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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Permalink

Journal

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Publication Date

2015

Peer reviewed

Alien Bacteria Found on Mars! A Model of Conceptual Change using the Re-categorization Paradigm

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Abstract: Many conceptual change theories posit that change occurs due to a variety of cognitive, social, and emotional factors (Dole & Sinatra, 1998; Ohlsson, 2011), however, few theories have tested these claims via computational models of conceptual change. In this paper, we present a hierarchical Bayesian model that addresses change processes and their effects on re-categorization, a form of concept change. Human data from a study using the re-categorization paradigm (Ramsburg & Ohlsson, 2013) are compared to the computational model. The structure of the human data suggests the 'non-monotonic' nature of conceptual change (Ohlsson, 2011) as indicated by the best-fit learning curves. For several such curves, model comparisons suggest good fits between the computational simulations and human data. The nonlinear form of the model's update functions lends additional support to concept change as a non-monotonic process. The model is discussed as a "proof of concept" for future conceptual change modeling endeavors.