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Abstract: Many problems in evolutionary theory are cast in dyadic terms, such as the polar oppositions of organism and environment. We argue that a triadic conceptual structure offers an alternative perspective under which the information generating role of evolution as a physical process can be analyzed, and propose a new diagrammatic approach. Peirce''s natural philosophy was deeply influenced by his reception of both Darwin''s theory and thermodynamics. Thus, we elaborate on a new synthesis which puts together his theory of signs and modern Maximum Entropy approaches to evolution in a process discourse. Following recent contributions to the naturalization of Peircean semiosis, pointing towards ‘physiosemiosis’ or ‘pansemiosis’, we show that triadic structures involve the conjunction of three different kinds of causality, efficient, formal and final. In this, we accommodate the state-centered thermodynamic framework to a process approach. We apply this on Ulanowicz''s analysis of autocatalytic cycles as primordial patterns of life. This paves the way for a semiotic view of thermodynamics which is built on the idea that Peircean interpretants are systems of physical inference devices evolving under natural selection. In this view, the principles of Maximum Entropy, Maximum Power, and Maximum Entropy Production work together to drive the emergence of information carrying structures, which at the same time maximize information capacity as well as the gradients of energy flows, such that ultimately, contrary to Schrödinger''s seminal contribution, the evolutionary process is seen to be a physical expression of the Second Law.

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