Mathematical Modeling of the Human Psychedelic Experience

A new collaboration, publication, and conversation illuminate how a new theory of reality based on consciousness will enable scientific study of the human psychedelic experience.



Psychedelic drug experiences are among the most fascinating but mysterious journeys of the human mind.

Long the domain of indigenous shamans and modern "psychonauts" who seek self-discovery, the sensory rich experiences often include kaleidoscopic geometries and intelligent entities that defy description - until now. A new research collaboration and scientific preprint between two frontier research organizations, the Trace Institute and Noonautics, respectively, detail a plan to study the mathematical architecture of human experience based on the psychedelic compound N,N-dimethyl tryptamine (DMT).

Noonautics, led by the psychedelic researcher, neurobiologist Dr. Andrew Gallimore, will use their extended state DMTx protocol - which can extend DMT experiences from a few minutes to hours - to send trained scientists and other experts into the DMT space to make precise observations and conduct experiments. Trace Institute Founder and Scientific Director, Professor Emeritus Donald Hoffman, and colleagues will deploy their arsenal of mathematical models, including a new version of the trace logic for conscious observers, to develop a quantitative framework to interpret the rich details of the DMT experience.

The collaboration will combine a theoretical basis for the psychedelic experience with human experiments to test predictions of the models for an empirical understanding of altered states of consciousness. The two scientific leaders will have a conversation about their research, and its background and implications for a new science of reality, on Saturday, June 13, 2026, at the Lighthouse, an applications-only creative campus at the historic Venice Beach Post Office, with plans for video releases to the public on YouTube.

The project, Hoffman says, "will provide a new framework for exploring the effects of psychoactive substances such as DMT on the structure and function of spacetime." Adds Gallimore, "With a theoretical foundation for the highly unusual state of consciousness induced by DMT, we can test these theories experimentally." Reflecting forward, Gallimore says, "This collaboration is a first step to a mathematics of altered states of consciousness and, ultimately, for engineering our perceptual interface to expand our view of reality."

Preprint Paper Link

Gallimore, A.R., Hoffman, D.D., Hermansson, N., Traces of the Other: DMT Phenomenology in the Framework of Conscious Realism. PsyArXiv, DOI: https://doi.org/10.31234/osf.io/8qvgy_v2

Event Registration Link

https://traceinstitute.org/collaborations/gallimore/#traces-of-the-other_

Noonautics

Noonautics is a 501(c)(3) non-profit research organization supporting public-facing research into the structure of the mind and the nature of non-ordinary experience. Director Andrew R. Gallimore is a pioneer of DMT research and co-inventor of the DMT extended state pharmacokinetic model, termed DMTx, with Dr. Rick Strassman. He is based at the Okinawa Institute of Science & Technology.

Website
https://noonautics.org

Contact
press@noonautics.org

Trace Institute

The Trace Institute is a non-profit research organization with a mission to build a science of reality based on mathematical modeling of conscious observers. Founder and Scientific Director Donald D. Hoffman is Professor Emeritus at the University of California-Irvine, who developed the interface theory of perception, conscious agent theory, and the trace logic of conscious realism, among the first unified, observer-centered models of nature.

Website
https://traceinstitute.org

Contact
media@traceinstitute.org