A Moving Picture of Thought

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Charles Sanders Peirce invented the algebraic notation for predicate calculus in 1885. But the diagrams in organic chemistry inspired him to keep searching for a graph notation for "the atoms and molecules of logic." In 1897, he invented existential graphs (EGs), which he called "the luckiest find of my career" (Sowa, 2011). More important than the notation was a simple and elegant method of reasoning. Peirce claimed it represented "a moving picture of the action of the mind in thought" (Pietarinen, 2003). The psychologist Philip Johnson-Laird said "Peirce's existential graphs are remarkable... They anticipate the theory of mental models in many respects, including their iconic and symbolic components, their eschewal of variables, and their fundamental operations of insertion and deletion" (Johnson-Laird, 2002).

In addition to deduction, reasoning methods based on EGs can support induction, abduction, analogy, and simulation by mental models. These possibilities make EGs a good candidate for a natural logic. But their structure also makes them a good candidate for a neural hypothesis. Existential graphs with their basic operations of insertion and deletion could be implemented by various mechanisms, including the neurocognitive networks proposed by the linguist Sydney Lamb (Lamb, 1999, 2011). This talk surveys EGs, the operations on them, and their relationship to current theories in linguistics, psychology, and neuroscience.

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