

Evolution of possessive determiners: A uniform change hypothesis for French, Spanish, and Portuguese

Alexandra Simonenko

*Research Foundation Flanders & Ghent
University*
alexandra.simonenko@ugent.be

Anne Carlier

Sorbonne University, EA STIH
anna.carlier@sorbonne-universite.fr

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Abstract

This paper deals with a diachronic shift in the semantics and morphosyntax of possessive DPs in Romance languages. Until now, the prevalent view has been that their evolution follows one of the two diachronic paths: either they stop co-occurring with determiners (French, Spanish) or they start requiring their presence (European Portuguese). Contrary to the common analysis which associates the first case with a transition from a modifier to a determiner semantics of possessives and the second with a retention of a modifier semantics (e.g. Alexiadou 2004), we propose that the only change affecting all Romance languages is the passage from NP to DP grammar, while the semantics of possessives stays unchanged. We argue that the only point of evolutionary divergence is which of the two pre-existing possessive paradigms language retains. Using novel quantitative corpus data, we show for the first time that French, Spanish, and Portuguese undergo exactly the same diachronic evolution: the frequency of determiners goes monotonously up with one possessive paradigm (long forms) and goes up and then down with the other (short forms). The paper contributes to our understanding of evolutionary divergence and convergence, the nature of language change, and the morphosyntax and semantics of possessive DPs by adducing empirical evidence from three novel cases of failed change.

Keywords: language change; failed change; language divergence; possessive DP; semantics of possessives; morphosyntax of possessives; determiners; existential presupposition; medieval French; medieval Portuguese; medieval Spanish

1 Introduction

The goal of this paper is to provide a unified analysis of the diachronic evolution of possessive phrases in Romance languages. Existing analyses for different Romance languages are based on the following empirical picture: in languages such as French or Spanish there is an emerging ban on the co-occurrence of adnominal possessives with overt determiners while in others, such as Portuguese and Italian, there is a emerging requirement of their co-occurrence. We adduce novel quantitative evidence from a variety of diachronic corpora showing that the evolutionary scenarios are both more nuanced and much more alike than previously thought.

All early medieval Romance languages feature adnominal possessive morphemes which can co-occur with determiners in the prenominal position. Examples (1)–(3) illustrate this for medieval French, Spanish, and Portuguese.

- (1) MEDIEVAL FRENCH
la tue aname el ciel seit absoluthe!
 DEF your soul in.DEF heaven be.SBJ absolved
 “...that your soul may be absolved in heaven!” 10XX-ALEXIS-PENN-V,82.751
- (2) MEDIEVAL SPANISH
bevemos so vino e comemos el so pan
 we.drink their wine and we.eat DEF their bread
 “We are drinking their wine and we are eating their bread.” Cid, 1104, cited from Ishikawa (1997: 62)]
- (3) MEDIEVAL PORTUGUESE
u o seu nome era escrito
 where DEF his name was written
 “... where his name was written.” Graal,1245, cited from Labrousse (2018: 1620)

The evolutionary outcome for this configuration is different depending on each language. In Modern French and Spanish, prenominal possessives never co-occur with determiners, as (4) and (5) show.

- (4) MODERN FRENCH
Que (*la) ton âme soit absolue !
 that DEF your soul be.SBJ absolved
 “That your soul may be absolved!”
- (5) MODERN SPANISH
Puedes tomar (*el) mi libro
 you.can take DEF my book
 “You can take my book.”

European Portuguese, along with other Romance languages such as Italian that we do not consider here, took a seemingly opposite path: Modern European Portuguese requires that prenominal possessives be accompanied by a determiner, as in (6).

- (6) MODERN (EUROPEAN) PORTUGUESE
 *(Os) **meus** dias são melhores que **as** **vossas** noites
 DEF my days are better than DEF your nights
 "My days are better than your nights." From Miguel (2002: 221)

The (non)co-occurrence property has been analysed as reflecting the morphosyntactic status of possessives (for references see Alexiadou (2004)). Lyons (1985) draws a distinction between adjectival and determiner-like possessives and adjectival-genitive-languages and determinative-genitive languages, respectively. Cardinaletti (1998), in her seminal work on the typology of possessive forms, distinguishes between three types of adnominal possessives: strong possessive adjectives, weak possessive adjectives, and (clitic) possessive determiners. While the former two types can co-occur with determiners, the latter cannot because, according to Cardinaletti (1998), it syntactically incorporates into D, which precludes the use of another determiner.

On this view, the contrast between (4)-(5) on the one hand and (6) on the other indicates that in French and Spanish prenominal possessives switched their status from XP to X^o (D^o) (e.g. Alexiadou 2004, Van Peteghem 2012), while in Portuguese (and other languages with similar patterning) they did not.

We argue, however, against the reanalysis of prenominal possessive morphemes. Instead, on the basis of quantitative corpus evidence, we show that all possessive phrases in all Romance languages under consideration underwent the same change, the rise of frequency of overt determiners. Again, uniformly across Romance languages this change succeeded with one type of possessive morphemes in prenominal position, long possessives, and failed with another, short possessives. The difference in the outcome between the languages is determined by one factor: which possessive paradigm was retained in the prenominal position and which was lost. We offer an analysis of the pan-Romance rise in determiner frequency in terms of a shift to a new grammar involving relational DPs.

This paper focuses on prenominal possessives because in it is in the prenominal position that we register evolutionary changes in the co-occurrence of possessives and determiners reflecting, we argue, the spread of relational DPs in possessive noun phrases on a definite interpretation.

This paper is organized in the following way. In the next three sections we present philological and quantitative data on the distribution of prenominal possessives and determiners in French (section 2), Spanish (section 3) and Portuguese (section 4).

We present syntactic and semantic details of the proposed unified account in section 5 and conclude in section 6.

2 French

In this section we present novel quantitative corpus evidence suggesting that the pan-Romance rise in determiner frequency proceeded very differently with two different morphological types of possessives in French, short and long.

2.1 Two possessive paradigms

Old French features two morphologically distinct paradigms of adnominal possessive morphemes. The two paradigms are illustrated for the first person possessives in tables 1–2 from Buridant (2019: 219). We label the paradigms “short” and “long” as pre-theoretical descriptions referring only to their relative phonological weight.¹

		SINGULAR	PLURAL		
		NOMINATIVE	OBLIQUE	NOMINATIVE	OBLIQUE
MASCULINE	mes	mon	mi	mes	
FEMININE	ma	ma	mes	mes	

Table 1: Old French short adnominal possessive forms.

		SINGULAR	PLURAL		
		NOMINATIVE	OBLIQUE	NOMINATIVE	OBLIQUE
MASCULINE	miens	mien	mien	miens	
FEMININE	meie	meie	meies	meies	

Table 2: Old French long adnominal possessive forms.

By the end of the fourteenth century, long forms virtually go out of use.² We investigate the distribution of the two series in the treebanks of Martineau et al. and

¹ In the literature the labels stressed/unstressed (or *tonique/atone* in French) are sometimes used (e.g. Buridant (2019)). We opt for long/short to stay agnostic with respect to the phonological status of the forms in question.

² Today, adnominal long forms are attested sporadically in an archaic or ironic style, e.g. *cette mienne vie* lit. “this mine life” (M. Proust, *À la recherche du temps perdu*, 1913). Their only synchronically active use is in elliptical constructions, as in *j'ai pris ton livre et le mien* (“I took you book and mine”).

Kroch & Santorini (2010). We extracted from these corpora all noun phrases with possessives in 1st, 2nd, or 3rd person singular ($N=25,104$ noun phrases), since only these distinguish between short and long forms.

