

Life Sciences

AUGMENTING COGNITION

EDITED BY
IDAN SEGEV
AND
HENRY MARKRAM

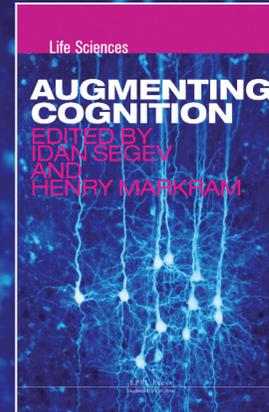
The Human brain is only 100,000 years old. Yet, this newly evolved organ endows us with unique creative capabilities beyond all other living creatures, including the gift to understand itself. As our very survival and success in life depends on utilizing our brain's power, intense efforts have begun worldwide to understand the brain, reverse-engineer it and even augment its capacity. Towards this end we harness every trick in the book of mathematics, physics, chemistry, pharmacology, biology, psychology, as well as computer science, information sciences, and engineering – giving rise to the birth to the new *AugCog Era*.

The new AugCog research field focuses on the development of scientifically-based rigorous approaches, including brain-computer interfaces and the use of various drugs, for restoring and augmenting cognition. The field includes the study of the relationship between basic operational states of the brain, such as sleep, or daily activities such as dance and their impact on augmenting cognitive capabilities.

This book confronts our entry into the *AugCog Era* through a series of contributions from the world's best know experts. The book is divided into two sections, the first of which discusses state-of-the-art methodologies; and the last provide some perspective on the social and ethical issues. These two parts are separated by an interlude in cognition, where a fascinating story of the savant syndrome is told.

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ABOUT THE EDITORS

Idan Segev is the David & Inez Myers Professor in Computational Neuroscience and former director of the Interdisciplinary Center for Neural Computation (ICNC) at the Hebrew University of Jerusalem. His research team utilizes computational tools to study how neurons, the elementary microchips of the brain, compute and dynamically adapt to our ever-changing environment. The ultimate goal is to unravel how local fine variations within the cortical network underlie specific computations (e.g., the orientation of a bar in the visual system) and may give rise to certain brain diseases or to a healthy individual brain.

Henry Markram is the Project Director of the Blue Brain Project, Director of the Center for Neuroscience & Technology and co-Director of EPFL's Brain Mind Institute (BMI). At the BMI, in the Laboratory for Neural Microcircuitry, Markram has continued his work to unravel the blueprint of the neocortical column, building state-of-the-art tools to carry out multi-neuron patch clamp recordings combined with laser and electrical stimulation as well as multi-site electrical recording, chemical imaging and gene expression. The ultimate aim of his ambitious Blue Brain Project is to simulate the brains of mammals with a high level of biological accuracy and study the steps involved in the emergence of biological intelligence.

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