Revisiting gradience in diachronic construction grammar: PPs and the complement-adjunct distinction in the history of English

Zehentner, Eva

DOI: https://doi.org/10.1515/zaa-2022-2066

Eva Zehentner*

Revisiting Gradience in Diachronic Construction Grammar: PPs and the Complement-Adjunct Distinction in the History of English

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Abstract: The present paper discusses the concept of gradience and fuzziness from the perspective of Diachronic Construction Grammar. It does so by investigating verb-attached PPs in the history of English, with a focus on their semantic and syntactic functions and features over time. Specifically, the paper uses the *Penn-Helsinki Parsed Corpora of Historical English*, including texts from Middle English (PPCME2), Early Modern English (PPCEME), and Late Modern English (PPCMBE) to revisit the distinction between adjuncts and complements. In particular, I address the question whether this traditionally binary classification finds support in diachronic data, or whether PPs rather represent a gradience between prototypical adjunct- and complementhood. Furthermore, the paper assesses whether any change in the distribution and features of PPs (specifically an increase in complementhood) can be observed over time. Ultimately, the findings suggest a multi-level network of PPs that is diachronically very stable.

Keywords: gradience, fuzziness, verb-attached PPs, adjunct-complement distinction, optionality, history of English

1 Introduction

This paper deals with verb-attached PPs, viz. PPs dependent in some form on the verb, or forming part of the predicate in the broadest sense. It investigates the diachronic development of such PPs in the history of English, specifically between Middle English and Late Modern English, thereby covering a timespan from approximately 1150 to 1914.

The main focus of the paper is on the different types of such verb-attached PPs, drawing on the traditional textbook distinction between adjunct-PPs on the one side, and complement-PPs on the other side. These two types, prototypical

***Corresponding author: Eva Zehentner**, English Department, Universität Zürich, Plattenstrasse 47, 8032 Zürich, Switzerland, E-mail: eva.zehentner@es.uzh.ch

examples of which are given in (1a–b), are commonly differentiated based, on the one hand, on their semantics: Adjuncts typically express circumstantial relations such as time, location, or manner, while complements denote meanings or participants that are more central to the action described. On the other hand, the types are defined in terms of various semantic-syntactic features, in that adjuncts are e.g. assumed to be entirely optional, with the sentence in (1a) still being perfectly grammatical even when the PP is omitted, whereas complements cannot be left out without rendering a clause unacceptable/ungrammatical, or altering the meaning significantly ([x]*We depend*). Other characteristics, or syntactic tests that are used to classify PPs include e.g. the ability to be anaphorically referred to with a *happen-* or *do*-pattern ([x]*We depended. This happened on them*; [x]*We depended on them and you did so on us*), and position in the clause.

(1) a. **In the morning**, they left Paris.
b. We depend **on them**.

The complement-adjunct distinction has featured prominently in many syntactic theories, and the binary classification can indeed be readily applied in many instances. However, it has also been shown repeatedly that in practice, many instances escape such a dichotomous, clear-cut distinction, and instead show features of either type. As Bergs (2021, 153) states, this has led to considerable controversy in contemporary linguistics. The most extensive constructionist account of PPs in Present Day English (PDE) to date is Hoffmann (2007), who posits a more fine-grained, gradient taxonomy which also features intermediate categories based on the mentioned syntactic features. Bergs (2021), drawing on Hoffmann's analysis as well as Aarts' (2007) discussion of adjuncts-complements as a case of both intersective and subsective gradience, explicitly approaches the distinction in terms of usage-based constructional gradience and fuzziness. He concludes that "we should treat adjuncts and complements rather as being on a gradient scale, with clear-cut boundaries (prototypes) at the edges and undetermined and debatable fuzziness for the middle ground" (Bergs 2021, 153; cf. also Keizer 2004).

Although this phenomenon has recently started receiving more attention (specifically in Construction Grammar, cf. e.g. Hoffmann 2007; Bergs 2021), a quantitative exploration of PPs and their types from a constructionist viewpoint is lacking so far. As Bergs also points out, the proposed classification schemes remain theoretical approximations and illustrations without empirical confirmation (2021, 155). Furthermore, important open questions pertaining to any investigation into linguistic fuzziness, viz. "[W]hen does a pile of individual sand grains form a heap? Where is the ultimate cut-off point for complements and/or for adjuncts on such a list? And do we need such a cut-off point?" (Bergs 2021, 155) are still unanswered in this case as well. The present paper now taps into these issues,

aiming to empirically test the assumption of a gradient complement-adjunct distinction with prototypical poles by operationalising the contrasts typically mentioned and applying them to corpus data. However, rather than dealing with Present-Day English data, the paper focusses on the historical development of the phenomenon at hand, and the role of gradience in this development.

The precise history of the adjunct-complement distinction has remained largely neglected to date. Investigations of the semantic history of specific PPs and specific prepositional constructions do exist, often framed in view of grammaticalisation processes (cf. e.g. Lundskær-Nielsen 1993; Molencki 2005, 2007, 2011; Sato 2009; Iglesias-Rábade 2011; Ciszek-Kiliszewska 2014a, 2015b, 2018; among others). Likewise, the history of prepositional verbs has been dealt with in comparatively great detail, mainly as a type of multi-word expression next to phrasal verbs, among other patterns, or in the context of the development of the prepositional passive or preposition stranding (cf. the overview given in Claridge 2000, 89–93, referring to de la Cruz 1973; Hiltunen 1983; Denison 1981, 1985, 1993; for recent discussions of the prepositional passive see e.g. Dreschler 2015; Anthonissen 2021; also e.g. Nykiel 2015 on preposition ellipsis). However, the development and distribution of PP-types over time in terms of adjuncts versus complements is greatly under-researched.

The main hypothesis to be tested in this regard is that PPs were initially mainly used in adjunctival function, and more complement-like types only gradually emerged through constructionalisation (as a process subsuming both grammaticalisation and/or lexicalisation tendencies) as part of English changing from a more synthetic to a more analytic linguistic system (cf. e.g. Lass 1999, 139; von Mengden 2012, 30–31; Smith 2012a, 440, 2012b, 34). Specifically, the assumption here is that PPs in general became increasingly more frequent from late Old English/early Middle English onwards, concomitant to a reduction in morphological inflections and a growing fixation of constituent order. This increase is expected to have affected PPs in all functions, meaning that more adjunct-like PPs and more complement-like PPs presumably both grew in numbers. Still, it has been shown in earlier research that prepositional adjuncts were common in Old English already, and were used equally, if not more frequently than NP-correspondences for relations such as time or place (cf. Traugott 1992, 207). By contrast, prepositional verbs such *to deal with*, *to look at*, or *to send for*, despite precursors of the pattern being found in earlier texts, only had their "breakthrough" in early Middle English, as "on the whole the appearance of the prepositional verbs on the linguistic stage seems to have been rather sudden" (Claridge 2000, 89; cf. also Denison 1981, 208; Hiltunen 1983, 186). These verb-PP combinations are typically analysed as tightly integrated in that "the preposition can be interpreted as having a closer connection to the verb or even of [sic] belonging to it"

(Claridge 2000, 90), suggesting that a re-analysis of phrase boundaries (or re-bracketing) from [V + $_{PP}$[P + NP]] to [[V + P] + NP] has taken place (Denison 1985, 198). For example, in a combination like *insist on*, the preposition has been argued to have become part of the verb in a change from [[*insist*]$_V$ [*on* [*something*]$_{NP}$]$_{PP}$]$_{VP}$ to [[*insist on*]$_V$ [*something*]$_{NP}$]$_{VP}$ (Anthonissen 2021, 82; also Brinton and Traugott 2005, 126; Denison 1981, 219; Goh 2000, 127; Inada 1981, 121, 128; Seoane 1999, 125; Quirk et al. 1985, 1164). These prepositional verbs are furthermore often taken to be non-compositional to a much higher degree than combinations of verbs and other PP-types (especially more adjunct-like elements), and accordingly exhibit certain characteristics typically associated with both grammaticalisation and lexicalisation processes, or constructionalisation as discussed in e.g. Traugott and Trousdale (2013; also e.g. Hundt 2001 on the grammaticalisation of prepositional objects in the history of German). This is supported by evidence from the development of the prepositional passive, prepositional stranding, and prepositional ellipsis (de la Cruz 1973; Denison 1981, 209–213, 1985, 190–201, 1993, 159–162; Claridge 2000, 89–91; Hoffmann 2011, 65–72; Nykiel 2015, 58; further Anthonissen 2021; Dreschler 2015; Ernst 2002). Similarly, Middle English saw a distinct increase in PPs marking more core functions such as 'recipients' – while also to some extent present in the Old English period, the prepositional alternative to the so-called double object construction (*gave them a book* vs. *gave a book to them*) only became fully productive from early Middle English onwards (De Cuypere 2015a, 2015b; McFadden 2002; Sato 2009; Zehentner 2017, 2019, 2022). Other functions which are more and more often seen as expressed by PPs include 'beneficiaries' as well as 'deprivees' (Zehentner 2021; Zehentner and Traugott 2020).

