



Background

- Evidence supports distinct category learning systems^{1,2}, which map on to distinct memory systems^{3,4}
- Strong encapsulation predicts no interaction between systems⁵
- Information sharing refers to content shared between systems
- However, category learning systems can interact through:
 - Competition⁶⁻⁸
 - Parallel learning, but single-system responding⁹⁻¹¹
- These types of interaction do NOT involve information sharing
- However, memory systems may share information^{12,13}

→ Is information sharing possible in category learning?

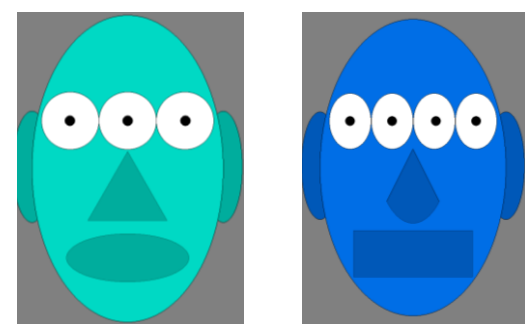
Research strategy: Category learning task with an explicit rule and simultaneous implicit pattern. If no information sharing, then no effect of implicit pattern.

Stimuli

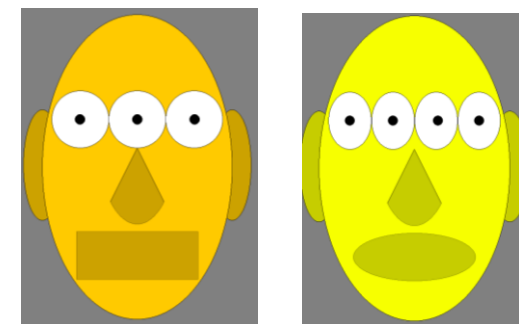
We constructed a stimulus set that simultaneously contained a rule based on shape (eyes and mouth) and a probabilistic color distribution.

Explicit rule: (exclusive OR)

Category A
Odd # eyes + round mouth OR
Even # of eyes + square mouth

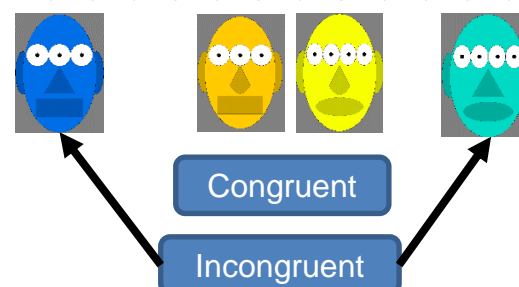
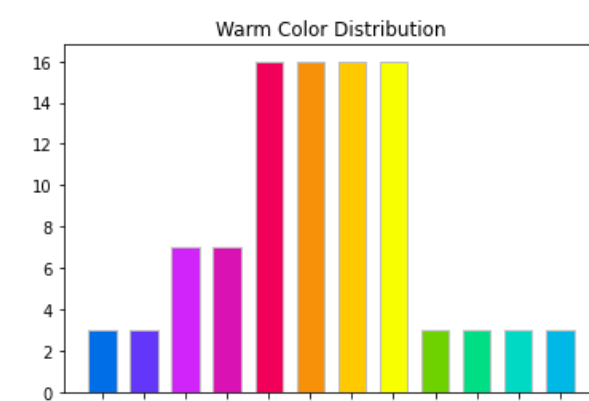
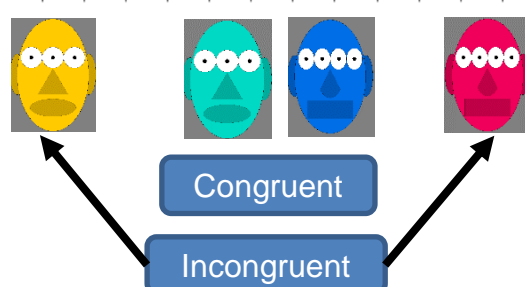
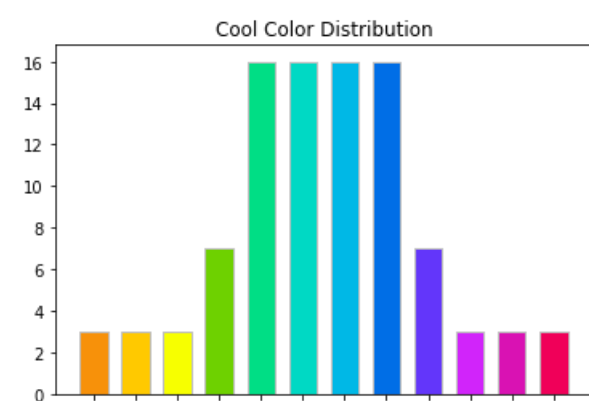


Category B
Odd # eyes + square mouth OR
Even # eyes + round mouth



Participants *WERE* told the eye-mouth rule for categorization.

