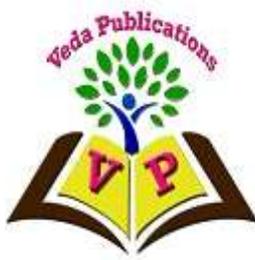


FAMILIARIZATION/NOVELTY PREFERENCE' METHOD: CONTRIBUTION TO PSYCHOLOGISTS' UNDERSTANDING OF COGNITION IN INFANTS

Ignatius Isaac Dambudzo

(Zimbabwe Open University, PO Box MP1119, Mount pleasant, Harare, Zimbabwe.)

ABSTRACT



The study set out to describe a method that can be used to gain an understanding of cognition in infants since their ability to interact is limited by inability to communicate thoughts in the absence of language. Literature has documented the difficulty of understanding what goes on in infants' minds because language is still underdeveloped unlike adults. Literature has also reported the tendency by infants to be attracted more by unfamiliar than the familiar stimuli. Consequently, understanding of what goes in the infant's mind is only possible through inference of observed behaviour. An experimental methodology was used. Psychologists have come up with a method called 'Familiarity/Novelty Preference Method'. The method involves observing infant behaviour at an early age such as 3 months exposed to familiar and unfamiliar objects in the environment. Gaze and duration of gaze are recorded and then an analysis of the recorded and observed behaviour to describe what goes on in the infant's mind at any given time. Results from the use of this method have demonstrated that psychologists can indeed develop some understanding of what goes on in the infant's mind even before language development is evident. Despite ethical issues of such experiments, the method produces valid and reliable results though there is no ecological validity due to the use of a controlled environment for the experiments. It is recommended that more experiments be carried out using this method for children from different backgrounds and environments.

Keywords: *Familiarisation, Infants, Language, Gaze, Experiments, Novelty/Preference, Understanding, Psychologists, Development, Unfamiliar Objects.*

Familiarization/novelty-preference is a powerful scientific or experimental method used to investigate infants' cognitive processes. (The Open University, 2006, Quinn & Oates, 2006). Familiarization is learning about a particular stimulus. Novelty means new and not previously seen or experienced. Preference means paying attention to or showing an inclination towards something. Cognition or knowing is the ability to relate one perception to another experienced before. It involves recognition and discrimination between the old (familiar) and the new (novel). (Slater & Oates, 2006). The essay will be presented in two parts. First, the familiarization/novelty-preference method will be presented and evaluated. Second, contribution of the familiarization/novelty-preference method to psychologists' understanding of infant cognition will be discussed. Examples will be cited to illustrate the views discussed. The familiarization/novelty-preference method will be outlined first.

According to Slater & Oates (2006), Quinn & Oates (2006) familiarization/novelty-preference method is laboratory based and is used widely to access what goes on in the infant's mind. Its use is based on the principle that infants as well as adults look at a stimulus until they get bored and lose interest and no longer look at it. This is called *habituation*. However, if at this point the same stimulus is presented together with another, not previously seen (novel) heightened interest in looking at the new object is observed indicating that the infant has been able to discriminate between the familiar and the new. Researchers came to the conclusion that there is general novelty preference demonstrated by gaze direction, length of time spend looking at the stimuli or head turning for auditory stimulus. Due to complications caused by richness of naturally occurring stimuli-colour, three-dimensional shape, size etc. it becomes difficult to describe or infer precisely what influences the infant's behaviour. In addition, infants cannot speak. Consequently, it becomes difficult to tell their thought processes or explain behaviour. The laboratory based experiments are therefore used to study infant cognition because: a) the technique reduces complexities of the real world, b) stimuli can be standardized making it possible to group responses from a group of infants, c) controls can be used to exclude confounding factors, d) familiarization is done to enable infants to learn the stimuli before preference test with novel stimuli, and e) enables development and understanding of how infants' thought processes operate.

