Piaget: The Concept of Objects

An assumption is made that we don't directly perceive objects, but only a pattern of sensory stimulation. We have to actively "construct" objects. Sensory information is like a set of movie stills, and we have to put them together in a running sequence.

Infants have no idea of object permanence: when an object disappears from sight it ceases to exist.

Development of object permanence (sensorimotor stages)

Stages 1 & 2: Babies become able to track moving objects and reach for them. Babies lose interest when object is out of sight or partially covered.
2-3 months: follows an object until out of sight.
3-6 months: child will reach for object in visual field but will not look for hidden object.

Stage 3: 4-8 mo. - Baby reacts to partially covered object. Still needs some perceptual cues to remember it exists – if you hide an object and do not let the baby go for it immediately, it loses interest.

Stage 4: 9-12 months - Infants search for hidden objects. Baby can combine sensorimotor schemes into goal-directed actions (will look for hidden object under pillow). Baby understands that object can be recovered after searching.

Hide an object under a blanket and then make it disappear. Baby will show surprise when blanket is removed.

Cover A Cover B

Object is hidden under A, and child retrieves successfully on two occasions.
Piaget says the knowledge is contained in the sensorimotor scheme required to retrieve the object.

Then hide object under B and child goes to A, if there is a 5-6 second pause. (Has to do with memory?) This is called the *A, not-B error*

Note the tendency of babies to go to the same place even when they have seen an object hidden in a new place. This only occurs if they have to wait a few seconds to begin search, and even then they only do it about 50% of the time.

Piaget believed that infants in stage 4 connect the reappearance of the object with one of their own motor behaviors (lifting a certain cloth). Object still does not have a permanence independent of their own activity.

Stage 5: 12-18 mo. - No longer make this error - search for hidden object wherever it last disappeared from sight. Not quite adult understanding.

Show a baby a toy in palm of hand until attention is achieved...close hand around it and place your hand under a yellow pillow...then take hand and toy out and put hand under blue pillow and leave toy there...infant will first look under yellow pillow and will then begin searching at random.

Or more simply, show baby a small toy, close hand around it, place hand under a cloth, leave toy there, and withdraw still-closed hand. Baby will search for toy in hand and when not there, will become upset and stop searching or will search randomly. May or may not move cloth and find toy. Cannot make inferences about what happens to objects that are out of sight.

Child cannot imagine an object's moving when the moving object itself is hidden from view.

Stage 6: Acquire a mature object concept. Now will search under blue pillow if not found under yellow.

Additions and variations on the object permanence

Many researchers argue that infants learn that objects exist much earlier, while still agreeing with the stages.

Others disagree with his interpretations, suggesting that the child understands prior to stage 4. Perhaps they know but do not have the skills to engage in an effective search, such as memory and manual search skills Experiments designed without requiring searching by child, for example testing the perception of partially hidden objects, or that do not require remembering.

The use of group statistics means that not all children have to show a skill.

The Perception of Partially Hidden Objects

Kellman and Spelke – the stick behind the box experiment. Babies at 3.5-4.5 months looked more at the surprising finding of two sticks. Later research shows that it is the fact that the two rods move in unison that leads infants to perceive them as part of the same partially hidden whole.

Other Tests of Object Permanence and What They Show

Hood & Willatts, 1986 – 5 mo. olds reach for an object to their right or left side after the lights have been turned out.

Renée Baillargeon – 5-7 mo. – screen rotating at 180 degrees. Block put behind screen so rotation is stopped. Block surreptitiously removed so screen goes through full cycle. Babies as young as 4 ½ mo. looked longer. By 6 ½ mo. showed expectation that screen would stop at a certain point.

Screen and box test. Car rolling down ramp would go behind a screen and reappear on other side. Block placed on ramp or next to ramp and hidden by screen. Box secretly removed. Babies from 6-8 mo. showed surprise that the car went through the box. With 4 mo. olds the girls were surprised but the boys not. Girls of 3.5 mo. did not show surprise.

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All in all these studies suggested that Piaget was correct about the sequence of stages but underestimated the **rate** of acquisition. An understanding of object permanence emerges between 3 and 5 months. These studies use a lower criterion for testing object permanence – less active responses (habituation and preferential looking tests), fewer demands on memory. Only necessary that a substantial minority show behavior.

T.G.R. Bower's experiments with vanishing objects.

W. Charlesworth's study - showing infant an object, covering it up, taking it away unobtrusively, and the infant looks surprised.

Moore, Borton, and Darby - an object moving behind two screens does not appear in the gap. (9 mo. olds)

Perhaps there are memory problems in these experiments?

It now seems that an understanding of object permanence emerges sometime between 3 and 5 months of age, several months sooner than Piaget suggested

The experiments require less active responses and less demands on memory

Explaining Infant's Search Behavior

Some aspects of object permanence are understood as early as 4 months, so why is search behavior so far behind understanding?

Perhaps they have trouble with the means-end behavior required to search for hidden objects, like lifting a cloth to get a toy. Piaget even said that chains of means-end behavior do not appear until stage 4, around 8 months.

This cannot explain the A, not-B error. Stage 4 babies search only in the previous location about half the time, and they always get it right if allowed to go *immediately* to the location.

Memory limitations – Babies search much more accurately if allowed to search immediately. If they have to wait 5-6 seconds after seeing something hidden, mistakes increase tremendously. (see course notes on infant memory).

Infant's Understanding of Other Object Properties

7.5-9.5 mo. – understanding of object support and balance in simple situations. Place an object on top of another and these kids show understanding of when the object should fall.

Note studies on causality – objects hitting each other. 10 month olds can tell when an apparent causal relation is not working, whereas a 6 mo. old cannot.

Evaluation of Piaget's Sensori-Motor Stage

Some Cognitive Attainments of Infancy and Toddlerhood

AGE	COGNITIVE ATTAINMENTS
Birth–1 month	Secondary circular reactions using limited motor skills, such as sucking a nipple to gain access to interesting sights and sounds
1–4 months	Awareness of many object properties and the rules governing their behavior, including object permanence, object solidity, gravity, and physical causality; deferred imitation of an adult's facial expression over a short delay
4–8 months	Improved understanding of object solidity, gravity, object support, and physical causality; deferred imitation of an adult's novel actions on objects over a short delay
8–12 months	Ability to solve sensorimotor problems by analogy to a previous similar problem
12–18 months	Deferred imitation of an adult's novel actions on objects over a long delay (several months) and across a change in context (from child care to home)
18 months–2 years	Deferred imitation of actions an adult tries to produce, even if these are not fully realized, indicating a beginning capacity to infer others' intentions and perspectives

Evaluation of Sensori-Motor Stage

- Piaget accurate about sequence, but not rate

- Based on research using looking behavior had habituation – at 4 months may understand that objects continue to exist when they can't be seen and that one object can block the movement of another.
- Early understanding of object permanence is incomplete – can't make specific inferences about size and location of hidden objects until several months later.
- Object search behavior lags considerably behind object-related looking behavior, perhaps because means-end behavior, memory, and the ability to inhibit automatic responses all develop more slowly than looking behavior.

Infants do not seem to construct all aspects of experience through motor activity (e.g. crawlers do find hidden objects earlier and perceive depth on visual cliff). Other kinds of activity are present very early (mouth imitation) and perceptual learning (looking and listening).

Development does not seem to proceed in a neat, stepwise fashion. Levels are mixed. Information processing approach assumes continuous development.