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The emergence of human consciousness in the context of the evolution of language

KAROLINA JANCZUKOWICZ

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Abstract

The paper presents a proposal for perceiving the development of human consciousness as related to the evolution of human speech. It discusses the development of language in evolutionary terms, relying on the theory of mind (Premack and Woodruff 1978) – especially the phenomenon of shared attention (Tomasello 2019), the Recruitment Theory (Bickerton 2009) and the Mirror System Hypothesis (Arbib 2008). Furthermore, the emergence of speech as well as gradual changes, resembling in principle, the processes of biological evolution, are compared and used in order to account for the appearance of human consciousness. Furthermore, consciousness is discussed in relation to types of memory (Tulving 1985), and the relation of an individual to him or herself or to the world outside (Janczukowicz and Wenzel 2021). A set of characteristic mental features necessary for the evolution of language are drawn from these theories – consistently with those proposed by Wacewicz and Żywiczyński (2015) – and are argued as most likely to have led to the emergence of consciousness.

Keywords

evolution of language, shared attention, Mirror System Hypothesis, displacement, anoetic, autonoetic and noetic consciousness

Powstanie ludzkiej świadomości w kontekście ewolucji mowy

Abstrakt

Artykuł przedstawia propozycję postrzegania rozwoju świadomości człowieka jako zjawiska powiązanego z ewolucją ludzkiej mowy. Omawia on rozwój języka w kategoriach ewolucyjnych, w oparciu o Teorię Umysłu (TU) (Premack and Woodruff 1978) – a zwłaszcza zjawiska 'dzielonej uwagi' (Tomasello 2019), Teorii Werbunku (Bickerton 2009) i Hipotezy Systemu Neuronów Lustrzanych (Arbib 2008). Oprócz tego, wyłonienie się języka oraz zestaw stopniowych zmian, analogicznych w swojej istocie do ewolucji biologicznej, są wykorzystane w artykule, aby przedstawić prawdopodobną hipotezę powstania ludzkiej świadomości. Ponadto, świadomość jest omawiana w odniesieniu do rodzajów pamięci (Tulving 1985) oraz w relacji do siebie samego i do świata otaczającego (Janczukowicz i Wenzel 2021). Z powyższych teorii wywiedziony jest zestaw tych cech umysłu, które – zgodnie z propozycją Wacewicza i Żywiczyńskiego (2015) – były kluczowe dla ewolucji języka, a w tym artykule są przedstawiane jako równie niezbędne dla rozwoju świadomości ludzkiej.

Słowa kluczowe

ewolucja języka, dzielenie uwagi, hipoteza systemu neuronów lustrzanych, 'oderwanie', świadomość anoetyczna, auto-noetyczna i noetyczna

1. Introduction

Human consciousness is what many people intuitively accept as the major distinguishing factor between humans and non-human animals. One feature frequently added is human language, capable of not only communicating the immediate experiences, emotions or attempts to make someone else do something, but also recreating in another person's mind somebody's exact ideas irrespective of time and space. Such features as the

use of symbolic representations, arbitrariness of signs, recursiveness, i.e. embedding one structure into another, have been argued to be crucial distinguishing features of human language in contrast with animal communication systems (Pinker and Bloom 1990, Pinker 1994, Kurcz 2011).

The aim of this paper is to formulate a coherent interpretation of the current views on the evolution of language, linking it to the evolution of human consciousness. In order to achieve this, I will discuss the problem along three paths; namely (1) the development of symbolic representations, (2) the evolution of the process of learning, and (3) the displacement, i.e. the removal of communication from the immediate experience (from 'here and now'). I am going to rely mostly on two theories; namely, the Mirror System Hypothesis formulated by Arbib (2008) and Bickerton's Recruitment Theory (2009). Although they are not normally viewed as compatible, even by the authors themselves, the aspects I will draw from them are complimentary for the purposes of my hypothesis.

