



## Biological Basis of Language: A Case Study of Ameera's Biological and Language Development

Ardiyani Widya Permatasari<sup>1</sup>; Diah Kristina<sup>2</sup>; Sumardi Sumardi<sup>3</sup>

Universitas Sebelas Maret  
Surakarta, 57126, Indonesia  
ardiyaniwidya@gmail.com

<http://dx.doi.org/10.18415/ijmmu.v5i5.430>

### **Abstract**

This paper presents a study about the biological and language development of a baby named Ameera in the age of 12 weeks–20 months. In particular, the study aims to find what stages of language acquisition are and how the process of the biological and language development of Ameera run. This is a case study and uses sample of convenience to choose one participant who is accessible and can be met anytime; a mother of a four-years old baby girl. The data were collected through informal interview, documents (pictures and video of the baby). The study found that there were 5 stages of language acquisition; prelinguistic stage, first manifestation of phonology, first word, two-word stage (first manifestation of syntax), and telegraphic speech. Then, the process of biological and language development of Ameera yielded certain considerations. One of the major findings was the fact that Ameera spoke first and walked later. In line with the finding, Darjowidjojo (2012) stated that the standard of weeks, months and years as written in the chart must be regarded relative for biological factor of human beings cannot be the same (p.199) It is expected that this research will give better understanding to the development and implication of Psycholinguistics in the field of Biological Basis of Language in the future.

**Keywords:** Biological Basis; Language Acquisition; Language Development

### **Introduction**

*An infant crying in the night; An infant crying for the light; And with no language but a cry* (Tennyson). This proverb really attracts people attention specially mothers who have just born their babies. Looking after of a baby needs a lot of patience, sincerity or love and education. Now, we are focusing more on education since mothers will not know anything about baby's crying. That is why education is highly recommended to put more concern on. By having education in form of knowledge from the books, news or any media, mothers will be able to translate baby's crying. When these babies have not reach their onset of babbling stage, they will always cry for anything, for hunger, thirst, pup, and pee. To learn more about the biological and language development of babies and how they relate each other, we need to raise this third topic of psycholinguistics to be discussed deeper, which is biological basis of language.

As part of genetically endowed language abilities, Lenneberg (1967) hypothesized a "critical period" during which language learning proceeds with unmatched ease. A child's early years are especially crucial for language development, Lenneberg argued, because that is the period before the two hemispheres of the human brain lateralizes and specializes in function. As partial proof, Lenneberg discussed cases where children in bilingual communities were able to learn two languages, fluently and without obvious signs of effort before the age of (about) twelve, but to learn a second language after the age of twelve becomes enormously difficult for most people (Dardjowidjojo., 2012, p. 218-9).

Exactly which language capacities are genetically given is an open, and hotly debated, question. Some linguists are so impressed by the speed and uniformity with which children all over the world learn the complex and abstract system of language that they are convinced that the parameters of what can be a human language are biologically determined (see for example Lightfoot 1982). McNeill (1970, p. 2-3) has even argued that the notion of 'sentence' is inherited: The facts of language acquisition could not be as they are unless the concept of a sentence is available to children at the start of their learning. The concept of a sentence is the main guiding principle in a child's attempts to organize and interpret the linguistic evidence that fluent speakers make available to him. There are not sufficient data to state conclusively the contribution of biology to human language, but all linguists acknowledge that biology does play some role.

As Patterson and Holts write in their chapter about language development in the gorilla Koko, neurologists know that the infant brain is only forty percent developed at birth (retrieved from: <http://papyr.com/hypertextbooks/grammar/lgdev.htm>). The brain will not achieve its final shape for two years, and many interconnections within the brain will not be complete until the child reaches seven years of age. Some neurologists insist, therefore, that the infant who struggles to gurgle and babble is not attempting to articulate speech sounds because the child has not attained enough neuromuscular, biological, maturity to control the vocal organs before the age of six months. However, Patterson and Holts's point of view were broken by certain researchers (Aitchinson., 1996, p. 52-3; Lieberman, 1992, p. 410-11; Ciani & Chirelli, 1992, p. 51-65 as cited in Dardjowidjojo, 2012, p. 193-6) who stated that though there are the similarities between human being and chimpanzee, these two living things are different and the ability to communicate which is owned by human beings only, the mouth structure of animals which has mouth ratio with tongue narrow size do not enable them to modify the air stream into different and distinctive sounds, and the mouth structure of human beings which has close teeth, similar height, and not slope forward make the air which come out from the mouth can be arranged. Thus, in term of biological side as breathing device, human beings are the only living things who is destined to be spoken primate and biological aspect play important role toward human beings language acquisition.

