

Chapter 2

Naturalizing Consciousness Emergence for AI Implementation Purposes: A Guide to Multilayered Management Systems

Jordi Vallverdú

Universitat Autònoma de Barcelona, Spain

Max Talanov

Kazan federal University, Russia

ABSTRACT

The purpose of this chapter is to delineate a naturalistic approach to consciousness. This bioinspired method does not try to emulate into a 1:1 scale real mechanisms but instead of it, we capture some basic brain mechanisms prone to be implemented into computational frameworks. Consequently, we adopt a functional view on consciousness, considering consciousness as one among other cognitive mechanisms useful for survival purposes in natural environments. Specifically, we wish to capture those mechanisms related to decision-making processes employed by brains in order to produce adaptive answer to the environment, because this is the main reason for the emergence and purpose of consciousness.

DOI: 10.4018/978-1-5225-1947-8.ch002

INTRODUCTION

The purpose of this chapter is to delineate a naturalistic approach to consciousness. This bioinspired method does not try to emulate into a 1:1 scale real mechanisms but instead of it, we capture some basic brain mechanisms prone to be implemented into computational frameworks. Consequently, we adopt a functional view on consciousness, considering consciousness as one among other cognitive mechanisms useful for survival purposes in natural environments. Specifically, we wish to capture those mechanisms related to decision-making processes employed by brains in order to produce adaptive answer to the environment, because this is the main reason for the emergence and purpose of consciousness (Ross, 2010; vanGaal et al 2012). From an evolutionary perspective, consciousness is cognitive mechanism useful for self-evaluation processes as well as for taking somehow elaborated decisions and managing attention processes (Damasio, 1999; Taylor, 2010). Thanks to the neuromodulators involved into attention processes, we can establish a clear connection between neuromodulatory activities and consciousness emergence (Montemayor & Haladjian, 2015). Despite of the previous ideas, in no case we suggest that consciousness is the highest and privileged way to manage multi-haptic data received by an organism. It is one of the several ways that employs the brain to process valuable information, although it is clear that consciousness owns several self-monitoring mechanisms and usually it makes possible to guide the whole system towards a required action.

We propose the crucial mechanism for emotional information processing, the neuromodulation, which must be placed into the multi-dimensional architecture of the cognition. The neuromodulators influence several emotional, intentional and processing mechanisms in the brain. For example: the presence of the DRD4 (the gene of dopamine receptor D4) is involved in subtle, and complex behavior. We use the naturalistic approach to consciousness and its emergence that is related to the active and determinant role of neuromodulators and we propose modeling consciousness emergence pathways. Our research is oriented towards the design of multi-dimensional cognitive systems into AI research. Some of our previous results (from NEUCOGAR project Vallverdu et al, 2016) are presented here as validation of our foundational ideas in the field.

THE DEBATES ON THE MEANING OF WORD ‘CONSCIOUSNESS’

David Chalmers’ Online database on consciousness is exhaustive and “monumental” (<http://consc.net/online>), indicating the great interest for this topic, expressed by philosophers, psychologists, neurologists, anthropologists or computer scientists.

15 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/naturalizing-consciousness-emergence-for-ai-implementation-purposes/176184

Related Content

Genetic Algorithms

Darryl Charles, Colin Fyfe, Daniel Livingstone and Stephen McGlinchey (2008). *Biologically Inspired Artificial Intelligence for Computer Games* (pp. 105-120). www.irma-international.org/chapter/genetic-algorithms/5909

Anatomical Therapeutic Chemical Classification (ATC) With Multi-Label Learners and Deep Features

Loris Nanni, Sheryl Brahnam and Gianluca Maguolo (2020). *International Journal of Natural Computing Research* (pp. 16-29). www.irma-international.org/article/anatomical-therapeutic-chemical-classification-atc-with-multi-label-learners-and-deep-features/258958

Squeeze Casting Parameter Optimization Using Swarm Intelligence and Evolutionary Algorithms

Manjunath Patel G. C., Prasad Krishna, Mahesh B. Parappagoudar, Pandu Ranga Vundavilli and S. N. Bharath Bhushan (2018). *Critical Developments and Applications of Swarm Intelligence* (pp. 245-270). www.irma-international.org/chapter/squeeze-casting-parameter-optimization-using-swarm-intelligence-and-evolutionary-algorithms/198929

A Novel Method for High Capacity Reversible Data Hiding Scheme Using Difference Expansion

Subhadip Mukherjee and Biswapati Jana (2019). *International Journal of Natural Computing Research* (pp. 13-27). www.irma-international.org/article/a-novel-method-for-high-capacity-reversible-data-hiding-scheme-using-difference-expansion/237981

Multi-Objective Generation Scheduling Using Genetic-Based Fuzzy Mathematical Programming Technique

Abdellah Derghal and Noureddine Goléa (2017). *Nature-Inspired Computing: Concepts, Methodologies, Tools, and Applications* (pp. 1131-1160). www.irma-international.org/chapter/multi-objective-generation-scheduling-using-genetic-based-fuzzy-mathematical-programming-technique/161065