

# The Alien in the Machine: Post-Detection in the Era of AI

Breakout session series for The Second Penn State SETI Symposium, 19-22 June 2023  
Penn State University, State College PA <https://sites.psu.edu/setisymposium2023/>

**Two days:** Mon 19 June 2023, Tues 20 June 2023, 1:00-3:00 pm EST each day.

**Format:** hybrid, incorporating online and in-person presenters/facilitators and participants

**Participants:** please bring your laptops to facilitate group work on Miro (shared online whiteboard). Thanks!

**Session description:** This session is a sequel to our “Post-detection for the 2020s: Fundamentals, Current Concerns, and New Discussions” breakout session (PSETI 2022). This year, we focus upon the intersections of post-detection with AI – a particularly hot topic in 2023 given ChatGPT4, ongoing innovation with machine learning in SETI searches, the role of generative AI in news ([Nieman Lab](#)), and a highly publicized [petition](#) calling for a moratorium on AI development.

For those interested in general post-detection matters: Denning’s post-detection review talk on Monday during the plenary will include some review of general current issues and recent developments in SETI Post-detection. Contact [kdenning@yorku.ca](mailto:kdenning@yorku.ca) for access to general post-detection resources from last year’s session.

Our breakout session includes a series of talks addressing the theme of AI and Post-detection from different disciplinary perspectives – including qualitative and computational social science, philosophy, history of science, and computing – which together provide grounding for a structured group exercise on Day 2. This “Futures Literacy Workshop” exercise (led by futures expert George Profitiliotis) uses methods from futures studies to guide participants through an imaginary technosignature detection in an unfamiliar version of the year 2040.

Specific topics addressed in talks will include: the integration of ideas from AI pioneers into early SETI conversations; the potential for postbiological intelligence in the Universe; computational models illustrating information (news) diffusion patterns and related behavior changes; potential uses of AI to assess global opinions about responding to a technosignature detection; potential uses of Earth AI in understanding incoming information-bearing signals or artifacts; the current state of AI in general; the potential risk of ET AI algorithms embedded in incoming signals; and existing complex beliefs and concerns about our own AI on Earth and how these could shape public reactions to a discovery which might represent extraterrestrial AI.

Our intention is to foster inclusive, interdisciplinary discussion about challenges related to post-detection in our era of rapid social and technological change.

## Co-organizers / Presenters / Facilitators

- **Anamaria Berea (in person).** Associate Professor, Department of Computational and Data Sciences, George Mason University, Fairfax VA. [aberea@gmu.edu](mailto:aberea@gmu.edu)
- **Rebecca Charbonneau (in person).** Jansky Fellow, National Radio Astronomy Observatory, Charlottesville VA. [rcharbon@nrao.edu](mailto:rcharbon@nrao.edu)
- **Kathryn Denning (Zoom).** Associate Professor, Anthropology, York University, Canada; SETI Institute Science Advisory Board; IAA SETI PC member; Just Space Alliance. [kdenning@yorku.ca](mailto:kdenning@yorku.ca)
- **Steven J Dick (Zoom).** Former NASA Chief Historian, Former Baruch S. Blumberg NASA/Library of Congress Chair in Astrobiology. [stevedick1@comcast.net](mailto:stevedick1@comcast.net)
- **Chelsea Haramia (Zoom).** Associate Professor, Department of Philosophy, Spring Hill College; Senior Research Fellow, Center for Science and Thought, University of Bonn. [charamia@shc.edu](mailto:charamia@shc.edu)
- **Brian McConnell (in person).** SETI Open Data Archive. Software developer, author of *The Alien Communication Handbook* (2021) and *Beyond Contact* (2001). [bsmcconnell@gmail.com](mailto:bsmcconnell@gmail.com)
- **George Profitiliotis (Zoom).** Blue Marble Space Institute of Science, [gprofitiliotis@hotmail.com](mailto:gprofitiliotis@hotmail.com)

