

A study of an article with the theme of evolutionary and the root source of lingu...

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' The role of dialogue in the ontogeny and phylogeny of early symbol combinations: A cross-species comparison of bonobo, chimpanzee, and human learners'

by Kristen Gillespie-Lynch, Patricia M. Greenfield, Heidi Lyn, Sue Savage-Rumbaugh (2011)

I will be discussing an article from the 31st volume of the journal ' First Language', published in November 2011 pp. 442-460, focusing on the ' evolutionary and developmental origins of linguistic creativity'. It compares the language learning processes of representatives of three different species: Panbanisha, a female bonobo, Panpanzee, a female chimpanzee, and ' NT', a human child, and was written by Kristen Gillespie-Lynch (University of California, USA), Patricia M. Greenfield (University of California, USA), Heidi Lyn (University of Southern Mississippi, USA), and Sue Savage-Rumbaugh (Great Ape Trust, USA).

The broad message of the authors' conclusion is that " novel symbol combinations are initially dependent on conversational input" although " reliance on conversational input for novel symbol combination fades with development" (Gillespie-Lynch et al., 2011). Their findings are helpful in the debate regarding whether " ape language is limited to imitation" and also addresses " the claim that apes are not capable of imitation" (Gillespie-Lynch et al, 2011), as the study found that imitation happened across all three of the species studied, and that they all became less dependent on imitation as they developed further, showing that ape language is in fact not limited to imitation only. This is a strength of the study as it makes the

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results useful in psychological and linguistic debate regarding ape language, and could be used as part of a content analysis in future studies on the topic.

The study operates on two hypotheses. The first was that “ conversational sources for symbol combinations would occur in all three species” (Gillespie-Lynch et al., 2011), and the second was that “ the prevalence of potential discourse sources would decrease over developmental time in all three species” and “ that there would be developmental movement from interdependent to independent symbol combination” (Gillespie-Lynch et al., 2011). The results show that all three species became able to use deferred imitation of phrases they had been exposed to in conversation independently later on. Without the role of dialogue, however, it would be incredibly difficult for even human learners, who are viewed from a Cartesian perspective as having “ biologically-determined properties of the mind/brain that provide a framework for the construction of mental representations [of language]” (Chomsky, 1992), to learn to create novel symbol combinations.

With regards to the second hypothesis, the researchers organized novel combinations into groups of those that did have a conversational precedent, those that didn't, and the age at which they were first produced independently. They tested the hypothesis using quantitative analysis methods, including chi-square tests of independence “ to compare the proportion of combinations with a conversational precedent across different time periods” (Gillespie-Lynch et al., 2011). To verify the validity of their results, the researchers also analyzed the number of potential precedents for word combinations that were coded as ‘ babbling’ and found that these also

decreased with age as they had done for proper, meaningful utterances. Also, the amount of babbling recorded decreased over the duration of the study, a significant negative correlation was found between this decrease and the increase in spontaneous concordant combinations for the bonobo and chimpanzee participants, shown by figure 2 (Gillespie-Lynch et al., 2011).

The subjects in the study were initially exposed to recurring routines as a source of linguistic input, meaning that they heard the same word combinations during every day routines. It was thought that this “ may allow language learners to reproduce combinations through deferred imitation” (Gillespie-Lynch et al., 2011), and later on be able to ‘ reproduce a model which has been absent for some considerable time’ (Piaget, 1999). It is thought that “ extensive contact with humans and their symbols may allow highly social species such as apes and dolphins to demonstrate deferred imitation in response to human cues” (Gillespie-Lynch et al., 2011), allowing human and ape symbol combinations to be accurately compared in this study, as well as the fact that ‘ like human infants, enculturated apes exhibit age-related increases in deferred imitation’ (Bjorklund et al., 2000; Jones & Herbert, 2006).

One of the strengths of Gillespie-Lynch et al.’s study is that it uses the longitudinal method, which in this case allows researchers to observe the development of the subjects’ symbol combinations, from the immediate imitation stage to the independent novel combination stage – something that a snapshot study simply could not do. Previous longitudinal records of child

language propose that “ conversational precedents for subsequent word combinations include deferred imitation of a model phrase” and “ joint constructions between conversational partners wherein each supplies a part of an utterance” (Gillespie-Lynch et al., 2011). Gillespie-Lynch et al. looked at joint constructions in the tables of results on pages 5 (proposition across speakers) and 6 (expansion), and found that both kinds were observable across all three species.

