Compositionality, Hierarchy and Recursion in Language

a Case Study in Fluid Construction Grammar

Abstract

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In this thesis it is argued that a number of universal features of human languages can be explained as being emergent properties of the complex dynamics governing the establishment and evolution of a language in a population of interlocutors on an inter-generational time scale, rather than being the result of a genetic selection process leading to a specialized language faculty that imposes those features upon language or than being a cross-generational cultural phenomenon.

In particular, I will focus on compositionality, hierarchy and recursion, generally acknowledged to be universal features of human languages. Together, by combining words into hierarchical phrases which can then recursively be combined into larger phrases, they allow the construction of an unlimited number of sentences using only a limited number of words.

There have been two major hypothesis about why all languages share these features: nativism and iterated learning. Unfortunately, in recent years, the evidence for humans possessing a unique and genetically encoded faculty dedicated to language has become increasingly small. The iterated learning hypothesis is also unsatisfactory, mainly because it neglects to see language as a complex adaptive system that is being shaped by language users as they are attempting to communicate.

It is argued that the mere urge for successful communication can explain why language becomes compositional, hierarchical and recursive: because these features allow the re-use of already acquired bits of language which in turn increases the chance that at least part of the message is conveyed. To support this claim, an experiment is presented in which a number of artificial agents bootstrap a communication system. It is shown that although the agents are not innately wired or biased towards recursive language and without any flow in the population, compositional and recursive language indeed can emerge.