

“Language as an Adaptation to the Cognitive Niche” by Steven Pinker

In this chapter, Steven Pinker presents the theory that “the human language faculty is a complex biological adaptation that evolved by natural selection for communication” (16). But first he provides an analysis of language by describing the nature of words and grammar. These two concepts allow for language’s expressive power to convey an infinite number of ideas between humans. Words are arbitrary symbols understood by speakers of a language, while grammar combines these words into longer utterances.

A human’s knowledge of grammar is contained in abstract categories, so that an infinite number of sentences and meanings can be created. There are rules of grammar, however, such as syntax, constituency, predicate-argument structure and transformations. Syntax refers to the combination of words into sentences and phrases. Constituency allows a conveying of “complex propositions consisting of ideas embedded inside ideas” (18) due to the hierarchical structure of sentences. Predicate-argument structure is involved with information stored in the mental lexicon and the semantic roles of words in relation to the predicate (verb.) Transformations provide “a layer of meaning beyond who did what to whom” (19) regardless of the location of the subject or the object.

In addition, morphology and phonology are further components of grammar. Morphology refers to the structure of simple and complex words whereas phonology is the structure of the sound system of a language. Humans must acquire phonological rules for a language because, unlike syntax, meaning of the whole cannot be inferred from meaning of the parts. Lastly, grammar must “interface with at least four other systems of the mind: perception, articulation, conceptual knowledge... and social knowledge” (21). These systems most likely evolved specifically to interconnect with human language even though they may have some non-linguistics functions.

In the next section, Pinker provides alternatives to and support for the theory that language is an adaptation shaped by natural selection. One alternative is that language can be considered “general intelligence,” yet it is hard to determine what exactly is meant by this. And in a debate over whether language is culturally acquired as other skills are, such as farming, or inherent as part of the human phenotype, there is more evidence for the latter.

Language is used by all humans throughout the world, and no language can be considered primitive or inferior because rules of grammar exist in every language. Furthermore, these rules conform to a standard or “universal design” (22). More evidence can be found in language acquisition in children. All children go through the same stages of acquisition at nearly the same ages, and their speech patterns, including their errors, are systematic. The children of parents who speak a pidgin language will develop a creole language that is different from the pidgin and which has all the same characteristics of other human languages. Cases of language impairment also provide further evidence that general intelligence and human language are distinguishable.

Another alternative to the theory is that language evolved by means other than natural selection. Several misconceptions try to explain this; the first being that natural selection is only a minor part of evolution. Yet natural selection is the only process that can produce such complex designs in organisms and it is the only concept that can be computer-simulated and measured and detected statistically. Another misconception involves the arbitrary features and complex grammar of human language that skeptics believe to be useless. Additionally, there is a

“misunderstanding of how evolution works” (25) in relation to why language arose in humans but not in chimpanzees. Humans did not descend directly from chimps, though they remain humans’ closest relatives, and human language could have evolved after this split. The last misconception is that language is useless if only one species has the ability to comprehend and produce it. Yet the “solution is that comprehension does not have to be in perfect synchrony with production” (25). Natural selection can explain the evolution of language “because it is the only physical process in which how well something works can explain how it came into existence” (26).

Assuming that language is an adaptation, Pinker then discusses the reasons why language did evolve. One such theory is that humans have filled the “cognitive niche” by gathering and exchanging information. Humans share many traits that are unique and absent from the rest of the living world. “Human lifestyle is a consequence of a specialization for overcoming the evolutionary fixed defenses of plants and animals” (27) and the knowledge of this can be conveyed through language to other humans. This ability of encoding and sharing knowledge has evolved solely in humans and “the three key features of the distinctively human lifestyle – know-how, sociality and language – co-evolved, each constituting a selection pressure for the other” (29).

Alternatives to the cognitive nice theory state that language evolved to allow humans to deceive others or to merely think instead of communicate. The problem with the first alternative is that others cannot be manipulated or deceived if they cannot understand the language. Arguments for the second alternative rely too heavily on the idea “that thought depends entirely on language” (30). Furthermore, grammatical concepts would be obsolete if thought were the sole purpose because the brain wouldn’t need rules for word order, case markers, etc.

In the last section, Pinker addresses new tests of the theory that language is adaptation. The first, game theory, attempts to explain language evolution in the framework of a game, similar to sex, aggression, and cooperation, all of which require at least two players. “Modellers assume only that the transmission of information between partners provides them with an advantage..., and that the advantage translates into more offspring, with similar communicative skills” (31). So the question to answer is how this repeated exchange of information between partners can produce a communication system, and whether this system has the properties of human language.

Simulations by Nowak show how the universal properties of human language – phonology and syntax - probably evolved. “In all communication systems, errors in signaling or perception are inevitable, especially when signals are physically similar” (31). As communication increases, so does the number of signals. Yet a communication system with a large number of signals becomes too cumbersome to use. So a limitation must be placed on the number, and in order to compensate for this, the signals are strung together into sequences (words) which have only one concept. Furthermore, a communication system cannot sustain itself with an extremely large number of words, as older and less-used words would be forgotten. Instead, compositional syntax pairs a word to a component of an event and not the entire event. As a result, less words need to be learned and memorized, and events can be talked about even if no single word exists for it.

Molecular evolution is another test of the theory that language is adaptation, and recent advances in genetics can show whether or not natural selection occurred. Because evolution involves a change in genes, “there should be genes that have as one of their distinctive effects the development of normal human language abilities” (33). Using cases of Specific Language

Impairment (SLI), researchers have identified a gene, FOXP2, on chromosome 7 that may be responsible for language functions. SLI is a wide range of syndromes in which language does not develop properly in a child. However, “in no known case of SLI is language wiped out completely, as would happen if language was controlled by a single gene” (34). Therefore, multiple genes are most likely responsible for language.

Lastly, and most importantly, a further test of the theory that language is adaptation states that language should exhibit evolutionary history. The debate over the testability of evolutionary hypotheses involves neutral evolution, which does not change an organism’s physical appearance, but can be detected through nucleotide replacements in genes. Comparing the variability of genes among species and across species, using neutral evolution as a baseline, allows the effects of natural selection to be measured.

Pinker ends his article with the statement of how it is possible to test the language as adaptation hypothesis. “If a gene associated with a trait has been identified, one can measure its variation in the population and apply the tests for selection” (36). Explaining a recent article in *Nature* about this testing, in which the authors concluded the FOXP2 gene had been selected for, Pinker maintains that this finding is not proof that language is an adaptation. But studies like these are the beginning of further research in the history and evolution of human language.