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The trajectory of φ-features on Old French D and n

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Abstract

Old French (OF) determiners (D), which are optional, show a three-way split between definite (DEF), indefinite(INDF), and expletive(EXPL) D. We develop a nano-syntactic analysis of these three paradigms, according to which the nominal spine is associated with a series of functional heads that include Number, Gender, D, and Kase. We test the predictions of the formal analysis with a quantitative analysis of corpus data from two 12th century Anglo-Norman texts – *Le voyage de saint Brendan* (*B*) and *Lais de Marie de France* (*MdF*) – which indicates that over a 60-year span, there are changes in the distribution of D. This presents itself in three ways. First, a decline in expletive D in *MdF* correlates with an increase in the use of D with masculine (M) non-count nouns ($n_{\text{NON-CT}}$) Second, while *B* lacks an overt indefinite plural (PL) D, *MdF* has one in the form of *des*. Third, with count nouns(n_{CT}), while feminine (F) nouns favour the absence of determiners in *B*, there is no gender effect in *MdF*. While the first two changes are predicted by the formal analysis, the third is not. More broadly, the results of our quantitative study provide a more nuanced picture of the factors that govern the distribution of D in OF: they confirm that – relative to conditioning the absence of D (D-drop) – definiteness, grammatical function, and number are stable factors, gender is not a stable factor, and word order does not play a significant role.

Keywords: Old French, determiner, variation, bare noun, phi-features

Résumé

Les déterminants de l'ancien français, qui ne connaissent pas toujours de réalisation phonologique, présentent une division tripartite : le défini, l'indéfini et l'explétif. Dans cet article, nous développons une analyse nano-syntaxique de ces trois paradigmes, selon laquelle à l'échine nominale est associée une série de têtes fonctionnelles dont Nombre, Genre, D et Kas. Nous testons ensuite les prédictions de cette analyse formelle en la soumettant à une analyse quantitative réalisée à partir de deux textes du 12e siècle rédigés en anglo-normand – *Le voyage de saint Brendan* (*B*) et *Lais de Marie de France* (*MdF*) – qui nous permettent de déceler des changements dans la distribution du D sur une période de 60 ans, changements qui se manifestent selon trois axes. D'abord, une décroissance du D explétif est à mettre en lien avec une augmentation des D réalisés phonologiquement avec les noms masculins non comptables. Ensuite, on note dans *MdF* l'émergence du D indéfini pluriel, *des,* déterminant qui n'apparait pas dans *B.* Finalement, alors que les noms féminins favorisent l'absence de D avec les noms féminins comptables dans *B*, on ne remarque pas un tel phénomène dans *MdeF*. Alors que notre analyse formelle prédit les deux premiers changements, ce n'est pas le cas pour le dernier. Dès lors, les résultats de notre analyse quantitative donnent une image plus fine des facteurs qui influencent la distribution de D en ancien français ; ils confirment, à l'égard des facteurs conditionnant l'absence de D (D-drop), que la définitude, la fonction grammaticale et le nombre sont des facteurs stables, alors que le genre ne l'est pas et que l'ordre des mots ne joue aucun rôle significatif.

Mots-clés: Ancien français, déterminant, variation, noms nus, traits-phi

1. The problem

In Old French (OF), several factors determine whether a noun occurs with a determiner or as a bare noun, i.e., without a determiner; we call this "determiner drop" (D-drop).[1] The factors that condition D-drop include predicativity, grammatical function, semantic class, definiteness, number, and gender (Foulet 1928/1974; Moignet 1976; Carlier and Goyens 1998; Buridant 2000; Boucher 2005; Carlier 2007,

[1]The following abbreviations are used: |1|: cardinality of one; #: Number; *B*: Le voyage de saint Brendan; C: complementizer; COLL: collective; CT: count; D: determiner, $D_{\emptyset}$: covert determiner; DEF: definite; EXPL: expletive; F: feminine; ***f1***: feminine declension class 1; ***f2***: feminine declension class 2; ***f3***: feminine declension class 3; Gen: gender F-head; GENDER: gender factor group; GF: grammatical function factor group; INDF: indefinite; K: case F-head; $K_{\emptyset}$: covert Kase; *l*-based: le, li, la; M: masculine; ***m1***: masculine declension class 1; ***m2***: masculine declension class 2; ***m3***: masculine declension class 3; MCVF Corpus: Corpus Modéliser le changement : les voies du français; *MdF*: Lais de Marie de France; MF: Modern French; *n*: noun; *N*: number of tokens; NON-CT: non-count; Num: number F-head; NUMBER: number factor group; OBJ: object; OF: Old French; PL: plural; SING: singular; SBJ: subject; *u*: unmarked; UG: universal grammar.

For the chi-square tests, to indicate significance, we use the following conventions: ***: *highly significant* (at $p < 0.001$); **: *very significant* (at $p < 0.01$); *: *significant* (at $p < 0.05$); *ms*: *marginally significant* (at $p < 0.1$); *ns*: *non-significant*.

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2013; Stark 2007, 2008; Mathieu 2009; Dufresne et al. to appear), and they condition D-drop as listed in (1).

(1) a. for **predicativity**, *n* predicates favour D-drop
b. for **word order**, post-verbal position favours D-drop
c. for **grammatical function**, object position favours D-drop
d. for **semantic class**, non-count (abstract and mass) *n* favours D-drop
e. for **definiteness**, indefinite contexts favour D-drop
f. for **number**, plural favours D-drop
g. for **gender**, feminine favours D-drop with count *n* (herein).

Our contribution is twofold. First, in light of theories of nominal syntax, we develop an analysis of the mechanisms that govern the above factors. Second, we use quantitative variationist methods to measure the relative weight of these factors and assess the predictions of our analysis.

We show that OF has indefinite, definite and expletive D-paradigms, with number and gender distributed differently in each paradigm. Corpus data from two Anglo-Norman texts — *Le voyage de saint Brendan* (*B*) and *Lais de Marie de France* (*MdF*) – indicates that, over a 60-year span, there are three changes in paradigm structure and D-inventory. First, there is a change in the expletive D-paradigm: while *B* uses *l*-based D for D_{DEF} (with n_{CT}) and D_{EXPL} (with $n_{NON\text{-}CT}$), *MdF* has a decline of overt D_{EXPL}, which correlates with an increase of D-drop with $n_{NON\text{-}CT.M}$. Second, with n_{CT}, there is a change in the indefinite D-paradigm (Dufresne et al. to appear): while *B* lacks an overt $D_{INDF.PL}$, *MdF* has one in the form of *des*, first attested with $n_{CT.M}$. Third, with n_{CT}, there is a change in how gender conditions D-drop, with $n_{CT.F}$ favouring D-drop in *B*, but not in *MdF*. The first two changes are predicted by the nano-syntactic analysis, but the third is not. More broadly, our quantitative study provides a more nuanced picture of the factors that govern the distribution of D in OF: relative to conditioning D-drop, definiteness, grammatical function, and number are loci of stability, gender is a locus of change, and word order does not play a significant role.

1.1 The context of this study: two Anglo-Norman texts

We examine D-drop in two Anglo-Norman texts. The first is *Le voyage de saint Brendan,* written by a male (the monk Benedeit) in the first quarter of the 12th century (*c*. 1106–1121), with a count of 10,829 words (Short and Merrilees 2006). The second is *Lais de Marie de France*, written by a female in the third quarter of the 12th century (*c*. 1154–1189), with a count of 33,031 words (Rychner 1983, Harf-Lancner 1990). These texts are large enough to allow quantitative analysis, and both are in verse, ensuring homogeneity in form and style. Their creation is separated by about 60 years, allowing us to detect changes that might be underway. Taking a generation to be a 30-year span (Tagliamonte 2012), and recognizing that generational spans may have been shorter in the Middle Ages, this means that the 60-year span between the texts represents at least two generations.

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1.2 Empirical problem: D-drop in Old French

We adopt the hypothesis that nominal arguments are DPs (Longobardi 1994, 2001, 2008), and that their surface form may vary according to whether D is overt or covert ($D_{Ø}$). The problem that we consider is that OF DP can appear with D or $D_{Ø}$; the latter corresponds to D-drop, that is, a determiner with no phonological content. One factor that conditions OF D-drop is the contrast between count (section 1.2.1) and non-count DPs (section 1.2.2).

1.2.1 D-drop with count DPs

OF count DPs contrast definiteness and number, with D attested in four contexts: definite singular (2), definite plural (3), indefinite singular (4), and indefinite plural (5). In the pairs of examples in (2)–(5), (a) has overt D, while (b) has covert $D_{Ø}$, that is to say, D-drop.

