

A Literature review on Why Animals Cannot Acquire Human Language

Mochammad Akbar Udin Maulana¹✉, Raudlotul Jannah²
Universitas Islam Negeri Sunan Ampel Surabaya^{1,2}

✉ akunyaakbaar@gmail.com

Abstract:

This study aims to comprehend the underlying factors that preclude the acquisition of human language by animals through a comprehensive review of experiments conducted on parrots and anthropoid apes has been undertaken. The research employs a qualitative approach, underpinned by a literature review method, with a focus on the cognitive and neurological functions of animals in the context of communication. The primary data have been sourced from a range of previous studies, including but not limited to: Irene Pepperberg's long-term experiment with the African grey parrot Alex; the Gua project by Robert Yerkes; and the research conducted by the Kellogg family, as well as William Henry Furness III's research on chimpanzees and orangutans. The findings demonstrate that while certain animals possess the capacity to imitate human sounds, respond to verbal commands, and comprehend specific concepts, their communication cannot be categorised as language. It has been demonstrated that parrots such as Alex and Cosmo have the capacity to associate words with objects and express simple intentions. However, their ability remains constrained by imitation and associative learning. In a similar manner, anthropoid apes such as Gua exhibited marked intelligence and responsiveness. However, due to anatomical and neurological limitations, they were unable to produce human-like speech. In conclusion, it can be posited that language is a complex result of human cognitive evolution that involves symbolic thinking, abstract reasoning, and social awareness. While animals may communicate with apparent efficacy, they lack the neurological and anatomical systems that are the hallmark of true language. The present findings indicate that language functions not only as a medium for communication but also as a distinctive manifestation of human consciousness and thought.

Keywords: neurolinguistic; evolutionary linguistic; orangutan; chimpanzee; parrot

Abstrak:

Penelitian ini bertujuan untuk memahami mengapa hewan tidak dapat menguasai bahasa manusia dengan meninjau beberapa eksperimen yang dilakukan pada burung beo dan kera antropoid. Penelitian ini menggunakan pendekatan kualitatif dengan metode tinjauan literatur, yang berfokus pada bagaimana fungsi kognitif dan neurologis hewan bekerja saat mereka berusaha berkomunikasi. Data utama diambil dari studi sebelumnya, termasuk eksperimen jangka panjang Irene Pepperberg dengan burung beo Afrika abu-abu bernama Alex, proyek Gua oleh Robert Yerkes dan keluarga Kellogg, serta penelitian William Henry Furness III tentang simpanse dan orangutan. Temuan menunjukkan bahwa meskipun beberapa hewan mampu meniru suara manusia, mengikuti perintah verbal, dan bahkan memahami konsep tertentu, komunikasi mereka tidak dapat diklasifikasikan sebagai bahasa. Burung beo seperti Alex dan Cosmo dapat mengasosiasikan kata-kata dengan objek dan mengekspresikan niat sederhana, namun kemampuannya tetap terbatas pada meniru dan pembelajaran asosiatif.

Demikian pula, kera antropoid seperti Gua menunjukkan kecerdasan dan responsivitas yang kuat, namun gagal menghasilkan ucapan seperti manusia karena keterbatasan anatomis dan neurologis. Kesimpulannya, bahasa adalah hasil kompleks dari evolusi kognitif manusia yang melibatkan pemikiran simbolis, penalaran abstrak, dan kesadaran sosial. Hewan mungkin dapat berkomunikasi secara efektif, namun mereka tidak memiliki sistem neurologis dan anatomis yang memungkinkan bahasa sejati. Temuan ini menyoroti bahwa bahasa bukan hanya alat komunikasi, tetapi juga cerminan unik dari kesadaran dan pemikiran manusia.

Kata kunci: neurolinguistik; evolusi bahasa; orangutan; simpanse; burung beo

INTRODUCTION

The utilisation of language for the purpose of communication is a universal human activity, occurring on a daily basis. It is evident that humans possess the remarkable capacity to utilise language as a fundamental skill (Francis 2024). However, it is pertinent to question whether humans are the sole species that can employ language as a medium of communication. The question thus arises as to whether other non-human living creatures are also capable of using language. Language is defined as a tool for conveying ideas or thoughts from one individual to another. This can be achieved through speech, writing or gestures, each of which has specific meanings. The capacity for human language ability is theorised to emerge from the cognitive functions possessed by humans themselves. However, the question remains as to whether non-human living creatures possess language abilities analogous to those exhibited by humans.

