

The Evolution of the Encoding of Direction in the History of French: A Quantitative Approach to Argument Structure Change

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0. Abstract

This paper presents a quantitative study of a change in the encoding of direction from the Old French period to the Middle French period: the loss of verb-particle combinations. Using a large electronic corpus, we test a previous hypothesis about the cause of this change from the theoretical literature, namely, that the loss of directional particles was caused by another change in the language around that period: the lexicalization of directional and aspectual prefixes onto verbal roots. We argue that a link between the two changes is not verified by our data. Through this study, we also investigate the extent to which argument structure change parallels another type of morpho-syntactic change: abstract parameter change. We argue that the shape of change in the valency of predicates is different from that of parameter change because argument structure change is sensitive to many more factors, including the semantics of particular lexical expressions.

1. Introduction

This paper presents a quantitative study of a change in the encoding of directionality in the history of French: the loss of verb-particle combinations from the Old French period (OF- 12th and 13th centuries) to the Middle French period (MF-14th-16th centuries). Using a large electronic corpus we test a previous hypothesis about the cause of this change from the theoretical literature, namely, that the loss of directional particles was caused by another change in the language around that period: the lexicalization of directional and aspectual prefixes onto verbal roots. The phenomena that we examine in this paper involve change in the selectional requirements of particular lexical items. We therefore also investigate the extent to which argument structure change parallels another, more frequently

studied, type of morpho-syntactic change: abstract parameter change.

1.1 The problem: two changes in the history of French

Like Modern English, but unlike Modern French, Old French contains a series of directional particles that serve to specify the path of a motion event (Buridant (2000); Dufresne et al. (2003); Burnett & Tremblay (2009)). The OF particle system consists of 10 elements: *arriere* 'back'; *avant* 'forward'; *sus* 'up'; *jus* 'down'; *ens* 'in'; *hors/fors* 'out'; *amont* 'upwards'; *aval* 'downwards'; *contremont* 'upwards'; *contreval* 'downwards'. As shown in the examples below, the OF particles all have a directional interpretation. This is consistent with many analyses of English particles, such as Jackendoff (1983) and Svenonius (2006), where these P-elements are proposed to refer directly to PATH arguments.

- | | | |
|--------|--|----------------|
| (1) a. | ...et pour ce se trait il arriere | Trispr |
| p. 263 | ...and for this himself draw he back
"...and, because of this, he left" | |
| b. | Lors saut avant Girflez et dist a la reïne: ...
Then jumps forward Girflé and says to the queen: ...
"Then Girflet comes forward and says to the queen:..." | Artu, p. 319 |
| c. | Et toutevoies recort il sus au serpent ...
And however re-run he up to-the snake
"However, he pursues the snake again..." | QGraal, p. 94 |
| d. | Ains descent tout maintenant jus de son ceval
So descends all now down from his horse
"He then dismounts from his horse " | Trispr, p. 127 |
| e. | et lors entrent enz li plus riche baron
and then entered in the most rich barons
"and then the richest barons came in" | Artu, p. 213 |
| f. | A ces criz et a ces noises issi hors Messires Gauvains de son ostel
At these cries and at these noises, came out Messire Gauvains-NOM from his house
"When he heard the cries and the noise, Messire Gauvain came out of his house" | Artu, p.130 |
| g. | si tost come il fu amont venuz en la roche...
so soon as he was upwards came on the rock
"As soon as he came up on the rock" | QGraal p. 94 |
| h. | il descendent del pals et viennent en la cort aval
They descended from the palaces and came into the courtyard down
"They descended from the palaces and came down into the courtyard" | Artu p. 194 |
| i. | Et il vient as degrez et monte contremont , ... | Graal p. 139 |

And he comes to the stairs and climb up...

"And he goes to the stairs and goes up..."

- j. *Si se leva et **devala** comme ainz pot **contreval** .*

"He got up and went down as fast as he could " SagesP, 21,12, cited in Buridant, 2000 :439

Like other Romance particles, OF particles form a semantic unit with the verb they appear with. However, unlike its Romance counterparts (Iacobini & Masini 2007, Rigau (p.c.)), but like Germanic verb-particle constructions (VPCs), this VPC is not syntactically atomic. This can be seen in the examples in (2), where the verb is separated from the particle by the direct object (2a), and an adverb (2b).

- (2) a.

*le mers **reportoit** le nef **ariere**.*

the sea re-bring-IMP the ship back

"the sea pushed the ship back"

Clari p. 74, cited in Dufresne, Dupuis & Tremblay

2003, example (26a)

- b.

*Je lour **courui** esranment **sus** ...*

I them-DAT run-PST immediately up

"I pursued them immediately..."

Trispr, p. 62, cited in Dufresne, Dupuis & Tremblay

2003, example (73)

The OF particles differ from English-style particles in that they can appear before infinitives (3) and past participles (4), i.e. in sentences which do not involve verb movement¹.

- (3)

a. *Voldrent le faire **sus lever** / Mais il ne pot sor piez ester*

wanted-3PP it make-INF up raise / but he NEG can on feet be-INF

"They wanted to make him stand up, but he could not stay on his feet. "

VieSGrég1, ms. A1, 2537-38, cited in

Buridant 2000: §440

b. *...si Dex me laist de cest champ issir vif/ Et sain et sauf **arriere revertir***

...if God me let from this field leave alive /and sound and safe back return.

"If God lets me leave from this field alive, and return safe and sound. "

Amiami p. 46

- (4) a.

*Li sēaus est **jus avalez***

The pail is down descended

"The pail is brought down. "

RenartR, II, 3641, cited in Buridant : §440

- b. *Garde le bien, tant que tu soies **arriere revenus** en Cornuaille.*

Keep it well, until that you are back returned in Cornwall

"Keep it well until you return to Cornwall."

