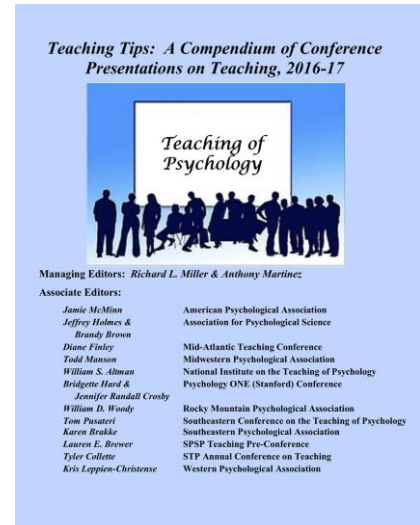


# Two Magic Tricks Illustrate Object Permanence

## Comparing Piaget's Tasks & Baillargeon's Habituation Method

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Abstract:

At what point do infants have their own mental representations, and realize objects continue to exist even when not observed (i.e., object permanence). Jean Piaget (1952) suggested acquiring representations requires an arduous struggle throughout infancy, with the basic object concept forming only around 8 months, and taking 24 months to fully develop (e.g., A-not-B error task). Renee Baillargeon (1987), in sharp contrast, suggested object permanence may be built into human thought, and quickly becomes measurable by 4 months of age (i.e., habituation method). Piaget's ideas about the active child struggling to form his or her own knowledge laid the foundation for modern educational ideas (e.g., inquiry learning); Baillargeon's nativist account laid the foundation for modern modularity hypotheses in Evolutionary Psychology. Two demonstrations with magic tricks engage students in learning about object permanence, and leave students with a thought-provoking question: Is Piaget or Baillargeon right?

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## Two Magic Tricks Illustrate Object Permanence:

### Comparing Piaget's Tasks & Baillargeon's Habituation Method

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At what point do infants have their own mental representations, and realize that objects continue to exist even when not observed? Nearly every *Introductory Psychology* textbook describes this idea – object permanence. Jean Piaget (1952) suggested that acquiring representations requires an arduous struggle throughout infancy, with the basic object concept forming only around 8 months, and taking 24 months to fully develop. Renee Baillargeon (1987), in contrast, suggested that object permanence may be built into human thought, and quickly becomes measurable by 4 months of age. Piaget's ideas about the active child struggling to form his or her own knowledge laid the foundation for modern educational ideas (e.g., inquiry learning), Baillargeon's nativist account laid the foundation for modern modularity hypotheses in Evolutionary Psychology. Here I describe two demonstrations to engage students in learning about object permanence, and leave them with a thought-provoking question: Is Piaget or Baillargeon right?

Before class begins I enter with an inflated balloon. Students volunteer to blow up an additional 5 balloons and I tape them along a classroom wall. A stuffed animal sits visibly across the room from the podium. I tell students they will see two magic tricks.

#### *Piaget's Description of Object Permanence & the Emergence of Representational Thought*

For my first trick, I ask students to keep their eyes on the stuffed animal. I dramatically lower a cloth blocking their view. Next I scurry across the room with the animal, always keeping the cloth up covering it, until the cloth is dangling above the podium. There is a barely audible "clump" on the podium. I scurry back to the original location where I held the stuffed animal with the cloth still up, and reveal with a dramatic whip of the cloth "Ta da! The stuffed animal has vanished!" The more you ham it up the better, because the more bizarrely students will look at you.

"What, it's gone! Isn't that amazing?" If no one shouts out that it's just behind the podium ask, "Where could it possibly be?" If need be, nudge for students to point to it. "It's not so remarkable? But perhaps your finding my magic trick so trivial really shows something quite remarkable about you. Even while the cloth covered the stuffed animal, you knew it was there. Even as I walked across the room, you couldn't see the stuffed animal, but your mind nevertheless pictured its movement. Were we born with this miraculous ability to represent objects we can't see, or did we need to figure it out? Piaget created a series of tasks demonstrating the gradual development of this ability."

I proceed to show the famous Piagetian Object Permanence Task and the A-not-B Error. By the time infants can understand a version of my magic trick, they are about two years of age; we see the emergence of their representational thought across many domains, such as language, pretend play, and drawing (Figure 1).

Figure 1. Piagetian Sub-Stages of Infancy & Object Permanence

6	Mental Representations	18 - 24	if an object is hidden and then moved to a new location without the infant seeing the object during the location change, the infant will search in the new location ["magic trick"]
5	Tertiary Circular Reactions	12 - 18	search for hidden objects and if the location for hiding is changed, infant changes where they search [A-not-B error task]
4	Coordination of 2nd Circular Reactions	8 - 12	search for hidden object [object permanence task]
3	Secondary Circular Reactions	4 - 8	search for partially hidden object
2	Primary Circular Reactions	1 - 4	no active search for objects.
1	Reflexes	0 - 1	no active search for objects.

Piagetian Stage of Infancy
≈ age (mo)
Object Permanence Milestone

### Baillargeon's Description of Object Permanence & the Habituation Method

What if infants really know about objects, but Piaget's tasks are too difficult? Could we make them simpler? If we don't have infants *do* anything, how can we tap their knowledge? I ask the class, "Can I understand anything about your knowledge without having you do something?" I pull out a giant pin and walk to the left-most balloon I had affixed to the wall at the beginning of class. *Pop!* The balloon bursts and students shriek at the loud sound. "Note the large reaction; what does this tell me about you?" *Pop!* The next balloon bursts. "Note there's still quite a reaction on the 2nd balloon." *Pop!* "Much less of a reaction on the 3rd balloon. *Pop! Pop!* "Barely a reaction on the 4th and 5th balloons." Then ... I stick the needle into the 6th balloon, but it just hangs there —unpopped. Students normally have a big laughing reaction. Why? What happened?

During the popping of the first 5 balloons, students became *habituated* because they *knew* that needles pop balloons, and they came to expect the loud sound. But on the last balloon students *dishabituated*. Their large reaction illustrated a violation of their expectations. Without asking students, I discovered they have an understanding of how balloons pop. Incidentally, the explanation of this magic trick is that I made an X of transparent tape on the balloon I inflated before I came to class. I put the needle into the X, which prevented the pop.

Using the second magic trick as an analog, I explain Baillargeon's classic study in which infants habituate to a drawbridge that moves through an arc of 180°. When an object is placed behind the drawbridge, even very young infants show surprise that it still goes through a 180° arc; they are illustrating their expectation that the hidden object would halt the bridge.

## Object Permanence & the Broader Context of Psychology

We can address many broader aspects of psychology with object permanence as a concrete example. The habituation method evokes the competence-performance distinction, while Piaget's tasks predict other aspects of development, like language acquisition (Gopnik & Meltzoff, 1986) and separation anxiety (Lester et al., 1974). We can illustrate the value of designing tasks even they're later used to challenge our hypothesis; performance on the A-not-B error task being explained with cognitive processes (Diamond, 1985) and intersubjectivity (Topal et al., 2009). Finally, we can demonstrate how radically "new" tasks such as Baillargeon's build upon a foundation of prior tasks, such as Fantz's (1961) box and Teller's (1979) visual-acuity cards.

When teaching the myriad ideas in Introductory Psychology, it's easy to lose the subject matter in a laundry list of concepts to memorize. We might make our classes more cohesive by continually returning to the same themes. The study of object permanence provides a perfect example of a crosscutting theme – how we understand a psychological phenomenon depends in large part on how we measure it.

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Author's Note: I provide additional details helpful for teaching in my presentation a year earlier at Psychology One. You can find a copy on my website, [CopernicanRevolution.org](http://CopernicanRevolution.org)

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