**IAA-01-IAA.9.2.12**

# COMMUNICATING CONCEPTS ABOUT ALTRUISM IN INTERSTELLAR MESSAGES: AN EVOLUTIONARY GAME-THEORETIC APPROACH

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One of the most relevant ways that terrestrial and extraterrestrial civilizations might be expected to evaluate one another is in terms of motivations, including the extent to which motivations are altruistic. Indeed, SETI programs that search for directed beacons assume some measure of altruism on the part of the transmitting civilizations; with no guarantee of a response, the other civilizations would be providing information to us with no direct payoff. Messages describing altruism may be useful for helping to clarify the motives of transmitting civilizations.

A focus on altruism as a content of interstellar messages has several advantages. First, there have already been significant applications of evolutionary and cognitive psychological approaches to understanding altruism, which provide a desirable scientific foundation for the contents of interstellar messages. In addition, aspects of altruism can be described in interstellar messages through mathematical modeling, given an appropriate foundational mathematical-logical language. The current study examines the feasibility of communicating concepts about altruism through evolutionary game-theoretic accounts (e.g., Hamilton, 1971) in an adaptation of Lincos (Freudenthal, 1960).

There is an additional value to introducing the SETI community to methods of modeling altruism. Some of the mathematical models for clarifying altruistic behaviors, such as game theory (Trivers, 1971), have also been suggested for use in SETI when making decisions about whether or not humankind should transmit a reply to an extraterrestrial signal (Billingham, 1999). Currently, however, such SETI-related decisions have not been studied thoroughly with game-theoretic approaches, although an initial attempt was made during the SETI Institute's recent strategic planning workshops, which identified research objectives for the Institute in the next twenty years. Thus, the specific content of interstellar messages dealing with altruism provides scientists in the SETI community with additional exposure to mathematical models that are relevant to some of the critical policy issues surrounding the receipt of a signal from another civilization.

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