

Integrating Top-Down and Bottom-up Approaches in Holistic Perceptual Categorization

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Perceptual categorization is a key problem for an agent to cope with its internal and external world. Following a functional and subjective approach of cognitive modeling, the primary purpose of perceptual categorization is modeled as the valuation of a stimulus regarding its potential to satisfy an agent's current needs. Additionally an integrated and holistic approach is used, where categorization considers the integration of subjective influences. Such an approach complies with the consideration of top-down perception and priming. Using an activation-based exemplar model, the objective criterion of perceptual similarity, which represents bottom-up aspects of perception, and the subjective expectation-based criterion of cathexis, which represents top-down aspects of perception, are integrated in a holistic multi-criteria model of perceptual categorization. An Artificial Life simulation demonstrates the model's ability to relate stimulus objects to an agent's internal needs. Additionally, the usage of multiple criteria provides a more confident valuation of stimulus objects.