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Author

Lynch, Jack

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Thinking With and Without Words:
A New Model of Cognition, Language and Mind

Jack Lynch (jlynch2@comcast.net)
200 Lake View Avenue
Cambridge, MA 02138 USA

Viewing the mind as a sophisticated processor of analog signals rather than as a processor of symbolic information has led me to conclude that human intelligence emerged from nonhuman primate intelligence as a consequence, and only as a consequence, of the evolution of natural language. A nonhuman animal's primary cognition processes endow it with a sophisticated means of extracting useful features of its environment from the signals from its sensors, such as the eyes and ears, that enable, some species, flexible survival-enhancing and even innovative behavior.

The powerful primary cognitive system was greatly enhanced by the hominid and human species evolving natural syntactic speech—a two-tiered system of auditory communication. Meaningless sounds combine in restricted ways to produce words and words combine in restricted ways to form sentences. The secondary cognition system, also called the human reason system, not only allows the expression of internal representations of the primary cognitive system, it has created a new way of thinking that has resulted in a entirely new culture on the planet that has produced Shakespearian sonnets, jumbo jet aircraft, international corporations and a cure for infectious diseases.

This new model of cognition is presented in two books, *I am not a machine—Book I: Thinking without words* (Lynch, 2004) and *I am not a machine—Book II: Thinking with words* (Lynch, expected late in 2004) and is introduced on the website, NOTaMACHINE.org. Under the proposed model of cognition, there is no inner language of thought (mentalese), no formal computational rules and procedures underlying thought and no inner "engine of reason" that controls or guides our behavior or utterances.

This paper starts with a description of the primary cognition system upon which the new conceptualization of human intelligence rests. The first of four parts of the primary cognition model is a neural network pattern classification system (association). In addition, primates have a second-order pattern classification system (also called relational matching or tertiary cognition). This second-order process cannot be implemented by a feedforward neural network because the similarities to be noted are not in the patterns themselves but in the higher-order relationships in the patterns.

The second part of the model is a mental representation system that can be best understood by introducing a new term, *cogject* that labels how minds from hamsters to primates mentally represent physical objects, actions and events. A critical property of *cogjects* is that they are singular and affirmative—a dog cannot represent, *The cat is not on the mat*. Unlike the popular inner language of thought hypothesis, these internal representations are not more precise than natural language—they are much less precise than natural language. This primary representation system has evolved the capability to chunk perceptions and representations in appropriately sized "bins," so that a creature can gather statistical information of its world via neural network pattern classification processes.

The third part of the model includes the well-documented specialized core knowledge systems. Also known as a cognitive toolkit, this system includes know-how about objects, navigation skills and a number sense.

The fourth part of the primary cognition model is an action planning and evaluation system. An animal's next immediate motor control movements are planned by sequencing representations of action control signals, that is, *cogjects*, in a buffer. Evaluation of a planned action is by an additional pattern classification process that operates on the *cogject* contents of the action buffer. The result of the evaluation process is either a go-ahead or an abort response that is simply based on pattern classification. If an action is aborted, another action can be planned and perhaps also aborted, leaving a human observer to conjecture that the momentarily inactive animal is "thinking."

Human cognition is modeled by three systems, the primary cognition system just outlined, a language cognition system, and a secondary cognition or human reason system. Language cognition includes those cognitive processes that support natural language. I endorse the cognitive linguists' theory based on patterns and spaces rather than rules, procedures, symbols and formal systems.

The third human cognitive system called, "human reason," may be the least intuitive. Based on natural language, it establishes a new world of complexity by allowing us to create, name, describe, explain and communicate intricate concepts, procedures and theories. What can the human mind do with words? My answer is that we can tell stories, period. Human logic and truth are Greek myths that need comprehensive revision. Even the "truth" of science is a value we bestow on a story that has been corrected many times by many people who look for consistency with other stories (theoretical import) and consistency with their observations of the world (empirical import). Truth is based upon group consensus and is always subject to change and revision.

Human intelligence is built upon animal intelligence and natural language and not on a separate engine of reason.

References

Lynch, J. (2004). *I am not a machine—Book I: Thinking without words*. Imperial Beach, CA: Aventine.

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