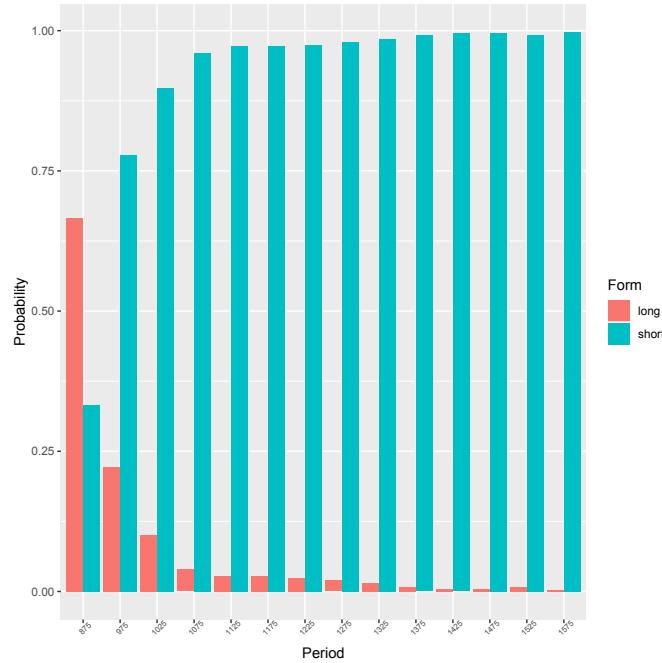


Figure 1: Short and long prenominal possessives in French.

There is no consensus in the literature as to whether or to which extent the morphological contrast is a reflection of syntactic and semantic differences. Gamillscheg (1957) argues that the choice between the paradigms is governed by metrical considerations only.³ Arteaga (1995) notes that the two types can be coordinated, which suggests their syntactic and semantic equivalence. In contrast, Buridant (2019) and Butet (2018) argue that the two series differ with respect to the possibility of co-occurrence with determiners: while short forms tend to not co-occur, long forms tend to do so. Butet (2018) takes the co-occurrence to be a hallmark of an adjectival status, and absence of co-occurrence as a signature of the determiner status. Our corpus data show that both types of possessives do occur with and without determiners at higher than chance rates. However, as we will demonstrate below, diachronic quantitative profiles differ dramatically.

³ Cited from Alexiadou (2004).

2.2 Co-occurrence with determiners

Examples (7) and (8) illustrate co-occurrence of a short form *tos* and a long form *tuen*, respectively, with an *l*-determiner (i.e., *le/lalles*).⁴

- (7) Los **tos** enfanz qui in te sunt, a males penas_aucidront;
 DEF your.SHORT children that in you are to bad pains succumb
 “Your children inside you will succumb to violent pains”.
 (1000-PASSION-BFM-P,100.41)
- (8) E tantes lermes pur le **tuen** cors plurét
 and many tears for DEF your.LONG body cried
 “And she shed so many tears after you.” (10XX-ALEXIS-PENN-V,95.860)

Examples (9) and (10) illustrate co-occurrence of short and long forms, respectively, with indefinite determiners.

- (9) il aueit un sol cheual qu il balia a **un** **son** parent.
 he had a single horse which he took to INDEF his relative
 “he had a single horse, which we had taken from a relative of his.” (122X-PSEUDOTURPIN-P-MCVF,270.180)
- (10) Mais uns **siens** moines donat sa pense a mobiliteit,
 but one his.LONG monk gave his though to moving
 “But one of his monks was planning to leave.” (1190-DIALGREG2-BFM-P,92.815)

In Modern French, co-occurrence of (short) possessives with any determiner type is strictly ungrammatical, as (11) and (12) illustrate.

- (11) MODERN FRENCH
 Que (***la**) **ton** âme soit absolue !
 that the your soul be absolved
 “That your soul may be absolved!”
- (12) MODERN FRENCH
 Il veut parler de (***un**) **son** fils.
 he wants speak of a his son
 “He wants to talk about his son.”

⁴ We exclude from considerations vocative noun phrases, as well as de-noun phrases, either partitive or in the scope of negation or a quantifier (e.g. *Pierre n'a pas d'eau* “Pierre doesn't have any water”, *Pierre a bu beaucoup d'eau* “Pierre has drank a lot of water”); and noun phrases with quantifiers, since those are incompatible with morphologically overt determiners. We are also dealing here only with possessives which occur with full nominal predicates, leaving aside possessive pronouns used in nominal ellipsis cases, which morphologically look like long forms.

We now proceed to the assessment of possible quantitative diachronic trends. To this end, we fit logistic regression models of the form in (13) to three datasets: noun phrases with short possessives ($N=24,607$ noun phrases), noun phrases with long possessives ($N=497$ noun phrases) and noun phrases without possessives ($N=186,768$ noun phrases).

$$(13) \quad P(\text{Determiner} = \text{yes} \mid \text{Date} = d) = \frac{1}{1+e^{-(\alpha+\beta d)}}$$

The logistic function, which describes processes that have phases of a slow take-off, rapid growth, and again a slow attenuation, has been identified as a model particularly suitable for capturing (successful) language changes (see Altmann et al. (1983), Kroch (1989), Niyogi & Berwick (1997), and Kauhanen & Walkden (2018) for details).

The model predicts the probability that the binary variable Determiner takes on the value *yes* given variable Date as a predictor. The coefficient β reflects the importance of the time factor for predicting the determiner probability, while α corresponds to the predicted probability at an (idealized) time point 0.

In the model fit to the dataset with short possessives, the coefficient equals -0.00937 , which happens to be a highly statistically significant value ($p < 2 \times 10^{-16}$). This means that the likelihood that the perceived diachronic trend is due to chance and in reality the weight of the time factor is zero is very small. That the coefficient is negative means that that for the higher values of date the model predicts lower probabilities of determiner appearance or, put differently, that the frequency of determiners decreases over time.

With noun phrases with long possessives we find an opposite trend. The frequency of determiners in noun phrases with long possessives increases in Old French at a statistically significant positive rate of 0.00694 ($p = 1.3 \times 10^{-9}$).

Finally, a model fitted to a dataset of noun phrases without possessives has the coefficient 0.00096 ($p < 2 \times 10^{-16}$), indicating a positive trend in the frequency of determiners across time in noun phrases without possessives.

The three logistic regression models are plotted in Figure 2 together with data points which correspond to the empirical frequencies of determiners in the three types of noun phrases in 50 year intervals. Specifically, the plotted relative frequency corresponds to the proportion of noun phrases with a determiner (definite, indefinite or demonstrative) among all relevant noun phrases. Each point corresponds to the proportion plotted at the middle of a given 50 year span, for instance, for the span 1100–1150, we plot a dot at 1125 on the x-axis with y-value corresponding to the average frequency for the texts in this period.

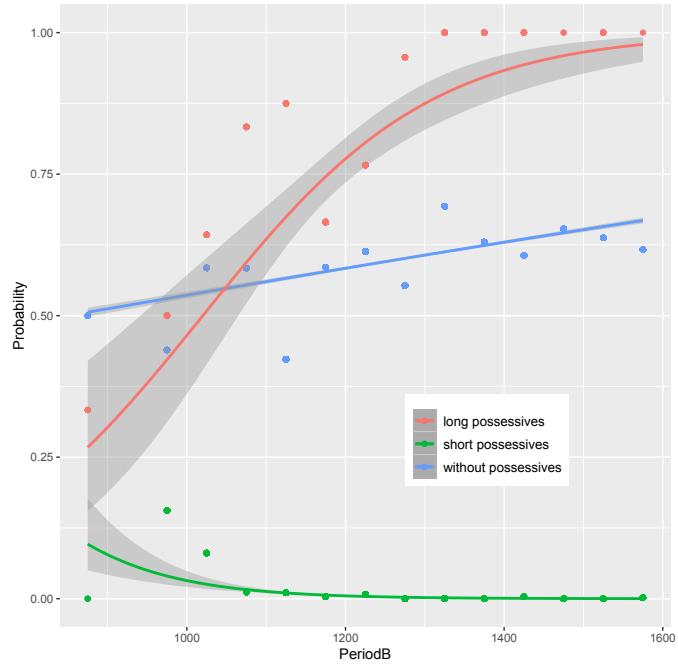


Figure 2: Determiners in noun phrases with and without possessives in French.

It clearly appears that the frequency of determiners in noun phrases with long possessives goes towards its maximum before long possessives disappear from the language. This development corresponds (not in rate but in direction) with the process we see in noun phrases without possessives. The dynamics of the noun phrases with short possessives is more complex.