## Day 1, Monday June 19, 1:00 - 3:00 pm

**1:00 - 1:05 Anamaria (in person): welcome and introduction to the session**

**1:05 - 1:15 Kathryn Denning (Zoom). Introduction: Post-Detection in the Era of AI.**

SETI scientists often say that ETI could well be artificial. However, studies exploring potential reactions to extraterrestrial intelligence have not sufficiently addressed how human reactions might be affected by the type of ETI, on the spectrum of biological vs postbiological vs hybrid vs undetermined. So, this area was already a critical gap, and it is even more important now, given the acceleration of our own Earth-developed AI and corresponding human ambivalences about it. Research shows that humans have mixed feelings about AI which are not limited to the more obvious concerns about autonomous weapons or workplace obsolescence. Surveys have for years demonstrated considerable public and expert distrust of AI and its makers, in addition to some more positive sentiments, and this situation is rapidly evolving given AI's continued evolution and growing visibility and accessibility. Added to a pre-existing popular culture repertoire involving the fear of soulless robots – real and fictional – this sets up a potentially complicated situation for a confirmed technosignature detection. For example, it could introduce additional skepticism or concern about SETI results achieved with significant AI assistance, i.e. new types of questions about the trustworthiness of the experiment results. It could also add to concern about the nature of the ETI behind the technosignature. It could exacerbate public distrust in the reporting and news, given the rise of generative AI in these domains. Further, the simultaneous rise in convincing deepfakes, voice cloning, and sophisticated mis/disinformation etc. poses a risk to scientific researchers engaged in public communication about high-impact events, constituting another significant potential post-detection complication. In short: amid the positive potentials of AI in multiple areas of research, we now also have a new generation of challenges for post-detection which require sustained attention and new investigations.

**1:15 - 1:30 Rebecca Charbonneau (in person). Cats in Space: The Role of AI Pioneers in the Development of CETI**

At a CETI conference held in the Soviet Union in 1971, artificial intelligence (AI) Pioneer Marvin Minsky interrupted a conversation on how best to communicate information about life on Earth to intelligences on other worlds. Discussion largely centered on how to best transmit a picture of a cat-- a simple enough idea, but one rife with potential problems. Some CETI scientists were concerned that the signal might become distorted as it traveled over vast interstellar distances, likewise distorting the image of the cat. Others were concerned ETI might have different visual perception from humans and would not understand how to interpret a 2D image of a cat. Minsky chimed in with a suggestion: "...instead of sending a picture of a cat... we can send the cat itself."

Minsky proposed sending computers into space, rather than simple messages or images. Sending a computer which held the genetic code of a cat, a dictionary of information on cat behavior, video and audio of cats--this, Minsky argued, would have far greater success at successfully conveying the complexity of a cat to ETI. Furthermore, if ETI had the ability to "converse" with the computer, it would minimize the problem of light-year-distance communication.

The idea was somewhat far-fetched at the time, as the development of artificial intelligence was in its nascency. But today, advances in AI systems make the ideas of Minsky and his counterparts not only possible, but likely. Furthermore, although we are not quite sending cats to space, AI and machine learning today play a large role in many areas of SETI science, such as analyzing data sets to detect signals human analysts missed. This talk will examine the influence of early AI technology in the development of CETI, focusing especially on the contributions of Marvin Minsky and Ronald Bracewell.

**1:30 - 1:45 Steven J Dick (Zoom). The Postbiological Universe: Cultural Evolution in the Cosmos**

The Search for Extraterrestrial Intelligence has typically been undertaken in the context of the biological universe, in which organisms are presumed to have evolved through Darwinian natural selection from simple to complex forms

