

Modeling Melody Familiarity Judgments in Musicians and Nonmusicians

We applied the Tank and Hopfield (1987) sequence recognition neural network (SRNN) to model melody recognition in musicians versus nonmusicians. Dalla Bella et al. (2003) examined effects of musical training and familiarity on the time course of melody recognition. Study participants judged whether a gated melody was familiar versus unfamiliar in order to obtain a Familiarity Emergence Point (FEP). This was the point in the melody where the participant began to correctly believe it was familiar. The FEP occurred earlier in musicians. Since the “feeling of knowing” is based on the total amount of accessed information (Koriat & Levy-Sadot, 2001), this finding was attributed to a stronger “feeling of knowing” in musicians because of accessing a larger initial cohort of melodies.

Using an SRNN, we implemented a model for familiarity judgments. Separate networks modeled musicians and nonmusicians. Sequence recognition (SR) neurons and associated weights represented stored melodies. The musician network had more SR neurons than the nonmusician network. A familiarity unit was used to represent higher-order familiarity neurons. The feeling of familiarity was evoked by activity of this unit whose inputs were based on the combined output of the SR neurons. Activity of the SR population before recognition, indicating access of the initial cohort of melodies in LTM, was larger for musicians versus nonmusicians.

For methodological reasons, Dalla Bella et al. did not address the case of familiarity judgments for unfamiliar melodies, where the participant responded to an unfamiliar melody as familiar. Our simulations, however, make predictions for this case.

References

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