(2) a. E puis chantent **la cumplie** / Od mult grant psalmodie.
and then sing.3PL DEF.F compline / with very great psalmody
'Then, on a very solemn psalmody, they sing **the Compline.**' [*B* v.387–388]

b. Granz curs unt fait li pelerin, / Mais uncore ne sevent **fin**.
great courses have made DEF.SBJ pilgrims / but yet not know end
'The pilgrims have travelled a great distance, but they don't yet see [**the**] **end**.'
[*B* v.1097–1098]

(3) a. Les plaies sunt mult parfundes, / Dun senglantes sunt **les undes**.
DEF.PL wounds are very deep / from.where bloody are DEF.PL waves
'The wounds are very deep, and **the waves** are bloodied.' [*B* v.943–944]

b. **Undes** de mer e ferent fort, / Pur quei n' ad fin la süe mort.
waves of sea him hit strong / for what not have end DEF.F his death
'[**The**] **waves** whip him and make him suffer a death without end.' [*B* v.1226-1227]

(4) a. – **Un anel** d' or li porterez
– INDF.SG ring of gold to.him will.bring
'– You(pl) will bring to him **a ring** of gold' [*MdF Eliduc* v.379]

b. **Esturbeiluns** plus tost ne vait / Quant sus en l'air li venz le trait
whirlwind more rapidly NEG go / when up in D.air DEF.SBJ wind it raised
'[**A**] **whirlwind** raised by the wind does not fly more rapidly' [*B* v.1149–1150]

(5) a. Puis que **des lais** ai comencié, / Ja n'iert pur mun travail laissié;
because C INDF.PL lais have started / 1SG NEG.have for my work leave
'Because I started to write **some lais** / nothing will make me give it up;'
[*MdF Yonec* v.1–2]

b. Tute fu blanche cele beste / **perches** de cerf out en la teste
all was white this beast / antlers of deer had in DEF.F head
'The beast was all white / and had [**some**] deer **antlers** on its head'
[*MdF Guigemar* v.91–92]

Regarding (5), as noted in Dufresne et al. (to appear), *MdF* has a $D_{INDF.PL}$ (*des*) that *B* lacks, and it is first attested with $n_{CT.M}$; we return to this in sections 2 and 5.2.1.

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1.2.2 D-drop with non-count nouns

D-drop is also attested with $n_{\text{NON-CT}}$, which includes abstract (6) and mass (7) nouns. The (a) examples contain a DP with overt D; the (b) examples contain a DP with D-drop.

(6) a. Mes si vus plest que jeo vus die / **La verité** vus cunterai
but if 2PL please that 1SG 2PL tell / D.F truth 2PL 1SG.will.tell
'If it interests you, I will tell you my adventure' (lit.'tell **the truth**')
[MdF Guigemar v.312–13]

b. Entre eus meinent **joie** mut grant.
between 3PL maintain **joy** much great
'They are happy to finally be together.' (lit.'maintain much **joy**')
[*MdF Chievrefueil* v.94]

(7) a. E par sun dun unt **le** **cunrei**.
and by his donation 3PL.have D.M provision
'He had furnished them with **provisions.**' (lit. 'have **the provision**') [*B* v.582]

b. Mais Deus ne volt que plus de fors Venist **cunreid** pur sul mun cors.
but God not want that more of.the outside came **provision** for only my body
'But God did not want to bring from outside **provisions** destined only to feed me.'
[*B* v.1583-4]

1.3 The theoretical problem: the nominal spine

We are interested in the contrast in OF between [D *n*] versus [$D_{Ø}$ *n*], with the latter corresponding to D-drop. To assess the theoretical significance of D-drop, we turn to current analyses of nominal phrases, which treat them as a series of functional heads associated with *n*. There is a consensus (Giusti 1995, Wiltschko 2014) that *n* combines with Gender, Num, D and K, as in (8). Accordingly, the contrast between [D *n*] and [$D_{Ø}$ *n*] is a contrast between an *n*-spine with functional categories that have phonological content (8a), or lack phonological content (8b). In the following discussion, we contrast D/$D_{Ø}$, with the understanding that D is a cover term for [K-D-Num-Gender], and $D_{Ø}$ qua D-drop is a cover term for [$K_{Ø}$-$D_{Ø}$-$Num_{Ø}$-$Gender_{Ø}$]. We present a morphological and syntactic analysis of OF φ-features as they pertain to D-drop (sections 2 and 3), and a quantitative analysis of D-drop in *B* and *MdF* (section 4), and then assess whether our analysis derives the quantitative results (section 5). We close with a discussion of how D-drop compares to *pro*-drop (section 6).

(8) a. [K [D [Num [Gender [*n*]]]]]

b. [$K_{Ø}$ [$D_{Ø}$ [$Num_{Ø}$ [$Gender_{Ø}$ [*n*]]]]]

2. Morphological analysis

The morphological analysis is developed in two steps: we first look at *n*- and D-paradigms (section 2.1) and then show how Agree adjudicates the realization of φ-features on D and *n* (section 2.2).

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2.1 OF n- and D-paradigms

It is pertinent to examine OF *n*- and D-paradigms, as the φ-features that define them (case, definiteness, number, gender) also condition D-drop. Table 1 illustrates OF *n*-paradigms *qua* declension classes. In *B* and *MdF*, the masculine noun (n_M) inflects for case (-***s***$_{SBJ}$) or number (-***s***$_{PL}$). As for the feminine noun (n_F), it inflects only for number (-***s***$_{PL}$) in *B*, but in *MdF* the second declension (***f2***) can also inflect for case (-***s***$_{SBJ}$); this corresponds to the grey cell in Table 1.[2,3]

The D-paradigms of *B* and *MdF* are shown in Tables 2 and 3 respectively, with grey cells corresponding to loci of differentiation. Note that inherent gender on *n* conditions contextual inflectional gender on D.

In count contexts, *MdF* has a $D_{INDF.PL}$ (*des*) that *B* lacks (Dufresne et al. to appear). In non-count contexts, we propose that there is a difference in inventory, with *MdF* lacking the masculine expletive D (***l***-) attested in *B*. This difference is subtle, as the OF D-base *l*- has a double life. First, as a semantically expletive D (Lekakou and Szendrői 2012), *l*- spells out D with no contribution of definiteness, has a phonologically conditioned schwa [ə], subject case -*i* or feminine gender -*a*, and selects $n_{NON\text{-}CT}$. Second, as D_{DEF}, *l*- is accompanied by a morphologically conditioned vowel (-e_{SG}, -i_{SBJ}, -a_F) and selects n_{CT}. While *B* deploys definite and expletive *le* and *li*, *MdF* has only definite *le* and *li*. Note that the schwa that occurs with *l*-$_{D.DEF}$ can be analyzed as masculine gender (*l*-e_M) or singular number (*l*-e_{SG}). It marks M in Modern French (MF), but SG in OF. Motivation for analyzing OF *le* as *l*-e_{SG} comes from comparing it with case-marked D_{DEF} (*l*-i_{SBJ}), which is number-neutral and occurs with n_{SG} (9a) or n_{PL} (9b). Notably, in (9b), uninflected *mur* 'wall' is construed as plural. This indicates that uninflected *n* is number-neutral: -***s***$_{PL}$ inflection on *n* forces a plural construal, but the absence of -***s***$_{PL}$ does not force a singular construal. The contrast in (9) illustrates blocking (Embick and Marantz 2008): in subject position -s_{SBJ} blocks -s_{PL} (9a), so the only way to express plurality is with uninflected *n* (9b).

(9) a. l-**i** mur-**s**
D.DEF-SBJ wall-SBJ
'the wall'

b. l-**i** mur
D.DEF-SBJ wall
'the walls'

Consider $D_{DEF.SG}$ *le*, which can co-occur with case-inflected *n* in subject position, (10a). In the corpus data, *le* is used in lieu of *li* only with singular n_{CT}.[4] Combining *le* with uninflected *n* yields a singular construal (10b); this differs from

[2]In OF, ***f1*** and ***f2*** are phonologically distinct: ***f1*** *n* ends with a vowel; ***f2*** *n* ends with a consonant.

[3]Case inflection on *n* (-***s***$_{SBJ}$) is categorical on ***m1***, but optional elsewhere, with optional -***s***$_{SBJ}$ on ***m2***/***m3*** arising from analogy with ***m1***. As for -***s***$_{SBJ}$ on ***f2***, it is a conservative form, and in the two texts under consideration, attested only in *MdF*. In terms of frequency, with n_M, ***m1*** is the most frequent declension class (*B*: 76,2%; *MdF*: 81,1%); with n_F, ***f1*** is the most frequent class (*B*: 65,8%; *MdF*: 83,2%). For details, see Joly (2004, 2009).

[4]There are 16 occurrences of *le*$_{DEF.SG}$ with a noun in subject position (11 in *B*; 5 in *MdF*). With such examples, in *B*, *n* also inflects for subject case (i), but not in *MdF* (ii).