This article will present a discussion of several studies and experiments that have been conducted in order to ascertain whether animals are also capable of using language in the manner of humans. In the context of research, a number of animals have been utilised as subjects, including parrots, which possess the capacity to replicate human vocalisations. Furthermore, research has been conducted on anthropomorphic apes such as chimpanzees and orangutans, given their purported high cognitive brain function in the domain of neurolinguistics. These animals have been shown to successfully complete a range of complex tasks and possess an anatomical structure that is analogous to that of humans. The present article also aims to convey the importance of knowledge about language to the general public, because not all gestures or sounds can be called language.

LITERATURE REVIEW

Research on language abilities in animals has been conducted by various experts using several types of animals, such as parrots and anthropoid primates (chimpanzees and orangutans). A plethora of experiments conducted on a parrot named Alex and Cosmo by Irene Pepperberg (2002), in addition to research on chimpanzees such as Gua by Robert Yerkes and the Kellogg family, and William Henry Furness III's experiments on other apes, have provided an understanding that certain animals possess the capacity to imitate sounds, comprehend commands, and even manifest complex cognitive behaviour. However, the majority of these studies have focused on the capacity to imitate sounds and respond to linguistic stimuli, as opposed to the ability to comprehend the meaning and structure of language, as is the case for humans.

A number of scholars have evaluated these animal language studies and arrived at conclusions that are broadly similar. Premack (1971) demonstrated that chimpanzees were capable of acquiring symbol systems and fundamental relational concepts, thereby exhibiting remarkable cognitive abilities. However, this learning predominantly occurred within artificial training contexts. Terrace's review of Nim Chimpsky (1979) found that ape "sentences" were largely imitations shaped by trainer cues, meaning they lacked true grammar. The strength of these reviews lies in their demonstration that animals are capable of comprehending labels, requests and emotional cues. However, a limitation of this research is that it often evaluates animal communication solely by human linguistic standards. Conversely, Lieberman (2007) and Fitch (2010) emphasised biological limits in the vocal tract that prevent apes and parrots from producing human speech, a convincing explanation, though one that focuses mostly on spoken language and less on alternative communicative modes such as gesture. A comprehensive review of the extant literature suggests that animals are capable of communicating in a meaningful manner within certain limits. However, human language remains unique in its symbolic structure and generative complexity.

RESEARCH METHODS

The present study employed a qualitative approach, as its primary objective is to gain an in-depth understanding of how animals' language abilities can be explained from a neurolinguistic perspective. The rationale behind this choice is twofold: firstly, the primary focus of the research is not on numerical data or statistical analysis, but rather on the

exploration of the cognitive processes and functions of the animal brain during communication. This approach seeks to demonstrate that animals’ capacity to mimic sounds, comprehend commands, and even manifest “meaningful” behaviour does not merely stem from biological happenstance, but rather from intricate cerebral processes.

This study employed a literature review to examine a range of previous experiments and studies discussing animal language abilities. The following studies are of particular note: Irene Pepperberg’s experiment on an African grey parrot named Alex, and Cosmo Robert Yerkes’ experiment with psychologists Winthrop and Luella Kellogg on a chimpanzee named Gua, and William Henry Furness III’s research on several chimpanzees and orangutans. A commonality that these four studies shares is that they all explore the relationship between animals’ ability to understand human language and the cognitive functions of the brain behind it.

The research instrument, in the form of a document analysis sheet, was utilised to record, examine and compare the results of previous studies. The primary focus of the study was on neurolinguistic aspects, encompassing brain activity, sound recognition processes, memory abilities, and reactions to verbal stimuli. A variety of scientific sources are consulted for the purpose of data collection, including journal articles, experimental reports and observational documentation. The focus of these documents is on interactions between animals and humans. In order to ensure objectivity and avoid bias in the results, researchers employ data triangulation techniques. These techniques involve the comparison of multiple research results to identify common patterns and thereby enhance the interpretative findings.

FINDINGS AND DISCUSSION

Gua Project-Robert Yerkes and Kellogg’s Family (1931)

Dr. Robert Yerkes, a psychologist and leading primatologist in the early 1900s, was motivated by curiosity about whether a chimpanzee could develop human-like speech if raised in a human environment. He captured a newborn chimpanzee named Gua and requested that his colleague, Winthrop Kellogg, and his wife, Luella, take responsibility for its upbringing alongside their infant son, Donald. It was observed that Gua and Donald received equivalent levels of care, attire, sustenance, recreation, and emotional support. The objective of the experiment was to provide Gua with developmental conditions analogous to those experienced by a human child. Notwithstanding the controversy



surrounding the experiment, due to the involvement of a human baby, the Kelloggs consented. Researchers hypothesised that this shared upbringing would facilitate Gua's natural acquisition of human language, as opposed to the utilisation of forced training methods. The objective of the project was to demonstrate that environment could overcome biological differences, and initial observations engendered optimism regarding the potential outcome.