All of these developments are commonly linked to the demise of the morphological case marking system, with PPs taking over functions previously expressed by case, as well as increasing restrictions on constituent order (which may e.g. have put verbs and prepositions closer together in the clause, impacting the development of prepositional verbs). Further influencing factors often mentioned are language contact with French (Claridge 2000, 90; also de la Cruz 1973, 16–17; Denison 1981, 209–213, 1985, 193), and especially in the case of prepositional verbs, the growing loss of verbal prefixation around the same time may also have played a contributing role (Denison 1981, 209–213).

What this means for the present hypothesis is that even though we would expect an increase in PPs in all functions, within the broad category of verb-attached PPs, more complement-like uses should come to account for a greater proportion of instances over time, as prepositional verbs and other more constructionalised patterns like prepositional recipient constructions were not as frequently present in earlier texts. At the same time, these developments should arguably be reflected in an increase in relative complementness. This is not to say

that PPs presumably became less adjunct-like with time, but only that the expansion of PPs into more complement-like terrain should be visible in the proportional distribution of the included PP-types compared to each other.

The present study explores these hypotheses by means of data retrieved from the *Penn-Helsinki Parsed Corpora of Historical English*, which consist of syntactically annotated corpora of Middle English (PPCME2, 1150–1500; Kroch, Taylor, and Santorini 2000), Early Modern English (PPCEME, 1500–1710; Kroch, Santorini, and Delfs 2004), and Late Modern English (PPCMBE2, 1700–1914; Kroch, Santorini, and Diertani 2016). While a comparable corpus for Old English (YCOE; Taylor et al. 2003) is available, this study does not include data from the earliest English texts, for two main reasons. The first of these is purely practical, as the study is derived from a larger project on prepositions in English argument structure from Middle English onwards, and extracting additional data for Old English was outside the scope of this project. Second, the choice to exclude Old English was motivated by the fact that most of the changes in question have been shown to take place in late Old English at best, and to only become fully effective in Middle English. Although a comparison with Old English would thus likely yield clearer insights, changes are still expected to be observable within (and beyond) Middle English.

Finally, the findings of the study will be approached with a focus on gradualness as the "diachronic dimension of gradience" (Traugott and Trousdale 2010b, 26), viz. the synchronic gradient continuum observed in Present Day English can be assumed to be the result of small-scale, step-wise, gradual diachronic change. This can be illustrated, on the one hand, by means of the semantic expansion of PPs into more 'core' domains: For example, it has been proposed that the prepositional 'recipient' emerged out of PPs expressing 'goals' ambiguous between institutions and humans (such as in *give sth. to church*; Zehentner 2019, 307–319) and was gradually extended to other, non-locative contexts in analogy to such instances. This is also suggested in Colleman's (2020) analysis of recipient marking in Dutch, where he states that a PP-pattern with *aan* came to be used for this meaning, "progressing through a series of micro-steps" (2020, 161), in a "a gradual expansion […] to more and more 'dative' contexts" (2020, 162). The synchronic 'gradience' of the *to*-PP in English (or *aan*-PP in Dutch) as expressing a range of relations including both 'goals', 'abstract goals', and 'recipients' (which can be modelled as distinct sub-constructions with separate meaning parts) would then be the result of gradualness in diachronic change. A similar point could be made with regard to certain prepositional verbs like *send for* or *insist on*, whose non-compositional meaning in PDE can be traced back to more compositional, concrete meanings in earlier times via a number of meaning-extension steps (Claridge 2000, 128–130, 140–146). On the other hand, changes in the formal features of patterns

are assumed to have proceeded in a gradual way as well – while the earliest examples of prepositional verbs feature rather flexible order of verb, preposition, and NP-complement, these patterns have become highly restricted, with the verb typically directly preceding the PP (and the preposition more or less categorically preceding the NP in PDE PPs in general). Again, this restriction is taken to not represent a sudden change, but an accumulation of smaller, step-wise changes over time (Claridge 2000, 128–130, 146–168).

The paper is structured as follows: In Section 2, the main theoretical underpinnings of the present study are briefly presented. While Section 2.1 introduces the notions of constructional gradience, fuzziness, and gradualness in some more detail, Section 2.2 then gives an overview of the phenomenon, viz. PPs in Present Day and historical English between adjuncts and complements. Section 3 presents the data and methods used in the study, before the main results are reported on in Section 4, starting with the distribution of complement scores over semantic roles and time in Section 4.1. Afterwards, I assess the factors impacting complement scores (Section 4.2), and identify broader clusters in the data (Section 4.3). Section 5 discusses the implications of the findings, with a focus on the multi-level nature of the PP-network (Section 5.1), as well as the possibility of stable gradience without change (Section 5.2). Section 6 concludes the paper.

2 Verb-Attached PPs as a Gradient, Fuzzy Category

2.1 Constructional Gradience, Gradualness, and Fuzziness

The present paper follows the basic usage-based, cognitive constructionist assumption that linguistic categorisation is inherently fuzzy and gradient rather than always adhering to "traditional clear-cut differentiations and binary oppositions" (Bergs 2021, 153; cf. also Croft 2001, 2007; Denison 2001, 2006; Aarts 2004; Aarts et al. 2004; Rosenbach 2006; among many others). That is, contrary to many other, especially formal syntactic theories, where categories may be seen as absolute and discrete, and fuzziness is regarded as an exception, they are here viewed as mere "notational tools [which are] abstract idealized means of reflecting syntactic and pragmatic differences between seemingly similar constructions" (Keizer 2007, 3). In practice, grammatical indeterminacy, categorical fuzziness and vagueness is pervasive in language, and may well be considered the norm from a usage-based perspective. Accordingly, it should feature centrally in any

usage-based, Construction Grammar account (cf. also Desagulier 2008, 2). This approach is also reflected in the following quote by Jackendoff (1983, 125):

> [F]uzziness must not be treated as a defect in language; nor is a theory of language defective that countenances it. Rather, fuzziness is an inescapable characteristic of the concepts that language expresses. To attempt to define it out of semantics is only evasion.

In one of the most extensive treatments of grammatical gradience, Aarts (2007) distinguishes between two different types of gradience – on the one hand, gradience may be 'subsective'; on the other hand, we find cases of 'intersective' gradience. The former refers to gradience within a particular category, viz. instances "where a particular string of elements conforms to a greater or lesser extent to a prototype construction" (Aarts 2007, 171). This means that members which are generally agreed to belong to a specific category can still be distinguished into more prototypical and more peripheral, marginal representatives of said category. Intersective gradience, by contrast, relates to overlaps or indeterminacy between two distinct categories, meaning cases where "in a particular string of words we can identify properties of a construction a as well as properties of a construction b" (Aarts 2007, 171; cf. also e.g. Denison 2001 for examples). Desagulier (2008) shows how such intersective gradience, or more specifically, 'constructional blends' can be modelled in an explicitly usage-based constructionist framework.

As for language change, fuzziness/gradience is often discussed as both a prerequisite and a consequence of change. For example, Desagulier (2008, 2–3) states that "fuzziness is what makes language change possible," and that "fuzziness is a central component of Construction Grammars since it amounts to the differential between the conservative and innovative dynamics of a construction." Fuzziness accordingly provides a zone of flexibility and potential development for a construction. At the same time, synchronic gradience is, as already laid out above, typically seen as "the product of gradual diachronic change" (Traugott and Trousdale 2010b, 21; also Rosenbach 2010), meaning that the gradient features of a particular category (in the sense of subsective gradience) but also the fuzzy boundaries between two categories are taken to reflect different, progressive steps in the development of the category/categories in question.

Note that a somewhat open question regarding the treatment of fuzziness in Construction Grammar is the issue of discreteness. On the one hand, cognitive Construction Grammar accounts might assume that categories or constructions can simply be fuzzy, viz. can have not clearly distinguishable boundaries, which (at least to some extent) also implies that gradual change can be continuous in the strictest sense. On the other hand, the majority of Construction Grammar discussions seem to rely on a definition of constructions as ultimately discrete, but

differing in degree of entrenchment. Here, categories or constructions may give the appearance of fuzziness, but this gradient nature can be captured by more fine-grained, discrete representations on lower, more substantive levels, or by multiple inheritance (cf. e.g. Desagulier 2008). Gradual change then is the accumulation of step-wise, discrete micro-changes rather than truly continuous (cf. e.g. Traugott and Trousdale 2010b, 25–26, as well as the contributions in Traugott and Trousdale 2010a). The present paper does not directly address this question in any more detail, but combines elements of both views. The following section briefly outlines the empirical phenomenon that forms the main focus of the paper in some more detail, discussing both the situation in PDE and the diachronic development of the patterns.

2.2 Adjuncts Versus Complements: PPs in Present Day and Historical English

The distinction between adjuncts and complements features prominently in many introductory textbooks to syntax and reference grammars, as well as accounts of theoretical syntax. Although not necessarily restricted to PPs (but also potentially applying to other phrase types), it is frequently used to classify PPs into distinct types, illustrated in (2), where the first PP *on the table* would qualify as a complement (also often referred to as an argument), while the clause-final PP is an adjunct.

(2) They put the book **on the table in the morning**.

