

Simulation of Explicit and Implicit Category Learning: Evidence for a Single Learning System



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Question: Does category learning use a single system or multiple systems?

Hypothesized Cognitive systems for Categorizing

1. Explicit system

- Rule-based
- Tied to language
- Conscious
- Learns one-dimensional categories

2. Implicit system

- Habit formation
- Not conscious
- Learns multidimensional categories

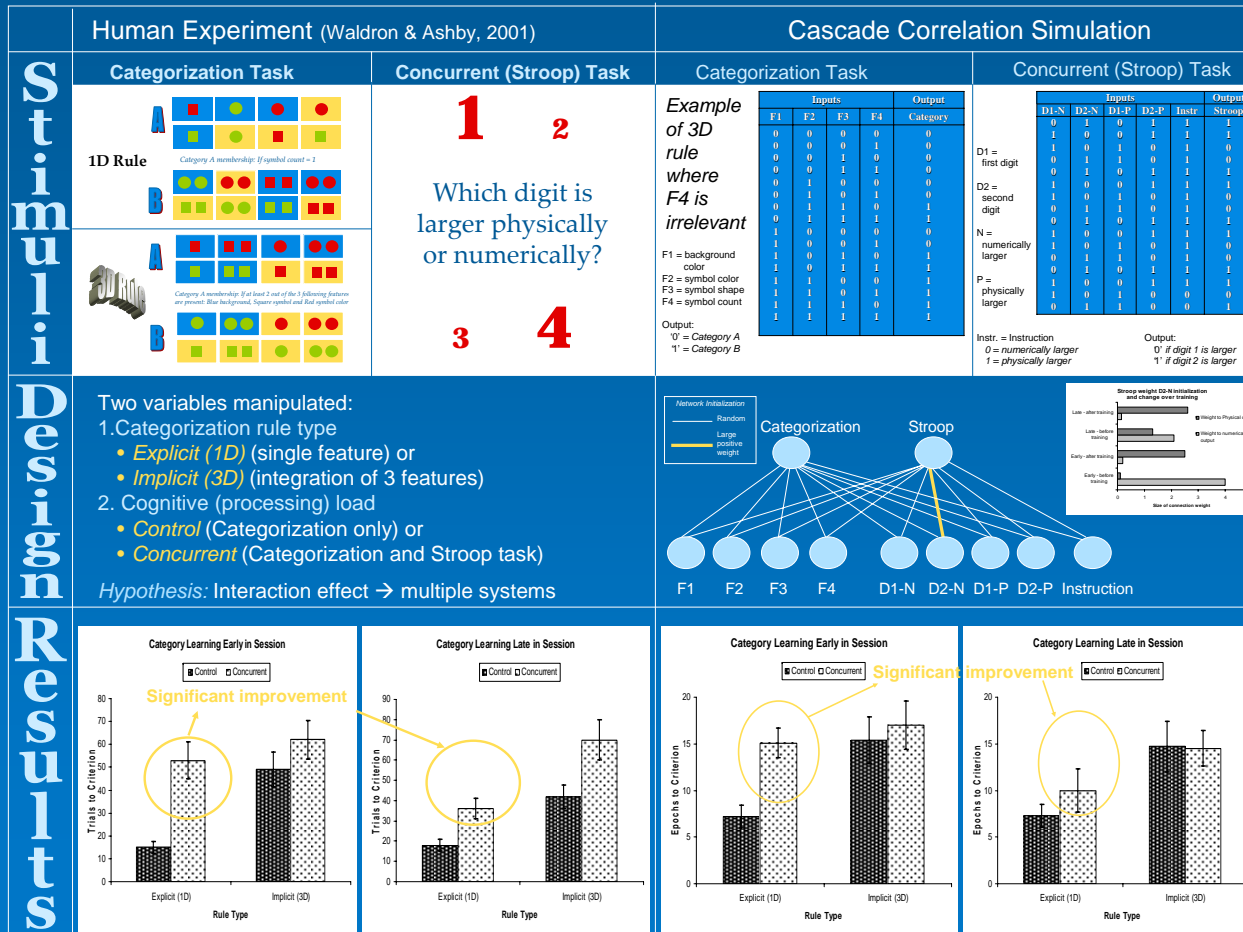
Human Experiment Rationale

1. If two systems exist, we can selectively interfere with one.

2. Stroop tasks and explicit category learning system share resources (e.g., working memory).

→ Stroop tasks should interfere with the explicit, but not implicit learning system

→ Predict interaction



Rule Type x Cognitive Load interaction: Evidence for multiple category learning systems?

Cascade Correlation neural network simulation

- **Single learning system**
- Captures all significant effects in the human experiment
 1. Main effect of *Cognitive Load*
 2. Main effect of *Rule Type* (1D and 3D)
 3. **Rule Type x Cognitive Load** interaction
 4. Significant improvement of the explicit concurrent task condition over the experiment

Alternative explanation for the interaction: Combined task complexity in a single learning system: when concurrent tasks are performed, the harder task determines processing and learning time.

Conclusion

The experiment of Waldron and Ashby (2001) does not provide sufficient evidence for the need of multiple category learning systems because a simulation with a single learning system covers the human data.

References

Fahlman, S. E., & LeBriere, C. (1990). The cascade correlation learning architecture. In D. S. Touretzky (Ed.), *Advances in Neural Information Processing Systems 2* (pp. 524-532). Los Altos, CA: Morgan Kaufmann.

Waldron, E. M., & Ashby, F. G. (2001). The effects of concurrent task interference on category learning: Evidence for multiple category learning systems. *Psychonomic Bulletin & Review*, 8 (1), 168-176.