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Abstract

This squib discusses empirical challenges incurred by assuming cognitive reality as a defining feature of constructions and the constructional network, as done in most usage-based, cognitive construction grammar approaches. Specifically, it zooms in on the methodological challenges in identifying cognitively plausible constructions in historical data, in particular when taking a highly exploratory, bottom-up approach with very little pre-selection or pre-analysis. I illustrate this issue with the example of a current project on PPs in the history of English, and the various functions these have in combination with verbs (from prototypical adjuncts to complements). I argue that the constraints of historical data make it necessary to find different, new ways to determine which abstractions and distinctions are likely to have been represented in minds of historical language users, and to furthermore identify changes in constructional networks over time.

Keywords: diachronic construction grammar, historical linguistics, cognitive reality, prepositional phrases, adjuncts, complements

1. Introduction

In this squib, I briefly revisit the principle of construction grammar as a "psychologically plausible […] theory of human language" (Hoffmann & Trousdale 2013, 3). That is, most

cognitive, usage-based versions of construction grammar subscribe to Lakoff's (1990) cognitive commitment, and constructionist models are taken to closely represent the actual knowledge of language users, rather than idealised, purely theoretical notions (Blumenthal-Dramé 2012, 29). Accordingly, the basic units of construction grammar, i.e. constructions as form-meaning pairings, as well as the networks these are organised in, are at least implicitly assumed to be 'cognitively real'.

However, the tenet of cognitive reality raises a number of theoretical and methodological issues for all constructionist accounts, and even more so for historical linguistics and language change studies. Most importantly, empirical evidence and appropriate methods are needed to obtain evidence for construction-hood, especially on more abstract, schematic levels. While for present-day language, a variety of types of data and tools can be used to approach this issue, historical investigations are much more restricted: We largely rely on textual data and corpus-linguistic means, as introspection is often problematic and experimental data is unavailable. In this squib, I discuss some of the implications of these constraints for diachronic constructionist studies and the cognitive reality hypothesis, drawing on the example of a highly exploratory, bottom-up research project on prepositions in the history of English.

The study in question is concerned with English PPs in conjunction with or part of a verb phrase, i.e. excluding PP-modifiers of noun or adjective phrases, but including most other occurrences. This is illustrated in example (1), where all underlined PPs would be taken into account.

(1) **On** Monday, I *went* **to** the city **by** train to *go* **to** hospital, *relying* **on** my parents to *be* there **after** the appointment and *bring* some food **for** me.

As immediately noticeable, the functions of such PPs in verb-preposition combinations are highly diverse, ranging from instances of adverbial PPs (adjuncts such as *on Monday*) to PPs as complements of a transitive verb (*bring for*) or as part of so-called prepositional verbs (*rely on*). For present-day English (PDE), this cline has convincingly been modelled as a fine-grained network of constructions – beyond the traditional binary division into adjuncts and complements – in Hoffmann (2007). However, the cognitive reality of the proposed distinctions has not explicitly been tackled from a construction grammar perspective so far; at the same time, the historical development of this network, and particularly the plausibility of the proposed PP-constructions as present in historical English speaker minds remains almost entirely unexplored to date. This squib briefly reports on the main methodological challenges faced in a research project aimed to provide such a historical construction grammar analysis of PPs, and suggests ways of tackling these.

The squib is structured as follows: In section 2, I briefly elaborate on the constructionist tenet of cognitive reality of constructions (2.1), and point out some challenges and recent methodological approaches to the issue, with special attention to aspects pertaining to historical linguistics (2.2). Section 3 first introduces the research project on PPs in the history of English (3.1), before discussing the study in relation to the main question of identifying plausible constructions (3.2). Finally, section 4 provides a conclusion.

2. Cognitive reality of constructions: Theory and method

2.1. Constructions and networks as cognitively real

In contrast to other theoretical frameworks of language, a main aim of constructionist accounts is to model linguistic knowledge as realistically or plausibly as possible (cf. Hoffmann & Trousdale 2013, 3). Constructions, on this view, are taken to become entrenched through repeated usage, starting at a fully substantive, concrete level, but may be generalised over to increasingly more abstract patterns in a bottom-up process (e.g. Goldberg 2006, 5; Diessel 2019). This leads to an intricate, multi-level, hierarchical, complex network of vertically linked constructions of different degrees of schematicity. In addition, horizontal connections are assumed to not only hold between formally related constructions at the same level of schematicity, but also between functionally similar constructions (so-called 'allostructions', cf. Perek 2015; Zehentner & Traugott 2020).