In this example, the complement, a locative PP, is "required by the sub-categorization frame of the verb *put*, while *in the morning* is an optional descriptor of the time at which the action was performed" (Merlo and Esteve Ferrer 2006, 342). Semantically, the former fills a specific role dependent on the verb, whereas the adjunct provides additional, circumstantial information that is largely independent and separate from the particular verb involved, and the interpretation of the adjunct is comparatively stable (Merlo and Esteve Ferrer 2006, 342; also Grimshaw 1990, 108). In addition, the PP-types are typically assumed to differ with regard to various syntactic tests, the most important of which is 'optionality' or 'obligatoriness'. That is, as outlined in detail in Hoffmann (2007) and Bergs (2021), among others, adjuncts are considered as optional; they can be omitted without significantly impacting the meaning of the entire clause (3a). By contrast, as indicated in (3b), omitting complements either renders a clause ungrammatical, or takes away a crucial meaning component (cf. also earlier work on dependency and valency approaches to these distinctions, e.g. Buysschaert 1982; Emons 1974; Helbig and Schenkel 1991; among others).

(3) a. They baked cake [**in the morning**].
b. *They put the book [**on the table**].

It should, however, be noted that optionality/obligatoriness as such is a somewhat problematic concept, which is not viewed as a strict dichotomy in all theoretical frameworks: For example, valency theory approaches propose 'optional complements' in addition to optional adjuncts and obligatory complements, as well as 'contextually optional complements' as a further category, all of which can be expressed by PPs. Moreover, the definition of 'obligatoriness' (e.g. distinguishing between structural obligatoriness, obligatoriness relating to valency, or communicative obligatoriness) may impact the analysis (cf. e.g. Herbst, Heath, and Roe 2004, xxx–xxxiii; Herbst 2008).

Further features include the *do-so* pro-form test (*do*-paraphrase-ability): As Hoffmann lays out, "[s]ince *do so* obligatorily replaces a verb and all its internal complements (i.e. VPs), it follows that combining this pro-form with an overt complement will produce an ungrammatical result, since all complements are already included in the pro-form" (cf. also Huddleston 2002, 223). The examples in (4) illustrate these differences, with (4a) again representing a prototypical adjunct, and (4b) a complement.

(4) a. Sam baked cake **in the morning** and Joe did so **in the evening**.
b. *Sam put the book **on the table** and Joe did so **on the bed**.

Paraphrase-ability by *happen* (also called the 'this happened'-test), similarly assesses the relative independence of a PP, presuming that elements which can be used in the paraphrase modify the entire event and are therefore adjuncts (5a; see Hoffmann 2007, 8; also Brown and Miller 1991, 90). Prototypical complements, by virtue of being more strongly dependent on the verb, are expected to be unable to enter the paraphrase (5b).

(5) a. They baked cake. This happened **in the morning**.
b. *They baked cake. This happened **for Laurie**.

Another frequently drawn on characteristic is the acceptability of a given PP in a prepositional passive. Here, adjuncts should be less acceptable than complements (6a vs. 6b).

(6) a. ***The morning** was baked **in**.
b. **Sam** was baked a cake **for**.

Finally, adjuncts and complements proposedly exhibit distinct positional preferences, in that the former are often found in pre-verbal position (7a). Although this order is not necessarily ungrammatical with complements, as shown in (7b), such

sentences are usually strongly marked in terms of information structure. Complements are moreover typically placed close to the verb, while adjuncts may be further removed (cf. Merlo and Esteve Ferrer 2006, 345–346).

(7) a. **In the morning** they put the book on the table.
b. ?**On the table** they put the book.

A last, related feature sometimes mentioned is iterativity, meaning the possibility of 'stacking' multiple PPs into a clause: As Merlo and Esteve Ferrer (2006, 345) point out, since complements "receive a semantic role from the selecting verb, arguments of the same type cannot be iterated because verbs can only assign any given type of role once." By contrast, adjuncts can be multiplied to a potentially infinite extent (8a vs. 8b).

(8) a. They baked cake **in the morning on Sunday at home with the oven**…
b. *They put the book **on the table in the drawer**…

Adjuncts are typically generally more flexible regarding additional elements (such as adverbs or optional NP-objects) in the clause, while complements are often less accepting in this regard (9a vs. 9b).

(9) a. They baked [cake] [twice] **in the morning**.
b. ?They put the book [twice] **on the table**.

An in-depth discussion of all of these variables and their specific treatment in Quirk et al. (1985) and Huddleston (2002) can be found in Hoffmann (2007) and most recently, Bergs (2021). However, what these authors importantly show at the same time is that there are numerous controversies and issues with the assumption of a binary complement-adjunct distinction, and that the traditional diagnostics are often difficult to apply and uphold. This is also visible in the following statements, with e.g. Bergs (2021, 145) claiming that this phenomenon is "a terminological and conceptual mess," Biber et al. (1999, 403) agreeing that "[i]n practice it is hard to make an absolute distinction," and Merlo and Esteve Ferrer (2006, 373) e.g. commenting that "native speakers' judgments on the argument and adjunct status of PPs are very unstable" and "the tests of argumenthood are often difficult to judge or even contradictory with each other."

Reflecting these issues, the phenomenon has therefore often been discussed with a particular focus on gradience and fuzziness; for example, Quirk et al. (1985, 1166) state that it may be more reasonable "to think of the boundaries of these categories as a scale." Aarts (2007, 173–174) specifically includes the adjunct-complement distinction among his examples for both subsective and intersective gradience. As to the former, it can be shown that some PPs traditionally subsumed into the category of adjuncts may be more prototypical than others: For instance,

time, location, and manner are arguably the most prototypical adjuncts, while e.g. accompaniment (*They baked cake **with their parents***) or instrument (*They opened the door **with the key***) may be slightly more peripheral members (cf. also Bergs 2021, 154–155). Similarly, complements may differ in their prototypicality. Concerning intersective gradience, it has been reported that intermediate instances, viz. 'hybrids' between adjuncts and complements which cannot easily be analysed as either the one or the other since they share features of both categories, are easy to come by. An example of such a hybrid pattern is given in (10); see also Aarts (2007, 186) as well as Bergs (2021, 153). Here, the PP expresses a typically adjunctival relation, i.e. location; furthermore, the possibility of inserting additional arguments is characteristic for adjuncts (*They lived their lives **in Rome***). However, the PP is also clearly obligatory (**They lived*), placement in clause-initial position is marked (?*In Rome they lived*), and it does not yield the expected outcome on all syntactic tests outlined above (e.g. **They lived. This happened **in Rome***).

(10) They lived **in Rome**.

The different intermediate types and their characteristics are described in detail in Hoffmann (2007), who proposes a fine-grained, non-binary classification scheme for PP-constructions in Present Day English, reproduced in Figure 1 (adapted from Hoffmann 2007, and Bergs 2021, 158). The main distinguishing feature in this constructional network is optionality versus obligatoriness; the further sub-constructions are based on variables such as subcategorisation for specific prepositions and the additional semantic-syntactic outlined before. That is, all three types of obligatory PPs specified in Hoffmann's (2007) network, and shown in the left part of Figure 1, exhibit the features characteristic of traditional complements in that the PP cannot be omitted without losing a meaning component (**They lived*/**They put*/**They belonged*), and cannot be paraphrased

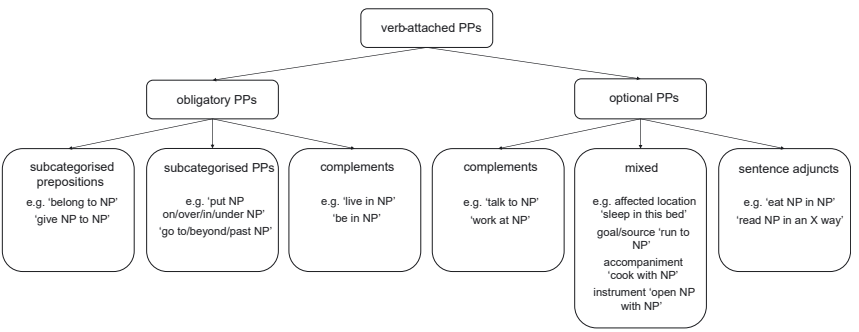

Figure 1: Network of verb-attached PPs in Present Day English as proposed in Hoffmann (2007) and discussed in Bergs (2021).

by *happen-* (**They belonged. This happened to us*/**They put the book. This happened on the table*) and *do*-structures (**They belonged to us and the other did so to him*). What distinguishes these constructions, then, is the degree of specification of the preposition. While for the leftmost pattern in the figure, the verb is associated with a particular (single) preposition (*belong + to* vs. **belong + on*), the preposition slot in the 'subcategorised PPs'-construction is more open, yet still semantically limited – for example, only directional prepositions like *to/from/beyond/past* in combination with a locational noun can be used with the verb *go*. By contrast, with the construction of obligatory 'subject complements' illustrated by *live/be PREP NP*, a wide range of prepositions and nouns can be used and a wide range of relations can be expressed by the PP.

