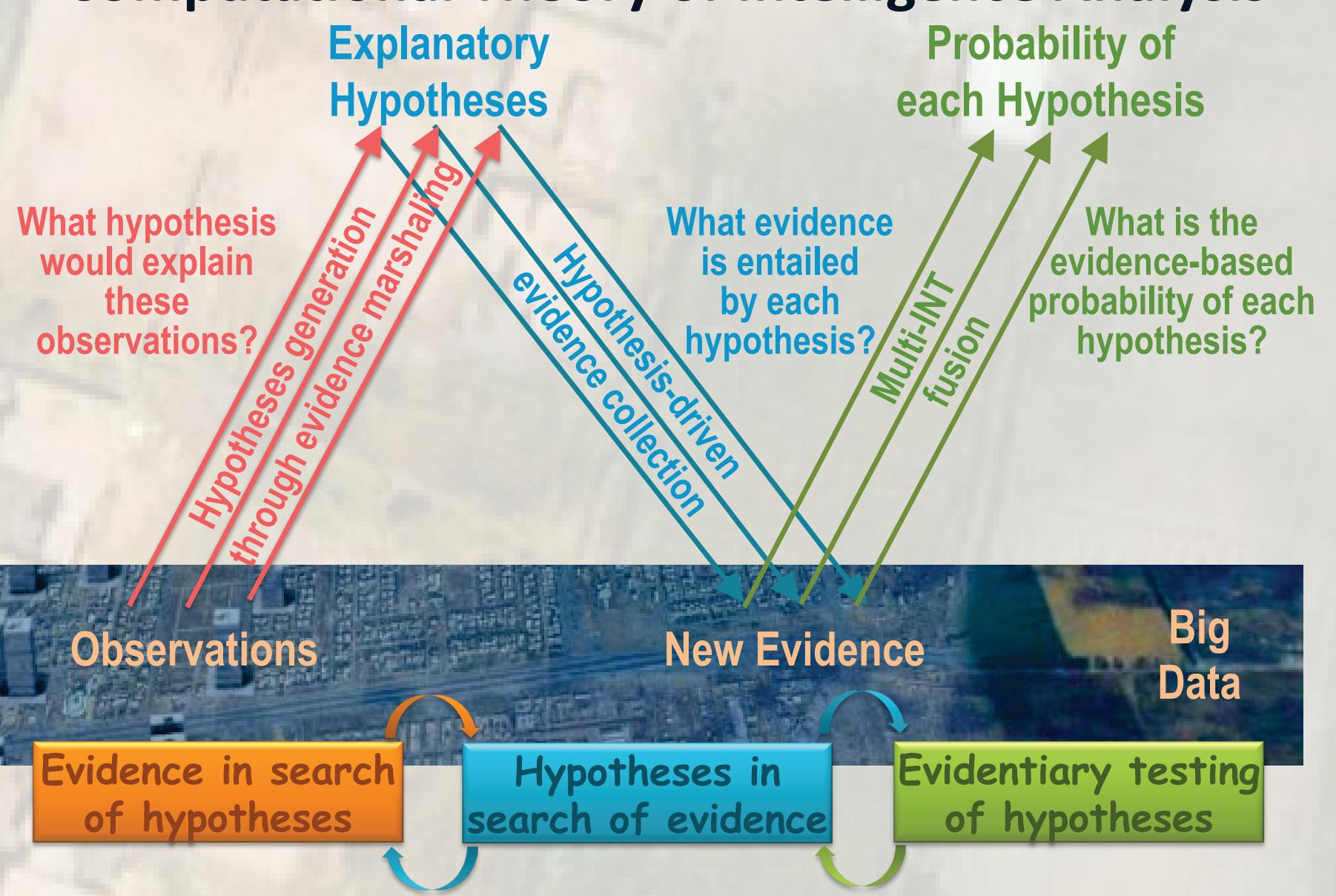


# Cognitive Assistants for Intelligence Analysis: Theory, Textbooks, and Tools

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## Computational Theory of Intelligence Analysis



## Key Elements

- Based on the scientific method.
- Systematic approach to evidence-based reasoning through a synergistic integration of abductive, deductive, and inductive reasoning.
- Computational models for essential analytical tasks (e.g., evidence marshaling, hypothesis-driven evidence collection, multi-INT fusion, detection and mitigation of biases).
- General analysis structure with favoring and disfavoring arguments for competing hypotheses.
- Intuitive system of Baconian probabilities with fuzzy qualifiers, allowing customizable assessment scales.
- Substance-blind ontology of evidence.
- General procedures for credibility/believability assessment.