Trispr p. 237

¹ It is interesting to note, however, that these were acceptable positions for verb particles in Old English.

According to Buridant (2000), verbal constructions formed with these elements disappeared from the language by the end of the 16th century. The fact that, by the Renaissance, the entire class of particles disappears without exception strongly suggests that the change is not simply an idiosyncratic loss of lexical items, but a change in the grammatical encoding of directionality in the French language. To this date, there has been no quantitative investigation into the shape of this syntactic change. This paper is the first step in filling this empirical void.

1.2 *A possible cause: the lexicalization of directional particles*

In the OF period, the path of an event could also be indicated by a parallel series of productive aspectual/directional prefixes. These prefixes attached to a series of verbal roots with underspecified PATH arguments (5), the majority of which also appeared bare in the language.

- (5) *aler* 'to go', *venir* 'to come', *tourner* 'to go/to turn', *traire* 'to draw/to go'
etc.

Thus, while 'to go back' could be expressed by the VPC *aler arriere* (6a), this meaning could also be expressed by the combination of the iterative/locative prefix *re-* and the verb *aler* (6b).

- (6) a. *Quide qu'il voist arriere en son païs*
Believe that-he goes back in his country
'Believe that he goes back to his country' *Moniage, Guillaume*, p.320
b. *raler s'en vuelt en son païs*
re-go CL-CL wants in his country
'He wants to go back to his country' *Marie de France. Lais* p. 131

Similar doublets involving particles and prefixes are shown in (7).

- (7) a. *saillir sus* vs *sursaillir* 'to jump up'
b. *traire hors* vs *extraire* 'to draw out'
c. *traire ens* vs *entraire* 'to draw in'

Starting in the Middle French period, many of the prefixes became lexicalized onto the verbal root; that is, they lost the ability to productively combine with verbal forms, and often underwent a semantic

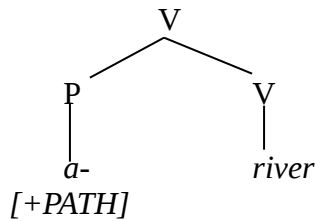
bleaching process (Dufresne, Dupuis and Tremblay (2000)). For example, Dufresne, Dupuis and Longtin (2001) show that the ability to form new verbs with the aspectual prefix *a-* declines in the 15th century, and Hamacher (2002) shows a similar loss of productivity for the prefix *con-* in the 14th century. As a consequence of this lexicalization process, the language lost many of the verbal roots as independent words in the language; indeed, for a number of authors, it is the absence of such roots that signals the end of the change. For example, Dufresne, Dupuis and Longtin (2001), following Rey (1993), conclude that, in the Modern French examples *accomplir* 'to accomplish', *achever* 'to finish', and *ajouter* 'to add', “the *a-* is no longer perceived as a prefix, since the non-prefixed form related by the meaning is not longer a part of the contemporary French lexicon. Thus the relation [between prefixed form and non-prefixed form necessary for isolating the prefix as a separate morpheme] can no longer be established” (DDL (2001: 5), our translation²). Further examples of lexicalization of the aspectual prefixes with the subsequent loss of the bare root include the replacement of *mander* 'to ask' by *demander* and the replacement of *garder* 'to watch' by *regarder*. With respect to the lexicalization of directional prefixes, we see the replacement of *river* 'to go alongside' by *arriver* 'to arrive', and the replacement of OF motion verbs *tourner* and *traire* + PATH by the prefixed forms *retourner* / *atourner* / *détourner* and *extraire* / *retraire* / *attirer* / *détraire*.

These two changes (the loss of directional particles and the lexicalization of directional prefixes) have been proposed to be linked in the theoretical literature on the development of the French prepositional system (cf. Tremblay, Dupuis and Dufresne (2004); Kopecka (2009) and Kopecka (to appear)). For example, Tremblay, Dupuis and Dufresne (2004) (TDD) argue that the loss of particles is a direct consequence of the lexicalization of prefixes. These authors propose that particles and directional prefixes bear a PATH feature/lexicalize a PATH node in the syntax. Thus, in Old French, when *a-* could combine productively with a verb taking a PATH argument, the [+PATH] feature was

²le *a-* n'est plus perçu comme un préfixe, la forme non préfixée apparentée par le sens n'appartient plus au lexique du français contemporain, de sorte de la relation ne peut plus être établie

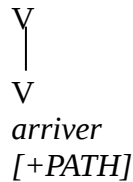
specified on the prefix.

- (8) Old French (Tremblay, Dupuis and Dufresne (2004:8))



However, with the lexicalization of *a-* and loss of *river*, the string *arriver* was reanalyzed as a monomorphemic verb that inherently bears [+PATH].

- (9) Middle French



Since, after this process, the path of the motion event was expressed directly by the verb, a particle was no longer needed to fill this selectional requirement. Therefore, for these authors, the disappearance of directional particles is attributed to the relexicalization of directionality as a verbal property in Middle French (p.9). In other words, they hypothesize that, in the MF period, motion verbs stopped selecting syntactic PATH arguments, and thus particles, elements that supply these arguments, disappeared from the language.

While this explanation for the loss of the verb-particle system of OF has much intuitive appeal, its claims are purely speculative; there has yet to be any empirical investigation into this matter.

1.2 Our proposal

We propose to test Tremblay, Dupuis and Dufresne's hypothesis by means of a large quantitative corpus study. To be fully explicit, we test the following theoretical hypothesis:

- (10) In Old French, the path of a motion event could be supplied either by a directional particle or a directional prefix. After the lexicalization of the prefixes, the path argument of the motion verb is satisfied word-internally; therefore, the particle cannot do so in the syntax.

