EVOLUTION OF TOPICALIZATION IN HUMAN LANGUAGE

DAIKI MATSUMOTO[*1,2]

[*]matsumoto.daiki.24x@st.kyoto-u.ac.jp
[1]Graduate School of Human and Environmental Studies, Kyoto University
[2]Japan Society for the Promotion of Science

This paper shows that the comparative approach to each subcomponent of our mosaic language capacity can also explain the evolution of seemingly theory-internal specific linguistic phenomena, by taking what is traditionally called "Topicalization" as an example. The first section sets the framework, overviews what Topicalization is with some examples, and introduces the questions to be addressed and answered. The results and hypotheses from the previous analyses of primate calls are sketched in Section 2, which play a significant role in the proposal. Section 3 hypothesizes that the origin of Topicalization can be found in how primate calls are formed. The same section further argues that Self-domestication played a pivotal role in the genesis of Topicalization in human language. Section 4 concludes the paper.

1. Introducing the Question to be Asked and Answered

Studies in the evolution of language center around various topics from the hierarchical syntax to the communicative function of our language. As Boeckx (2021) a.o. rightly points out, language is not a monolithic cognitive capacity but a mosaic property of our cognition, consisting of various sub-components. There is mounting evidence in the literature that once this mosaic property is decomposed into pieces, remarkable similarities and relations with other species can be discovered with respect to those subcomponents of our language competence including intentionality (Tomasello 2008), recursive syntax (Hauser & Fitch 2004), semantics (Hurford 2007), and phonology (Samuels 2011).

However, language as a mosaic whole is not entirely limited to those conspicuous cognitive sub-modules. It is widely known that there are many seemingly language-specific semantic, syntactic, phonological and pragmatic phenomena that are considered to be universal across individual languages. One

example can be obtained from what is called "Topicalization[1]". Topicalization is widely known in the relevant literature (see e.g., Culicover, 1999) as a syntactic operation that fronts a "topic" of a sentence to the sentence-initial position:

(1) (Talking about the book over there and your conversation partner asks you about who bought the book when. Then you reply:)
The book over there, John bought (it) when Mary visited him.

In (1), "the book over there" serves as a topic of the conversation as the question by the addressee is about it, and it is fronted to the sentence-initial position in your answer sentence. The rest of the sentence serves as a comment on this topic, which essentially elaborates what this topic is about.

Interestingly, in the same context, (2) sounds infelicitous. This is because "when Mary visited him" is not a topic of the sentence but is a part of the comment about the topic "the book over there" (* indicates that the sentence is ungrammatical).

(2) *When Mary visited him, John bought the book over there.

Furthermore, it is known that (3) is dispreferred, in which the topic is placed at the end of a sentence rather than at the initial position.

(3) *John bought when Mary visited him the book over there.

This talk seeks to show that the nature of Topicalization, which is seemingly language-specific, can also be captured through the lens of the decompositional approach to narrow down the gap between human languages and other species' cognition. The questions to be asked are: why does Topicalization always "front" a topic rather than postposing etc. the topical element in human language? Is this a purely language-specific phenomenon, the analog of which cannot be observed elsewhere? In what follows, it is argued based upon previous studies (Arnold & Zuberbühler, 2006a, b, 2008, 2012, 2013; Schlenker et al., 2016) that it is not human language specific and the analog can be found in primate calls. We will also see that the fact that Topicalization always fronts a topic finds its evolutionary rationale in how primates form a sequence of alarm calls.

2. How Primate Alarm Calls are Pragmatically Formed

[1] By "Topicalization," I mean the grammatical *operation* that yields the result such as the one in (2) in the text.

As is widely known, male Putty-nosed monkeys have two main alarm calls: *pyow*s and *hack*s (see Seyfarth et al., 1980a, b for an initial work in the field). *Pyows* were initially analyzed as calls that signal that a leopard (*Panthera pardus*) is in the vicinity (Arnold & Zuberbühler, 2006a, b). However, in later studies, Arnold and Zuberbühler (2013) modify their previous analysis and propose that *pyow*s should be analyzed as calls that simply draw attention to the presence and location of the caller, signaling the presence of a threat.

*Hack*s were assumed to be indicative of the existence of crowned eagles (*Stephanoaetus coronatus*) nearby (Arnold and Zuberbühler, 2006a, b). However, Arnold & Zuberbühler (2013) has further refined this analysis and proposed the idea that they are true alarm calls that indicate high arousal, which can be triggered not just by an eagle's presence but also by many other phenomena related to aerial threats such as tree fall (Schlenker et al., 2016). These calls facilitate movements appropriate as a reaction to escape the threats.

