A CONSTRUCTIONIST APPROACH TO THE EVOLUTION OF MORPHOLOGICAL COMPLEXITY

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The domain of morphology provides a particularly challenging area of research not only for general linguistics, but also for the study of language evolution. This paper discusses which insights can be gained from the theoretical framework of Construction Grammar (CxG) with regard to the evolution of morphology. It is shown that the CxG model of linguistic knowledge is perfectly compatible with an emergentist account of morphological complexity.

1. Introduction

Morphology has been called "the conceptual centre of linguistics" (Spencer & Zwicky, 1998) since it is tightly connected with phonology, syntax, semantics, and pragmatics. Nevertheless, with the notable exception of Carstairs-McCarthy's (e.g., 2010) body of work, morphology has so far only played a minor role in the study of language evolution. This paper aims at elucidating the merits and possibilities of studying the evolution of morphology in a Construction Grammar (CxG) framework. More specifically, I will argue that regarding morphological patterns as constructions in the CxG sense allows for a straightforward account of the emergence of morphology in the course of the cultural evolution of language. In this view, morphology evolves quite naturally in a bottom-up and usage-based fashion as a 'linking element' between syntax and lexicon. The emergence of morphology is therefore tightly connected with the evolution of the syntax-lexicon continuum.

This paper draws on three core assumptions, which will be spelled out in more detail in the subsequent sections. First, language is a Complex Adaptive System (CAS) constituted by the interrelated dynamic systems of biological evolution, socio-cultural transmission, and individual learning, which operate at the phylogenetic, glossogenetic, and ontogenetic timescales, respectively (cf. Steels, 2011; Kirby, 2012). In the course of cultural evolution, this complex

system adapts to domain-general learning and processing biases (cf. Christiansen & Chater, 2008). In this view, it can be assumed that developments to be observed in historical language change as well as in language acquisition can inform an account of the emergence of morphology. Second, morphology and syntax do not constitute separate autonomous modules of the grammar; neither do lexicon and grammar constitute separate modules of language (cf. Taylor, 2012). Instead, any natural human language can be exhaustively described in terms of constructions, which are – in line with the CAS approach – intrinsically dynamic, since their meaning constantly has to be 'negotiated' in actual language use (cf. Lewandowska-Tomasczyk, 1985). Thus, they are constantly subject to constructional change (Hilpert, 2013), which also entails constant shifts on the syntax-lexicon continuum. The third major assumption, which follows out of the first two, is that grammar is entirely usage-based. As Tomasello (2009) puts it: "Meaning is use" and "structure emerges from usage".

The remainder of this paper is divided into three parts. First I will discuss the role of morphology in constructionist accounts of linguistic knowledge. Then I will show how these theoretical considerations can be combined with empirical findings from child language research, historical linguistics, and comparative studies to yield a more comprehensive picture of the cognitive capacities as well as the socio-cultural factors that play a role in the evolution of morphology. A brief conclusion then outlines a possible scenario how and due to which pressures morphologically complex constructional schemas might have evolved.

2. Morphology in Construction Grammar

Construction Grammar (CxG) serves as an umbrella term for a family of linguistic theories that sees constructions as the basic units of language. Constructions are defined as form-meaning pairings at different levels of abstraction including morphemes, words, idioms, and abstract phrasal patterns (cf. Hoffmann & Trousdale, 2013). On this view, morphology takes a middle place on a scale ranging from atomic to highly specific items, the so-called syntax-lexicon continuum. Indeed, morphology is itself quite heterogeneous: Some morphological constructions (e.g. N+N compounding) can be assigned a position closer to the 'syntax' pole, while others (e.g. suppletion: *go* – *went*) are more 'lexical' in nature. Morphological constructions can be represented as constructional schemas such as the one in (1) for nominal compounds like *milkman* in English. Importantly, these schemas can also capture non-morphemic processes such as conversion, as the constructional schema for Dutch conversion (e.g. *bouw* 'to build' > *bouw* 'building') in (2) demonstrates.

(1) $[[a]_{Xk}\ [b]_{Ni}]_{Nj} \leftrightarrow [SEM_i \text{ with relation R to } SEM_k]_j$ (from Booij, 2010, p. 17)
(2) $[[x]_{Vj}]_{N[-neuter],i} \leftrightarrow [ACTION_j]_i$ (from Booij, 2010, p. 40)