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		MASCULINE			FEMININE	
		SG	PL		SG	PL
m1	SBJ	*mur-**s***$_{\text{SBJ}}$	*mur*	***f1***	*porte*	*porte-**s***$_{\text{PL}}$
	OBJ	*mur*	*mur-**s***$_{\text{PL}}$			
m2	SBJ	*livre-(**s***$_{\text{SBJ}}$*)*	*livre*	***f2***	*flor-(**s***$_{\text{SBJ/MDF}}$*)*	*flor-**s***$_{\text{PL}}$
	OBJ	*livre*	*livre-**s***$_{\text{PL}}$		*flor*	
m3	SBJ	*fel-(**s***$_{\text{SBJ}}$*)*	*felon*	***f3***	*niece*	*niecain-**s***$_{\text{PL}}$
	OBJ	*felon*	*felon-**s***$_{\text{PL}}$		*niecain*	

Table 1: Old French *n*-paradigm (/MDF = form found only in *MdF*)

	#SG			#PL		
	GENDER:M		GENDER:F	GENDER:M		GENDER:F
	KASE:SBJ	*u*KASE		KASE:SBJ	*u*KASE	
COUNT						
• INDEFINITE	*un-**s***$_{\text{SBJ}}$	*un*	*un-**e***$_{\text{F}}$	Ø	Ø	Ø
• DEFINITE	*l-**i***$_{\text{SBJ}}$	*l-**e***$_{\text{SG}}$	*l-**a***$_{\text{F}}$	*l-**i***$_{\text{SBJ}}$	***l***-[ə]-***s***$_{\text{PL}}$	***l***-[ə]-***s***$_{\text{PL}}$
NON-COUNT						
• EXPLETIVE	*l-**i***$_{\text{SBJ}}$	*l-*	*l-**a***$_{\text{F}}$		n/a	

Table 2: *Brendan* D-paradigm

number-neutral ***li*** (9b), where the same combination yields a plural construal. The contrast between (9b) and (10b) confirms that *le* contributes singular number in (10b). With definite non-subject DPs, a plural construal is possible only if *n* inflects for -*s*$_{\text{PL}}$ (10c), in which case D (*les*) agrees in number with *n*. The obligatoriness of number agreement in (10c) supports the claim that the absence of -*s*$_{\text{PL}}$ on *n* in (9b) results from blocking.

(10) a. l-**e** mur-**s**
D.DEF-SG wall-SBJ
'the wall'

b. l-**e** mur
D.DEF-SG wall
'the wall'

c. l[ə]-**s** mur-**s**
D.DEF-PL wall-PL
'the walls'

As for feminine forms with the *l*- D-base, in *B* and *MdF* *-a* codes feminine with D$_{\text{EXPL}}$ (*l-a*$_{\text{F}}$) and D$_{\text{DEF}}$ (*l*$_{\text{DEF}}$*-a*$_{\text{F}}$). In our analysis, OF definite *le* is D$_{\text{DEF.SG}}$ (rather than D$_{\text{DEF.M}}$); *la* is D$_{\text{DEF.F}}$.

(i) L-**e** abe-**s** lur dist "Portez nus ent!"
D.DEF-SG abbot-SBJ to-3PL said: 'bring to-me some
'**The abbot** told them: "Bring me some!"' [*B* v295]

(ii) Deus, tant est dur l-**e** partement!
God so.much is difficult D.DEF-SG separation
'God, how cruel is **the separation**!' (*MdF Eliduc* v604)

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	#SG			#PL		
	GENDER:M		GENDER: F	GENDER:M		GENDER: F
	KASE:SBJ	*u*KASE		KASE:SBJ	*u*KASE	
COUNT						
• INDEFINITE	*un*-***s***$_{SBJ}$	*un*	*un*-***e***$_{F}$	Ø	***d***-[ə]-***s***$_{PL}$	Ø
• DEFINITE	*l*-***i***$_{SBJ}$	*l*-***e***$_{SG}$	*l*-***a***$_{F}$	*l*-***i***$_{SBJ}$	***l***-[ə]-***s***$_{PL}$	***l***-[ə]-***s***$_{PL}$
NON-COUNT						
• EXPLETIVE	Ø	Ø	*l*-***a***$_{F}$		n/a	

Table 3: *Lais de Marie de France* D-paradigm

2.2 Agree and the realization of φ-features on D and n

We now turn to the question of how OF φ-features (case, definiteness, number, gender) are realized when D and *n* combine. As OF D-paradigms have three D-bases (indefinite, definite, expletive) it follows that φ-feature realization reflects this split. Specifically, morphological exponence realizes the Agree relation between *n* and D, that is, the span of functional categories that includes K, D, Num, and Gen. This means that the *n*-spine involves four Agree relations: Agree <K,*n*>, Agree <D,*n*>, Agree <Num,*n*>, and Agree <Gen,*n* >. We show how they manifest with D_{INDF}, D_{DEF}, and D_{EXPL}.

Table 4 illustrates how AGREE plays out with D_{INDF} *un*-. The first row shows case agreement, with -s_{SBJ} on D and *n*. The second row shows indefiniteness agreement, realized as a selectional sortal relation where *un*$_{INDF}$- selects n_{CT}. The third row shows number agreement: because the cardinality of *un* is |1|, this is construed as a collective number (cf. (14) below). The fourth row shows gender agreement with n_F and n_M. The shaded second row is the least marked context, with only indefiniteness in play; note that [***un*** $n_{CT.M}$] in the last row is indistinguishable from this unmarked form.

Table 5 shows how Agree is resolved with D_{DEF} *l*-. The first row shows case agreement, realized as agreement between subject inflection on D_{DEF} (-i_{SBJ}) and $n_{CT.M}$ (-s_{SBJ}). The second row shows definiteness agreement: l_{DEF} selects n_{CT}. The third row shows number agreement: l_{DEF}-e_{SG} agrees with unmarked (SG) n_{CT}; l_{DEF}[ə]-s_{PL} agrees with plural-marked n_{CT}-s_{PL}. The fourth row shows gender agreement: l_{DEF}-a_F agrees with $n_{CT.F}$. The shaded second row is the least marked context, with only definiteness in play.

The resolution of Agree with D_{EXPL} is shown in Table 6. The first row shows case agreement. The second row shows sortal agreement, with D_{EXPL} selecting $n_{NON\text{-}CT}$. As number is undefined for $n_{NON\text{-}CT}$, as indicated in the third row, D_{EXPL} does not participate in number agreement. The last row shows gender agreement: *l*-a_{FEM} agrees with $n_{CT.F}$. Tables 4–6 show how Agree in the *n*-spine is resolved; within the minimalist framework that we adopt, Agree arises in specific syntactic environments (Rezac 2011), which we now introduce.

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Agree		D-exponent	*n*-exponent
<K_{SBJ}, n_{SBJ}>		$un_{\|1\|}$-s_{SBJ}	$n_{CT.M}$-s_{SBJ}
<D_{INDF}, n_{CT}>		$un_{\|1\|}$	n_{CT}
<$Num_{PL.COLL}$, n_{PL}>		$un_{\|1\|}$ (*e*)-$s_{PL.COLL}$	n_{CT}-s_{PL}
<Gen, n_{CT}>	(i) <Gen_F, n_F >	$un_{\|1\|}$-e_F	$n_{CT.F}$
	(ii) <Gen_M, n_M>	$un_{\|1\|}$	$n_{CT.M}$

Table 4: Agree relations with indefinite D-base *un–*

Agree		D-exponent	*n*-exponent
<K_{SBJ}, n_{SBJ}>		*l*-i_{SBJ}	$n_{CT.M}$-s_{SBJ}
<D_{DEF}, n_{CT}>		*l*-	n_{CT}
<Num, *n*>	(i) <Num_{SG}, n_{SG}>	*l*-e_{SG}	n_{CT}
	(ii) <Num_{PL}, n_{PL}>	*l*[ə]-s_{PL}	n_{CT}-s_{PL}
<Gen_F, n_F>		*l*-a_F	$n_{CT.F}$

Table 5: Agree relations with definite D-base *l–*

3. Syntactic analysis

We discuss nano-syntactic DP typology in section 3.1, introduce OF DP nano-syntax in section 3.2, and lay out the predictions of our analysis in section 3.3.

