行動神経生物学セミナー

2017 年 10 月 27 日(金曜日) PM4:30~5:40

理学部 5 号館 8 階 5-813 号室

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Learning biases underlie "universals" in avian vocal sequencing

Biological predispositions in vocal learning have been proposed to underlie commonalities in vocal sequences, including for speech and birdsong, but cultural propagation could also account for such commonalities. Songbirds such as the zebra finch learn the sequencing of their acoustic elements ("syllables") during development. Zebra finches are not constrained to learn a specific sequence of syllables, but significant consistencies in the positioning and sequencing of syllables have been observed between individuals within populations and between populations. To reveal biological predispositions in vocal sequence learning, we individually tutored juvenile zebra finches with randomized and unbiased sequences of syllables and analyzed the extent to which birds produced common sequences. In support of biological predispositions, birds tutored with randomized sequences produced songs with striking similarities. Birds preferentially started and ended their song sequence with particular syllables, consistently positioned shorter and higher frequency syllables in the middle of their song, and sequenced their syllables such that pitch alternated across adjacent syllables. These patterns are reminiscent of those observed in normally tutored birds, suggesting that birds "creolize" aberrant sequence inputs to produce normal sequence outputs. Similar patterns were also observed for syllables that were not used for tutoring (i.e., unlearned syllables), suggesting that motor biases could contribute to sequence learning biases. Furthermore, zebra finches spontaneously produced acoustic patterns that are commonly observed in speech and music, suggesting that sensorimotor processes that are shared across a wide range of vertebrates could underlie these patterns in humans.

References

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- Chen, Y., Matheson, L.E., and Sakata, J.T. 2016. Mechanisms underlying the social enhancement of vocal learning in songbirds. *Proceedings of the National Academy of Sciences 113: 6641–6646.*
- Sakata, J.T., and Brainard, M.S. 2008. Online contributions of auditory feedback to neuronal activity in avian song control circuitry. *Journal of Neuroscience 28: 11378-11390.*

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