


【Grant-in-Aid for Transformative Research Areas (B)】

Psychosentience:
Creating Inclusive Society by Understanding Subtlety of Dynamic Human Mind

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	Project Information	Project Number : 25B102 Keywords : dynamics of the mind, cross-cultural understanding, biological signals, interpersonal interaction, perspectives on mortality	Project Period (FY) : 2025-2027

Purpose and Background of the Research

● Outline of the Research

To develop technologies that enrich the human mind, we must first establish theoretical frameworks capable of understanding the diverse mental states we experience. Previous studies have attempted to infer them from physiological signals—facial expressions, heart rate, skin conductance, and brain waves—but these methods fall short in capturing the complexity of our mind. Emotions are rarely singular or isolated. Nevertheless, many studies have defined emotional states in a deterministic manner, which results in an oversimplification of the mind.

In this research, we propose a new theoretical foundation that assumes the simultaneous presence of multiple emotions with varying intensities. We consider that humans interpret physiological signals in conjunction with context—the situational background in which those signals occur. By integrating subjective reports, physiological indicators, contextual information, we establish a comprehensive framework called “Psychosentience,” a new field dedicated to the cognitive understanding of emotional complexity.

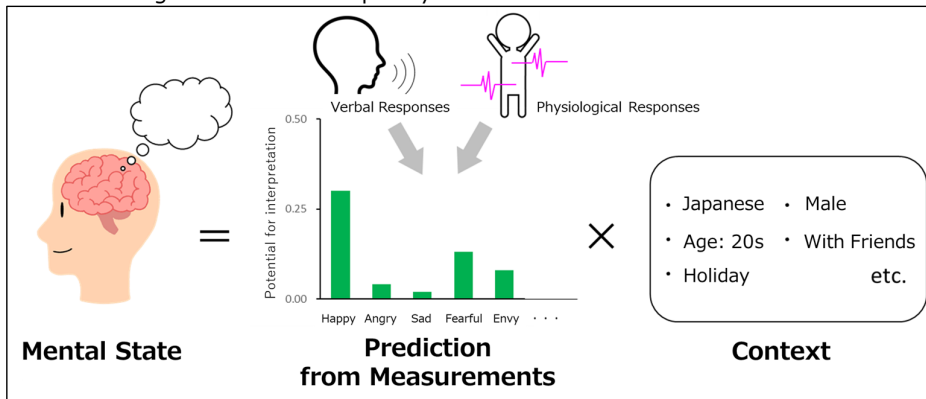


Figure 1. Relationship among mental states, emotions, and contexts as proposed in this research

● Four Key Challenges Addressed by This Research

1. Defining Mental States (A01-Psychology Group)
How should composite emotional states be defined through the integration of context, physiological signals, and linguistic expressions? This challenge aims to establish a framework that enables interdisciplinary research.
2. Measuring Mental States (A02-Measurement Group)
How can we model the relationship between mental states and physiological responses? This group will analyze physiological and self-report data to establish methodologies for quantitative analysis.

3. Mental States Arising in Social Interaction (B01-Interaction Group)

In social settings, individuals may experience mental states that do not emerge when they are alone. We aim to expand the study from solitary contexts to dynamics through interaction with others.

4. Bridging Everyday Life to Attitude to Life and Death (C01-Medical Group)

Everyday emotional fluctuations and the profound emotions associated with life and death lie along a continuous spectrum. We aim to capture the full range of mental states as a single continuum.

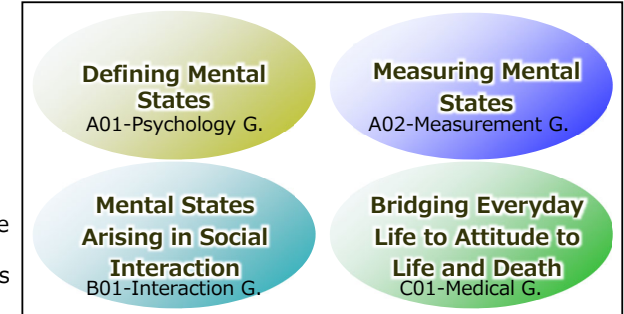


Figure 2. Four Key Challenges Addressed by This Research

Expected Research Achievements

● Achievements from Each Group

This research aims to establish a foundational framework that can serve as the basis for all future research on mental state understanding. Specifically, it enables interdisciplinary collaboration across fields.

In A01–Psychology Group, the goal is to collect stimuli that evoke various mental states and construct a standardized stimulus set as a foundation for related fields. The group will also investigate the neural backgrounds and cultural diversity.

In A02–Measurement Group, the focus is on developing a probabilistic model that can quantitatively represent the one-to-many and ambiguous relationships between mental states and physiological responses.

In B01–Interaction Group, after dyadic conversations, participants’ expressions of mental states are mapped to the content of the dialogues, allowing the creation of a “Dialogue-Based Dataset.”

In C01–Medical Group, the focus is on how mental states arise in care and communication contexts, such as depression and grief. By analyzing actual medical counseling sessions, the group seeks to systematize emotional states unique to caregiving situations.

Across all projects, we establish a theoretical foundation for understanding mental states in various scenes.

● Broader Implications of the Research

This research can redesign the study of how people understand one another, and through its deepening, the following impacts are expected.

First, by elucidating mental states and their expressions across multiple cultures, we can examine cross-cultural correspondences between expressions of mental states. For example, a sentiment that is verbalized in one culture can be explained using other words tied to similar experiences in another culture, thereby fostering an embodied or intuitive understanding across cultures.

Second, the framework to estimate diverse mental states can contribute to the development of technologies that support computer-mediated communication.

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