

UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

Computational cognitive requirements of random decision problems

Permalink

<https://escholarship.org/uc/item/93h185q4>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 42(0)

Authors

Franco, Juan Pablo

Doroc, Karlo

Yadav, Nitin

et al.

Publication Date

2020

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at <https://creativecommons.org/licenses/by/4.0/>

Peer reviewed

Computational cognitive requirements of random decision problems

Juan Pablo Franco

University of Melbourne, Melbourne, Australia

Karlo Doroc

University of Melbourne, Melbourne, Australia

Nitin Yadav

University of Melbourne, Melbourne, Australia

Peter Bossaerts

University of Melbourne, Melbourne, Australia

Carsten Murawski

University of Melbourne, Melbourne, Australia

Abstract

Previous studies have found that for electronic computers the computational requirements of solving an instance of a problem are related to a specific set of features of the problem. This mapping has been shown to apply to electronic computers on a multitude of problems and is referred to as Instance Complexity (IC). However, it remains an open question whether IC applies to humans. For this purpose, we ran a set of experiments in which human participants solved a set of instances of one of three, widely studied, computational problems (Knapsack, Traveling Salesperson and the Boolean Satisfiability). We found that, in line with our hypothesis, IC had a negative effect on human performance in all problems. Our results suggest that IC can be used as a generalisable measure of the computational resource requirements of a task. Moreover, given its properties, IC could serve a crucial role in the cognitive resource allocation process.