Interactional and Cognitive Mechanisms in the Evolution of (Proto)language(s)

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Abstract

This paper discusses the role of interactional and cognitive mechanisms in the emergence of (proto-)linguistic structures and the evolution of (proto)language(s) from the perspective of usage-based and constructionist approaches. Both the social, interactive nature of human communication and the enchronic, interactional timescale have received increasing attention in investigations of how structure emerges in the complex adaptive system of language, which operates across multiple timescales and is shaped by multiple different factors. This has also led to an increasing focus on the mechanisms involved in the dialogic co-construction of structure and meaning in interaction. These include ad hoc constructionalization, interactive alignment, conceptual pacts, reuse and modification, and local forms of entrenchment, routinisation and schematisation. Interactional and cognitive mechanisms like these not only play a crucial role in the emergence of structure in modern languages. They

can also help explain how the first (proto)constructions came into being in hominin interaction. Frequently re-occurring, temporary, local (proto)constructions acquired increasing degrees of entrenchment, which led to their subsequent diffusion throughout hominin communities. They were then subject to processes of conventionalisation and cumulative cultural evolution. This process is hypothesised to eventually have led to the gradual transition from protolanguage to language.

Keywords: usage-based approaches, (proto)language(s), construction grammar, interactional mechanisms, language evolution

1. Introduction

Social cognition and interaction have increasingly been recognized as key factors in the evolution of (proto)language(s) (Levinson, 2006; Scott-Phillips, 2015; Tomasello, 2008). This theoretical development is in line with calls for an interactional and social turn in the language sciences, especially in usage-based and cognitive linguistics (Harder, 2010; Zima and Brône, 2015). In this paper, I am going to discuss interactional mechanisms that have been theorised to play an important role in the evolution of protolanguage(s) as well as in the transition to fully complex modern human language.

38 In doing so, I will mostly focus on the role conversational interaction plays in the
39 emergence of linguistic structure and propose that the mechanisms involved in it can
40 also serve as an explanatory framework for the emergence of protolanguage(s). The
41 perspective presented in this paper is one operating from the interrelated fields of
42 cognitive linguistics, usage-based approaches, construction grammar, and
43 evolutionary linguistics. It will therefore be informed by my background as someone
44 coming from a) cognitive linguistics — with a special focus on usage-based and
45 sociocognitive approaches to language acquisition and b) evolutionary linguistics —
46 with a special focus on the integration of cognitive linguistics and usage-based
47 approaches with language evolution research.

48 This perspective also entails a particular view on the usage of the terms *language*,
49 *languages*, *protolanguage*, and *protolanguages*. From a constructionist point of view,
50 knowing language means having acquired constructions, that is form-meaning pairings
51 of different degrees of schematicity, specificity, abstractness and complexity (e.g.
52 (Goldberg, 2003)). Importantly, these properties are not binary, discrete categories,
53 but are instead dimensional phenomena on a syntax-lexicon continuum. This means
54 that constructions can be more or less simple vs. complex, and more or less specific

55 vs. abstract. For example, monomorphemic word constructions such as *close*, *my*,
56 *eyes* occupy spaces close to both the specificity and simplicity poles, whereas affix
57 schemas such as [STEM]-[AFFIX] (e.g. *loveless*, *bloody*) are closer to both the
58 schematicity and the complexity poles. Multiword expressions such as *Valentine's Day*
59 or *soft as snow* on the other hand, are close both to the specificity and complexity
60 poles, whereas syntactic categories such as [ADJ] and [N] are closer to the
61 schematicity and simplicity poles (Stefanowitsch and Flach, 2017).

62 This gradualistic view of language also extends to definitions of language and
63 protolanguage, which are seen to be on a continuum. Importantly, both protolanguage
64 and language are kinds of symbolic systems that not only have a communicative, but
65 also a conceptualising and perspectivising function (cf. Sinha, this volume). The
66 transition from protolanguage to modern language is therefore seen as a gradual
67 change in degrees of complexity and schematicity in the shared symbolic storage of
68 constructions represented on the level of individual (proto)language users and its
69 diffusion through a community. There is no clear cut-off point where protolanguage
70 suddenly becomes language, or a specific point where a protolinguistic system

71 becomes a linguistic one. The differences between protolanguage and modern
72 languages, then, are one of degree and not of kind.

73 Conversely, usage-based and constructionist approaches also take the position that
74 many of the processes that led to both the incremental emergence of protolanguages
75 and the gradual transition from protolanguages to modern languages are the same
76 ones that operate during and explain the emergence of structure in the diachronic
77 change of modern languages (Pleyer, 2017, Hartmann & Pleyer, in press) Bybee,
78 2010; Heine and Kuteva, 2007)). That is, usage-based, constructionist approaches
79 take a unified perspective on the mechanisms that are relevant for both “constructing
80 a protolanguage”, the transition from protolanguage to language, and historical
81 language change. This is also the perspective adopted in this paper, and the following
82 sections will outline mechanisms, especially interactional and cognitive mechanisms,
83 thought to be relevant to these different processes of emergence on different
84 timescales.. Regarding further terminology, the terms protolanguage and
85 protolanguages will be used relatively interchangeably, with *protolanguage* focussing
86 more on the overall status and stage of the different systems employed by different
87 communities of protolanguage users at a given point in time, and *protolanguages* when

focussing on the different systems in use by these communities. Generally, a usage-based, constructionist view of a gradual transition from a protolinguistic phase to a linguistic phase, or from protolanguages to modern languages is consistent with the view that there were several protolanguages out of which extant modern human languages developed. In the words of (Nichols, 2012), this view is consistent with the assumption that “language originated gradually over a diverse population of pre-languages and pre-language families.”

