Facial Imitation In The Sensorimotor Stage According To Piaget

Introduction

Jean Piaget was a biologist and philosophist, and one of the researchers with immense influence in the area of psychological development during the 20th century. Since he was a biologist, he was mostly interested in biological influences of development and how humans evolve and grow. While he was cooperating with Binet, he noticed qualitative difference in children's thinking and various stages of cognitive development. He hypothesized that infants are born with schemes of operation that he called reflexes. As a biologist, he stated that these reflexes had an important role at the very beginning of their life and later got replaced with constructed schemes. After some research, he came to define four stages of cognitive development.

The first stage is Sensorimotor stage that is characteristic for infants and that will be in the focus in this paper. In this stage knowledge is limited, but being developed through newly made experience. Children develop their intellectual abilities and acquire some language skills by the end of this stage. Their interaction with the environment is mostly based on physical interaction.

The second stage is present in toddlers and early childhood and it is called Pre-operational stage. In this stage, children demonstrate their intelligence with the use of language and symbols, however they are very egocentric and their memory and imagination are being developed. Their thinking is nonlogical.

Concrete operational stage is present in elementary and early teen years and its main characteristic is that operational thinking has developed and is predominant. Egocentric way of thinking diminishes and intelligence is demonstrated through logical and systematic manipulation of symbols.

The last stage according to Piaget is Formal operational stage that is known in adolescence and adulthood. Here, intelligence is demonstrated through logical use of abstract concepts. However, according to Piaget, many people do not reach this stage in their adulthood.

As stated earlier, the focus here will be on sensorimotor stage, precisely on facial imitation that occurs in infancy during this phase of development. This stage covers the first two years of a child's life and explains the very beginning of development and understanding of the world. This stage can be broken down into six substages, each explaining the baby's progress.

This paper will focus on facial imitation that occurs during the sensorimotor period and try to answer in what nature it is related to cognitive development and if correlates with it in any capacity.

According to many studies, the ability to imitate includes a variety of perceptual, cognitive, motor and social competencies. Some researchers argue that facial imitation is present as early as in the first year of a child's life, whereas others state that it is not visible until the second year.

Recent studies connect facial imitation with so called mirror neurons.

Mirror neurons are according to many one of the most important discoveries in the last decade of neuroscience. They represent a number of visuospatial neurons which reveal plenty about human social interaction. These neurons respond to actions we observe in others. Ultimately, they are responsible for imitation but also for other sophisticated human behaviors and thought processes. Human infant data using eye-tracking measures suggest that the mirror neuron system develops before twelve months of age, and that this system may help human infants understand other people's actions. This further implies that infants have developed a system that would help them with facial imitation before reaching their first birthday.

Literature Review

Based on many studies, imitation is one of the most important things that infants are facing and that they have to learn. Many children with typical development struggle with this process, but they figure out a way to fully master it eventually. One of the studies explains how this process is hard on children with autism or children with atypical cognitive development. According to this study, the hard part is not imitation in itself, but rather holding your child’s attention long enough so that they can comprehend what they are supposed to do, watch and learn a certain process. The authors also emphasize that children with autism may know how to imitate a specific action, but prompting them to do so would be the difficult part, as their attention span is not the same as in children with typical development. However, they advise starting with simple things you would want your child to imitate and then slowly make progress, but always rehearsing previously obtained imitations.

Various studies have discussed how and when facial imitation does happen. It is still an interesting topic due to specific conditions in which these experiments need to be performed as well as the sample group. One of the articles did a research on six weeks old, two months old and three months old babies. The requirements were to have normal birth weight, no known visual or motor disorders and to have normal length of gestation. The authors of the study have carefully instructed both mothers and strangers how to perform their act during the experiment. They were supposed to either open their mouth or protrude their tongue at a specific rate without giving away any other facial expressions such as smiling, nodding or making funny faces. They were sitting on bar chairs so that their faces were approximately at baby’s eye level and therefore easily seen. Mothers or strangers would get infant’s attention by calling their name and shaking a rattle, after which they would perform the task they were previously instructed to do. This experiment was videotaped and later the tapes were analyzed.

This experiment gave away three very important findings. The first one suggested that the familiarity did not play a significant role. Infants have imitated their mothers as well as strangers at an equal rate. Another outcome implied that infants can imitate both static facial postures and dynamic gestures. The last one is that there is no loss of facial imitation with growing up due to drop out of neonatal reflexes.

This study used these experiments as well as theory knowledge to come up with new possible suggestions of how facial imitation occurs and how it is related to cognitive development. Their ideas place early imitation within a broader psychological framework than simple reflexes. The authors intend to show how infant imitation contributes to theories of early social cognition and

informs discussions about infants' earliest and most basic notions of persons. According to this article, a comprehensive view of early imitation needs to explain the conditions under which infants imitate, as well as those in which they do not. Imitation is not always elicited either in our work or that of others. A model that considers imitation an act of primitive social cognition fares better by stressing the functional uses of imitation to infants. The pilot experiment revealed that infants who did not visually track adults as they appeared and disappeared prior to doing the assigned task, inspected the new person, and then intently performed the actions shown by the previous person. This suggests that the adult gestures are not simple sign stimuli that automatically trigger the infant's behavior. Infants use actions, including facial gestures, as a part of communicating with a person.

