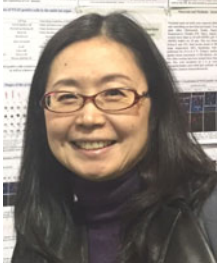


**Interdisciplinary Area**



**Title of Project : Integrative Research toward Elucidation of Generative Brain Systems for Individuality**

Noriko Osumi  
(Tohoku University School of Medicine, Professor)

Research Project Number : 16H06524 Researcher Number : 00220343

**【Purpose of the Research Project】**

How does individuality emerge? Individual genomic differences (personal characteristics) form the basis, but the manifestation of individuality varies according to upbringing, lifestyle and other environmental factors. This is because of the epigenome, a mechanism that changes the way genes work in response to the environment. We see individuality in mental functions, such as cognitive faculties and personality, which depend on the function of the cerebral nervous system, but we lack a clear understanding of the neural basis or the genetic/environmental factors involved. In recent years, however, we have gained access to “big data,” including human brain imaging data, data from observation of animal behavior, and neural activity data, facilitating various kinds of multivariate analyses. We now have an excellent opportunity to undertake research on individuality. In this innovative/interdisciplinary project, we aim to understand the emergence of individuality by elucidating diversity in brain development and evolution.

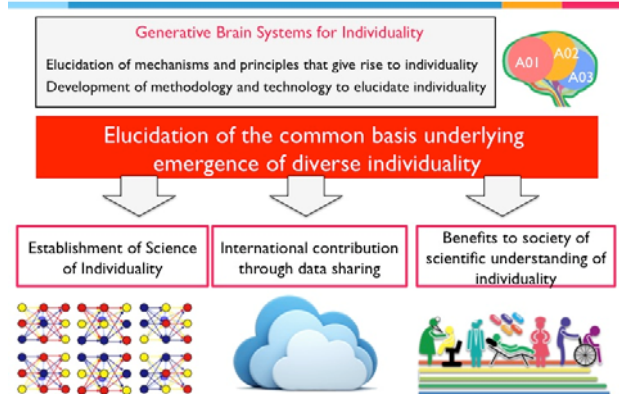
**【Content of the Research Project】**

Our innovative research will be undertaken through close collaboration among researchers in A01 humanities and social sciences, A02 biology, A03 mathematics and technology to understand emergence of individuality in humans and other animals based on diversity in cerebral nervous system growth and development and fluctuations due to intervention. By establishing models and frameworks common to humans and animals, it will be possible to do animal-based research on problems such as intrapopulation maladaptation and transmission to the next generation, which have hitherto been difficult to research using humans alone.

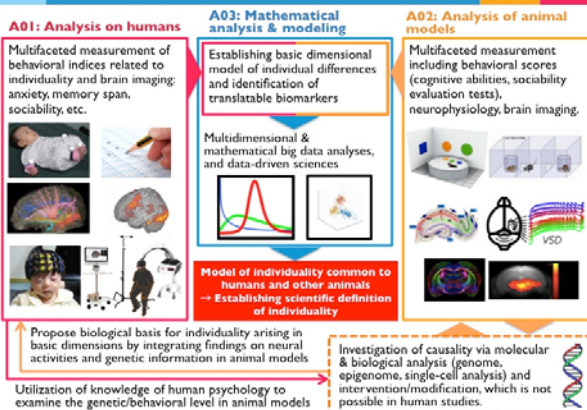
**【Expected Research Achievements and Scientific Significance】**

The creation of a new discipline that integrates research fields such as neural development, neurogenesis, developmental brain science, novel tools, big data, and mathematical models, has the potential to develop significantly in ways that could have a broad and powerful impact on related disciplines, such as medicine, informatics, pedagogics and humanities. We plan to promote this activity by establishing an international data-sharing platform. We believe the virtual “aggregation of knowledge” resulting from the creation of this new discipline has the potential to contribute significantly to international society. Moreover, by elucidating the neural basis and molecular mechanisms underlying the emergence of individuality, this research may facilitate effective utilization of our scientific understanding of diverse forms of individuality within society. Because it is important for our society to handle scientific knowledge relating to individuality with caution, we intend to examine the ethical, society, and legal issues associated with the dissemination and utilization of scientific information regarding individuality and to provide a basis for the formation of a social consensus.

**Significance of this research and spin-off benefits**



**Strategy for understanding individuality, the goal of this research area**



**【Key Words】**

**“Individuality”**: Here we refer to individual differences in traits and/or characteristics in organisms, ranging from animals to humans, as “individuality.”

**Basic dimension model**: A model of a basic framework underlying personality structure

**【Term of Project】** FY2016-2020

**【Budget Allocation】** 1,153,000 Thousand Yen

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

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