2.3 *A failed change*

Although the model fitted to the noun phrases with short possessives detects a diachronic trend, it does not fit the data particularly well when it comes to the texts composed before 1000. Moreover, a simple look at the distribution of data points allows to detect a different, non-monotonous trend, namely, the rise of the determiner frequency before 1000 and a decline afterwards. This perceived trend is strongly reminiscent of failed changes discussed in Postma (2010). Note that this evolutionary trend may be expected on theoretical grounds. Recall that Late Latin did not have definite or indefinite determiners, but that in particular the *l*-determiners are already frequent in the oldest French texts. Therefore, the stage of the determiner loss in noun phrases with short possessives that we clearly observe in Old French after 1000 must have been preceded by their *rise*.

A failed change is not a particularly rare phenomenon. On the basis of data presented in Oliveira e Silva (1982), Postma (2010) argues that in Brazilian Portuguese, the frequency of determiners in noun phrases with possessives first rises and then goes down between 1650 and 1850. Another example is the failed *do*-support in positive declarative contexts in English. This construction grows in frequency from around 1500 to 1560 and rapidly declines afterwards, because *do*-support in positive declaratives is not a semantically viable option (Postma 2010). The distribution of *to*-marking with the recipient argument in English ditransitive constructions has likewise been analyzed as a failed change by Bacovcin (2017).

Formal properties of such changes are discussed, in particular, in Postma (2010), who proposes that they correspond mathematically to the first derivative of the logistic regression representing the corresponding successful change. The first derivative of a logistic regression in (13) is given in (14).

$$(14) \quad P(\text{Determiner} = \text{yes} \mid \text{Date} = d)' = \frac{e^{-(\alpha+\beta d)}}{(1+e^{-(\alpha+\beta d)})^2}$$

To see if such a model suits our data better, we fit it to the determiner (non)occurrence in the set of noun phrases with short possessives. The result is illustrated in Figure 3, where green points correspond to 50 year bins (used for model fitting) and black ones – to determiner frequencies in individual texts, which are unevenly distributed across centuries.

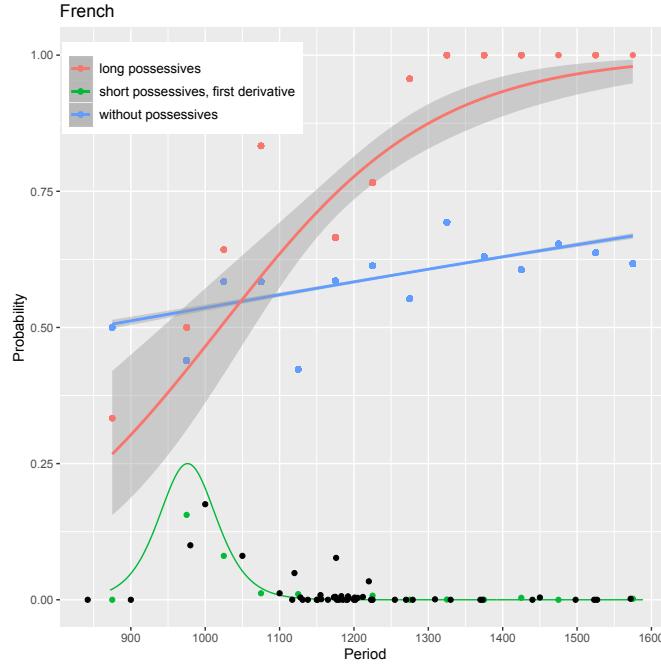


Figure 3: First derivative model for determiners in noun phrases with short possessives.

Sparsity of determiner occurrences in noun phrases with short possessives in general and before 1000 in particular makes it difficult to compare the simple logistic vs. first derivative models. Specifically, because the positive cases are so few, at the 0.5 probability cutoff point (an arbitrary threshold used to convert model's probabilistic predictions to categorical values for accuracy estimations), both models have an extremely high accuracy (0.996), simply because they effectively predict zeros everywhere. In particular, both models have zero specificity (share of cases predicted to be positive among empirical positives). This is not very informative, however, because we are concerned precisely with capturing the distribution of the few positive cases we have. We therefore lower the cutoff point to 0.01, because the frequency of determiner occurrence never exceeds 16% of determiner occurrence and because even 1% of determiner use is important for us to capture. At this cutoff, the accuracy of the simple logistic model goes down to 0.94 because many negative cases are classified as positive (1336). At the same cutoff point, the accuracy of the first derivative model is somewhat higher, 0.96, because, while specificity goes up (29 or about one third of the empirical positives are now predicted to be positive), there are fewer misclassified negatives (763) compared to the simple logistic model (1336). Table 3 offers a summary of these results.

FIRST DERIVATIVE MODEL		
Predicted	Observed	
	bare	det
bare	23746	69
det	763	29
Accuracy	$\mu = 0.966, 95\% \text{ CI} : (0.9639, 0.9684)$	

LOGISTIC MODEL		
Predicted	Observed	
	bare	det
bare	23173	63
det	1336	35
Accuracy	$\mu = 0.943, 95\% \text{ CI} : (0.9402, 0.946)$	

Table 3: Confusion matrices at 0.01 probability cutoff.

Although neither model is highly efficient in predicting the empirical outcome, the first derivative model is striking a better balance between predicting true positives (i.e. determiner frequencies above 1%), while not predicting false positives. This is because for the period before 1000, the first derivative model does allow for true negatives, while according to the simple logistic model, at the cutoff of 0.01, the period before 1000 should only have non-zero frequencies, whence false positives.

The search for a more optimal model will not be pursued further here.⁵ However, this result allows us to conclude that the family of models which allow for zero determiner frequencies in Early Old French are generally to be preferred to models not making such assumption. In other words, to capture the distribution of determiners in noun phrases with short possessives in Old French, a model which involves “up and down” is better than a model with just “down”. Both on theoretical grounds (determiners must have first emerged in this environment before declining) and on empirical evidence (the “up and down” model is more accurate than just “down”), we conclude that Old French manifests a failed change in the context of short possessive noun phrases.

In Postma’s perspective, a change can be “doomed” to fail from the outset: the frequency of certain forms rises only to go down in the next generation because of an inherent suboptimality of the configuration resulting from the change. On this view, which we adopt, short possessive forms intrinsically have a property (or properties) making their co-occurrence with overt determiners suboptimal. We argue

⁵ In further work, it would be interesting to consider bell-shaped curves with asymmetrical slopes, which can be generated, in particular, by models involving a multiplication of logistic regressions with different coefficients, such as the ones discussed in Bacovcin (2017).

that this property is their determiner-like semantics, which enables them to spell out D (details are given in section 5).

3 Spanish

It will be shown below that in Spanish, just like in French, determiner frequency grows with long possessives and follows the “up and down” pattern with short ones. Long forms do however not completely disappear from the language but they do no longer occur in the prenominal position.

3.1 *Two possessive paradigms*

Medieval Spanish features two paradigms of possessives, short and long forms, both of which can occur in the prenominal position. Subparadigms of both types for the first person are given in tables 4–5.

SINGULAR	PLURAL
mi	mis

Table 4: Spanish short adnominal possessive forms.

	SINGULAR	PLURAL
MASCULINE	mio	mios
FEMININE	mía	mías

Table 5: Spanish long adnominal possessive forms.

Similarly to French (cf. Figure 1), long forms disappear from the prenominal position, as illustrated in Figure 4. This dataset consists of 1st, 2nd, and 3rd person short and long prenominal possessives ($N=1,275,626$ noun phrases) taken from Davies (2002-).⁶

⁶ Because the corpus is not annotated syntactically, the distribution of possessives in the postnominal position cannot be confidently established.