3.1 Nano-syntax of DP

The φ-features that create paradigmatic contrasts in OF (case, definiteness, number, gender) correspond to distinct syntactic functional heads. Relevant is the fact that, cross-linguistically, DP syntax varies in how Num and Gen are realized. Gen, which introduces noun classification (Corbett 1991), is typically associated with the lower part of the *n*-spine (Ferrari 2005, Lowenstamm 2007). In some languages Gen and Num are realized on the same head, as in Bantu (Déchaine et al. 2014); see

Agree	D-exponent	*n*-exponent
<K_{SBJ}, n_{SBJ}>	*l*-i_{SBJ}	$n_{NON\text{-}CT.M}$-s_{SBJ}
<D, $n_{NON\text{-}CT}$ >	***l***-$_D$	$n_{NON\text{-}CT}$
<Num, *n*>	(undefined)	
<Gen_F, n_F>	*l*-a_F	$n_{NON\text{-}CT.F}$

Table 6: Agree relations with expletive D-base *l–*

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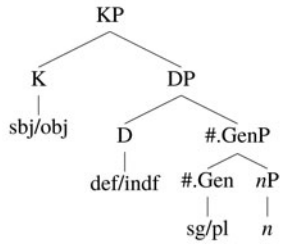
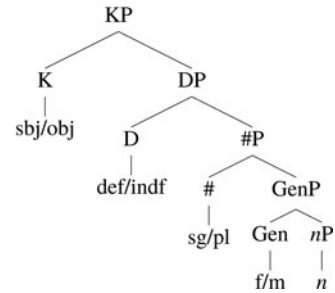
(11a). But in languages such as Spanish (Picallo 2008), Gen and Num are distinct heads (Ritter 1991, 1993; Bernstein 1993); see (11b).

(11) a. [K [D [#.Gen [[*n*]]]]

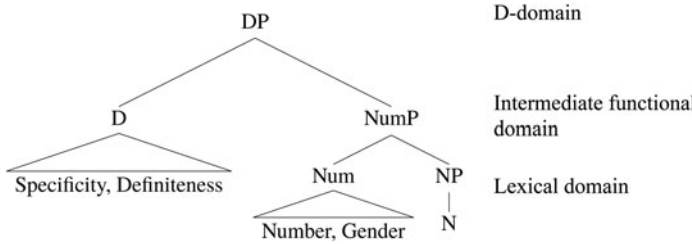


b. [K [D [# [Gen [*n*]]]]



In Modern French (MF), Num and Gen are realized on the same head, as in (12), adapted from Granfeldt (2004). D is the locus of specificity and definiteness; Num, an intermediate functional head, is the locus of number and gender; N (=*n*) is the lexical head. To situate MF relative to OF, consider the MF D-paradigm in Table 7, which shows that first, MF D does not inflect for case; second, MF $D_{INDF.PL}$ *des* and $D_{DEF.PL}$ *les* are gender-neutral; third, *l*-based D inflects for gender, contrasting *l*-e_M with *l*-a_F; and fourth, with n_{CT}, Num and Gen compete. With this background, we now show that OF has both a Bantu-type and a Spanish-type DP.

(12) MF *n*-spine (adapted from Granfeldt 2004: 4, (5))



3.2 Nano-syntax of Old French DP

Here we show that DP nano-syntax differs according to whether D combines with n_{CT} or $n_{NON\text{-}CT}$.

3.2.1 Count DP

Count Ds show a definiteness split: *l*- spells out D_{DEF}; *un*- spells out D_{INDF}. In addition, Num and Gen are conditioned by definiteness. In the definite series, Num/Gen are substitutive, (13a); this derives plural *l*-[ɔ]-s_{PL}, singular *l*-e_{SG}, and feminine *l*-a_F. In the indefinite series, Num and Gen are additive (13b); this derives two PL.COLL Ds: masculine *un*-s_{PL} and feminine *un*-e_F-s_{PL}. The latter confirms that, in the indefinite

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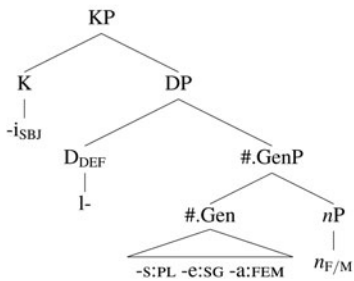
	#SG		#PL	
	GENDER:M	GENDER:F	GENDER:M	GENDER:F
Count				
INDEFINITE	*un*$_{M}$	*un-**e***$_{F}$	***d***-[ə]-***s***$_{PL}$	
DEFINITE	***l-e***$_{M}$	***l-a***$_{F}$	***l***-[ə]-***s***$_{PL}$	
Non-count				
EXPLETIVE	***l-e***$_{M}$	***l-a***$_{F}$	n/a	

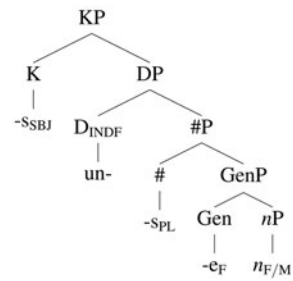
Table 7: Modern French D-paradigm

series, Num and Gen are distinct heads: (14a) is the PL.COLL of n_{M} *degrez* 'steps'; (14b) is the PL.COLL of n_{F} *eles* 'wings'.[5]

(13) a. Definite count DP



b. Indindefinite count DP



(14) a. un-**s** degre-**z** b. un-**e-s** ele-**s**
D.IND-COLL step-PL IND-F-COLL wing-PL
'staircase'; lit 'collection of steps' 'pair of wings'; lit. 'collection of wings'

3.2.2 *Non-count DP*

Non-count nouns do not participate in number contrasts; the absence of number on $n_{NON\text{-}CT}$ indicates that $DP_{NON\text{-}CT}$ lacks Num as a functional head, as in (15). The D-base for non-count DPs (*l-*) is the pure expression of D, and it inflects for case

[5]In the texts under discussion, PL.COLL occurs twice in *MdF*, as shown in (i) and (ii) below. During the period under study, PL.COLL is generally taken (Buridant 2000) to be a property of earlier (*B*) and later (*MdF*) OF, so we take its absence in *B* to be accidental.

(i) L' eisnee portout [**un-s** **bacin-s**] / D' or esmeré, bien faiz e fins;
D.DEF elder carry.IMP D.INDF-COLL basin-PL / of gold pure well made and fine
'The elder was carrying **a pair of basins** of gold, fine and well made;' (*MdF Lanval*, l. 61–62)

(ii) od [**un-s** **esché-s**] se deduieient
with D.INDF-COLL chess-PL REFL amuse.3PL
'with **a game of chess** (i.e. a collection of chess pieces) they amused themselves'
(*MdF Milun*, l. 198)

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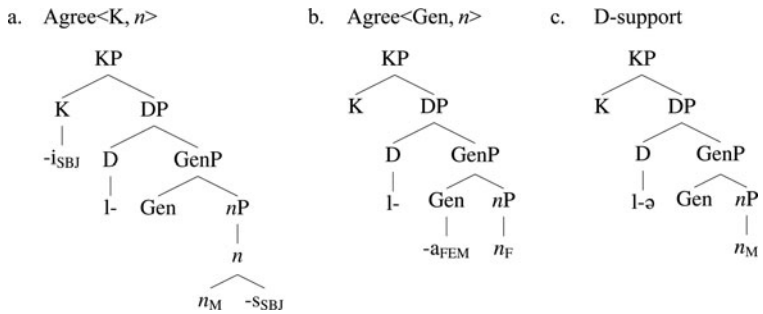
(l_D-i_{SBJ}) (15a) or gender (l_D-a_F), (15b). In the absence of case and gender, l_D- is supported by a phonologically conditioned schwa (l_D-[ə]).[6]

(15) Non-count DP



3.3 Predicting the distribution of D-drop

The DP structures we propose for OF are summarized in (16). Our analysis makes the following claims. First, overt K forces D-to-K movement, which strands Gen and Num. This accounts for why K on D is in complementary distribution with Num and Gen. Second, overt D shows a sortal partition between n_{CT} and $n_{NON\text{-}CT}$, and with n_{CT}, a definiteness partition that contrasts D_{INDF} *un* with D_{DEF} *l. l-* is also the base for D_{EXPL} ($\boldsymbol{l}_D$-) which occurs with $n_{NON\text{-}CT}$. Third, Num and Gen pattern differently in each D-series: (i) with D_{INDF}, Num and Gen co-occur; (ii) with D_{DEF}, Num and Gen compete; (iii) with D_{EXPL}, only Gen is expressed. Fourth, *n* has inherent gender inflection, as well as contextual case (-s_{SBJ}) and number (-s_{PL}) inflection: n_{CT} inflects for case (-s_{SBJ}) or number (-s_{PL}), but $n_{NON\text{-}CT}$ inflects only for case (-s_{SBJ}).

