

**AUTOMATED PROTOCOL ANALYSIS FOR
EXTRACTING FIRST-PASS DESCRIPTIVE
COGNITIVE MODELS FROM HUMAN
EXPERIMENTAL DATA**

By

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A Thesis Submitted to the Graduate
Faculty of Rensselaer Polytechnic Institute
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
Major Subject: COGNITIVE SCIENCE

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March 2012
(For Graduation May 2012)

ABSTRACT

This work presents the SANLab Log Analyzer for parsing log files of human performance in computer-driven tasks, including keystroke, mouse, and eye movement data, into first pass descriptive cognitive models. In addition, the tool attempts to identify models of similar structure and combines them by computing probability distributions of individual activities to provide stochastic predictions of performance. All models are described using the SANLab-CM (Patton and Gray, 2010, hereafter referred to as SANLab) modeling tool and best approximate the observable motor actions of the human participant. To validate the tool, data from three different experimental paradigms are used to generate a set of descriptive models capturing human variability under those experiments: an eye-tracking calibration task (Trewin et al., 2012), the NavBack task (Ralph, Gray, & Schoelles, 2010; Ralph, 2011), and the Decision-Making Argus Prime (DMAP) tasks (Schoelles & Gray, 2001; Veksler, 2011). Analyses showed that generated models performed best in repetitive tasks with few opportunities for participants to explore the environment, but overall models were still able to accurately reflect between 20-50% of behavior, with differences of about 5.5% between model predictions and the recorded data.