

1

Higher Level Cognition

So far, we have networks that can:

- See, recognize objects, direct attention.
- Remember events, general facts, maintain info “online”.
- Pronounce words, activate and combine semantic meanings.

So, what’s missing?

2

Higher Level Cognition: What’s Missing

- Planning
- Reasoning
- Decision-making
- Emotion
- Consciousness, sense of self
- Free will
- Social interaction

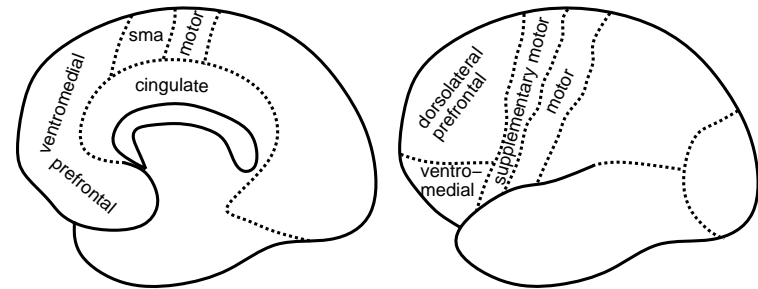
3

Higher Level Cognition: What We Know

Frontal damage impairs planning, reasoning, decision-making, self-initiated actions, self-awareness, social interaction...

4

Structures of the Prefrontal Cortex



PFC is not everything: Requires the entire brain working together.

5

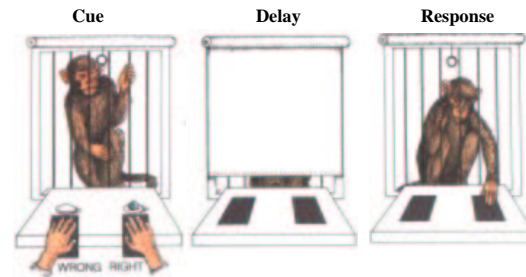
The Range of Frontal Functions

Activation-based working memory

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Activation-based Working Memory

Monkey electrophysiology



The prefrontal cortex (PFC) can maintain information over time as firing of neurons (activation-based memory).

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The Range of Frontal Functions

Activation-based working memory

Inhibition Stroop: Difficulty inhibiting prepotent response.

8

The Stroop Task

Purple

Yellow

Green

Red

9

The Range of Frontal Functions

Activation-based working memory Monkey electrophysiology.

Inhibition Stroop: Difficulty inhibiting prepotent response.

Flexibility Continue with same response after task changes, *perseveration*.

Fluency Difficulty generating variety of responses.

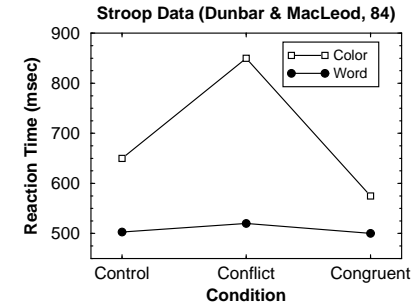
Executive control Probs w/ goal-directed planning, coordinating.

Monitoring/evaluation e.g., Error-monitoring.

10

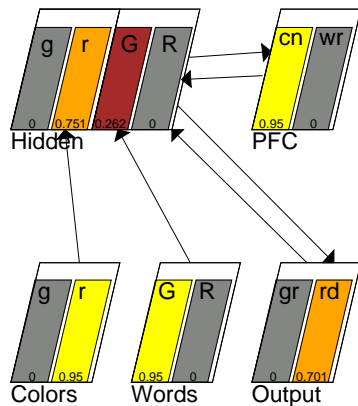
The Stroop Task: Data

Control: Red. Conflict: **Red**. Congruent: **Red**.



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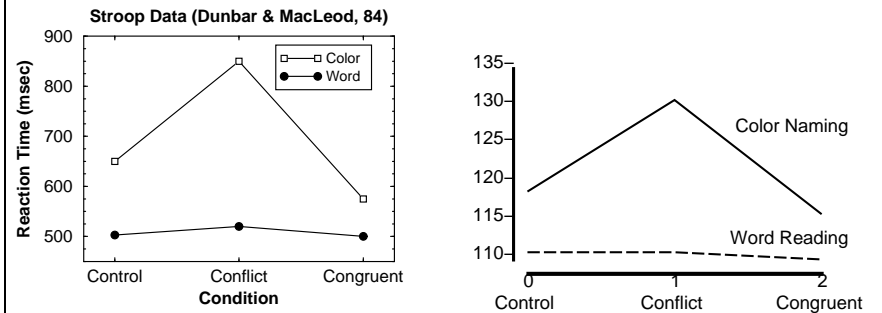
Stroop Model



12

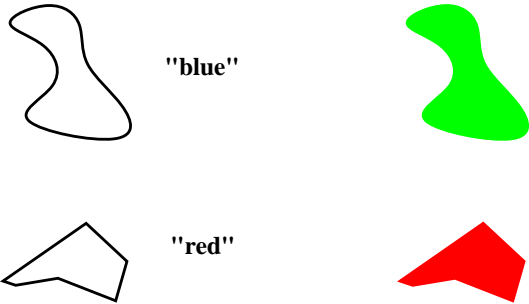
The Stroop Task: Model Data

Control: Red. Conflict: **Red**. Congruent: **Red**.



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Stroop Accounts: Continuum, not a Dichotomy



Shape-naming first like color-naming in standard Stroop, then like-word reading.

14

Stroop Accounts: Not a Horse Race

