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Introduction

In recent years, the Human Effectiveness directorate of the Air Force Research Laboratory (AFRL) has increased its investment in science and technology for human behavior representation. One beneficiary of this increase has been the Agent-based Modeling and Behavior Representation (AMBR) Model Comparison Project. The primary goal of the AMBR Model Comparison Project is to advance the state of the art in cognitive and behavioral modeling. It is organized as a series of model comparisons, orchestrated by a moderator team at BBN Technologies. In each comparison, a challenging behavioral phenomenon is chosen for study. Data are collected from humans performing the task. Cognitive models representing different modeling architectures are created, run on the task, and then compared to the collected data. This poster presentation will include results from the first two rounds of the comparison, ongoing work in Round 3, and future plans for Round 4.

Round 1: Multi-tasking

The first iteration of the AMBR Project is complete. The modeling goal in the first round was multi-tasking, and the task domain required a simplified version of en-route air traffic control. Modelers using ACT-R, COGNET/iGEN, D-COG, and EPIC-Soar participated in Round 1. All were able to approximate the trends and central tendencies of the data, but naturally the particular implementation of multi-tasking capability differed across architectures. Round 1 provided a motivation for extending and/or testing each of these architectures in a new way. It was particularly noteworthy that all four utilized some form of "embodiment" (e.g., eyes, hands), although at different levels of fidelity.

Round 2: The Icarus Federation

In Round 2 of the AMBR Model Comparison Project, the Defense Modeling and Simulation Office (DMSO) sponsored the conversion of the simulation environment and models from Round 1, so that they are compliant with DMSO's High-Level Architecture (HLA). Goals for Round 2 include the following:

- Develop an HLA-compliant testbed for research in human behavior representation (HBR)
- Assess the adequacy of the HLA for supporting HBR research
- Assess the adequacy of DMSO's FEderation Development and Execution Process (FEDEP) as a framework for creating and running federations for HBR research

Round 3: Concept Learning

To increase the cognitive requirements of the task used in Rounds 1 and 2, the air traffic control simulation is being supplemented with an embedded category learning task. Multiple aircraft will query the controller (the one that is being modeled) about the possibility of changing altitude. The controller will make a decision to authorize an altitude change based on a multi-dimensional attribute matrix that might include dimensions like aircraft size, level of atmospheric turbulence, and current altitude. The Controller must learn the appropriate responses on the basis of feedback received through the user interface concerning whether they made a correct decision or not. This concept learning task is based on the original laboratory study by Shepard, Hovland, and Jenkins (1961), and modeling studies reported by Nosofsky, et al. (1994).

Round 4: Under Development

The task for Round 4 will be fundamentally similar to the task used in Round 3, but the details are still under consideration. Based on the results of the Round 3 model evaluations, the Round 4 task will be designed to further stress the models and examine their capabilities. We anticipate a focus on the ability of models to adapt from one set of learned concepts to a new, changed set of concepts based on the same or a similar set of concept attributes. Other manipulations such as the workload of the perceptual motor task may also be explored as deemed appropriate given the results of Round III.

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