

Imprinting and Critical Period of Language Acquisition

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Abstract. In language acquisition, imprinting during the critical period helps people to encode the information and influences received from outside more actively. It provides opportunity for people, especially children, to be socialized and have closer interactions with their environment, later forms social attachment. After the critical period, people still can learn new languages but requires more effort for the same outcome.

Keywords: Imprinting, Critical Period, Language Acquisition.

1. Introduction:

Before linguistic memory is stored in the hippocampus, it is first recognized as a sensory input. After the sounds or information is received, rehearsal could help to further encode the memory to long-term memory. Children are especially sensitive to new phonemes and syntaxes and can acquire languages better due to their high-plasticity neuron network during critical period. Through imprinting, they acquire languages and store them as semantic memory, which helps them accurately interpret words in the future. Nevertheless, this ability does not diminish after the critical period, people can still learn new languages but requires more devotion.

2. Role of the Critical Period in Language Acquisition

Critical period is a fixed period when people can acquire language simply and smoothly (Formkin & Rodman, 1983). This hypothesis was first introduced by Wilder Penfield and Lamar Roberts in 1959, then refined by Lenneberg, claiming that critical period is essential for first-language learning. After this period passed, language acquisition requires more effort and are often less successful (Lenneberg, 1967). Children, with their high neuron plasticity, has better ability to learn new languages and skills compare to adults who had passed their critical period. During the critical period, children establish sensitive learning towards environments and circumstances, which provides them strong socialization possibilities to determine new sounds and to distinguish among those sounds. Children have higher neuron plasticity than adults, so they are more capable to learn new sounds in different languages and more able to acquire different languages. A peak of language learning ability occurs during maturation, then it decreases gradually as time process. Although children's short-term memory capacity is less than adults that they only process several morphemes of the words, adults need to process multiple information at once, cause more confusions during language learning. Cognitive abilities that are more mature compete and intervene typical grammar, and is not beneficial for language-learning tasks, therefore the acquisition of second language is often less successful for adults (Newport, 1990). Some isolated children who lack social interactions with others might recover some of languages after social contacts, but they still fail to obtain normal language skills. The exercise hypothesis states that if linguistic skills are not used frequently, people might lose the ability to acquire new languages in the future; for people who practice different languages since childhood, they can still learn new languages successfully when reached adulthood (Birdsong, 1999). Some explains that systems of language generation and perception need to cooperate to ensure language acquisition, so that language-perception ability does not exceed language-generation ability. The role of mental grammar is to balance between the two systems, and by continuously usage, it could connect two systems together and consistently help people to learn new languages (Bever, 1981). For children who do not get enough linguistic access and training during critical period, they would face difficulties and are likely to fail when regaining languages. For bilinguals, their left hemisphere of the brain is activated compared to monolinguals. If one language of the bilingual is learned later,

passed the critical period, the PET or fMRI image would display a less overlapping and less activated than their first language (Newport & Bavelier & Neville, 2001).

3. Alternative Hypothesis for the Critical Period

To satisfy the definition of critical period, there should be a clear start and end time, and that there should be a significant gap before second language acquisition, emphasizes difference in language acquisition after one time; environmental factors should not cause great impacts during the critical period. When both analyzing the process and result of the language-learning process, adults and children tend to yield similar data, but those data are more affected by environmental factors such as economics and education, rather than age (Hakuta, 1999). The critical period, rather than a specific time, can be more determined by a gradual change in learning abilities, also as brain plasticity (Redmond, 1992). After the critical period of language learning, the ability for people to learn second language does not diminish, people can still learn the language but requires more time and effort than during the critical period. Language acquisition is a long-term learning process, and people still have possibilities to learn second or third languages even after the critical period, and it is not an absolute idea that adults cannot gain new skills in language learning; the only possibility relates to this idea is that it requires more time for adults to learn new languages compare to children. In experiments, elders tend to spend more time recalling words than youngsters, they spend more time establishing long-term-encoded memory and begin to forget details in memory. Those components are required for language acquisition, a decay for those abilities cause people to have decreased ability to learn and use languages, which is a gradual change rather than a critical period for memory and cognition (Bialystok & Hakuta, 1999). Thus, if cognitive changes result in changes in language proficiency, the obtaining and declining language acquisition would be a gradual change. Critical period is then redefined according to cognitive neuroscience, that it is a relatively elastic period which certain area are possible to hold changes. Brain plasticity, distinct from hard-wired, is the capability of the neuron network to form new conjunctions and to change due to different stimuli. Even after the neuron network mature, it is still possible for people to alter based on external stimuli it receives, means that language acquisition is the interaction between innate instincts and environmental factors (Eubank & Gregg, 1999).

4. Imprinting

Imprinting was first introduced by Konrad Lorenz and is defined as the critical period for animals to create social attachment and response to social stimulations in their early stages (Lorenz, 1935). In traditional psychology, the application of imprinting cannot be used to analyze the structure and function of memory (Zhang, 1992). Animals gain innate instincts that help them survive during or after the imprinting period. They would learn through their primary group and later begin socialization from their attachment agents. For animals that lack imprinting, their neuron formation and interactions would be affected and cause their neuron network to disfunction in some situations. Imprinting increases the synaptic contacts of the neuron network, caused by sensory input and then transfers the senses to the brain; the frontal lobe is activated when this synaptic contact increases and can be maintained until adulthood (Tzschentke & Plagemann, 2006). Imprinting during critical period emphasizes the skills in long run, from childhood to adulthood, to assist language learning in different stages of people's lives.

5. Role of Imprinting in Language Acquisition

Although some animals do not have self-concepts, infants would start to imitate others and later know what actions they should perform based on different situations they are in. The role of imprinting provides children learning abilities and possibilities to actively engage with the environment, which facilitates the formation of their own concepts about people and their words. An

experiment demonstrates that in a bird species, the juvenile birds do not acquire flight response as fast as the neonate birds; juvenile birds are more likely to act in the same way as before the imprinting happened, whereas neonate birds have better learning abilities to learn flight responses (Jaynes, 1957). When imprinting occurs during the critical period of individuals in one species, it would have greater possibilities for individuals to acquire the skills compare to who had passed their critical period. Imprinting could occur at any point of their living stages, but after the critical period ends, they face less chances and need to spend more time to gain second language acquisition. Because the memory process is consisted of three stages (sensory memory, short-term memory, long-term memory), information would lose after the message passed to the next stage (Gui, 2000). In the acquisition of second language, in order to enhance learning, people need to study the relationship between memory with cognition, the connection of new languages to previous information, and strategies to integrate newly acquired information with learned language information.

6. Conclusion

Despite infants and children with high brain plasticity could gain new languages more efficiently, people's ability to learn new skills does not end after the critical period. In some exceptions, it is possible for adults to gain equal or better results than children, and they still have opportunities to learn and to imprint new knowledges to form a complex neuron network and synaptic contact; people not only can obtain new languages during their critical period, but also can obtain them during later stages through imprinting. By effortful processing such as chunking and testing effect, people could acquire language more efficiently; by improving the effects of noticing to improve the quality of inputted message, and by method of loci to increase the efficiency of second-language acquisition. People can also use mnemonics and rehearsal to process languages deeply and diversely, eventually successfully acquire new languages.

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