### **Research Problems**

There are problems underlie this case, firstly according to Pakulak and Neville (2010) the rates of language development vary substantially among children, and this variability is a product of a complex interaction between genetic and environmental factors (p. 1). Then, Mc Neill (1966) stated that most parents do not teach their babies the rules of language which cause babies acquire a language without explicit teaching and result in error (both grammatical and morphological forms) when they are producing a sentence (p. 69). Another case come from Bishop and Mogford (1993, p. 22 as cited in Dupoux and Mehler., 1990, p. 195) who stated that though variability exists in the rate at which a construction may be acquired or vocabulary grows in a child, "individual variation is less striking than similarities in development". For example, blind children acquire language and vocabulary at the same rate seeing children. Similarly, there are logical problems of language acquisition which come from genetic or environmental factors, no explicit teaching, limited amount of time, and under varying circumstances.

Thus, little evidence currently exists which specifically addresses the contribution of biological basis toward language to babies development. This paper intends to answer the following research questions:

1. What are the stages of language acquisition?
2. How does the process of the biological and language development of Ameera run?

This study is conducted to put more emphasis on the distinction between human being and animals that the biological factor which differentiate human can speak any languages while animals cannot (Darjowidjojo., 2012, p. 189). The second reason is to show that there are processes of language acquisition which relate biological factor with language acquisition (p. 197).

### ***Methodology***

The study is conducted in Salatiga. The participant is a mother who works daily in an office and having a four-year-old daughter. The reason for selecting this case was because biological basis of language seems to be simple matter in life which no one notices or pays attention on. In fact, this case is really crucial and essential to be put emphasis in acquiring the language and the healthy physic. Thus, choosing this topic is considered appropriate for this study.

In addition, informal interview was conducted toward the mother. She gave evidence in form of pictures and video of her development. The selection of participant was based on ‘sample of convenience’ method (McKay., 2006, p. 37). It meant that this mother was more accessible to be asked information regarding how the process of the biological and language development of Ameera and had bigger willingness to be questioned about further information related to their data.

### ***Results and Discussions***

In the first solution, it discusses on what the stages of language acquisition are written below. According to Hamann, there are five stages of language acquisition:

- *From birth to about 6 months–so called prelinguistic stage*

In this stage, the first sounds a baby makes are not language related but stimuli driven noises expressing discomfort. In this sense, there are no language sounds.

#### 4-8 days of age:

babies prefer language to other noise,  
distinguish their mother tongue (independent from speakers)  
distinguish (certain) foreign languages

#### 4-8 months of age:

babies prefer pauses at syntactic boundaries to random pauses;  
babies distinguish syllables, but not chains of consonants;  
babies can distinguish phonemes (perception of categories); /pa/ > /ba/  
babies distinguish the phonemes of the universal inventory, narrow this down  
to the inventory of their native language;

### Experimental Techniques

head turning times; frequency of non-nutritive sucking; HAS (High Sucking frequency indicative of baby's interest) (as shown in figure 1)

- *at around 6-8 months onset of babbling (first manifestation of phonology)*
- *at around 10-12 months first words*
- *at around 20-24 months onset of the two-word stage (first manifestation of syntax) (Retrieved from:[http://www.uni-oldenburg.de/fileadmin/user\\_upload/anglistik/personen/cornelia.hamann/Language Acquisition.pdf](http://www.uni-oldenburg.de/fileadmin/user_upload/anglistik/personen/cornelia.hamann/Language%20Acquisition.pdf))*