However, the postulation of constructions as psychologically real and constituting part of speakers' mental knowledge can be criticised. Among the main theoretical points in need of discussion are first, and very basically, the question which patterns are in fact entrenched in language users' minds, and what the defining criteria for constructionhood are: As is well-known, the earliest definition of constructions was based on idiosyncrasy of formal or functional features of patterns, which was later extended to cover any pattern of 'sufficient' frequency (Goldberg 2019, 7). In addition to the fact that this definition is still very vague, it also begs the question of which abstractions language users in fact make, as well as what the limits of abstraction are. For example, highly abstract, 'meaningless' constructions in the network such as the 'Verb Phrase construction' or the 'Prepositional Phrase construction' can be questioned; it is doubtful whether these are strongly (or at all) entrenched in language users' minds, or whether such "most schematic constructions in the constructional hierarchy only represent potential (rather than actual) abstractions" (Blumenthal-Dramé 2012, 29; cf. further Lieven & Tomasello 2008, 186; Hilpert 2014, 57). Perek (2015) shows that with English

ditransitives, speakers seem to generalise both over instances of the same construction (beyond the verb-specific level) as well as over the formally distinct yet semantically similar members of the dative alternation. On the other hand, Pijpops et al. (2018) provide evidence that variation between transitive NP-patterns and prepositional alternants in Present Day Dutch likely plays out on lower, verb- and noun-specific levels instead of between highly abstract NP-/PP-patterns. This means that the plausibility of constructionhood and particularly the degree of abstraction appear to vary considerably between phenomena.

2.2. Challenges and possible approaches to identifying constructions (and networks)

The crucial conclusion of the preceding discussion is that the cognitive reality of constructions (no matter which level of schematicity) needs to be tested against empirical evidence in each case. Such a call for empirical support for constructionhood is omnipresent in the literature: For instance, Bergen and Chang (2013, 169) state that "each constructional form-meaning pair represents a hypothesis to be validated through observations of behavior in natural and experimental settings". Similarly, Dabrowska asserts that "[a] firm empirical basis is indispensable for work that purports to be psychologically realistic" (2004, 227-228).
For present-day language use, the most suitable empirical approaches are typically thought to be experimental or observational (Tomasello 2003, 98). For example, priming studies or sorting task experiments can provide evidence for constructional status and support the assumption of lower and higher-level schemas (cf. e.g. Perek 2015). An overview of a range of experimental, corpus-based and computational/ machine-learning based methods commonly used in construction grammar studies, including e.g. collostructional analyses (Stefanowitsch 2013), is given in Gries (2013). More recently, advanced methods such as e.g. neural-network techniques or distributional semantics models, measuring semantic similarity based on co-

occurrence frequencies, have started to gain increasing attention in analyses of present-day phenomena. These tools are used in investigations of individual constructions as well as in alternation studies – work like Levshina & Heylen (2014), Pijpops et al. (2018), Hilpert & Flach (2020) or Madabushi et al. (2020) shows how they can be employed to disentangle meanings, zoom in on the productivity and schematicity of constructions, or identify allostructions and determine the appropriate levels of alternation, among other things.

While there are thus comparatively many reliable options to test for constructional status in present-day languages, the situation is quite different when it comes to historical investigations: First, textual data is typically the only type of primary data available, meaning that corpus evidence cannot be compared and consolidated with evidence using other types of data. Second, historical data – and particularly data from earlier stages of languages – poses additional challenges. Specifically, the available data is typically much smaller in size; furthermore, issues such as excessive spelling variation may cause difficulties, and diagnostic features employed for present-day language may not be useful due to changes in the linguistic system. Still, current applications of more elaborate statistical tools and methods to cases of language change (though typically to relatively recent data) indicate that they can put many assumptions about diachronic constructions and their cognitive plausibility, as well as constructional changes on firmer grounding (e.g. Hilpert & Perek 2016; Perek 2016; Budts & Petré 2020; Percillier 2020, or Fonteyn 2020).