At the inception of the study, Gua's development appeared to exceed that of Donald's. The subject demonstrated an aptitude for following simple verbal instructions, exhibited an understanding of gestures and facial expressions, and exhibited enhanced strength and coordination. Gua's ability to comprehend instructions such as "Point your nose" and "Give it to Donald" indicates an understanding of spoken language, despite her inability to produce it. However, the production of speech became the primary impediment. Despite the continuous repetition of words such as "mama" and "papa," Gua's vocal output remained limited to emotional sounds such as "ma'aa" and "ooh." Her primary form of communication was gestural, encompassing behaviours such as pulling, pointing, nodding, shaking her head, and clapping in response to praise. While Gua demonstrated evident cognitive ability and comprehension, her verbal progress remained stagnant, indicating a discrepancy between comprehending language and producing it.

As time passed, an unanticipated consequence became evident: rather than Gua acquiring human speech, Donald began to emulate Gua. As the experiment progressed, Donald's movements became increasingly limited to crawling and using his hands. He also began to pound his chest, emit screams, and adopt vocalisations reminiscent of chimpanzees. In addition, he employed a form of communication involving the use of grunts, akin to the manner employed by chimpanzees, to communicate with Gua. These behavioural changes caused concern among the Kellogg family, as they had anticipated that Gua would exert a positive influence on Donald, rather than the reverse. Following a period of nine months, the experiment was concluded and Gua was returned to the laboratory. The results of the study led the Kelloggs to conclude that, while chimpanzees are capable of comprehending human speech to a certain extent, their anatomical and neurological structures hinder their ability to produce it (Kellogg and Kellogg 1933). The anatomical configuration of the chimpanzee larynx, coupled with the limited flexibility of their tongues, renders the formation of human consonants unfeasible. The study ultimately

demonstrated that environment alone cannot overcome biological constraints in language production (Andrew R. Halloran 2012).

William Henry Furness III's Project (1915)

William Furness, a scientist specialising in both physics and ethnography who resided in Philadelphia, conducted research on great apes because he believed they possessed higher cognitive abilities. He theorised that if apes were capable of comprehending complex instructions, they might also be capable of acquiring language. This research led him to travel to Kalimantan, where he captured two wild orangutans, and to purchase two chimpanzees from exotic animal traders. Furness's approach entailed the domestication of the primates in a manner analogous to that of a child, encompassing the inculcation of proper sitting posture, the utilisation of utensils, the donning of clothing, and the handling of household tools. The apes were not merely kept as animals; rather, they were incorporated into daily routines with the intention of shaping their behaviour and cognitive development to resemble that of humans.

In order to facilitate the development of their verbal skills, Furness employed a method of repetitive vocal training. The subject was observed to consistently articulate basic vocabulary in the presence of the test subjects and would offer positive reinforcement for any vocalisations that approximated the target sounds. In addition, the researcher taught the apes basic commands such as "come" and "take", which the apes subsequently learned to follow with great accuracy. The apes demonstrated the capacity to recall and recognise routines, to identify Furness as their caretaker, and to manifest human-like emotions such as anger, happiness, and jealousy. Nevertheless, their vocal development remained constrained. Of the two orangutans, only one was able to imitate the vocalisation of the word "papa," and even then, this imitation was more emotional in nature than linguistic. The two chimpanzees demonstrated no significant progress, and endeavours to instruct the apes in novel words, such as "cup," through physical guidance of their mouth movements, proved unsuccessful.

Furness's conclusion, arrived at through meticulous analysis and observation, posits that despite the remarkable intellectual and behavioural adaptability exhibited by apes, the species is inherently incapable of developing human speech. This incapacity is attributed to inherent anatomical limitations, particularly in the structure of the vocal apparatus. The experiment was declared a failure in terms of the achievement of spoken communication.

However, Furness published his findings in the 1916 journal *Observations on the Mentality of Chimpanzees and Orangutans*, which attracted significant attention and inspired further research into animal cognition.

Alex the Project - Irene Pepperberg (1977-2007)

Parrots are frequently selected as subjects in research on language acquisition among non-human species, largely due to their remarkable capacity for vocal imitation. In contrast to humans, who produce sounds by utilising vocal cords, parrots rely on a distinct anatomical structure known as the syrinx, which is composed of thin muscles located above the trachea. The capacity to manipulate this syrinx with precision enables the production of a wide range of sounds, including vocalisations that closely resemble human speech. This unique vocal apparatus enables parrots to replicate words with a high degree of fidelity, as well as to modulate pitch and intonation, thus forming the basis for more sophisticated communicative behaviour that extends beyond simple mimicry.