including intelligence. Two decades ago, however, I argued that taking into account 13.8 billion years of cosmic evolution it is highly likely that life has evolved beyond the biological to the postbiological (Dick, 2003). In particular I argued we must recognize that astronomical and biological evolution to the level of general intelligence is often followed by cultural evolution, which comes to dominate all other forms of cosmic evolution in terms of its rapidity. This is explicit in the Drake Equation, which embraces all three forms of cosmic evolution. Today the argument is even stronger that the vast sweep of cosmic evolution, the likely ages and lifetimes of technological civilizations, the example of recent rapid advances in artificial intelligence (AI) on Earth, and the application of what we term “the intelligence principle,” all suggest that the universe maybe filled with artificial intelligence. In my view the conclusion that we live in a postbiological universe remains highly likely, though biologicals may also be present to an undetermined extent. The existence of postbiological superintelligences has implications for SETI, for post-detection protocols, and for our future interactions with life in all its forms. All of these implications require further interdisciplinary study from the natural science, social science and artificial intelligence communities.

Dick, S. 2003. “Cultural evolution, the postbiological universe and SETI,” *International Journal of Astrobiology*, 2: 65–74; reprinted as “Bringing culture to cosmos: The postbiological universe,” in Dick and Lupisella (2009), pp. 463–488. online at [www.nasa.gov/connect/ebooks/hist\\_culture\\_cosmos\\_detail.html](http://www.nasa.gov/connect/ebooks/hist_culture_cosmos_detail.html)

### **1:45 - 2:00 Anamaria Berea (in person). Post-detection Lessons from Information Diffusion Models in Society**

In this talk I will highlight some of the most important findings from information diffusion and opinion dynamics computational models that have been previously successfully applied in various real life situations (i.e., fake news, voting behavior, pandemic and epidemics, conflicts and natural disasters, etc.). These generalizable models can be used as proxies for how information about discovery of life elsewhere in the Universe can spread and what type of real effects can have in society. We currently know well the informational pathways and network topologies in social media and online environments regarding the spread of major news and we also know how human behavior spreads through real and virtual networks of people. We know less about how information changes people’s real behavior and decisions and vice-versa, regardless of whether the information is accurate (e.g., there is a disconnect between what people say in various contexts vs. what they actually do). I will showcase scenarios where behavior spread between people can have multiplied effects comparatively to information spread between people.

### **2:00 - 2:15 Chelsea Haramia (Zoom). AI, Post-Detection, and the Possibility of Consent**

How should we respond to the successful detection of extraterrestrial technology? Whatever our response, including the decision not to respond, it will constitute a global act taken on behalf of humanity. Since there will be risks involved in any such act, there is reason to claim that acting agents should be provided with an appropriate level of consent from those affected before acting. But there are obvious logistical and theoretical difficulties with soliciting global consent, as has been discussed in work on both SETI PD and METI. However, AI may be a tool that can help us to overcome certain obstacles to achieving consent. I provide two distinct candidate routes for AI programming to help tackle this issue. The first route involves developing deep learning programs aimed at providing data that are directly related to specific questions about extraterrestrial events and interactions. The second involves deep learning programs aimed at deriving shared values from amassed data across cultures and groups. Both options would generate data that could be used to justify claims of what, if anything, humanity in general consents to. The former could generate actual consent; the latter could be used to generate a kind of hypothetical consent. I also outline various relevant concerns with such a proposal, including the environmental and financial costs of running such programs, maximin reasoning, privacy, opacity, critiques of what counts as appropriate consent, overrepresentation of dominant groups and/or developed nations, and the lack of data regarding non-human interests and those of future generations.

### **2:15 - 2:30 George Profitiliotis (Zoom). Endemic Monsters against Foreign Ones: Insights from Monster Theory and Terror Management Theory on the Post-Detection of an Extraterrestrial AI Agent**

