

## **Tools for Cognitive Modeling: Developing tasks for universal access by models and human participants, exploring a massive parameter space to find the best fit of model to data, and analyzing the persuasiveness of the best-found fit**

**Vladislav “Dan” Veksler (vdv718@gmail.com)**

U.S. Army Research Laboratory,  
Human Research & Engineering Directorate  
Aberdeen Proving Ground, MD, USA

**Keywords:** Simple Task-Actor Protocol (STAP);  
MindModeling.org; Model Flexibility Analysis.

### **Introduction**

The aim of this tutorial is to walk participants through much of the cognitive modeling research cycle, from experiment/simulation development, to parameter exploration for finding the best fit of model predictions to empirical results, to determining the persuasiveness of the found fit (vis-a-vis Roberts & Pashler, 2000). This tutorial will provide hands-on experience with (1) Simple Task-Actor Protocol (STAP; Veksler, et al., in press) — a technology that enables reuse of task software for human participants in lab, online, and on mobile devices, and computational participants regardless of computational framework and programming language; (2) mindmodeling.org (Harris, 2008) — a free online parallel computing resource for exploring large parameter spaces; and (3) Model Flexibility Analysis (Veksler, Myers, & Gluck, 2015) — a method for estimating model complexity/flexibility.

Harris, J. (2008). MindModeling@Home: a large-scale computational cognitive modeling infrastructure. In *The Sixth Annual Conference on Systems Engineering Research* (pp. 246–252). Los Angeles, CA.

Roberts, S., & Pashler, H. (2000). How persuasive is a good fit? A comment on theory testing. *Psychological review*, 107(2), 358.

Veksler, V. D., Buchler, N., Lebiere, C., Morrison, D., & Kelley, T. D. (in press). The performance comparison problem: Universal task access for cross-framework evaluation, Turing tests, grand challenges, and cognitive decathlons. *Biologically Inspired Cognitive Architectures*.

Veksler, V. D., Myers, C. W., & Gluck, K. A. (2015). Model Flexibility Analysis. *Psychological Review*, 122(4), 755–769.