

Press release

A new experiment shows that a language-competent bonobo does not infer immanent links between speech sounds and abstract shapes.

A collaborative study from researchers in Europe (Freie Universität Berlin, University of St Andrews, Max Planck Institute of Evolutionary Anthropology) and the United States (Pennsylvania State University, Ape Initiative) has shown that “a language competent nonhuman primate does not intuitively map a ‘round’ sounding nonword to a curved shape and a ‘sharp’ sounding nonword to a spiky shape – a phenomenon known as sound symbolism in humans”. The results of this work are an important contribution to the field of language emergence in humans, as it suggests that an ability much relevant in shaping “protowords” is plausibly human-specific. This work is published in the Proceedings of the Royal Society B on 2 February 2022.

In human language the link between a word and its referent is usually arbitrary. Any word can stand for expressing any meaning. However, there are cases in language for which this link is not arbitrary. “Humans can infer that a meaningless word, such as ‘bouba’ or ‘maluma’ refers to a curved shape, whereas the nonwords ‘kiki’ or ‘takete’ are interpreted as describing a spiky shape”. These immanent mappings are shared across speakers of different languages. Some researchers have speculated that this specific type of sound symbolism, also known as the bouba-kiki effect, could have assisted the generation of the first spoken words in humans.

However, is this ability to perceive connections between words that “sound round” and things that “look round” specific to humans? Or can other animals, including our closest living relatives, the great apes, also infer that a meaningless speech sound is ‘sharp’ or ‘round’ and refers to a curved or spiky shape?

Researchers decided to answer this question by testing the nonhuman great ape Kanzi. Kanzi is a bonobo who lives at the Ape Initiative in Des Moines, Iowa, USA. Kanzi is well known for being one of a small number of nonhuman great apes who understand human language. He was taught to communicate with humans via hundreds of different symbols called ‘lexigrams’. Kanzi can match spoken English words to corresponding pictures, including pictures he has not seen before.

In a new study led by Konstantina Margiotoudi, Kanzi performed his familiar task of matching English words to pictures on a touchscreen. However, in a small number of trials, Kanzi was tested not on familiar English words, but instead on unfamiliar non-words and images of the bouba-kiki type. The researchers reasoned that if an intuitive grasp of sound symbolic associations predated the emergence of early human languages, then a speech competent bonobo like Kanzi might transfer this tendency when asked to match a novel picture to a nonsense word of the bouba-kiki type. If this were the case, Kanzi should perform well in matching round-sounding non-words to round shapes, and sharp-sounding non-words to spiky shapes.

The findings now published in *Proceedings of the Royal Society B: Biological Sciences* revealed that Kanzi was astonishingly good at matching English words to pictures of objects. However, unlike humans, Kanzi chose randomly in sound symbolic trials with unfamiliar words and shapes. “The bonobo did not show a tendency to match a ‘sharp’ sound to a spiky shape or a ‘round’ sound to a round shape indicating that the proclivity to perceive sound symbolism of the bouba-kiki type may not have been present in the last common ancestor of humans and bonobos.” The authors acknowledge that these results do not necessarily demonstrate that nonhuman apes are not able to perceive other sound symbolic associations (e.g., associating low pitched tones with larger objects). For associations of the bouba-kiki type, however, known biological differences between human and nonhuman apes at a neuroanatomical level could provide an explanation why Kanzi did not perceive them in the same way humans do.



Kanzi, a bonobo (*Pan paniscus*), performing a match-to-sample task at his home Ape Initiative in Des Moines, Iowa, USA.

Bibliography

Bo-NO-bouba-kiki: Picture-word mapping but no spontaneous sound symbolic speech-shape mapping in a language trained bonobo. Margiotoudi Konstantina, Manuel Bohn, Natalie Schwob, Jared Taglialatela, Friedemann Pulvermüller, Amanda Epping, Ken Schweller and Matthias Allritz. *Proceedings of the Royal Society B: Biological Sciences*, 2 February 2022. DOI: 10.1098/rspb.2021.1717