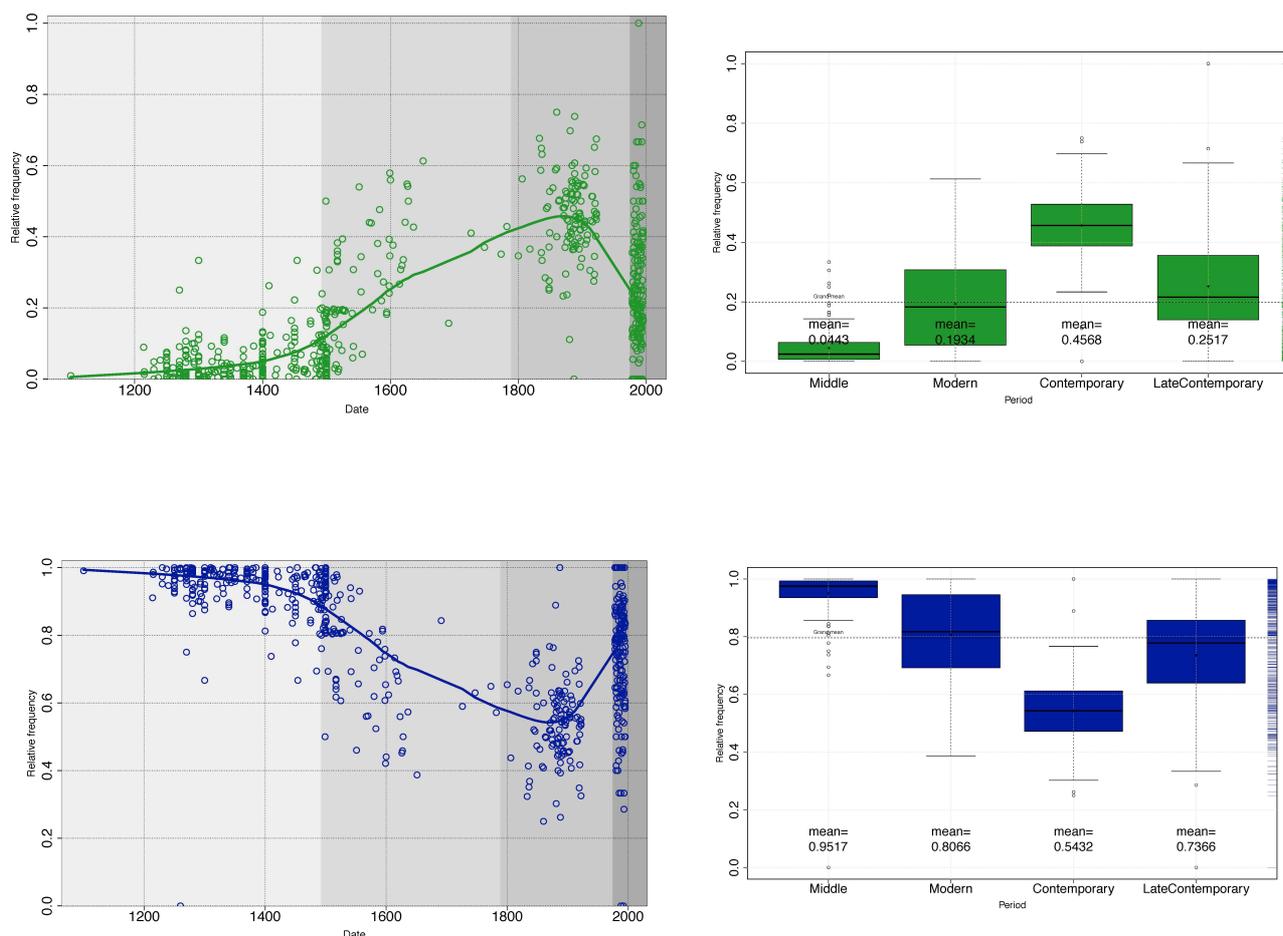


Figure 3: Relative frequency of *estar* (top) and *ser* (bottom) with past participles from the 12th to the 20th century.