The main focus of this paper will lie on mechanisms and processes influencing the emergence of communicative structure in modern humans. The gradual transition from protolanguage to modern language is assumed to have happened in the human lineage over an extended period of time, meaning that the processes described in this paper in some form were characteristic of the emergence of protolinguistic communication within the hominin lineage in general. From a continuist, gradualist perspective, it is assumed that a network of constructions approaching the linguistic pole on the protolanguage-language continuum has existed at least since the advent of homo sapiens, indicating a time-depth of around 200kya (Nichols, 2012; Tallerman and Gibson, 2012), or possibly dating back even to our last common ancestor with

105 Neanderthals, 500kya (Dediu and Levinson, 2013). However, these interactional
106 mechanisms are hypothesised to also have led to the emergence of the first
107 (proto)constructions, which are assumed to have a considerably deeper time depth.
108 Levinson and Holler (2014), for example, argue that “that the origin of modern speech,
109 and the prevalence of the vocal tract in human communication, would seem to lie
110 somewhere between 1.4 Ma and ca 600 000 years ago.” On this view, many
111 foundations for the emergence of a protolinguistic communication system would have
112 already been in place in the immediate ancestor of Homo heidelbergensis. These
113 include, for example, ritualised gestures, pointing, iconic gestures, voluntary vocal
114 utterances. In addition, they also include many aspects of the “interaction engine”.
115 underlying sociocognitively sophisticated bouts of collaborative communication
116 characterised by turn-taking, processes of the negotiating of meaning as well as the
117 stabilisation of communicative constructs in interaction and their diffusion in a
118 community (Levinson and Holler, 2014).

119 In terms of methodologies and theoretical frameworks, I will look at research within the
120 frameworks of constructionist, usage-based, cognitive-linguistic and usage-based
121 approaches, such as dialogic construction grammar (Brône & Zima 2014), emergent

122 grammar (Hopper 2015); interactional cognitive linguistics (Zima & Brône 2015), and
123 usage-based models of entrenchment and conventionalization (Schmid 2016; 2020;
124 Divjak 2019) and which perspectives they offer on the evolution of (proto-) languages.
125 In the following I will first describe the evolutionary timescales that are relevant to
126 capturing the complex adaptive system of language and highlight the importance of
127 the enchronic, interactional timescale (§2). I will then focus on the question what a
128 focus on the enchronic timescale can tell us about language evolution and the
129 emergence of (proto)linguistic structure in interaction (§3). Building on this, I will
130 describe some of the key interactional and cognitive mechanisms involved in the
131 emergence of (proto)linguistic structure (§4). Specifically, I will describe interactive
132 alignment (§4.1), conceptual pacts (§4.2), reuse and modification of prior utterances
133 (§4.3), the process of resonance activation (§4.4), as well as the processes of micro-
134 entrenchment, and local-level routinisation and schematisation (§4.5). In §5, I will
135 briefly discuss how the emergence of protolinguistic structure in interaction can
136 represent a first step in the entrenchment and conventionalisation of such structures,
137 which is the foundation for their subsequent grammaticalization and
138 constructionalization and the transition from protolanguage(s) to modern language(s).

139 I will end with a short outlook of potential synergies and further research that follow
140 from the perspective on cognitive and interactional mechanisms in the evolution of
141 (proto)language(s) described in this paper (§6).

142

143 2. Evolutionary Timescales

144 One of the central foundational assumptions of approaches that can be subsumed
145 under the framework of “emergentism” (Ellis, 2019; MacWhinney and O’Grady, 2015),
146 such as cognitive linguistics (Dabrowska and Divjak, 2015), usage-based approaches
147 (Barlow and Kemmer, 2000), and evolutionary linguistics (Kirby, 2012; Steels, 2011) is
148 that “language is a complex adaptive system” (Beckner et al., 2009) whose properties
149 emerge out of the interactions of a variety of factors on multiple related timescales.
150 Enfield (2014) proposes that these timescales can be seen as “causal frames” that
151 characterize language. They also represent converging sources of evidence for
152 questions about the emergence, change, acquisition, processing, and use of language.
153 As such, these different timescales are all instrumental in investigating the complex
154 adaptive system of language.

155 While there a number of proposals for relevant timescales (e.g. Kirby, 2012; Larsen-
156 Freeman and Cameron, 2008; MacWhinney, 2005; Steels, 2011; see Enfield, 2014 for
157 a discussion) in the following I will briefly present the MOPEDS model (Enfield, 2014),
158 as it emphasizes the importance of the social-interactional frame, which is central to
159 the view outlined here. I will then concentrate on a number of timescales that are of
160 particular relevance to questions about the evolution of (proto)language(s) and its
161 interactional foundations.

162 With regard to language, in the MOPEDS model, there are six different timescales or
163 frames

- 164 • **Microgenetic:** The timescale of psychological processing and action processing
165 of language
- 166 • **Ontogenetic:** The timescale of an individual's language development across the
167 lifespan
- 168 • **Phylogenetic:** The timescale of the biological evolution of language
- 169 • **Enchronic:** The timescale of social interaction and language use in context
- 170 • **Diachronic:** The social/cultural historical timescale of language change
- 171 • **Synchronic:** The representation of relations among linguistic items

172 Importantly, in a way many of these timescales are interrelated, and interact with each
173 other. In addition, sometimes clear distinctions are not entirely possible. For example,

174 linguistic microgenetic processes in conversation by definition also extend to the
175 enchronic timescale. As Enfield (2014) himself notes, this also holds for the synchronic
176 frame, which in the structuralist tradition of de Saussure (1916) (de Saussure, 1916) is
177 interested in the static relation of linguistic units.

178 From a usage-based perspective that sees language as a complex adaptive system,
179 the association networks that characterise a language user's knowledge of language
180 are fluid and dynamic and are constantly changing and adapting. Every instance of
181 language use in context influences association strengths and weightings within the
182 network, with ripple-effects that can influence the entire system in subtle ways (e.g.
183 Diessel, 2015, 2019; Schmid, 2020).

184 Within language evolution research, there are three timescales that have been the
185 focus of most attention: The ontogenetic timescale, the phylogenetic timescale, and
186 the diachronic timescale (e.g. (Kirby, 2012; Steels, 2011, Pleyer & Winters, 2014). The
187 latter is often called "glossogenetic" (Hurford, 1990) in evolutionary linguistics and has
188 been the focus of a wealth of modelling (see Gong et al., 2014; Kirby et al., 2014;
189 Steels, 2011 for reviews) and experimental work (see (Scott-Phillips and Kirby, 2010;
190 Tamariz, 2017 for reviews) focussing on the various social, cognitive, and

191 environmental mechanisms and factors that influence the cultural evolution of
192 language.

