UI Manipulation for Persistent, Subtle Security Proofs

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Is high-level decision making (e.g., cheating) reflected in detectable unconscious low-level input device usage?

Human Subtlety Proofs

- Differentiate humans from bots.
- Are at least as secure as Human Interactive Proofs.
- Are unobtrusive as Human Observational Proofs.
- Use cognitive models to classify not only behavior but cognitive processes.
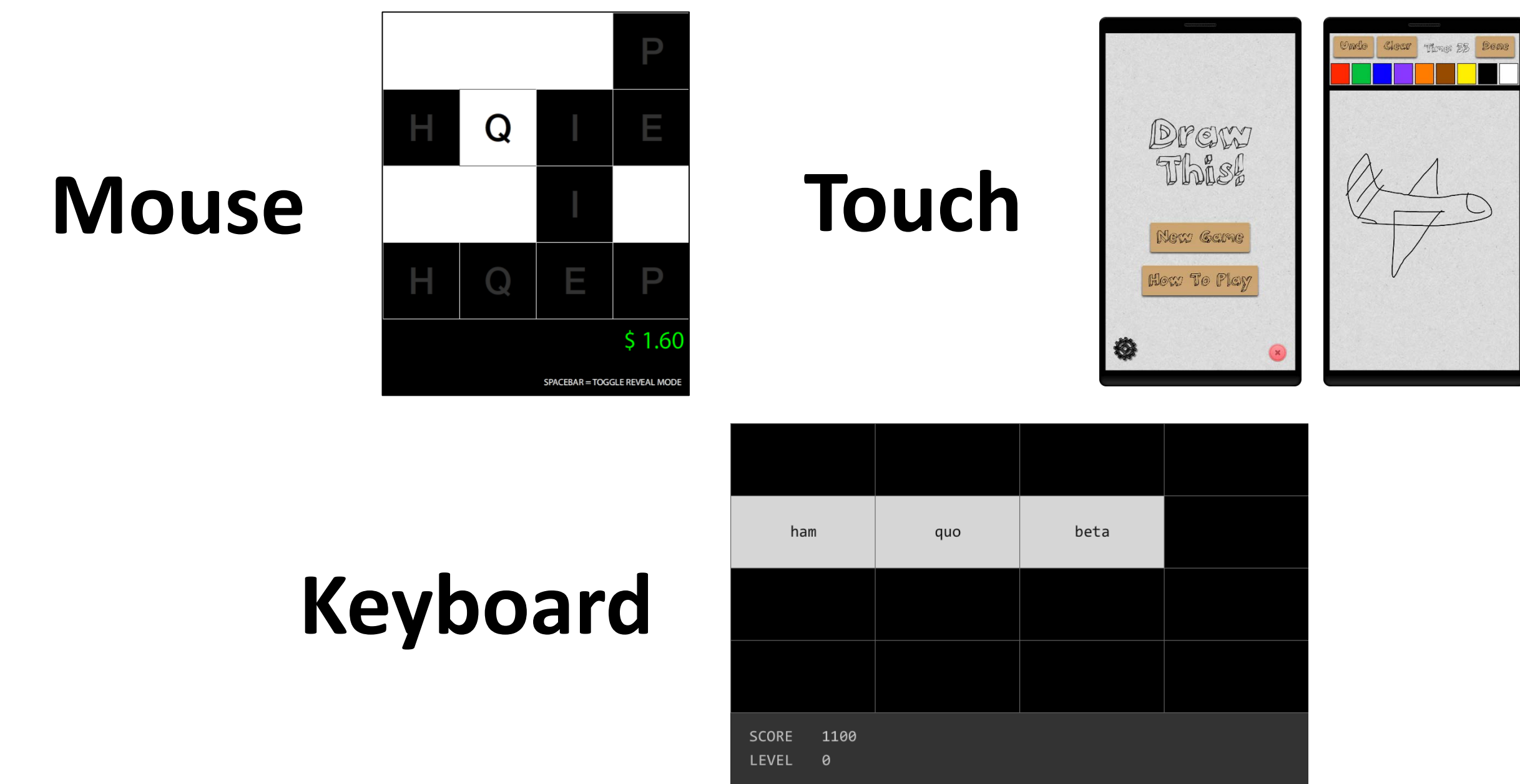- Apply to almost any user interface.