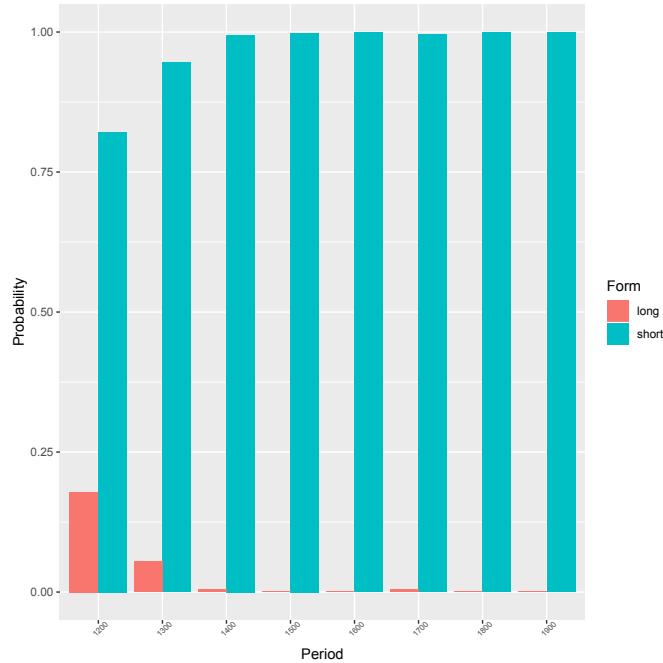


Figure 4: Short and long prenominal possessives in Spanish.

3.2 Co-occurrence with determiners

In medieval Spanish, both short, (15)–(16), and long, (17)–(18), series can be used with and without determiners in the prenominal position (Labrousse 2018: 38).

- (15) MEDIEVAL SPANISH
 cuanto **los sus** scriptores lo[s] quisieron crescer y ensalçar
 how.much DEF their scribes them wanted magnify and praise
 “How much their scribes wanted to magnify and to praise him.” Amadís, 1490,
 from Labrousse 2018: 2296
- (16) MEDIEVAL SPANISH
 por ser a él según **su** flaqueza más conformes
 for being to him according his weakness more compliant
 “for being more compliant to him according to his weakness” Amadís, 1490,
 from Labrousse 2018: 2303

- (17) MEDIEVAL SPANISH
 fuestes mio vasallo e heredado en el **mio** regno
 you.were my vassal and inherited to DEF my reign
 “You were my vassal and inherited my reign” Livro del cavallero Cifar, 1300, from Davies 2002-
- (18) MEDIEVAL SPANISH
 manda seellar esta carta con **mio** seollo de plomo.
 send.IMP seal this letter with my seal of lead
 “have this letter sealed with my lead seal” Documentos castellanos de Alfonso X, 1221,
 from Davies 2002-

In Modern Spanish, short forms cannot co-occur with determiners, while long forms, restricted to the postnominal position, can, as illustrated in (19)-(20).

(19)	MODERN SPANISH	(20)	MODERN SPANISH
	(*la) su casa the his/her house “his/her house”		la casa suya the house her “her house”

Below it is shown that, just like in medieval French, in medieval Spanish the frequency of determiners increases with long forms (until the long forms disappear from the prenominal position) and decreases with short forms. Again, as in medieval French, a failed change pattern can be identified in the latter case.

To evaluate diachronic trends, we first fit logistic regression models of the form in (13) to three data sets: noun phrases with (mostly) prenominal short possessives ($N=7,703$ noun phrases from Labrousse 2018), noun phrases with prenominal long forms from Davies (2002-) ($N=3657$ noun phrases), and noun phrases without possessives from P.S. Post Scriptum corpus ($N=6,121$ noun phrases).⁷

With short forms, the estimated coefficient or rate of change is -0.00839 ($p < 2 \times 10^{-16}$). With long forms, it equals 0.00097 ($p = 2.88 \times 10^{-7}$), and with noun phrases without possessives it again equals 0.00141 ($p = 5.81 \times 10^{-8}$).⁸

⁷ The rates of long forms in the dataset of Labrousse (2018: 88) are negligible, ranging from 0% to 0.6% except in the earliest text where it is 13%. We therefore consider the dataset to be representative of short forms.

⁸ No mention is made of data on noun phrases without possessives in Labrousse (2018), and P.S. Post Scriptum corpus spans a later period (Early Modern Spanish). We opted for P.S. Post Scriptum rather than for Davies (2002-) because the former corpus has a syntactic annotation layer which makes pattern retrieval extremely reliable, in contrast to the latter corpus.

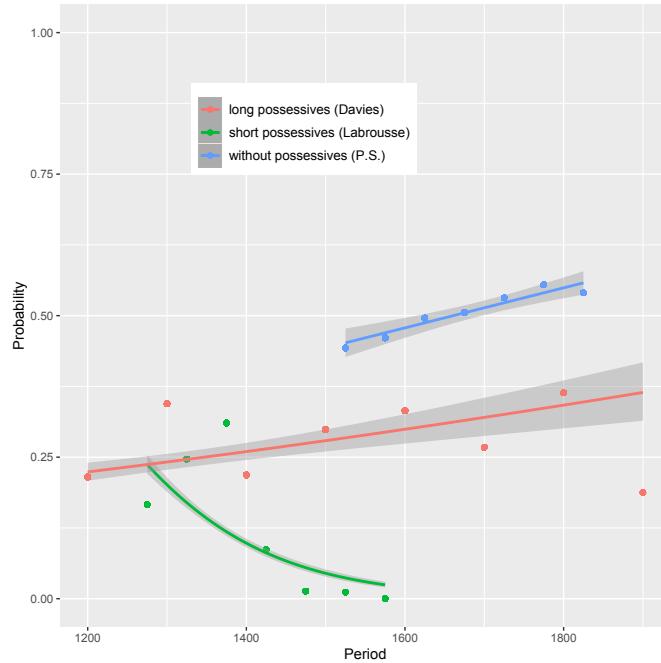


Figure 5: Determiners in noun phrases with and without possessives in Spanish.

The model fitted to noun phrases with long possessives has a relatively poor fit after 1600. This poor result can be accounted for by the fact that long possessives have almost disappeared in the prenominal position by that time and, hence, data are sparse. It seems beyond doubt, however, that the general trend is captured correctly, as (quasi-)monotonous rising.

3.3 A failed change

In contrast, a logistic regression does not prove to be the optimal model to capture the distribution of determiners in noun phrases with short forms. As in the case of French, it may be expected on theoretical grounds that before the decline of determiner frequency in this environment, there must have been a rise (again, simply because Latin lacks determiners, whereas determiners are already frequent in Early Old French). The question is whether this hypothesized rise can be assumed to be part of the empirical window available to us. There seems to be a rising trend before 1400. To see how plausible this assumption is, we fit a bell-shaped first derivative model of the type in (14) to this dataset and compare accuracy of the two models, s- and bell-shaped. The latter replaces the logistic model in Figure 6, where we added data points for individual texts (in black), in addition to 50 year bins (in green).

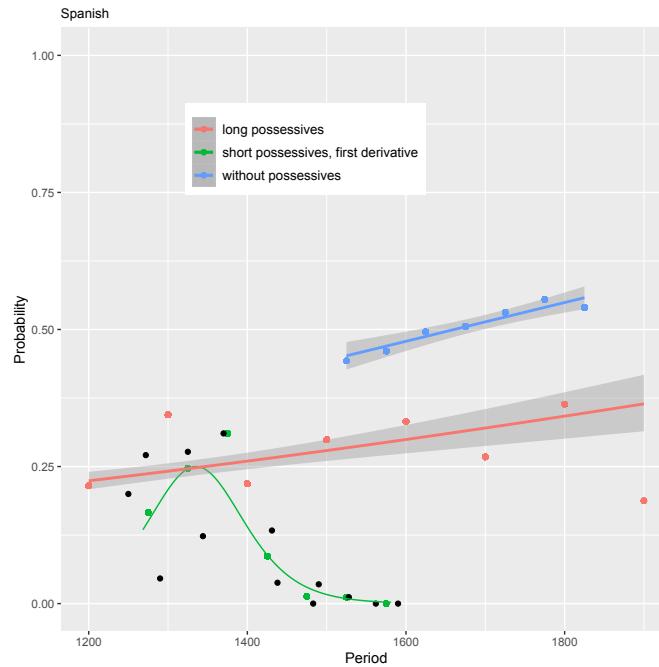


Figure 6: Determiners in Spanish.

At the 0.23 probability threshold, the logistic model has the accuracy of 0.704, whereas the first derivative model has an accuracy of 0.778.⁹ Table 6 presents the corresponding confusion matrices.

