


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

**Qualia Structure:** Bridging a gap between subjective conscious experience and scientific objectivity by establishing a super interdisciplinary research program

	Head Investigator	ATR Computational Neuroscience Laboratories, Department of Qualia Structure, Department Head Naotsugu Tsuchiya Researcher Number:80517128
	Research Area Information	Number of Research Area : 23A101 Project Period (FY) : 2023-2027 Keywords : Consciousness, qualia structure, information structure, category theory, phenomenology

Purpose and Background of the Research

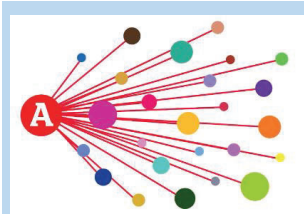
●Outline of the Research

Is my “red” the same as your “red”? How similar is my conscious, subjective experience to another’s? What are the physical substrates in the brain that support conscious experience? If we don’t understand the link between consciousness and the brain, how will we ever know how other people, animals, and artifacts feel?

The contents of consciousness, called “qualia” (such as the redness of red) that are directly experienced, cannot be conveyed fully using only language. And until recently there has been no way to study them scientifically.

**The Qualia Structure paradigm** which we advocate proposes to measure the relationships between a quale and other qualia on a large scale. We believe such a relational approach will allow for a scientific, systematic way of characterizing qualia better than ever.

So far, the qualia structure paradigm has been only applied only to adult human subjects using colour as the domain of research. We will expand this through super-Interdisciplinary research over the next 5 years.



Qualia Structure represents relationships among qualia



Conceptual videos for qualia structure (4 min, English)



Introduction to Qualia Structure (15min, Japanese)



Interdisciplinary studies across psychology, math, philosophy, development, neuroscience, information, semiotics, linguistics, and AI.

●Understanding others to lead a new view of humanity.

Society includes many people with different subjective worlds. Consider people with color-blindness, dyslexia (inability in reading letters and/or words), and aphantasia (inability in imagining anything visually). What is it like to be like them? Understanding subjective experiences of others is arguably the first step towards building a new view of humanity by better understanding of others.

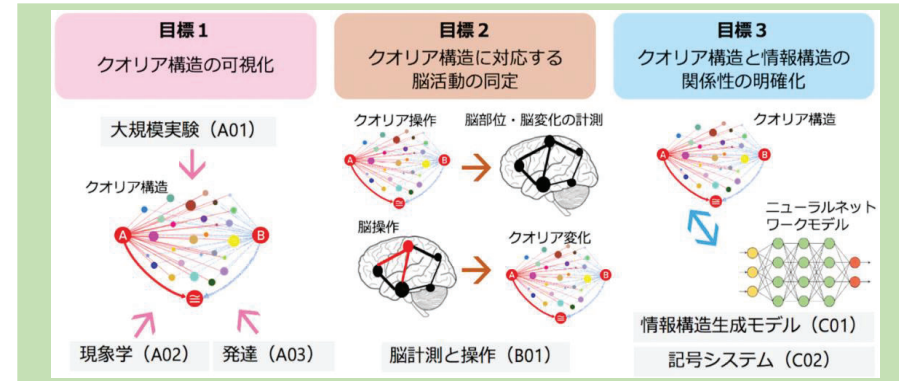
●Leading a next generation consciousness research in the world

The 1st generation consciousness researchers proposed various wild theories since 1980. Since 2000 (the 2nd generation), a huge effort identify the neural correlates of consciousness continues. Previous generations have not dealt the problem of qualia, which will be the focus of the 3rd generation research.

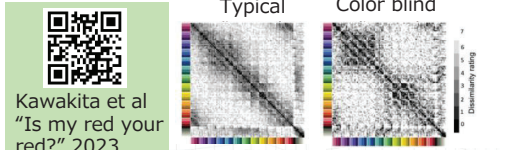


Expected Research Achievements


- Goal 1. To visualize a qualia structure.
- Goal 2. To identify brain regions that correspond to qualia structure.
- Goal 3. To clarify the relationship between qualia structures and information structures in the brain.



Example of approach to Goal 1 and 3: Kawakita et al 2023 evaluated differences in color qualia structures estimated from color-typical and color-blind participants using large-scale similarity measures. A similar approach can be applied to various domains, such as emotional qualia.



Grant proposal for Qualia Structure



Impacts for society and life

1. Understanding others to lead a new view of humanity.
2. Understanding qualia through a relational approach
3. Leading 3<sup>rd</sup> gen. consciousness research in the world

Due to the mismatches in qualia structures, these two cannot be matched by optimal transport method!