In addition, Dardjowidjojo (2012) said that there is universal in language acquisition which is based on phonological and syntax and semantics aspects (p. 237-8). In Jakobson's theory or Minimal Vocalic System which ensure there are of three vocals from /a/, /i/, /u/, only /a/ which is the most used vocal (1971, p.8-20 as cited in Dardjowidjojo., 2012, p. 238). In Ameera's case, she spoke her first word by saying 'yah'. What Ameera faced was quite different to Gass and Selinker's finding that babies acquire sound /m/ and /a/ because of the ease (2001, p. 92 as cited in Dardjowidjojo., 2012, p. 238-9). Thus, the arrangement of sounds is genetic and because of the biological development of human beings is different so when do certain sounds appear cannot be measured by years or months. In this case, Echa who can speak (4; 9) and her sister (3;0) (Darjowidjojo., 2000, p. 113). Moreover, Ameera is able to speak /r/ in her 18 months. In this case, the universal level of phonological aspect cannot be determined surely as high level of universal considering Ameera's case. Then, universal of syntax and semantic aspects have lower level than the previous. Syntax aspect covers the sentence pattern which is gained universal. Semantic aspect deals with what kind of word is acquired and how many words are based on the children' condition (Dardjowidjojo., 2012, p. 240-1). For the reason that Ameera live in two condition, in the village, at Grandma's house and in Salatiga, she often uses Javanese like *oyo...oyo...oyo... mah...* when she responded to her mom's want to record Ameera.

In the second solution, how the process of the biological and language development of Ameera run. In this world, babies acquire language by the similar process. However, Ameera has some differences among other babies. In her 12 weeks, she started to have sitting position, slept like an adult, she begun the cooing for 20 seconds and chuckling sounds were made. In her 16 weeks, Ameera liked to be in *tengkurap* position. Her head was self-supported. She responded quickly to human sounds definitely and her eyes seemed to search for speaker. Consonantal sounds were made with the vowel-like cooing but the vocalizations were very different from sounds of mature language. In her 20 weeks, she liked to roll over her body moved her hands and legs frequently but she has not been able to sit. She started to hold all the things around her. She starts to crawl backward. This time, Ameera changed her cooing to babbling with single syllables like ma, mu, mi, etc. In her 6-8 months, she was in her golden period for she showed a lot of progress. She started to crawl forward and her hands and legs moved more frequently. She could sit with properties behind her. She could call her own nick name like *ta.ta.ta*. She started to have identical sound, one syllable like *nen.nen.nen* (meaning that she asked for ASI before her mom went to work). She started to be able to respond to simple command. She could point at her head, nose, mouth, legs when she was asked. When the songs were played her hands were dancing. What Bates (1976) creates interesting connections between the development of language and the child's gestural communication by regarding gestures like those described above as communicative acts ('speech acts') performing the same social functions of request and assertion that utterances later satisfy. A child pointing with a finger is commonly making an assertion ("There's my ..."). Similarly, Ameera learns that intention (assertions, requests, command) which can be conveyed as signals; she learns to combine signals and use nonverbal vocalization to communicate a message.

In her 10 months, she stood holding on in the bedroom's walls. She understood more of simple command like when her mom recorded her, her mom said *lihat mama* and she suddenly turned her face to the camera. When her mom said smile, she smiled. When her mom said kiss bye and she gave the gesture of kissing good bye and shaking her hands. When her mom said *jeleknya gimana* and she turned her face into ugly face like in the picture. Next, in her 12 – 15 months, she started to stand by one hand and walk for five steps. Definite signs of understanding appear in responses to simple command. She responded Indonesian songs like Pok Ame-Ame, Topi Saya Bundar by shaking her hands and giving certain gestures. She understood her mom's question and held her mom's hand when she was going to stand and walk like in the video. In her 18 – 20 months, Ameera was able to do many things. She could walk slowly and creep downstairs. She was able to sing Indonesian songs like *pok ame-ame*, *naik-naik ke puncak gunung*, and *topi saya bundar* with its gesture like in the first picture. Then, the surprised event occurred when her mom was recording her and she was angry by saying '*oyo...oyo...oyo....oyo...oyo mah...*' Meaning that she did not want to be recorded and tried to take the hand phone like in the second picture. Fortunately, she was able to say her long name but with not yet clear vocalization. She started to imitate all human sounds. (as shown in figure 1).