The method is based on the assumption or principle that infants have the tendency to prefer looking at new (novel) things. (Fantz, 1963). The method comprises two stages. Stage 1 is the learning or 'familiarization'. During this stage, infants are shown a picture or exemplar of a single category such as a cat which they look at until they get used to it or habituate to it and lose interest. In stage 2, a novelty-preference test is administered to the same group of infants. In the test a different stimulus from the one shown already is shown together with a stimulus from a new category such as dog not seen before. The preference test results are then observed and interpreted. The prediction is that the infants will spend more time looking at the novel stimuli (dog) and less on the familiar novel exemplar (cat). If this happens it means the infant has already formed a mental representation of the cat and stored it in memory and has been able to discriminate the new stimuli from the familiar. By spending

more time on the novel exemplar (dog) it can be assumed that infants prefer looking at a novel exemplar and not the novel from a familiar category-cat.

According to Quinn and Oates (2006) the laboratory experiments usually use computer screen to display the stimuli with both distance from the screen and time of observation carefully controlled. This raises ethical issues of subjecting infants to such stressful situations but such studies are essential to understand how infants develop early in their lives. While the experiments are effective, it is not clear from mere observation whether attention to the dog exemplar was due to novelty of the stimulus or some other interesting feature in the dog. The beauty of the method is that familiarization/novelty-preference method can use either the within- or between experimental design. Consequently, if in doubt whether more attention paid to the dog exemplar was the result of novelty or something else, experiments can be replicated with another group of infants. If preference is for the dog then it can be concluded with confidence that the effect was the result of familiarization. On the other hand, infants may find it difficult to make a distinction between different types of cats as adults would do. In such a case a different group of infants can be familiarized with a different cat one after another. If infants' attention declines as they look at the first and increases for the next, this will be enough evidence of their ability to discriminate between the two within category exemplars. These measures are controls that help guard against misleading results. It is important to note that the experiments make use of groups of infants whose behaviour is analysed and interpreted. Consequently, they do not reflect individual behaviour or responses and generalization about infant behaviour should be made with caution. In addition, individual infants behave differently. Some may engage in the activity while others fail. Because they are controlled laboratory experiments, they lack ecological validity. This further limits their external validity. Despite these limitations, results from these experiments have been found to provide effective and significant trends across groups of infants. They have provided valuable insights into what goes on in the infants' minds before they are able to speak. Actual results or outcomes of the experiments can only be inferred from infants' behaviour. The method has been used extensively to investigate the following cognitive processes: ability to categorize (Quinn & Oates, 2006); classify (Eimas & Quinn, 1994; organize categories (Behl-Chadha, 1996), imitation (Piaget & Inhelder, 1969); (Meltzoff & Moore, 1977); store in memory (Younger & Gotlieb, 1988); discrimination (DeCasper & Spence, 1986, 1994); object permanence (Piaget & Inhelder, 1969; Baillargeon & DeVos, 1991), comprehension and developmental trends and language development (Harris, 2006).

Through these experiments it has been established that infants as young as 3-4 months were as capable of forming categories like adults. However, infants used perceptual attributes of objects while adults used both perceptual and abstract attributes to categorize. (Bomba & Siqueland, 1983; Quinn, 1987; Younger & Gotlieb, 1988; Quinn et al, 1993; Eimas & Quinn, 1994; Quinn & Eimas, 1996a). The latter compared results from infants of different age groups-3, 5 and 7 months. Results showed statistical significance of the infants' ability to

categorize with the more mature showing greater competence in discriminating between exemplar objects. In addition to categorization, researchers also investigated infants' ability to store categories either as individual exemplars or prototype abstractions/ averages. Results showed that ability for storage in either format depended on the degree of complexity and experimental design. If complex, the prototype abstraction was preferred, and exemplar form if few and simple. (Younger & Gotlieb, 1988). Using the same method, Behl-Chadha established that infants could organize objects into a nested hierarchy such as global, basic and specific. Similarly, Quinn (1994) demonstrated that infants could categorize spatial relations such as 'above' and 'below' and at the age of 6-7 months more complex spatial relations like 'between' and 'outside'.

The experiments were also used to test infant recognition of voices, ordinary and prosodic sounds in speech learning and detecting word boundaries. Of interest is the fact that infants tended to respond to familiar as opposed to novel sounds for example, reacting to familiar rhymes, prosodic sounds of native versus foreign languages (English versus French). (DeCasper & Spence, 1986, 1994; Johnson & Jusczyk, 2001 p. 555, 557). The following paragraphs present assessment of how the experiments have influenced the psychologists' understanding of infant cognition.