One of the most significant and enduring experiments in this field is Irene Pepperberg's research on an African grey parrot named Alex, which began in 1977 and continued for more than three decades. Pepperberg applied the Model/Rival Technique, in which two human participants interacted in front of Alex; one posing questions and one acting as a rival for attention and rewards. Through observing these interactions, Alex learned that words had specific meanings and communicative functions. As time passed, the child's vocabulary increased exponentially, surpassing one hundred words. In addition, he exhibited a remarkable aptitude for categorising objects based on attributes such as colour, shape, material, and quantity. Furthermore, the subject demonstrated an understanding of numerical values up to six and was able to express the concept of absence using the term "none", indicative of cognitive abilities comparable to those of young children (Pepperberg 1987). This suggests that the subject's communication involved symbolic understanding rather than mere imitation.

In addition to his linguistic and conceptual abilities, Alex demonstrated social and emotional awareness, often expressing refusal, boredom, or a desire to discontinue an activity through phrases such as "I'm sorry" or "Wanna go back." Pepperberg (1987) emphasised that although Alex did not possess human-like grammatical structure or unlimited language productivity, his communication represented a form of proto-language, characterised by meaningful and flexible symbolic use. In the aftermath of Alex's

demise in 2007, the insights yielded by this research have persisted in exerting a seminal influence on the domains of cognitive ethology and neurolinguistics. This is evidenced by the research findings challenging long-standing assumptions that complex language use is exclusive to humans and thereby contributing to an expansion in the scope of our understanding of animal cognition.

Cosmo the Parrot – Irene Pepperberg’s Successor Project (2002)

The second experiment, which involved parrots, was conducted on an African grey parrot named Cosmo. In contrast to Alex, who underwent a systematic training regime within a laboratory setting, Cosmo was raised in a domestic environment, and the research was of an observational nature. The proprietor of Cosmo observed the avian’s communicative behaviour over a considerable duration, meticulously documenting the manner in which Cosmo employed the lexical competencies he had acquired to engage in spontaneous interaction with human beings. It is noteworthy that Cosmo possessed a vocabulary of approximately 200 words and frequently employed expressions such as "I love you" or "Wanna go back" in suitable circumstances (Pepperberg 2002). Furthermore, he has been observed to combine multiple words into coherent, simple sentences that convey pragmatic meanings. For instance, the utterance “Wanna go play” can be interpreted as a request for attention, while “Come here” can be understood as a directive to approach. In contrast to other animals, which merely repeat sounds, Cosmo exhibits the capacity to select words that are congruent with the circumstances, thereby suggesting an understanding of the communication’s intended meaning.

A notable finding from the experiment with Cosmo is his capacity to engage in two-way communication without the need for direct commands. It has been observed that Cosmo frequently initiates interactions with humans and exhibits indications of empathy. For instance, when an individual exhibits signs of sadness or anger, Cosmo will imitate a gentle intonation and utterances such as “It’s okay” or “Don’t be sad”. This finding suggests that emotion recognition may be facilitated by consideration of the social context. On multiple occasions, Cosmo exhibited the capacity to acquire knowledge through the process of association and experience. He is aware that the term “bye-bye” is used to denote the departure of an individual, and thus, he will repeat this phrase whenever his owner bids him farewell. This behavioural pattern serves to reinforce the assumption that



Cosmo is not merely imitating sounds, but also demonstrating an understanding of the relationship between situations, words and meanings.

However, it should be noted that experiments conducted on Cosmo are subject to certain limitations, given that they were not undertaken in the controlled laboratory environment utilised for Alex. Nevertheless, observations demonstrate that parrots such as Cosmo possess the capacity for complex symbolic and pragmatic communication. A neurolinguistic approach provides a framework for understanding this behaviour, with its basis in the brain's unique structure in the song system and vocal learning centre. These function in a manner analogous to the Broca's and Wernicke's areas in humans. These two areas facilitate parrots' ability to process sounds, recall phonetic patterns, and associate them with specific meanings. In summary, Cosmo's research demonstrates that parrots possess a neurocognitive capacity that facilitates communication of a meaningful nature, albeit not to the same degree of complexity as human language.

