Modeling Object Knowledge from Child Visual Experience

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Abstract

The distributional approach to language has been helpful in understanding and making predictions about children's semantic and linguistic development. In the current research, we apply similar techniques to study children's conceptual development using their first-person visual experiences. This study investigates the distributional properties of objects encountered in early visual experience and how they may contribute to the learning of concept organization. Frames were extracted from head-mounted camera videos at regular intervals, segmented into objects, and manually annotated with their superordinate and subordinate categories. We then built a distributional model of object–image co-occurrences and computed the similarity of different objects based on their distributional statistics. We show that objects' distributional patterns would allow children to make useful predictions about objects' high-level semantic categories, such as foods, appliances, and electronic devices. These results highlight that early distributional experiences may facilitate category formation, with implications for developmental theory and computational modeling.

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