By comparing the frequencies of *estar* with prepositional phrases introduced by *en* (presented in Figure 2) with those of *estar* with past participles (in Figure 3), it can easily be seen that the frequency of *estar* with prepositional phrases is higher than with past participles in the earliest centuries. We take this as evidence that those (most frequent) uses of *estar* with prepositional phrases are the ones which influenced the change of *estar* + PP as an adjectival passive. We interpret this as evidence for the idea that the extension of *estar* in combination with prepositional phrases introduced by *en* ‘in’ might have influenced the development of adjectival passives with *estar*, as the former preceded the latter and it has always outnumbered adjectival passives. In analogical processes it is well known that the usage frequency of a given pattern (model) might

influence the target (Bybee and Hopper, 2001; Bybee and Cacoullos, 2008).

To see whether the aspectual type of the underlying predicate in adjectival and verbal passives plays a determining role in the origins and development of adjectival passive *estar* + PP, we investigated *estar* with different semantic types of predicates separately. If change in Spanish adjectival passives was mainly driven by semantics, then we expect to find differences in the frequency changes of *estar* with different types of predicates over time. On the contrary, if the development of adjectival passives with *estar* responds to other factors, we will expect to see that the frequencies with these semantic types of predicates are relatively steady over time.

In order to explore this, we compiled lists of verbs belonging to different aspectual classes following standard tests (Dowty 1979). The list of atelic predicates, containing 100 verbs, includes 50 individual (IL-)level states (e.g. *abundar* ‘to abound’, *admirar* ‘to admire’, *adorar* ‘to adore’, *agradar* ‘to please’, *saber* ‘to know’, *significar* ‘to mean’,...), and 50 activities (*acariciar* ‘to caress’, *andar* ‘to walk’, *bailar* ‘to dance’, *buscar* ‘to search’, *circular* ‘to circulate’, *pasear* ‘to wander around’,...). The list of telic predicates includes 50 locative (25 locatum and 25 location) verbs, e.g. *encarcelar* ‘to jail’, *encadenar* ‘to chain’, and 26 change of state verbs, including accomplishments and achievements, such as *abrir* ‘to open’, *romper* ‘to break’. Lastly, we considered other predicates, with variable aspectual behaviour. In particular, this list includes 100 degree achievements, e.g. *congelar* ‘to freeze’, *alargar* ‘to lengthen’, and 100 object experiencer psychological verbs, e.g. *enfadar* ‘to get angry’, *asustar* ‘to frighten’.

Table 5 summarizes the findings obtained from the corpus of *estar* and *ser* in combination with classical aspectual classes of predicates. The first column in this table indicates the type of predicate and the first line in each row shows the relative percentage of *estar* within each century. The second line shows the proportion of *ser* with the same group of predicates. The third line in each row indicates the total number of *ser* and *estar* with each predicate type.

As can be clearly seen from this table, the proportion of *estar* with atelic predicates (both IL states and activities) is mostly stable and rather low over time. This is expected as atelic predicates cannot appear in adjectival passives; they can only appear in verbal passives.

The frequency of *estar* with change of state predicates increases, especially after the 17th century. It takes place, then, after that of *estar* + PP (cf. Figure 3), which clearly fits our main hypothesis: the stative denotation of adjectival passives has a locative origin.