This talk will frame the potential societal reactions following a detection of an extraterrestrial artificially intelligent agent through the lenses of both Monster Theory and Terror Management Theory. The analysis will be based on the

observation that an extraterrestrial AI agent may escalate the feeling of monstrosity by transgressing multiple categorical boundaries all at once, this category transgression being a key element of any monster: e.g., life—Earth, intelligence—Earth, life—organic, intelligence—organic. Drawing on Monster Theory, the overall activity of the search for extraterrestrial life will be conceptualized as a monstrous endeavor, characterized by hybridity, uncertainty, abduction & anticipation, and ontological liminality, which render it able to bring more monsters to the world via successful discoveries. This monster metaphor offers a culture-level heuristic for understanding the potential public reactions to a monstrous future discovery of an extraterrestrial AI agent and suggests a coping strategy for handling those reactions, i.e. monster assimilation, which aims at adapting both the monster and the cultural categories against which it is evaluated. Complimentary to that, Terror Management Theory offers a social psychology-level perspective. Specifically, following this theory, a discovery of an extraterrestrial AI agent that might pose an extensive and deep worldview threat to some individuals would activate existential anxiety, which in turn could be mitigated by bolstering self-esteem or defending worldviews. The most constructive worldview defense tactic among the alternatives is worldview exploration, which can lead to worldview accommodation, providing a second guardrail on potentially successful post-detection coping strategies. To address the current lack of empirical research on the prevalence of cultural categories and worldviews across publics, I suggest getting the help of two other, more familiar, monsters: futures, which shape societal predispositions, and large language models, which may mirror societal biases.

## **2:30 – 3:00 Discussion, and Wrap-Up.**

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## **Day 2, Tuesday June 20, 1:00 - 3:00 pm**

### **1:00 - 1:05: Rebecca: welcome/ intro**

### **1:05 - 1:20 Anamaria Berea (in person). AI Today - Between History and Future**

I will provide an overview of the current state of the AI field, both in terms of research and applications, for non-experts, scientists and the public at large. Where are we today in the field, what is the state of the art, where are the big strides currently, where are the myths and what can we predict and also not able to predict about the future? I will describe briefly how neural networks and deep learning work, exemplifying with the most famous algorithms that we have right now, from computer vision and self-driving cars to chatGPT.

### **1:20 - 1:35 Brian S. McConnell (in person). AI as an Agent for Communication or Comprehension**

In this talk, I will discuss how AI can be used as both an agent for communication, and as part of the effort to comprehend the contents of an information bearing transmission or artifact. There is a long history of speculation about AI in SETI literature, from Bracewell probes to post-biological civilizations. With the recent development of human competitive AI systems, we finally have some insight into what these systems may be capable of and what role they may play in post detection scenarios.

A surprising aspect of GPT based AIs is their ability to develop emergent capabilities that are unrelated to their initial training, despite the underlying simplicity and compactness of the underlying algorithms. This suggests that if we detect an information bearing signal or artifact that AIs may be able to detect patterns that are difficult for us to see in an alien dataset. As a communication agent, an AI based message would offer many benefits, most notably the ability to interact with the receiver in local real time, thereby mooted communication delays due to the speed of light, which has implications for both outbound messaging (METI) and what we might expect to encounter in an inbound transmission.

We'll discuss the different ways in which AI can be used in the analysis and comprehension effort that would follow a detection event, as well as the ethical and risk management considerations of handling algorithmic content in an information bearing message.

#### **Brief Q&A.**

**1:45 - 2:50, George Profitiliotis (Zoom) and all: *Futures Literacy Workshop on the Futures of SETI***

#### **Group Exercise (online and in-room participants working together)**

In our "Futures Literacy Workshop on the Futures of SETI", we will mentally travel together to the year 2040 twice. We will access two different types of futures, a likely one and a strange one, and collectively explore an imaginary future technosignature discovery. We will use our mental time travels to contemplate our deepest assumptions about the future of SETI. Becoming aware of our assumptions, we will attempt to reframe our perception of both the future and the present of the SETI field, reflect, rethink, and collectively come up with ideas for actions that could help shape SETI's future.

This group exercise will actively explore themes at the intersection of AI and Post-Detection, allowing additional reflection about the content of this breakout session's presentations from Day 1 and Day 2.

Participants: please bring your laptops to the breakout session, as we will be working together on a shared Miro whiteboard online.

**2:50 to 3:00: Anamaria:** final discussion, wrap up.