(16)

a.	[$_K$ -s_{SBJ}	[$_{D.IND}$ *un-*	[$_{\#}$ -s_{COLL} [$_{GEN}$ -e_F	[$n_{F/M}$-$s_{SBJ/PL}$	]]]]	COUNT: INDF
b.	[$_K$ -i_{SBJ}	[$_{D.DEF}$ *l-*	[$_{\#.GEN}$ {-s_{PL}, -e_{SG}, -a_F}	[$n_{F/M}$-$s_{SBJ/PL}$	]]]]	COUNT: DEF
c.	[$_K$ -i_{SBJ}	[$_D$ *l-*	[$_{GEN}$ -a_F	[$n_{F/M}$-s_{SBJ}	]]]]	NON-COUNT

In addition to accounting for how φ-features map onto the *n*-spine, our analysis predicts that Num and Gen are a likely locus of variation and change in OF. While $DP_{NON\text{-}CT}$ lacks Num, DP_{CT} expresses Num as a distinct syntactic head (indefinite DP) or as a feature that competes with Gen (definite DP). The factors identified in previous studies are *factor groups* in our variationist analysis, and we expect that the factor groups that condition D-drop (GF, SEMANTIC CLASS, DEFINITENESS, NUMBER, GENDER) will show similarities and differences across the two texts. Specifically, we expect D-drop to pattern in the same way in both texts for the factor groups GF, DEFINITENESS, and SEMANTIC CLASS. This is because, as shown in Table 8, these factor groups reflect the activity of invariant syntactic and semantic features: case

[6]OF D-support is akin to English *do*-support (Bobaljik 1995): both provide a functional head with phonological content (T in English, D in OF).

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Factor Group		Prediction		Rationale
GF	OBJ > **SBJ**	↓D-drop	/ $n_{M.SBJ}$	$D_{K.SBJ}$ disambiguates n_M
DEFINITENESS	**INDF** > DEF	↑D-drop	/ D_{INDF}	bare n = INDF by default
SEM. CLASS	**NON-CT** > CT	↑D-drop	/ n_{NON-CT}	D_{EXPL} non-informative
NUMBER[7]	**PL** > SG	↑D-drop	/ $D_{INDF.PL}$	$D_{INDF.PL}$ absent in some contexts
GENDER	**F** > M	↑D-drop	/ $n_{F.CT}$	NUM unambiguous with n_F

Table 8: Predicted impact of factor groups that condition D-drop (↑ = favoured; ↓ = inhibited; / = in the context of)

inflection on D (first row), D-paradigms with a definiteness split (second row), a count/non-count contrast (third row), the absence of overt D.INDF.PL in some contexts (fourth row), and unambiguous -s_{PL} marking on $n_{CT.F}$ (fifth row). This leads to the following predictions. Relative to GF, with $n_{CT.M}$, D-drop will be inhibited in SBJ position because D_{SBJ} disambiguates n_M-s_{SBJ} from n_M-s_{PL}. Relative to DEFINITENESS, D-drop will be favoured with D_{INDF} as bare n is indefinite by default (Leonetti 2012). Relative to SEMANTIC CLASS, D-drop will be favoured with n_{NON-CT} as D_{EXPL} adds no information. Relative to NUMBER, D-drop will be favoured by $D_{INDF.PL}$, as there are contexts where $D_Ø$ is the only possibility. Finally, relative to GENDER, given the unambiguous number-marking with $n_{CT.F}$, D-drop will be favoured in that context.

Since the syntax of Num and Gen varies, we expect them to be loci of variation. Our formal analysis predicts the changes in Table 9. Relative to NUMBER, in *MdF*, D-drop will be inhibited with indefinite plurals because of the introduction of the indefinite plural D *des*, initially attested with n_M. Relative to GENDER, the change will present itself differently with n_{CT} and n_{NON-CT}. With $n_{NON.CT}$, in *MdF*, D-drop will be favoured with $n_{NON.CT.M}$ because the decline of expletive D l_D-[ə] and l_D-i_{SBJ} in *MdF* means $n_{NON.CT.M}$ occurs more often with $D_Ø$. In *MdF*, D-drop will be inhibited with $n_{CT.M}$ because of the introduction of $D_{INDF.PL}$ *des* with n_M. To assess these predictions, we turn to our quantitative analysis of D-drop in *B* and *MdF*.

4. QUANTITATIVE ANALYSIS

We introduce the corpus in section 4.1, the variable rule program and coding procedure in section 4.2, and then present our findings in section 4.3.

4.1 Corpus analysis

Our data is drawn from the *Voies du français* corpus (Martineau et al. 2005–2010, Martineau et al. 2007, Martineau 2008), and syntactically parsed with *Corpus Search* (Randall et al. 2009). Based on descriptions of OF Ds, as well as descriptions

[7]If NUMBER conditions D-drop with DP_{DEF}, this predicts that $D_{DEF.SG}$ and $D_{DEF.PL}$ will pattern differently. To assess this, one must control for plural marking, which is sometimes present on n_M, but always present on n_F. We put this aside.

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Factor Group		Prediction		Rationale
NUMBER	PL > SG	↓D-drop	/ $D_{INDF.PL}$ (*MdF*)	overt $D_{INDF.PL}$ ***des*** (*MdF*)
GENDER	(i) M > F	↑D-drop	/ $n_{M.NON\text{-}CT}$ (*MdF*)	D_{EXPL} declines (*MdF*)
	(ii) F > M	↓D-drop	/ $n_{M.CT}$ (*MdF*)	***des*** 1st attested w/n_M (*MdF*)

Table 9: Predicted impact of factor groups contributing to change in D-drop: (↑ = increase from *B* to *MdF*; ↓ = decrease from *B* to *MdF*; / = in the context of)

and analyses of Romance bare nouns (Longobardi 1994, Dobrovie-Sorin and Laca 2003, Dobrovie-Sorin et al. 2006, Dufresne et al. to appear), we circumscribe the variable occurrence of D-drop as follows: (i) all *n* are coded for the PREDICATE/ARGUMENT contrast, WORD ORDER (preverbal, interverbal, postverbal), and GENDER (masculine, feminine); (ii) argument *n* is further coded for GF (subject/object) and SEMANTIC CLASS (count/abstract/mass); (ii) argument n_{CT} is further coded for DEFINITENESS (definite/indefinite) and NUMBER (singular/plural).[8]

4.2 Variationist analysis

Using the variable rule program *GoldVarb Lion* (Rand and Sankoff 1990, Sankoff et al. 2005) – which performs a stepwise logistic regression on multiple categorical predictors (*factor groups*) – we conducted a variationist quantitative analysis (Labov 1963, 1969, 1972) of *B* and *MdF* with the goal of measuring the relative weight of linguistic factors. We applied a *GoldVarb* analysis on each text, which allows us to measure the significance (at the .05 level), size, and direction of changes in the factors (Poplack and Tagliamonte 2001). To measure the effect size, the program assigns *factor weights* (probabilities) to each factor in a group: factor weights higher than .5 or lower than .5 on a 0–1 scale indicate that the application value is favoured or disfavoured, respectively. The effect size is measured by the *range*, which is the difference between the highest and lowest factor weight within a given factor group. The order of factor groups mirrors the order of factor strength as assessed by range, and indicates the direction of the effect: factor groups with higher ranges are stronger constraints.

DEFINITENESS and NUMBER identify four variants of $D_{Ø}$, with each one having an overt counterpart, as in Table 10. For D_{INDF}, there is one exponent of $D_{INDF.PL}$ (*des*, attested only in *MdF*), four exponents of $D_{INDF.SG}$ (*un, une, uns, unes*), three

[8]The *MCVF* corpus does not code D and *n* for definiteness, gender or number, so we did this manually. In coding $D_{Ø}$, we proceeded as follows. For NUMBER, we assume plural *n* is introduced by plural $D_{Ø}$. To decide if $D_{Ø}$ is (IN)DEFINITE, we used context, as indicated by the translation; see Dufresne *et al.* (to appear). For GENDER, we consulted two OF dictionaries (Godefroy 1881, Tobler and Lommatzsch 1915–). With indeterminate gender, as when dictionary entries indicate F or M gender, we attribute to *n* the gender of the overt D it occurs with in the text. For a bare *n* (i.e., without an overt D), we searched for other occurrences of *n* with D, and used the gender of D to attribute gender to *n*. If no other occurrence allowed us to identify the gender of *n*, we assigned it the gender of its MF counterpart.

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DEFINITENESS	NUMBER	$D_{Ø}$	D		*B*	*MdF*
indefinite	plural	$Ø_{INDF.PL}$	$D_{INDF.PL}$	des_{PL}	×	✓
indefinite	singular	$Ø_{INDF.SG}$	$D_{INDF.SG}$	$un_{M}/une_{F}/uns_{SBJ}/unes_{COLL}$	✓	✓
definite	singular	$Ø_{DEF.SG}$	$D_{DEF.SG}$	$le_{M}/li_{SBJ}/la_{F}$	✓	✓
definite	plural	$Ø_{DEF.PL}$	$D_{DEF.PL}$	li_{SBJ}/les_{PL}	✓	✓

Table 10: Old French variants of D and $D_{Ø}$

exponents of $D_{DEF.SG}$ (*le*, *la*, *li*), and two exponents of $D_{DEF.PL}$ (*les*, *li*). For D_{DEF}, note that: (i) subject *li* is number-neutral and can introduce plural or singular *n*; (ii) following descriptive tradition we code *le* as masculine, as it always accompanies n_{M}. However, *le* can be analysed as $D_{DEF.M}$, $D_{DEF.SG}$, or D_{EXPL} (see section 2).

