

Science Education Collection

Mutual Exclusivity: How Children Learn the Meanings of Words

URL: <https://www.jove.com/science-education/10132>

Overview

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Humans are different from other animals in many ways, but perhaps the most important differentiating factor is their ability to use language. Other animals can communicate and even understand and use language in limited ways, but trying to teach human language to a chimp or a dog takes a great deal of time and effort. In contrast, young humans acquire their native language easily, and they learn linguistic rules without explicit instruction, which is an accomplishment that even the smartest animals cannot match.

One advantage young humans have over animals is that the human brain is especially adapted to learn new words. With only a few exposures, young children can learn new words and remember them. Perhaps more impressively, children can use what they already know to guide their future learning. For example, children treat objects as if they have only one label. So, if a child has learned the word hammer, they won't assume an unfamiliar tool has the same name. This is the principle of mutual exclusivity.¹⁻²

This video demonstrates children's ability to use mutual exclusivity to match words to objects in their environment.

Procedure

Recruit healthy 2-year-old children with normal hearing and vision and no history of developmental disorders. For the purposes of this demonstration, only one child is tested. Larger sample sizes are recommended when conducting any experiments.

1. Gather the necessary materials.

1. Select a familiar and unfamiliar test object.
 1. The familiar test object should be something identifiable to most 2-year-olds. In this case, use a toy banana.
 2. The unfamiliar test object should be something unfamiliar to most 2-year-olds. In this case, use a garlic press.

2. Data collection

1. Seat the child at a table across from the experimenter. The child may sit on a parent's lap, if necessary.
2. Place the two objects in front of the child, but out of their reach.
3. Say, "Look at what I have here. I have a dax here."
4. Push the objects into the child's reach and say, "Can you get the dax?"
5. Note which object the child handles. If the child responds ambiguously (e.g., the child grabs both objects), ask, "Can you give me the dax?" while holding out a hand.
6. Note which object the child indicates or hands to the experimenter.

3. Analysis

1. After testing a sufficiently large sample of children, compare the proportion of children selecting the unfamiliar object to the number of children who would be expected to pick the unfamiliar object randomly.
2. Use a chi-square test to determine if children select the unfamiliar object at rates that exceed random responses, in this case 50%.

Results

Given two objects, each child responding at random would have a 50% chance of grabbing the unfamiliar object first. However, if the child knows the label of the familiar object and treats it as being exclusive to that object, then they should guess that the new label refers to the unfamiliar object (**Figure 1**). Because 2-year-olds have different experiences, not every child knows or remembers the label for the banana. So some toddlers select the banana, but most link the unfamiliar object to the novel label. In order to have enough power to see significant results, researchers would have to test at least 18 children.

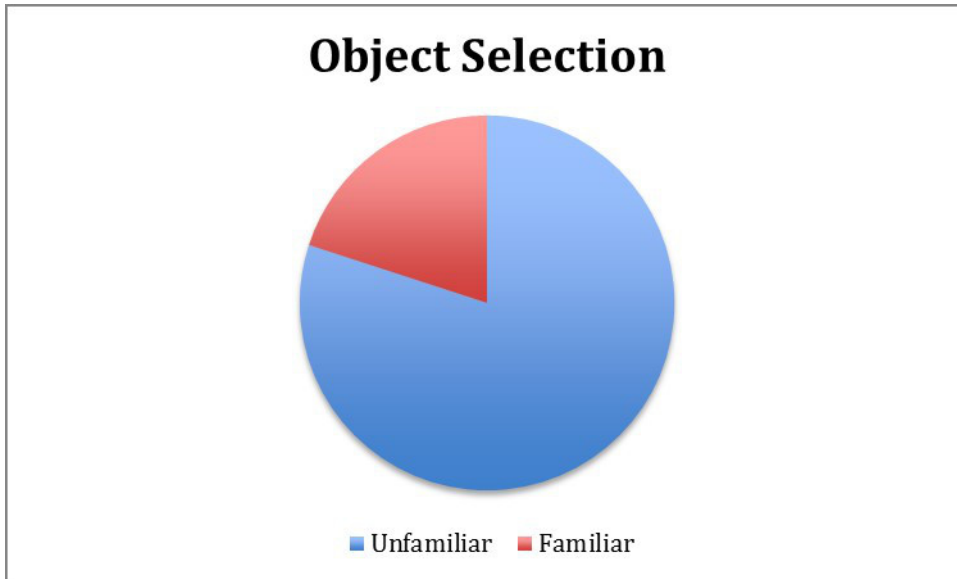


Figure 1: Pie chart showing the percent of children who selected the unfamiliar object.

Applications and Summary

The world is full of objects, and one of the early challenges faced by children who are learning a language is to match the labels they hear to the correct objects in their environment. Children have several tendencies that help them to solve this problem. First, they treat labels as referring to whole objects, so they don't get confused about what is being labeled. For example, when a child hears "banana," they don't think the label is a feature of the object, like a part or a color; they assume the word refers to the whole object. Second, children treat these labels as being exclusive. So, each object has only one name. Thus, if they hear a new label, they can assume it does not apply to any of the many items they've already learned to name. Since children learn words very effectively during this time in their development, they quickly reduce the ambiguity in their environment, and the problem of linking labels to objects becomes increasingly easy to solve using the principle of mutual exclusivity.

The finding that children can determine the meaning of a new word without having to receive direct instruction from another person is important, because it shows that parents and other adults do not have to make a special effort to teach their child language. Instead, just by speaking naturally and introducing the child to a wide range of objects and experiences, adults are actually enabling the child to learn new vocabulary.

References

1. Markman, E.M., & Wachtel, G.F. Children's use of mutual exclusivity to constrain the meanings of words. *Cognitive Psychology*. **20**, 121-157 (1988).
2. Merriman, W.E., & Bowman, L.L. The mutual exclusivity bias in children's word learning. *Monographs of the Society for Research in Child Development*. **54** (Serial Nos. 3-4) (1989).