Ellen Markman (1994):
“Constraints Children Place on Word Meaning”

- One way that word acquisition has been understood is that a child makes a hypothesis about the possible meaning of a word. Subsequent positive evidence upholds the hypothesis until negative evidence is encountered, at which point the child revises his assumption.
- Markman dismisses this notion:
  - Experiments have shown that, while children as young as two are quite good at acquiring word meanings, children as old as six are quite bad at inductive reasoning.
  - Quine (1960) correctly brings up the fact that for any set of data, there are infinite hypotheses that are consistent with the evidence.
- This paper explores the constraints that children use when formulating hypotheses about word meaning so that they don’t end up with the infinite (and wrong) guesses.

Whole-Object Assumption and Taxonomic Assumption:

- When presented with a novel term, a child will assume that it refers to the entire object that is indicated, rather than a piece of the object or an aspect of it. (“Dog” rather than “tail” or “furry” or “brown” or “Mommy petting the dog” or “dog under the tree”)
- This is somewhat problematic, because studies have shown that children’s attention is frequently drawn to thematic relationships (such as matching up Mommy and the dog because Mommy is patting the dog, or the dog and the tree because the dog is under the tree) rather than taxonomic categories (such as matching a dog and a cat). However, words hardly ever refer to relationships, and children must make that assumption.
- Markman and Hutchinson tested the whole-object constraint and the taxonomic assumption by performing an experiment with 4 and 5 year olds.
  - The experiment required children to match up a picture with another one like it.
  - When children were familiar with the object presented, they chose the thematically related picture (Cow with Milk, rather than Cow with Pig) about 75% of the time.
  - However, when presented with an unfamiliar word, they chose the categorically related picture about 75% of the time.
  - This demonstrated the use of taxonomic assumption in the learning of novel words.
  - They replicated these findings by gesturing toward the pictures rather than the previous condition of introducing an unfamiliar word.
- In order to be relevant to early language learning, though, these processes have to be at play in children who are even younger.
  - Bauer and Mandler (1989) attempted to show this by having 31-month olds sort objects.
    - They predicted that without any label, the children should sort by thematic relationship but with a label they would sort by category.
- This did not hold true, though—even without a label, the children sorted taxonomically about 75% of the time.
- It is possible to explain this outcome because of the design of the experiment’s reinforcement, since when the reinforcement was inverted, they achieved a similar rate of thematic sorting.
  - When Markman repeated the experiment without any reinforcement, the predicted outcome was achieved, proving that the taxonomic assumption is used by children as young as 18 months.

**Mutual Exclusivity Assumption**
- Children assume that each object has exactly one label. This, in turn, helps them override the taxonomic assumption in order to acquire more words.
- Mutual exclusivity appears to guide a child’s first guess at what a word means, but it is overridden when evidence to the contrary is presented.
- It is closely related to several other principles that have been investigated by various researchers:
  - One-to-one mapping
  - Uniqueness Principle
  - Contrastive principle—(Clark) the idea that each word contrasts with every other word. This is a broader principle than mutual exclusivity, and is how children can make sense of the fact that “dog” and “animal” cannot in fact mean identical things.
    - Problem with Clark: evidence comes from productive data.

- Markman and Wachtel (1988) came up with experiments to test comprehension/receptive use of the principle with three and four year olds.
  1) Two pictures are presented to the child, one that is familiar and the other that is not. A novel word is presented, and the child is asked to what it refers. The child was expected to say it referred to the unfamiliar object.
    - This supports the mutual exclusivity assumption.
  2) The child is presented with an object, either known or unknown. A term is introduced which refers to a part of that object. When questioned as to the meaning of the term, children in the familiar condition (dorsal fin as part of a fish) correctly induced that it referred to a part of the object 57% of the time, compared with only 20% in the unfamiliar condition (trachea as part of lungs).
    - This supports the mutual exclusivity assumption.
  3) Like experiment 2, experiment 3 tested a child’s ability to label a part of a whole in unfamiliar objects. This time, however, the unfamiliar whole was explained to the child before the novel name for the part was introduced. This, as predicted, boosted the child’s performance in the task to 85% accuracy.
    - This supports the mutual exclusivity assumption.
  4) A puppet said, “This is pewter,” in reference to either a cup (familiar) or a pair of tongs (unfamiliar). The child is then presented with a ceramic cup or wooden tongs and asked if it is pewter. Children presented with the familiar condition (the cup) rejected that the ceramic cup was pewter, whereas children presented with the unfamiliar condition (tongs) accepted that the wooden tongs were pewter.
The mutual exclusivity assumption is proven to be strong enough even to override grammatical cues (“This is X” is not a normal English way to introduce a noun.)

5) Study five had the same goals and design as study four, except that it tested each subject in each condition. It replicated study four’s results.

6) Study six presented the child with a novel word (rattan) referring to either an unfamiliar object (an odd box) or a familiar one (a hat) and then asked whether a plastic hat or a piece of rattan fabric was “rattan.” Predictably, the children in the familiar condition properly used the mutual exclusivity assumption to override the whole-object assumption and learn the meaning of rattan, which the children in the unfamiliar condition did not. Furthermore, again, in the unfamiliar condition, children ignored clear grammatical cues, as in studies four and five.

Conclusion
The mutual-exclusivity assumption functions as a check on the whole-object constraint and taxonomic assumptions thereby helps children acquire many more words than would be possible without mutual exclusivity.