FIRST DERIVATIVE MODEL

Predicted	Observed	
	bare	det
bare	6041	713
det	715	234
Accuracy	$\mu = 0.814, 95\% \text{ CI} : (0.8058, 0.8232)$	

LOGISTIC MODEL

Predicted	Observed	
	bare	det
bare	5090	615
det	1666	332
Accuracy	$\mu = 0.704, 95\% \text{ CI} : (0.6935, 0.7141)$	

Table 6: Confusion matrices at 0.23 probability cutoff.

⁹ At the threshold of 0.23, both models have their highest accuracy.

We argue that for Spanish as well as for French, a bell-shaped failed change model is a better representation of the distribution of determiners with short possessives.

4 European Portuguese

4.1 Two possessive paradigms

Medieval Portuguese offers a similar picture with respect to the two paradigms of adnominal possessives, short and long. These are illustrated in tables 7–8 for the first person.¹⁰

	SINGULAR	PLURAL
MASCULINE	mo	not attested
FEMININE	m(h)a	not attested

Table 7: Portuguese short adnominal possessive forms.

	SINGULAR	PLURAL
MASCULINE	meu	meus
FEMININE	mi(nh)a	mi(nh)as

Table 8: Portuguese long adnominal possessive forms.

In contrast to French (and Spanish prenominal position), it is the short forms that do not survive. We track the distribution of the two types in the prenominal position (N=323,814 noun phrases) using the corpus of Davies (2006-).

¹⁰ As in Old French, there is a lot of spelling variation. All the variants listed in Labrousse (2018: 40–41) have been retained, as well as the plural forms.

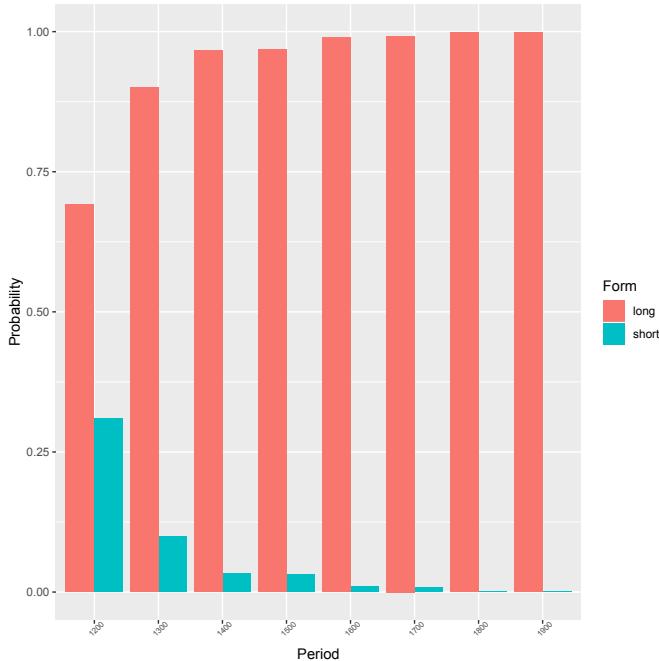


Figure 7: Long and short possessives in European Portuguese.

4.2 Co-occurrence with determiners and a failed change

In diachronic texts, both long and short forms are attested with and without determiners in the prenominal position. Examples (21)–(22) offer an illustration for long forms and examples (23)–(24).

- (24) MEDIEVAL PORTUGUESE
 Flérida Aquel tal que lamenta **su** ventura y exclama **su** tristeza
 Flérida Aquel that which regrets his fate and exclaim his sadness
 “Flérida Aquel, the one who regrets his fate and exclaims his sadness”
 Gil Vicente, Obra completa, 1465, from Davies (2006-)

In Modern European Portuguese, in the prenominal position, long (and only) possessives normally co-occur with definite articles, whereas in the postnominal position they are used with indefinite articles, numerals, *wh*-words, as well as without determiners (cf. Brito (2007: 31), among many others).

- | | |
|---------------------------------|---------------------------------|
| (25) MODERN EUROPEAN PORTUGUESE | (26) MODERN EUROPEAN PORTUGUESE |
| o meu livro | um livro meu |
| the my book | a book my |
| ‘my book’ | ‘a book of mine’ |

Against a backdrop of our findings for French and Spanish, namely, that while determiner frequency rise is observed in all noun phrases types, this development is next reversed with short possessives, we expect to find the same pattern in Portuguese. In order to check this, we do a corpus investigation, combining multiple corpora to increase the size and the quality of our empirical base.

We fit a logistic regression model of the type in (13) to a dataset from Labrousse (2018) which overwhelmingly consists of prenominal long possessives in Figure 8 ($N=11,443$ noun phrases). The observed rising trend with long possessives corresponds to a statistically significant coefficient $\beta = 0.00575$ ($p < 2 \times 10^{-16}$). In the same figure, we co-plot a logistic regression model fitted to the noun phrases without possessives taken from the corpora of Galves et al. (2017) and P.S. Post Scriptum ($N=27,604$ noun phrases), which cover a shorter time span and also shows a rising trend ($\beta = 0.00221$, $p < 2 \times 10^{-16}$).¹¹ Finally, as with French and Spanish, we first fit a simple logistic (in green in Figure 8) to the determiner distribution in noun phrases with short possessives (taken from Davies (2006-), $N=5,264$ noun phrases). The fitted coefficient 0.00046 is not statistically significant at the 0.05 significance level ($p = 0.056$), indicating that this model is not detecting a diachronic trend in the occurrence of determiners in noun phrases with short possessives. The distribution of the (green) data-points, however, suggests another possible model.

¹¹ The data on the overall distribution of determiners are absent from Labrousse (2018). Therefore, we completed our dataset by Galves et al. (2017) and P.S. Post Scriptum, these corpora being more reliable than Davies (2006-) thanks to the syntactic annotation.

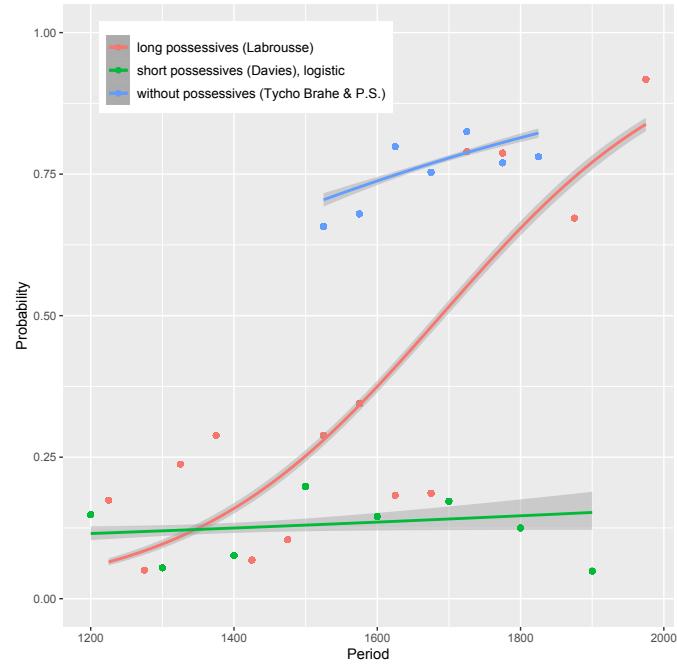


Figure 8: Determiners in European Portuguese.

We fit a bell-shaped curve in (14) to the determiner distribution with short possessives. The result is plotted in Figure 9.

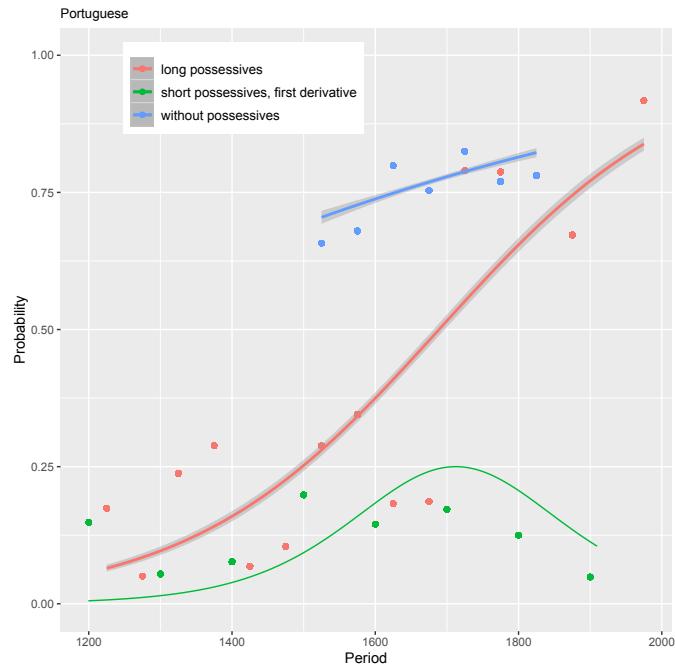


Figure 9: Determiners in European Portuguese.