When discussing animals, we often adopt the behaviorist perspective and look for stimuli which trigger certain actions. This way of understanding animal behavior represents bottom-up (data driven) mental processing and we focus on their response to the immediate environment (Bloom 2018, Arbib et al. 2023). We also perceive them in terms of genetical determinism, with most behaviors imprinted in the species and any learning dependent on the environment as the result of forming associations through trial and error. In the case of humans, we assume the potential of learning as the result of a deliberate action (pedagogy) requiring rudimentary volition and an awareness of the environment. However, in order to account for the preliminary mental stage from which the evolution of language took off, we must look for such behavior that must involve certain prerequisite mental capacities. These might not only be symptoms of **basic symbolic representations**, communicated **independently of the context**, but also **using tools** or **constructing** objects, as an instance of **deliberate actions**, rather than

a response to certain stimuli, or the presence of more complex **memory systems** and **concepts**.[1]

2. Symbolic representations

One of the crucial features which distinguishes human language from animal communication systems (ACS) is the presence of symbols (sounds, gestures or visual representations) which trigger in the mind of the recipient a particular idea, and which are organized according to a certain hierarchical set of rules allowing for the meaning to be precise and independent of the context. A characteristic feature of human language is the fact that the symbol is *arbitrary* rather than *iconic*, i.e. its shape or sound does not resemble the meaning. Although human sign languages are mostly made up of iconic symbols, since the sign gestures relate to the meaning in some way, the actual resemblance is of such an arbitrary nature, that it is impossible to decode it without learning the linguistic system as well (Corballis 2002). When one compares sign languages established in different countries, one can see how different from each other the symbols are, and that in spite of the fact that one can understand the meaningful cues in each of them, their shape is far from sufficient to work out the meaning of the sign itself. Likewise, instances of iconic writing, i.e. where symbols relate directly to the meaning rather than the sounds that are used to represent them, have the shape so far removed from the actual representations, that one can only describe them as mostly arbitrary connections.

When looking for symbolic representations in animal communication systems (ACS), the most famous case are vervet monkey warning calls, different for the danger coming from the

[1] Wacewicz and Żywiczyński (2015) pointed to the need for reorganizing the way we perceive human speech characteristics from their outward features, such as e.g. recursiveness or use of symbolic representations, to the mental capacities which enabled these qualities.

air and from the ground (Seyfarth, Cheney, Marler 1984).[2] Another example of an arbitrary connection between the sign and its meaning might be elements of bees' communication, the so called 'dance', which indicates the distance and the direction of the source of food. The bees' communication has the additional advantage over any other ACS that it is removed in time and space, because it describes elements that the bees encountered some distance away, some time before. Even if this distance in time and space is not significant, this information still needs to be stored to be passed on later and is not a response to an immediate change in the environment.

The examples above are, nevertheless, very rudimentary instances of ACS using symbols. When trying to find instances of further development of cognitive capabilities of animals, Arbib et al. (2023) provided two such examples: capuchin monkeys cracking nuts with a stone as an example of animal use of tools, and birds' building nests as an example of construction. Both are time consuming activities, requiring from the animal extended attention, memory and are dependent on the environment. Moreover, the final outcome should be seen in terms of a *goal* rather than *effect* (Arbib et al. 2023).

In the case of capuchin monkeys, the learning is most likely happening by trial and error, reinforced by the desired side-effect in the form of the nut, once the nutshell is broken. It is a process extended over several years, with the final result being the skill of cracking very hard shells. Such learning relies on intuitive inborn predilection, reinforced by imitation of other monkeys cracking nuts. The reason why tool use is such an important aspect of their mental change is the fact that you need to 'extend' your body in a way,[3] i.e. mentally moving beyond

[2] These sounds have been accepted to symbolically represent the concepts of a "snake" and "eagle"; however, Bickerton (2009) points to the fact that they could easily represent a whole message, like e.g. "run up the tree" or "hide on the ground" and are only produced in response to actual danger at the moment of making those sounds. Because of this, these warning calls may not be symbolic at all.

[3] Arbib et al. (2023) call it 'a body plus object system'.

yourself. That, in turn, involves a better understanding or at least utilizing spatial relationships. If one looked at understanding space – body relations, the next step in mental development would be tool construction (capuchin monkeys use simple tools – an object chosen but not deliberately modified), the example of which might be stone-napping by early hominids, and the next – the use of spear. Stone napping involves a greater awareness of the tool – its desired shape and what it takes to achieve it, thus a higher degree of consciousness, and an awareness of the purpose for which it will be needed; consequently, a shift from bottom-up stimulus-response behavior towards a top-down goal driven action. The use of spear is a further step in the spatial awareness of one's body and the tool, since the object remains in control even though it is no longer connected to the body.

