Identifying Malicious Insiders through Mouse Cursor Movements

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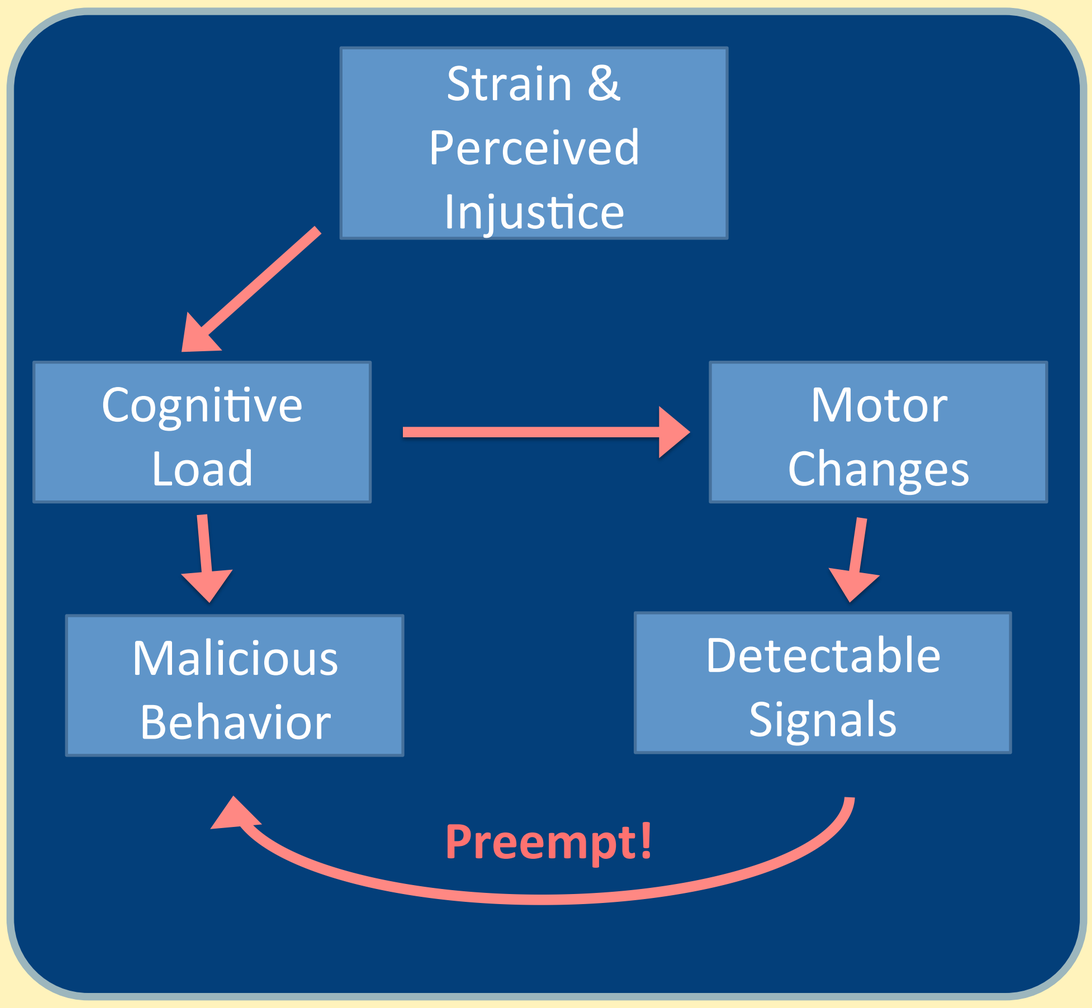
Preemptively Measure Internal Mental States

The objective of this project is to identify potentially malicious insiders by detecting changes in motor nervous system movements using standard human-computer interface devices.