**Knowledge Engineering:**  
Building Personal  
Learning Assistants  
for Evidence-based  
Reasoning

Theory of knowledge engineering  
and evidence-based reasoning  
Examples and exercises  
Practice with Disciple-EBR  
to build learning assistants  
such as Disciple-CD

## From TIACRITIS to Disciple-CD and to COGENT

- Improvements over TIACRITIS
- Probability system
  - Argument development
  - Evidence-based reasoning
  - Knowledge base management
  - Usability
  - Scalability
  - Reliability

TIACRITIS  
Teaching Intelligence Analysts Critical Thinking Skills

Disciple Assistant for Connecting the Dots  
Disciple-CD  
2011-2014

Version 1  
(Summer 2014)  
Cognitive Agent for Cogent Analysis

COGENT  
2012-2016

- New Generation Tool
- Easy to use
  - Enforcing cogent analyses
  - Learning and reuse
  - Collaborative analysis
  - Enabling fast analyses
  - Customizable scale

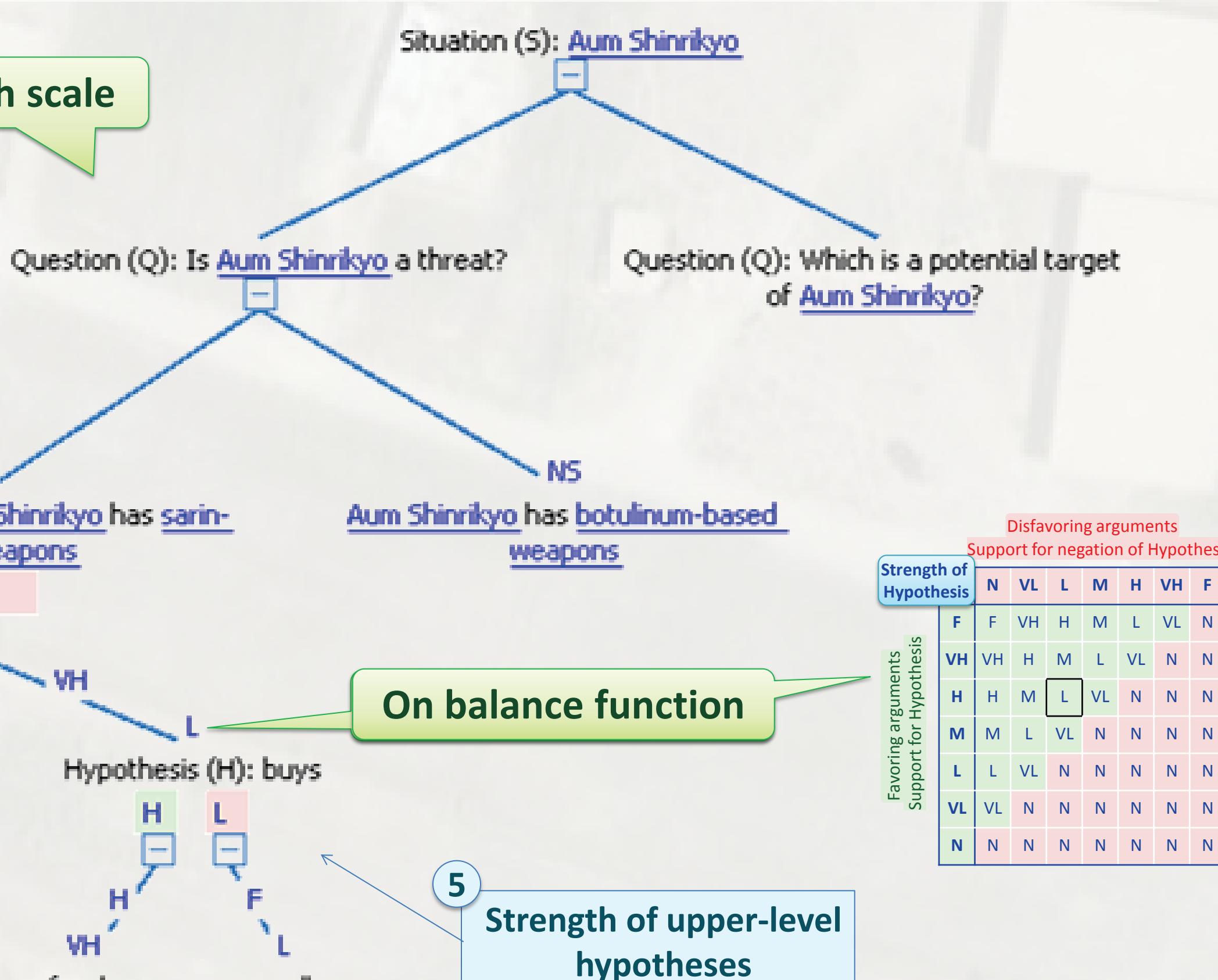
Connecting the Dots:  
Intelligence Analysis as  
Discovery of Evidence,  
Hypotheses, and  
Arguments

Theory of intelligence analysis  
and evidence-based reasoning  
Examples and exercises  
Basic and advanced practice  
with Disciple-CD to assess  
hypotheses based on evidence