193 Increasingly, theoretical approaches in the language sciences also stress the
194 importance of the 'online', dialogic, interactive nature of human communication in the
195 emergence of linguistic structure. For example, the enchronic, conversational level has
196 been argued to play an important role in language change by proponents of the view
197 that grammar is an emergent, interactional phenomenon (e.g. Hopper 2011, Du Bois
198 2014; Pleyer, 2017). This view is best encapsulated in the phrase that "Yesterday's
199 discourse is today's language; today's discourse is tomorrow's language." (Roberts,
200 1944; cf. (Hopper, 2011)). In general, the 'enchronic' timeframe can be seen as one of
201 the central timeframes that characterizes the complex adaptive system of language. It
202 interacts with factors on the ontogenetic, diachronic, and phylogenetic levels as well
203 as others. For this reason, it is therefore of central importance to theories of language
204 evolution to outline the interactional and cognitive mechanisms that influence the
205 emergence of structure in the dialogic co-construction of meaning, as well as the
206 subsequent conventionalization of these emergent patterns.

207 In the next sections, I will especially focus how interactive mechanisms on the
208 enchronic timescale, that is interactional mechanisms that take place on the level of
209 interactive exchanges, can be related to the evolution of (proto)language(s).
210 Specifically, I will look at research within the frameworks of constructionist, usage-
211 based, cognitive-linguistic and usage-based approaches, such as dialogic construction
212 grammar (Brône and Zima, 2014), emergent grammar (Hopper, 2015); interactional
213 cognitive linguistics (Zima & Brône 2015), and usage-based models of entrenchment
214 and conventionalization (Divjak, 2019; Schmid, 2016, 2020) and which perspectives
215 they offer on the evolution of (proto-) languages.

216

217 **3. Language Evolution and the Emergence of (Proto-)linguistic Structures in Interaction**

218 One of the key insights of approaches that concentrate on the enchronic, interactional
219 timescale of communication is that conversational interaction can be seen as the “core
220 ecology for language use” (Levinson and Holler, 2014). This is the key context in which
221 the function of linguistic structures should be investigated, which can be
222 conceptualised as resources for social interaction (Couper-Kuhlen and Selting, 2018).
223 Interaction is a process in which embodied agents dynamically coordinate, co-create

224 and negotiate meaning and perspectives in a process of participatory sense making
225 (Di Paolo et al., 2018).

226 From the perspective of language evolution, one further central finding of such
227 approaches is not only that linguistic structures serve as resources to share meaning
228 and to solve communicative problems, but that these structures also emerge in the
229 process of interaction between cooperative agents. Such emergent structures then
230 have the potential to serve as “reusable material” for subsequent interactions and to
231 spread through the community. This is why whenever humans communicate using
232 language, they engage in a “process by which grammar is created” (Croft, 2001;
233 Schmid, 2020). Language, on this view, is a dynamic system of emergent structures
234 that in principle is always changing under the influence of cognitive and interactional
235 mechanisms that operate on the dialogical, enchronic timescale. As Schmid (2020: 9)
236 puts it, the “linguistic system is usage-based and emergent: the design and structure
237 of language emerges from an is continuously updated by usage” (Schmid 2020).

238 One of the main aims of usage-based approaches and interactional, social cognitive
239 linguistics frameworks is to describe how linguistic knowledge is shaped by social-
240 interactional and cognitive mechanisms at the level of language users engaged in

241 interaction (Divjak, 2019; Harder, 2010). The key commitment of these approaches is
242 it that “the emergence of grammatical patterning in on-line production, dialogically, and
243 as a cooperative achievement” (Fried and Östman, 2005), is based on domain-general
244 processes whose application to communicative utterances in interaction shapes the
245 emergence of structure in language.

246 On the one hand, describing the processes that take place on the enchronic timescale
247 represents an important part of characterizing the evolutionary foundations of language
248 whose operation across different timescales shape the complex adaptive system of
249 language (Hartmann & Pleyer, in press; Pleyer & Winters, 2014). That is, describing
250 these processes and the sociocultural, interactional settings in which they take play,
251 as well as their respective evolutionary foundations, are part of specifying what makes
252 the human brain “language-ready” (Arbib, 2012; Pleyer & Lindner 2014; Waciewicz et
253 al., in press). Together with elucidations of the processes relevant to language
254 acquisition, language change, and so forth, they therefore make up part of the
255 “shopping list” of processes and abilities needed for language to evolve, and whose
256 evolutionary histories the science of language evolution needs to untangle.

257 However, the focus on the dialogic, in-vivo, pragmatic and interactive emergence of
258 structure has implications beyond characterising the language-ready brain. Namely,
259 they form part of the explanatory framework for the question of how (proto)language(s)
260 came to have structure in the first place, that is for the question of how
261 (proto)language(s) evolved. Processes of grammaticalization and constructionalization
262 form one important part of this puzzle, as they have been argued to have led to the
263 gradual transition from protolanguage to modern language (Arbib, 2012; Bybee, 2010;
264 Heine and Kuteva, 2007). However, the enchronic emergence of structure in
265 interaction represents another central, interlocking puzzle piece in that the
266 mechanisms implicated in the interactive emergence of structure have the potential to
267 explain how the first protolinguistic structures emerged in interactive agents. In the
268 following, I will flesh out this picture more fully with regards to the mechanisms that are
269 of special importance for this process from a usage-based, constructionist perspective.
270 From the perspective of usage-based, constructionist approaches, these changes take
271 place in terms of the emergence of and changes to constructions, that is form-meaning
272 pairings and their relationship to each other within a dynamic network. In other words,
273 emerging constructions underwent a dynamic process of ad hoc constructionalization

274 (Brône and Zima, 2014; cf. Traugott and Trousdale, 2013). As will be further discussed
275 in §5 these processes and their operation on the enchronic timescale also have
276 implications for the subsequent conventionalization and constructionalization of
277 structures in the development of (proto)languages and the transition of modern
278 language(s). In the following, section, however, I will first focus on some of the most
279 important interactional and cognitive mechanisms involved in the in-vivo interactional
280 emergence of constructions. Taken together, they form an important aspect of the
281 emergence of structure across different levels and timescales (Croft, 2001; Du Bois
282 and Giora, 2014; Hopper, 2015; Zima, 2013; Zima and Brône, 2015).

283

284 **4. Interactional and Cognitive Mechanisms Involved in Ad Hoc Constructionalization**

285 Research in dialogic construction grammar (Brône and Zima, 2014), emergent
286 grammar (Hopper, 2015), and interactional linguistics (Couper-Kuhlen and Selting,
287 2018; Su, 2016) suggests that “the beginnings of the emergence of constructions can
288 be found in individual interactions” (Su, 2016).