In other words, morphologically complex words do not necessarily have to exhibit complex morphemic structure. They can also be complex by virtue of bearing a systematic structural and/or semantic relation to another word, as is the case in clipping. The clipped forms *sax* for *saxophone*, *par* for *paragraph*, and *vet* for *veterinarian* (Schmid, 2011, p. 217), for example, are all formed in accordance with the same constructional schema. Moreover, they are all marked for informality. However, word-formation products can also lose their relationship to their base words by means of lexicalization. For example, *flu* has lost the aspect of informality and has surpassed *influenza* as the default choice of words for describing this disease even in more formal text types throughout the 20th century, as a corpus research in the TIME magazine corpus of American English (Davies, 2007) reveals: While the token frequency of *influenza* decreases significantly (Kendall's $\tau = -0.67$, $p < 0.05$), the frequency of *flu* increases ($\tau = 0.61$, $p < 0.05$). Consequently, the proportion of *flu* in relation to the sum total of instances of both *flu* and *influenza* also increases significantly from about 5% in the 1920s to more than 80% in the 2000s ($\tau = 0.78$, $p < 0.01$).

CxG conceives of the mental representation of language in terms of a so-called constructicon (cf. e.g. Goldberg, 2006), which can be metaphorically described as a 'mental corpus' (Taylor, 2012): Language users keep track of the linguistic utterances they encounter and form generalizations over these instances of language use at different levels of abstraction. In the domain of morphology, this means that language users abstract away constructional schemas from usage patterns. These schemas then serve as templates against which specific instances of morphological patterns are understood and which can in turn be used productively in accordance with the constraints defined by the respective schema. Importantly, the constraints imposed by constructional schemas are entirely usage-based. They come about in a strictly bottom-up fashion and can be overridden by language change, i.e. by changes in usage.

3. The Evolution of Morphological Complexity

Although it is hardly a matter of debate that the underlying capacities of language are – at least in the specific arrangement that made the emergence of language possible – uniquely human, most cognitively oriented approaches assume that the grammars of human languages make use of general cognitive

principles which evolved for non-linguistic purposes. Specifically, Tomasello (2009) proposes that the capacity to acquire a language fundamentally relies on two more general functions, namely, intention-reading and pattern-finding. Precursors of both can arguably be found in non-human animals (cf. Tomasello, 2008). For example, Endress et al. (2009) found that cotton-top tamarin monkeys "can spontaneously (no training) acquire an affixation rule that shares important properties with our inflectional morphology". They conclude that some of the cognitive mechanisms underlying affixation rely on perception or memory primitives. However, the pattern-finding abilities involved in linguistic morphology are of course much more complex and can be discerned drawing on insights from language change and language acquisition.

Concerning the latter, CxG assumes that children learn language from the statistical features of their input (cf. Goldberg, 2006, p. 71), making use of the skewed frequencies characterizing this input (cf. Taylor, 2012). Despite a variety of open questions and language-specific differences, there is a great amount of evidence that children acquire both inflectional and derivational morphology by first making rather small generalizations and then building up the morphological schemas in a piecemeal fashion (cf. Behrens, 2009). To be sure, the pattern-finding abilities involved in the acquisition of morphology go way beyond simple categorization capabilities. They also involve highly sophisticated cognitive processes such as metaphor and metonymy, which have been studied extensively in Cognitive Linguistics (cf. Croft & Cruse, 2004). For example, Dirven (1999) argues that conceptual metonymy of event schemas, operating at the predicate-argument level, is involved in English noun > verb conversion, e.g. *nurse* > (*to*) *nurse sb.* In this example, the typical activities of a nurse are metonymically mapped to the verb yielded by the constructional schema for N>V conversion. Children tend to adopt and overgeneralize this pattern, cf. e.g. German *lampen* '(to) lamp (i.e. use a flashlight)' (Behrens, 2011, p. 165).

The cognitive processes involved in language acquisition also play a role in historical language change. The importance of pattern-finding in the cultural evolution of morphological patterns is obvious in the diachronic development of many morphological constructions, e.g. in the case of the emergence of a new ablaut class in German: Verbs such as *melken* '(to) milk' or *spinnen* '(to) spin' changed their inflection pattern from *melken - m<u>a</u>lk - gem<u>o</u>lken* to *melken - m<u>o</u>lk - gem<u>o</u>lken* (cf. Nowak, 2013). This pattern became entrenched over time so that other verbs such as *schwimmen* 'to swim' tend to be inflected according to this pattern, as well.

In the view presented in the preceding sections, accounting for the evolution of morphology is tantamount to accounting for the emergence of

morphologically complex constructional schemas. For example, in the often-cited example of the reanalysis of *-gate* from *Watergate* (which, being a proper name, can be treated as a simplex construction [*Watergate*]), a complex constructional schema $[[x]_{Ni}\ [gate]_N]_{Nj}$ emerges (cf. Booij, 2010, p. 90). On the meaning pole, the suffix *-gate* imposes the meaning 'scandal' to whatever lexical item is inserted into the open slot of the schema.