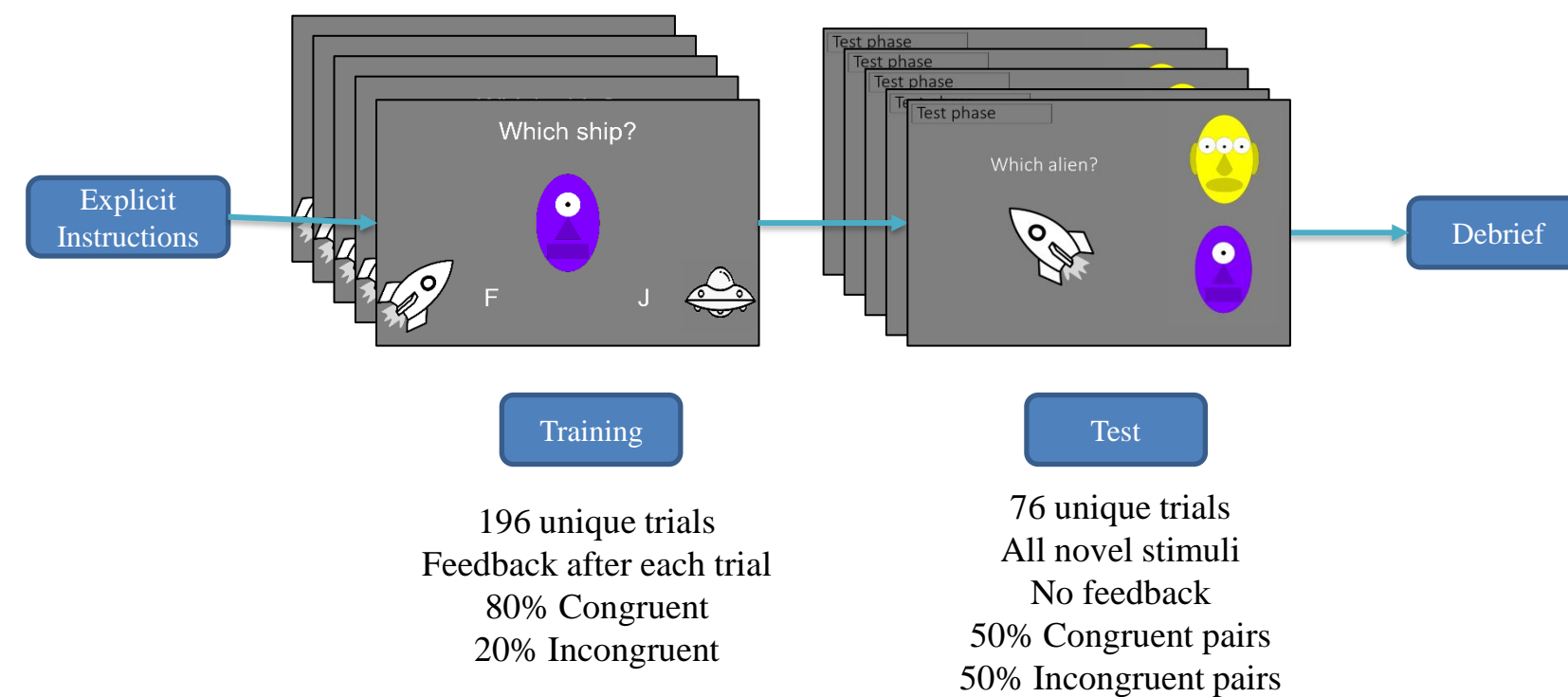
Implicit color distribution:



Participants *were NOT* told about the color distributions.