This claim is very broad: it covers all the particles, all the motion verbs, and, moreover, all the prefixes. A comprehensive evaluation of this proposal is therefore out of the scope of this paper. This being said, we present a case study of the interaction between the loss of VPCs and the lexicalization of directional prefixes, one that, in principle, exemplifies the types of situations that (10) was designed to cover. We study the possible interaction between the loss of the particle *arriere* 'back' and the lexicalization of directional prefixes with two motion verbs: *tourner* 'to turn/to go' and *traire* 'to draw/to go'. In Modern French, both of these verbs have specialized meanings; *traire* in particular is only used with the extremely restricted sense of 'milking'. But in Old French, both of these roots were basic motion verbs that selected for a PATH argument that could be specified either by a prefix (11a), or by a particle (11b).

- (11) a. Nostre Dame s'apparut a elle, dont elle **retorna** en s'abbaye et le chevalier se rendi
moine
Our Lady CL-appeared to her, so she returned in her abbey and the knight CL
became monk
'Our Lady appeared to her; therefore, she returned to her abbey and the knight became a monk'
(TFA: MirPer7, p.311)
- b. Li pelerin torment **arriere**
the pilgrims turn **back** (TFA: Chartres)
- (12) a. A une part se sunt **retrait**
at one part CL were withdrawn
'At one point, they drew back' (TFA: Wace, p. 168)
- b. et pour ce se trait il **arriere**
and for that CL draw he **back**
'and, because of this, he drew back' (TFA: Trisper p. 263)

We have three main goals in this paper: the first one is empirical. We document the loss of the particle *arriere* in a large historical corpus. We also provide quantitative data on the lexicalization of prefixes of the sort that has not been observed before. We therefore make the first steps in the mapping out for the time-course of these important changes in the morpho-syntax of French. Our second goal concerns the particular analysis of the change in the encoding of directionality in French. We test TDD (2004)'s hypothesis by means of empirical data, and argue that our study suggests that the loss of particle verbs should *not* be attributed to the lexicalization of prefixes. Our final goal is to compare the

time-course of a change in the argument structure of motion verbs to other types of change, like change in the setting of word-order parameters. Our study suggests that, unlike parameter change that ignores lexical variation, valency change is highly sensitive to the syntactic and semantic properties of individual lexical items.

Additionally, a corpus-based approach to the study of argument structure change presents a number of puzzles that are not present in the examination of phenomena, like word order, that are more commonly studied in this manner. We provide a discussion of some of these problems throughout the paper.

In section 2, we present the methodology of our study. We discuss the particular challenges involved in the quantitative study of the encoding of directionality in the history of French, and we provide a response to them. In section 3, we present our results, and in section 4, we provide a discussion and conclusion about their significance for the theory of morpho-syntactic change in the history of French.

2. *Methodology*

In this section, we give a detailed outline of the procedure we followed in the study.

2.1 *The shape of parameter change*

One of the main results of the large-scale quantitative study of syntactic change has been that the rate at which an innovative form spreads seems to remain constant across the different linguistic contexts affected by the change. That such a result can be used to determine whether two seemingly different patterns of change are the surface manifestations of a single underlying structural change is known as the *Constant Rate Hypothesis*:

(13)

Constant Rate Hypothesis (CRH):

"When one grammatical option replaces another with which it is in competition across a

set of linguistic contexts, the rate of replacement, properly measured, is the same in all of them" (Kroch (1989: 2))

Constant rate effects have been found in many studies including change from OV order to VO order in the history of English (Pintzuk (1991)), change from INFL(ection)-final to INFL-medial phrase structure in Yiddish (Santorini (1993)), and the rise of verb movement to INFL in English (Kroch (1989)), among others.

However, the first thing to point out about all these studies is that they involve change that is supposedly located in abstract grammatical structures. Indeed, the proposed explanation for why we find these effects is that they are a result of changes in parameter settings or grammatical features on abstract functional syntactic heads. These (presumably universal) elements are purely formal syntactic objects that are insensitive to the particular surface forms and meanings of the individual lexical expressions of the language. Thus, a change in a parameter that is associated with a particular category should affect all members of that category equally, regardless of idiosyncratic variation in their form or meaning. An empirical example of this principle comes from Santorini (1993)'s study of change in the INFL head in the history of Yiddish. She shows that all types of verbs, both simple and complex (i.e. structures containing auxiliaries or modals), change from occupying a final position to a medial position at the same rate. Thus, in parameter change, we do not expect to see variation based on particular lexical items.

In our study, we first investigate whether the rate of the loss of *arriere* is constant across all contexts studied, i.e. whether the shape of the loss of *arriere* is the same with *traire* as with *tourner*, which is what we would expect if the loss of VPCs were the result of an abstract grammatical change.

Secondly, we examine whether we find a constant rate effect between the loss of VPCs with the particle *arriere* and the lexicalization of directional prefixes. In the Old French period, motion verbs such as *tourner* and *traire* select for a PATH argument specifying the direction of the motion event which could be saturated either by a directional particle or by a directional prefix. With the reanalysis

of directional prefixes as part of the verbal root, the direction of the motion event is specified within the root itself, and *tourner* and *traire* stop selecting for independent PATH arguments. Given this scenario, we may identify two competing grammars: the OF grammar with the lexical items *tourner* (that selects for a PATH argument) and *arriere* (that can saturate a PATH theta role), and the grammar that replaces it containing neither one of these elements. In this second grammar, the PATH argument is saturated inside the verbal root (by a lexicalized prefix), which is equivalent to saying that, in the modern language, PATH arguments are not syntactically realized.³ Thus, the loss of verbs that assign a PATH theta role and syntactic particles that can satisfy this role are two manifestations of the change in the argument structure of motion verbs. Assuming that the *Constant Rate Hypothesis* is correct and appropriate for this situation, we should find a correlation between rate of the loss of the particles and the rate of the lexicalization of directional prefixes.