Technical Approach

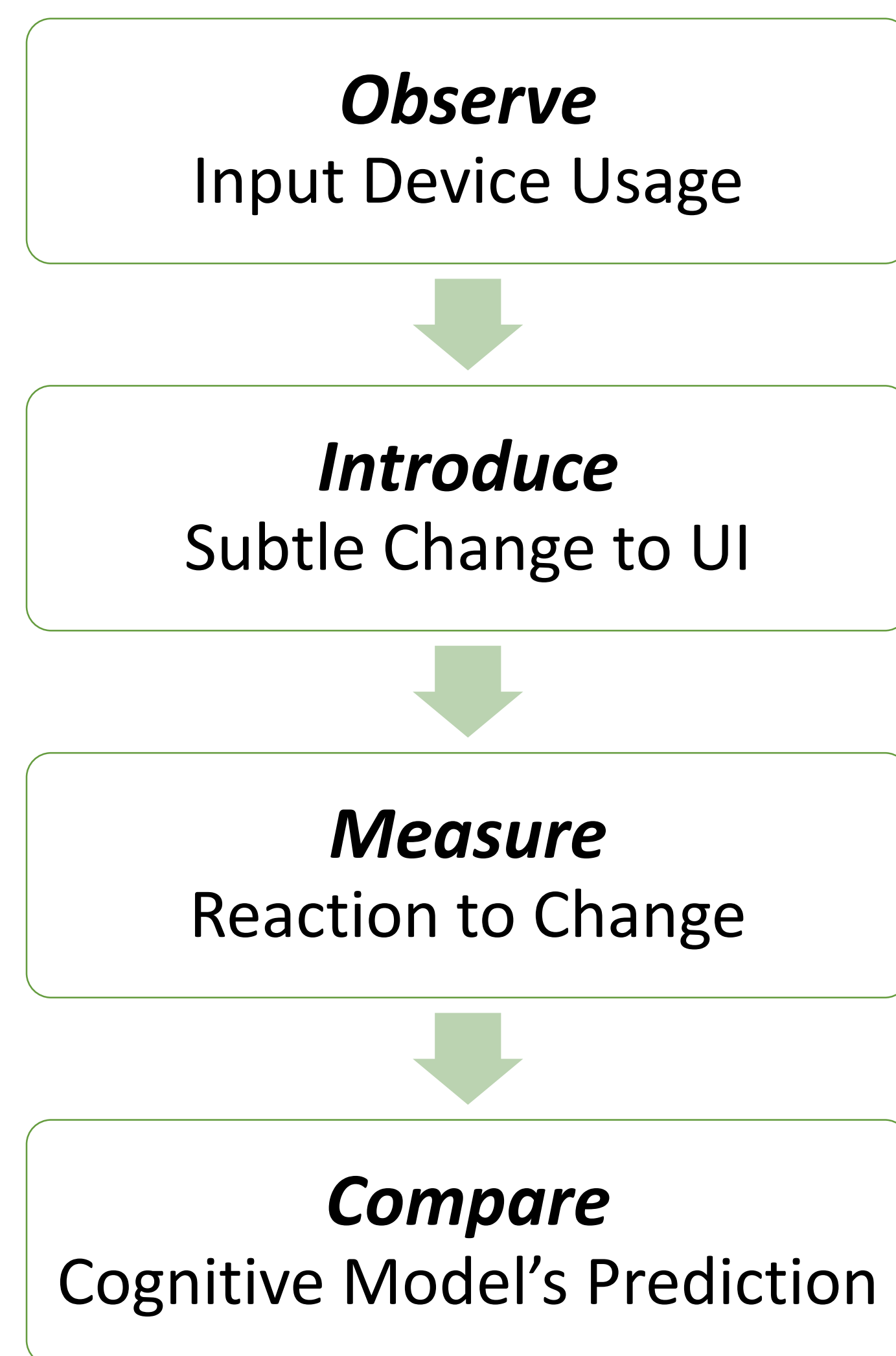Develop predictive, explanatory models of human behavior.