In the case of the optional PPs on the right-hand side of the figure, 'sentence adjuncts' constitute the most prototypical adjuncts in expressing time, place, or manner: These usually fulfill all criteria for adjunct-hood laid out before. The 'mixed' optional type, on the other hand, features optional PPs, but is less clear-cut in terms of syntactic tests. For instance, accompaniment-PPs are less acceptable in a *happen*-paraphrase (?*They cooked. This happened with us*), suggesting that the PP does not modify the event as a whole, but "the event itself is somehow affected by the circumstances described in the prepositional phrase" (Bergs 2021, 158). The group is also mixed with regard to passivisation – while affected locations are e.g. readily used in prepositional passives (*The bed was slept in*), passives with instruments or goals are typically not grammatical (**The house was run to*/**The key was opened with*). The final category of 'optional complements' again differentiates itself from the other proposed constructions by showing greater restrictions in terms of preposition type. Although the PP can be left out in a sentence like *They worked at the project*, choosing a different preposition significantly alters the meaning.

However, this network remains a theoretical approximation so far, and no larger-scale empirical investigation, including e.g. frequency information on the various types and their features, exists as yet. Furthermore, the history of PP-patterns in English has received little attention. In general PPs are commonly assumed to have increased substantially since Old English times, as part of the broad move of English from a more synthetic language to a language more reliant on analytic means of expression, concomitant to a loss of inflectional marking and a rigidification of constituent order (cf. e.g. Lass 1999, 139; von Mengden 2012, 30–31; Smith 2012b, 34; Smith 2012a, 440; also Baugh and Cable 2002, 145, 155). That is, prepositions and prepositional patterns are taken to have increased in token frequency overall, but also to have come to acquire more and more grammatical, and thus arguably more complement-like functions through grammaticalisation processes. One well-known example for such a development is, as

discussed above, the increasing expansion of a prepositional ditransitive pattern (*give NP to NP*) in early Middle English, where the PP can now express the comparatively core semantic role of recipient (Allen 1995; De Cuypere 2015a, 2015b; Zehentner 2019, among many others). Similarly, as also already mentioned, tight verb-preposition combinations of the type *depend on*, viz. prepositional verbs, only became more productive and frequent at the turn from Old to Middle English (cf. Claridge 2000, 89–91; also Hiltunen 1983, 179; Denison 1981, 209–213, 245–246). The hypothesis of a general increase in more complement-like PPs proposed in Section 1 is tested in a pilot study on PPs in Early Modern English in Zehentner and Hundt (2022), suggesting that at least a slight increase can be seen within this period. The present paper now extends this question to both Middle English and Late Modern English, aiming, on the one hand, to give further support to this assumption. On the other hand, the paper intends to empirically test and operationalise the gradient nature of the complement-adjunct distinction in the timeframe covered, allowing also for a comparison to both more traditional, binary classification schemes and the more detailed taxonomy proposed in Hoffmann (2007) for PDE. In the following, I outline the data and methods used to address these questions.

3 Data and Methods

The present dataset forms part of a larger project on prepositions in argument structure from Middle English to Late Modern English (Zehentner et al. In press), which comprises all instances of verbs (excluding modals as well as *be*, *do*, and *have*) in a 'sister-relation' to PPs in the *Penn-Helsinki Parsed Corpus of Middle English* (PPCME2; Kroch, Taylor, and Santorini 2000), the *Penn-Helsinki Parsed Corpus of Early Modern English* (PPCEME; Kroch, Santorini, and Delfs 2004), and the *Penn-Helsinki Parsed Corpus of Late Modern British English* (PPCMBE2; Kroch, Santorini, and Diertani, 2016). These corpora have a respective size of about 1.2, 1.8, and 2.8 million words, and include texts produced between 1150–1500, 1500–1710, and 1700–1914, respectively. The total number of verb-attached PPs in the dataset is N = 206,169.

Since PPs are not distinguished into adjuncts and complements in the corpus tagging (cf. Santorini 2016), in order to investigate the distribution and development of PPs and their function in more detail, for the present study a random sample of 1,500 instances (500 instances per period/corpus) was then taken from the entire dataset. These tokens were manually coded for the following features by two annotators: (a) obligatoriness, (b) paraphrase-ability by *do*, (c) paraphrase-ability by *happen*, and (d) acceptability in a prepositional passive, following the

assumptions laid out in Section 2.2. For each variable, a tri-partite coding was used, distinguishing between 'yes (acceptable/possible)', 'no (not acceptable/possible)', and 'maybe' (potentially acceptable/possible). In a next step, these values were translated into joint numerical scores for each feature (0–1), averaged across the two annotators and based on their presumed indicativeness for adjunct- versus complementhood. Specifically, for factors (a) and (d), obligatoriness and use in the prepositional passive, 'yes' was translated into a score of 1, as these features are arguably more characteristic for complements. By contrast, for factors (b) and (c), paraphrase-ability by *do*- or *happen*-patterns, 'yes' was transformed into a score of 0, as these are expected to hold for adjuncts but not complements. Finally, an overall average 'complement score' (0–1) was derived by summing over the four individual variable scores, with 0 indicating the highest adjunct-likeness, and 1 indicating the highest complement-likeness.

In addition to these factors, each instance was coded for 'semantic role': Here, each verb-preposition combination in the data was matched with the corresponding frame elements automatically derived from *FrameNet* (Ruppenhofer et al. 2016; also e.g. Boas 2017), and the options were then manually evaluated for each instance. In the end, I distinguished between 19 types given in alphabetical order in (11) and defined in more detail in Table A1 in the Appendix.

(11) *addressee, affectee, agent, co-participation, goal.activity, goal, instrument, location, loc.aff* (affected location), *manner, reason, recipient, result, role, source.abstr* (abstract source), *source, stimulus, time, theme*

Last, a variable for 'time' (based on decade of manuscript production, centered around 1650 as the mean decade, log-transformed and scaled, cf. Röthlisberger 2018, 87; also Gelman 2008), as well as text ID and a number of structural variables were added to the annotation. These include the position of the PP in relation to the verb (pre-verbal or post-verbal position, annotated as 'V-PP' vs. 'PP-V'), the presence or absence of an intervening argument (either an NP-subject, NP-object, or an additional PP, coded as 'TRUE' or 'FALSE'), as well as the overall number of PPs in the respective clause (distinguishing between 'single' and 'multiple').

All analyses and visualisation were carried out in R (R Core Team 2021); specifically, I used functions from the packages 'ggplot2' (Wickham 2016), 'dplyr' (Wickham et al. 2018), and 'viridis' (Garnier et al. 2021). The packages 'lme4' (Bates et al. 2015) 'car' (Fox and Weisberg 2019), and 'visreg' (Breheny and Burchett 2017) were used for linear regression modelling (Gelman and Hill 2007; Winter 2019, 232–273). For hierarchical clustering (cf. Levshina 2015, Ch. 15) I made use of 'cluster' (Maechler et al. 2019), 'factoextra' (Kassambara and Mundt 2020), 'dendextend' (Galili 2015), 'ggdendro' (de Vries and Ripley 2020), as well as 'stats'

(R Core Team 2021). The following sections present the results of said analyses, starting with an overview of the distribution of complement scores across semantic roles and periods.

4 Results

4.1 Complement- Versus Adjunct-hood Across Semantic Roles and Time

A first observation to make when considering the distribution of complement scores in the present dataset is that PPs overall tend towards the lower end of the range, viz. tend to be more adjunct-like, with a mean score of 0.34, a median of 0.35, and a mode of 0; the variance is 0.049, and the standard deviation 0.22. Taking a closer look at the distribution of complement scores over the semantic roles within the entire dataset, we first find that there are significant differences between them (Kruskal–Wallis chi-squared = 787.56, *df* = 18, *p*-value < 2.2e–16). Second, Figure 2 shows that the types clearly seem to be spread out over a cline. This ranges from PPs expressing 'time', 'manner', 'reason' and 'location' as the

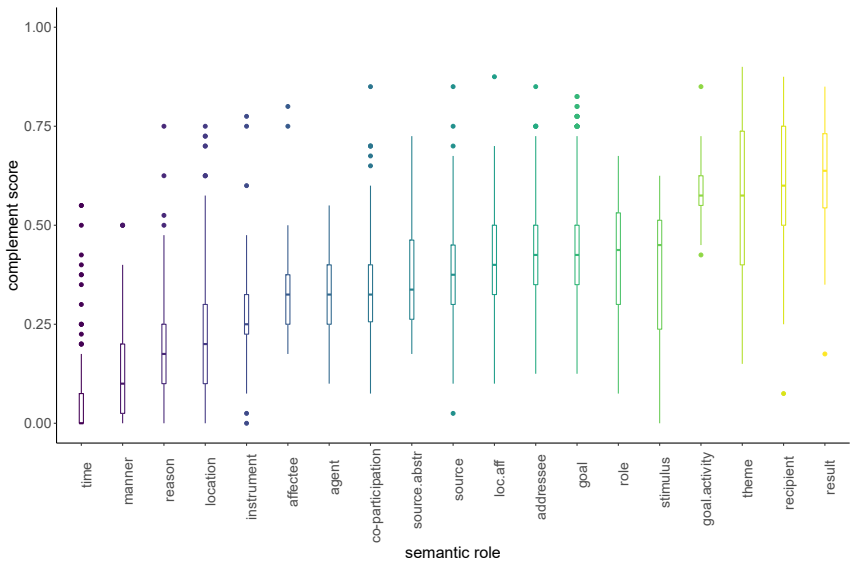

Figure 2: Boxplots for complement scores per semantic role (ordered from least complement-like/most adjunct-like on the left to most complement-like/least adjunct-like on the right).

most adjunct-like types with very low complement scores (means of 0.06, 0.13, 0.21, and 0.23, and medians of 0, 0.1, 0.18, and 0.2, respectively) to roles such as 'theme', 'recipient', and 'results' (resultatives), which emerge as the most prototypically complement-like elements, with comparatively higher complement scores (means of 0.56, 0.6, and 0.62, and medians of 0.58, 0.6, and 0.64, respectively). Note that the highest average score is still rather low, while more extreme means are found towards the lower end of the continuum – this suggests that 'true complementhood' is harder to achieve based on the variables considered by contrast to clear adjuncthood. Furthermore, many intermediate types, such as e.g. 'source' or 'goal', can be found.

