



**Title of Project : Replacement of Neanderthals by Modern Humans :
Testing Evolutionary Models of Learning**

Term of Project : FY2010-2014

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【Purpose of the Research Project】

This project will interpret the gradual replacement of Neanderthals by modern *Homo sapiens* in an innovative framework that illuminates the contrast between modern human societies, which succeeded in solving survival-strategic problems, and Neanderthal societies, which failed to do so. We view this divergent outcome between the two types of societies as being attributable to a difference in learning abilities between the two species. Thus, we propose a working hypothesis (hereafter called the “learning hypothesis”), which explains the replacement in terms of a difference in their learning abilities, and will subject this hypothesis to various empirical tests.

【Contents of the Research Project】

Modern humans appeared in Africa about 200,000 years ago and, as they later spread across Eurasia, encountered indigenous Neanderthal populations. The two species coexisted until 30,000 years ago or perhaps even later, but the Neanderthals eventually went extinct. A number of current hypotheses address the possible mechanics of the replacement of Neanderthals by modern humans, and there has been extensive debate as to whether or not the presence of the latter accelerated the extinction of the former.

In this context, this project will investigate the differences in individual and social learning abilities between Neanderthals and modern humans, and show that the relatively advanced learning abilities of modern humans were a/the decisive factor.

The learning hypothesis is significant in that it seeks to explain the replacement in terms of a difference in learning abilities, as evidenced by a difference in the responses of the two species to environmental change. Thus, Neanderthal societies persisted in maintaining their traditional culture(s), whereas modern human societies created new culture(s) in response to environmental change.

The specific goal of this project is to verify the learning hypothesis within an interdisciplinary research framework incorporating new perspectives and methods from the humanities, biological sciences including neuroscience, and engineering. There are three research foci.

- (1) Empirical demonstration of a difference in learned behaviors between Neanderthals and modern humans;
- (2) Theoretical and empirical demonstration of the circumstances that led to a difference in learning abilities between Neanderthals and modern humans;
- (3) Demonstration of a difference in learning abilities between Neanderthals and modern humans, based on anatomical evidence for a structural difference in their brain neural substrates.

The overall plan of the project is to integrate the results of research in these three domains and to comprehensively test the validity of the learning hypothesis. In addition, from our perspective on the importance of learning, we will attempt to define a new verifiable evolutionary model, which predicts how and under what circumstances modern *Homo sapiens* acquired their unique high intelligence and modern behaviors.

【Expected Research Achievements】

This project is unique in its focus on learning abilities in the search for an explanation of the replacement phenomenon. It will have a strong impact on the replacement problem and on the design of research in this field. The research strategy itself is original in that it will integrate specialized knowledge accumulated in various disciplines (archaeology, paleoanthropology, genetics, etc.), not simply as a discipline-segmented collection of information, but under the overarching concept of learning abilities. Providing tests of the currently available hypotheses, creating a more universal system of knowledge, and offering a new development in debate the origins of modern humans, this project will make a major academic contribution.

【Key Words】

Neanderthals, modern human origins, learning, Middle to Upper replacement event, human evolution

【Homepage Address】

<http://www.koutaigeki.org/>