

THE LANGUAGE OF CELLS

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The notion of a "language" of cells does not look consistent in relation with the standard views of Information Theory applied to biology. Although Shannon and Wiener distinguished between discrete, continuous, and mixed information sources, the standard application of their ideas to the biology of the cell has been heavily influenced by the DNA and RNA sequential structure, and only the discrete-positional case has been traditionally considered (e.g., Gatlin). As a consequence, the lack of distinction between "positional" and "compositional" forms of information and the subsequent neglect of the latter have implied an analytical dead-end concerning the possibilities of elucidating mechanisms of cellular languages.

However, one can point at a number of instances in natural and social communication where symbols are used in a rather different way.

Instead of a "positional" context, a "compositional" one is the case. In this alternative context, messages are exchanged as presences or absences of symbols which have been accumulated upon predetermined sets of objects. No meaningful positional relationships among the objects within the set or among the symbols accumulated upon the objects are assumed. Theoretically, that messages might be reliably distinguished and transmitted by this method, which implies "concurrent processing of discrete states of media" has been postulated by Karl Javorszky (1996). A whole body of partition calculus (or granularity algebra) has been envisioned by that author (Javorszky, 1995, 1997, 1998).

Clear examples of the compositional way of information exchanges may be found in the communicational use of colors, odors and tastes by individual organisms; also in social insects, pheromones; and anecdotally in the etiquette "language of flowers," and perhaps within musical compositions and within the formative frequencies of vowels and consonants of our own spoken languages as well. The "language of cells", as we will discuss here, may be one of the most interesting instances of communication by means of such compositional tools; and it has been the forerunner of any further means of biological communication.

Marshall McLuhan's famous dictum "the medium is the message" and the particular disdain this author showed about Shannon's information theory (McLuhan, 1968) are worth being remembered when considering this fundamental distinction between positional and compositional forms of information exchange. Besides, the ideas of abstract symmetry and of variational principles in biological systems can be meaningfully related to this discussion.