OFFICE OF THE DIRECTOR OF NATIONAL INTELLIGENCE

SIRIUS Overview
Office of Incisive Analysis
IARPA

L E A D I N G   I N T E L L I G E N C E   I N T E G R A T I O N

Dr. Rita Bush
Program Manager

SIRIUS Goals/Objectives

- **Goal:** Create experimental Serious Games to train participants and measure their proficiency in recognizing and mitigating the cognitive biases that commonly affect all types of intelligence analysis.

- **Objectives:**
  - Experimentally manipulate variables in Serious Games and determine whether and how such variables might enable player-participant recognition and persistent mitigation of cognitive biases
  - Provide a basis for experimental repeatability and independent validation of effects, and identify critical elements of design for effective analytic training in Serious Games
  - Examine 6 cognitive biases of particular interest to IC: (1) Confirmation Bias, (2) Fundamental Attribution Error, (3) Bias Blind Spot, (4) Anchoring Bias, (5) Representativeness Bias, and (6) Projection Bias

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LEADING INTELLIGENCE INTEGRATION

Why Games?

- Serious Games provide…
  - Experiential learning – "learning by doing"
  - A safe environment where learning from failure is OK
  - Repetition, repetition, repetition
- Use of games & simulations is typical in military training…but not the Intelligence Community
- Other education & training applications (e.g., medical, clinical, STEM) show promise

When Heuristics Cause Mistakes

- **Confirmation Bias**: The tendency to search for or interpret information in a way that confirms one's preconceptions. Often preceded by priming.

- **Fundamental Attribution Error**: The tendency for people to over-emphasize personality-based explanations for behaviors observed in others while under-emphasizing the role and power of situational influences on the same behavior (also called attribution bias).

- **Bias Blind Spot**: The tendency for an individual to be unaware of their own cognitive biases, even when the individual can recognize cognitive biases in others.

- **Anchoring Bias**: The tendency to rely too heavily, or "anchor," on one trait or piece of information when making decisions (related to focalism or focusing illusion).

- **Representativeness Bias**: The tendency for people to judge the probability or frequency of a hypothesis by considering how much the hypothesis resembles available data. Also sometimes referred to as the "small numbers" bias.

- **Projection Bias**: The tendency to unconsciously assume that others share one's current emotional states, thoughts and values.

Research Challenges

- Cognitive biases are notoriously resistant to traditional training methods

- Prior research on Serious Games treats the game as a "black box" -- we don't have a scientific understanding of what it is about games that makes them effective training tools

- No standard measure of cognitive bias

SIRIUS Program Structure

- Program kicked off October 2011

- Two main phases carried out over 50 months, each comprised of three research cycles that will focus on the following cognitive biases:

  - **Phase 1**: Confirmation Bias, Fundamental Attribution Error, and Bias Blind Spot

  - **Phase 2**: Anchoring Bias, Representativeness Bias, and Projection Bias

- Follow-up tests of training effectiveness at 8 weeks (Phase 1) and 12 weeks (Phase 2) to test for persistence of effect

Independent Variables Being Studied

- Character customization
- Communication type, frequency, style
- Fantasy elements
- Fidelity/abstraction of task, social, visual, or audio features
- First vs. third person view
- Game session duration/repetition
- Priming of participants

- Real-time feedback
- Reward structure
- Scaffolding
- Single player vs. multi-player
- Structured Analytic Techniques
- Student Modeling
- Time Pressure
- Type of narrative

Program Metrics

	Target Percentage Reduction in Cognitive Bias Compared to Pre-Test	
Weeks After Post-Test	Phase 1	Phase 2
0	50%	75%
8	35%	
12		65%

	Target Engagement Metrics (Percentage of Play Session)	
Program Phase	Individual	All Subjects
Phase 1, all Cycles	≥50%	≥75%
Phase 2, all Cycles	≥75%	≥90%

➢ Johns Hopkins University/Applied Physics Lab will conduct Independent Validation & Verification (IV&V) to replicate performers' results