

## General

Focus of chapter is on three aspects of cognitive development:

- Infant's understanding of objects
- The way infants respond in a special way to people
- The ability of infants to use models as representations of the world

Methodological problems:

- Cognitive processes aren't observed directly, but have to be inferred from behaviour
- Unambiguous evidence is rarely produced
- Interactionist and nativist positions provide different interpretations of the same results

## Understanding Objects

**Piaget** - in the early months infants have no concept of *object permanence* - takes until 8-9 months old until they look for an object that has disappeared. Evidence from an experiment where an object is hidden under a cloth. Conclusion based on studies of just a few infants, but other researchers have confirmed robustness of the result. **Butterworth** - one of the major achievements in the first months and worthy of study because of this. (Interactionist interpretation.)

## Expectation as a clue to understanding

Another interpretation of the same result is that although the infant understood what was happening, they couldn't physically co-ordinate their response before 8-9 months. **Bower** investigated with a train stopping behind a screen and watched where a child's gaze went. Findings appear to contradict **Piaget** as children as young as 2 months would anticipate the train's reappearance, but a modified version where the train is stopped before the screen showed that the

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child's gaze continued to track - therefore gaze not an indicator of understanding of object permanence.

### *Violation of expectations*

Habituation - less attention is paid to familiar events. Violation of expectations - relies on the idea that more time is spent looking at events that are 'impossible'.

**Baillargeon et al** - habituation of 5 m.o. infants to a 180 degree rotation of a drawbridge. Wooden block placed to impede rotation at 120 degrees. Condition 1 - left there, drawbridge stops; condition 2, block discretely removed when drawbridge vertical, so rotation carries on to 180 degrees. Finding was that infants paid more attention to the 'impossible' 180 degree event than the 'possible' 120 degree event, despite habituation. Possible interpretations were:

(i) infants were interested in the drawbridge apparently going through a solid object => implies they 'know' there is a hidden block (i.e. demonstrates object permanence younger than **Piaget** argues.)

(ii) infants spent longer looking at 180 degree rotation because it takes longer? Trials re-run to account for this possible confounding variable - same result.

Conclusion - (i) they believed the block continued to exist even when obscured and (ii) they understood the presence of an invisible object was an obstacle to the progress of the drawbridge.

Another variant - toy car, track blocked / not blocked by a hidden obstacle behind a screen. 6-8 m.o. behave in same way as adults - surprised if the block is removed from the track when behind the screen and its motion continues. Findings replicated on 3.5 m.o. children by **Baillargeon and DeVos**.

Conclusion - infants understand (i) box continues to exist after it is hidden; (ii) car continues to exist after it goes behind the screen; (iii) the car could not roll

through the same space as the block.

Sophistication of understanding of occluder increases between 2.5 -> 3.5 months (**Aguiar and Baillargeon**)

**Piaget** - argued that realising objects still existed when hidden was a developmental task - however, these results suggest infants realise objects continue to exist from the start according to **Aguiar and Baillargeon**.

### *Searching behaviour in the dark*

**Hood and Willatts** - 13 infants, 5 m.o. objects presented to left, right or not presented. Lights turned out. Finding - infants reach out towards the direction the object had been seen than in any other. Note - some infants reached out more than others - so the finding was made from a 'within participant' comparison.

**Shinskey and Munakata** argued the finding may have been due to methodological differences between the object present / object not present tasks - but a controlled comparison of 6.5 m.o. search behaviour for a toy hidden in the dark or under a cloth in the light support the original findings.

### *Memory and object permanence*

**Piaget** - A-not-B error - a perseveration error. Hide a toy multiple times under cloth A, child searches for it. Hide it under cloth B in full sight of the child, they still look under cloth A (unless the toy immediately found under cloth B.) **Piaget** interprets this as evidence of infants being *egocentric*. It is also incompatible with the experiments that suggest 5 m.o. children do understand objects continue to exist even when not visible.

**Harris** - repeated this experiment but introduced a 5 second delay on some occasions before search was allowed. Search straight away - no difficulties. 5 second delay - cloth A usually selected. Interpreted as the new memory being so fragile it is easily disrupted.

**Butterworth** - challenges by using transparent covers (so no demands on memory) - same result. His explanation was that those who make the A-not-B error do so because they memorise the object with an egocentric code and the cover with an allocentric code (or vice versa). When the toy is moved, only one code is updated. If infant behaviour is governed by the unchanged code, they may make the A-not-B error.