CONCLUSION(S)

It is evident from the findings of numerous studies and the analysis of various experiments conducted on animals, including parrots and primates, that while some animals exhibit relatively sophisticated communication capabilities, they do not possess the same level of linguistic complexity as humans. Experiments conducted on Alex and Cosmo, demonstrate that parrots possess the capacity to comprehend the association between sound and meaning. They have even been observed utilising symbols to convey their desires. However, this aptitude remains constrained to imitation and association, rather than extending to a comprehension of the inherent linguistic structure. In a similar vein, experiments conducted on chimpanzees, as well as research undertaken by William Henry Furness III, have demonstrated that apes possess high levels of intelligence and are capable of following instructions. However, they are incapable of producing or processing language in the same manner as humans, that is to say, phonetically and syntactically.

From a neurolinguistic perspective, Lyu (2024) explained this phenomenon can be attributed to the disparities in anatomical structure and brain function between humans and animals. In humans, the Broca's and Wernicke's areas of the brain are well-developed and directly connected to other parts of the brain involved in language production and comprehension. In contrast, in animals, these areas are not yet complexly developed. Moreover, anatomical limitations, such as the position of the larynx and the flexibility of

the tongue, act as significant impediments to the development of speech in animals, especially in apes (Gillespie-Lynch et al. 2019). A comprehensive review of extant studies reveals a consensus that language ability is the result of a highly intricate cognitive and evolutionary process. Sebeok (2021) explain on his book, This process is contingent not only on the capacity to imitate sounds, but also on the ability to comprehend the meaning, symbols and social context inherent to these sounds. Human language is not merely a means of communication; it is also a reflection of consciousness, thought, and culture that other living creatures do not possess. Nevertheless, experiments on animals, including parrots and anthropomorphic apes, continue to make a significant contribution to our understanding of how communication developed in nature and how the cognitive abilities of animals can approach the initial limits of the concept of “language” itself.

REFERENCES

- Andrew R. Halloran. 2012. *The Song of the Ape Understanding the Languages of Chimpanze*. St. Martin's Press. <https://libraryaware.com/1157/Records/ViewFirstChapter?key=5grwbkpfpostjmbh6fp5ad1uo> (October 21, 2025).
- Francis, Norbert. 2024. “The Origins of Language: An Introduction to Evolutionary Linguistics.” 15: 1–5.
- Furness, William H. 1916. “Observation on The Mentality of Chimpanzees and Orang-Utans.” *Science* 2(29): 242–50. <https://archive.org/details/jstor-4576614>. Gillespie-Lynch, Kristen Marie, Emily Sue Savage-Rumbaugh, Heidi Lyn, and Patricia M. Greenfield. 2019. “What Did Language Grow From? Ape Hands, Mouths, or Both?” *Frontiers for Young Minds* 7. doi:10.3389/frym.2019.00061. Kellogg, Winthrop, and Luella Kellogg. 1933. *The Ape and The Child*.
- Lieberman, Matthew D. 2007. “Social Cognitive Neuroscience: A Review of Core Processes.” *Annual review of psychology* 58: 259–89. doi:10.1146/ANNUREV.PSYCH.58.110405.085654.
- Lyu, Xuesong. 2024. “Revisiting Brain Mechanisms in Language Processing: From the Perspective of Broca’s and Wernicke’s Area.” *International Journal of Education and Research* 12(9): 33–40. www.ijern.com34.
- Pepperberg, Irene M. 2002a. *The Alex Studies: Cognitive and Communicative Abilities of Grey Parrots*. London: Harvard University Press.
- Pepperberg, Irene M. 1987. “Acquisition of the Same/Different Concept by an African Grey Parrot (*Psittacus Erithacus*): Learning with Respect to Categories of Color, Shape, and Material.” *Animal Learning & Behavior* 15(4): 423–32. doi:10.3758/BF03205051.
- Pepperberg, Irene M. 2002b. “Cognitive and Communicative Abilities of Grey Parrots.” 11: 83–87. https://www.wellbeingintlstudiesrepository.org/acwp_asie.

- Premack, David. 1971. "Language in Chimpanzee?" *Science* 172(3985): 808–22. doi:10.1126/SCIENCE.172.3985.808.
- Sebeok, Thomas. 2021. A Sign is Just a Sign *A Sign Is Just a Sign*. doi:10.2979/asignisjustasign.
- Tecumseh Fitch, W. 2010. "The Evolution of Language." *The Evolution of Language* 9780521859936: 1–611. doi:10.1017/CBO9780511817779.
- Terrace, H. S., L. A. Petitto, R. J. Sanders, and T. G. Bever. 1979. "Can an Ape Create a Sentence?" *Science* 206(4421): 891–902. doi:10.1126/SCIENCE.504995. Yerkes, Robert. 1925. *Almost Human*.