1. Human Observations → 2. Cognitive Architectures → 3. Machine Learning
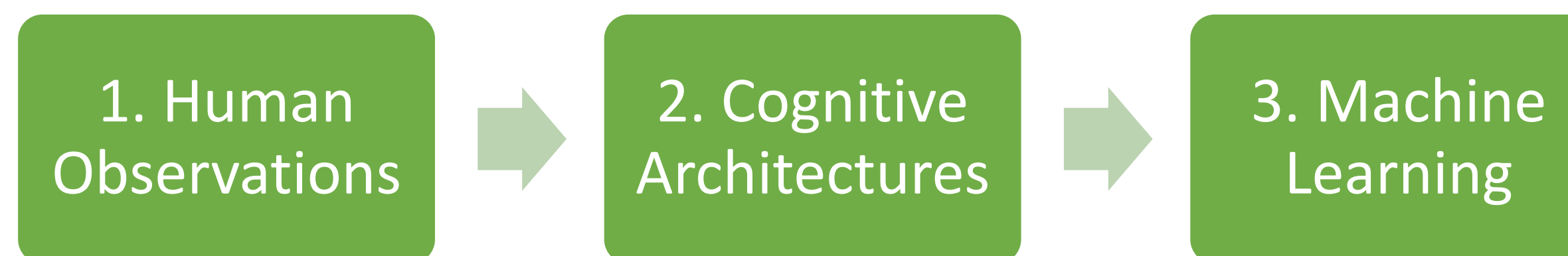
1. Human observations as **ground truth**.
2. Cognitive models for **explanation**.
3. Machine learning for **classification**.

Interfaces

Mouse

Touch

Keyboard

| ham | quo | beta |

SCORE   1100
LEVEL   0

How Do HSPs Work?

Observe
Input Device Usage

↓

Introduce
Subtle Change to UI

↓

Measure
Reaction to Change

↓

Compare
Cognitive Model's Prediction

Strategy

Casual games as a proxy

- Affordance for task manipulation
- Comparable complexity to real world tasks
- More natural experimental setting
- Motivational context leading to higher engagement
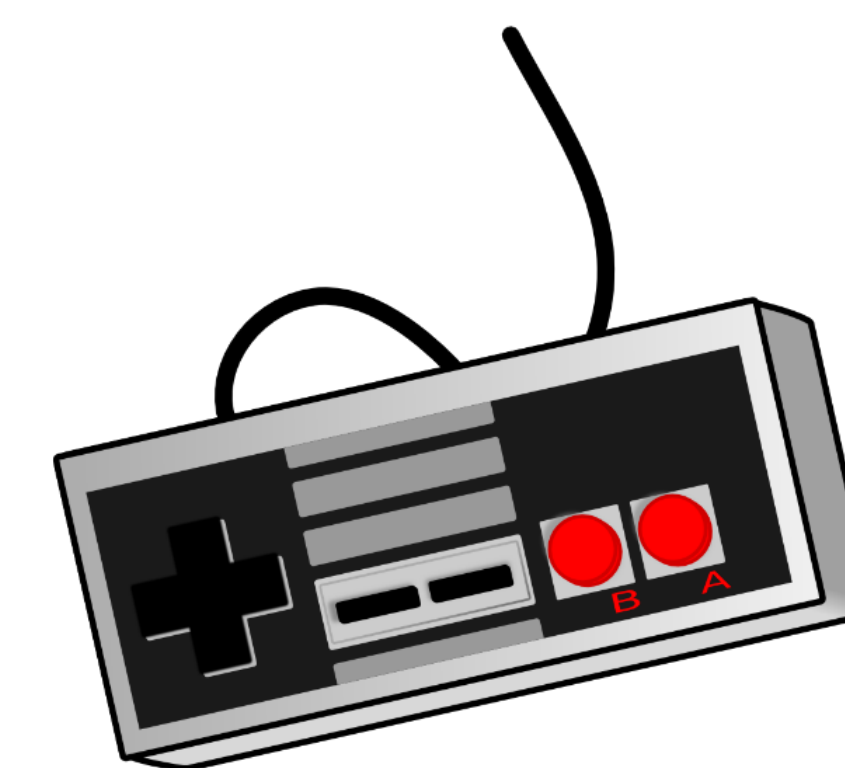
Some Potential Applications

Real human		Bot
Memory recall		Visual Search
Familiar task	Vs.	Unfamiliar task
Skilled		Novice
Content production		Memory recall
Normal behavior		Deceptive behavior

Science of Security Lablet

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