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A Calculus of Negation in Communication

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The paper compares Claude E. Shannon's mathematical theory of communication to George Spencer-Brown's calculus of indications. Whereas the former proposes a probabilistic understanding of information and a redundant world of a code shared among sources and destinations of messages, the latter proposes to start with not just binary but general negation and to account for observers either following a call or crossing the distinction being called. Both Shannon's theory and Spencer-Brown's calculus share a cybernetic understanding of control and communication that centers around replacing a complex and, therefore, untreatable contingency with a sequence of many "more special" contingencies relating to one another. In Shannon's theory, that sequence is exogenously given and technically constrained as the set of possible messages, whereas in Spencer-Brown's calculus, it is a sequence of crosses by first-order and markers by second-order observers concatenated within the form of their distinction. The calculus of Spencer-Brown imagines states of time as the precondition for the resolution of a complex contingency. Information and communication are to be analyzed in time, not in space. They are events that, appearing and vanishing instantaneously, induce their own decay while also calling for new, or the same, indications and distinctions to be called and crossed.
Keywords: calculus, communication, negation, uncertainty

I. Selection

Claude E. Shannon, in his 1948 paper "A Mathematical Theory of Communication,"[2] distinguishes between aspects of communication considered to be relevant to the engineering problem and those that are not. The former are referred to as *significant* aspects of communication and the latter as *semantic* aspects of communication (which, to the dismay of humanities people, are considered less relevant). The engineering problem is that of "reproducing at one point either exactly or approximately a message selected at another point" (Shannon, 1963, p. 31). To be able to solve this problem, Shannon chooses a statistical mechanics approach as already proposed by Harry Nyquist and Ralph V. L. Hartley. "The significant aspect," then, "is that the actual message is one *selected from a set* of possible messages" (Shannon, p. 31). A message is defined as its probability of occurrence with respect to all other messages within a determined set of messages. Knowing the set allows one to correct or restore a message distorted by noise.

Apparently, such a statistical notion of a message has nothing to do with the semantic aspects of communication that lend meaning to a message. Shannon focused rather exclusively on the engineering problem, of ensuring the transmission of messages or, rather, signals. The transmission of messages depends on the ability to correct distorted messages. Moreover, this engineering problem related to an earlier

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2. The title was later changed to "The Mathematical Theory of Communication."

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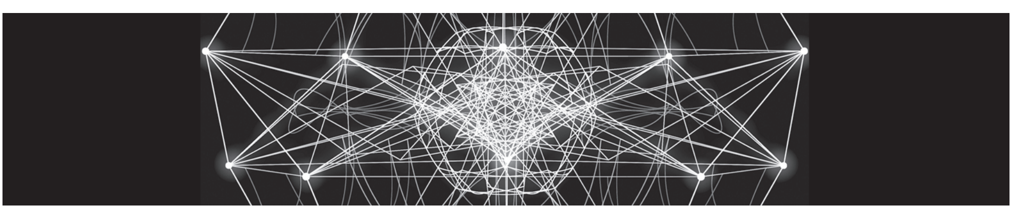

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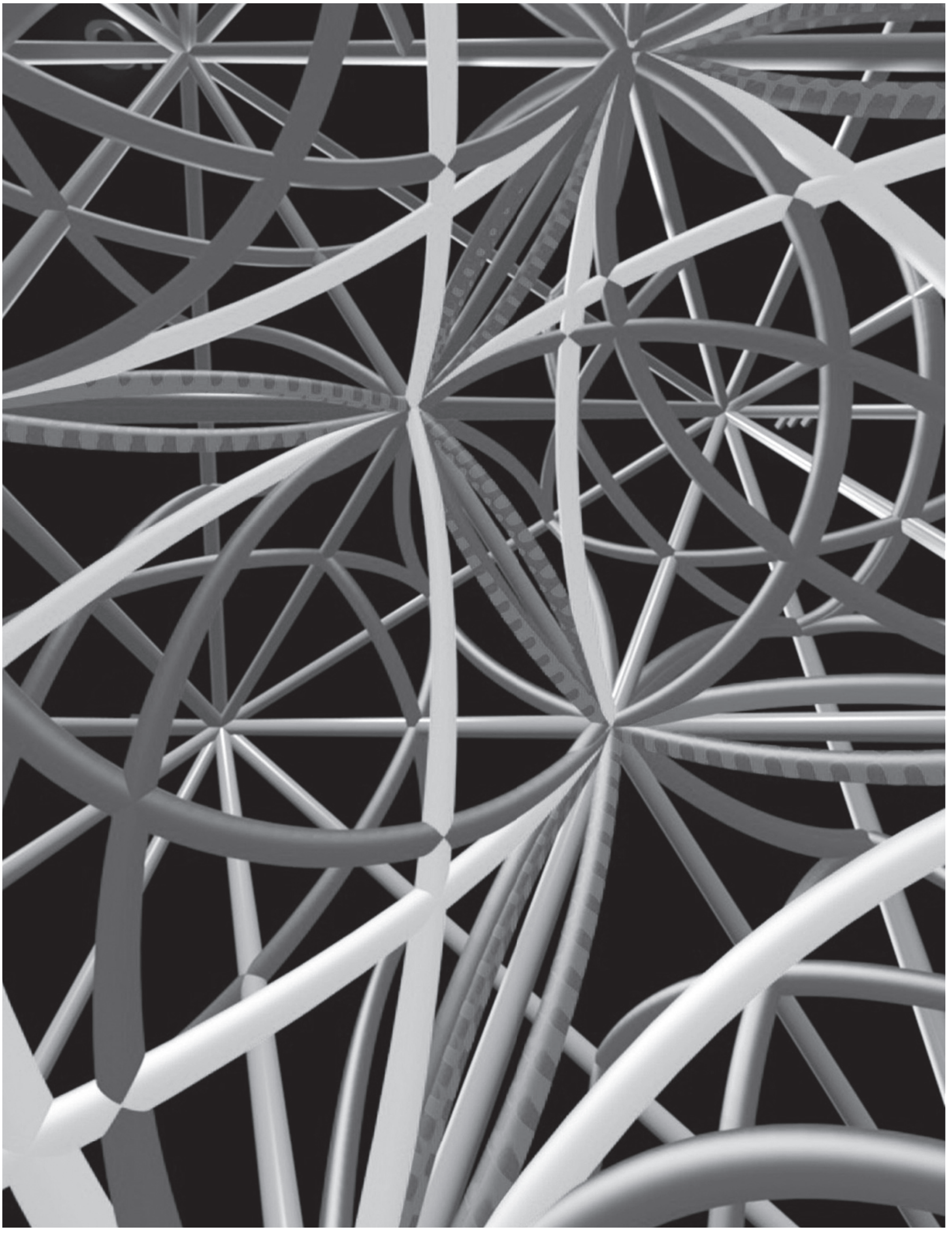

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Circles of 5 epitahedra in the icosahedron. Illustration.