Figure 3 presents the distribution of complement scores for each of the periods covered by the dataset. As readily visible in the figure, by contrast to the differences seen with semantic roles, the average complement scores do not significantly differ between periods, with medians/medians of 0.33, 0.38/0.35, 0.33/0.34 for Middle English, Early Modern English, and Late Modern English, respectively (Kruskal–Wallis chi-squared = 5.3202, *df* = 2, *p*-value = 0.07). This indicates that there is no evident decrease or increase in complement-likeness over time.

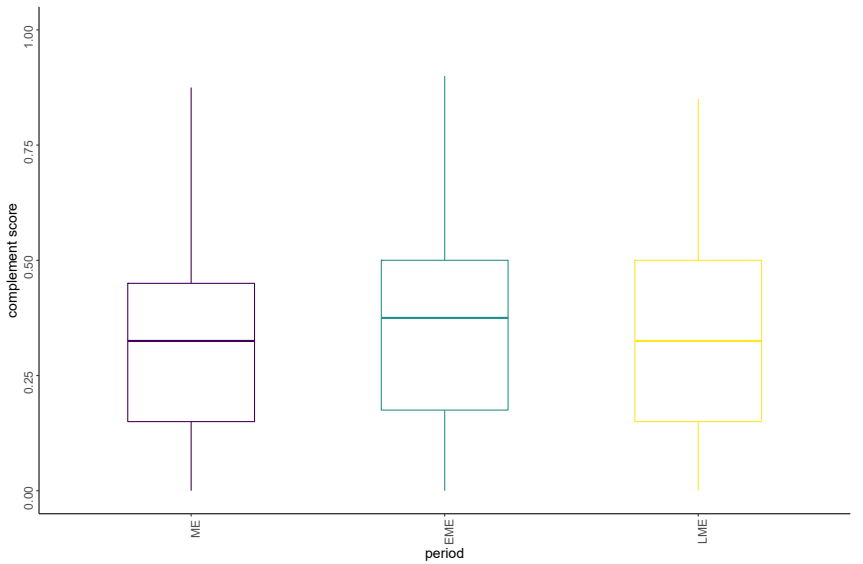

Figure 3: Boxplots for complement scores across all semantic roles per period (Middle English – Early Modern English – Late Modern English).

The general absence of change over time is also reflected in the distribution of complement scores for individual semantic roles across periods – despite some fluctuation in the average scores, a significant development can only be detected for the role of 'addressee', which seems to become slightly more complement-like between Middle and Late Modern English (Kruskal–Wallis chi-squared = 10.992, *df* = 2, *p*-value = 0.004). All other roles do not show any significant change. The development for 'addressee' is illustrated in the examples in (12), where (12a) is a sentence including the verb *say* from Middle English, which received the comparatively low complement-score of 0.225 overall. Both annotators rated the *unto*-PP as largely optional, acceptable in the *do*-paraphrase (*The lady said this to her, and you did so to him*), and not able to appear in the prepositional passive (*She was said sth. unto*), with some disagreement on the acceptability of the *happen*-paraphrase (?*The lady said something. This happened to her*). The instance in (12b), by contrast, is from Late Modern English, and was rated very highly on complementhood by both annotators, yielding a joint score of 0.875. That is, the instance was rated as obligatory, in that *to correspond* without the PP does not have a meaning of 'communicating in writing', as likely passivisable, even if not fully felicitous (?*He was corresponded with*), and not able to be used in the *happen*-paraphrase (**I corresponded. This happened with him*). As for the *do*-paraphrase, the annotators disagreed (?*I corresponded with him, and you did so with her*).

(12) a. þan þe lady seyd **on-to hir**, "Margerya in pouerte?
'Then the lady said unto her: "Margery in poverty?"'
(CMKEMPE,93.2120; ME, c1450)

b. I must and will correspond **with you**.
(POPE-172X-2,159.77; LME, 1920s)

The two examples also relate to different potential explanations for this increase in complementhood of addressee-PPs: On the one hand, this may reflect an increase in prepositional verbs like *correspond with* (first attested in this meaning in 1650, according to the OED 2022, s.v. *correspond*), constituting tighter verb-preposition combinations than the relatively compositional collocations of *say, tell*, or *speak* and a *to*-PP. Note, however, that the PP in *correspond with* could be argued to denote an 'interactor/interlocutor' rather than an 'addressee' (cf. e.g. Hauf 2021, 24), in which case the observed rise would rather have to be attributed to changes in the expression of this (sub-)role. A different explanation, as suggested by a reviewer, concerns changes in the complementation patterns of the verb *say* (also e.g. *explain*), which regularly appeared in a double object construction with a nominal addressee (*say/explain me this*) in earlier English, but became increasingly restricted to (*to*-) prepositional addressees between Middle and Early Modern English (Klotz 2019, 346; Hauf 2021, 77–182; also Goldberg 2019 on PDE).

This increase in association strength between these communication verbs and one specific preposition may also be reflected in the complement-status of the 'addressee'-category.

4.2 Factors Impacting Complement- Versus Adjunct-hood

Moving on to the factors influencing the degree of adjunct- or complementhood of PPs in the history of English, Table 1 and Figure 4 provide the output of a linear regression model using complement score as the (numeric) dependent variable, and time, semantic role, position of the PP in relation to the verb (order V/PP),

Table 1: Generalised linear regression model output.

Main effects		**Estimate**	**Std.error**	***t*-value**	**Pr(>|*t*|)**	
(Intercept)		0.450	0.015	30.991	<0.0001	***
Time		−0.002	0.002	−0.730	0.466	
Semantic role						
addressee →	*affectee*	−0.098	0.032	−3.102	0.002	**
	agent	−0.090	0.052	−1.744	0.081	.
	co-participation	−0.067	0.023	−2.917	0.004	**
	goal	0.006	0.017	0.369	0.712	
	goal.activity	0.154	0.040	3.865	0.0001	***
	instrument	−0.128	0.023	−5.571	<0.0001	***
	loc.aff	−0.011	0.022	−0.498	0.619	
	location	−0.186	0.019	−9.615	<0.0001	***
	manner	−0.276	0.019	−14.396	<0.0001	***
	reason	−0.196	0.023	−8.573	<0.0001	***
	recipient	0.181	0.025	7.233	<0.0001	***
	result	0.199	0.025	7.918	<0.0001	***
	role	0.000	0.036	−0.008	0.994	
	source	−0.038	0.023	−1.647	0.100	.
	source.abstr	−0.023	0.035	−0.667	0.505	
	stimulus	−0.044	0.037	−1.191	0.234	
	theme	0.121	0.021	5.795	<0.0001	***
	time	−0.324	0.020	−16.008	<0.0001	***
Order V/PP						
V-PP →	*PP-V*	−0.053	0.013	−4.185	<0.0001	***
Number of PPs in clause						
single →	*multiple*	−0.024	0.010	−2.464	0.014	*
Intervening argument						
FALSE →	*TRUE*	−0.046	0.009	−5.390	<0.0001	***

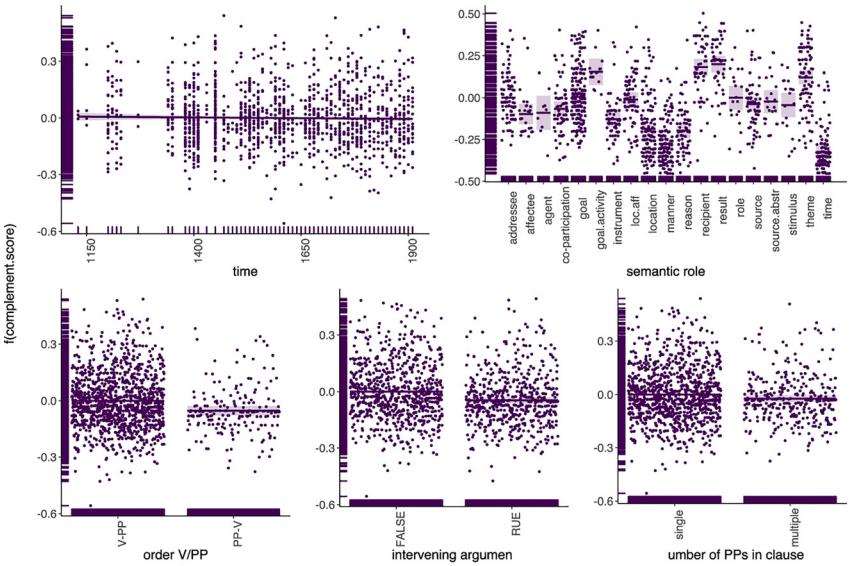

Figure 4: Linear regression output; impact of fixed variables (time, semantic role, order V/PP, intervening argument, and number of PPs in clause) on complement score.

intervening argument, and number of PPs in the clause as independent variables. The resulting model has acceptable discrimination power and accuracy (concordance index $C = 0.789$, $R2 = 0.585$).

