

Development of Sensory-Stimulation Technology to Modulate Reciprocal Altruism

Project manager

(selected in 2025)

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Leader's institution

The University of Tokyo

R&D institutions

Tokyo Metropolitan Institute of Medical Science

National Institute of Information and Communications Technology (NICT)

Summary of the project

We aim to realize a society where sensory stimulation enhances cooperation, trust, and altruism among people. By applying visual and auditory stimuli to gently activate brain reward and empathy systems, we will examine changes in cooperative behavior through small-scale and online experiments. Based on these findings, we aim to design and socially deploy a “passive mind-support technology” that can be used broadly in schools, communities, workplaces, and other everyday settings.

Milestone by year 2032

- Establish a method to design visual and auditory stimuli that induce brain activity related to reciprocal altruism using encoding models and generative AI, and propose generalized stimuli applicable without fMRI.
- Conduct PoC studies (100–200 participants, 1–2 sites) in schools, workplaces, or communities to evaluate improvements in cooperation, helping behavior, social participation, and subjective well-being, and develop ELSI guidelines (consent, transparency, privacy).

Milestone by year 2027

- Develop encoding models predicting brain activity to visual/auditory stimuli and prototype an optimal stimulus generation algorithm.
- Quantitatively verify the short-term effects of stimulus presentation on reciprocal altruism and cooperative behavior using behavioral tasks such as trust games.
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Project structure

- ① Modulation of psychological states via sensory stimulation**
Use fMRI, encoding models, and generative AI to induce emotion- and cognition-related brain activity through visual and auditory stimuli and evaluate behavioral effects.
Leads: Yukio Nishimura, Tomoya Nakai, Kaoru Amano
- ② Modulation of psychological states via transcranial focused ultrasound (tFUS)**
Non-invasively intervene in candidate brain regions identified via sensory stimulation and examine associations between brain activity (BOLD) changes and cooperative/reciprocal behaviors.
Leads: Masahiko Haruno, Kaoru Amano
- ③ Building a foundation for social implementation of psychological modulation technologies**
Develop stimulus design methods applicable to individuals without fMRI and conduct PoC studies in schools, workplaces, and communities, alongside establishing the ELSI framework.
Leads: Kaoru Amano, Yu Nishitsutsumi

