

# New Research From Psychological Science

May 23, 2016

Read about the latest research published in *Psychological Science*:

## [From Creatures of Habit to Goal-Directed Learners: Tracking the Developmental Emergence of Model-Based Reinforcement Learning](#)

*Johannes H. Decker, A. Ross Otto, Nathaniel D. Daw, Catherine A. Hartley*

In making decisions, people may engage in deliberate processing that draws on existing cognitive models or more automatic processing that relies on reward-based feedback. Adults can toggle between these slow and fast strategies, but the developmental trajectory of such decision making is unknown. Children, adolescents, and young adults completed a computer-based sequential learning task that involved collecting “space treasure.” Participants chose a spaceship, which usually landed on one planet but occasionally landed on another one, and then selected an alien to complete the mission. They were rewarded with space treasure or nothing, based on a gradually shifting probability. All three age groups tended to repeat initial choices that led to treasure (model-free learning), but only adolescents and adults were also able to use knowledge about the different landing probabilities in making their choices (model-based learning). The findings suggest that individuals’ ability to use model-based decision-making strategies matures with age into adulthood.

## [The Perception of History: Seeing Causal History in Static Shapes Induces Illusory Motion Perception](#)

*Yi-Chia Chen and Brian J. Scholl*

When we look at certain shapes — such as a cookie with a chunk missing, a dented can, or a twisted towel — we implicitly perceive the shape as having changed over time. For example, a cookie missing a bite-size chunk is seen as a cookie that started whole and was then bitten. Are these kinds of observations the product of visual processing or do they reflect higher-level reasoning based on visual input? Participants watched an animation of a square as it changed into a form with a “piece” missing and reported whether the change occurred suddenly or gradually. When the contours of the missing piece reflected a causal history, observers reported that the change unfolded gradually even when the change was actually sudden. This phenomenon provides robust evidence that visual processing is influenced by higher-level cognitive processes allowing us to reconstruct the causal history of the shapes.

## [Associative Activation and Its Relation to Exploration and Exploitation in the Brain](#)

*Shira Baror and Moshe Bar*

Does the word “blue” make you think of the sky or a banana? The strength of the association between

different concepts may depend on whether the mind is focused internally or externally. Previous research indicates that the mind constantly oscillates between a “big picture” exploratory focus that favors novelty and a more detail-oriented exploitation focus that favors familiarity. Across three experiments, subjects viewed a series of target words and reported the first associated word that came to mind. At the same time, subjects were also asked to complete a cognitive task that was either easy or challenging, such as remembering either a two-digit or a six-digit number. Subjects tended to produce more diverse and original word associations under a low cognitive load compared with a high cognitive load. These results suggest that an exploratory focus is the brain’s default state, but this focus narrows to favor more immediate associations under high-load conditions.