289 As argued by Brône & Zima (2014), in interaction language users set up temporary
290 routines for the purposes of communication and mutual understanding. These routines

291 can be conceptualised as “ad hoc constructions” and the process that leads to their
292 emergence as “ad hoc constructionalization.” Ad hoc constructions can be described
293 as “locally entrenched form-meaning pairings within the boundaries of an ongoing
294 interaction” (Brône & Zima 2014). Importantly, these ad hoc constructions are co-
295 created in interaction, as interlocutors “jointly set up local constructional routines with
296 varying degrees of flexibility and fixedness” (Brône and Zima, 2014: 459). Many of the
297 processes evolved in ad hoc constructionalization are the same that generally lead to
298 the abstraction of constructional patterns from usage events that can be observed in
299 all forms of language learning, albeit on a more local level. However, this means that
300 for a characterization of the interactional mechanisms involved in ad hoc
301 constructionalization, observations which processes lead to the internalization of
302 constructions are highly relevant as well. As argued for Pleyer (2017)
303 , ad hoc constructionalization can also serve as a mechanism to get protoconstructions
304 off the ground and lead to the emergence of protolanguage, making these processes
305 even more crucial for specifying a usage-based, constructionist model of language
306 evolution.

307 Key processes involved in the emergence of structure in conversation are the following,
308 which will be outlined in more detail below: interactive alignment, conceptual pacts,
309 resonance activation, reuse and modification, and routinisation, schematisation, and
310 entrenchment at the local level. Whereas interactive alignment, conceptual pacts and
311 resonance activation are processes that operate at the local level of an interaction,
312 processes of reuse, modification, routinisation, schematisation, and entrenchment take
313 place over different timescales. This means that they are not only relevant for the
314 emergence of constructions in interaction, but also for their subsequent development
315 over longer periods of time. This also makes them especially important from an
316 evolutionary perspective, as they have the potential to explain not only how the first
317 protolinguistic structures emerged in interaction, but also how these structures
318 stabilized into a protolinguistic system, or network of protoconstructions in a
319 protolanguage user.

320

321 **4.1 Interactive Alignment**

322 The process of interactive alignment describes how interactants align their linguistic
323 representations on different levels (Pickering and Garrod, 2005). Alignment can take
324 place across different levels of representation, including alignment on the lexical and

phrasal level, but also on the level of structures and thematic relations. It helps language users to converge on shared conceptualisations of a situation and reaching communicative goals.

Importantly, interactive alignment extends beyond linguistic levels, as interactants also show coordination in terms of gaze, gesture, body posture, and other 'nonverbal' dimensions. This means that behavioural alignment is in fact a multimodal phenomenon that involves processes of synchronisation at different semiotic and behavioural levels (Oben and Brône, 2016; Rasenberg et al., 2020). As alignment is not confined to linguistic levels of presentation, but a general semiotic and behavioural process, it therefore also has an important place in capturing how hominins converged on aligned expressive behaviour that represented the basis for the emergence of protolinguistic structure.

Two foundational processes discussed in theoretical approaches to alignment are that of *priming* and *grounding* (Oben, 2018; Rasenberg et al., 2020). Priming refers to a low-level, individual automatic process in which the instantiation of a particular pattern of activation makes the subsequent activation of that pattern, as well as closely connected patterns, more likely. A further distinction in priming is that between self-priming and other-priming. In self-priming, the activation of a particular structure or pattern of activation increases the subsequent retrievability of that structure of the producer and makes it more likely that they use the pattern again within an interactive bout. In other-priming, use of a pattern or structure by one interlocutor makes it more likely that that pattern or structure will be used by another interlocutor in the dialogic exchange (Neels, 2020a; Pickering and Garrod, 2017). Both processes of priming have

348 been suggested to also play a role in grammaticalization, as they increase the
349 likelihood of particular structures emerging in interaction (Mair, 2017; Neels, 2020a;
350 Pickering and Garrod, 2017). This is another argument for the potential relevance of
351 priming mechanisms for the emergence of protolinguistic structure and the transition
352 to linguistic structure.

353 Grounding, on the other hand, focusses on processes of alignment as a result of high-
354 level, interactive efforts of interlocutors to jointly coordinate referential expressions.
355 That is, grounding refers to temporary agreements reached by interlocutors on specific
356 construals on different semiotic levels as they interactively co-create meaning, and
357 negotiate a shared perspective on a situation (Oben, 2018; Rasenberg et al., 2020).
358 When looking at interactive encounters, it is likely that both processes of interactive
359 synchronization are in operation (Oben and Brône, 2016). In fact, Rasenberg et al.
360 (2020) argue that priming and grounding should not be seen as dichotomous, but that
361 instead alignment processes should be seen as taking place on a continuum with
362 priming and grounding representing the respective endpoints of that continuum.

363 From an evolutionary perspective, what research on interactive alignment indicates is
364 that the interactive mechanisms involved in the emergence of (proto)linguistic structure
365 in interactional encounters involve both more low-level, automatic processes, as well
366 as higher-level, mediated processes that involve hominin's advanced abilities in the
367 domain of perspective-taking, social cognition, and ostensive-inferential cooperative
368 communication (Pleyer & Lindner 2014; Pleyer, 2017; Heintz and Scott-Phillips, 2021;
369 Scott-Phillips, 2015; Tomasello, 2019).

4.2 Conceptual Pacts

As a specific expression of grounding processes in interactive alignment, the notion of conceptual pacts (or ‘referential pacts’) is of particular importance when considering how interacting agents converge, and first converged on shared referential expressions in the evolution of protolanguage. In interaction, interlocutors often converge on specific lexical referential expressions for an object, situation, or event (for example, if someone is a ‘thief’ or a ‘robber’, or something is a ‘bush’ or a ‘tree’). Conceptual pacts are often important for successful communication, especially when interlocutors need to agree on a particular construal, expression or perspective to refer to a referent that is ambiguous, for which no prior agreed upon expression exists (for example in a maze-game task, cf. (Garrod and Doherty, 1994)) or if multiple expressions can possibly be applied to the same referent. Matthews et al. (2010), for example, showed that by 3 years of age, children are sensitive to the fact that conceptual pacts can be seen as as agreements “made between two people to take a given perspective on an object, where this agreement is believed by both interlocutors to be mutual, and its maintenance is understood to be cooperative” (Matthews et al., 2010).