In what follows, we assume following these authors' later work that *pyow*s are calls that signal the presence of a threat and draw attention of the listeners to the caller while *hack*s signal that there is an alert causing high arousal triggered by the presence of an aerial threat. Below, P stands for *pyow*s and H does for *hack*s.

In their series of work, Arnold & Zuberbühler (2006a, b, 2008, 2012, 2013) have shown that Putty-nosed monkeys sometimes produce distinct P^+-H^+ sequences. These P^+-H^+ sequences consist of a small number of Ps followed by a small number of Hs. According to Arnold & Zuberbühler, P^+-H^+ sequences are analyzed as signals that initiate "group movement".

In sum, the following "semantics" of Putty-nosed monkeys' alarm calls is generalized (from Schlenker et al., 2016 with a slight modification):

(4) The "semantics" of the alarm calls by Putty-nosed monkeys
   a. P^+ signals that there is an alert (and it draws attention to the presence and location of the caller).
   b. H^+ signals that there is an aerial predator (an eagle and tree fall, to mention just two).
   c. P^+H^+ initiates a group movement.

One fact that is particularly noteworthy regarding (4) is that P^+ sequences are not observed when an eagle is present in the vicinity. Under the definition in (4a), this absence of P^+ is unexpected: since (4a) basically says that P^+ can be used if there is an alert and the presence of an eagle is clearly an alert for Putty-nosed monkeys, (4a) expects P^+ to be observed in this case, contrary to fact.

To explain this fact while maintaining the crux of the generalization in (4), Schlenker et al. (2016: 15) propose the following principle:[2]

(5) Urgency Principle
If a sentence *S* is triggered by a threat and contains calls that convey information about its nature and location, no call that conveys such information should be preceded by any call that does not.

Urgency Principle in (5) basically states that calls that convey "more urgent" information should precede ones that convey less urgent one. According to (4), P^+ is a call that signals that there is an alert while H^+ signals that there is an *aerial* alert. Therefore, (5) predicts that at the presence of an eagle, P^+ is preempted by H^+. This is what is observed according to the experiments by Arnold & Zuberbühler, and hence Urgency Principle in (5) neatly explains the fact that (4) fails to capture (I refer the reader to Schlenker et al., 2016 and Arnold & Zuberbühler, 2006a, b, 2008, 2012, 2013, for the details of the experiments).

Furthermore, (5) predicts that not only P^+ but also P^+H^+ is unavailable when there is an aerial alert such as the presence of an eagle or tree fall. According to Schlenker et al. (2016: 17), this is what we observe (again, due to space limitations, I refer the reader to Schlenker et al., 2016 and Arnold & Zuberbühler, 2006a, b, 2008, 2012, 2013, for details).

Summing up this section, the distribution of P^+, H^+, and P^+H^+ is restricted by Urgency Principle defined in (5). Before adopting this idea to the biological underpinning of Topicalization, note in passing that Urgency Principle has an evolutionary rationale: it is plausible to assume that the principle in (5) has emerged evolutionarily since those that obey this principle obviously increase the chance of survival by quickly reacting the potential threats to their lives. Thus, we can claim that it is a residue of group selection.

In the next section, we hypothesize that Urgency Principle is the origin for Topicalization observed in (virtually) every human language.

3. Urgency Principle as the Origin of Topicalization

Urgency Principle dictates that those calls that convey information about the nature and location of a threat precede ones that do not convey such information.

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[2] Of note here is that by this principle Schlenker et al. seek to propose a compositional semantic account of those alarm calls. Since their compositional semantics does not play a role in what follows and this principle still plays its role even if their compositional semantics is abstracted away from, this paper does not delve into the details of Schlenker et al.'s semantic account.

In the wild world of the animal kingdom, this abstractly means that calls that convey information "about their lives" precede ones that do not convey such information. Given the fact that those calls further evoke escaping movement of those addressees, this can be further interpreted as follows: those calls uttered in accord with (5) "are about" the comment (i.e., types of movement that they evoke).

Under this interpretation of the pragmatic function of Urgency Principle, the similarity between the principle and human language Topicalization becomes obvious. Both "front" the information that conveys what the comment is about.

Based upon this, this article hypothesizes the following:

(6) Topicalization is evolutionarily derived from Urgency Principle.

(6) claims (i) that Topicalization, which is seemingly not just human-specific but also language-specific, can find its analog in how primate calls are shaped in a particular manner, and (ii) that it has Urgency Principle as its evolutionary basis. Below, the rationales for this hypothesis are provided.

