Intelligence Analysis: Developing a Model of the Process
Based on a Cognitive Task Analysis

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TOPIC: C2 Decision Making and Cognitive Analysis
Intelligence Analysis: Developing a Model of the Process Based on a Cognitive Task Analysis

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Abstract

Intelligence analysts must filter, analyze, synthesize and determine the relevance of a continual stream of incoming information that often pertains to several different situations. The sheer volume makes it hard to process all the data, yet currently available technology is not always effective in helping the analyst assimilate the huge amount of information that needs to be synthesized. A critical part of the analyst's task also involves projecting future anticipated events. Products of this information foraging and analysis are used by senior decisionmakers to make high-stakes decisions. One goal for the research reported here is to capture data that will provide input to building computational models of the intelligence analyst and analytic processes used by intelligence analysts. A Cognitive Task Analysis (CTA) was conducted to support development of computational models of the analyst's processes, biases, and analytic strategies. CTA is an extension of traditional task analysis techniques to produce information regarding the knowledge, thought processes, and goal structures that provide the foundation for task performance (Chipman, Schraagen, and Shalin, 2000). The goal of CTA is to discover the cognitive activities that are required for performing a task to identify opportunities to improve performance by providing improved support of these activities. (Potter, Roth, Woods, and Elm, 2000).

Fourteen military officer-students, currently enrolled in a graduate school program at the Naval Postgraduate School (NPS), Monterey, CA, were interviewed. These subject matter experts were students in the intelligence information management and national security affairs curricula at NPS and had an average of ten years experience working as intelligence analysts. These participants were considered experts as the literature generally defines an "expert" as an individual who has over ten years experience and "would be recognized as having achieved proficiency in their domain." (Klein, 1989, p. 462) Initial semi-structured interviews were conducted, during phase one, to identify examples of the challenging aspects of their tasks and why these tasks are challenging, the cues and strategies that are used by practitioners, the context of the work, and to identify a representative set of problems or cases.

Many CTA techniques have as one of their goals to elicit information on actions taken and the decisions leading up to those actions. The nature of the intelligence analyst's task places greater emphasis on deductive reasoning, looking for patterns of activity, and making judgments about the level of risk present in a particular situation. Thus, a modified version of the critical decision method was developed and used for phase two where analysts were asked to describe a critical assignment where they had to collect, analyze, and produce a report on intelligence of a strategic nature. Interview probes provided in the literature (Hoffman Coffey, and Ford, 2000) were modified to develop new probes to capture information on the types of information used and how this information was obtained, mental models used by analysts, hypotheses formulated and the types of products there are produced.
Time pressure to get reports out to decision-makers is becoming an increasingly stressful requirement. Multiple sources of data must be combined to predict complex, dynamic events. Moreover, these data come from a variety of sources with varying degrees of validity and reliability and domain expertise is needed to analyze each type of data. A high cognitive workload is produced when information must be constantly evaluated, updated and synthesized. An additional contributor to the high workload is the labor-intensive process employed when analysts process data manually, because no one single database exists that can correlate across the various types of data that must be assimilated.

Difficult human judgments are involved in (i) considering the plausibility of information, (ii) deciding what information to trust, and (iii) determining how much weight to place on specific pieces of data. One aspect of the intelligence analysis task that is particularly challenging involves merging different types of information when the analyst does not have technical familiarity with all these types of information. Human intelligence, electronic intelligence, imagery, open source intelligence, measures and signals intelligence can all include spurious signals or inaccurate information due to the system used or to various factors associated with the different types of data. This aspect of the intelligence analyst's task presents a potential for biases to influence interpretation. For example, the confirmation bias may influence the analysis process when analysts attempt to reduce their cognitive load by analyzing what they understand and discounting what they don't understand. Moreover, discrepancies regarding interpretation may result when analysts at different locations (e.g., on different platforms, different services) rely on different systems that produce different results. Additionally, the sheer volume of information makes it hard to process all the data, yet no technology is available that is effective in helping the analyst synthesize the different types of information.

Analysis of a complex cognitive task, such as the intelligence analyst's job, often requires the use of multiple techniques. When results from several techniques converge, confidence is increased regarding the accuracy of the CTA model (Potter, et al, 2000). The major impact of the work described above will be to provide data to develop computational models which will be used to develop tools to help analysts in locating and gathering information from large collections of information, synthesizing and developing an understanding of this information.

References