In the remainder of the paper, we investigate whether we find a constant rate effect (CRE) for the loss of *arriere* with both *tourner* and *traire*, and whether we also find a CRE between the loss of *arriere* and the lexicalization of directional prefixes with both these roots.

2.1 Corpora

As mentioned in the previous section, we test for a constant rate effect between two changes in the encoding of directionality using a large corpus of historical French. For the data on the Old French period (12th-13th centuries), we used the *Textes de français ancien* (TFA) database. (<http://www.lib.uchicago.edu/efts/ARTFL/projects/TLA/>). This database was established under the direction of Pierre Kunstmann at the *Laboratoire de Français Ancien* (LFA, University of Ottawa), in collaboration with Mark Olsen (University of Chicago), who hosts and processes the data on the ARTFL Project server. The database contains predominantly texts from the OF period, with a couple of

³ This claim is consistent with Troberg (2009)'s study of the evolution of the prepositions *a* and *en* in which she argues that, in Old French, these elements could have a directional (i.e. PATH) meaning, but in Modern French they are purely locative (i.e. introduce PLACE arguments).

texts from the 14th and 15th centuries. According to the website, the corpus has a total of about 3 014 389 word occurrences. In this study, we limited our searches in the TFA to the OF period. There are 33 texts from the 12th century, and 21 texts from the 13th century.

For data on the Middle French period, we used the *Dictionnaire du Moyen Français*, a part of the ATILF project (*Analyse et traitement informatique de la langue française*- Nancy Université & CNRS: <http://www.atilf.fr/dmf>). This corpus contains predominantly texts from Middle French (14th and 15th centuries), but also a small corpus from the Renaissance (16th century). The 14th century subcorpus contains 2 879 163 words, the 15th century subcorpus contains 3 312 906 words, and the 16th century subcorpus contains 794 702 words.

2.2 Studying the loss of *arriere*

The first challenge involved in tracking the replacement of one grammatical form by another is the identification of the original structure and the innovative structure with which it is in variation. Many quantitative studies of syntactic change are performed on phenomena where the identification of the diachronic variants can be done *syntactically*, i.e. through simple inspection of strings. When looking at change in verbal argument structure, the diachronic variation that we study is *semantic* in nature: an element that fulfilled a particular semantic role at one stage of the language ceases to be able to do so at another. While it is reasonable to assume that this role is filled by something else after the change, it is not always obvious what that new element (or elements) is. Thus, simply establishing the variants for a particular semantic feature in diachrony is a delicate process that requires a great deal of knowledge of the syntax and semantics of previous stages of the language under examination.

Fortunately, unlike some other particles, *arriere* has a clear semantic variant with which it is in competition throughout the history of French: the iterative/directional prefix *re-*. For example, the OF sentence in (14a), with the verb-particle combination *tourner arriere*, would be translated in Modern French by means of the verb *retourner* (14b).

- (14) a. Li pelerin torment **arriere**
the pilgrims turn **back** (TFA: Chartres)
b. Les pelerins **retournent**
'The pilgrims return'

Therefore, in this article, we look at the rate of replacement of verb-particle combinations with *arriere* by verbs prefixed with *re-*. *re-* itself was a productive prefix in OF, which seemed to have most of the same semantic values as *arriere* (for a detailed synchronic study of OF *re-*, see Gosselin (1999)).

- (15) Nostre Dame s'apparut a elle, dont elle **retorna** en s'abbaie et le chevalier se rendi moine
Our Lady CL-appeared to her, so she returned in her abby and the knight CL
became monk
'Our Lady appeared to her; therefore, she returned to her abbey and the knight became a monk'
(TFA: MirPer7, p.311)

Intuitively, one way of studying the replacement of *arriere* by *re-* in the context of the root *tourner* would be to count up the number of occurrences of the VPC *tourner arriere*, and compare it to the occurrences of *retourner*. However, there is a complication: OF had doubling of iterative elements. For example, as shown in (16), *retourner arriere* was also a well-formed VPC in Old French, and it was interpreted as contributing a single iteration.

- (16) Ma douce amie, **retorne t'an arriere**
My sweet friend return CL-CL back
'My sweet friend, turn back' (TFA: Ami. p. 22)

This 'iterative concord' phenomenon was widespread, and could even involve up to three iterative elements being interpreted as one.

- (17) Si chantant en itel meniere **resont tuit revenu arriere**
Thus singing in this way REwere all REcome BACK
'Thus, singing in this way, they all came back'
(Dole, p. 335, cit. Askedal & Shoesler (2007))

We therefore propose to study the loss of *arriere* by looking at the evolution of the expression of backward direction using a particle. In other words, we compare the frequency of forms that express the concept of 'turning back' and 'drawing back' using a particle, versus the frequency of forms that express this concept in a single word. Concretely, we track the replacement of the forms *tourner*

arriere and *retourner arriere* by *retourner*, and the replacement of *traire arriere* and *retraire arriere* by *retraire*.

2.3. Studying the lexicalization of prefixes

The second change in the encoding of directionality that we examine in this paper is the reanalysis of autonomous directional prefixes as opaque parts of the verbal root. Studying the lexicalization of aspectual and directional prefixes across time from a corpus perspective is even more problematic than studying the loss of particle verbs. Previous studies of this phenomenon, like Dupuis, Dufresne and Longtin (2001) and Hamacher (2002), have proceeded by counting the number of verb types, i.e. distinct lemmas that occur at each time period. While this methodology gives us a good picture of the loss of productivity of a prefix, it returns data in a format that is incompatible for comparison with studies based on rates of change. We must therefore find some other way of studying the lexicalization process that allows us to compare it to the rate of the loss of *arriere*.