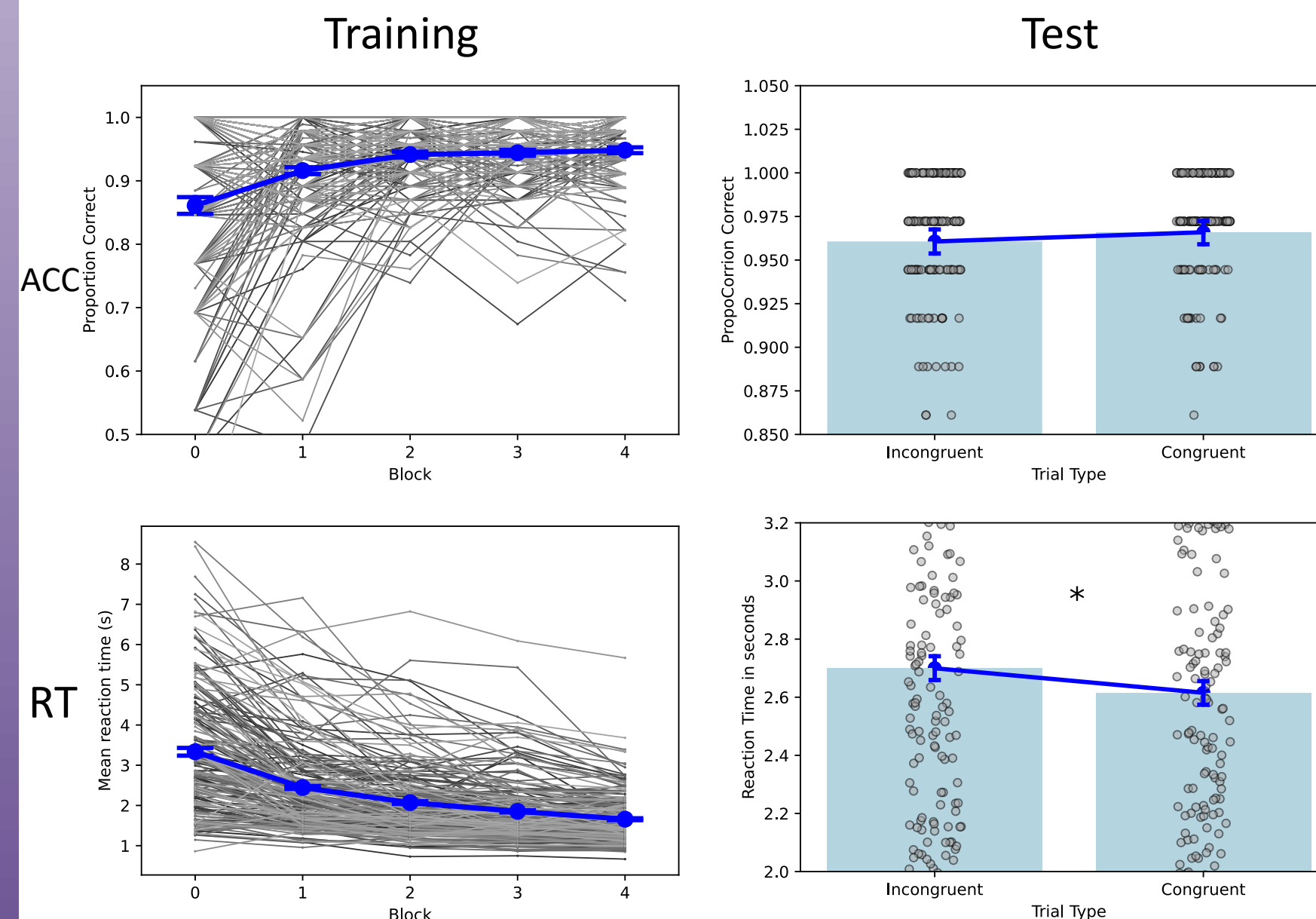
Behavioral Study

Procedure



Participants completed a training phase with feedback and biased color distributions, followed by a test phase with no feedback and even color distributions.

