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“Investigating the emergence of linguistic signs”

Among the scenarios proposed for the origin of language, very few have considered what the evolution of the linguistic -or communicative- units could have been per se. Such attempts are present in the work of philosophers of the 18th century, who argued that linguistic "signs" evolved from "simple" to "complex". Even if this view is incomplete, it may rise relevant questions regarding the nature of the first significant, their link to their referents, the cognitive abilities they imply and the kind of communication they allow.

Following this line of thinking, we highlight two processes that may be essential for the emergence of language: convention and segmentation.

"Convention" is the process leading from individuals to a collective agreement. Its emergence implies that the first communicative units were bound to what they referred to by a kind of 'iconic' tie and that a brain mechanism enabled the sharing of a "representation" among a community. In our opinion, mirror neurons are the best "candidate" mechanism for initiating agreement. Besides, self-organization may be the mechanism that spread the convention in the whole population. Afterwards, it provides an initial layer on which the conceptual space can develop. Eventually, the 'signs' no longer need to be iconic, even if they probably still refer directly to real world.

The other mechanism we emphasize is "segmentation" both as a categorization and a parsing of a continuous stimulus into its components. This segmentation is reciprocally associated with the combining process.

Three spaces are involved in these processes: a reference space, consisting of the observed world, a mental semantic space where representations take place, and a communicative space, that may be based on gestures or acoustic stimuli.

We consider that the semantic space is initially categorized according to the reference space and that subsequently, the communicative flow is mapped on this semantic space. In order to reach their full complexity, The development of both semantic and communicative spaces obviously implies the existence of feedbacks.

Moreover, the categorization of the semantic space may have been rooted in 'ontological' relations between 'agents' and 'concepts' encountered in the real world (e.g. use of tools). These ontological relations, associated to the increasing of semantic complexity thus lead to the basic primitives of syntax in the broad sense (connexions and ordering).

Beside experiments that may be driven about the role of mirror neurons in the emergence of convention and representation of ontological relations, we propose to evaluate how categorization can emerge in the semantic space and then, be mapped on the communicative stimuli using LEMMingS (toolkit for both multi-agent and neural network simulations).

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