However, there is one aspect of the change that lends itself to comparison with the loss of *arriere*: the decline and subsequent loss of bare PATH selecting roots. As has been suggested in Dufresne, Dupuis and Longtin (2001) and Tremblay, Dupuis and Dufresne (2004), the loss of these forms is an integral part of the lexicalization process. We should therefore be able to track the course of this process by looking at the rate of the decline in the use of bare *tourner* and *traire*.

We compare the occurrences of bare *tourner* and bare *traire* to the occurrences of the forms of these verbs prefixed by directional morphemes. In order to obtain the complete list of prefixed forms, we used the *lemmatiseur* function of the *Dictionnaire du moyen français*. This gives us both the complete list of verbs with the root forms *tourner* and *traire* starting in the 14th century, and the complete list of the spellings and conjugations of these verbs. We then searched for these forms in both the TFA and the DMF corpus.

3. Results

In this section, we present the results of our study. We first compare the rate of the loss of VPCs formed with *arriere* to the rate of the loss of unprefixated forms with the verbal root *tourner*. We then make a similar comparison for the verbal root *traire*.

3.1 TOURNER

We first examine the loss of the VPCs formed with *(re)tourner* and *arriere*. As shown in the table below, the number of VPCs drops rapidly between the 13th and 14th century.

Century	12 th	13 th	14 th	15 th	16 th
<i>tourner arriere</i>	27	9	8	12	1
<i>retourner arriere</i>	30	48	39	49	5
Total with particle	57 (76%)	57 (73%)	47 (5%)	61 (3%)	6 (1%)
Bare <i>retourner</i>	18	21	885	1761	505
Total without particle	18 (24%)	21 (27%)	885 (95%)	1761 (97%)	505 (99%)

Table 1: The evolution of 'to turn back' in Old and Middle French

It is interesting to note that VPCs with *retourner arriere* persist longer than their (seemingly synonymous) non-prefixed counterparts. This is, in fact, the exact opposite of what we would expect under a Tremblay, Dupuis and Dufresne story: for them, doubling of the prefix by the particle should be, at best, a marginal, stylistic construction given that, in this theory, it was the redundancy of doubly saturating the PATH argument that led to the loss of the particle.

The entire list of prefixed forms of the verb *tourner*, along with their occurrences across the centuries, is shown in Table 2 below.

Century	12 th	13 th	14 th	15 th	16 th
<i>aretourner</i>	0	0	0	0	0
<i>atourner</i>	160	128	173	89	2
<i>bistourner</i>	0	1	15	21	0

<i>contourner</i>	0	0	3	17	0
<i>désatourner</i>	0	0	1	1	0
<i>détourner</i>	10	7	116	75	26
<i>entourner</i>	0	0	0	0	1
<i>estourner</i>	0	0	0	0	0
<i>pourtourner</i>	0	0	0	0	0
<i>ratourner</i>	1	1	1	1	0
<i>rebestourner</i>	0	0	0	0	0
<i>retourner</i>	48	69	924	1810	510
<i>trestourner</i>	38	18	3	1	0
Total	257	224	1236	2015	539

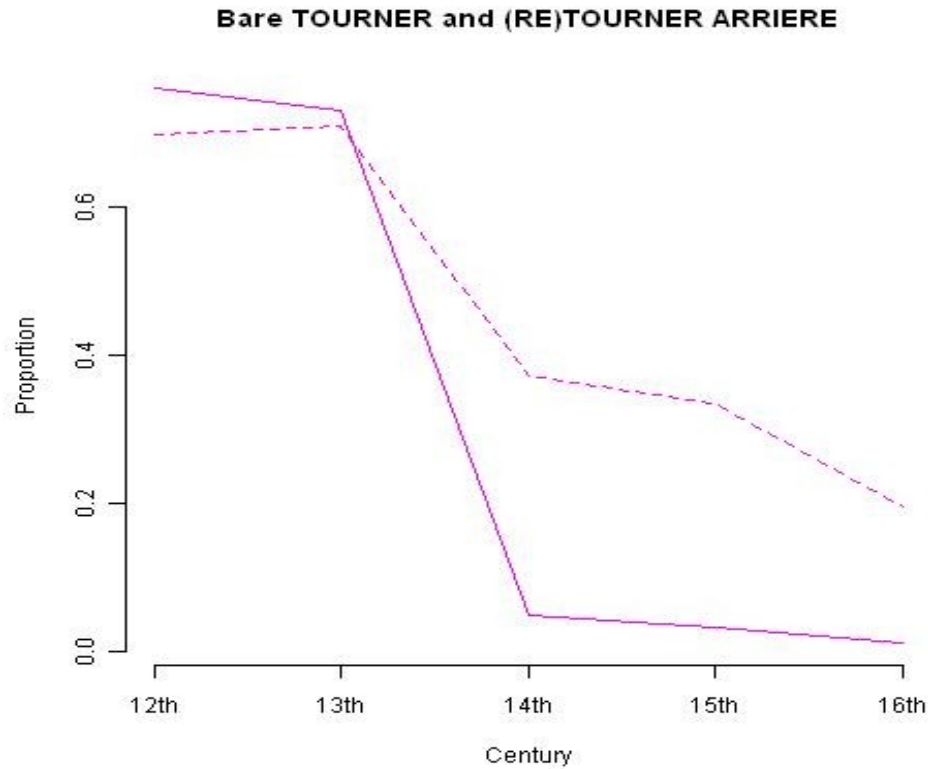
Table 2: Occurrences of prefixed *tourner*

Comparing the frequency of the prefixed forms to that of the bare form, we can track the loss of bare *tourner* from the 12th century to the 16th century.

