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The Role of Word Labels in Children's Causal Inductions and Exploratory Play

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Although there is widespread agreement that children learn through exploratory play, little is known about the factors that affect children's exploratory play or how exploratory play might lead to accurate learning. However, recent research suggests that children's exploratory play might be affected by the ambiguity of the evidence children observe. For instance children who are allowed to play with a toy that provides causally unambiguous evidence later prefer a novel toy; children who are given causally ambiguous (confounded) evidence, continue to explore the original toy (Schulz & Bonawitz, in press). The current study looks at whether children's exploratory play is affected when an ambiguity arises, not from confounded evidence, but from a conflict between an object's category membership and its causal properties.

Considerable evidence suggests that children can use word labels to make inductive generalizations concerning non-obvious properties of objects (e.g. Gopnik & Sobel, 2000). That is, children expect objects with the same label to possess the same hidden causal properties. Critically, note that if a causal property is *not* shared by every token of a type (i.e., some 'blickets' are magnetic and some are not), the causal power of any particular token is ambiguous. However, children should not be surprised if objects with different labels possess different causal properties (if 'blickets' are magnetic and 'dax' are not). Given different labels, the causal properties of individual objects are disambiguated by their category membership; membership in different categories accounts for the difference in causal properties (see Prasada, 2006). Here we predict that given perceptually identical objects, children will play more with a set of objects if the causal properties of the objects vary within a single category than if they vary between categories. In the former case, children need to explore every token of the type to identify its causal powers; in the latter, exploring a single token of each type suffices to infer the objects' causal properties.

Method

Participants: Thirty-two 4-year-old children, (M = 48m, Range = 42m – 57m; 44% female) were recruited from the Discovery Center of the Museum of Science, Boston.

Materials: Two sets of perceptually identical purple, inch long cylindrical blocks, with a yellow face, were used. One set of five blocks was magnetic; the other set (of ten blocks) was inert. A magnetic board attached to a three-legged support was also used.

Procedure: Children were shown the set of five magnetic blocks and were told they were 'Blickets'. Each block was then stuck to the magnet board so it hung upside down. Children were then presented with the second set of ten (inert) blocks. In the *One Word* condition, the experimenter said, "And here are some more Blickets". In the *Two Word* condition, the experimenter said, "And here are some Dax". Children were allowed to play freely for 60 seconds, after which the experimenter returned and ended the experiment.

Results & Discussion

There were no differences between conditions in total time spent playing with all the blocks (from both sets). We coded the number of blocks from the second (inert) set that children tried to stick to the board; we also looked at how many children in each condition tested more than a single block from the inert set. Children in the *one word* condition attempted to stick more inert blocks (M = 4.6) to the board than children in the *two word* condition (M = 2.7), (Mann Whitney U test, Z = 2.47, p_2=0.014). Additionally, significantly more children tested just a single block from the inert set in the *two word* condition than in the *one word* condition (χ^2 (1, N = 32) = 8.96, p ≤ 0.01).

The results of this study suggest the role of word labels in disambiguating children's causal inductions and affecting their exploratory play. When membership in a category was uninformative about an object's causal properties, preschoolers were sensitive to the ambiguous status of each token of the type and selectively engaged in exploratory play. By contrast, when the difference in causal properties could be explained by differences in category membership, preschoolers inferred that evidence about the causal properties of a single token generalized to every token of that type. They were able to use this inference to constrain their exploratory play (indeed, 46% of the children in the *two word* condition tried only a single block from the inert set; strikingly, no children did so in the *one word* condition). These results suggest that, even when children are 'just playing', they are sensitive to causal ambiguity and to the relationship between category membership and causal properties.

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