388 Importantly, such conceptual pacts are at first specific to a given interaction. This is
389 also understood by children, who have an awareness that a conceptual pact agreed
390 upon with one interlocutor (e.g. calling a particular ambiguous roundish toy “a nose”),
391 does not hold for interactions with another interlocutor (who might call the same object
392 “an apple”; cf. Matthews et al. 2010).

393 According to Brône & Zima (2014), ad hoc constructions can be seen as conceptual
394 pacts between interlocutors that are set up as temporary routines during an unfolding
395 interaction. As such, the process of agreeing on conceptual pacts has obvious
396 implications for language evolution, as it represents one kind of interactional
397 mechanism that can lead to the emergence of protolinguistic structures. From such an
398 evolutionary perspective, it is also highly relevant which factors influence the process
399 of setting up conceptual pacts, as they can shed light on the processes involved in the
400 first protolanguage users setting up conceptual pacts in interaction to solve
401 communicative tasks. Conceptual pacts for situations where interlocutors need to
402 agree on a new referring expression can also be influenced by the affordances of the
403 environment (Nölle et al., 2020). However, as soon as they acquire a history of being
404 successfully used to solve recurrent interactional tasks, especially when used with

multiple interactants, just as other processes of interactive alignment they can acquire degrees of conventionalisation (Garrod and Doherty, 1994), and have also been implicated in potentially leading to processes of language change and grammaticalization (Nölle et al., 2020; Pickering and Garrod, 2017). Both interactive alignment and the specific process of forming conceptual pacts therefore are potentially important interactional mechanisms involved in the emergence of (proto)constructions in the evolution of (proto)language(s).

4.3 Reuse and Modification

Processes of interactive alignment on a more general level constitute processes of reuse, which also offer participants in an interaction the option to modify reused structures. That is, in interaction interlocutors not only reuse prior utterances, but also modify them. On this view, previous discourse is a resource that language users can draw on in new usage events (Langacker, 1987; Zima, 2013). This is in line with research indicating that formulaic utterances and entrenched chunks of linguistic structure, including speech formulae, idioms, fixed and semi-fixed phrases, make up for a much larger part of our knowledge of use than was previously believed. For example, formulaic expressions have been estimated to make up almost 25% of everyday speech (Van Lancker-Sidtis and Rallon, 2004). This makes it likely that the

424 interactions of protolinguistic hominins at one time also consisted to a large degree of
425 such prefabricated chunks or fixed expressions.

426 However, such processes have also been suggested to represent a way in which
427 grammar can emerge through building on and modifying previous “material” from prior
428 utterances. In the words of Goodwin (2013), “building subsequent utterances through
429 decomposition, reuse, and transformation of language structure provided by another
430 is a central locus for grammar as a form of public, social practice” (cf. Su, 2016).

431 From an evolutionary perspective, this opens up a way to describe the way in which
432 individual interactions are the communicative format in which (proto)constructions first
433 emerged. Interestingly, additional support for this view also comes from usage-based
434 investigations of language acquisition. For example, Lieven et al. (2009) have shown
435 that when looking at the multiword expressions of two-year-old children, between 58-
436 92% of their utterances were either a) verbatim repetitions of a previous utterance, or
437 b) could be generated by a single operation on a previous utterance. This also
438 represents a possible pathway for the gradual emergence of (proto)linguistic structure
439 through reuse and modification of material from previous utterances. Reuse and
440 modification then, are likely mechanisms both for the emergence of constructions in
441 interaction, but also for the diffusion and cumulative accretion of constructional
442 changes in communities of interacting agents.

443 Reuse and modification take place across different timescales, meaning that on the
444 one hand interactants reuse and modify material from a given interactional exchange.
445 But on the other hand, they also reuse and modify material from previous interactional
446 encounters. In terms of the mechanisms involved in these processes, it is again

probable that both low-level individual and more high-level interactive features are at play. Within interactional enchronic encounters, priming (cf. §4.1) is an important mechanism that sets the stage for the reuse and modification of prior utterances, by “creating cognitive conditions that facilitate the selective reproduction of recently used linguistic forms and structures” (Du Bois, 2014).

Other such individual processes that influence reuse and modification are the micro-entrenchment of structures in interaction as well as processes of local schematisation and routinisation, which will be discussed in more detail in sections 4.5. In terms of high-level interactive mechanisms, reuse and modification are influenced by grounding mechanisms in interactive alignment described in section 4.1 as well as processes of resonance activation, which will be described in the next section.

4.4 Resonance Activation

Just as conceptual pacts, resonance activation can be seen as an interactional mechanism that is located more towards the grounding pole of the priming-grounding continuum. This is the case because it relates to the way that speakers use materials and structure from previous utterances for purposes of stance taking and expressing perspectives on a situation. Resonance activation be broadly be defined as “the activation of affinities across utterances” (Du Bois, 2014). These affinities are

467 intersubjective and conceptual-semantic correspondences that are built upon when
468 interlocutors re-use and exploit in their own utterances forms and meanings expressed
469 by their interlocutor's utterances. As an example of resonance activation, take the
470 following exchange between two preschoolers, which is often used as an example by
471 Deborah Tannen (e.g. Tannen, 2010):

472 GIRL 1: Did you know.... Did you know my babysitter, called Amber, has already
473 contacts?

474 GIRL 2: My mom has already contacts and my dad does, too!"

475 [Girl 1 laughs]

476 Girl 1:the same?!

477 In this example, the syntactic pattern of the second speaker resonates with that of the
478 first speaker, including the non-conventional word order ("My [NP] has already
479 contacts"), which in the terms of dialogic syntax can be interpreted as an expression
480 of stance-taking and affiliation. Resonance activation can also be used for multiple
481 different purposes, including different conceptualisations of the same situation or
482 entity, but they share the fact that they represent a mechanism where structure is co-
483 created on-line and in-vivo in interactional encounters to negotiate and express

perspectives. As such, resonance activation represents another mechanism implicated in how protolinguistic hominins converged on the first shared constructions.

