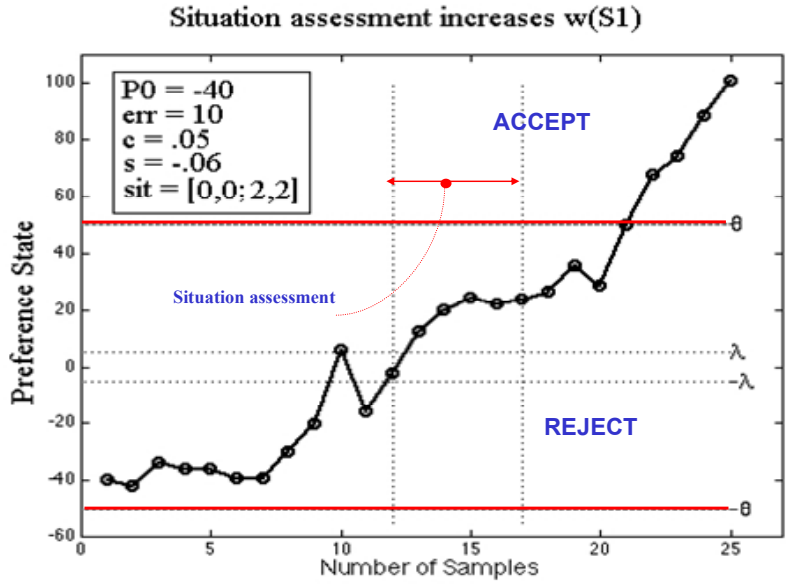
Scientific Computing Within the ORNL Modeling & Simulation Group: ACS Expertise – Human Cognitive Modeling

The ORNL Modeling and Simulation Group (MSG) develops sophisticated numerical solutions for a wide range of scientific, engineering, and operational applications. MSG's core competency is computational physics and engineering, and within our analysis of complex systems focus area we have developed considerable expertise modeling human cognition. This problem solving scope encompasses an extremely diverse set of solution techniques, computing platforms, and applications. Categories of worked problems include the following.

- Models of human performance, human/machine interaction, artificial emulation of human intelligence, and reliability for industrial processes.
- Models of predictive workload, supervisory decision making, trust in automation, and situational awareness/understanding within combat environments.
- Real-time measurement of human cognitive state.
- Experimental assessment of animal behaviors.
- A wide variety of analysis methodologies and multivariate techniques such as artificial neural nets, support vector machines, nonlinear dimension reduction, discrete-event and agent-based simulation, and system-of-systems analysis.
- DOE applications that include nuclear-reactor control-room and chemical-process operators.
- DoD applications that include the U.S. Army's Joint Virtual Battlespace and Future Combat System Programs.

These applied scientific computing capabilities represent an extremely versatile human cognition modeling resource for a broad range of R&D, industrial, homeland defense, and military applications. We welcome the opportunity to discuss your potential applications and ways MSG can contribute to a solution.



MSG utilized decision field theory to model human deliberation as a random walk or diffusion process to predict deliberation time needed to accept or reject decision aid &/or the accuracy of the information

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