However, the study had a very small sample (just one representative of each species). This means that no generalizations can be made regarding the emergence of novel symbol combinations in other members of the species, particularly the two non-human species. The researchers address this, stating that they aim to “ present an existence of proof concerning species capabilities rather than a claim concerning frequency of particular processes” (Gillespie-Lynch et al., 2011), but it can be argued that the study would perhaps be more useful had more subjects been involved, as there is nothing to say that the patterns observed in the existing subjects were not completely coincidental. Small sample size can be a weakness as it means that researchers don't have any average to check their results against in order to blur out anomalies, and sample size is important as “ it allows the researcher to control for the risk of reporting a false-negative finding (Type II error)”. A Type II error is where a null hypothesis that is actually false is accidentally upheld, and when made these types of errors project the entirely wrong viewpoint on a topic and may prove an entire study pointless and invalid.

Another strength of the study is that the researchers were very thorough yet succinct in finding the information that they needed in their gargantuan database. The human data was not entirely holistic, but recording of the ape subjects' language usage took place for eight hours every single day for three years, providing a huge pool from which symbol combinations of importance can be drawn. Researchers determined whether each symbol combination had a conversational precedent by searching a database of all recorded utterances " to determine if modeled or joint constructions containing the symbols in each novel combination did or did not occur at some point prior to each novel concordant symbol combination" (Gillespie-Lynch et al., 2011), which allowed them to analyze the development over time (the data were organized by date) of the decrease in conversational precedence in the subjects' novel symbol combinations.

The paper also includes some actual transcriptions of the utterances that were recorded on pages 450-453, allowing us to compare the results described with the utterances given to us. This is important as the inclusion of the data provides evidence to back up the claims that are being made, and the researchers are sure not to go into too much detail about discoveries they made without providing the relevant data. For example, the paper states that there is an " ability to use deferred imitation of modeled phrases to construct symbol combinations independently at a later point" that is evident in all three species (Gillespie-Lynch et al., 2011), and table 4 (p. 453) immediately below this gives confirmation that all three participants did in fact possess and employ this ability.

A small flaw in the research design shows in the fact that the human child was observed “ approximately 0.2 times as frequently as the apes” (Gillespie-Lynch et al., 2011). Although they were observed to produce a similar number of combinations, it is perhaps biased that the apes were observed with such a greater frequency than the human participant. Although the observations of the human were supplemented by diary entries written by their mother, these were discarded in the final results stage so as to make quantitative comparison easier - this means that many novel symbol combinations, whether conversationally proceeded or not, may have been missed from the human child’s dataset, which may mean that they were thought to have produced a smaller number of novel word combinations than they actually did. This could have a causal sequence effect on the results, as key data such as novel symbol combinations arising from those that previously had a conversational precedent may be missing from the dataset, and something like this could cause the study’s overall results to be skewed.

The paper includes a lengthy discussion of the study and its’ findings on pages 477-457, allowing the study’s applications and usefulness to be discussed. This helps to establish the study within the community of language acquisition/primate language research, and helps to point out which parts of the study the researchers believe are the most important for future studies and the most relevant to the surrounding debates. For example, the discussion states that “ the qualitative evidence suggests that all three species use deferred imitation and other dialogic sources to generate early word combinations ... this pattern occurs only for symbol

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combinations that are meaningful in context ... this sequence of steps provides cladistic evidence for Vygotsky's (1962) developmental progression from inter-individual to intra-individual competence" (Gillespie-Lynch et al., 2011). This shows how the study is useful in providing clarity to existing debates, as it provides evidence for a previously posed theory and thus goes towards clearing up issues in the topic of inter-individual and intra-individual language competence.

Another important section of the discussion is the collection of paragraphs that assess the study's weaknesses and limitations, as this shows that the authors are aware that their study is not perfect and are aware of potential improvements that could be made. For example, it states that " another potential limitation of this study is that a visual lexigram board upon which all choices are immediately available may require fewer memory resources than the internal lexicon that a child accesses in order to speak" (Gillespie-Lynch et al., 2011). This is to say that, when presented with a lexigram of approximately 256 symbols, it requires less brainwork to select the correct symbol than it does for a human child to go through their entire lexicon, probably consisting of thousands of words constantly. A choice between 256 cannot really be accurately compared to a choice between thousands of symbols, and this points out the key difference between the language learning of humans and apes. Although, as the vocal cords of apes are not capable of producing sounds comprehensible to the human ear, there is no way to eliminate this problem, and the lexigram concept is the closest thing to human language usable by primates that has been developed in research thus far.

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In conclusion, Gillespie-Lynch et al. present a very strong study, with useful findings backed up by empirical evidence provided within the paper. The paper is well organized and readable, allowing for a concise yet detailed account of the study's hypotheses, methods, and findings, along with a helpful discussion to ease understanding and point towards further reading. Although it is not without limitations, the study provides a very useful insight into the ability of humans and primates to produce novel symbol combinations and the reliance this ability has upon conversation in the first years of life, and will be helpful to those down the line who choose to conduct further research on this topic.