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WHAT'S IN A SIGNAL ANYWAY: LESSONS FROM STUDYING NONHUMAN COMMUNICATION
SIGNALS.

Abstract

Ok, we have a signal. Now what? SETI has long searched for a beacon, a single pulse unequivocally a sign of a civilization far away. What if we get a different type of signal or signals? How will we decode and analyze the information? Some say it will be mathematical and others expect just a simple “Yes, we are Here”.

Scientists have been faced with many similar problems in the decipherment of nonhuman animal communication signals here on Earth. What is the sensory mode of the other species? What can we assume in an alien signal? Or can we? How do we start the decoding process? The kinds of data a behavioral biologist, or animal communication specialist, analyzes can vary from a physical signal to multiple signals within a social or behavioral context. For example, dolphins use multiple modalities to communicate including body postures, touch, vision, and most elaborately sound. Dolphins use three main types of acoustic signals: frequency modulated whistles (narrowband with harmonics), echolocation (broadband clicks) and burst pulsed sounds (packets of closely spaced broadband clicks). Many of these sounds provide a challenge to categorize and recognize, due to their graded and overlapping nature. Sequences of sound types, harmonics, and prosodic aspects including rhythm and synchrony have also provided complex information about dolphin communication.

Basic animal behavior frameworks for communication work, along with current deep learning and pattern recognition algorithms suggest some new directions for looking at signals, especially if the information is unknown. We will discuss 1) different sensory systems and the information they contain, 2) patterns of modulation and encoding – differences and similarities between species, and 3) new tools that are moving us into new research. Animal communication studies might provide insight and ideas to both passive and active SETI in the larger context of searching for life signatures.