Both on the form and on the meaning pole of a construction, abstraction and schematicity emerge diachronically through language use. This is evident in the well-attested process of grammaticalization (Hopper & Traugott, 2003). For example, the Germanic form **līka-* was associated with the fairly concrete meaning 'body'. Through frequent use in compounds, it gradually became an affix (e.g. adverbial *-ly* in English, adjectival *-lich* in German).

In a usage-based view, "there is every reason to assume that the very first grammatical constructions emerged in the same way as those observed in more recent history." (Bybee, 2010, p. 202) Therefore, diachronic language change, most importantly grammaticalization phenomena, can shed light on the origins of structure in language (cf. Heine & Kuteva 2007). Of course, the processes at work in the emergence of morphology go beyond grammaticalization. For example, reanalysis, pragmatic factors, and grammaticalization conspire in the emergence of the suffix *-gate*. In the initial stages of its productive use, it could only be understood because of the association with *Watergate*, i.e. its use presupposed some common ground between interlocutors; hence, this example also highlights the pragmatic and intersubjective as well as cultural factors involved in the emergence of morphological patterns.

To sum up, morphology evolved – and keeps on evolving – through actual language use. This ties in neatly with the scenario outlined by Bybee (2010, p. 203): "Grammar developed gradually as language was used and as the capacities of humans or our ancestors increased to accommodate a large vocabulary, more abstract categories and many automated sequences."

4. Conclusion

In a constructionist perspective, the evolution of morphology in an emergentist way (cf. e.g. Hopper, 1998) seems entirely conceivable. Given the assumption of a syntax-lexicon continuum, in a CxG perspective, the emergence of morphology is closely related to both syntax and lexicon. In the case of syntax, we can assume the gradual emergence of syntactic complexity, starting with the mere succession of lexical items (e.g. *farmer kill duckling*) and eventually, through schema abstraction over usage patterns, yielding highly complex constructional

schemas. Of course, the open slots of syntactic constructions are more often filled by some lexical items than by others – indeed, empirical investigations of specific constructions reveal highly skewed frequencies, often even Zipfian distributions (cf. Goldberg, 2006, p. 76). Consequently, specific lexical items tend to occur together – and as countless cases in the traceable history of human languages demonstrate, "items that are used together fuse together" (Bybee, 2007, p. 316).

Experimental approaches in an iterated learning framework have shown that linguistic structure is subject to pressures for compressibility and simplicity in the course of cultural evolution (e.g. Smith et al., 2013). These pressures are at work in the evolution of morphology, as well. If the scenario outlined above is correct, morphological complexity emerged in response to the need to compress a fairly broad range of patterns of thought in an efficient way. At the same time, the pressure for simplicity pertains both to the form and to the meaning pole of a (morphological) construction. These pressures are closely tied to pragmatic and discursive needs. For example, the lexicalization of a frequent complex word such as *wheelchair* ensures efficient communication, again – as in the case of *-gate* – drawing on common ground and shared extra-linguistic knowledge. In this view, there is no need to assume a specific 'module' for morphology to evolve on the phylogenetic/biological timescale. Instead, the emergence of morphology can be treated as a process of cultural evolution.

While the assumptions concerning the cognitive capacities underlying morphology differ fundamentally from Carstairs-McCarthy's (2010) approach, the scenario he outlines is in principle compatible with the theory presented here. He assumes that the evolution of morphology begins with purely phonological alternations ("proto-'allomorphy'"). These are reanalyzed in a similar fashion as umlaut patterns, which at first were purely phonologically conditioned (e.g. *foot - feet*). Indeed, this scenario bears important similarities to the scenario for the evolution of syntactically complex constructional schemas presented above: We start with distinct items and eventually arrive at generalization and schema abstraction. These considerations also open up new perspectives on the debate about the "building block" metaphor (cf. e.g. Langacker, 1987: 452f.): Indeed, this metaphor applies quite straightforwardly to a hypothetical protolanguage consisting solely of lexical items. To a certain extent, it also applies to a hypothetical protolanguage consisting of lexical items and rudimentary syntax. However, given the storage and processing constraints of the human brain, such a "building-block" language would neither be very efficient nor capable of expressing complex states of affairs. As language adapts to the human brain (Christiansen & Chater, 2008), it makes use of domain-general capabilities

which can be subsumed under Tomasello's broad notion of pattern-finding, blurring the boundaries between syntax and the lexicon. Now, we are dealing with schemas rather than building blocks. At the same time, the emergence of morphology fundamentally draws on common ground and intersubjective meaning construal (Tomasello's 'intention reading'). Hence, in a usage-based constructionist perspective, cognitive, social-interactional, and cultural factors conspire in the evolution of morphological complexity.

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