

Explanation-Based Decision Making

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MITRE Sponsored Research

The logo for the MITRE Technology Program, featuring a stylized graphic of stacked blocks in yellow, orange, and blue to the left of the text.

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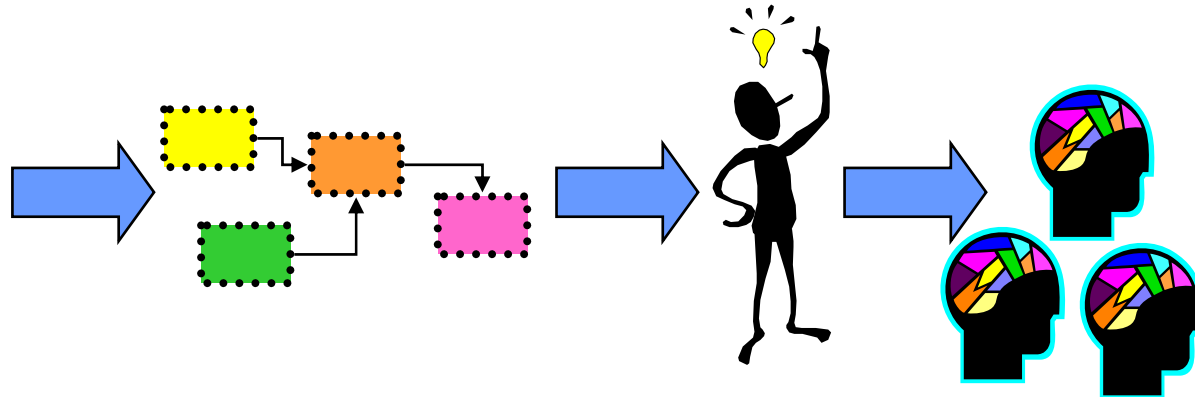
Problem

- **Although hypotheses are typically expressed as simple propositions, they often have elaborate mental models (such as causal explanations or stories) associated with them.**
- **These mental models are largely tacit and not externalized or represented in any form.**
- **This lack of externalization contributes to analytic failure by increasing the vulnerability of judgments to natural cognitive limits.**

Background



Think



Externalize

- Hypotheses
- Evidence
- Inferences
- Assumptions

Deliberate

- Reflect
- Interpret
- Understand

Share

- Review
- Critique
- Revise

Cognitive Support to Analysis

Objective

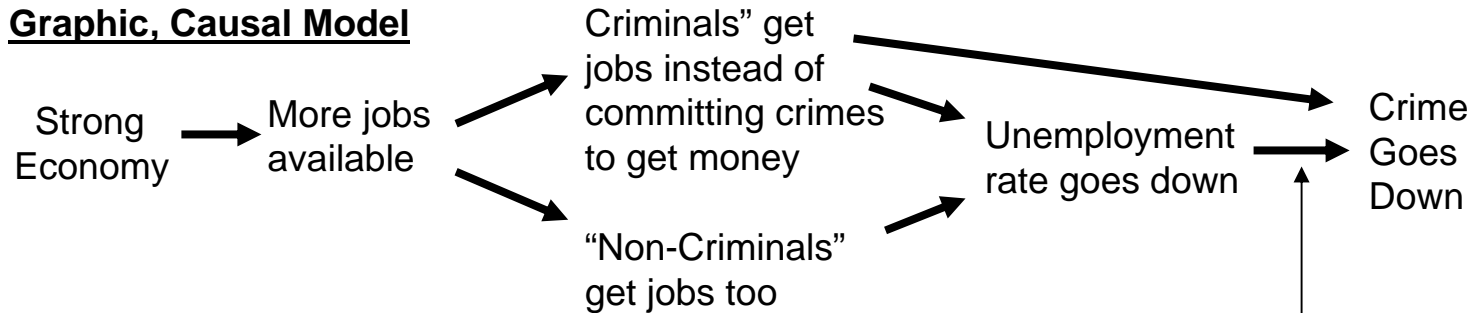
- **Develop an explanation-based externalization method for hypothesis exploration**
 - Give consumers greater insight into the evolution of analytic judgments
- **Demonstrate how information technology enables externalized hypothesis exploration**
 - Assist “evidence-seeking hypotheses” and “hypotheses seeking evidence”
- **FY06: Implement a prototype EBDM analysis support environment**

Activities

- **Conducted team analysis exercises**
- **Developed an analysis “process model” derived from analysis training materials as well as direct analysis experience**
- **Implemented an initial prototype following workflows derived from the process model**
- **Conducted a formative evaluation**
- **Prototyping activities are ongoing**

Highlight

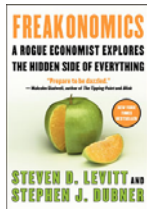
Graphic, Causal Model



Evidence

Evidence For Causal Link

- [Studies](#) have shown that an unemployment decline of 1% led to a 1% drop in nonviolent crime



H: A Strong Economy Caused the Decrease in Crime in the 1990s

Evidence Against Causal Link

- During 1990s, unemployment rate fell by 2%, but nonviolent crime fell by roughly 40%
- Homicide fell at a rate even greater than 40% during the 1990s
- [Number of reliable studies](#) have shown virtually no link between economy and violent crime

Demonstration

The screenshot displays the Minuteman software interface, which is used for evidence discovery and marshaling. The interface is divided into several sections:

- Left Panel (Tree View):** Shows a hierarchical structure of evidence. The root is 'crescent', which contains 'Toolbox', 'Evidence', 'Report', and 'Dossier'. Under 'Report', there are dates '7 April. 2003' and '5 April. 2003'. Under 'Dossier', there is a 'Ramazi' dossier containing 'Bank accounts' and 'Dossier Template'. The 'Bank accounts' folder contains 'account number 107' and 'First Union Bank in S'. The 'Dossier Template' folder contains 'Judgment' and 'Ramazi is leader of terrorist ce'. The 'Graph' folder contains 'Money Transaction'.
- Top Panel (Evidence Summary):** Displays the summary for the selected evidence, 'Ramazi is leader of terrorist cell'. It includes fields for Name, Classification (Unclassified), and Credibility (Medium). Below this are sections for 'Grounds' (containing 'Money Transaction') and 'Rebuttal' (containing '...').
- Bottom Panel (Evidence Graph):** Displays a graph showing the relationships between evidence items. The graph includes the following nodes and relationships:
 - Node 1: 'Six checks totaling \$35,000 have been deposited in this account in the past four months' (has a)
 - Node 2: 'account number 1070173749003' (has a)
 - Node 3: 'drawn on accounts at the Pyramid Bank of Cairo, Egypt and the Central Bank of Dubai, United Arab Emirates' (has a)
 - Node 4: 'possible conduits in money laundering schemes' (has a)

Evidence Discovery & Marshaling Workbench

Impacts

Future Plans

