

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

### Section IV



#### Title of Project : Analysis and synthesis of deep SHITSUKAN information in the real world

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#### 【Purpose of the Research Project】

SHITSUKAN is an important research topic for informatics, neuroscience, and industry. We have learnt from our past research that we should realize not only the superficial SHITSUKAN processing that links the sensory information to SHITSUKAN attribute variables and/or linguistic labels, but also the underlying hidden processing that we call Deep SHITSUKAN. Specifically, what we consider Deep SHITSUKAN are: (A) The process of calculating the ecological values of things or events from SHITSUKAN, including the subsequent process to induce emotional body responses. (B) The process of constructing action-predictive models of the external world in the brain from SHITSUKAN. (C) Processes in which SHITSUKAN processing is influenced by the characteristics of the individuals, such as age, brain dysfunction, and personal experiences (D) The process of determining what are real and fake through multimodal sensory information of actual objects. Based on this idea, we aim to deepen our understanding of SHITSUKAN by scientifically revealing human Deep SHITSUKAN processing, and developing innovative Deep SHITSUKAN technologies.

#### 【Content of the Research Project】

Planned Research consists of three research items, “A01: SHITSUKAN Machine Recognition,” “B01: SHITSUKAN Biological Recognition,” and “C01: SHITSUKAN Generation” (Fig. 1).

In A01, Nishino's group will develop machine vision to recognize Deep SHITSUKAN, including states, intentions, and semantic structures of people, objects, and places. Okatani's group will reveal the indescribable internal representation of Deep SHITSUKAN. Sato's group will use advanced physical measurement technology to determine the differences between real and fake artworks.

In B01, Kamitani's group will use brain decoding technology to reveal the three-dimensional model of the external world using functional MRI. Minamimoto's group will use the advanced neural manipulation methods (e.g., DREADD) to elucidate the brain's mechanism for computing value from SHITSUKAN. Suzuki's group will elucidate the neural basis of SHITSUKAN cognition from the perspective of clinical neurology, and explore ways to improve the SHITSUKAN environment. Nishida's group will examine the mechanism of SHITSUKAN recognition from visual, tactile, auditory, and lingual information from the perspectives of psychophysics and sensory engineering.

In C01, Iwai's group will modulate real-world SHITSUKAN with novel wearable light modulation glasses. Watanabe's group will realize Deep SHITSUKAN

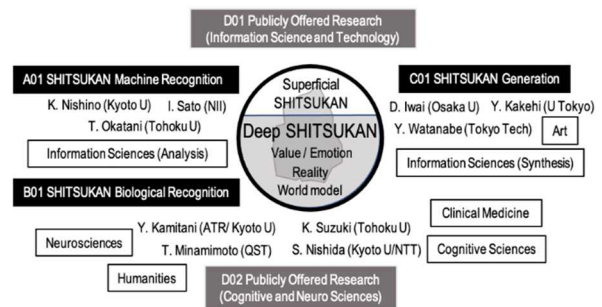


Fig. 1: Research formation

manipulation by high-speed projection mapping. Kakehi's group will generate new SHITSUKAN by multimodal control of real materials.

Planned Research will be supported by Publicly Offered Research groups belonging to either “D01: Information Science and Engineering for Deep SHITSUKAN” or “D02: Cognitive Neuroscience for Deep SHITSUKAN.”

#### 【Expected Research Achievements and Scientific Significance】

In informatics, we expect to develop technologies that can recognize Deep SHITSUKAN like humans do, recognize Deep SHITSUKAN that humans cannot perceive, and manipulate Deep SHITSUKAN in the real world as one wish. In art, we expect further fusion of art with science and the realization of ultimate cloned artworks. In cognitive neurosciences, we expect to make progress in understanding the neural mechanisms of Deep SHITSUKAN, the relationship between perception and emotion, and the nature of subjective reality. In clinical aspects, we expect to improve the quality of the living environment for people with brain dysfunction and to find universally comfortable SHITSUKAN environments.

#### 【Key Words】

SHITSUKAN: A Japanese word that literarily means "the sense of quality." In this research project, we use this term to refer to the senses of physical properties, materials, and conditions of things and events, as well as the human ability to estimate the subjective values.

【Term of Project】 FY2020-2024

【Budget Allocation】 1,150,800 Thousand Yen

#### 【Homepage Address and Other Contact Information】

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