

Language Gene: A Study to Explore Child Language

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How children learn language is debated fiercely in academia. Behaviourists believe that children learn language through limitation and reinforcement learning while nativists argue that children are born with linguistic knowledge that can help them acquire language. One justification for the unreasonableness of children acquiring language through learning is the complexity of language. Another reason for child language acquisition not finishing through learning is the irrelevance between general intelligence and language competence. It can be argued that children acquire language innately by controlling the “language gene”, which develops through evolution. In ancient times, humans may have nothing different compared to other animals. Nowadays, after the evolution of a long period of time, the “language gene” inside children’s bodies could help them develop language faculties. The viability of this theory is underpinned by the poverty of the stimulus argument, language’s conformity to universal features, the change from pidgin and creole language, and the same sequence of the development of child language acquisition. However, critics claim that this theory cannot solve the problem of second language acquisition of adults and the case of Genie. This could be explained by the lack of “incomprehensible input” and language environment and the degeneration of the language acquisition device. They also argue that the evidence from neuroscience is missing, and it is pseudoscience. The evidence from Wernicke’s area, Broca’s area, and the FOXP2 gene could rebut the counterargument.

Keywords: child language acquisition, language faculty, language gene

Introduction

Child language acquisition, regarded as a complex and mysterious process, has been studied for an extended period in academia. Some point out that children acquire language through imitation and reinforcement learning (Skinner, 1957), whereas others believe language is their innate competence (Chomsky, 1959; Hauser, Chomsky, & Fitch, 2002). This study will argue that the child language acquisition achieved by the “language gene” is innate by illustrating why children cannot master language entirely through learning, how they acquire it innately with some proofs and rebutting some counterarguments of this theory.

Why Language Cannot Merely Be Learned

One justification for the unreasonableness of children acquiring language through learning is the complexity of language. Behaviourists tried to explain language acquisition by emphasizing the significance of learning after birth and experience. Skinner (1957), as a representative, states that language can be learned through operant conditioning. However, language is a rather complex sign system governed by a multitude of

rules; at the same time, the language input of a child is limited, which means they do not have adequate learning material. A youngster is exposed to a limited percentage of the potential sentences in their language, restricting their database for developing a broader form of that language in their mind or brain, which has logical ramifications for any system attempting to learn a natural language from sparse data (Hauser et al., 2002). Under this circumstance, even though children can learn specific lexical units, these pieces cannot support them to master a language, namely comprehending and speaking it easily. Nevertheless, the truth is that children can comprehend around 6,000 words and have adult-like pronunciation at the age of five despite some problems in fricatives and consonant clusters (Rowland, 2014). Many Chinese undergraduates who are English learners cannot even know more than 6,000 English words with pronunciation problems, though studying the language since primary school. Moreover, Chomsky (1959) reveals that many phenomena cannot be explained by Skinner's (1957) work; for example, the child will not change what they say when corrected. In fact, attributing a complex achievement of human beings, namely language, to the experience of a short period of time rather than millions of years of evolution is unreasonable (Chomsky, 2015). Using language is far more complex than programming in essence, but programmers can communicate with each other without taking any efforts, whereas they need to take pains to programme. This case is nearly impossible to account for without the help of the "language gene" that humans may develop through evolution.

Another reason for child language acquisition not finishing through learning is the irrelevance between general intelligence and language competence. If language acquisition is a learning behaviour, then the ability to learn a language should be correlated positively with general intelligence. In other words, people with a low intelligent quotient should have a lower language capability than ordinary people. However, the truth is that even though people have mental retardation or intellectual disability, they can still develop and communicate through language and even sometimes show incredible talent in language. For example, people with savant syndrome will have severe mental disabilities but also gain a special skill that is superior to others (Treffert, 2009). This special skill could be acquiring language. Much research has shown that some savants can excel at language despite low cognitive skills. Moreover, if the positive correlation between general intelligence and language competence is accurate, people with good cognitive skills should be therefore good at using language. Nevertheless, patients with specific language impairment will be difficult to acquire language even though their cognitive level is average, representing a standard level of intelligence. Under this circumstance, although they are born with high intelligent quotients, they may still suffer from difficulty in language competence. To summarize, with the diseases of savant syndrome and specific language impairment, no matter what intelligent quotients children have, they have nothing to do with their language abilities. Given that learning behaviour is inextricably linked with general intelligence while language competence is not related to it, it can be argued that acquiring language is not a learning behaviour.