The use of familiarization/novelty-preference method has helped psychologists appreciate the complex nature of cognition in infants. It involves sensori-stimuli and their interpretation, perception-the formation of mental representations, concept formation and behaviour. It also demonstrates that cognition is an invisible mental process that cannot be observed directly but accessed only through feelings, behaviour and thoughts. (Slater & Oates, 2006). Infants cannot speak hence psychologists can only infer their cognition from their behaviour—the main source of data for familiarization/novelty-preference method. Thus, associating the infant's behaviour with what goes on in their minds enables psychologists to understand infant cognition better.

Ability of infants to recognize familiar and novel experiences is based on their ability to discriminate between stimuli for example, native and foreign language, family members and strangers, new and familiar words. Recognition and discrimination are cognitive processes. Consequently, psychologists learn that infants like adults have the ability to recognize and discriminate. (Harris, 2006; Quinn & Oates, 2006; Slater & Oates, 2006).

Category formation has been linked to language and vocabulary development. The link between vocabulary spurt, categorization ability and object permanence has been shown to be statistically significant (Gopnik & Meltzoff, 1987). Thus, psychologists have developed the understanding that infants' minds are constantly building their vocabulary as a basis for language production. In addition, psychologists learn from this method that language development is a social process which grows with increases in social interaction. Language difficulties are often associated with inadequate social interaction in early life. (Harris, 2006).

Psychologists have also learnt that cognition develops with age or maturity concomitant with maturity of senses and the brain particularly the frontal cortex which is responsible for the formation and co-ordination of mental representations. Consequently, cognition in infants is malleable and grows with more experience following a developmental trend. For example, vocabulary builds up in early infancy and speech production follows at a later age. When speech production occurs infants are able to link sounds and meanings by way of gestures or pointing or other cues-evidence of comprehension. Linking sound to an event or activity or object is part of the cognitive process. Thus, psychologists will look for associations in behaviour in order to understand cognition in infants. (Slater & Oates, 2006; Harris, 2006).

Psychologists also learn that infants have a memory which stores representations, enabling them to discriminate, recognize, categorize, classify, organize new and familiar and similar objects. How these are encoded will depend on the complexity of the stimuli and their presentation. (Younger & Gotlieb, 1988). Thus, to promote learning introduce new concepts using new methods in order to stimulate learners' interest and capture their attention. Since perceptual behaviour is dominant in early infancy and conceptual later, psychologists, particularly those in education learn that presentation of concrete stimuli beginning with the familiar is more effective in early years.

The paper has described and explained the familiarization/novelty-preference technique as extensively used to investigate cognition in infants because they cannot speak. It has shown that though infants cannot speak a lot can be learnt about what goes on in their minds by observing, analysing and interpreting their behaviour. Though the method lacks ecological validity due to controls applied, results have shown that it is the most effective way to gain insight into what happens in the infant's mind. Experiments have also shown that infants do not always prefer novel experiences but familiar as well such as mother's or caregiver's face or voice, native language versus foreign language, familiar sounds or voices, simple versus complex stimuli etc. The method has ethical problems since the experiments subject infants to computer light on screen and forced observations whenever the experiments are carried out. Controls by way of replications using either within- or between experimental designs have been used to validate results. That replications have been used successfully shows that the method is detailed and clear. It consists of two stages only: familiarization and preference test.

Its use has enhanced psychologists' understanding of infant cognition in the following ways: a) it is a complex process involving stimuli, sensation, perception, recognition, and behaviour all entwined in a reciprocal process in which the brain controls or facilitates, b) cognition is developmental and occurs in stages being more effective in later stages for example comprehension and word production, vocabulary spurt c) infants like adults are capable of categorization, d) infants are capable of recognition and discrimination such as telling languages apart, old and new experiences which guides their thinking and reasoning, e) learning by association for example associating actions, words, events and objects in

speech streams, f) infants are capable of selective imitation—a complex process involving reception, storage, translation and action evidence of cognitive sophistication, g) the natural environment is too complex for the infant to cope with due to poor co-ordination a function of the frontal cortex of the brain which is well developed in later childhood and adults and that infants have a memory exemplar or prototype abstraction that stores experiences in the environment demonstrated by their ability to imitate, repeat, match familiar with novel objects or experiences. Thus the method has opened a window into infants' minds as well as a tool for further research with infants to generate more knowledge and theories.

