The Role of Perceptual Dimensions in Auditory Category Learning

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Introduction

- Dual systems of category learning
  • Competition between Verbal and Implicit Systems (COVIS) (Ashby, Alfonso-Reese, Turken & Waldron, 1998; Yi, Maddox, Mumford, & Chandrasekaran, 2014)
  • Information-Integration (II): Procedural/implicit system; uses the tail of the caudate nucleus
    • Requires pre-decisional integration of the two dimensions
  • Rule-based (RB): Explicit system; uses the head of the caudate nucleus and prefrontal cortex
    • Requires selective attention to the relevant dimension

Results

- The dimensions that define the categories affect learning:
  • II, which requires both dimensions be integrated, had high performance from the beginning of training
  • RBMF, which requires selective attention to the MF dimension, had higher performance than RBCF which requires selective attention to the CF dimension

Questions

- How do dimensions defining auditory categories influence category learning?
- Do participants learn to generalize information-integration and rule-based categories?

Methods

Conditions (Stimulus Distributions)

Stimulus Distributions:
1. Information-Integration
2. Rule-Based: Modulation Frequency
3. Rule-Based: Center Frequency

Task: Systematic Multimodal Association with Feedback (SMAF) task

Procedure

Participants

30 Carnegie Mellon University undergraduates (II: n = 10, RBMF: n = 9, RBCF: n = 11)

Results

- The relevance of dimensions continues into the post-test:
  • There are different patterns of generalization depending on which dimensions are relevant for categorization

Conclusions

- The dimensions that define the categories interact with learning. Rule-based category learning performance depends on which dimension was relevant.
- The patterns of generalization between groups separated information-integration from both rule-based conditions.

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References