How Children Acquire Language

If language cannot be acquired by learning, then how can children achieve it? It can be argued that children acquire language innately by controlling the "language gene", which develops through evolution. In ancient times, humans may have nothing different compared to other animals. Suddenly, by the effect of gene mutation, they started to evolve minds as well as first-order intentionality, which means they can be conscious of their own existence and detect other objects, including their own species. They, therefore, had strong desires to express and even communicate with others because there were a lot of ideas and images gathering in their

minds. After this, a magic moment happened when their primitive articulators, which provided physical conditions for language, the ability to symbolize objects and use basic syntax, all of which had evolved separately before, came to evolve in parallel (Bickerton, 1990). This magic moment provided a perfect condition for primitive humans to develop language. Then the first group of humans acquired language, with the help of which, their likeliness of survival increased because they could talk about or write down things in future or in the past without the restriction of other animals' communication systems. This indirectly accumulated a multitude of shared experiences and even knowledge in the human species, therefore improving the development of their brains, which equipped them to survive in the wild, primitive world. According to the law of natural selection, most humans who evolved language survived and passed genes, including the "language gene", to the next generations. This is where the "language gene" is derived

Nowadays, after the evolution of a long period of time, the "language gene" inside children's bodies could help them develop language faculties. The faculty of language in a broad sense (FLB) is comprised of a sensory-motor system, a conceptual-intentional system, and the computational mechanisms for recursion, while the faculty of language in a narrow sense includes only recursion (Hauser et al., 2002). The set of language faculty, as generative grammarians believe, are built into human brains when they are born, which contains a series of grammar building rules, namely principles of universal grammar (Hornstein, Nunes, & Grohmann, 2005). Universal grammar can be regarded as the genetically determined initial state of the language faculty, which is shared by humans to a very high degree and from another angle; universal grammar could be currently understood as the language acquisition (Chomsky, 2015). It is through the innate language acquisition device that children can acquire language. It is worth noting that innatism does not simply emphasize the innateness of language but also pays attention to the role of acquired stimulus, claiming that language talent can only be revealed in a specific stage of maturity and appropriate external environmental conditions (Chomsky, Belletti, & Rizzi, 2002). This theory can perfectly solve the problem of acquisition and creativity of children language by emphasizing the significance of recursion.

The viability of this theory is underpinned by extensive research. Firstly, the primary argument in favour of the language acquisition device was the poverty of the stimulus argument, which argues that unless children have significant innate knowledge of grammar, they would not be able to learn the language as quickly as they do, given their lack of access to negative evidence and infrequent direct instruction in their first language (Van Patten & Benati, 2010). This argument is similar to the complexity of language mentioned above. Indeed, if children do not know anything about language, how could they become proficient language users only through a small amount of language inputs within a short period of time? Secondly, all languages conform to some universal features. There are some design features in all languages proposed by Hockett (1960), including structure dependence, creativity, and arbitrariness. The universal language features of structure dependence and creativity may come from the computational mechanism of recursion, which underpins while the feature of arbitrariness is derived from a conceptual-intentional system. These features that might be derived from the language faculty inside human brains indicate that all language should conform to certain universal rules that Chomsky (1959) calls universal grammar. Thirdly, the language of pidgin and creole can also provide proofs for the existence of the language acquisition device. The speed of a pidgin turning into a creole is really fast. However, the process that a rather simple sign system evolves into a complete as complex as any other language is not simple as presumed, which is similar to that children using a primary language turns into proficient one. In this process, complex grammatical rules are created and acquired by the language users

automatically, which is impossible to happen without the help of the language acquisition device because even the most intelligent people cannot design a mature language, but those “normal” pidgin users only use a few years to have one shared mature creole.

Furthermore, the influence of the “language gene” can also be seen in the development of child language acquisition. Lenneberg (1967) claimed that language develops much in advance of children’s demand for communication; children do not choose to learn a language on their own; external events will not trigger the development of language. This indicates that language “grows” inside human brains on its own, similar to the plant’s growth, which is a biological phenomenon controlled by genes. Furthermore, the acquisition of the mother tongue is in the same order, showing that language is a kind of human’s phenotype. After going through the same stage of language development, children will say their first word around the age of one. A language explosion occurs between the ages of two and a half and three years, and new vocabulary can be produced at an exponentially growing rate each day. They will then begin producing three-character words, phrases, and sentences between the ages of three and four and will be able to speak whole sentences around the age of four. At the age of five, they employ some sophisticated words and sentences (Rowland, 2014). Children who acquire the same native language perform similarly at all stages of development, despite their differing rates of acquisition. Some children may be a little faster than others for three to five months, while others may be slightly slower. However, the developmental path of youngsters is analogous. These developmental phases share cross-linguistic properties. Such properties are not exclusive to British youngsters. Children in the United States of America, Japan, and India are all in the same developmental stage. Moreover, children also have their own systematic rules of language, which could be different from adults’. For instance, all youngsters will first learn the word “no” and will use it to refuse everything. When the mother said: “eat some chocolates”, a 2-year-old baby said: “no eat some chocolate”. They cannot learn the correct expression for “don’t eat” until they reach the later stages of development. At the same time, children don’t accept corrections to their own language. No matter how many times caregivers tell them not to say “no eat some chocolate”, just say “don’t eat chocolate”. They do not accept making mistakes until one day they choose to say the correct expression themselves. These phenomena could provide solid proof for arguing that language is a typical phenotype of human beings under the control of the “language gene”.

