# Cognitive Modeling in Human Factors (Generally) and in Predator UAV Operations (Specifically)

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Abstract

Cognitive modeling has its origins in the emergence of artificial intelligence and information processing psychology in the 1950's. The relevance of cognitive modeling for the human factors community was made clear with the publication of Card, Moran, and Newell's (1983) book *The Psychology of Human-Computer Interaction*. Since then the field has seen the emergence of cognitive architectures (e.g., ACT-R, CoLiDeS, EPIC, Soar), which are broadly-scoped computational systems that make theoretical assumptions about the representations and processes involved in perceiving, thinking, and acting.

This presentation will begin with discussion of the advantages of cognitive modeling as a research approach available to the human factors community. The remainder of the presentation will focus on one of the cognitive modeling research efforts underway at the Air Force Research Laboratory's Mesa Research Site. Specifically, we are using a Predator UAV synthetic task environment (STE) to study pilot performance and skill acquisition, and we are developing a cognitive model of the UAV pilot. For the cognitive modeling research we have interfaced the ACT-R cognitive architecture and modeling environment to the UAV STE. This allows us to develop computational cognitive models capable of flying the UAV, just as human participants do in our empirical studies. The model flies basic maneuvers at the expert level, subject to the cognitive constraints inherent in the ACT-R architecture (e.g. the model can only attend to one instrument at a time). Comparison with a variety of human performance data on the basic maneuvering task suggests that the cognitive model is a valid representation of real-time human performance. We are currently extending the model to perform the reconnaissance task. The presentation will conclude with some discussion of how models of this sort can be of use to the human factors community in general, and to the Predator community in particular.