“MUSIC” PRODUCTION BY COCKATIELS

YOSHIMASA SEKI [*1]

[*]Corresponding Author: yoshimasa.seki@gmail.com
[1]Department of Psychology, Aichi University, Toyohashi, Japan

Elucidating the biological substrates essential for music (*i.e.*, musicality) could increase our understanding of the evolution of human language. Researchers have done work towards this aim using both humans and non-human animals; however, defining the concept of “music” is difficult and discussion of the evolution of musicality has not yet converged on a single idea (Savage et al., 2021). Some birdsongs may be similar to human music (Baptista & Keister, 2005); however, this does not mean these songs are universally considered to be music. Further, studies on music *production* (or, imitation) by non-human animals are very scarce, though some avian species (*e.g.*, bullfinches, starlings, Amazon parrots and African Greys) occasionally imitate human music.

Therefore, I documented four types of sound production behaviors (similar to human music production) in 3 cockatiels. First, (1) cockatiels exposed to a melody of a popular song (so it was universally considered music) spontaneously imitated the melody without any food reinforcement. Then, (2) the cockatiels spontaneously sang the song in synchrony with a playback of the melody; (2*a*) when the melody was played back shortly after a bird started singing the song, the bird paused singing and resumed after a short period to synchronize the timing of his singing to that of the playback melody; (2*b*) when the melody was played back while a bird was not vocalizing, the bird started singing and skipped some initial notes to synchronize the timing of his singing to that of the playback melody. So far, only a few studies have reported unison-like singing by several wild songbirds; however, the present examples might be a striking demonstration of this because the cockatiels sang a melody of human music in unison. Further, a few months later, (3) the birds spontaneously rearranged (or, customized) the melody. Some of them inserted novel sound elements around the tail of the melody. Finally, (4) they later produced novel rhythmic sound sequences which

did not share similarities with sounds which occurred in their living environment, which means they created original sound sequences. The motor commands to produce these sounds were not likely inherent in this species because the acoustic patterns varied greatly among the individuals. Further, one of the birds produced a sound sequence by utilizing both vocal sounds and sounds generated by drumming a food cup with his beak (*see*, Le Covec et al., 2019). This is similar to a behavior observed in Palm cockatoos (Heinsohn et al., 2017). However, the cockatiel combined learned vocalizations (an imitation of a human word) and the sound made by hitting his beak against a hard surface, and repeated them in regular short intervals (similar to a human song that contains both vocals and drumming).

The results suggest that the cockatiels and humans share some of the capabilities necessary for music production. Because we only have a few reports on sound production behavior in wild cockatiels, it is difficult to discuss how the findings are involved in their ecology. As this report demonstrates, captive cockatiels are prominent imitators of man-made music; however, interestingly, they are not known to be proficient at imitating long stretches of human speech. Therefore, some elements of music (*e.g.*, tonality and meter) may assist them in producing structured and hierarchical sound sequences. The results may suggest a connection between musicality and the production of long-form speech, at least in the earliest stage of the evolution of vocal language in humans (Brown, 2017).

Acknowledgements

This study was supported by MEXT/JSPS Grant-in-Aid for Scientific Research on Innovative Areas #4903 (Evolinguisitics) JP17H06380.

References

Savage, P., Loui, P., Tarr, B., Schachner, A., Glowacki, L., Mithen, S., & Fitch, W. (2021). Toward inclusive theories of the evolution of musicality. *Behavioral and Brain Sciences*, *44*, E121.

Baptista, L. F., & Keister, R. A. (2005). Why birdsong is sometimes like music. *Perspectives in Biology and Medicine*, *48*(3), 426-443.

Heinsohn, R., Zdenek, C. N., Cunningham, R. B., Endler, J. A., & Langmore, N. E. (2017). Tool-assisted rhythmic drumming in palm cockatoos shares key elements of human instrumental music. *Science Advances*, *3*, e1602399.

Le Covec, M., Aimé, C., & Bovet, D. (2019). Combinatory sound object play in cockatiels: a forerunner of music? *Behaviour*, *156*(5-8), 595-617.

Brown, S. (2017). A joint prosodic origin of language and music. *Frontiers in Psychology*, *8*, 1894.