Responses to Some Criticisms

However, this theory also encounters criticism and scepticism, which will be rebutted accordingly. Some question that if human beings have the language acquisition device derived from the “language gene”, why is it hard for adults to learn a second language and how do we explain the case of Genie? Actually, only when language learners are exposed to “comprehensible input”, namely a second language input which is slightly higher than his existing language skill level, and they focus on the understanding in meaning or information rather than format, will language acquisition happen (Krashen, 1982; 1985). When a child becomes an adult, his language environment has changed, which is hard for him to find “comprehensible input”. This can explain why the language acquisition device does not work. Further, If the language-related gene programme is activated during the critical period of language development, it enhances the individual’s ability to learn their mother tongue and other languages; on the other hand, if the language environment is not exposed, language-related genes are inhibited, resulting in the individual losing language learning ability (Arshavsky, 2009). Another reason for its ineffectiveness could be that the children’s language acquisition devices will

degenerate at a certain age. Given that language may be a phenotype of human beings, language acquisition may lose effect gradually, which is similar to the fact that the number of bones in a person will gradually decrease with age. One phenomenon of the critical period that child is hard to learn language after it may indicate the degeneration of the language acquisition device. Furthermore, the recursion mechanism is also questioned because there is a language called Piraha that might not be recursive. After Everett (2005) analyzed the features of the Piraha language, he claimed that this language lacks the recursion, which directly challenged the idea of universal grammar and relating theories. However, Nevins, Pesetsky, and Rodrigues (2009) argue that Everett's (2005) analysis of embedding/recursion is dubious or incorrect, whose proposal that culture and grammar are connected unnecessary and has no influence on Hauser et al.'s (2002) version of universal grammar. There are indeed some unusual features of the Piraha language; however, the original record and analysis of it are purely by Everett. As a consequence, his work is inconvincible and needs further research.

Moreover, according to critics, there is insufficient evidence from neuroscience to support the assumption that everyone possesses the language acquisition device, as well as the associated concepts of universal grammar and stimulus poverty (Hoff & Shatz, 2007). Some experts even claim that it is pseudoscience (Sampson & Babarczy, 2014). In fact, researchers have found that some areas in human brains are linked with language, which could indicate that the language faulty containing the language acquisition device may hide in these parts of the brains. Wernicke's area, alternatively referred to as Wernicke's speech area, and Broca's area are two regions of the cerebral cortex associated with speech. Wernicke's area is concerned with the comprehension of written and spoken language, as opposed to Broca's area concerned with language production. Broca's area has been connected to language processing since Pierre Paul Broca discovered deficits in two patients (Kennison, 2014). They had lost their capacity to talk after a brain lesion to the posterior inferior frontal gyrus (Dronkers, Plaisant, Ibazizen, & Cabanis, 2007). The damage to each area could affect different functions of language. It could be therefore argued that different language faculties may lie in different parts of the human brains. Further, numerous experts have recently shown that human language development is regulated by genes through the study of single-egg and double-egg twins (Bishop & Hayiou-Thomas, 2008). After studying the KE family, researchers found the FOXP2 gene, which could affect human beings' language abilities, leading to language disorder. There has been sufficient study to demonstrate that language and genes are intricately intertwined. This also shows, from a biogenetic standpoint, that language can be regarded as a unique human ability, indicating that "universal grammar" or the language acquisition device has a biological basis.

Conclusion

In conclusion, children language acquisition could not be achieved by learning due to the complexity of language and the irrelevance between language and general intelligence. Instead, it is achieved with the help of the language faculties containing the language acquisition device inside human brains under the control of the "language gene". This is supported by the poverty of the stimulus argument, language's conformity to universal features, the change from pidgin and creole language, and the same sequence of the development of child language acquisition. However, critics claim that this theory cannot solve the problem of second language acquisition of adults and the case of Genie. This could be explained by the lack of "incomprehensible input" and language environment and the degeneration of the language acquisition device. They also argue that the evidence from neuroscience is missing, and it is pseudoscience. The evidence from Wernicke's area, Broca's

area, and the FOXP2 gene could rebut the counterargument. It could be therefore claimed that child language acquisition is innate.

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