4.5 Micro-entrenchment, Local-level Routinisation and Schematisation

Entrenchment is a key concept in usage-based approaches (Blumenthal-Dramé, 2012; Divjak, 2019; Langacker, 1987; Schmid, 2016, 2020). It captures the way in which repeated encounters in language usage impact cognitive encoding and storage and strengthen the representation of these structures in memory (Divjak, 2019). In Langacker's (1987) original phrasing:

"Every use of a structure has a positive impact on its degree of entrenchment, whereas extended periods of disuse have a negative impact. With repeated use, a novel structure becomes progressively entrenched, to the point of becoming a unit; moreover, units are variably entrenched depending on the frequency of their occurrence."

Importantly, entrenchment is a matter of degree, with structures exhibiting stronger and weaker degrees of entrenchment in memory. The process of entrenchment is influenced by a whole host of different factors, which include, but are in no way limited

501 to frequency effects, different types of salience, attention, contextual and pragmatic
502 effects and processes of memory consolidation (Divjak, 2019; Schmid and Günther,
503 2016; Schmid, 2016). According to Divjak (2019), there are three types of effects that
504 entrenchment has on linguistic representations:

- 505 1. “What You Do Often, You Do Faster and with Fewer Errors :” A structure that
506 is cognitively entrenched in memory is activated and processed with reduced
507 cognitive effort and conversely, with an increased degree of automatization.
- 508 2. “Units that Occur Together, Refer Together:” The frequent association of
509 structures leads to co-occurring structures achieving unit status, which eases
510 their simultaneous access and retrieval.
- 511 3. “Units that Occur Together, Blur Together:” Structures that become entrenched
512 are often chunked together, which in some cases can lead to the emergence of
513 a fused structure such as in *I don't know* → *dunno* and *going to* → *gonna*
514 (Bybee, 2010).

515 These processes have wide-ranging implications for usage-based research on
516 language evolution (Pleyer & Hartmann 2020), language learning (Pickering and
517 Garrod, 2005; Schmid, 2016), language change (Hilpert, 2017; Neels, 2020b), and the

518 conventionalisation of entrenched units in (proto)linguistic communities (Hartmann &
519 Pleyer, in press).

520 However, Brône & Zima (2014) also argue that entrenchment at the local level of an
521 interaction, or “micro-entrenchment” also plays a crucial role in the emergence of ad
522 hoc constructions. As they argue, ad hoc constructionalization “essentially involves the
523 same type of entrenchment processes as in language acquisition (Pickering and
524 Garrod, 2005: 99) and grammaticalization” Repeated reuse and modification driven by
525 alignment and resonance leads to micro-entrenchment, making ad hoc constructions
526 “locally entrenched parts of the repertoire (or mini-langue, Du Bois, p.c.) of the specific
527 interaction from which they emerge” (Brône and Zima, 2014). Framing this repertoire
528 of ad hoc constructions in terms of a ‘mini-language’ of course has interesting potential
529 implications for conceptualising the emergence of localised repertoires of ad hoc
530 protoconstructions (or protoconstructicons) in interaction as a crucial step in the
531 evolution of protolanguage(s) (Pleyer, 2017).

532 Furthermore, as Divjak’s (2019) distinction of three types of entrenchment shows,
533 entrenchment is not only a process related to simple storage in memory, but can also
534 lead to more routinised and schematised behaviours. Schematisation as a discourse
535 process can create both item-based schemas, and as discourse progresses has the
536 potential of turning these schemas into more abstract and elaborate structures
537 (Tomasello, 2014). Schematisations over instances of actual language usage are one
538 of the core mechanisms thought to be responsible for language learning and language
539 change in usage-based approaches (Barlow and Kemmer, 2000; Diessel, 2019;
540 Langacker, 1987; Traugott and Trousdale, 2013). In Brône and Zima’s (2014) model,

they are also hypothesised to operate on the local level, and in tandem with local routinisation, represent important cognitive and interactional mechanisms involved in ad-hoc constructionalization. In addition, these local processes also represent important candidates for mechanisms involved in modelling the process of the emergence of protoconstructions in hominins.

In all, the interactional and cognitive mechanisms outlined in Section 4 are important processes that have the capacity to explain how protolinguistic structure could have emerged in communicative encounters of interacting hominins on the enchronic timescale. However, as already indicated, this description of possible processes that lead to the emergence of protoconstructions also has implications for a model of how ad hoc protoconstructions became entrenched in the minds of individual protolanguage users. In such a model, if temporary structures emerge and recur frequently, they stabilize across multiple discourse encounters and emerge as schematised community-wide construction without being limited to individual interactional encounters. Building on this, they can then be subject to further cultural evolution and cumulative change such as grammaticalization and constructionalization, leading to the gradual transition of protolanguage(s) to modern language(s). This process model will be outlined in more detail in the following section.

5. Language Evolution and the Entrenchment and Conventionalization of (Proto)linguistic Structures

562 The scenario that arises from the perspective outlined here is one of a complex
563 scaffolding process in which protolinguistic structures emerged as temporary problem-
564 solving devices in individual communicative interactions. Recurring problems and
565 tasks led to the frequent re-emergence of particular structures (Dabrowska, 2010;
566 Fischer, 2015). The likelihood of these particular structures re-emerging repeatedly
567 was also boosted by frequently re-occurring solutions to communicative problems being
568 increasingly consolidated in memory and becoming increasingly entrenched, thus
569 making them emerge more easily and frequently in subsequent interactions.

570 This also made them more likely to be used with different communicative partners,
571 leading to diffusion and spread of emergent structures through the community. This
572 process is described as “usualization” by Schmid (2020): “recurrent utterance types
573 become established and are sustained and continually adapted as agreed-upon
574 means of reaching recurrent communicative goals in specific contexts and can
575 therefore function as tacit norms.” Usualization then leads to the diffusion of emergent,
576 usualized structures through the community, leading to their conventionalisation.

577 According to Schmid (2020) conventionalization refers to the process in which
578 communities of interacting agents, for example members of a (proto)linguistic

579 community establish and readapt regularities in their communicative behaviours. This
580 process is based on the repetition of usage activities during usage events, and can be
581 defined as the continuous mutual matching and coordination of communicative
582 practices and knowledge (Schmid, 2020).

