

Experimentation and Data Collection  
For Sequential Decision Making Under Uncertainty

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**ABSTRACT:**

The overall objective of the Sequential Decision Making Under Uncertainty (DMUC) project was to collaborate with academia in order to develop cognitive models of performance for human observers in uncertain situations. In developing these models, ARL and other agencies will have more guidance concerning the cognitive limitations and needs of decision makers on the battlefield. These needs and limitations can then be factored into the development of future Command and Control Systems (C2S).

The main focus of the testing I was involved in concerned an evolution of the primary model being used to analyze DMUC. Prior to my arrival, researchers utilized a Seek & Destroy task to determine how observers attempted to localize and destroy a static enemy in a noisy environment. The enemy was located at any point on a five by five matrix and the observer utilized reconnaissance and artillery to find and destroy the enemy. My research focused on a similar mission, however in the evolved case, the enemy was mobile and moving toward a known goal state. The observer tried to find and destroy the enemy before it reached the goal state.

With the information gathered in this testing, the team hopes, through analysis of the data, to gain a better understanding of the cognitive limitations of a decision maker in an uncertain situation. This understanding can be used to provide “cognitive prosthetics” to aid the decision maker in the seek & destroy and other similar tasks. While the purpose of these studies is to gain a general understanding of DMUC, the possible areas for future application become quite apparent.

**KEYWORDS:** Sequential Decision Making, Partially Observable Markov Decision Process, Signal Detection Theory, Seek & Destroy

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