4.3 Results of quantitative analysis

We look at D-drop in three contexts: argument *n*, argument $n_{NON\text{-}CT}$, and argument n_{CT}. For each context, we consider three things: first, whether TEXT conditions D-drop; second, which linguistic factor groups condition D-drop; and third, if relevant, the significance in changes in the proportion of D-drop.

4.3.1 Distribution of D-drop with argument n

Table 11 shows that with argument *n*, *B* mildly favours D-drop (.626), *MdF* mildly inhibits it (.453), and there is a highly significant decrease ($p < .001$) in D-drop from *B* (33.3%) to *MdF* (19.8%). This raises the question of whether D-drop decrease is uniform across all contexts.

To identify where and how D-drop decreases, we ran a multivariate analysis on each text, and compared the results. This allowed us to establish the relative weight of linguistic factors within a text. In addition, juxtaposition of these results allowed us to compare the patterning of D-drop across the two texts. Similarity in the patterning of variability – similarity in significance, range and ranking – indicate the underlying grammars are similar. Conversely, dissimilarities in significance, range and ranking indicate that the underlying grammars are different. Table 12 shows that, with argument *n*, GF is a highly ranked and stable constraint, with a range of 40 in *B*, and 43 in *MdF*. For SEMANTIC CLASS, which is significant in both *B*[9] and *MdF*, there is an increase in range (30 in *B*; 49 in *MdF*). Although there is an overall decrease of D-drop in almost all contexts (subject and object, feminine and masculine, postverbal and preverbal), there is an increase of D-drop with mass *n* (*B*: 51.1% to *MdF*: 83.3%) and abstract *n* (*B*: 51.2% to *MdF*: 70.5%). Thus, $n_{NON\text{-}CT}$

[9]In Table 12, for *B*, the ranking of factor weights for mass (.740) and abstract (.651) *n* does not match the proportion of D-drop (mass *n*: 51.1%, abstract *n*: 51.2%). This indicates the factor group SEMANTIC CLASS interacts with some other factor group, in this case GF. For discussion, see (Dufresne et al. to appear).

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	Input 0.229 Total $N = 1650$ Log likelihood = −881.820		
Text	Factor weight	%	*N*
Le voyage de saint Brendan	.626	33.3	445
Lais de Marie de France	.453	19.8	1205
Range	**17**		

Table 11: Contribution of text to probability of D-drop with argument *n*

favours D-drop in both texts, but even more so in *MdF*. The larger value in the range for SEMANTIC CLASS in *MdF* indicates that, between *B* and *MdF*, though there is an overall decrease of D-drop with argument *n*, there is an increase of D-drop with $n_{\text{NON-CT}}$. Also, with argument *n*, GENDER is a significant factor group in *B* (range of 21), with n_{F} mildly favouring D-drop (.636) and n_{M} mildly inhibiting it (.426). However, GENDER is not a significant factor group in *MdF*.

4.3.2 *Distribution of D-drop with non-count argument n*

Table 13 shows that with $n_{\text{NON-CT}}$, *MdF* mildly favours D-drop (.605), *B* strongly inhibits it (.384), and there is a significant increase in D-drop from *B* (51.1%) to *MdF* (72.0%).

Table 14 shows that, with $n_{\text{NON-CT}}$, GF continues to be a significant and stable factor group conditioning D-drop, with a range of 33 in *B*, and 30 in *MdF*. In addition, GENDER emerges as a significant factor group in *MdF*, with masculine favouring D-drop with $n_{\text{NON-CT}}$. Finally, with $n_{\text{NON-CT}}$, neither SEMANTIC CLASS (mass versus abstract *n*) nor WORD ORDER emerge as significant factor groups. Table 14 also shows that the increase of D-drop with $n_{\text{NON-CT}}$ (abstract and mass) is attributable only to n_{M}, which shows an increase from 45.2% (*B*) to 82.1% (*MdF*), which is highly significant ($p = .000237$). This contrasts with feminine $n_{\text{NON-CT}}$ which shows a stable rate of D-drop, 64.3% in *B* and 65.6% in *MdF*. We conclude that, with $n_{\text{NON-CT}}$, the overall increase in D-drop between *B* and *MdF* is attributable to n_{M}.

4.3.3 *Distribution of D-drop with count argument n*

Table 15 shows that TEXT is a significant factor group in conditioning D-drop with n_{CT}: *B* favours D-drop (factor weight of .651), and *MdF* inhibits D-drop (factor weight of .450). There is a *significant* decrease in D-drop from *B* (28.7%) to *MdF* (15%).

Table 16 shows that for n_{CT}, the significant and stable factor groups are DEFINITENESS, NUMBER, and GF. Their range remains the same. Their ranking also remains the same across the two texts: namely DEFINITENESS > NUMBER > GF. GENDER emerges as an unstable factor group, significant only in *B*, with feminine favouring D-drop. This indicates that, with n_{CT}, GENDER is a locus of change.

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	Le voyage de saint Brendan Input 0.297 Total *N* = 445 Log likelihood = –237.068			*Lais de Marie de France* Input 0.146 Total *N* = 1205 Log likelihood = –473.478		
Linguistic factors	Factor weight	%	*N*	Factor weight	%	*N*
GRAMMATICAL FUNCTION						
Object	.718	52.7	201	.705	31.8	635
Subject	.316	17.2	244	.275	6.3	570
Range	**40**			**43**		
SEMANTIC CLASS						
Mass N	.740	51.1	47	.939	83.3	12
Abstract N	.651	51.2	43	.908	70.5	88
Count N	.447	28.7	355	.447	15	1105
Range	**30**			**49**		
GENDER						
Feminine	.636	44.5	155	[ ]	[20.3]	[522]
Masculine	.426	27.2	290	[ ]	[19.3]	[683]
Range	**21**					
WORD ORDER						
Postverbal	[ ]	[34.1]	[223]	[ ]	[27.1]	[402]
Preverbal	[ ]	[32.6]	[221]	[ ]	[16.3]	[574]
Interverbal	[ ]	[0]	[1]	[ ]	[12.2]	[49]

Table 12: Factors contributing to probability of D-drop with argument *n* (Factor groups not selected as significant are in square brackets.)

In addition to identifying which factor groups are stable for D-drop with n_{CT}, Table 16 also shows that the decrease of D-drop is systematic, since in all contexts there is a decrease in the proportion of D-drop with n_{CT}.

Two questions remain. For n_{CT}, is the decrease of D-drop from *B* to *MdF* significant for all factor groups and for each factor within a factor group? For a given factor group, do the factors participate equally in the change? To answer these questions, we used a chi-square test to compare the significance of decrease in D-drop between *B* and *MdF* for each factor of the factor groups that emerged as significant in the *GoldVarb* analysis, namely DEFINITENESS, NUMBER, GF and GENDER.

Table 17 confirms that the decrease of D-drop from *B* to *MdF* is significant for all factor groups and for each factor within a factor group. It also indicates that within a factor group, not all factors participate equally in the change. For NUMBER, there is a sharp difference between PL and SG n_{CT} (PL is more stable). For GENDER there is a sharp difference between n_F and n_M (n_M is more stable). However, these differences are not equally robust. The difference between $n_{CT.SG}$ and $n_{CT.PL}$ is attributable to sample size: 1225 $n_{CT.SG}$ versus 235 $n_{CT.PL}$. The difference between n_F and n_M is a more solid finding, as the sample size is comparable (588 n_F, 872 n_M) and the highly significant factor contains fewer tokens (588 n_F) than the significant factor (872 n_M). We

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	Input 0.626 Total $N = 190$ Log likelihood = −121.656		
Text	Factor weight	%	*N*
Lais de Marie de France	.605	72,0	100
Le voyage de saint Brendan	.384	51,1	90
Range	**22**		

Table 13: Contribution of text to probability of D-drop with non-count *n*

	Le voyage de saint Brendan Input 0.512 Total $N = 90$ Log likelihood = –57.275			*Lais de Marie de France* Input 0.742 Total $N = 100$ Log likelihood = –53.943		
Linguistic factors	Factor weight	%	*N*	Factor weight	%	*N*
GRAMMATICAL FUNCTION						
Object	.663	67.4	46	.578	78.2	78
Subject	.330	34.1	44	.246	50	22
Range	**33**			**30**		
GENDER						
Masculine	[ ]	[45.2]	[62]	.656	82.1	39
Feminine	[ ]	[64.3]	[28]	.399	65.6	61
Range				**26**		
SEMANTIC CLASS						
Abstract	[ ]	[51.2]	[43]	[ ]	[70.5]	[88]
Mass	[ ]	[51.1]	[47]	[ ]	[83.3]	[12]

Table 14: Factors contributing to probability of D-drop with non-count *n*
(Factor groups not selected as significant in square brackets.)

conclude that, with n_{CT}, the decrease in D-drop between *B* and *MdF* is mainly attributable to n_F.