583 This dynamic can also be seen to have a spiralling, ratcheting effect (Tomasello, 1999),
584 where particular resources and strategies for communicative problem-solving could be
585 cumulatively built upon, changed and adapted in interaction. This is in line with the
586 view that grammatical structures are “best understood as what has been ritualized from
587 interactions” (Thompson and Couper-Kuhlen, 2005). More frequent use of
588 (proto)constructions also has an effect of constructional generalisation. As
589 constructions become more entrenched, automated, and more habitual for a
590 (proto)language users, they also gradually become more schematic: “As the use of a
591 construction expands incrementally, its mental representation is being adjusted too:
592 the construction becomes more abstract, more schematic, more productive – more
593 general” (Neels 2020a). More schematic (proto)constructions also had the potential of
594 widening and expanding their context of use in a similar manner as is found in
595 grammaticalization (Himmelmann, 2004; Neels, 2020a); Context expansion is

596 influenced by analogical mappings and associations of similar constructions and
597 contexts, which is in line with approaches that assign processes of analogy a catalysing
598 role in the evolution of protolanguage(s) (Brand et al., 2020). In addition, the
599 schematisation of protolinguistic constructions would have been scaffolded by other
600 processes that involved in the emergence of grammatical and (proto)linguistic
601 structure, such as metaphor, metonymy, pragmatic inferences, and ostensive-
602 inferential communication (Heintz and Scott-Phillips, 2021; Smith and Höfler, 2015).
603 Once these widening contexts became themselves conventionalised within a
604 community, that is once the repeated contexts they were used in was absorbed into
605 the conventional semantic meaning of the constructions, they could then potentially
606 serve as points of departure for further elaborations and extensions of
607 (proto)constructional schemas (De Smet, 2016; Neels, 2020a; Traugott and Trousdale,
608 2013).

609 In the context of cumulative culture, this process therefore has the potential to explain
610 the emergence of the first protolinguistic structures, their subsequent rise in complexity
611 and structuring, and their spread through communities. In combination with processes
612 of grammaticalization and constructionalization, it also has the potential to explain the

613 gradual transition to modern forms of human language through cumulative systemic
614 changes on the level of communities of practice. Reoccurring structures turned into
615 routines that were used with more and more communicative partners. This led to
616 temporary, emergent communicative routines turning into an inventory of entrenched
617 community-wide communicative routines – protolanguage. Over time, these developed
618 increasing degrees of conventionalisation within the community. However, they also
619 accumulated changes through processes of cumulative innovation, evolving into a fully
620 grammaticalized and conventionalized structured inventory of constructions shared by
621 a community – language. This is the general, overall picture of the emergence of
622 protolanguage(s) and their transition to modern languages.

623 One of the key challenges for further filling in the details of this very broad general
624 pictures is it to investigate the different types of processes implicated in it and the levels
625 at which they operate. On the one hand, as already indicated, we need to distinguish
626 between speakers on the enchronic timescale, which lead to the online, in vivo
627 emergence of structure in interactions. And on the other hand, we need need to look
628 at the effects repeated instantiations of these enchronic processes have across the
629 diachronic level and the level of the history of a population. However, there is a second

630 important distinction that cuts across the different timescales involved in the
631 emergence of (proto)constructions, namely that between speaker-internal cognitive
632 processes, and community-wide processes.

633 This distinction is also captured in Schmid's (2020) Entrenchment-and-
634 Conventionalization model. This model is a usage-based, cognitive-linguistic model of
635 the way that language usage shapes language. Entrenchment processes refer to the
636 "the continuous routinization and re-organization of associations, depending on
637 exposure to and frequency of identical or similar processing events" that happen
638 on the level of the cognitive systems of individual language users. Conventionalization
639 processes, on the other hand, refer to community-wide socio-pragmatic
640 communicative processes of how norms and regularities in communicative behaviour
641 diffuse and become established in a community. Conventionalization in this model
642 does not operate on the minds of individual speakers, but over surface level
643 populations of utterances (Schmid 2020; cf. Croft 2000 (Croft, 2000)). Both processes
644 interact and reinforce each other, leading to the emergence and change of linguistic
645 structure. As these processes are built on domain-general as well as sociocognitive

646 processes, they also have potential applications for a model of the emergence of
647 protolanguage(s).

648 A second model with potentially applications to the emergence of protolanguage(s) is
649 the “Automation-and-Ritualisation Model” of grammaticalization proposed by Neles
650 (2020a, 2020b). which is based on research from cognitive-functional linguistics,
651 usage-based approaches, and constructionist approaches. Just as Schmid’s model, it
652 is intended as a model to explain processes involved in the diachronic emergence of
653 grammatical structure. However, given that it proposes general cognitive and social
654 processes that lead to the cognitive entrenchment and subsequent conventionalisation
655 of communicative structures it also has important implications for investigations of the
656 emergence of protolanguage(s) and the gradual transition from protolanguage(s) to
657 modern language(s). In this model, “automation” covers the role of cognitive processes
658 in the emergence and internalisation of structure in individual speakers, whereas
659 “ritualisation” covers the community-level socio-communicative processes evolved in
660 the transmission and spread of communicative structures.

661 The “Automation-and-Ritualisation” Model describes grammar as a specifically
662 linguistic instantiation of behaviour that is cognitively automated and socially ritualised

663 (Neels 2020b, see also Haimann, 1994; Lehmann, 2017). Both cognitive automation
664 and ritualisation crucially depend on regular repetition and frequency effects, which
665 together with cognitive and interactional processes found in grammaticalization lead to
666 the “sedimentation” of discourse patterns both in language users and linguistic
667 communities. Comparing both models, automatization can be said to take place on the
668 same level as entrenchment in Schmid’s model, while ritualisation takes place on the
669 same level as conventionalisation.

670 One particular aspects that is highlighted these models as well as in other recent work
671 (e.g. Petré and Anthonissen, 2020; Petré and Van de Velde, 2018) is that both macro-
672 level diachronic change in communities and micro-level idiolectal lifelong changes in
673 the individual and their interactions are relevant for modelling the factors involved in
674 the emergence of structure across different timescales and levels.

675 A focus on “individuality in complex systems” (Petré and Anthonissen, 2020) from a
676 constructionist perspective also offers a solution to the gradual shift from
677 protolanguage to modern languages. As research on individual differences in language
678 users’ native language attainment has shown (Dąbrowska, 2012; Dąbrowska and
679 Street, 2006), people can differ in their representations of the same token structures.