	Century	13th	14th	15th	16th	17th	18th	19th	20th
IL-state	<i>estar</i>	0.3%	0.4%	0.9%	3.7%	11.6%	20%	14%	13.8%
	<i>ser</i>	99.7%	99.6%	99.1%	96.3%	88.4%	80%	86%	86.2%
Total		4,652	2,347	4,220	1,178	173	60	883	406
Activity	<i>estar</i>	3.5%	1.3%	4.9%	25.5%	26.8%	33.3%	25.5%	10.5%
	<i>ser</i>	96.5%	98.7%	95.1%	74.5%	73.2%	66.7%	74.5%	89.5%
Total		426	371	510	337	41	6	310	285
Change of State	<i>estar</i>	2.9%	1.8%	7.6%	19.5%	40.5%	41.9%	62.4%	52.5%
	<i>ser</i>	97.1%	98.2%	92.4%	80.5%	59.5%	58.1%	37.6%	47.5%
Total		4,425	3,383	3,097	1,247	158	31	764	381

Table 5: The frequency of *ser* and *estar* with aspectual classes of verbs from the 13th to the 20th

century.

Let us then turn to see the changes in the frequency of *estar* with other types of predicates, specifically locatum/location, psychological and degree achievement predicates. Given that these predicates are closer to locations, not only semantically but also morphologically (cf. section 5), we expect to find a higher frequency of *estar* with these predicates since the earliest documented data.

Table 6 illustrates the results from the corpus analysis of the frequency of *estar* and *ser* with locatum and location, (object experiencer) psychological predicates and degree achievements. The frequency of *estar* with all these predicates increases over time, yielding similar, and in some cases higher, frequencies to that of *estar* with change of state verbs (as shown in Table 5).

	Cent.	13th	14th	15th	16th	17th	18th	19th	20th
Locatum/location	<i>estar</i>	2.8%	1.3%	9.5%	59.1%	46.7%	60%	61.9%	52.4%
	<i>ser</i>	97.2%	98.7%	90.5%	40.9%	53.3%	40%	38.1%	47.6%
Total		358	455	284	66	15	5	139	124
OE Psych	<i>estar</i>	7.7%	4.7%	10.7%	30%	53.3%	76%	68.5%	66.2%
	<i>ser</i>	92.3%	95.3%	89.3%	70%	46.7%	24%	31.5%	33.8%
Total		888	724	1,082	510	122	25	1,341	476
Degree Ach.	<i>estar</i>	3.1%	3.5%	4.5%	7.7%	29.4%	21.4%	43%	40%
	<i>ser</i>	96.9%	96.5%	95.5%	92.3%	70.6%	78.6%	57%	60%
Total		897	489	1,018	1,003	34	14	242	140

Table 6: The frequency of *ser* and *estar* with aspectual classes of verbs from the 13th to the 20th century.

Besides, the numbers in Table 6 suggest that the development of *estar* with these predicates occurs at different moments over time. In particular, the verb classes with which the frequency of *estar* increases first and more dramatically are locatum and location verbs (in the 16th century), object experiencer psychological verbs (17th century) and change of state verbs (19th century). Later it extends (but without outnumbering *ser*) to degree achievements. This is summarized in (27).

(27) locatum/location > object experiencer psych > change of state > degree achievement

This development fits our expectations given our account that the development of adjectival passives expressed by *estar* + PP is driven by those cases with a meaning closer to locative prepositional phrases. The corpus data, as presented above, point to a possible explanation in terms of analogy, whereby locative verbs combine first and more frequently with *estar* due to their similarities with locative prepositional phrases that originally combined with *estar*.

5 Discussion

The fact that the development is lead at different stages by locative and object experiencer psychological verbs, which often incorporate a preposition provides further morphological evidence for our account. Location and locatum verbs often are denominal, e.g. *engrasar* ‘to grease’ (*en* ‘in’ + *grasa* ‘grease’), *encarcelar* ‘to imprison’ (*en* ‘in’ + *cárcel* ‘prison’). Likewise, there are many denominal verbs among psych predicates, e.g. *asustar* ‘to frighten’ (*a* ‘to’ + *susto*) ‘fright’, *enfurecer* ‘to get furious’ (*en* ‘in’ + *furia* ‘fury’). An interesting observation is that we do not find

the same extension to other morphologically derived verbs, which have a related adjective, that is degree achievements, instead of a noun (e.g. *alargar* ‘to lengthen’, *ampliar* ‘to widen’).