**Diamond** - charted the progress of 25 infants aged 7-12 months using the original Piagetian task. Length of time before search commenced varies until the child began to make the A-not-B error. Finding was that older children can cope with a longer delay. Explanation is information is held in short term memory, which varies in efficiency in individuals - therefore, not surprising that it would still be developing during the child's first year. Also, infants have developed a habit of finding the toy under cloth A - so other cause is the inability to inhibit an incorrect action that has become a habit.

### People: The Social Object

**Piaget** - Infants born with a small number of behaviours/reflexes. - little control. The ability to think and reason develops from this starting point. When a child can create memories of experiences, it can be used to influence current actions - i.e. thinking or reasoning.

**Imitation** shows the start of development of memory. His evidence was from detailed notes on his own three children - rich data, but very small sample to generalise from. Believed that in early stages of imitation, children can only imitate what they are already able to perform and unable to imitate what they cannot see - e.g. their own face. To be certain imitation took place, **Piaget** insisted on a time lag between the original event and its imitation. **Under these conditions, imitation occurs during their second year.**

**Uzgiris and Hunt** - study of 12 children supports that <1 y.o. could attempt to imitate (if not finish) actions;

9-12 months - imitation of what they could see in others (e.g. tongue poking) but not see themselves do it; 12-18 months - imitation of novel actions.

Contradicting Piaget - **Meltzoff and Moore** - Nativist

1977 experiment - four behaviours (lip, tongue, mouth, finger movement); 6 infants; 12-21 days old. Each shown one gesture for 15s, space of 20s, then video taped. Judges used to determine if imitation takes place (but not told what they are meant to be imitating). Demonstrated significant results. (Criticism - no 'not imitating' option provided, so could skew results.)

Second study - 12 2wk old. Impassive adult face, 15s demonstration of tongue or mouth; filmed for 2.5 minutes. Procedure repeated to expose them to a novel behaviour. Tapes judged; more tongue protrusions following its demonstration; more mouth openings following its demonstration; claim is that it demonstrates 2wk old children can perform selective imitation.

**Kaye** - criticisms - 39 tongue pokings after demo; but 15 without demo. Only a few produced any imitations at all. Although the difference is statistically significant, there was a low response rate and some infants produced nothing at all.

Note methodological differences between **Piaget & Meltzoff and Moore**: individuals vs groups in different conditions; followed over years vs single occasion.

**Jacobson** - stimuli of tongue presentation more effective at getting infants to poke out their tongues than a white ball or pen - but not much in it. Therefore, she concluded infants could not be said to selectively imitate.

**M&M** 1983 experiment - facial gesture imitation in 40 infants < 72 hours old. Findings supported earlier conclusions that contradict **Piaget**.

**Tim Holyoake** 2009 - <http://www.tenpencepiece.net/>

However, can be argued that **M&M** and **Piaget** are looking at different aspects of imitation - e.g. **Piaget** insisted on a long time delay.

**M&M** do not believe there is no development in imitation - they see their findings as an indication of the capacity needed for later cognitive devmnt being present at birth - i.e. a Nativist interpretation. But it does imply infants have the ability to symbolise the world - contrary to **Piaget**.

### Development of understanding representations

**Mandler** - **procedural** representations 'know how to ride a bike' - difficult to explain and pass on vs **declarative** representations 'know that 2+2=4' - possible to communicate to others.

**DeLoache** - model room vs full scale room experiment.

3 years or more - can deduce position of doll in full scale room from its position in the model. 2.5 years or younger are unable to do this (**Piaget's** theory is that the ability to use representations takes time to develop - hence findings in line with this.) Most common error in younger children is to search where the doll was last time - similar to A-not-B error.

**Sharon and DeLoache** used 129 children between 2y4m and 2y8m to investigate further if it was due to inhibiting - 77% failed to find the doll on the first trial, suggesting this was not the case. Further experiments demonstrated to the children the doll was not in the same place as last time (specifically reducing inhibitory control demands). Perseveration errors not made, but didn't improve their performance.

Results therefore confirm young children have great difficulty in appreciating the relationship between a model and what they represent

Older children therefore (i) understand objects still exist when out of sight and (ii) can hold in mind representations of a changing environment to what is needed for successful imitation.