680 In particular, they might differ in the level of abstraction at which they represent and
681 store a particular instance of linguistic knowledge. Some language users may have
682 “extracted an abstract generalization, others approximate their behaviour by relying on
683 memorised exemplars or lexically specific pattern”(Dąbrowska, 2020).

684 This presents a possible pathway for a gradual shift from protolanguage to modern
685 languages. That is, at a given point in the evolution of (proto)language(s), some
686 interactants will still have relied mostly on exemplar representations with limited
687 schematicity, thus being closer to the protolanguage pole of the protolanguage-
688 language continuum. Other interactants at the same time will have abstracted higher-
689 order schematic connections between constructs, thus being closer to the modern
690 language pole of the protolanguage-modern language continuum. This means that
691 they will have generalised schematic construction types over token sequences that
692 other interactants do not treat as interrelated to the same degree, if at all. This implies
693 that there was a time in the transition from protolanguage to modern language where
694 more and more interactants recognised particular token structures, or constructs, as
695 types, whereas others treated them as tokens. The former type of interactants then
696 increasingly and gradually moved towards the modern language pole of the continuum

697 by incrementally adding more abstract generalisations. While doing so, they still
698 retained a significant number of specific constructions such as fixed and semi-fixed
699 multiword expressions, idioms, prefabricated chunks as well as low-level schemas,
700 which still characterise a significant part of modern languages today (Stefanowitsch
701 and Flach, 2017; Pleyer & Hartmann 2020)

702 What follows from this perspective is that at the same point in time, there were
703 interactants with protolinguistic/linguistic systems that were similar and overlapped in
704 terms of their token and surface production, but that differed in the underlying cognitive
705 mechanisms of how these surface tokens were produced and interpreted and that
706 differed in the degree of abstraction at which these surface tokens were represented.

707 In other words, they produced similar constructs, but underlying these constructs were
708 different constructions in the (proto)language users' mental inventory of constructions.

709 Such a usage-based perspective can also serve as an answer to the question "Who
710 did the first speaker talk with?" or who did a user of a particular protolanguage stage
711 communicate with? (Johansson & Fujita, this volume) They communicated with
712 (proto)language users with less abstract and schematised constructional repertoires.

713 In addition, successful communication during a given communicative episode was also

scaffolded by ostensive-inferential communication, which aided the resolution of potential producer/recipient mismatches (Johansson & Fujita, this volume(Heintz and Scott-Phillips, 2021)) as well as repair mechanisms (Dingemanse et al., 2015) and the interactional mechanisms of alignment and “ad hoc constructionalization” described in this paper.

Moving on from this stage, generational turnover will have played a role in the gradual protolanguage-language transition. As older members pass and leave the discourse community, certain constraints on what is accepted within that community are lifted. This means that younger (proto)language users with higher degrees of abstraction can produce a wider variety of constructs licensed by their more schematised constructional representation (Petré and Van de Velde, 2018).

6. Conclusion

In this paper I have highlighted the potential role of interactional and cognitive mechanisms in the evolution of (proto)language(s). Specifically, I have shown how a process of ad hoc constructionalization on the enchronic timescale driven by these mechanisms could have led to the emergence of (proto)constructions in interactions. These emergent, temporary protoconstructions could then have provided the starting

732 point for increasing entrenchment and conventionalisation of frequently recurring
733 patterns, setting the stage for the further evolution of protolanguage(s) and the gradual
734 transition towards the language pole on the protolanguage-language continuum.

735 I have discussed some models that promise to be highly relevant in further addressing
736 the dynamics and processes evolved in the emergence of protolanguage(s) and their
737 transition to modern language, such as the Entrenchment-and-Conventionalisation
738 Model (Schmid 2020) and the “Automation-and-Ritualization” Model (Neels 2020b), as
739 well as the relevance of factors also involved in grammaticalization and
740 constructionalization. However, this discussion has only scratched the surface of
741 relevant mechanisms. A more extended look at how the various processes in both
742 models as well as grammaticalization and constructionalization research may have
743 operated in the evolution of (proto)language(s) promises to have wide-ranging
744 implications.

745 Overall, the focus on cognitive, social and interactive mechanisms on the enchronic
746 timescale on the one hand, and on community-wide socio-communicative processes
747 of diffusion and conventionalisation has a number of important implications for future
748 research. One of them is the desideratum to integrate sociolinguistic research and
749 theorizing into accounts of the emergence, stabilisation, and diffusion of linguistic
750 structure. This point is forcefully made by Roberts & Sneller (Roberts and Sneller,
751 2020). They show that a) language evolution research so far has made little contact
752 with sociolinguistics and that b) integrating language evolution research with
753 sociolinguistics and initiating a theoretical debate between these fields has the
754 potential of leading to significant theoretical and empirical progress. Such an

755 integration can prove profitable both for evolutionary linguistic research on the
756 emergence of protolanguage(s) and the transition to modern language(s).

757 As the present paper has also shown, another research area with important
758 implications for language evolution is research on the changes in the language use of
759 individuals across the life-span. After being neglected for a long time, this aspect has
760 recently been receiving increasing attention in diachronic linguistics (De Smet, 2016;
761 Neels, 2020a; Petré and Anthonissen, 2020; Petré and Van de Velde, 2018). Research
762 on the life-span change in the organisation of the structured network of interconnected
763 items internalised by communicative agents can help in outlining the processes that
764 would have operated in the minds of protolanguage users and how new constructions
765 could have emerged within an individual's life-span. That is, this area of research can
766 help in investigating not only the process of how constructions become entrenched in
767 a (proto)language user's (proto)linguistic system, but also how this system changes
768 with age, repeated language usage and interaction with a community. This research
769 can therefore help language evolution address the tension and relation of changes at
770 the micro-level of the individual and the macro-level of a linguistic community (Neels
771 2020b: 360; De Smet 2016).

772 Lastly, whereas the scenario outlined here was evidence-based but at the level of a
773 verbal theory, this model would surely profit from further theory building informed by
774 computational modelling of the interplay of cognitive and interactional mechanisms
775 operating on individual (proto)language users as well as populations of utterances
776 within a community across different timescales (Guest and Martin, 2020; van Rooij and
777 Baggio, 2021; Zuidema et al., 2020).

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