Auditory Responses in the Avian Song Nuclei to the Own Song with the Systematic Modification

*Takuya. Koumura¹, Yoshimasa. Seki¹²³, Kazuo. Okanoya¹²³
¹The Univ. of Tokyo, Tokyo, Japan ²ERATO, Japan Sci. and Technol. Agency, Tokyo, Japan ³RIKEN Brain Sci. Inst., Wako, Japan

Auditory information & song maintenance
Songbirds use their own song for song maintenance. Auditory information is important especially for Bengalese finches.

Auditory stimuli
Acoustic stimuli
Multi-unit recording
Under anesthesia
Recorded from HVC & Area X sequentially in within-subject design.

Temporal structure of songs
Frequency (Hz)
Sound Amplitude
Time (s)
Song elements
Temporal structure of song
Local structure of each element
Order of elements

Songbird brain
motor command learning

Neural activities in a single bird
Original song
Local reverse
Order reverse
Whole reverse
Mean instantaneous spike rate (Hz)

Conclusion ①
Average spike rate in HVC & Area X are sensitive to the local temporal structure of the bird's own song

Conclusion ②
Spike timing is more consistent in HVC > Area X

Experimental procedure
Multi-unit recording
Acoustic stimuli
Under anesthesia
Recorded from HVC & Area X sequentially in within-subject design.

Analysis of average spike rate
Selectivity of average spike rate for original song over reversed stimuli

Analysis of spike timing
Spike timing consistency
original song
stimuli with reversed
local temporal structure

Neural activities in a single bird

Definition of spike timing consistency

Definition of spike timing consistency

Definition of selectivity

\[
\text{Selectivity} = \left( \frac{\text{SR} - \text{SR} \text{ of } \text{original song}}{\text{SD of SR to original song} + \text{SD of SR to reversed stimulus}} \right)
\]

- *p<0.05, pairwise post-hoc t-test with Bonferroni correction
- **p<0.01, pairwise post-hoc t-test with Bonferroni correction

Mean instantaneous spike rate (Hz)

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