Results

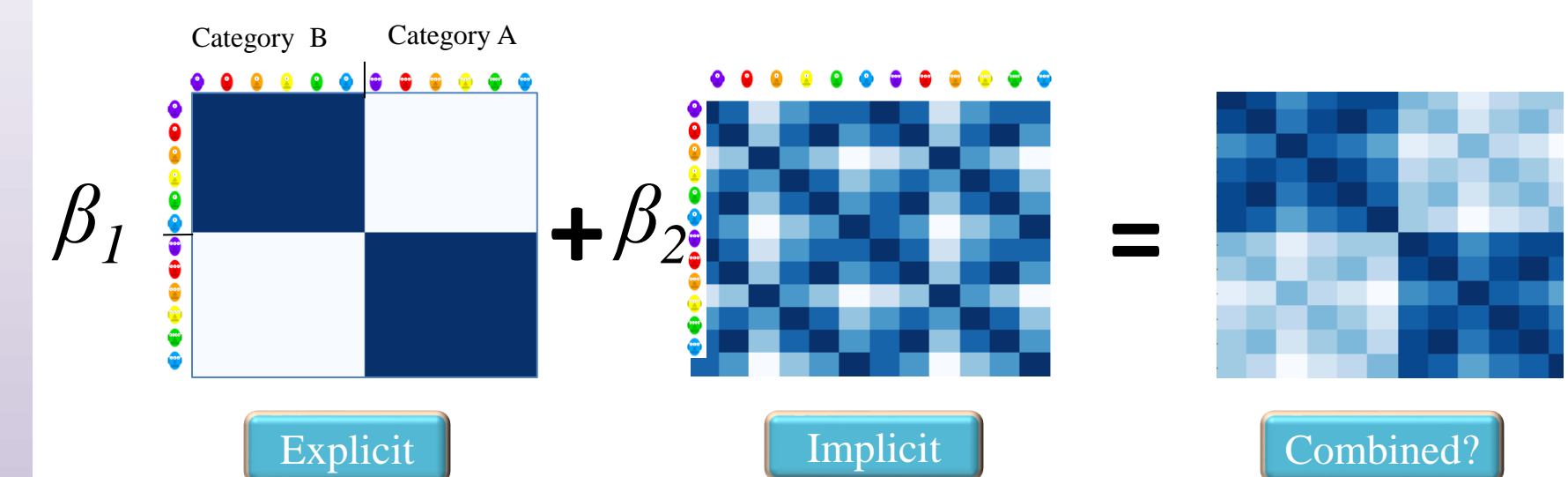


Discussion

If there were no interaction and no information sharing, then performance on congruent and incongruent trials should be the same (explicit rule use only). However, at test, participants were slower on incongruent trials than congruent trials ($t = 4.25$, $p < .001$). From these results it is not clear whether information is shared between systems during learning, or later at a response stage. We will use fMRI-RSA to answer this question.

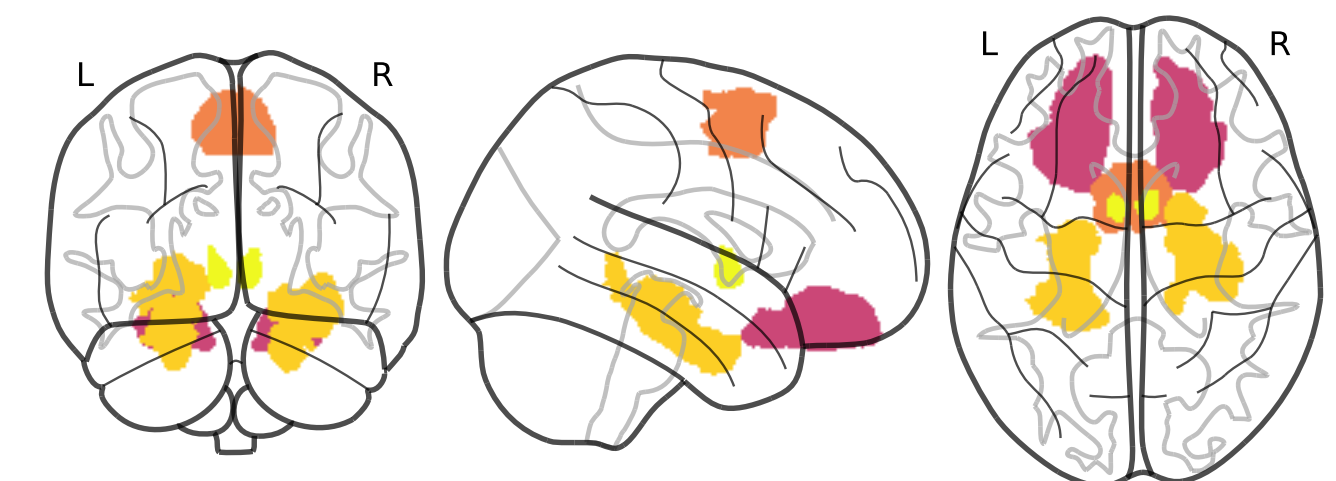
Imaging Methods

Representational Similarity Analysis



- The explicit rule and implicit color distribution create different dissimilarity matrices (RDMs).
- We will compare the relative beta weights in ROIs after training.
- Similar beta weights for implicit and explicit RDMs in striatal or temporal ROIs suggest information sharing at learning.
- Similar beta weights in frontal ROIs suggest information sharing at decision/response

Regions of Interest



- Hippocampus** – explicit learning
- Striatum** – implicit learning
- mPFC** – decisions, rule use
- SMA** – response selection

References

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