Nest building gives an interesting perspective on the question of cognitive development, especially in terms of memory and concept formation (Arbib et al. 2023). Firstly, the fact that a nest is a construction built, depending on the species, over hours or even days, places greater demands on the bird's working memory, as the builder is required to break up the process of construction in order to eat, defend territory, search for a mate etc., while keeping track of the particular stage at which the work has been left and needs to be resumed. Moreover, the whole process of constructing a nest results in quite different outcomes, depending on the conditions, the environment and the previous experience of the bird. The implications of such differences are significant, as it is not feasible to talk of nest building as some predetermined final construct. It is rather an image of the final goal, or a concept existing in the long-term memory, towards which an individual bird will strive, but which cannot be achieved in the exact form as the mental image. Described in this way, a nest can be understood as an ideal image with imperfect practical realizations, which places it fairly close to our understanding of human conceptual system, where a concept is defined as an internal mental representation, which

is the result of the sum of individual experiences with it. This shows that constructing a nest is a good illustration of a borderline case between species specific predetermined activity and a deliberate individualized action.

Furthermore, it also illustrates a shift from the bottom-up mental processing, characteristic of stimulus-response activity towards a top-down, cognition driven process, which takes advantage of the mental images kept in the working memory store. Thus, constructing a nest is probably an activity towards a deliberate *goal* rather than *effect*, where *goal* is understood as a desired outcome over which the animal had at least some amount of choice in contrast with *effect*, which is a more general term including any by-product of an activity. If consciousness is understood as a form of independence from the stimuli and a potential deliberateness of actions, then tool use and nest construction can both be seen as a move in this direction.

Arbib et al. (2023) present stone napping conducted by proto humans and early hominids as an important step towards the human level of mental development, as it also requires an internal image of the final state (just like nest construction in birds) and the use of tools (just as with capuchin monkeys). Stone napping also demands a conceptual image of the final goal (an efficient tool) and extended attention together with working memory in order to continue the work towards that goal. The additional element in the case of stone napping (in contrast with both, nest construction and cracking nuts) is the cultural element; namely, the final tool, i.e. the hand hammer, depends not only on the available materials and the environment, but on the convention used by the group – there are different ways in which the stones were napped and these can be related to culture. Consequently, the whole process of developing such a skill becomes less of a species specific and environmentally determined outcome, but rather a culturally transmitted process, the development of which relies on learning with the help of a far more complex and specific means of communication. Such communication requires symbolic representations

and a shift from protolanguage towards human language as such.

Protolanguage is a form of communication which relies on individual symbols (sounds or gestures) which are environmentally dependent (they gain meaning thanks to the context in which they appear) and which cannot be combined to create a more complex meaning (Arbib et al. 2023). Although it is a hypothetical construct, certain forms of actual communication, such as sign language taught to chimpanzees, one-word utterances spoken by two-year-olds or communicating in very noisy conditions, are thought to bear some resemblance to it (Kurcz 2011). The shift from protolanguage towards language means that the symbols start bearing some meaning regardless of the context and can be combined according to certain rules. Thus, the meaning gains precision and complexity, while symbols gain rules according to which they can be combined and can represent new concepts.

3. Displacement

Another distinguishing characteristic of human language is *displacement* – as it evokes in the mind of the recipient images or meanings away from the immediate environment and which, as a result, are removed in time and space (Bickerton 2009). This ability to trigger in the mind of another person the same idea that the speaker has is argued to have been possible thanks to *shared attention*, especially one of its aspects – *shared intentionality* (Tomasello 2019). Herd animals can work together in order to obtain a particular goal; however, once this goal has been reached, they cease to cooperate and start to function each for his or her goal. Unlike non-human animals, humans have a sense of common welfare as soon as the age of three, a feature which Tomasello (2019) argues to have first developed thanks to an emotional attachment between two members of the same species. It is hypothesized to have developed as an ability to perceive the world from a double perspective with a mutual welfare

in mind. This, in turn, enabled one to perceive oneself from the point of view of the other person.

The same ability to see the reality from the perspective of another person has enabled humans not only to visualize the state of knowledge different from one's own (false belief), but also to form symbolic signs which stood for ideas or meanings independent of the context in which they were said, and in this way marked the beginning of the *protolanguage*, as at this stage of communication the linguistic sign had both informational and functional reference (was used not only to manipulate others but also to pass on information), was displaced from the immediate environment (bore the same meaning regardless of when and where it was spoken), was transmitted culturally, and had a capacity to refer to the past, the present and the future (Bickerton 2009: 325).