## Customizable assessment scale

Strength	Probability	Belief
F (Full strength)	C (Certain)	TB (Total Belief)
VH (Very High)	AC (Almost Certain)	SB (Strong Belief)
H (High)	VL (Very Likely)	MB (Moderate Belief)
M (Medium)	L (Likely)	WB (Weak Belief)
L (Low)	LS (Lack of Support)	LB (Lack of Belief)
VL (Very Low)		
N (No strength)	NS (Not Set)	NS (Not Set)
NS (Not Set)		

## Strength scale

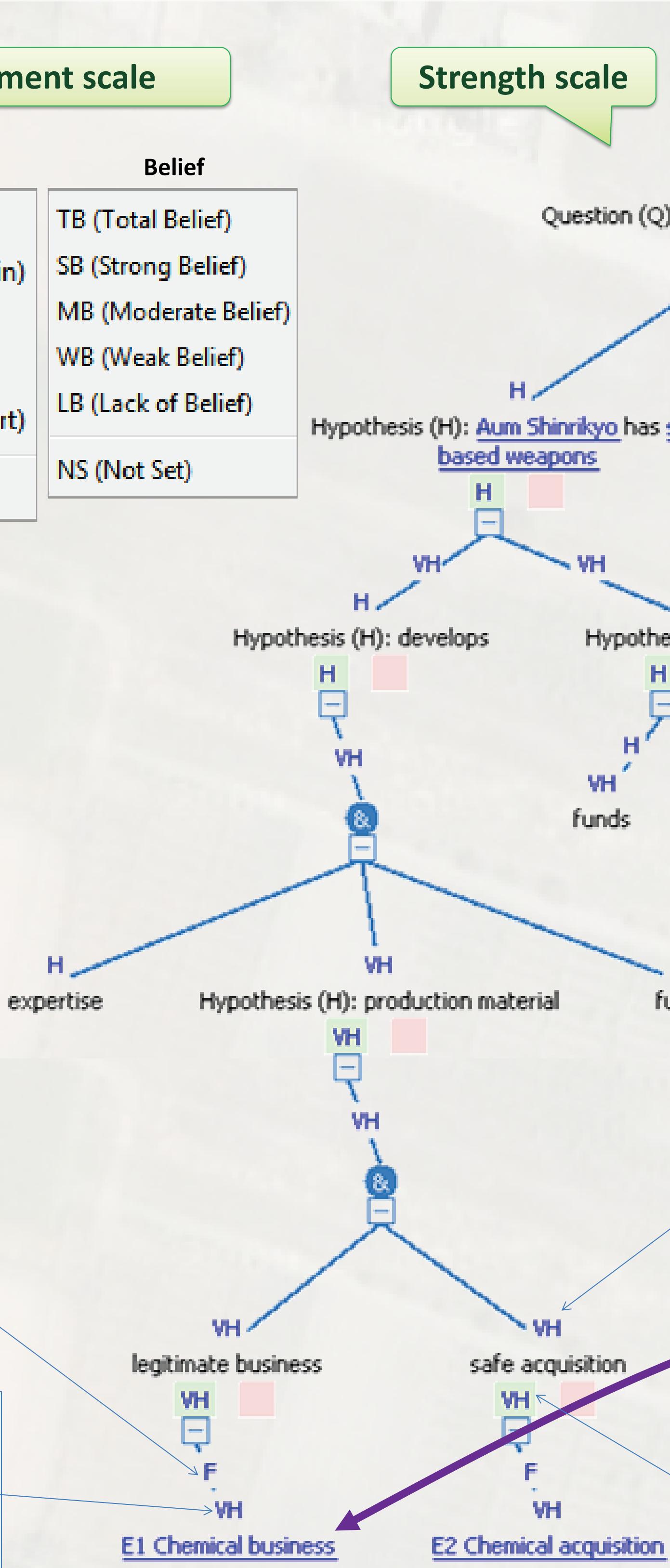


Strength of Hypothesis	Disfavoring arguments					
	F	VH	H	M	L	VH
Favoring arguments	VH	H	M	L	VH	N
H	H	M	L	VH	N	N
M	M	L	VH	N	N	N
L	L	VH	N	N	N	N
VH	VH	N	N	N	N	N
N	N	N	N	N	N	N

## Analyst assessments

**Strength of link**  
How strong is the link between what the evidence states and the hypothesis? That is, assuming that Aum has indeed created the two dummy chemical companies, how strong is the hypothesis that it has a legitimate business which is justified to acquire sarin?

**Credibility of evidence**  
How high is the credibility of E1 (i.e., that Aum has indeed created two dummy chemical companies)?



**Strength of hypothesis**  
(based on both favoring and disfavoring arguments)

**Strength of favoring argument**  
What is the strength of the favoring argument for the "safe acquisition" hypothesis, based only on E2?