Of note first is that Topicalization has a communicative function and it plays little role (if any) in constructing a propositional meaning of a sentence: even if Topicalization does not happen, the basic semantics of (2) remains the same, and its primary role is to front a topic of the current discourse and create a structure in which the topic and the comment about it are divided in a communicatively efficient fashion. This suggests that Topicalization is not required for semantic composition and hence should not be observed in the first place if no communicative function exists in our language use. Succinctly put, Topicalization primarily has a communicative function.

Notice at this point that Urgency Principle is also a principle that forms a sequence that conveys important/urgent information in an efficient way in accord with the external condition under which those calls are produced.

From these, it is not unreasonable to assume that the functional basis of Topicalization can be found in Urgency Principle. Then, how did Topicalization evolve from Urgency Principle? Notice already that Topicalization in human language is not triggered by urgency in any sense.

To address this issue, I hypothesize that human self-domestication played a key role in the evolution of Topicalization from Urgency Principle. As is widely discussed in the relevant literature (see Theofanopoulou et al., 2017 for an excellent overview and insights), modern humans are claimed to have undergone a process of self-domestication which caused the globularization of the brain case and a reduction in tooth size among many other features peculiar to domesticated

species (see also Wilkins, Wrangham, & Fitch, 2014 for some pioneering work in the field). It has also been widely argued that self-domestication reduced reactive aggression in humans. Self-domestication in humans is argued to be triggered by many types of socio-environmental chaos such as the climate catastrophe during the Last Glaciation, which facilitated prosocial behavior of our ancestors (Spikins et al., 2021). And this is claimed to have resulted in a selection for less emotionally reactive group partners and for receptiveness towards extra-group individuals (Hare, Wobber, & Wrangham, 2012; Pisor & Surbeck, 2019).

Recently, Benítez-Burraco, Ferretti, & Progovac (2021: 1) argue that "the reduction in reactive aggression, one of the key factors in self-domestication processes, enabled us to fully exploit our cognitive and interactional potential as applied to linguistic exchanges," claiming that it played a decisive role in the evolution of our pragmatic capacities.

Based upon this illuminating previous work, I hypothesize that Topicalization, which has a clear communicative (and hence, pragmatic) function, became available to humans through self-domestication via socialization, emancipating us from the prison of urgent threats and reactive aggression.[3] In other words, because of self-domestication, Urgency Principle could be safely applied to our language use with no urgency. Once it became nonurgent, it has a clear communicative function that forms a signal sequence that conveys information in an efficient way in accordance with the discourse, which eventually culturally evolved and stabilized in the species along with other pragmatic capacities.

As one of the anonymous reviewers suggests, to which I am indebted, Urgency Principle in (5) can be further restated as a principle that requires "calls that contain more information that is currently relevant come first." Under this abstracted interpretation of (5), the similarity between (5) and Topicalization should be fairly obvious. Based upon this suggestion by the reviewer, I submit that what self-domestication facilitated was to liberate our ancestors from urgency, and it allowed us to generally front more relevant information in the discourse.

In sum, the hypothesis is that though Topicalization resulted from Urgency Principle, it became nonurgent due to self-domestication. An immediate virtue of this hypothesis is that it can be further tested experimentally, by designing a

[3] One of the reviewers wonders whether the current proposal assumes that "Topicalization emerged fairly late in human language evolution and so that self-domestication episode is the most relevant one". I indeed hypothesize so. This can be tested experimentally via simulation by letting a language evolve and seeing in what stage(s) Topicalization (or a phenomenon analogous to it) emerges. I leave this important work for future research.

computer simulation which examines whether liberation from urgency indeed facilitates the generalization of (5) as a condition of relevance.

4. Conclusion

To the best of my knowledge, specific grammatical operations have thus far escaped serious investigation in the circle of language evolution. This paper has brought up the operation called "Topicalization" to the body of research questions in the field of evolution of language and has sought to show that the comparative approach that has been proven to be fruitful in this field sheds light on how this specific, seemingly language-specific operation arose in our lineage.

If language evolution is about how our language biologically evolved, then those specific linguistic operations/phenomena should also be taken as serious objects of evolutionary inquiry. This paper is an attempt to show with a specific example that those theory-internal linguistic operations that have hitherto escaped serious evolutionary attention can be studied in a basic "divide and conquer," comparative fashion. Needless to say, there are scores of other specific grammatical operations/phenomena discussed neither in this paper nor in the previous evolinguistic literature. It is hoped that those will also be studied in the comparative way, along with search for neurological underpinning among others, in future research.

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