A final point to make here is that both synchronic and diachronic constructionist research usually starts with relatively narrow and clear definitions of the phenomena under investigation. Typically, constructionist accounts are concerned with pre-defined constructions or alternations (such as the double object construction, the *way*-construction, the caused-

motion construction, or instances of syntactic variation such as the dative, conative, or causative alternation). The empirical task in these cases may then be to confirm constructional status for sub-constructions, potential super-constructions or allostructional connections, but the phenomenon as such is usually comparatively well-established, has comparatively clear definitional boundaries, and accordingly lends itself comparatively easily to such investigations. Taking a highly exploratory, inclusive approach to more general (historical) phenomena then adds another layer of complexity to the issue. In the following, I briefly comment on the challenges and possibilities of identifying constructions in the context of a specific historical linguistics project with a very broad scope and bottom-up approach, viz. an investigation into PPs in the history of English.

3. Cognitive reality of constructions as a challenge for exploratory diachronic investigations: PPs in the history of English

3.1. PEAS: English prepositional phrases and their history

Prepositional phrases play an important role in the system of verbal complementation in PDE. Although they are typically divided into adjuncts (e.g. of time, location, or instrument, as in 2a) versus complements (2b), it has been noted in several places that such a categorical binary distinction is difficult to uphold (e.g. Quirk et al. 1985; Kay 2005; Bergs 2021).

(2) a. They wrote a letter **with** a pencil **in** Rome **on** Monday.

b. They depended **on** their family.

Hoffmann (2007) proposes a more fine-grained classification of verb-preposition-combinations using a range of semantic and syntactic features (such as optionality/obligatoriness or variability of the preposition slot), modelled as a network of meso- and micro-constructions. While this gradient taxonomy is convincing and certainly preferable over the traditional dichotomy, it is nevertheless unclear to what extent it in fact corresponds to language users' representations; furthermore, it is so far mainly based on introspective (and some corpus-linguistic) applications of syntactic tests, which is problematic for any investigation into the history of the patterns.

In regard to the diachrony of PPs and their functions, it has been suggested that prepositional patterns have undergone substantial change over time: They seem to have increasingly expanded from mainly adverbial uses to more 'core' semantic roles previously expressed by NPs only as part of English moving from a more synthetic to a more analytic language (Hundt & Zehentner forthc.). A prime example of this is the emergence of tight verb-preposition combinations (prepositional verbs) such as *depend on* or *consist of* in earlier English (Claridge 2000). However, while there is copious research on PPs in the history of English, previous studies have been highly restricted in scope, mostly dealing with specific constructions only (e.g. De Cuypere 2015; Yáñez-Bouza 2015). The overall development and potential shifts in the functions of PPs are greatly under-researched so far. To address this gap from a constructionist perspective then constitutes one of the main goals of the project 'Prepositions in English Argument Structure' (PEAS).

In this project, we trace the development of verb-preposition combinations from Middle English to Late Modern English, making use of the syntactically annotated *Penn Parsed Corpora of Historical English* (PPCME2, Kroch, Taylor & Santorini 2000; PPCEME, Kroch, Santorini &

Delfs 2004; PPCMBE, Kroch, Santorini & Diertani 2016). Reflecting both the syntactic annotation practices of these corpora – which do **not** pre-classify PPs according to function – as well as the primary research focus, the extraction strategy employed was highly inclusive and broad. That is, the datasets include all instances of PPs as 'sisters' of verbs, independently of their being prototypical adjuncts, complements, or anything in between, and independently of their position in the clause, or the voice of the clause, etc.). The only PPs that are excluded are noun modifiers (e.g. *the book <u>of the students</u>*), PPs dependent on an adjective (e.g. *to be fond <u>of them</u>*), or PPs constituting clearly grammaticalised elements (e.g. *to* as an infinitival marker). The resulting database is unsurprisingly quite large, covering a total of almost 400,000 tokens, and involving over 3,500 different verbs types and about 140 preposition types. In the following section, I lay out the main challenges of combining such a large-scale, broad focus with the aim to sketch a psychologically plausible network of constructions, and suggest ways to approach this in a systematic, methodologically sound and insightful manner.

3.2. Challenges and approaches to identifying PP-constructions in the history of English

Besides the general challenges pertaining to historical data (such as e.g. limitations in text types, or high degree of spelling variation), the two main problems in disentangling the network of PP-constructions in the history of English are as follows: First, the extracted datasets are greatly heterogeneous as mentioned – the main (or indeed only) shared feature of all instances is the fact that all tokens include a verb and a prepositional phrase that is dependent on it (in a very broad sense). One very basic issue here is that a given verb often has multiple PPs in one clause, as in (3), which features a prototypical adjunct *in Germany* alongside a prepositional 'object' of a ditransitive verb (*to Latin*), among other things. Such 'duplicates' are problematic not only for analyses of token frequency, but also for network

modelling, as they instantiate several argument structure constructions at the same time (i.e. reflect multiple inheritance).