Century	12th	13th	14th	15th	16th
Bare <i>tourner</i>	592	547	736	1021	131
Prefixed <i>tourner</i>	257	224	1236	2015	539
% bare <i>tourner</i>	69.72%	70.94%	37.32%	33.62%	19.55%

Table 3: The Loss of bare *tourner* in Old and Middle French

Like VPCs with *arriere*, bare *tourner* declines sharply at the beginning of the Middle French period. However, the decline is not as steep. This can be easily seen in the graph below, where the loss of bare *tourner* is represented by the dotted line, and the loss of forms *(re)tourner arriere* is represented by the solid line.



Recall that, in the methodology section, we argued that the Tremblay, Dufresne and Dupuis analysis predicts a constant rate effect between the two changes that we are studying. Using logistic regression techniques, we can estimate the rates of these two changes to see whether we find such an effect. The rates of change of the loss of *arriere* and the loss of bare *tourner* are shown in Table 4, and they are significantly different.

	<i>Loss of arriere</i>	<i>Loss of bare root</i>
<i>Slope</i>	-1.553	-0.607
<i>Intercept</i>	2.944	1.644
<i>t</i>		

Table 4: Rates of VPC loss and bare root loss

These results suggest that the two changes are unrelated.

In summary, we compared the loss of VPCs with *arriere* to the loss of the bare verbal *tourner*. We show that there is no constant rate effect between the loss of *arriere* and the lexicalization of directional prefixes, suggesting that TDD.'s hypothesis may not be on the right track. Additionally, we

have observed that using both a prefix and a particle to indicate iteration is more common throughout history than simply using one or the other elements; that is, we saw that, at every time period, *retourner arriere* was a more common VPC than *tourner arriere*. While this may not be a hard and fast refutation of the TDD hypothesis, it is certainly unexpected given that, under their analysis, the loss of particles is driven by a pressure to avoid doubling.

3.2 *TRAIRE*

In this section, we examine whether we find similar results for with another verbal root: *traire*. As shown below, the loss of VPCs with *arriere* is a lot more gradual with this root. Additionally, the unprefixed VPC is the more frequent form at every time period.

Century	12 th	13 th	14 th	15 th	16 th
<i>traire arriere</i>	49	36	53	9	0
<i>retraire arriere</i>	3	5	2	7	0
Total with particle	52 (28%)	41 (19%)	55 (12%)	16 (3%)	0 (0%)
Bare <i>retraire</i>	132	170	397	494	29
Total without particle	132 (72%)	170 (81%)	397 (88%)	494 (97%)	29 (100%)

Table 5: The evolution of 'to draw back' in Old and Middle French

Turning to the lexicalization of directional prefixes, the list of prefixed forms of *traire* and their occurrences are shown in Table 6.

Century	12 th	13 th	14 th	15 th	16 th
<i>attraire</i>	40	13	197	168	10
<i>contraire</i>	70	57	2167	1883	418
<i>détraire</i>	16	7	29	10	0
<i>distraire</i>	0	0	7	6	7
<i>encontraire</i>	0	0	0	0	0
<i>entraire</i>	0	0	0	0	0
<i>extraire</i>	31	40	69	115	26
<i>fortraire</i>	0	4	7	14	1
<i>horstraire</i>	0	0	0	0	0
<i>partraire</i>	0	0	0	0	0
<i>portraire</i>	5	10	21	47	14
<i>rattraire</i>	0	2	2	1	0
<i>rentraire</i>	0	0	0	0	0
<i>retraire</i>	135	175	399	501	29
<i>surtraire</i>	0	0	0	2	0
Total	297	308	2898	2474	504

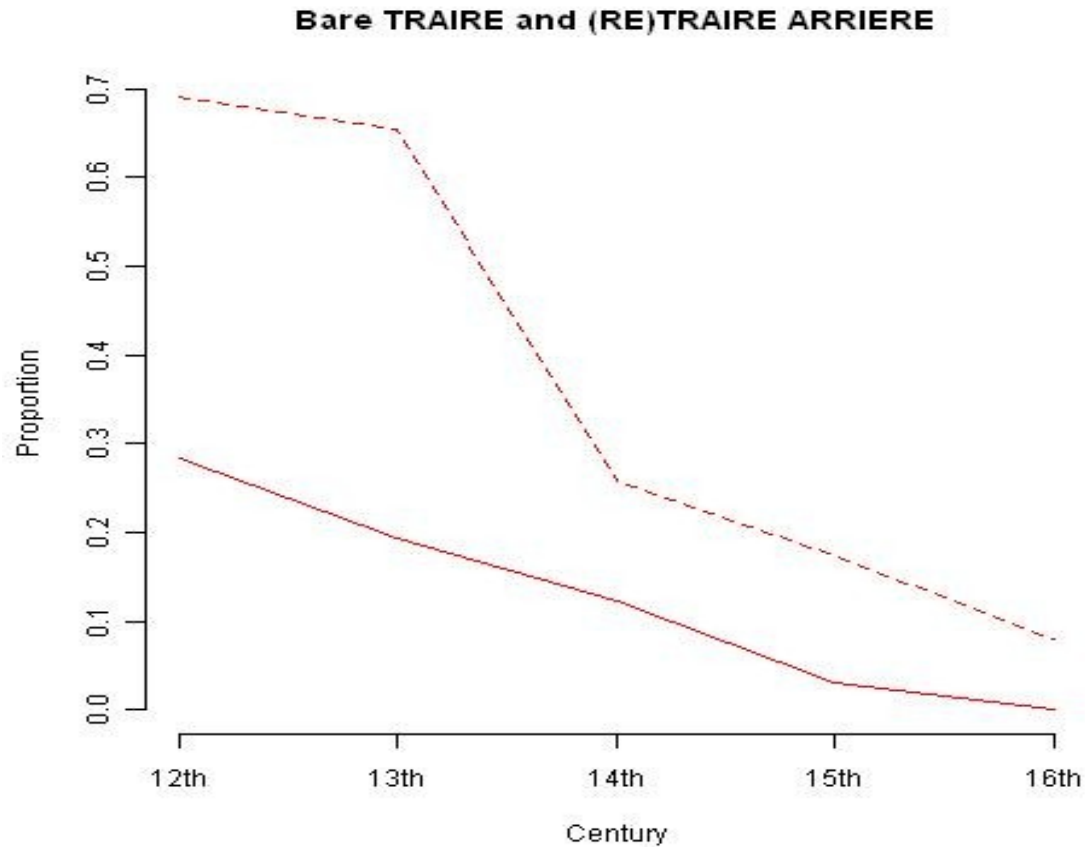
Table 6: Occurrences of prefixed *traire* in Old and Middle French

If we compare the frequency of these prefixed forms to that of the bare form across time, we see that, similar to the loss of bare *tourner*, bare *traire* declines sharply at the beginning of the Middle French period.