The following examples from the corpus provide further evidence for the idea that analogy was the driving force in the extension of adjectival passives expressed by *estar* + PP in Spanish. In these examples, the formal and semantic similarities between prepositional phrases, (a) examples, and participles, (b) examples, that might have been the basis for the analogical change, are transparent. (28) shows examples of a locative prepositional phrase introduced by *en* ‘in’ (*en castillo* ‘in castle’) and a similar location predicate (*encastellado* ‘lit. in-castled’).

- (28) a. Ca el que es de buen coraçon sabe sofrir & lidia esforçada mente
because the that is of good heart knows suffer and fights hardly
como sy estudiase en Castillo
as if were.LOC in castle
‘Because the one who has a good heart knows how to suffer and fights as if he were in a castle’ (*Libro del Cauallero Çifar*, 1214)
- b. Ffablades como omne: que esta encastellado Mas sy prender uos puedo:
talk like man that is.LOC in castle-d but if take you can
de fuera de sagrado Seades bien seguro: que seredes colgado
of out of sacred be well safe that be hung
‘You talk like a man who is in a castle; but if I can take you, you can be certain that you will be hung’ (*Obras de Gonzalo de Berceo*, Gonzalo de Berceo, 1230)

Finally, (30) shows examples of a prepositional phrase describing a more abstract location (*en sanna* ‘in rage’), (30a) and a similar object experiencer psychological predicate (*ensannado* ‘enraged’) (30b).

- (30) a. conuiene al omne que sepa medida en sanna & en la yra. que
is convenient to the man that knows measure in rage and in the anger that
non sea su sanna muy fuerte ni muy prolongada.
not be his rage very strong nor very long
‘Men should be cautious in rage and anger. Their rage should not be very strong nor for a long time.’ (*Poridat de poridades*, 1250)
- b. Alexandre fue yrado. Manda lidiar cuemo estaua ensannado.
Alexandre was annoyed. order fight as was.LOC in-rage-d
‘Alexandre was annoyed. He made them fight because he was enraged.’
(*Libro de Alexandre*, 1240)

6 Concluding remarks

In this paper we explored the origins and development of adjectival passives with *estar* + PP on the basis of corpus evidence from a large diachronic corpus of Spanish. As we have seen, firstly *estar* takes over uses of *ser* in locative constructions and then with past participles. In addition, we have provided evidence for the idea that the extension of *estar* + PP as the only expression for adjectival passives in Spanish takes place with some predicates before others. More specifically, in the following order: locatum and location verbs, object experiencer psychological predicates, change of state verbs, and lastly, degree achievements. We have argued that the main mechanism for this change are the analogical relations established on the basis of semantic and morphological similarities between locative prepositional phrases and the first participles combining with *estar*.