4.4 Summary of quantitative analysis

The *GoldVarb* analysis, enriched by the results of the chi-square test with n_{CT}, yields a snapshot of progress in change. First, while there is an overall decrease in D-drop with n_{CT}, there is an increase of D-drop with $n_{NON\text{-}CT}$. Second, some factor groups are stable (GF, DEFINITENESS, NUMBER), others unstable (SEMANTIC CLASS and GENDER), and others (WORD ORDER) are not significant in conditioning D-drop. That WORD ORDER emerges as not significant converges with Mathieu (2009). In addition, the quantitative results identify GENDER as a locus of change: D-drop increases with $n_{NON\text{-}CT.M}$, while it decreases with $n_{CT.F.}$

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	Input 0.178 Total $N = 1460$ Log likelihood = –680.434		
Text	Factor weight	%	*N*
Le voyage de saint Brendan	.651	28.7	355
Lais de Marie de France	.450	15.0	1105
Range	**21**		

Table 15: Contribution of text to probability of D-drop with count *n*

	Le voyage de saint Brendan Input 0.184 Total $N = 355$ Log likelihood = –118.506			*Lais de Marie de France* Input 0.065 Total $N = 1105$ Log likelihood = –294.082		
Linguistic factors	Factor weight	%	*N*	Factor weight	%	*N*
DEFINITENESS						
Indefinite	.921	74.8	107	.926	51.3	265
Definite	.258	8.9	248	.311	3.6	840
Range	**66**			**62**		
NUMBER						
Plural	.748	40.2	92	.796	27.3	143
Singular	.406	24.7	263	.450	13.2	962
Range	**34**			**35**		
GENDER						
Feminine	.690	40.2	127	[ ]	[14.3]	[461]
Masculine	.390	22.4	228	[ ]	[15.5]	[644]
Range	**30**			—		
GRAMMATICAL FUNCTION						
Object	.618	48.4	155	.584	25.2	559
Subject	.408	13.5	200	.414	4.6	546
Range	**21**			**18**		

Table 16: Factors contributing to probability of D-drop with count *n*
(Factor groups not selected as significant in square brackets.)

5. TRACKING THE TRAJECTORY OF φ-FEATURES

We revisit the trajectory of OF φ-features relative to the loci of stability (section 5.1) and change (section 5.2), and assess, in section 5.3, to what extent our morpho-syntactic analysis captures them.

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Factor group		chi-square	*p*-value	Significance	*N*		
					B	*MdF*	Total
DEFINITENESS	indefinite	17.2075	.000034	***	107	265	372
	definite	11.8161	.000587	**	248	840	1088
NUMBER	singular	20.7136	.000005	***	263	962	1225
	plural	4.2871	.038403	*	92	143	235
GENDER	feminine	41.7144	.000000	***	127	461	588
	masculine	5.503	.018984	*	228	644	872
GF	object	30.8579	.000000	***	155	559	714
	subject	17.9659	.000022	***	200	546	746

Table 17: chi-square test of D-drop decrease with count *n*
(*** = highly significant ($p < 0.001$); ** = very significant ($p < 0.01$); * = significant ($p < 0.05$))

5.1 Loci of stability

In assessing loci of stability, it is instructive to consider whether the formal and quantitative analyses diverge or converge. The formal analysis identifies NUMBER as a locus of change, but quantitative results indicate that it is stable. For this reason, we defer discussion of NUMBER to section 5.2, and focus here on DEFINITENESS and GF, which are identified as loci of stability by both formal and quantitative analyses.

5.1.1 DEFINITENESS

DEFINITENESS is the highest ranked factor group overall, with a range of 66 in *B* and 62 in *MdF* (see Table 16). In both texts indefinite contexts strongly favour D-drop (factor weights above .9), while definite contexts strongly inhibit it (factor weights below .35). The strength of DEFINITENESS as a factor group can be understood in two ways. First, on formal grounds D is the primary functional head of the *n*-spine and is the locus of the definiteness contrast (Déchaine and Tremblay 2012). Accordingly, the robustness of DEFINITENESS as a factor group might reflect its UG status, and so should emerge as a highly ranked factor group in all languages. Alternatively, given that OF D-paradigms, and perforce DPs, have a definiteness partition, it could be that the high ranking of DEFINITENESS is a language-specific property. If so, we would expect DEFINITENESS to emerge as a highly ranked factor group only in languages with a morphological definiteness contrast. Finally, the fact that DEFINITENESS remains a stable factor despite the overall decrease of D-drop between *B* and *MdF* indicates that it is not a trigger of change; this is consistent with it being a stable UG-property.

5.1.2 GF

In *B* and *MdF*, GF is a significant and stable factor group – object position favours D-drop and subject position inhibits it – for all argument *n*, whether they are $n_{\text{NON-CT}}$ (*B*: 33, *MdF*: 30) or n_{CT} (*B*: 21, *MdF*: 18). The stability of GF reflects the fact that

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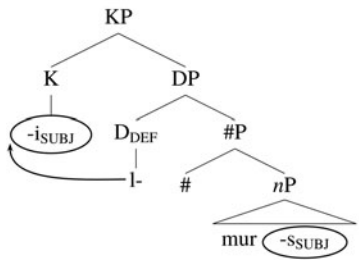
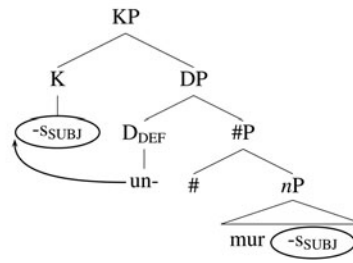
GF tracks the function of a nominal and so involves DP-external syntax. In OF, the morphological correlate of GF is case inflection. Consider the trees in (17), which show how case-marked (in)definite DPs are resolved with overt D. An arrow indicates movement; circled nodes participate in Agree. Case inflection (-i_{SBJ} or -s_{SBJ}) triggers D-to-K movement, deriving D_{DEF} *l*-i_{SBJ} and D_{INDF} *un*-s_{SBJ}; Agree <K, *n*> derives case-inflection (-s_{SBJ}) on n_M. Now consider what happens if D-drop applies, shown in (18). When functional categories lack phonological content, -*s* inflection on *n* is ambiguous: it can be -s_{PL} or -s_{SBJ}. Subject DPs are under pressure to retain overt D to disambiguate inflectional -*s*. Subject case inflection is present in *B* and *MdF*, and as predicted by our syntactic analysis, quantitative results indicate that subject position inhibits D-drop. In our account, the subject/object asymmetry observed in OF is not because object position favours D-drop, as proposed by Longobardi (1994) for Italian.

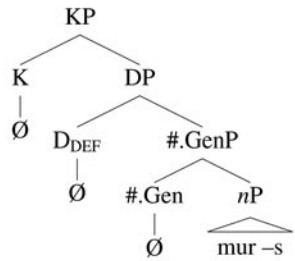
(17) a. Case-marked definite DP



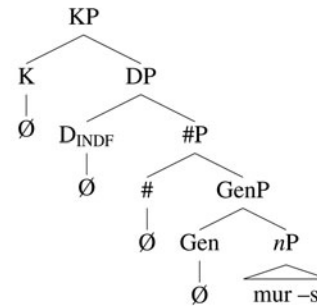
b. Case-marked indefinite DP



(18) a. Definite DP with D-drop



b. Indefinite DP with D-drop



On a more speculative note, we draw attention to GF as a DP-external factor group. All the other linguistic factor groups that are significant – DEFINITENESS, NUMBER, and GENDER – are DP-internal. In particular, the [D-Num-Gen] cluster forms a morpho-syntactic span (Williams 2003), as confirmed by the fact that OF case-inflection on D is in complementary distribution with Num and Gen. Our syntactic analysis models this structurally: case-inflection is resolved as D-to-K movement, and this movement strands Num and Gen, bleeding movement of Num and Gen to D. In the definite series, this blocks **l*-a_F-i_{SBJ}, **l*-e_{SG}-i_{SBJ}, and **l*-[ə]s_{PL}-i_{SBJ}.