Since sensorimotor stage encompasses children from the day they are born until they second year, this study experimented with 12 months old, 18 months old and 24 months old children. They have found out that the first group of subjects, that consisted of 12-month-old babies only reproduced the shown behavior when they seemed to have a reason to do so. The next group made of 18-month-old children selectively imitated when the model seemed to be aloof, but imitated more once the model acted socially acceptable. The last group, whose members were 2-year-olds, imitated regardless of the context.

Similarly, another study found out that neonates imitate a limited range of facial expressions when faced with an attentive adult. Moreover, three to five months old children also imitate a certain amount of vocal expressions along with facial expressions. Shortly after their first birthdays, infants copy the behaviors of in-group members more closely than those of out-group individuals, even though they are equally likely to imitate any behavior they are disposed to. This study also reveals that children react pleasantly and positively when being imitated, they smile and express satisfaction and happiness.

Eventually, Piaget himself gave a theory of imitative development. He claimed that imitation is intertwined with cognitive development through different substages of sensorimotor stage. As previously mentioned, Piaget postulated six substages of sensorimotor period, and those can be explained in three major levels. In level 1 (0–8 months of age) infants are restricted to the imitation of simple hand movements and vocalizations. For example, the Piagetian 6-month-old would be expected to imitate a simple hand-opening gesture or an /a/-vocalization even if the infant had never had the relevant associative learning experience. For instance, the infant could directly compare the adult's hand movements with those of its own visible hand, and thereby use vision as a guide in the matching process. Similarly, the infant could use audition to monitor both his own and the model's vocalizations and to guide his own vocalizations until they sounded like the model's.

The second level is of interest for this paper. In level 2 (8–18 months of age) infants first become capable of imitating facial behaviors and novel acts. The fundamental claim made by Piaget is that the difficulties involved in manual and vocal imitation pale in comparison to those involved in facial imitation. Not only Piaget, but many different authors claim that facial imitation is hard to master. It is mostly so, according to them, due to the fact that infants cannot see their own faces, they cannot directly compare their own acts with the ones they see. According to Piaget, facial imitation (or invisible imitation as it is sometimes called) is a landmark cognitive achievement that is first passed during the fourth substage of the sensorimotor period.

Finally, level 3 (18–24 months) is characterized by the emergence of the ability to perceive a

behavior at one point in time and then, without having responded in the presence of the demonstration, to delay the duplication for a significant period. Deferred imitation directly implicates mnemonic and representational capacities, and Piaget argued that it emerged synchronously with other complex cognitive abilities such as high-level object permanence (the search for invisibly displaced objects), symbolic play, and insightful problem-solving. All these synchronous developments constituted what Piaget termed stage 6, the last sensorimotor stage of infancy.

In summary, Piaget’s cognitive-developmental hypothesis claims that infants are gradually becoming able to postpone their reaction and perform it later. First they imitate those involving intramodal comparisons (manual and vocal acts), next those involving cross-modal comparisons (facial acts), and finally those implicating a stored representation of the modeled act (deferred imitation). Piaget also argued for the idea that infant imitations were based on cognitive development and rejected the idea that infant imitation was based on learned associations.

Discussion

Facial imitation is one of the most important stages of development. Many articles and authors argue that it is a keypoint in development and it can occur as early as in the fifth month, but for sure before the second year of life. Imitation serves as a powerful learning tool in infancy and that explains why authors devote so much attention to it. Facial imitation is happening parallel as Piaget’s first stage of cognitive development, known as sensorimotor stage. According to him, facial imitation develops from the eighth month and it advances through several substages until the baby turns a year and a half.

Many other authors support this theory, only stating that signs of facial imitation are visible as early as in the fifth month. They also support the theory that this type of imitation is very important for infant’s comprehension of the surrounding world. None of the researches have shown that facial imitation will develop faster and advance more if the baby is cognitively ahead of its age. Facial imitation is mostly supported by typical cognitive development, but is not entirely dependant on it. Studies have shown that cognitively delayed children, as well as children with autism can learn facial imitation. The issue however is getting their attention and focus long enough to learn and comprehend. Due to the fact that facial imitation has a fairly extensive developing span (from fifth month to second year), mildly to moderately developmentally delayed individuals usually are able to reach the satisfactory level when it comes to imitating.

Newly discovered mirror neurons are suspected to have high impact on children with autism and some studies show that deficit in these neurons or defect that is genetic in nature are responsible for autism. However, if started with some simple tasks, they are still able to imitate the model's face. Many authors claim that facial imitation is hard to master only because children are unable to see their own faces and therefore cannot be sure if they fulfilled the task accordingly.

Further research in this area is necessary due to the discovery of mirror neurons, but also the importance of mastering facial imitation during infancy. Some advice for future research would be to do a longitudinal study during all four stages of cognitive development according to Piaget and see if early learned facial imitation has an impact on later development of cognitive skills

and empathy.

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