

**The Mechanics of Multitasking: The Choreography of Perception,
Action, and Cognition over 7.05 Orders of Magnitude**

by

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ABSTRACT

This dissertation details the development of an advanced real-time cognitive model that plays a version of *Space Fortress*, an arcade-style video game. A new, streamlined version of the game, called *Pygame Space Fortress* was developed, as well as a new interface system to connect a cognitive architecture like ACT-R to external simulations that run as separate process from the task environment. An experiment was run that recorded subjects' performance in the game over the course of 31 hours, and the data from this experiment was used to inform the cognitive model of the high-level strategies used by expert players, as well as low-level tactics that the subjects implemented but did not report, likely because they were not consciously aware of them. Implications are discussed for visual tracking, multitasking, task switching, and theories of cognitive control.