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In the indefinite series, this blocks *un-e_{F}-s_{SBJ}, *un-s_{PL}-s_{SBJ}, and *un-e_{F}-s_{PL}-s_{SBJ}. These blocking effects follow if DP-external syntax (qua case-inflection as D-to-K movement) is distinct from DP-internal syntax (qua number and gender inflection as Num/Gen movement to D). These competition effects converge with claims in the theoretical literature that DP is a phase for movement (Adger 2007).

5.2 GENDER as a locus of change

The quantitative analysis detects two loci of change: masculine GENDER (with $n_{NON\text{-}CT}$) and feminine GENDER (with n_{CT}). We argue in section 5.2.1 that masculine GENDER as a locus of change reflects the decline of $D_{EXPL.M}$ in *MdF* with $n_{NON\text{-}CT}$. As for the disappearance of GENDER as a conditioning factor with n_{CT}, at present this remains mysterious, but in section 5.2.2 we speculate on possible causes. In addition, though it does not emerge as significant in the quantitative analysis, there is a qualitative change in the D-inventory via the introduction of the (masculine) indefinite plural D *des* in *MdF*, discussed in section 5.3.

5.2.1 Non-count nouns

From *B* to *MdF*, there is an increase of D-drop with $n_{NON\text{-}CT}$. In *B*, $n_{NON\text{-}CT}$ combines with D_{EXPL} that inflects for case (l-i_{SUBJ}), gender (l-a_{F}), or is the pure expression of D (l-[ə]). In *MdF*, the decline of [l-[ə] + $n_{NON\text{-}CT}$] and [l-i_{SUBJ} + $n_{NON\text{-}CT}$] is attributable to the (gradual) disappearance of expletive l- with $n_{NON\text{-}CT.M}$. Though *MdF* retains $l_{D.DEF}$-e_{SG} and $l_{D.DEF}$-i_{SBJ} with n_{CT}, $l_{D.DEF}$ cannot combine with $n_{NON\text{-}CT}$, as this would be a sortal mismatch. (In our analysis, combining D_{DEF} with $n_{NON\text{-}CT}$ violates Agree<D, n>.) In sum, the decline of D_{EXPL} in *MdF* is mirrored by an increase of D-drop with $n_{NON\text{-}CT.M}$. The independence of expletive l_{D}-a_{F} and l-[ə] is consistent with our analysis, which treats -a as the D-exponent of Agree<Gen_{F},n_{F}>. With D_{EXPL} there is no counterpart *Agree<Gen_{M},n_{M}>, so we correctly predict no parallelism between l_{D}-a_{F} (which does participate in gender agreement) and l_{D}-[ə] (which does not participate in gender agreement).

Our morpho-syntactic analysis of D_{EXPL} contrasts with that of Simonenko & Carlier (2016), who develop a semantic treatment that treats all exponents of l- as semantically weak Ds. Moreover, they assume that $n_{NON\text{-}CT}$ does not occur with D in OF; for the two OF texts that we study, though D-drop is more frequent with $n_{NON\text{-}CT}$, it is not obligatory. Although we believe that the weak D analysis is correct for MF, the gender contrast found with $n_{NON\text{-}CT}$ does not support a weak D analysis for OF. Rather, in *B* and *MdF*, D_{EXPL} and D_{DEF} are distinct D-paradigms, as confirmed by the distributional differences that we have documented.

5.2.2 Count nouns

With n_{CT} there is a decrease of D-drop from *B* to *MdF*, and GENDER is a significant factor group conditioning D-drop with n_{CT} in *B*, with $n_{CT.F}$ favouring D-drop. This gender effect with n_{CT} disappears in *MdF*. This change is not predicted by our analysis, and though we have no clear understanding of what drives it, we offer some speculative comments.

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The increase in the use of overt D is accompanied by the disappearance of GENDER as a conditioning factor in *MdF*. This is puzzling, as the unambiguous number-marking of OF $n_{CT.F}$ favours D-drop. One can understand this as follows: if inherent GENDER inflection on *n* is no longer a conditioning factor, then we expect all n_{CT} (n_F and n_M) to pattern together; this is what happens in *MdF*. The unsolved question is what drives this change. There are three possible sources: the syntax of *n*, the syntax of D, or both acting in concert. First, if a change in the declension system neutralizes the F/M contrast, then gender would not be criterial for D-drop with n_{CT}. However, there is no detectible change in the declension classes at this stage. Second, it could be that D drives the change: recall that D_{INDF} and D_{DEF} differ in how they spell out Num and Gen, with D_{INDF} having distinct Num and Gen heads, but D_{DEF} a collapsed Num/Gen head. If, in *MdF*, D_{INDF} collapses Num/Gen, this would lead to the neutralization of gender with n_{CT}. Third, it could be that the combined effect of [D $n_{CT.M}$] acts as a pull chain on [D $n_{CT.F}$]. In all three scenarios, the change would take place at the same rate in all contexts, reflecting the same underlying change, namely a move away from D-drop.

5.3 Assessing the predictions

Consistent with the formal analysis, the quantitative results confirm that subject position inhibits D-drop, indefinite contexts favour D-drop, $n_{NON\text{-}CT}$ favours D-drop, and plural favours D-drop. As for GENDER, with respect to n_{CT}, *B* behaves as expected, with $n_{CT.F}$ favouring D-drop. The unexpected twist is that *MdF* does not pattern in this way, showing no GENDER effect with n_{CT}. Finally, we expect that the introduction of the overt $D_{INDF.PL}$ *des* in *MdF* would inhibit D-drop with plural n_{CT}. At this stage of the grammar, the qualitative change in the D-inventory is not detected in the quantitative analysis. This is likely because there are so few tokens of *des* in *MdF*. The remaining prediction – increase in D-drop with $n_{CT.M}$ because of the introduction of $D_{INDEF.PL}$ *des* with n_M – is likewise undetected by the quantitative analysis, again likely because of sample size.

6. CONCLUSION

In the spirit of Cornips (2015), our aim has been to show that combining formal and quantitative tools allows a more precise modeling of language change. Variationist analysis provides insight into the structure of different grammars, by measuring the significance of various factors, as well as their ordering and relative strength. Relative to the two texts investigated here – which have the status of two grammars in variationist modelling – our study uncovers three novel findings, listed in (19).

(19) a. With $n_{NON\text{-}CT}$, quantitative analysis confirms a contrast between definite $l_{D.DEF}$ versus expletive l_D, as manifested by an increase in D-drop with $n_{NON\text{-}CT.M}$ in *MdF*. This increase in D-drop is attributable to the decline of masculine D_{EXPL} in *MdF*.

b. With n_{CT}, quantitative analysis indicates that GENDER is a significant factor group in *B*, with n_F favouring D-drop. This trend is reversed in *MdF*, where GENDER is not a

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significant factor group. Moreover, across the two texts, with n_{CT}, there is an overall decrease of D-drop, a decrease that is more significant with $n_{CT.F}$ than count $n_{CT.M}$.

c. In addition to paradigmatic changes, there is a change in D-inventory, with the presence of $D_{INDF.PL}$ (*des*) in *MdF* in the third quarter of the 12th century indicating that it is attested at an earlier date than advanced in previous studies, which locate the 13th century as the time when *des* is introduced (Buridant 2000, Carlier 2013).

In closing, we highlight one of the research perspectives that a detailed investigation of D-drop opens up. One question that immediately presents itself is how OF D-drop compares with D-drop in other languages, and in particular with the diachrony of D-drop in Romance. A possible next step would be to determine if the factors identified in the present study interact in a similar fashion in other Romance languages (Stark 2007, 2008). In this regard, it is relevant that ever since Postal (1969), it is widely recognized that determiners and pronouns belong to the same category (Longobardi 1994, 2001; Déchaine and Wiltschko 2002; Kiparsky 2008). If so, we might expect that loss of D-drop in OF to follow a parallel trajectory to that of *pro*-drop, and to exhibit a constant rate effect (Kroch 1989). A confound is that OF *pro*-drop does not behave as predicted by Rizzi's (1982) parametric analysis, according to which a referential subject pronoun is possible only if accented. Rizzi's analysis further links the accentuation of overt pronouns to the absence of overt expletive pronouns, since the latter are never accented. However, OF has both overt subject pronouns and overt expletive pronouns; moreover, when subject pronouns are expressed, they do not necessarily have an emphatic interpretation. The existence of unaccented pronouns together with the variable occurrence of subject *pro*-drop in OF has led some linguists to consider OF as a 'semi *pro*-drop' language (Holmberg 2009). This is especially relevant in light of the fact that the present study shows that variable D-drop in OF is sensitive to the contrast between referential (i.e., definite and indefinite) and expletive D. This raises the question of whether variable *pro*-drop in OF is sensitive to the contrast between referential and expletive pronouns. We anticipate that future research will shed light on this.

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