(3) **In** Germany, **at** the Gymnasia, *six hours a week* are given **to** Latin, **for** four years
(BAIN-1878,380.310)

A more pressing problem relating directly to the question of distinguishing between different functions of PPs – taken to constitute different cognitively real constructions – is the fact that the semantic and syntactic diagnostics employed for classification in PDE cannot be straightforwardly applied to the historical data.[1] A pilot study in which project members categorised instances according to their function showed excessively low inter-rater reliability; generally, relying on modern-day intuitions about e.g. obligatoriness is problematic if not impossible (and corpus data does not readily lend itself to these tests, either).

Other features useful to assess present-day data are inadequate due to systemic change over time. This concerns, for instance, position: In PDE, complements typically (directly) follow the finite verb in PDE in contrast to the usually more clause-peripheral adjuncts. However, as illustrated in (4), constituent order in general, and in consequence, the position of complements in the clause, was still more flexible in earlier English.

(4) **on** my answer depends whether Bessie enters this place with a character for chanting
(YONGE-1865,163.106)

[1]For a neat overview of these features see Bergs (2021, 155; based on Huddleston & Pullum 2002 and Hoffmann 2007, inter alia).

Similarly, in PDE more complement-like PPs often alternate with nominal patterns, whereas adjuncts usually do not. (For example, the 'recipient'-PP *to Latin* in (3) may be paraphrased with an NP in active clauses.) However, this feature cannot be used for earlier stages of English, as alternations between PPs and NPs in many cases only gradually emerged over time, and competition has been resolved in very different ways since. Finally, semantic change of individual verbs and prepositions, but also of larger V-PP-patterns, as well as issues such as lexicalisation processes (e.g. habitual *go to church* versus *go to the church*) pose additional challenges.

What this means for the present discussion and the project in question is that there are essentially three possible ways to address these challenges: (a) abandon the investigation entirely, (b) narrow down the dataset to allow for a more feasible and focussed study, e.g. to individual verbs, verb classes, or prepositions, or (c) acknowledge the obstacles presented by the data and scope and find and adapt (new) methods to tackle them. While the first evidently hardly seems desirable, introducing top-down pre-categorisations is also at odds with the bottom-up agenda of the project, thus only leaving the latter option. In the project, we then use statistical means such as collostructional analyses (Stefanowitsch 2013), (multiple) correspondence analyses (e.g. Glynn 2014), behavioural profile analyses (e.g. Divjak & Gries 2006), or distributional semantics models (e.g. Percillier 2020 for Middle English) to identify clusters in the data. That is, we use collocational information and other features for which the instances can be unproblematically or relatively unambiguously annotated to categorise the tokens in a more data-driven, exploratory manner. We expect that this will allow us to distinguish between the various PP-constructions (ranging from prototypical adjuncts to complements) similar to Hoffmann (2007)'s analysis for PDE, and to determine which distinctions were likely relevant to language users of earlier English, and which abstractions

were likely part of their mental knowledge. As a very basic example, instances featuring a motion verb (e.g. *come* or *go*) in combination with a goal or source preposition (e.g. *to* or *from*) and a location-noun within the PP should cluster together in comparison to e.g. instances of *to* with communication verbs like *say* or *tell*. Ultimately, we thereby aim to gather as robust as possible evidence to model a cognitively plausible network of PP-constructions in earlier stages of English, and importantly, identify any changes in this network, despite the particular challenges historical data presents.

4. Conclusion

This squib has aimed to briefly discuss some theoretical and methodological challenges that are brought about by a main assumption followed by many constructionist approaches, viz. that assumed constructions correspond closely to language users' actual knowledge. Corroborating the existence of specific constructions based on solid empirical data and appropriate methods is essential for construction grammar investigations that adhere to this principle. However, this is often difficult to achieve in historical linguistics due to constraints in data availability and type. Nevertheless, as I have shown based on an investigation into PPs in the history of English and their functions, recent methodological advances and new statistical tools increasingly provide sounder ways to address this need also for historical stages of languages.

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