References

- Arche, M. J. (2006). *Individuals in time: tense, aspect and the individual/stage distinction*. Amsterdam: John Benjamins.
- Austin, P. (1998). 'Crow is sitting chasing them': Grammaticalisation and the verb 'to sit' in the Mantharta languages, Western Australia. In A. Siewierska and J. Jung Song (Eds.), *Case, typology and grammar: In honor of Barry J. Blake*, ed., Typological Studies in Language, 38. Amsterdam/Philadelphia: John Benjamins.
- Batllori, M. & Roca, F. (2011). Grammaticalization of *ser* and *estar* in Romance. In D. Jonas, J. Whitman, and A. Garrett (Eds.), *Grammatical change: Origins, Nature, Outcomes*, ed., chapter 4. Oxford University Press.
- Bosque, I. (1990). Sobre el aspecto en los adjetivos y en los participios. In *Tiempo y aspecto en español*, ed. I. Bosque, 177–211. Cátedra.
- Bouzet, J. (1953). Orígenes del empleo de *estar*: Ensayo de sintaxis histórica. In *Estudios dedicados a Menéndez Pidal*. Consejo Superior de Investigaciones Científicas.
- Bybee, J., and P. Hopper. (2001). *Frequency and the emergence of linguistic structure*. Amsterdam: John Benjamins.
- Bybee, J. & Torres Cacoullos, R. (2008). Phonological and Grammatical Variation in Exemplar Models. *Studies in Hispanic and Lusophone Linguistics* 1:399–413.
- Cleveland, W. S. (1981). Lowess: A program for smoothing scatterplots by robust locally weighted regression. *The American Statistician*.
- Collins, M. (2002). Discriminative training methods for Hidden Markov Models: Theory and experiments with Perceptron Algorithms. In *Proceedings of the ACL-02 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 1–8.
- Corfis, I. A., O'Neill, J. & Beardsley, T. S. Jr. (Eds.) (1997). *Early Celestina Electronic Texts and Concordances*. Wisconsin: Hispanic Seminary of Medieval Studies, Ltd. Madison.
- Coromines, J. (1954). *Diccionario crítico etimológico de la lengua española*. Francke Verlag.
- Emonds, J. (2005). Adjectival passives: The construction in the Iron Mask. In M. Everaert & H. van Riemsdijk (Eds.), *The Blackwell Companion to Syntax, Volume I*, 16-60. Oxford: Blackwell.
- Gehrke, B. (2012). Passive states. In V. Demonte & L. McNally (Eds.), *Telicity, Change, and State: A Cross-Categorial View of Event Structure*, 185-211. Oxford: Oxford University Press.
- Gentner, D. (1988). Metaphor as structure mapping: The relational shift. *Child Development*, 59, 47-59.
- Gruber, J. (1965). *Studies in lexical relations*. Doctoral Dissertation, M.I.T.
- Haspelmath, M. (1990). The grammaticization of passive morphology. *Studies in Language* 14.1:25–71.
- Heine, B. & Kuteva, T. (2002). *World lexicon of grammaticalization*. Cambridge: Cambridge University Press.
- Herrera, M.T. & González de Fauve, M.E. (1997). *Concordancias electrónicas del corpus médico español*. Wisconsin: Hispanic Seminary of Medieval Studies, Ltd. Madison.
- Jackendoff, R.S. (1990). *Semantic Structures*. Cambridge, MA: MIT Press.
- Kasten, L., Nitti, J. & Jonxis Henkemens, W. (Eds.) (1997). *The Electronic Texts and Concordances of the Prose Works of Alfonso X, El Sabio*. Wisconsin: Hispanic Seminary of Medieval Studies, Ltd. Madison.
- Luján, M. 1981. The Spanish copulas as aspectual indicators. *Lingua* 54:165–210.
- Lyons, J. (1968). Existence, location, possession and transitivity. In van Rootselaar, B. & Staal, J. F. (Eds.), *Logic, methodology and philosophy of science*, 495–504. Amsterdam: North-Holland.
- Mangialavori, M.E. (2013). Conciliating States and Locations: Towards a More Comprehensive and In-Depth Account of the Spanish Copula *Estar*. *Studies in Hispanic & Lusophone Linguistics* 6(1), 37-77.
- Marín, R. (to appear). In Gutiérrez-Rexach, J. (Ed.), *Ser y estar*. In *Enciclopedia de lingüística hispánica*. Londres / New York: Routledge.

