

UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

Signatures of hierarchical, heuristic-guided planning in real-world human conceptual navigation

Permalink

<https://escholarship.org/uc/item/3f7109zh>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 48(0)

Authors

Lan, Denis C. L.

Mattar, Marcelo G

Publication Date

2026

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

Signatures of hierarchical, heuristic-guided planning in real-world human conceptual navigation

Denis C. L. Lan

University College London, London, United Kingdom

Marcelo G. Mattar

New York University, New York City, United States of America

Abstract

Real-world planning requires navigating vast spaces of possible futures, many of which are unknown. However, prior studies of human planning have focused on simplified environments with fully specified state spaces. To bridge this gap, we explored human planning in the Wiki Game, where players navigated a vast and sparsely known conceptual network—*Wikipedia*. We analyzed human behavior across two datasets (a large naturalistic online dataset and a controlled laboratory experiment) and simulated the performance of various agents implementing various combinations of strategies. We identified signatures of heuristic and hierarchical strategies within both human and agent behavior: both participants and hierarchical heuristic-guided search models made choices that appeared biased by semantic similarity and graph centrality at stereotyped points in their trajectories and exhibited deliberation dynamics that were modulated by heuristic factors and category boundaries. Overall, this suggests that humans may navigate vast, sparsely known environments using hierarchical, heuristic-guided search.