## Conclusion

By discussing on the previous case, Ameera's case, there are certain conclusions made. Firstly, the benchmark of weeks, months and years as Lenneberg's chart which talked about Echa's biological and language development (the grandchild of Dardjowidjojo) must be regarded relative for biological, language comprehension and production factors of human beings aren't the same (Dardjowidjojo., 2012, p. 199). For instance, Ameera's case who could not stand holding on until her 10 months while Echa could stand in her 8 months. Another example, Echa understood and responded to simple command in her 12 months while Ameera could do that in her 10 months. Secondly, human beings acquire language natively and occur in the period of 2–12 years old. At last, the mother's of Ameera unconsciously used or applied behaviorism toward Ameera. For the reason that Ameera spoke first than walk, Ameera's language learning is the result of 1) imitation (word-for-word repetition), 2) practice (repetitive manipulation of form), 3) feedback on success (positive reinforcement), and 4) habit formation (Markle., 1969; Skinner., 1968 as cited in Fauziati., 2009, p. 19). Similarly, Ameera was able to speak fluently, respond well, and sing Indonesian songs with gesture in her 18 months for she was always given stimulus in form of repetition, drilling, and rejoinder (Brook., 1964, p. 156-61 as cited in Fauziati., 2009, p. 21-4). Her mother always trained her with Indonesian songs and its gestures, gave her simple command like *cantiknya mana?* give me your smile, *jeleknya mana?*, *kakinya mana?* *hidung peteknya mana?* (*hidung pesek*)

Based on the facts and the experts discussed above, biological phenomenon especially biological development; its direction and schedule of the appearance of one element in a language is genetic problem. People cannot make it faster or slower the appearance of elements. Another factor is environment factor affect what have been existed in the human biology as well. In Dardjowidjojo' research toward his grandchild, Echa, she was attracted by many efforts to speak /r/ or /j/ but she could speak them in her (4;9). In Ameera's case, she was able to respond simply command in her 6-8 months and pronounce /r/ and /j/ clearly in her 14 months. Thus, we notice that biological basis and language development of a baby are interrelated. In brief, Ameera's biological and language development run well by noticing on the stages of language acquisition and because of her mother's recognition toward Ameera's every single growth and Ameera's ability.

## **Acknowledgement**

This research received no funding from anyone or institutions. However, I do appreciate to my sister in law who participated and spared her time for my study in providing many data in the form of pictures and video of her daughter and giving many informations of her daughter biological and language development in the form of interview session.

## **References**

- Dardjowidjojo, S. (2012). *Psikolinguistik: Pengantar Pemahaman Bahasa Manusia*. Jakarta: Yayasan Pustaka Obor Indonesia.
- \_\_\_\_\_. (2000). *Echa: Kisah Pemerolehan Bahasa Anak Indonesia*. Jakarta: Grasindo.
- Dupox, E., & Mehler, J. (1990). Monitoring the lexicon with normal and compressed speech: Frequency effects and the prelexical code, *Journal of Memory and Language*, 29: 316-335.
- Fauziati, E. (2009). *Reading on Applied Linguistics: A Handbook for Language Teacher and Teacher Researcher*. Surakarta: Era Pustaka Utama.
- Lightfoot, David. (1982). *The Language Lottery: Toward a Biology of Grammars*, Cambridge. Mass: The M.I.T. Press.
- McKay, S. L. (2006). *Researching second language classrooms*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- McNeill, D. (1966). "Developmental Psycholinguistics". In F. Smith and G.A. Miller (eds): *The Genesis of Language*. Cambridge, Mass: MIT Press.
- McNeill, David. (1970). *The Acquisition of Language*, New York: Harper & Row. 1985 "So You Think Gestures are Nonverbal?" *Psychological Review*, 92: 350-71.

### Online Sources:

Kies, Daniel. (1991). *Language Development in Children: Modern English Grammar*. Retrieved from <http://papyr.com/hypertextbooks/grammar/igdev.htm>.

## **Appendices**

### **Appendix 1**

#### ***The Biological and Language Development of Ameera***

The focus of my interview is to ask you about the biological and language growth of Ameera. Points that I am going to ask are

- How was Ameera's biological and language growth from 12 weeks to 20 months?
- What were the evidence?

The response were written directly in the chart and the evidence were in the form of pictures and video. For the video will be attached.

12 Weeks



Ameera started to sit and did not like to be carried by her mother like usual babies. She preferred to be carried in front of her mother's chest and sit like a one year old baby. She slept in inclined position like how adults sleep. She has begun the cooing for 20 seconds and chuckling sounds were made.

16 Weeks



Ameera liked to be in *tengkurap* position. Her head was self-supported. She responded quickly to human sounds definitely and her eyes seemed to search for speaker. Consonanted sounds were made with the vowel-like cooing but the vocalizations were very different from sounds of mature language.