Century	12 th	13 th	14 th	15 th	16 th
Bare <i>traire</i>	661	584	1003	576	44
Prefixed <i>traire</i>	297	308	2898	2747	504
% bare <i>traire</i>	68.99%	65.47%	25.71%	17.33%	8.02%

Table 7: Loss of bare root *traire*

However, we see that the shape of this decline is very different from the decline of *(re)traire arriere*, and this is shown in the graph below. Like in our discussion of *tourner*, the dotted line represents the loss of the bare root, and the solid line represents the loss of the VPC.



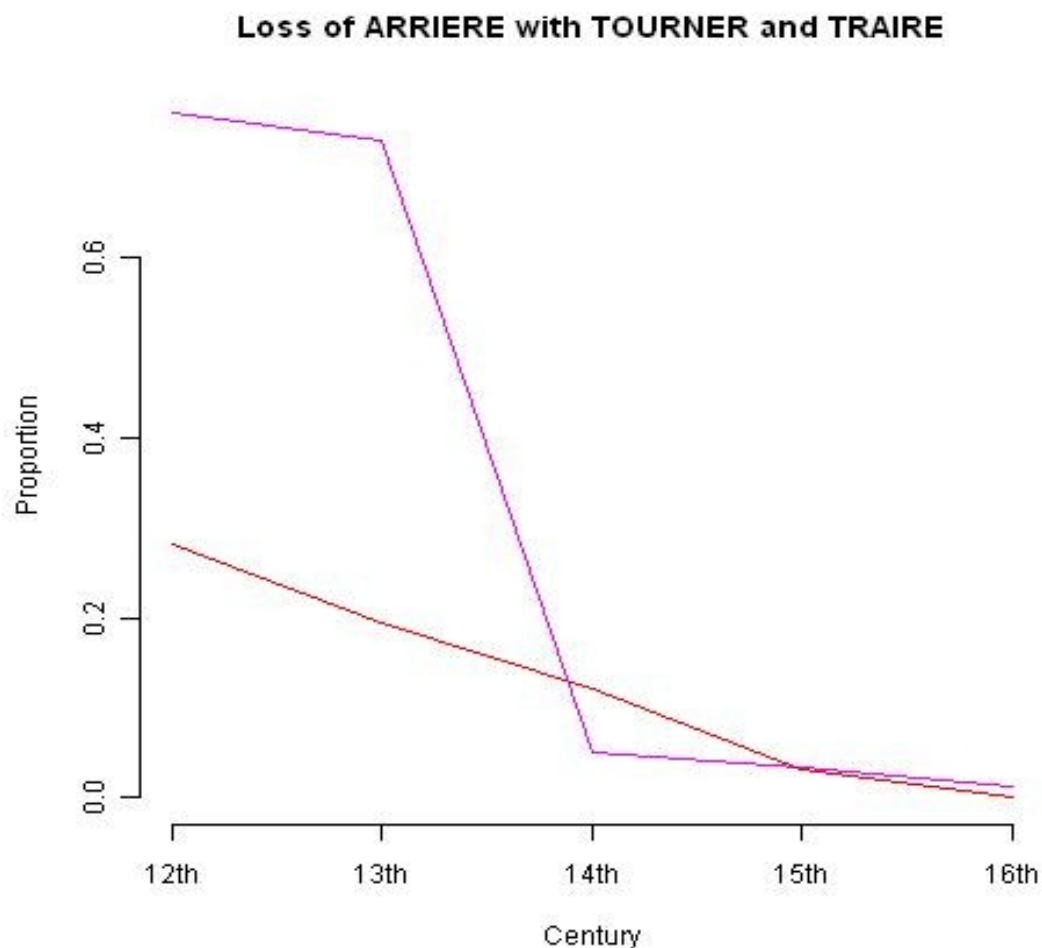
We again estimate the rates of the two changes, and see that they are different.

	<i>Loss of arriere</i>	<i>Loss of bare root</i>
<i>Slope</i>	-4.159	-0.8679
<i>Intercept</i>	6.781	1.8793

Table 8: Rates of VPC loss and bare root loss

In summary, as with *turner*, we find no constant rate effect between the loss of VPCs with *arriere* and the loss of the bare verbal root. However, unlike with *turner*, we see that prefixed particle verbs are less common than unprefixed ones.

Additionally, we can compare the rates of the loss of *arriere* with both verbal roots. As shown in the graph below (as above, *turner* is represented by the magenta line, and *traire* is represented by the red line), they differ greatly: *arriere* is lost much more gradually with *traire* than *turner*.



Correspondingly, as shown in the table below, their estimated rates of change are very different.

	<i>traire</i>	<i>tourner</i>
<i>Slope</i>	-4.159	-1.553
<i>Intercept</i>	6.781	2.944

Table 9: Rates of loss of *ARRIERE* with *tourner* and *traire*

This result is surprising since, if the loss of particle verbs was due to some parameter change or change in the strength of a functional head, we would not expect to see lexical variation.

