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LESSONS FROM STUDYING NONHUMAN ANIMAL COMMUNICATION

Abstract

Animal behavioral scientists have a long history studying nonhuman communication. There are many analogous issues involved in the potential decipherment of signals from nonhuman animals and an alien non-Earth civilization. How do we start the decoding process of another culture, especially one so different than us? A behavioral biologist often collects data from observations and analyzes physical sensory signal and metadata, preferably within a social or behavioral context to understand communication. In the past, thoroughly decoding animal communication sometimes took decades. With current machine learning techniques, both supervised and unsupervised, the process of data mining is rapid. These steps may be necessary to discover, identify, and categorize the patterns of modulation and encoding including the smallest unit of information, combined units, and grammar or order. In my own research project, we have been utilizing many different techniques for categorizing and interpreting dolphin communication signals (frequency modulated whistles and broadband clicks) utilizing clustering techniques, alignment-based learning, and context-free grammar. However, to accurately interpret these data it may also be necessary to overlay it carefully with relevant metadata (age, sex, relationships, behavioral context) of the society. This will also hold true in the data mining of an alien signal. Interpretation may rest in the metadata and contextual details used in the society itself. Techniques like information theory may reveal the complexity of a message, but interpretation and meaning will rest within the application of metadata. We might assume that an intentional signal sent by an alien civilization would include a key for deciphering and interpreting message content. Are there examples of nonhuman animals that have purposely included a primer into the message itself, to help a naive receiver interpret the message? Historically, research have been slow to recognize the importance of nonhuman animal abilities when designing interfaces for exchange. Recent results from a two-way interactive underwater system between dolphins and humans has demonstrated how dolphins wish to communicate with their human counterparts. In an interesting turn, dolphins produced an analogous sequence of responses, possibly intentionally infusing their response with an example designed to teach humans their intent. Over the decades, physical teaching has also occurred during real time, in-water interactions. The study of nonhuman animal communication systems can potentially provide insight into the post detection and analysis of alien signals in the future.