



THE CONCEPT OF RESONANCE: FROM PHYSICS TO COGNITIVE PSYCHOLOGY



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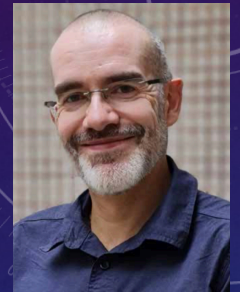
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ABSTRACT. There are very few connections between physics and cognitive psychology. But in this paper, we assume that recent models inspired by concepts issued from physics and problem solving cognitive processes like the Model Human Processor with Real Time Constraints (MHP/RT) model (Kitajima and Toyota, 2012) allow to better describe and predict human behaviors especially in complex and dynamical environments where interactions between several bands and space-time constraints exist. After presenting the importance of the concept of resonance in physics and in cognitive psychology, the deterministic chaos in human action and behavior will be described, by focusing on an innovative model directly inspired by models issued from physics and problem-solving cognitive processes, Model Human Processor With Real Time Constraints (MHP/RT). If nowadays, the distance between physics and psychology is very prominent, the main goal of this paper is to defend the necessity to (re-)create strong relationships between physics and psychology to better understand and predict human behaviors because these situations are the majority of situations where an individual takes actions (such as walks, reads, stops, watching the other pedestrians' behavior in complex buildings or in street, etc.).

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Keywords: Physics; Resonance; Deterministic chaos; Cognitive modelling

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Muneo Kitajima currently works at the Department of Management and Information Systems Engineering, Nagaoka University of Technology. His recently published book “Memory and Action Selection in Human-Machine Interaction” (2016) proposes a unified theory of action selection and development by integrating PDP, Two Minds, and Layered structure of human action. The theory provides a comprehensive view of how our brain functionally works in our daily life. His current interest is to understand the implications of the theory to development of skill of adaptive problem solving, the important skill for survival.

He works with Jérôme Dinet since many years to better understand human behaviours in complex and dynamic situations (eg., pedestrians in urban areas). Jérôme Dinet is interested in the development of cognitive processes, specially for users with specific needs (young children, children with autism spectrum disorders, elderly people, ...) by combining quantitative and qualitative data obtained in experimental and ecological studies.

Together, they are trying to describe and modelise human behaviours by using concepts issued from complementary approaches such as physics and psychology.

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