While the logistic regression models predicts a constant probability of determiner occurrence, the bell-shaped curve captures a diachronic trend coherent with the empirical data: except for the data point for 1200, determiner frequencies seem to clearly follow an up-and-down pattern.

Because in the data there is no initial no-determiner period, the bell-shaped curve does not result in a better accuracy than a stable-rate line. Specifically, the former achieves its best accuracy (0.73 and highest specificity (0.1) at 0.24 probability threshold (that is, model's probabilistic predictions exceeding 0.24 are classified as predicting determiner occurrence, and below – as predicting no occurrence). For the latter, at the optimal threshold (for maximising both accuracy in general and specificity) of 0.13, the accuracy is 0.79 and specificity 0.11. While evaluating the two models, we need to keep in mind that unlike the data on short possessives in French and Spanish, this dataset comes from a corpus without syntactic annotation and contains a degree of noise. Another consideration which makes us prefer a bell-shape model is that, although unavailable in our temporal window, there is no doubt about the existence of the initial no-determiner period, which cannot be captured by the constant frequency line.

5 Analysis: The rise of DP

We now can compare the evolution of determiner distribution in possessive and non-possessive noun phrases in three Romance languages, viz. French, Spanish, and Portuguese. For the ease of comparison, we present the corresponding plots side by side in Figure 10.

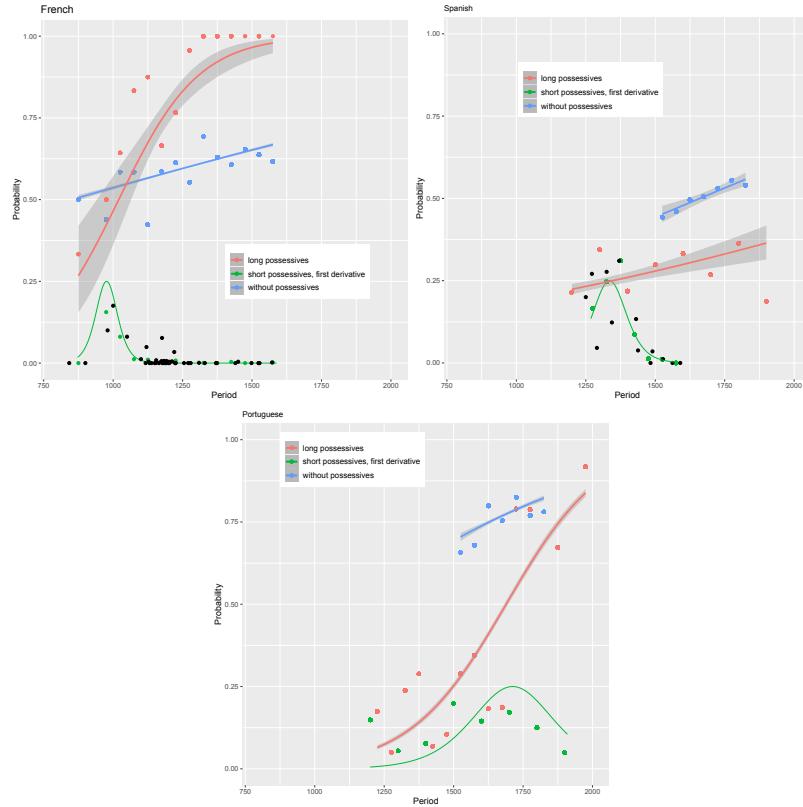


Figure 10: Determiners in French, Spanish, and Portuguese.

The figures show that the languages under consideration follow parallel evolutionary paths in terms of the general trends in determiner frequencies across contexts. Namely, determiner frequency grows monotonously in noun phrases without possessives and in noun phrases with long possessives, while determiner frequency goes up and then down in the context of noun phrases with short possessives. Moreover, the graphs visualize the fact that all changes take effect earlier in French than in Spanish, and in both earlier than in Portuguese. This temporal ordering is in line with claims made by Carlier et al. (2012) and Carlier & Lamiroy (2018). Another observation that emerges from language comparison is that changes in determiner frequency in the context of long forms precede changes in the context of short possessives.

Our analysis must account for the fact that both long possessives and short possessives show an increase of determiners (at least at the outset for short possessives), an evolution which is in line with the emergence of determiners in noun phrases without possessives, even if it occurs earlier. It should also account for the fact that short and long possessives have a different evolutionary profile, which supports the view that they have different grammatical and semantic properties, as suggested among others by [Miguel \(2002\)](#) and [Butet \(2018\)](#). In particular, it should elucidate why in all three languages the bell-shaped model is more appropriate for capturing determiner distribution in noun phrases with short possessives than a monotonous curve that seems to be predicted by the reanalysis accounts.

5.1 *Grammatical shift*

In order to account for the rise of determiners with both noun phrases containing prenominal long possessives and prenominal short possessives, rather than postulating changes at the level of individual prenominal possessive forms, we propose that across Romance languages there is a general reanalysis of noun phrases with prenominal possessives as structures with relational determiners, that is, determiners which involve a relation between individuals with the property denoted by the nominal predicate and a certain contextually-given individual. In other words, at the level of an extended nominal projection, a single shift happens: a replacement of the grammar parsing possessive nominal expressions as an adjectival projection plus a noun, as in (27a), by a grammar which parses them as a relational determiner plus a noun, as in (27b), where *i* is an index of a silent pronoun to be discussed shortly.¹²

- (27) a. $[NP [[AP A-i] [NP N]]]$ old pan-Romance grammar of noun phrases with possessives
- b. $[DP D [RP R-i [NP N]]]$ new pan-Romance grammar of noun phrases with possessives

Our analysis of this shift is couched in the perspective of grammar competition which assumes that in a given population of speakers more than one syntactic or semantic analysis of an utterance can be available (e.g., [Kroch \(1989\)](#) as one of the foundational works and [Pintzuk \(2003\)](#) for an overview).

We assume that the increasingly frequent parsing of possessive noun phrases as structures with relational determiners is a consequence of an emerging pressure to morphologically mark existential presupposition at the noun phrase level rather

¹² We use the term “relational determiner” to refer to the simultaneous presence of D and R heads, whether or not they are spelled out by a single morphological item.

than at the sentential level by means of constituent order and/or prosodic means, as recently suggested by Simonenko & Carlier (2020) for French.

We propose that in noun phrases without possessives, the same pressure leads to the increasingly frequent DP analysis, as schematised in (28), which manifests itself as the observed rise in the frequency of determiners.

- (28) a. [NP N] old pan-Romance grammar of noun phrases on definite interpretation
 b. [DP D [NP N]] new pan-Romance grammar of noun phrases on definite interpretation

5.2 Presupposition triggering relational head R

That the “old” grammar in (27a) does not have obligatory RP and DP layers does not mean that it is devoid of relational determiners. For example, languages without obligatory determiners nevertheless have demonstrative determiners, which can be conceived as composed of a D head and a relational component R which anchors the denotation to a particular individual (Elbourne 2008). Simonenko (2014) argues for a syntactic as well as semantic decomposition of demonstratives into D and R heads, as in (29), where R is a relational predicate with a denotation in (30), i is the index of a silent individual pronoun, and s is the index of a silent situation pronoun.¹³

- (29) $[_{DP} \mathbf{D}\text{-}\mathbf{s} [_{RP} \mathbf{R}\text{-}\mathbf{i} [_{NP} \mathbf{N}]]]$
 (30) $\llbracket R \rrbracket = \lambda P_{<e, <s,t>>} . \lambda Q_{<e, <s,t>>} . \lambda y_e . \lambda s_\sigma : |\{x : Q(x)(s)\}| > 1 . P(y)(s)$
 & $Q(y)(s)$

Simonenko (2014) assumes that the individual denoted by the index i is turned to an expression of the appropriate type, a predicate (an identity function), by Partee's *ident* type shift: $\text{ident}(\llbracket i \rrbracket^g) = \lambda x . \lambda s . x \text{ is identical to } g(i) \text{ in } s$. In the case of (30), this identity function fills the P argument.