The threat of malicious insiders is a top concern for governmental agencies and corporations. In general, malicious insiders are typically disgruntled employees who encounter a negative experience, or stressor, as a triggering event. Criminology research has long associated certain stressors with malicious behavior. Recent neuroscience and cognitive psychology research has unequivocally demonstrated that linkages exist between cognitive processing (e.g., cognitive conflict, emotion, arousal, etc.) and hand movements. In a human-computer interaction context, growing support has found that emotions influence mouse cursor movements. Importantly, this work has demonstrated that negative emotions associated with stressors influence users' mouse cursor movements. Building on this foundation, this work will answer critical questions regarding the identification of mouse curser data features that may indicate negative emotions induced by stressors.

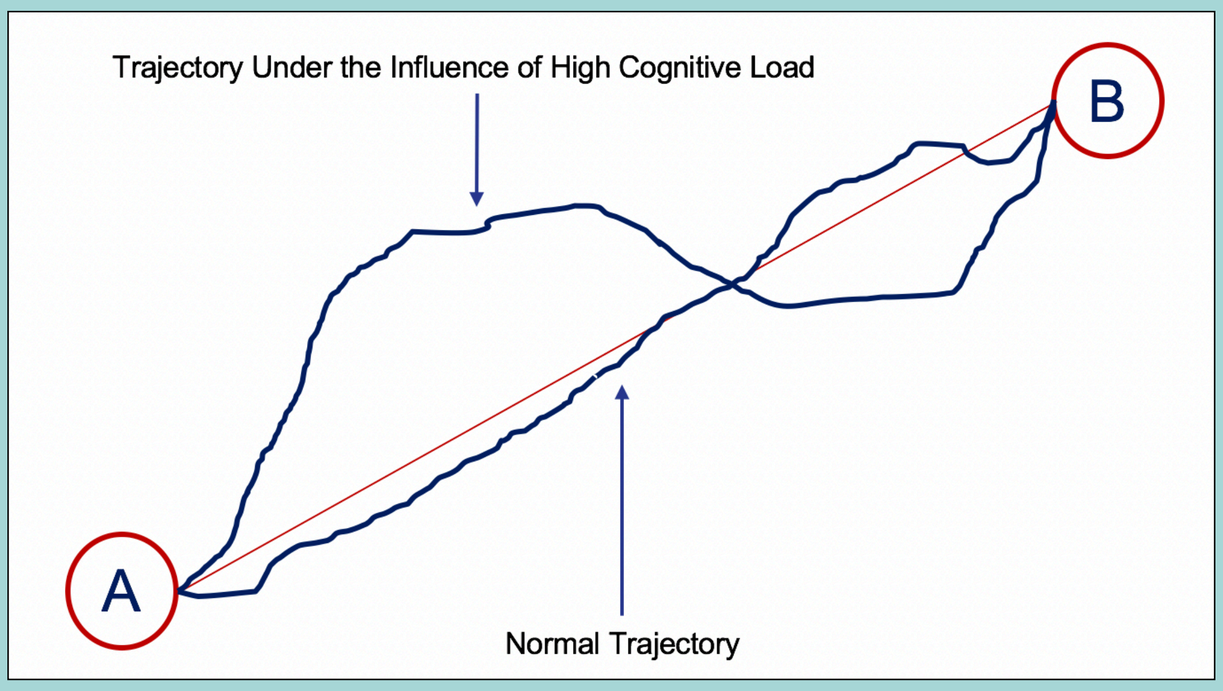


Experimental Approach

Induce Strain: Unfair Intelligence Test

- To induce stress, participants complete an unfair intelligence test.
- Test contains made up questions that are impossible to answer.
- Reward payments are based on performance.
- Some subset will cheat to complete task (i.e., a policy violation → a malicious event).
- Malicious participants will experience increased cognitive load.
- Increased cognitive load induces predictable changes on fine motor movements.
- Movements will be used to predict malicious participants.

Measure Fine Motor Movements



Progress Update: Deployed Websites

- Created fake cheating websites
- Performed Search Engine Optimization to ensure answers will be found if questions are searched via Google

Progress Update: Pilot Data Collection

- Evaluate instrument and procedures
- November 2016: Pilot on campus – 20 undergrads
- December 2016: MTURK Pilot

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National Science Foundation
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NSF Secure and Trustworthy Cyberspace Principal Investigator Meeting
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