REFERENCES

1. Baillargeon, R. and DeVos, J. (1991). 'Object permanence in young infants: further evidence', *Child Development*, vol. 62, pp. 1227-46.
2. Baillargeon, R. Spelke, E.S. and Wasserman, S. (1985). 'Object permanence in 5-months old infants', *Cognition*, vol. 20, pp.191-208.
3. Bancroft, D. and Flynn, E. (2006). 'Early cognitive development in Oates, J. Wood, C. and Grayson, A. ED209 *Psychological Development and Early Childhood*, The Open University.
4. Behl-Chadha, G. (1996). 'Basic –level and superordinate-like categorical representations in early infancy', *Cognition*, vol. 60, pp.105-41.
5. Bomba, P.C. and Siqueland, E.R. (1983). 'The nature and structure of infant form categories', *Journal of Experimental Child Psychology*, vol. 35, pp. 294-328.
6. Christophe, A. and Morton, J. (1998). 'Is Dutch Native English?' Linguistic analysis by 2-months olds', *Developmental Science*, vol. 1, 215-19.
7. DeCasper, A.J. and Spence, M.J. (1986). 'Prenatal maternal speech influences newborns' perception of speech sounds', *Infant behaviour and Development*, vol. 8 , pp.181-95.
8. Eimas, P.D. and Quinn, P.C. (1994). 'Studies on the formation of perceptually based basic level categories in young infants', *Child Development*, vol. 65, pp. 903-17.
9. Fantz, R.L. (1963). 'Pattern vision in newborn infants', *Science*, vol. 40, pp. 296-7.
10. Gopnik, A. and Meltzoff, A.N. (1987). 'categorization and naming basic level sorting in eighteen months-olds and its relation to linguistic developments', *Child Development*, vol. 58, pp. 1091-103.
11. Harris, M. (2006). 'First words' in Oates, J. and Grayson, A ED209 *Cognitive and Language Development in Children*, The Open University.
12. Harris, M., Jones, D. and Grant, J. (1983). 'The non-verbal context of mother's speech to infants', *First Language*, vol. 4, pp. 21-30.
13. Harris, M., Barlow-Brown, F. and Chasin, J. (1995a). ' The emergence of referential understanding: pointing and the comprehension of object names', *First Language*, vol. 15, pp.19-34.
14. Johnson, E.K. and Jusczyk, P.W. (2001). 'Word segmentation by 8-months-olds when speech cues count for more than statistics.' *Journal of Memory and Language*, vol. 44, pp. 548-67.
15. Mandler, J. (1983). 'Representation' in Mussen, P.H. (series eds.) Flavell, J.H. and Markman, E.M., vol. eds.: *Handbook of Child Psychology*, vol. 3, Cognitive Development, New York, Wiley.
16. Meltzoff, A.N. and Moore, M.K. (1977). 'Imitation of facial and manual gestures by human neonates', *Science*, vol.198, pp.75-8.
17. Piaget, J. and Inhelder, B. (1969). *The Psychology of the child*, London, Routledge and Kegan Paul.

18. Quinn, P.C. (1987). 'The categorical representation of visual pattern information by young infants', *Cognition*, vol. 27, pp. 58-69.
 19. Quinn, P. C. and Eimas (1996a). Perceptual organization and categorization in young infants', *Advances in Infant Research*', vol. 10, pp. 1-36.
 20. Quinn, P.C. (1994). 'Categorization of above and below spatial relations by young infants', *Child Development*, vol. 65, pp.58-69.
 21. Quinn, P.C., Adams, A. Kennedy, E. et al. (2003). 'Development of an abstract category representation for the spatial relation 'between' in 6-10 month-old infants', *Developmental Psychology*, vol. 39,pp. 151-63.
 22. Slater, A. and Oates, J. (2006). 'Sensation and Perception', in Oates, J. Wood, C. and Grayson, A. (eds), *ED209 Psychological Development and Early Childhood*, The Open University.
 23. Younger, B.A. and Gotlieb, S. (1998). 'Development of categorization skills: changes in the nature or structure of infant form categories?' *Developmental Psychology*, vol. 24, pp.611-9.
 24. The Open University, (2006). 'Study Guide 3, ED209 Child Development, Milton Keynes, The Open University.
 25. The Open University, (2006). *Assignment Booklet*, Milton Keynes, The Open University.
-