- Mateu, J. (2002). *Argument structure: Relational construal at the syntax semantics interface*. Doctoral Dissertation, Universitat Autònoma de Barcelona.
- Mateu, J. 2009. Gradience and auxiliary selection in Old Catalan and Old Spanish. In *Historical syntax and linguistic theory*, ed. P. Crisma and G. Longobardi. Oxford: Oxford University Press.
- McWhorter, J. (1994). From Focus Marker to Copula in Swahili. In *Proceedings of the Twentieth Annual Meeting of the Berkeley Linguistics Society: Special Session on Historical Issues in African Linguistics*, 57–66.
- Mendeloff, H. (1964). The passive voice in Old Spanish. *Romanistisches Jahrbuch*, 269–287.
- Nitti, J. & Kasten, L. (Eds.) (1997). *The Electronic Texts and Concordances of Medieval Navarrese-Aragonese Manuscripts*. Wisconsin: Hispanic Seminary of Medieval Studies, Ltd. Madison.
- O’Neill, J. (Ed.) (1999). *Electronic Texts and Concordances of the Madison Corpus of Early Spanish Manuscripts and Printings*. Wisconsin: Hispanic Seminary of Medieval Studies, Ltd. Madison.
- Padró, L., Collado, M., Reese, S., Lloberes, M. & Castellón, I. (2010). Freeling 2.1: Five years of open-source language processing tools. In *Proceedings of the 7th Language Resources and Evaluation Conference (LREC 2010)*. Malta: ELRA.
- Padró, L. & Stanilovsky, E. (2012). Freeling 3.0: Towards wider multilinguality. In *Proceedings of the Language Resources and Evaluation Conference (LREC 2012)*. Istanbul, Turkey.
- Pountain, C. J. (1985). Copulas, Verbs of Possession and Auxiliaries in Old Spanish: The evidence from Structurally Interdependent Changes. *Bulletin of Hispanic Studies*, 62.
- R-Development-Core-Team (2010). *R*. Viena: R Foundation for Statistical Computing.
- Rodríguez Molina, J. 2010. *La gramaticalización de los tiempos compuestos en español antiguo: cinco cambios diacrónicos*. Doctoral Dissertation, Universidad Autónoma de Madrid.
- Sánchez, M.N., Herrera, M.T. & Zabía, M.P. (Eds.) (2003). *Textos medievales misceláneos*. Wisconsin: Hispanic Seminary of Medieval Studies, Ltd. Madison.
- Sánchez Marco, C. (2012). *Tracing the development of Spanish participial constructions: An empirical study of semantic change*. Doctoral Dissertation, Universitat Pompeu Fabra.
- Sánchez Marco, C., Boleda, G. & Padró, L. (2011). Extending the tool, or how to annotate historical language varieties. In *Proceedings of the 5th ACL-HLT Workshop on Language Technology for Cultural Heritage, Social Sciences, and Humanities (LaTech)*. Portland, OR, USA.
- Sebastián-Gallés, N. (2000). *Lexesp: Léxico Informatizado Del Español*. Barcelona: Edicions Universitat Barcelona.
- Seiler, W. (1985). Imonda, a Papuan language. Number 93 in *Pacific Linguistics series B*. Canberra: Department of Linguistics Research School of Pacific Studies.
- Søgaard, A. (2010). Simple semi-supervised training of part-of-speech taggers. In *Proceedings of the ACL 2010 Conference Short Papers*, 205–208. Uppsala, Sweden: Association for Computational Linguistics.
- Spoustová, D., Hajic, J., Raab, J. & Spousta, M. (2009). Semi-supervised Training for the Averaged Perceptron POS Tagger. In *Proceedings of the 12th Conference of the European Chapter of the ACL (EACL 2009)*, 763–771. Athens, Greece: Association for Computational Linguistics.
- Thornell, C. (1997). *The Sango language and its lexicon*. Lund: Lund University Press.
- Toutanova, K., Klein, D., Manning, C. D. & Singer, Y. (2003). Feature-rich partof-speech tagging with a cyclic dependency network. In *Proceedings of the 2003 Conference of the North American Chapter of the Association for Computational Linguistics on Human Language Technology (NAACL)*, 173–180. Edmonton, Canada: Association for Computational Linguistics.
- Waltman, F. (Ed.) (1999). *Textos y concordancias electronicos del Fuero general de Navarra*. Wisconsin: Hispanic Seminary of Medieval Studies, Madison.