As can be seen, the model confirms (i) that there is no significant impact of time on the rate of complementhood, and (ii) that semantic role is indeed a significant factor, with roles such as 'time', 'location', 'manner' or 'reason' decreasing the probability of higher complement scores (compared to the reference level of 'addressee'). By contrast, and mirroring the results given in Section 4.1, the roles of 'recipient', 'theme', 'result' and 'goal.activity' have a significant positive impact on complementhood.

Furthermore, relative order of verb and PP appears to be influential – while more complement-like PPs tend to occur in post-verbal position, more adjunct-like elements are often found in pre-verbal (typically clause-initial) position. Greater distance between verb and PP, viz. the presence of an argument between the two constituents in question, also impacts the degree of complementhood: If verb and PP are directly adjacent ('intervening argument: FALSE'), complement scores are likely to be higher, whereas scores are lower when an additional NP-object or PP, or a subject, is used in between the elements. The model moreover suggests that more prototypical adjuncts are often accompanied by other PPs; by contrast, more

prototypical complement-PPs have a higher probability of being the only PP-constituent in a clause. Finally, these factors seem to be stable over time rather than dynamic. Adding interaction terms between time and the main effects does not significantly improve the model (and the interaction effects are marginal at best), wherefore they were discarded.

In sum, the results indicate that PPs located more towards the adjunct-extreme of the cline commonly express semantic roles like time or location, and are associated with pre-verbal position, with greater distance to the verb, in clauses with more than one PP. This is illustrated in the Middle English example in (13a). By contrast, (13b) represents a typical complement: It has the semantics of 'recipient', directly follows the verb, and is the only (verb-dependent) PP in the clause.

(13) a. So **on the morne** they rode all three towarde kynge Pellam
'So in the morning, they rode all three towards King Pellam'
(CMMALORY,62.2091; ME, a1470)

b. It sholde seme that I hadde yeve **to thee** over me the maistrie
'It should seem that I had given the mastery over me to you'
(CMCTMELI,220.C1.113; ME, c1390)

The following section expands on the question of whether larger clusters, potentially corresponding to traditional binary notions of 'adjuncts' versus 'complements' can be identified in the data.

4.3 Clusters of Semantic Roles and Their Features

In order to assess whether the semantic roles introduced above can be clustered into broader groups, behavioural profile analysis as applied e.g. in Gries and Divjak (2009) and described in Levshina (2015, 301–322), among others, is used: This method allows to cluster categories or patterns based on their similarity or rather distance regarding a number of specified features. In the present case, these variables are the factors outlined in Section 3, viz. obligatoriness/optionality, paraphrase-ability with *do* and *happen*, as well as the ability to appear in the prepositional passive. Furthermore, the additional variables of relative position of verb and PP, presence or absence of an intervening argument, and number of PPs in the entire clause are taken into account for parts of the analysis. For each variable, the average (mean) score or proportion is calculated per semantic role and used as the input for hierarchical clustering; the values are then represented as 'behavioural profile' vectors, and "the numerical differences between the vectors [are] transformed into distances between the objects [i.e. the semantic roles]" (Levshina 2015, 301). Based on the variables the instances were coded for, we can

thus determine which semantic roles are (on average) more similar or dissimilar to which others. Furthermore, the behavioural relationships between the roles can be explored by grouping those most similar to each other together, and determining the optimal number of groups in the data.

In the present analysis, two different approaches are explored, presented in the top versus bottom part of Figure 5: First, I cluster the semantic roles according to their scores on the four main variables (obligatoriness, paraphrase-ability and passivise-ability). As can be seen in the top panel of the figure, this yields 6 clusters as the ideal number. These clusters mostly correspond to intuitions; the roles of 'time', 'manner', 'reason', and 'location' form one cluster, while 'theme' and recipient' as well as 'goal.activity' and 'result' are grouped into others, and 'agent'

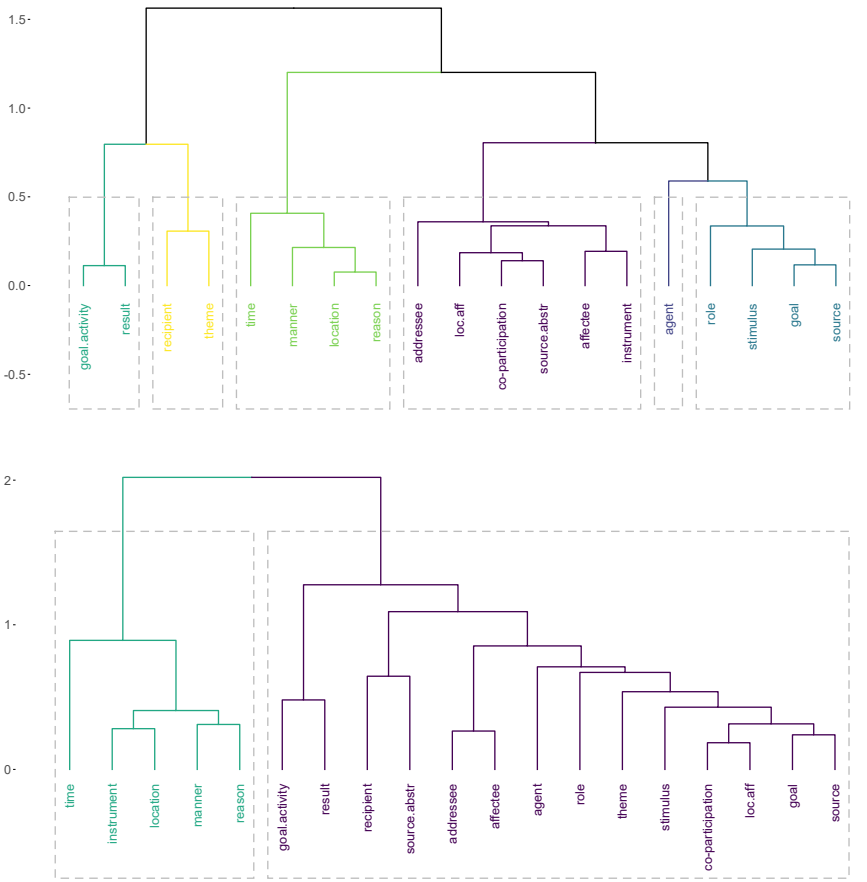

Figure 5: Hierarchical cluster dendograms for semantic roles (method = ward.D2, Canberra distances). Top: 6 optimal clusters based on obligatoriness, paraphrase-ability with *happen*, paraphrase-ability with *do*, and prepositional passive; bottom: 2 optimal clusters based on same factors in addition to order V/PP, intervening argument, and number of PPs in clause.

forms its own, single-member category. The remaining clusters are larger, e.g. putting 'instrument' together with 'addressees' and 'affectees' on the one hand, and 'sources' as well as 'goals', 'roles', and 'stimulus'-PPs, among others, on the other hand.

Importantly, if the distributional preferences regarding relative order of verb and PP, intervening argument, and number of PPs in the clause are added to the clustering, the results are relatively different, with only two large clusters (one including 'time', 'manner', 'reason', 'location', and 'instrument', and the second comprising all other roles) emerging as the best option (see the bottom part of Figure 5).

The snakeplots in Figure 6 provide more information on the specific characteristics of each cluster against all others (drawing on the smaller clusters identified in the less inclusive approach and represented in the top panel in Figure 5). Variables located further to the edges on the *x*-axis here indicate that a cluster is mainly associated with these features (with positive values pointing towards a positive association, and negative ones to a negative correlation).

