Structured knowledge and novel object kinds can be inferred from visual event streams

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One way to achieve abstraction from sensory experiences is to encode relations among sensory events: a basic one being the direction of prediction (‘before’ vs ‘after’).

To what extent do adult learners do this spontaneously in naturalistic and bottom-up fashion?

Statistical information should spontaneously inform conceptual judgment and category formation without a top-down instructional context.

Relational schemas should operate fairly automatically during event processing.


Experiment 1: How objects attain causal properties from naturalistic event streams

Stimuli: sequence of 250 animated visual events for 2 objects, order governed by markov chain.

Oddball decision task
- Higher (40%) noticing rate due to slight changes in the task. Thus, participants split into noticers and non-noticees using likelihood responses post-task.
- Training object 2 was always tested first.
- Same-relation condition: ‘cause’ event was ambient for both videos, or object-based for both videos.

Familiarity forced choice test
- Strong transitions compared to weaker transitions administered following all training exposure

Motion match F(1,17) = 15.36, p < .001  Causal match F(1,17) = 5.52, p < .05

Why is this important?

Predictive structure is a pervasive part of experience that can be extracted using straightforward learning mechanisms. But it can also be leveraged to gain abstraction, as predictive relations can be generalized across participating events and sensory features. Together, this could account for bottom-up abstraction of sensory experience and the formation of novel kinds generalizing across sensory features.