4. Discussion

The results presented in the previous section clearly suggest that the lexicalization of directional prefixes and the loss of verb-particle combinations are not causally related. However, we must be cautious in interpreting these results as a flat out rejection of Tremblay, Dupuis and Dufresne's theory

since a complete counter-argument involving them relies a number of premises that are not uncontroversial.

A first assumption that we made concerns the proper way of studying the lexicalization of prefixes. As discussed in the methodology section, we had to find a concrete way to track the rate of lexicalization, and we chose to do so by looking at the loss of bare verbal roots in the language, since the loss of prefixed/bare root pairs was one of the diagnostics for the lexicalization process. However, even from a synchronic point of view, the relationship between the decline of bare PATH selecting motion verbs and the loss of productivity of certain directional and aspectual prefixes is not 100% clear. Even if the productivity of the prefixes disappeared, it is not clear why the bare roots could not co-exist in the language which these new forms. In the particular cases we chose, *tourner* and *traire*, the use of the root as a motion verb with underspecified direction does disappear; however, this pattern does not hold for the entire class of motion verbs. For example, Old French had both *venir* 'to come' and *revenir* 'to come back', and both of these forms are present in the modern language with roughly the same meanings as in the 12th century. Even more suspicious is that the loss of productivity of Old French *re-* does not always result in the prefixed form being preserved. Old French contained pairs *aler* 'to go' and *raler* 'to go back', and *raler* is the form that is lost, dying out during the 15th century⁴. In summary, while tracking the lexicalization of prefixes by looking at the loss of bare roots is possible with *tourner* and *traire*, this method cannot be applied to other verbs, and so future attempts to study the time-course of this change will have to take a different form than the one we present here.

However, despite this possible objection, our results are still enlightening to the question of whether the lexicalization of prefixes was important to the loss of particles. In particular, the difference that we see in the evolution of doubling forms (i.e. forms that mark iteration with both a prefix and a particle) between *tourner* and *traire* argues strongly against a theory in which the absence of the particle is caused by the presence of a prefix. Recall that, with *tourner*, *retourner arriere* was, by far

⁴ In our corpus, there are 124 occurrences of *raler* in the 14th century, 20 occurrences in the 15th century, and 0 occurrences in the 16th century.

more common than *tourner arriere*. This fact itself casts doubt on TDD's story, since, under their approach, doubling should be highly disfavoured or impossible. Furthermore, the occurrence of a directional particle with a verb that is already specified for direction is not limited to *retourner*; in fact, we find such patterns with almost every particle in the system: *monter sus* 'to rise up', *descendre jus* 'to descend down', *entrer enz* 'to enter in' and *issir hors* 'to exit out'. Doubling seems to have been a robust phenomenon in Old French, and it is unclear why, in the Middle French period it would suddenly be disallowed. Therefore, regardless of whether we find a constant rate effect, there are reasons to think that the loss of verbal particles was due to something other than the lexicalization of directional prefixes.

Indeed, it is not even clear with the types of changes that we are looking at whether we should expect to find constant rate effects at all. Recall that, in one study that reported a CRE, verb-type did not matter to the rate of change. This is not the result that we found in our study: the rate of the replacement of *arriere* by *re-* was drastically different with *traire* than it was with *tourner*. Why would this be so?

We suggest that the lack of a constant rate effect across verbs with the loss of VPCs stems from a fundamental difference between changes in the feature specifications of functional heads (or parameter settings), and change in the selectional features of lexical heads (i.e. argument structure change). In particular, argument structure change involves more than flipping from one binary setting to another: it is crucially dependent on a number of factors, many of them semantic. Thus, even things like the descriptive content of a particular lexical item (like the meaning difference between 'to turn' and 'to draw') is important to what kind of arguments this predicate can take, can not take, or can change. It is therefore reasonable to think that, in cases of change in the argument structure of a predicate, we would *not* expect a change to ignore idiosyncratic lexical differences, since individual predicate differences matter to argument structure change in a way that they do not for parameter change.

We conclude with a few remarks about the loss of VPCs as a class. It is true that, without looking in depth at the data, the loss of VPCs appears to resemble a case of abstract grammatical change: we have particular grammatical structures (VPCs), and then a change occurs, and it is constant across all contexts (all the members of the class of particles die out around the same time). But, perhaps, unlike the intuitions presented in Buridant (2000) and Tremblay, Dupuis and Dufresne (2004), the loss of verbal particles was not the result of a single abstract grammatical change from a grammar with VPCs to a "non-VPC" grammar, but rather the result of a lexical diffusion process that began with individual VPCs being disfavoured and the ban on VPCs spread to the entire set of particle verbs. Thus, our impression that the loss of directional particles was a change that uniformly affected the "particle" syntactic category may simply be due to the fact that we have yet to examine the change in a detailed way. This question can be investigated in a straightforward manner, and it is the goal of our future research.

5. **Conclusion**

We presented a quantitative corpus-based study of two changes in the encoding of directionality in the history of French: the loss of verb-particle combinations and the lexicalization of directional prefixes. We compared the loss of the particle *arriere* and the lexicalization of prefixes with two bare motion verbs: *tourner* and *traire*. We argued that a previous proposal (Tremblay, Dupuis and Dufresne (2004)) linking the two changes is not verified by our data, since, with these two roots, the two changes take place at different rates. However, we also showed that the rate of the loss of *arriere* was not constant across both *tourner* and *traire*. Thus, the picture that our study gives us of the loss of VPCs in the history of French is one that looks a lot less like a parameter change, that is constant across all contexts, and more like a change that is highly conditioned by particular lexical items. We hypothesized that this pattern may be characteristic of the difference between change in the features of abstract functional heads (or parameters) and change in the features of lexical predicates, since argument

structure change is sensitive to many factors, including the semantics of particular lexical expressions.

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