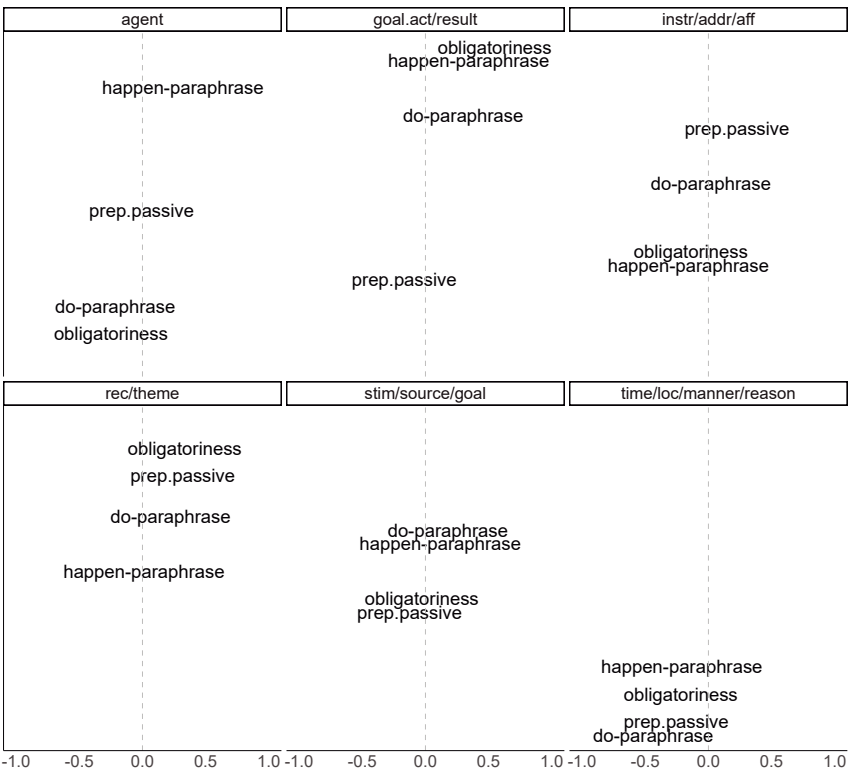

Figure 6: Importance of factors obligatoriness, paraphrase-ability with *happen*, paraphrase-ability with *do*, and prepositional passive for each cluster; factors further to the edges of each panel are more distinctive for the respective semantic role cluster (compared to all other clusters).

Position around 0 suggests that the cluster is rather unbiased with regard to that factor. The figure shows that the most adjunct-like cluster including 'time' and 'location' is clearly associated with low scores on all features (viz. they can be paraphrased by *do* and *happen*, but are typically rated as not obligatory and not able to be used in the prepositional passive). The cluster of 'recipient' and 'theme', by contrast, is most distinctive in terms of obligatoriness and prepositional passive-use, while paraphrase-ability is not as indicative. Similarly, obligatoriness is a highly important feature for the cluster of 'goal.activity' and 'result' (top mid panel); however, in this case, the cluster is also greatly associated with non-acceptability of paraphrases, whereas (non-)passivise-ability is little revealing. The latter feature, specifically the ability to be used in the prepositional passive, appears to be the main characteristic of the group around 'instrument' (cf. e.g. ***the key*** *the door was opened* ***with***). The single-member group of 'agent' is comparatively high on non-obligatoriness, but at the same time has greater rates of rejection of the *happen*-paraphrase (e.g. [?x]*The door was opened. This happened* ***by the teacher***). Finally, 'sources' and 'goals', among other roles, seem to represent intermediate types, being roughly neutral on all variables. If the additional variables are taken into account again, we find that the cluster including 'time' is most evidently characterised by a high degree of paraphrase-ability with *do*, as well as a greater extent of optionality; among the added factors, the existence of an intervening argument and pre-verbal position are most influential.

Summing up, the data suggest that while the different semantic roles are spread out over a cline in terms of the degree of their complement- versus adjunct-hood, they also seem to pattern together in principled ways. These proposed clusters partly support the assumption of a bi-partite, coarse distinction into adjuncts on the one hand, and complements on the other, especially if more structural preferences such as positional biases are taken into account. At the same time, the findings also support a more fine-grained sub-grouping into PP-types based on semantic information (role) as well as semantic-syntactic features like optionality. As such, the categorisation suggested here is compatible with both more traditional assumptions about argument-hood, as well as Hoffmann's (2007) more elaborate taxonomy of PPs in Present Day English.

As a final point before moving on to the discussion, Figure 7 zooms in on change over time by tracking the proportional frequency of the individual clusters across periods (6 cluster solution on the left, 2 cluster solution on the right). The results here then once more confirm that there is little sweeping change to be observed in the history of English PPs from Middle English onwards: In the more fine-grained clustering approach, a significant increase can only be observed for the cluster of 'recipient' and 'theme', whose proportional frequency more or less

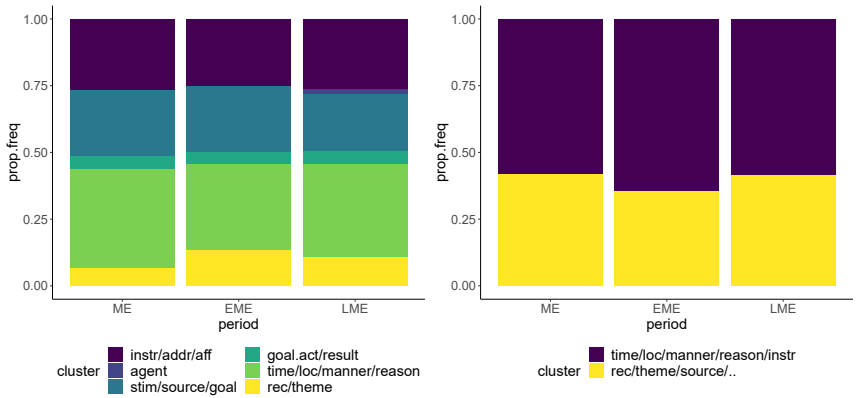

Figure 7: Proportional frequency distribution of clusters across periods (Middle English – Early Modern English – Late Modern English); left: 6 cluster solution, right: 2 cluster solution.

doubles between Middle and Late Modern English (6% to ca. 11%), but the remaining clusters are very stable (Kruskal–Wallis chi-squared = 12.07, *df* = 5, *p*-value = 0.034). Comparing the proportions of the two larger clusters over time, we find that despite some fluctuation, there is no significant change between the periods (Kruskal–Wallis chi-squared = 0.028, *df* = 1, *p*-value = 0.87), but the more adjunct-like cluster containing time and location consistently takes up the majority of instances. The following section now discusses these findings from a Diachronic Construction Grammar perspective, focussing in particular on the question of how to model gradience in constructional networks.

5. Discussion

5.1 PPs as a Multi-Level Network: Modelling Constructional Gradience

One of the main conclusions to be drawn from the results presented in the preceding sections for a model of the constructional network of verb-attached PPs in the history of English is that it can be sketched as involving multiple levels of schematicity or abstractness. More precisely, as drafted in Figure 8, the findings of this study suggest that individual semantic role-patterns with comparatively specific semantics and behavioural profiles can be distinguished and play an important role (represented by boxes with solid line frames in Figure 8). That is, the individual semantic roles vary significantly in their degree of optionality,

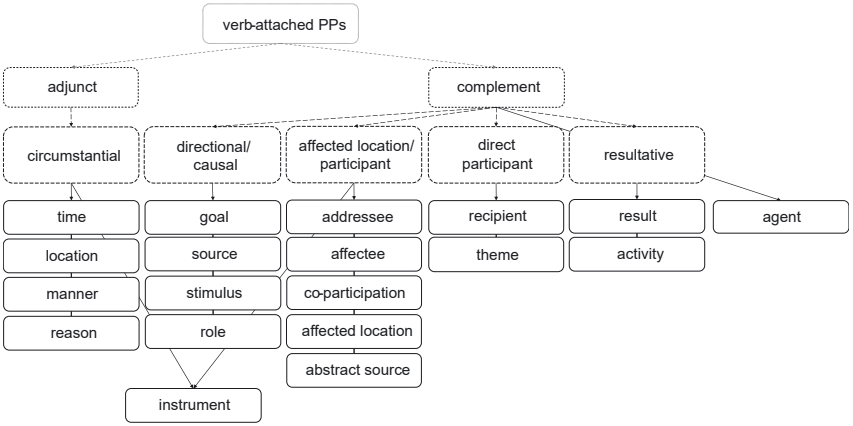

Figure 8: Constructional sketch for the multi-level network of verb-attached PPs in historical English.

anaphoric paraphrase-ability, and passivise-ability; furthermore, these features correlate with variables such as preferred position and distance to the verb. While these narrow sub-constructions may differ in entrenchment and frequency of use, they are overall presumably comparatively salient to language users.

At the same time, the data also support the assumption of more schematic generalisations over the fine-grained semantic role-constructions. As has been shown, these can be clustered into a smaller number of patterns according to their profiles – this is represented in Figure 8 as an intermediate level (represented by boxes with dashed line frames in the figure), where e.g. semantic roles such as 'time', 'location', 'manner', and 'reason' are linked to a more abstract construction with the rather underspecified semantics of 'circumstantial'. Similarly, 'recipient' and 'theme' may be abstracted over into an intermediate construction denoting 'direct' (more core) participants. In addition to sharing general semantics, the members of these different clusters are also similar in their distributional features. Finally, an additional level of schematicity contains two broad constructions: on the one hand, an abstraction essentially equivalent to the circumstantial patterns comprising the most prototypical 'time', 'location', 'manner', and 'reason' adjunct-types (labelled as 'adjunct' in the figure), and on the other hand, a large group subsuming all remaining types. The former is semantically comparatively specific, and is also associated with distinct preferences in terms of clausal features, viz. position (often pre-verbal), greater distance to the verb, and iterativity, as well as being predominantly optional, paraphrase-able and not able to enter the prepositional passive. The latter, referred to as 'complement' in Figure 8, is

under-specified in its semantics to a greater extent, but also exhibits structural biases, with higher degrees of obligatoriness, lower acceptance of paraphrases, a stronger tendency towards directly adjacent post-verbal position, and lower iterativity rates.