One other important mental capacity which enabled language to be displaced from 'here and now' can be argued to be 'insight', a form of thinking which does not rely on drawing associations between the observed data, but rather relies on the prior knowledge, experience and visualization of possible alternative solutions. We can sometimes see signs of insight in non-human animals such as chimpanzees or in pre-verbal humans (e.g. using a tool constructed out of two sticks to obtain food, where a single stick was not enough), but this form of thinking is typically ascribed to humans.

The essence of insight can be seen in the different kinds of *tracking* that hunter-gatherers used to trace an animal. Liebenberg (1990) points to three types of tracking: simple tracking (following the traces directly), systematic tracking (relying on your thorough knowledge of the hunted animal being able to notice many more, otherwise undetectable traces) and speculative tracking (based on your knowledge and experience being able to reimagine the actions of the animal and, adopting its perspective visualize where it has possibly gone). Although insight is not exactly the same as speculative tracking, it also requires the mind to move away from the observable to the

possible. It is this kind of thinking that allowed humans to move away mentally from what one can actually see and hear to the things one could have seen and heard depending on the circumstances.

Linguistically, an important step in that direction could have been introducing the negation into the protolanguage, as it requires the mind to visualize not the presence but the absence of something (Bickerton 2009: 311). One might speculate that another such step in terms of grammar might be the inclusion of the conditional or the subjunctive mood. While this shift remains hard to prove, we do have some indication of the appearance of such a shift in the mentality of the prehistoric humans in the form of cave paintings depicting half-human half-animal creatures, like the 18,000-year-old bird-headed man from Lascaux Cave (Altares 2023)[4] or the ivory sculpture of a lion-headed man from Stadel Cave.[5] Such artefacts indicate that at that time it might have been possible for the mind of the prehistoric man to depict things that they never encountered.

This capability of thinking in two different ways – by making associations between observable data together with drawing conclusions on their basis, and by imagining alternative possibilities, only some of which are actually realized, may have resulted in two different modes of thinking: syntagmatic and paradigmatic (Bruner 1986: 13), responsible for linear narratives or hypothetical abstractions respectively. This, in turn, may have determined completely different ways of arranging meanings in our minds; with (1) narrative-like linear thinking attempting to substantiate ideas in reality and actual experiences and (2) hypothetical thinking in an ability to formulate abstract presuppositions.

[4] Although it cannot be proven beyond doubt that the drawing was indeed that of a man with a bird's head, it is one of many famous examples where such a possibility has been raised.

[5] The British Museum (2018).

4. The development of learning

Using language requires the mind to conduct operations on symbolic representations, i.e. signs which are conventional and arbitrary. Animal communication systems (ACS) also use conventionalized signs, but they are not symbolic – they are reduced forms of an actual gesture aiming to act in a particular way, i.e. a horse threatening another one to kick – first, really kicking, but later reducing the gesture to an ever smaller movement of the hind leg and the whole body, while in the end a flattening of the ears becomes a sufficient warning for other horses (Corballis 2002: 90).

However, human language operates on symbols, which need to trigger an idea in the mind rather than bring about an automatic response to the stimulus. Arbib (2008: 17) proposes a model for how the appearance of such symbols could have been brought about. He suggests that it happened in three stages of learning: the first being **an imitation**, which means that one observes an actual performance and copies it thanks to the presence of the mirror neurons in the Broca's area; then, in the case of more complex activities, **a demonstration** – an exaggerated performance, intended to create in the mind of the viewer the idea of that action. Lastly, **a pantomime** – a similar enactment is conducted, but only with gestures and miming the presence of any objects or props, which aims to evoke the already existing ideas – symbols in the mind of the viewer.

In time, **pedagogy** replaced a pantomime as a form of cultural transmission, which resulted in protolanguage transforming into language. It meant that the symbolic representations became learnt not from the actual experience but as a part of an already existing system, which allowed for a far more efficient learning, development and rise in the complexity of signs used to communicate. The eventual symbols became ever less iconic (less resembling the thing they referred to) and more arbitrary, which allowed for a greater precision of meaning, and later for combining symbols to achieve meanings greater than the sum

of its parts. The rule governed systems of combining these symbols became the grammar in the contemporary sense.

