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Novelty Drives Exploration in Early Development in a Bottom-up Manner

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Abstract

One hypothesis for the exploration-to-exploitation developmental shift posits that children's heightened exploration can be driven by stimulus perceptual novelty through a bottom-up mechanism. A challenge to test this hypothesis has been the conflation of perceptual novelty and epistemic uncertainty, making it difficult to examine its independent effect. The current study decoupled perceptual novelty and uncertainty to provide new evidence that perceptual novelty alone can drive early exploration. We conducted two experiments in which children and adults were instructed to collect rewards from different options. Computational modeling was employed to compare children' and adults' exploration strategies. The results revealed that unlike adults, children were more likely to choose the option with perceptual novelty even when it had low reward values and no epistemic uncertainty. However, their novelty-preference attenuated when stimulus perceptual novelty was hidden rather visible, indicating that perceptual novelty drives heightened exploration in early development in a bottom-up manner.

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