According to (30), R introduces an anti-uniqueness presupposition, a requirement that the extension of the NP predicate in the relevant situation be greater than a singleton. This presupposition captures demonstratives' incompatibility with noun phrases that denote a singleton (e.g., *#this twentieth president of the US*) (Corblin 1987) for French demonstratives, Wiltschko (2012) for Austro-Bavarian strong determiners, Wolter (2006), Simonenko (2014) for English demonstratives).¹⁴

¹³ We modify the original denotation from Simonenko (2014: 93) by adding to it an intensional dimension.

¹⁴ One exception to this are affective or emotive uses of demonstratives as in *this first days at school*, discussed, in particular, Wolter (2006: 81) and Simonenko (2014: 90).

More generally, the use of demonstratives is infelicitous whenever the extension of the complement of a demonstrative in the relevant situation coincides with the extension of the nominal predicate in that situation. Consider the infelicity of *#Feed these 3 dogs* in a situation where there are only three dogs. In other words, demonstratives are infelicitous whenever they do not perform a restrictive function, that is, do not carve out a subset of the extension of their nominal argument. If D in (29) denotes a function that takes the property of being identical to $g(i)$ and having the nominal property and returns a unique individual with these two qualities, then the anti-uniqueness presupposition correctly captures the restriction requirement: if nominal predicate denotes non-uniquely, then the unique individual returned by D is its proper subset.

We note, however, that the anti-uniqueness presupposition is sufficient only for singular demonstratives. For a plural demonstrative, which denotes a plural individual with the nominal property and identical to the referent of the silent pronoun, the anti-uniqueness constraint on the nominal predicate by itself does not guarantee the restrictive effect.

We argue that the interpretative effect in question, namely, that the extension of the demonstrative phrase is a subset of the nominal extension, results from the combined workings of the anti-uniqueness presupposition and the general Minimize Restrictors! principle as implemented in Schlenker (2004). According to the principle, unless restriction has a pragmatic effect (e.g., emotive), the resulting denotation should not be identical to the denotation of the nominal predicate. This condition is met if the denotation that results from intersecting the nominal property with the property of being identical to the referent of the silent pronoun (relative to a given situation) is a subset of the nominal property (again, relative to a given situation).

The resulting subset can, in principle, be empty. This will be the case if in the relevant situation there happens to be no individuals with the nominal property that also have the property of being identical to the referent of the individual pronoun i . We argue, however, that such interpretations are ruled out by the grammar in favour of explicit negative quantification. For instance, *Pink ponies are not here* cannot be used against the background knowledge of the existence of a group of ponies to convey that none of them is pink. In other words, we propose that restricting a predicate which is known to have a non-zero extension in a given situation cannot result in an empty extension. We will give this conclusion a working label “No extension annihilation!”.¹⁵

¹⁵ We further speculate that this semantic mechanism is responsible for at least a share of cases known in morphosyntactic terms as definite feature percolation or definiteness spreading (e.g., in Modern Hebrew, Danon (2008)). Stated generally, the mechanism in question implies that if one part of a complex nominal expression is presupposed to have a non-empty extension, the whole nominal

Given Minimize Restrictors! and No extension annihilation!, it is in fact enough to have a weaker existential presupposition instead of the anti-uniqueness condition in the semantics of R to capture the attested range of interpretations. We therefore simplify (30) as in (31).

$$(31) \quad \llbracket R \rrbracket = \lambda P_{\langle e, \langle s, t \rangle \rangle} . \lambda Q_{\langle e, \langle s, t \rangle \rangle} . \lambda y_e . \lambda s_\sigma : \exists x [Q(x)(s)] . P(y)(s) \& Q(y)(s)$$

For D, we assume a Fregean semantics from Heim (2011) in its situational implementation, as in Schwarz (2009), whereby D denotes a function which takes a situation s, a property P, and returns a Sharvy's maximal individual that has P in s, provided that there exists such individual in the relevant situation, as in (32).

$$(32) \quad \llbracket D \rrbracket = \lambda s_\sigma . \lambda P_{\langle e, \sigma t \rangle} : \exists ! x [\text{Max}(P)(x)(s)] . \iota x [\text{Max}(P)(x)(s)], \\ \text{where } \text{Max}(P) = \lambda x_e . \lambda s_\sigma . P(x)(s) \& \neg \exists y [P(y)(s) \& x < y]^{16}$$

When combined, the existential presupposition introduced by R, Minimize Restrictors!, and No extension annihilation! entail that there are individuals with both Q and P properties and that they form a proper subset of individuals with the Q property (nominal property). This, in turns, partially satisfies the presupposition of the definite determiner that the extension of its complement is not empty in the relevant situation.

5.3 Long forms within competing grammars

Simonenko (to appear) argues, on the material of possessives in Finno-Ugric languages, for the presence of the R component in the logical form of possessives. We propose that long possessives in Romance languages correspond to an R head with an accompanying index. The difference between R in demonstrative and in possessive phrases consists in the nature of the silent pronominal element that comes with R. We propose that a silent possessive pronoun denotes a property of being related to a particular possessor by a contextually relevant relation in a given situation. This is formalized in (33) for a first person singular silent possessive pronoun.¹⁷

$$(33) \quad \llbracket \text{poss1st} \rrbracket^g = \lambda x . \lambda s . x \text{ is related to the speaker in } s.$$

expression is entailed to have a non-empty extension, which can manifest itself as multiple definiteness marking.

¹⁶ The symbol “<” stands for a proper part relation.

¹⁷ This assumption addresses the fact that relations expressed by means of possessive morphemes extend beyond the ownership proper (see the discussion in Partee & Borschev (2003), among others).

We propose that semantically the difference between R and an context-sensitive adjectival head which takes a silent pronoun as one of its arguments boils down to the existential presupposition introduced by R. Assuming that a lexical item can spell out a subset of the features it is specified with, as in the nanosyntactic approach to lexicalization (see Starke 2018 for a recent exposition), in addition to spelling out R, long possessives can spell out an adjectival phrase with an A head and an index which points to the possessor.

The structures that can be spelled out by long possessives are then as underscored in (34a) and (34b).

- (34) a. [NP [_{AP} A-i] [NP N]] spellout 1 by a long possessive
 b. [DP D [[_{RP} R-i [NP N]]]] spellout 2 by a long possessive

We assume that postnominal long possessives (or adjectives) spellout AP following an N-over-AP movement, as in Cinque (1994).¹⁸

There is non-quantitative evidence in support of the proposal that in Modern Portuguese prenominal long possessives spell out functional heads rather than adjectival phrases. Brito (2007) shows that in European Portuguese, prenominal possessives cannot be modified by “exclusion” adverbs (*só, apenas* “only, just”), (35), in contrast to postnominal determiners, (36).

- (35) MODERN PORTUGUESE
 *O **só meu** problema é que não percebo nada disto.
 DEF only my problem is that not understand nothing of.this
 Intended: “My only problem is that I don’t understand it.” Brito (2007: 32)

- (36) MODERN PORTUGUESE
 Um problema **só meu** é que não percebo nada disto.
 INDF problem only my is that not understand nothing of.this
 “My only problem is that I don’t understand it.” Brito (2007: 32)

Based on this pattern and the assumption that heads cannot be coordinated (Kayne 1994), Castro & Costa (2002) propose that prenominal possessives in Portuguese are heads.¹⁹ Cardinaletti (1998) shows for Italian that pre- and postnominal possessives

¹⁸ While aware of alternative derivations of the ‘noun adjective’ order in Romance, argumentation in favour of a particular choice is immaterial for and falls outside of the scope of this paper (for an overview see Van de Velde et al. (2014)).