20 Weeks



In the video, it was shown that Ameera liked to roll over her body and moved her hands and legs frequently but she has not been able to sit. She started to hold all the things around her. She started to crawl backward. This time, Ameera changed her cooing to babbling with single syllables like ma, mu, mi, etc.

6 - 8 Months



She started to crawl forward and her hands and legs moved more frequently. She could sit with properties behind her. She could call her own nickname like ta.ta.ta. She started to have identical sound, one syllable like nen.nen.nen (meaning that she asked for ASI before her mom went to work). She started to be able to respond to simple command. She could point at her head, nose, mouth, legs when she was asked. When the songs were played her hands were dancing.



18-20 Months

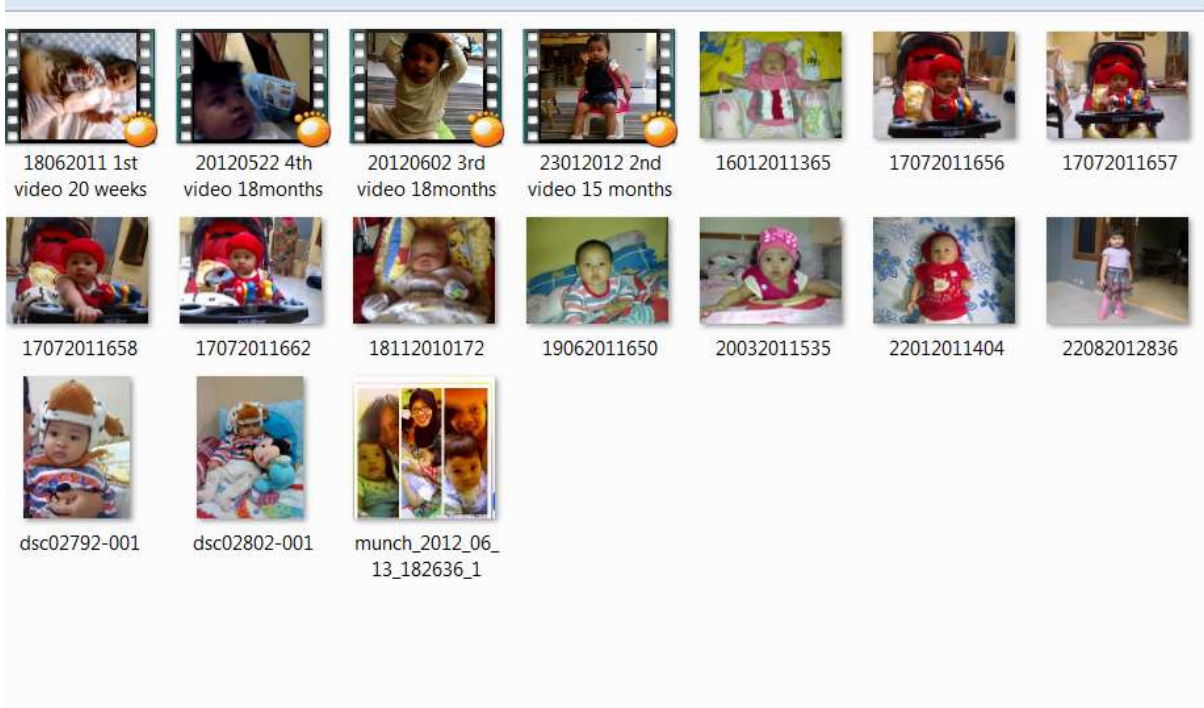


In this age, Ameera was able to do many things. She could walk slowly and creep downstairs. She was able to sing Indonesian songs like *Pok Ame-Ame*, *Naik-naik ke puncak gunung*, and *Topi saya bundar* with its gesture like in the first picture. Then, the surprised event occurred when her mom was recording her and she was angry by saying 'ojo...ojo...ojo....ojo...ojo mah.... Meaning that she didnot want to be recorded and tried to take the handphone like in the second picture. Fortunately, she was able to say her long name but with not yet clear vocalization. She started to imiate all human sounds.

Fig. 1 The relationship between the biological and language development

**Appendix 2**

**Videos and Pictures of Ameera**





**Copyrights**

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).