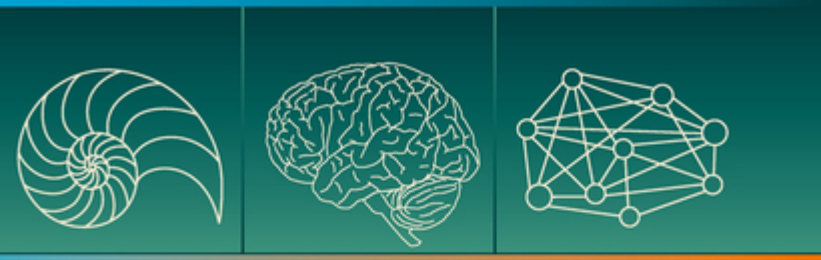

Culture and Neural Frames of Cognition and Communication

Shihui Han
Ernst Pöppel
Editors

PARMENIDES BOOK SERIES
ON THINKING

Springer

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On Thinking

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Preface

The present volume of the book series *On Thinking* is organized based on the seventh Sino-German workshop on cognitive neurosciences in Beijing in October 2008. This workshop is one of the series conferences that are organized by the Department of Psychology at Peking University, Beijing, China, and the Human Science Center of Munich University, Germany, and attended by psychologists, cognitive neuroscientists, linguistics, anthropologists, psychiatrists, computer scientists, philosophers, economics, sociologists, and researchers in other related fields from China, Germany, Japan, Poland, the USA, the Netherlands, Hungary, and Russia. The goal of the series workshops is to promote the communication and cooperation in cognitive neuroscience between researchers from different disciplines and different countries.

The workshop in 2008 focused on the relationship between culture and cognition because there has been accumulating evidence during the last few years that sociocultural contexts generate strong influences on human cognitions and the underlying neural substrates. Since then, there has been increasing interest in studies of the interaction between sociocultural factors and multiple levels (e.g., gene, neuron, neural circuit) of the biological basis of human cognitive processes. Researchers have also started to examine neurocognitve processes in specific sociocultural contexts from the evolutionary point of view in order to understand the mutual interactions between environments and the human brain.

The present volume contains presentations from the workshop and some invited chapters. Two chapters give general views of the relationship between biological evolution and cultural evolution and recent cultural neuroscience studies of social cognition. Other chapters focus on several aspects of human cognition that have been shown to be strongly influenced by sociocultural factors such as self-concept representation, language processes, emotion, time perception, and decision making. The main goal of this volume is to address how thinking is conducted and how the underlying neural mechanisms are affected by culture and identity – a frame in which human cognition develops and evolves.

We very much appreciate the contributions of the distinguished authors from different disciplines who contribute greatly to both the series workshop and the present volume of the series *On Thinking*. We are also grateful to Anette Lindqvist from Springer Science+Businesses Media and Susanne Piccone from the Human Science Center of Munich University for their constant support which makes the series Sino-German workshop and the series book possible.

Peking, China — Shihui Han
Munich, Germany — Ernst Pöppel
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Neuroplasticity: Biological Evolution's Contribution to Cultural Evolution

Bruce E. Wexler

Abstract The increase in brain size in humans relative to other primates is due to an increase in the number of cells and their interconnections. These increases exponentially increase the number of possible combinations of cells. Brain functions, including behavior and cognition, are based on functional systems that integrate widely distributed brain areas and millions of individual cells. The connections among neurons that constitute these functional systems are shaped by neuronal activity induced by stimulation from the environment. The powerful postnatal shaping of brain structure and function by environmental input during childhood continues much longer in humans than in other animals. Moreover, humans are the only animal that shapes the environment that shapes its brain. Today, most children are raised in largely human-made environments. This process of creating different neural structures through transgenerational alterations in the rearing environment is cultural evolution. By young adulthood, established neurocognitive structures are self-maintaining and the biological processes that support change in neuronal connections become less powerful. As a result, the homology between internal neurocognitive structures and the external environment achieved in childhood by the brain shaping itself to the environment is maintained in adulthood by acting on the environment to make it match established internal structures.

Keywords Cultural evolution · Evolution · Epigenetic · Neuroplasticity · Parenting · Rearing environment

1 Introduction

The human brain differs from the brains of other mammals most fundamentally in the greater extent to which development of its structure and function are influenced

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