

Baillargeon's explanation of early infant abilities, including knowledge of the physical world; violation of expectation research.

Piaget was the first researcher to investigate how infants develop knowledge of how objects in the physical world behave. An example would be his object permanence experiments. However, researchers now think that infants are capable of much more than Piaget claimed, and that at least some of their knowledge of the physical world is innate.

Renee Baillargeon challenges Piaget's claim that babies develop object permanence (the idea that objects still exist even when you are not looking at them) at around 8 months old. Instead, Baillargeon argues that babies have a 'physical reasoning system' that is present from birth.

This suggests infants understand that objects continue to exist much earlier than Piaget thought. Their failure to search for hidden items is likely due to underdeveloped motor control and executive functioning (the brain's ability to plan a physical action to move a blanket), rather than a lack of mental understanding.

Baillargeon developed studies which show that the reason infants appeared to fail to understand object permanence was because they did not have the necessary motor skills to pursue a hidden object. To overcome this Baillargeon developed a technique called violation of expectation research.

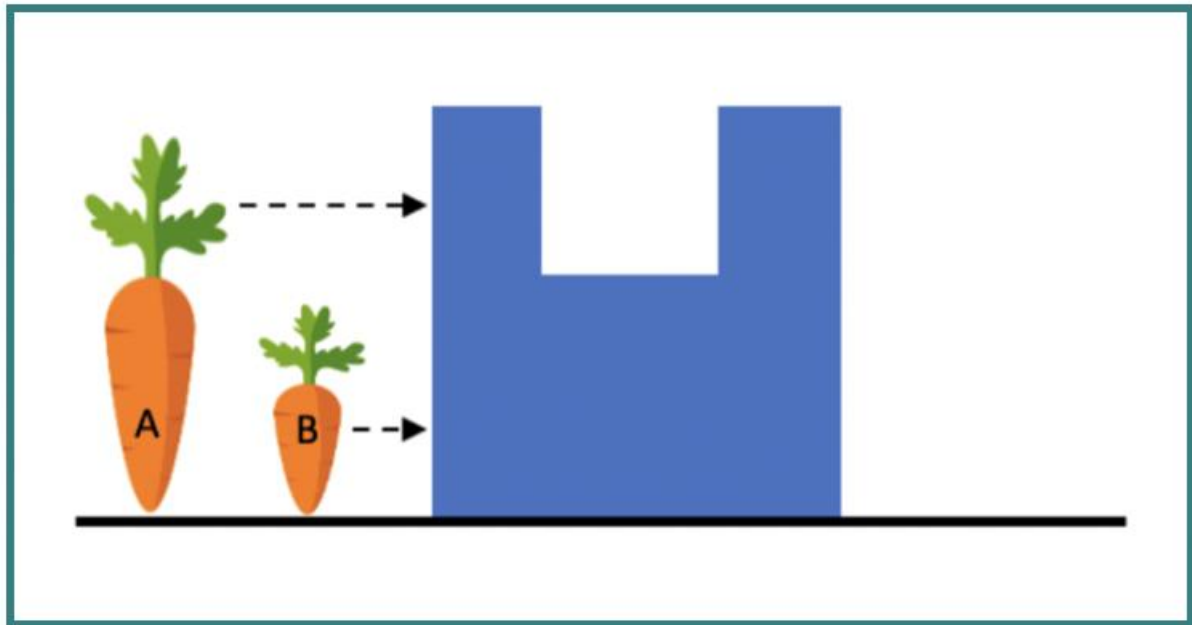
Violation of Expectation Research

This is the idea that infants will look at things that do not fit with their understanding of the physical world (i.e. things that violate their expectations) for longer than they will look at things that do fit with their understanding of the physical world (i.e. that are in line with their expectations). Suggesting an infant will show surprise when witnessing an impossible event. The 'carrot', 'drawbridge', 'ramp' and 'rabbit' experiments are all examples of violation of expectation.

In a VOE experiment, an infant is first introduced to a novel situation. They are repeatedly shown this stimulus until they indicate, by looking away, that it is no longer new to them. Baillargeon (2004) explained VOE experiments as those that test children's abilities, which she described as more sophisticated than Piaget believed. In a typical Baillargeon experiment babies see two test events; an expected event which is consistent with the view that something may happen, and an unexpected event, which violates this.

In the carrot experiment, (which in effect is an object permanence experiment), Baillargeon and DeVos (1991) found that children as young as 3 months demonstrated object permanence. Piaget only found this ability to develop at around 8 months.

Here, 3.5-month-old infants watched a short or a tall carrot slide along a track. The track's centre was hidden by a screen with a large window in its upper half. The short carrot was shorter than the window's lower edge and so did not appear in the window when passing behind the screen; the tall carrot was taller than the window's lower edge and hence should have appeared in the window but did not. The infants looked reliably longer at the tall than at the short carrot event, suggesting that they (a) represented the existence, height, and trajectory of each carrot behind the screen and (b) expected the tall carrot to appear in the screen window and were surprised that it did not. Control trials supported this interpretation.



Bower et al (1971) support Baillargeon's research by demonstrating that four-month-old infants will move their gaze towards an expected event. They showed children a moving train which became temporarily hidden behind a screen before re-emerging the other side. The children were able to understand that the train was out of sight but would be expected to reappear.

However, Cashon & Cohen (2000) showed that infants looked longer at scenarios which were more interesting, challenging Baillargeon's ideas.

Hespos & Van Marle (2012) suggest that Baillargeon's ideas help us to explain our universal understanding of the physical world. They state that the universal understanding of the physical world is innate, as we all have a good basic understanding of the physical world regardless of culture or experience.

There is now considerable evidence that infants are surprised when shown impossible events that violate their beliefs about objects, as indexed by reliably greater looking times at these events than at possible events that are consistent with their beliefs. Do infants also attempt, as older children and adults do, to generate explanations for these impossible events? Data from our laboratory provide intriguing hints that infants, like older children and adults, strive to reconcile what they observe with what they believe. This evidence comes from experiments in which infants were presented with an impossible and a possible event and were found not to show the typical preference for the impossible event. Five examples are presented, involving infants aged 3 to 10 months, and ranging over several facets of infants' physical reasoning. It is argued in each case that infants' failure to look preferentially at the impossible event stems from their having arrived at some explanation for the event. In some instances, infants' explanations appear to be entirely self-produced, as when infants spontaneously posit hidden objects to make sense of otherwise impossible events. In other examples, infants' explanations appear to depend on additional clues provided, either deliberately or inadvertently, by the experimental situation. Despite these superficial differences, however, the examples are all related in suggesting that infants, like older children and adults, actively seek explanations for inconsistencies in their world.

Renee Baillargeon (1994)

Baillargeon's Theory of Physical Reasoning

Baillargeon et al (2012) proposed that infants are born with a physical reasoning system (PRS). This means they are hard-wired with a basic understanding of the physical world and also have the ability to learn more details easily.

Initially we have a primitive awareness of the physical properties of the world, and this becomes more sophisticated as we learn from experience.

In the first few weeks of life infants begin to identify event categories. Each event category corresponds to one way in which objects interact. For example, occlusion events take place when one object blocks the view of another.

As a child is born with a basic understanding of object persistence (shown as object permanence in infancy) and quickly learns that one object can block their view of another. By the time they are tested in the carrot experiment, they know that the tall carrot should appear at the window. The 'impossible' event captures their attention because the PRS readies them to take notice of new events that might develop their understanding of the world.