¹⁹ According to Brito (2007: 34), coordination of prenominal possessives is marginally acceptable in Portuguese provided one of the coordinated members is focalised. It is preferred, however, to use postnominal possessives in cases of coordination.

differ with respect to adverb modification (no for prenominal, yes for postnominal) and coordination (no for prenominal, yes for postnominal).²⁰

Diachronically, because of the emerging pressure to use presupposition-triggering elements in the noun phrase, for “long possessive + noun” sequences the parse with a presupposition-triggering R is increasingly preferred to the parse with AP. We speculate that this tendency is reinforced by a more general pressure to opt for a head rather than a phrase parse whenever possible, as captured in Head Preference principle of [Van Gelderen \(2004\)](#). Since R introduces a presupposition that the extension of RP is not empty in the relevant situation (see the discussion in section 5.2), RP, if felicitous in a given context, satisfies the existential part of the presuppositional requirements of a definite determiner (the other part being the maximality requirement). Given the Maximize Presupposition reasoning, this proposal correctly predicts that on the R-parse, prenominal possessives have a strong tendency to appear with a definite D, rather than an indefinite D. In contrast, analysing prenominal possessives in Portuguese as A has nothing to say about this co-occurrence (unless A is assumed to be specified with a definiteness feature, which, we believe, makes it only nominally different from R of our analysis).

The increasingly frequent choice of parses with R and with D corresponds to the increasing frequency of long possessives in the prenominal position co-occurring with definite determiners. This is what we observe empirically in the diachronic data presented in sections 2, 3, and 4. At the synchronic level, in Modern Portuguese, which retained long possessives in the prenominal position, long possessives occur virtually exclusively with definite determiners. Similarly, in a corpus of Modern Italian [Bosco et al. \(TUT\)](#), among 284 noun phrases with prenominal possessives, there is only one instance of an indefinite determiner, all other cases featuring definite determiners.

In sum, we propose that the observed changes in the determiner frequency with prenominal long possessives reflect a growing preference for the long-possessives in the prenominal position to spell out an R head which triggers an anti-uniqueness presupposition rather than a presupposition-less adjectival phrase. This resonates with the proposal of [Brito \(2007\)](#), couched in morphosyntactic terms, which states that while in medieval Portuguese prenominal long possessives correspond to APs, in Modern Portuguese they correspond to A heads specified with a definiteness feature.

²⁰ [Cardinaletti \(1998\)](#) concludes that Italian possessives are XPs generated in different locations within a DP: prenominal in a spec of a left-peripheral head and postnominal – adjoined to the right of the noun.

5.4 Short forms within competing grammars

For short possessives, we take the parallel with demonstratives a step further and assume that their Logical Form involves both R and D heads. This means that short possessives structurally match the new grammar in (28b). This also means that noun phrases with short possessives can be generated and parsed both by the old grammar, where the DP layer is optional, and by the new grammar, where it is obligatory.

Given this representation, it can be expected that the frequency of determiners does not rise in the context of short possessives, since noun phrases with short possessives are already DPs by virtue of the internal structure of short possessives. Empirically, however, we observe a failed change in this context: the frequency of determiners goes up, never exceeding 25%, and then goes down. We propose that the short possessives are compatible with overt determiners, but that this configuration is not competitive compared to more more economical, i.e., more easily processed, alternatives: short possessives without overt determiners or long possessives with overt determiners. We explain below why.

Assuming, as before, the nanosyntactic subset principle of spellout, we propose that short possessives can spell out either both D and R, as in (37a), or only the R layer, as in (37b).²¹

- | | | |
|------|-----------------------------------|------------------------------------|
| (37) | a. [DP D [<u>RP R-i</u> [NP N]]] | spellout 1 by a short possessive |
| | b. [DP D [<u>RP</u> R-i [NP N]]] | spellout 2 by 2 a short possessive |

We argue that in order to generate a sequence ‘determiner + short possessives + noun’, some type of lookahead or post-insertion syntactic realignment is needed to make a short possessive morpheme match only R instead of D-R when D is lexicalized by another determiner. Alternative spellouts, which is to lexicalize both D and R by a single item (i.e., ‘short possessive + noun’) without adding a separate determiner (and thus avoid readjustment) or to lexicalize R by a morpheme which can lexicalize only R and therefore, again, does not require readjustment (‘determiner + long possessive + noun’), are simpler in terms of processing and therefore, we argue, preferred options. Nevertheless, the force of analogy with the constructions ‘determiner + noun’ and ‘determiner + long possessive + noun’ drives the use of ‘determiner + short possessive + noun’ for some time, which is reflected in the upward slope of the green curves in the figures in 10.

The analogy-based argument, in addition to conceptual considerations, rests on the aforementioned quantitative fact that the rise in determiner frequency begins

²¹ Since spellout targets constituents, we assume that R-to-D movement takes place prior to lexicalization. This assumption essentially matches Cardinaletti (1998) proposal that clitic possessives head-adjoin D. Miguel (2002) proposes that the short possessives in medieval Portuguese are D-adjoined clitics.

earlier in the context of noun phrases with long possessives than with short ones in the languages we investigated, as figures in 10 show. From a diachronic viewpoint, the tension between analogy and economy is eventually resolved in favour of the latter in all three languages, and the frequency of ‘determiner + short possessives + noun’ goes down.

6 Conclusions

We examined diachronic changes in the distribution of determiners in noun phrases with prenominal possessives and in noun phrases without possessives in three Romance languages. Focusing on the co-occurrence between possessives and determiners, it was demonstrated, for the first time, that French, Spanish, and Portuguese have remarkably similar evolutionary paths: determiner frequency first starts growing in noun phrases without possessives, then in noun phrases with long possessives, and, finally, in noun phrases with short possessives. In the latter context, shortly after the onset, the frequency goes down and tends to zero. We showed that bell-shaped models based on the first derivative of a logistic regression, as suggested in Postma (2010) for failed changes, offer a better fit for the data than s-shaped curves.

This investigation is the first of its kind in terms of the size of datasets and methodology. With the exception of Postma (2010) treatment of Brazilian Portuguese possessives, we are not aware of statistical modelling applied to the evolution of possessive noun phrases in Romance languages. It is also the first study to identify on quantitative grounds failed changes in the context of short possessives in the three languages considered.

To capture this empirical uniformity, we proposed that the noun phrase structure in Romance languages changes in a uniform way, shifting in the direction of an increased presence of presupposition triggering heads, such as a relational modifier head R and a determiner head D. For longs possessives this means that they lexicalize with an increasing frequency R, rather than AP. For short possessives, the grammatical shift itself does not have consequences, since they already contain D-R as part of their lexical entry, except that the analogy with other types of noun phrases causes a temporal spike in their use with overt determiners, which we modelled by bell-shaped curves.

Since according to our analysis the spread of R in possessive phrases is the cause of the spread of D in this environment, but is only indirectly related to the spread of D in noun phrases without possessives (via a general pragmatic pressure), we do not necessary expect any similarity between the rates with which the frequency of determiners grows in noun phrases with and without possessives. Logistic models we used suggest that determiners in general start spreading later in noun phases with

possessives than in noun phrases without, but that they spread faster in the former context than in the latter. We thus conclude that the spread of R, as manifested by the increasing frequencies of determiners with possessives, lags behind the spread of D in contexts without possessives.

One of the most intriguing outstanding questions concerns, of course, the different fates of short and long paradigms across Romance languages: long forms disappear from French, can no longer be used to spell out R in the prenominal position in Spanish, and are still used in Portuguese both pre- and postnominally (while the short forms are lost in this language). We speculate that at least part of the explanation lies in the prosodic dimension. In French, the disappearance of word-level stress is sometimes invoked as a possible trigger behind some syntactic changes such as the disappearance V2 order (see [Rainsford \(2011\)](#) for a discussion). An explanation along this lines can be conceived concerning the disappearance of long possessives from the prenominal position. Another deciding factor may be general principle of economy and, in particular, the preference of Late Merge over movement ([Van Gelderen 2004](#)): this would explain why in French postnominal long possessives, whose derivation presumably involves an N-overt-AP movement, are replaced by possessive PPs (*à moi* “of mine” etc.). We leave further investigation to the future.

Abbreviations (mandatory)

DEF = definite, INDF = indefinite, DEM = demonstrative, SBJ = subject

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