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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 38(0)

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Publication Date

2016

Peer reviewed

An interactive model accounts for both ultra-rapid superordinate classification and basic-level advantage in object recognition

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Abstract: While people are faster to categorize objects at an intermediate or basic level of specificity (e.g. “bird”), several recent studies have shown them to have much earlier access to more general category information (e.g. “animal”). Ultra-rapid superordinate classification has been taken as evidence that recognition processes are largely feed-forward. In simulations with a deep neural network model, we show that this conclusion does not follow: even a model that is fully recurrent and interactive shows ultra-rapid superordinate classification patterns when tested with analogs of behavioral tasks such as rapid serial visual presentation or deadline classification. Moreover, this recurrent model explains recently-observed similarities and differences in the time-course of classification as estimated by electro-encephalography (EEG) versus human electro-corticography (ECoG), and also account for the well-known basic-level advantage in non-speeded classification. These results provide evidence that ultra-rapid and unconstrained visual object recognition is supported by interactive processes in the brain.