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LEONARDO THINKS

Opinion: To the Stars, Silently

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There has long been hope that contact with an extraterrestrial civilization might result in “the discovery of new aesthetic forms and endeavors that lead to a richer life” [1]. Until recently, however, little attention has been given to the concrete ways that aesthetic sensibilities might be conveyed across interstellar space. Should we some day find intelligence beyond Earth, we may want to establish contact. And we might well want to convey something about our sense of beauty. But how? While we could certainly include visual art, or other images that we find aesthetically pleasing, in messages to other worlds, would our intent be understood? What sort of physical signals can we send and what information can we communicate through *messages* encoded into these signals?

SETI scientists scan the electromagnetic spectrum in search of signals that stand out as clearly artificial, radically different from the naturally produced cosmic static. Many SETI programs search for radio signals capable of traversing interstellar space cheaply at the speed of light. Compared to radio signals, space probes are expensive and slow.

Electromagnetic waves, however, pose a special challenge for interstellar communication: They may arrive in a form that cannot be apprehended directly by the recipient’s senses. The electromagnetic signals that carry our television broadcasts, for example, travel outside the range of human vision. Thanks to standardization within the telecommunications industry, “decoding” such Earth-based signals is as simple as turning on our TV sets and unconsciously making sense of the images. Extraterrestrials, though, would not have it so easy.

First, they would need to determine the format of any messages embedded in the signals. If we wanted to send pictures to other civilizations, we would do well to include ample clues about how to organize the incoming data and explain how then to interpret the resulting images. But even if beings on other worlds possess vision, extraterrestrial ways of seeing may be so different from those of humans that our pictures would be meaningless to them [2].



To make matters even more difficult, a back-and-forth interstellar exchange could take centuries or millennia. Without short-term feedback to correct mistaken assumptions or misinterpretations, errors could be perpetuated for generations.

To address these challenges and to promote new ways of composing interstellar messages, the SETI Institute and the International Society for the Arts, Sciences and Technology (Leonardo/ISAST) have initiated a series of international workshops [3]. Though the discipline of interstellar message composition is still nascent, the first generation of proposals is already being scrutinized and alternatives proffered. For example, media theorist John Schott has cautioned against trying to convey our aesthetic sensibilities using only circumscribed mathematical concepts such as the Sierpinski Gasket or the Fibonacci series, as others have suggested [4]. To do so, he argues, would give a very truncated view of our notions of beauty. Instead, Schott advocates interstellar messages that have progressively more complex and context-dependent levels, reflecting the complexity of human aesthetic judgments.

As we craft interstellar messages to be transmitted at radio frequencies, we should strive to exploit the characteristics of this medium. We should use the form of the signal itself to encode directly the concepts we wish to convey [5]: for example, if we want to communicate something about rhythm, we should rhythmically vary the signal itself.

The result would be messages somewhat akin to Michael Heivly's microwave sculptures [6], which cannot be apprehended directly by human senses, but can be imagined in their physical reality as they silently move beyond Earth. Though radio waves themselves are invisible, inaudible and intangible, through our scientific understanding we can appreciate the physical form of these waves as it would be detected by any civilization receiving our signals. Ironically, by attempting to convey our meanings directly through signals that are themselves imperceptible without technological mediation, we might render our messages more comprehensible—and perhaps even more aesthetically pleasing—to intelligent beings on other worlds.



Endnotes

[1] B.M. Oliver and J. Billingham, *Project Cyclops: A Design Study of a System for Detecting Extraterrestrial Intelligent Life* (Moffett Field, CA: National Aeronautics and Space Administration, 1971) p. 31.

[2] D.D. Hoffman, "Images as Interstellar Messages," in D.A. Vakoch, ed., *Between Worlds: The Art and Science of Interstellar Message Composition* (Cambridge, MA: MIT Press, 2004).

[3] Extended abstracts and full papers from these workshops are being published in special sections of several issues of *Leonardo* and the *Leonardo Electronic Almanac*. See, for example, D.A. Vakoch, ed., Special Section Introduction: "The Art and Science of Interstellar Message Composition," *Leonardo* 37, No. 1, 33–39 (2004).

[4] J. Schott, "Reflections on Strategies for Communicating Visual Images in Interstellar Message Design," paper presented at the Workshop on Encoding Altruism: The Art and Science of Interstellar Message Composition, Paris (2003), <http://publish.seti.org/art_science/2003/abstract_details?aID=96&language=e&year=2003>.

[5] . D.A. Vakoch, "Signs of Life beyond Earth: A Semiotic Analysis of Interstellar Messages," *Leonardo* 31, No. 4, 313–319 (1998).

[6] M.L. Heivly with M. Reed, "The Space between the Real and the Imagined: Microwave Sculpture in Deep Space," *Leonardo* 25, No. 1, 17–21 (1992).

Bio: Douglas Vakoch is the Director of Interstellar Message Composition at the SETI Institute, as well as the only social scientist employed by a SETI (Search for Extraterrestrial Intelligence) organization. More information about his work is available at <http://www.seti-inst.edu/about-us/staff/vakoch-doug.php>. His email is vakoch@seti.org.