5. The emergence of consciousness

Many mental changes needed to happen for the human language to appear. These included extending long term memory and working memory, the increased importance of cognition-driven (over data-driven) mental processing or the conceptual development leading to the mental capacity for symbolic operations. However, one that seems critical in having triggered not only language, but also human conscious awareness of oneself and of the surrounding environment is *displacement* – an ability to recreate in the mind of another human being ideas or images that one could not see in the immediate surroundings and even more importantly, that one could not see in reality. This, in turn, was made possible thanks to the phenomenon of *shared attention* which allowed humans to look at the world from somebody else's perspective.

The appearance of both language and consciousness may seem a mystery. While most of us admit to the emergence of humans as a result of the evolutionary process, it is sometimes hard to accept the mental leap that humans made as a sequence of evolutionary adaptations. Bickerton (2009: 15) proposes to look at this change as an instance of *discontinuity*, somewhat like the appearance of flight in insects, where wings were first a gradual evolutionary modification for the sake of cooling the body; however, the survival advantage that the wings gave brought about a leap in quality and enabled insects to fly.[6] A similar discontinuity happened to the prehuman mind once it became possible for it to conceive of things not directly visible or even nonexistent. In terms of communication, it led to the

[6] Bassett and Gazzaniga (2015) point to such a process at the neurological level and they use the term *emergentism* to describe the discontinuity in the evolutionary changes that lead to such leaps made and followed by a drastic change in quality.

emergence of human language, while in terms of cognition it brought about conscious awareness.

Certain mental changes enabled human communication to operate on symbols, become cognition driven (rather than a mere response to a change in the environment), become culturally transmitted and, most importantly, discuss things displaced from the immediate surroundings; as a result, also equipping communication with an ability to mentally move in time – discuss things from the past and the potential future as well as the present. In this way, it was possible for a human being to develop a far deeper and broader **awareness of the world around** him or her.

Endel Tulving (1985) defined consciousness according to his 3-tiered division of memory, which meant that the procedural memory (remembering how to do things – the least conscious ability to automatize sequences of actions) was responsible *for anoetic consciousness*, semantic memory (memory of factual information responsible for the general knowledge of the world) related to *noetic consciousness* and episodic memory (remembering events and one's own experiences) related to *auto-noetic consciousness*. Anoetic consciousness adheres more to the things we do automatically, focusing entirely on immediate sensations and an appropriate response, which means that we share much of it with non-human animals. However, the same mental changes which triggered conceptual development, reasoning and (by virtue of looking at the world with the eyes of another) allowed a human being to look at oneself from an outsider's perspective led to both human language and two uniquely human capacities; to be consciously knowledgeable about the reality surrounding you (*noetic consciousness*), and to have **a sense of self** (*auto-noetic consciousness*). These two forms of consciousness, strictly connected to two different types of memory, semantic and episodic, are not the result of the emergence of language, nor is language a by-product of human consciousness; rather, both of them can be argued to have

emerged in a parallel manner as a result of the same mental changes.

Furthermore, the shift from predominantly bottom-up to top-down mental operations meant that human activity ceased to be triggered mostly by an external stimulus, but became ever more often an act of will – the result of a voluntary decision. According to William James (2010 [1890]) our sense of self in all its complexities is the aspect that brings about our motivation, and it seems plausible to argue that the mental changes that resulted in human volition are the same changes that shaped the sense of *self* in humans. That is why, *auto-noetic consciousness* is also the result of this addition of the cognition-driven deliberate processes to the already existing stimulus-response mechanisms.

Lastly, one needs to remember that conscious awareness, once it emerged, did not replace the reflexive, biologically inherent processes altogether. It is more of an addition of consciousness and volition to the already existing biologically determined mechanisms. As language is both the tool for social communication (with the same communicative roles that animal communication has) and a tool for higher order cognition (indispensable for reasoning about the world or for human creativity), so is consciousness both: an awareness of the surrounding reality together with the ability to respond adequately to it (anoetic consciousness) and the knowledge of the world irrespective of time and space (noetic consciousness) combined with the sense of self (auto-noetic consciousness) resulting from our memory of the past experiences and predicting future possibilities.

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Karolina Janczukowicz
ORCID iD: 0000-0001-8933-7088
Institute of English and American Studies
University of Gdańsk
Wita Stwosza 51
80-308 Gdańsk
Poland
karolina.janczukowicz@ug.edu.pl