Importantly, however, both the intermediate level of representation and the more schematic binary distinction may not be given for all speakers, or may not be stored in exactly the same way (depicted by the dotted and dashed lines around these constructions in the figure). Moreover, language users may differ in the precise assignment of individual semantic role-constructions to these mid-level schemas: This is reflected here by the fact that 'instrument' is variably included in the group of prototypical (circumstantial) adjuncts, or features in the cluster of affected locations and participants, which otherwise patterns with more complement-like features. The more abstract categories can therefore be considered both as fuzzy and gradient. Specifically, the network featuring some overlaps between constructional types means that the abstract categories which can be established are gradient both in the sense of connecting to a rather large number of lower-level, more semantically and syntactically specified constructions, and in the sense of involving some fuzziness in their boundaries. The highest level presented in the figure, viz. that of 'verb-attached PPs' is very tentative, and may merely reflect speakers recognising the formal commonalities between all types of prepositional phrases (with the construction denoting a highly abstract meaning of some sort of 'relation' between the elements involved).

Comparing the findings of the present study to previous research into the adjunct-complement distinction, especially Hoffmann's (2007) and Bergs' (2021) explicitly constructionist discussion of this phenomenon, we find that they are compatible to a large degree, although there are also differences in the details of the proposed models. First, both the present account and Hoffmann's network are of a multi-level nature and place particular emphasis on more fine-grained, smaller sub-constructions, many of which are similar if not overlapping in both proposals. Nevertheless, the models differ in the precise structure: For one, Hoffmann's network gives precedence to the feature of optionality to a greater extent than the one posited here, where all variables are given equal importance. This also influences the grouping – although in both cases, a binary distinction between two types of PPs is made, 'adjuncts' in the present network represent a much narrower class than in Hoffmann's (2007) approach. A further, highly relevant difference is that the present study does not include information on the specific prepositions involved. Sub-categorisation frames, or strong collocational preferences between individual verbs and prepositions (or preposition classes) are accordingly not featured. Ultimately, either model may therefore be seen as an approximation only, and a more extensive and detailed combination of both may

yield the most representative picture. Last, a notable point of divergence between the models is evidently the database considered – while Hoffmann (2007) is dealing with Present Day English, the results of this study are derived from historical data. This point is briefly addressed in the following section, before the paper is concluded.

5.2 PPs in the History of English: Stable Gradience

As has been shown in Section 4 above, the findings of the present investigation are characterised by a conspicuous lack of change over time: Both the frequency distribution of individual constructions (whether lower-level or higher-level) and their associations with the various features seem to be remarkably stable in the timeframe discussed here, and a comparison with studies on Present Day English suggests that no sweeping developments likely took place within the last century. Overall, the data accordingly do not support the hypothesis that verb-attached PPs have become progressively more 'grammatical' or more complement-like throughout the history of English (at least since Middle English), despite the fact that grammaticalisation processes can be observed with selected prepositions and roles, and in spite of the possibility of micro-variation and micro-change in aspects not covered here. Instead, the history of PPs appears to illustrate one of long-term diachronic stability. This is in line with previous observations that "[g]radience may be relatively stable over long periods of time" (Traugott and Trousdale 2010b, 5) and that variation "may not always reflect dynamic structural change or a continuum of grammaticalization" (Traugott and Trousdale 2013, 132; cf. also Nichols and Timberlake 1991, the contributions in Sornicola, Poppe, and Shisha-Halevy 2000; as well as Janda and Joseph 2003 or Nichols 2003 for typological discussions of stability in language).

A potential (but very tentative and debatable) explanation for the macro-stability in this particular case may be that the adjunct-complement distinction is not entirely salient to language users, with lower-level semantic role-constructions being much more entrenched than any abstractions. The higher entrenchment of semantically specific lower-level constructions and/or lack of an underspecified, productive, abstract construction may reflect a situation of 'fossilisation' of the system, where little analogical extension or reanalysis is invited. At the same time, as discussed at greater length in Section 1, it is of course well plausible that the relevant changes occurred before the timespan investigated here, viz. in Old English or even earlier, yielding the system found in early Middle English. The

network put forward to capture the data in Section 5.1 may also reflect the outcome of prior changes not observable in this particular dataset. Regardless of the ultimate causes of this phenomenon, the ongoing presence of fuzziness in a system is striking, touching on the broader question of how pervasive (or dispreferred) grammatical gradience and fuzziness in language really is (cf. Aarts et al. 2004; Aarts 2007; Bergs 2021).

6 Conclusion

To conclude, this paper has revisited the notions of gradience and fuzziness in usage-based, cognitive constructionist accounts, focussing in particular on assessing such gradience in empirical data and implications for theoretical modelling. Specifically, the paper has zoomed in on the traditional distinction between adjuncts and complements and its development in the history of English, by means of a corpus-based investigation of verb-attached PPs in Middle English, Early Modern English, and Late Modern English. It has been shown that first, the PPs are spread over a continuum between a prototypical adjunct-pole and prototypical complements in the timeframe covered, but that at the same time, clusters at different levels of schematicity/abstractness can be identified based on different semantic and syntactic features such as obligatoriness or positional biases. Second, the study has suggested that this multi-level network of PP-constructions has remained remarkably stable over time, with little change taking place in the almost eight centuries investigated. This evidently does not mean that the synchronic gradience observed is not ultimately a consequence of gradual change; it may simply indicate that the relevant changes took place before Middle English already. Including data from Old English in future research is likely to shed more light on this question. Still, the long-term absence of change is striking and worthy of more focussed exploration.

A further issue which needs to be addressed in more detail is the problematic aspects of manual annotation of the distinction and features in question – annotating for e.g. optionality in historical data based on intuition is challenging, and to some extent also questionable considering the rather low rates of inter-annotator agreement in the present case for some variables. Implementing these factors in a more automated, 'objective' way not reliant on speakers of Present Day English may amend some of these issues.

Research funding: This study was funded by SNSF (100015_175987).

Appendix

Table A1: Classification scheme of semantic roles with corpus examples.

Semantic role	Example	
addressee	*after dinner the Ladie desired to speake* ***to mee*** *in private* 'after dinner the lady desired to speak to me in private'	(HOXINDEN-1650-E3-P2,167.14; EME, 1650)
affectee (beneficiary, maleficiary)	*this suffred oure Lord Jhesu Crist* ***for man*** *upon the croys* 'this suffered our lord Jesus Christ for man upon the cross'	(CMCTPARS,294.C2.270; ME, c1390)
agent	*the opera was performed* ***by children***	(OKEEFFE-1826-1,1,32.336; LME, 1826)
co-participation (co-theme)	*I sat a little* ***with the company*** *at cards*	(BOSWELL-1776-1,39.91; LME, 1776)
goal (directional)	*and, after, I walked* ***to the Dales***	(HOBY-E2-H,172.759; EME, 1599–1601)
goal.activity (prototypical activity)	*and so went* ***to bed***	(HOBY-E2-P2,98.907; EME, 1599–1601)
instrument	*you should be frequently pricking it up and down* ***with some small iron instrument***	(MAXWELL-1747-1,21.207; LME, 1747)
loc.aff (affected location)	*and it stands* ***on great stone pillars***	(FIENNES-E3-P2,178.239; EME, 1698)
location	*þere here aunte Ethelburga servede God* ***in þat abbey*** 'there her aunt Ethelburga served God in that abbey'	(CMPOLYCH,VI,53.353; ME, a1387)
manner	*he swore* ***in his wrath*** *that yf ever he died before her, he wold never give her anything* 'he swore in his wrath that if ever he died before her, he would never give her anything'	(FORMAN-E2-H,10.217; EME, 1602)
reason (purpose, cause)	*The Protractor* ***for this Purpose*** *is best made a whole Circle* 'the protractor, for this purpose, is best made a whole circle'	(WYLD-1725-2,104.155; LME, 1725)

Table A1: (continued)

Semantic role	Example	
recipient	*ich shal singe to our Lord þat ȝaf **to me** godes* 'I shall sing to our lord who gave goods to me'	(CMEARLPS,13.484; ME, c1350)
result (effect)	*if he turned him **into ridicule** by caricature*	(BURNEY-1792-2,5,84.628; LME, 1792)
role	*He gave Advice herein **as a Counsellor*** 'He gave advice herein as a counsellor'	(THOWARD2-E2-P1,1,99.722; EME, 1571)
source (directional)	*I returned **from Dubln*** 'I returned from Dublin'	(OCONNELL-1844-2,200.1714; LME, 1844)
source.abstr (abstract source)	*and perhaps he learns a little **from me***	(NIGHTINGALE-188X-1,414.105; LME, 1880s)
stimulus	*Cecilia was struck dumb **by this speech***	(BURNEY-1782-2,1,128.431; LME, 1782)
theme (object)	*Neverthelesse amonge the chefe rulers many beleved **on him*** 'Nevertheless among the chief rulers many believed in him'	(TYNDNEW-E1-P1,XII,40J.86; EME, 1534)
time	*this John adroyns **in the euenyng** departyd fro the sayd market towne* 'this John Adroyns in the evening departed from the said market town'	(MERRYTAL-E1-P1,7.85; EME, 1526)

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