

A knowledge representation architecture for the construction of stories based on interpretation and evidence

Susan van den Braak & Gerard Vreeswijk

Department of Information and Computing Sciences,
Utrecht University

Stevie

- A tool for crime detection to infer stories of “what happened” from evidence
- Interpret, explain and relate evidence

Goal

- Formulate hypotheses as stories of “what happened”
- Maintain overview over all data
- Compare different scenarios
- Express underlying reasons

Contribution

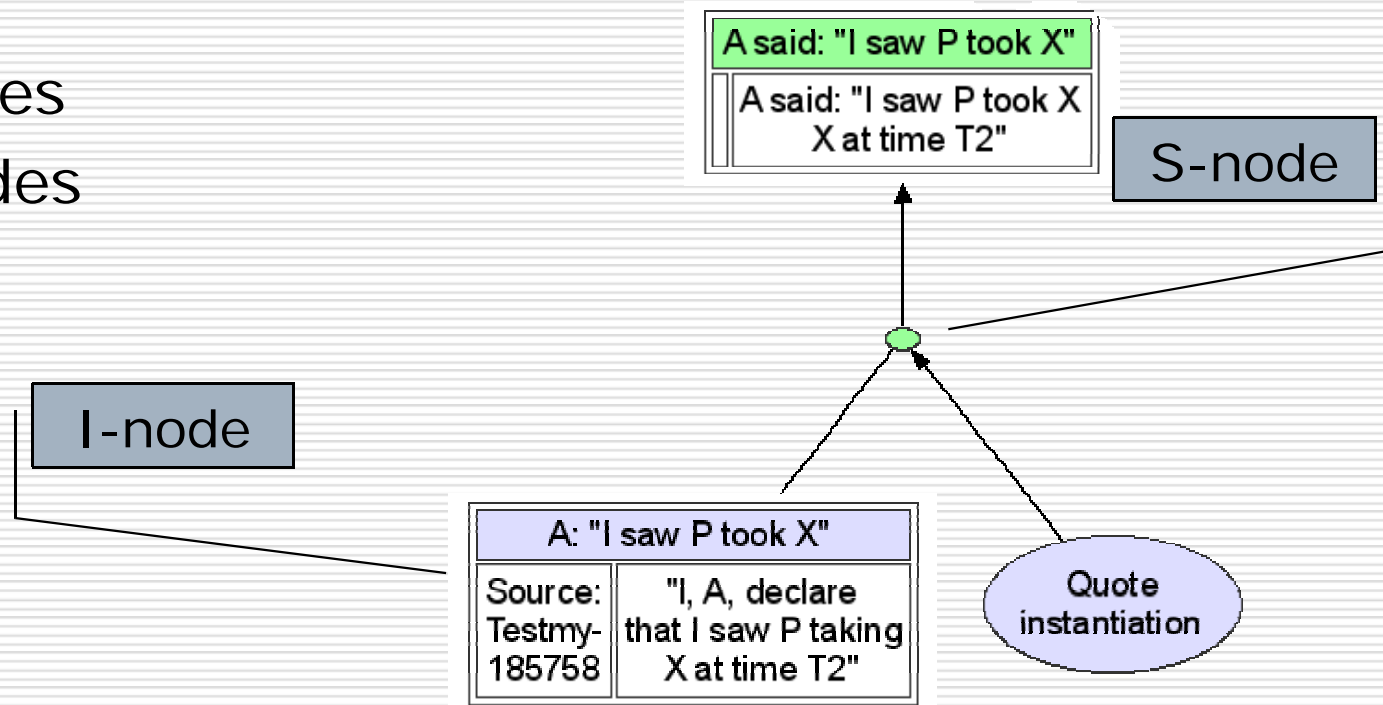
1. Di-graph representation
3. Inferential component
 1. Argumentation schemes
 2. Dialectical status assignment
4. Temporal information

Theory

- AIF ontology
- Argumentation schemes
- Anchored narratives
- Defeasible reasoning

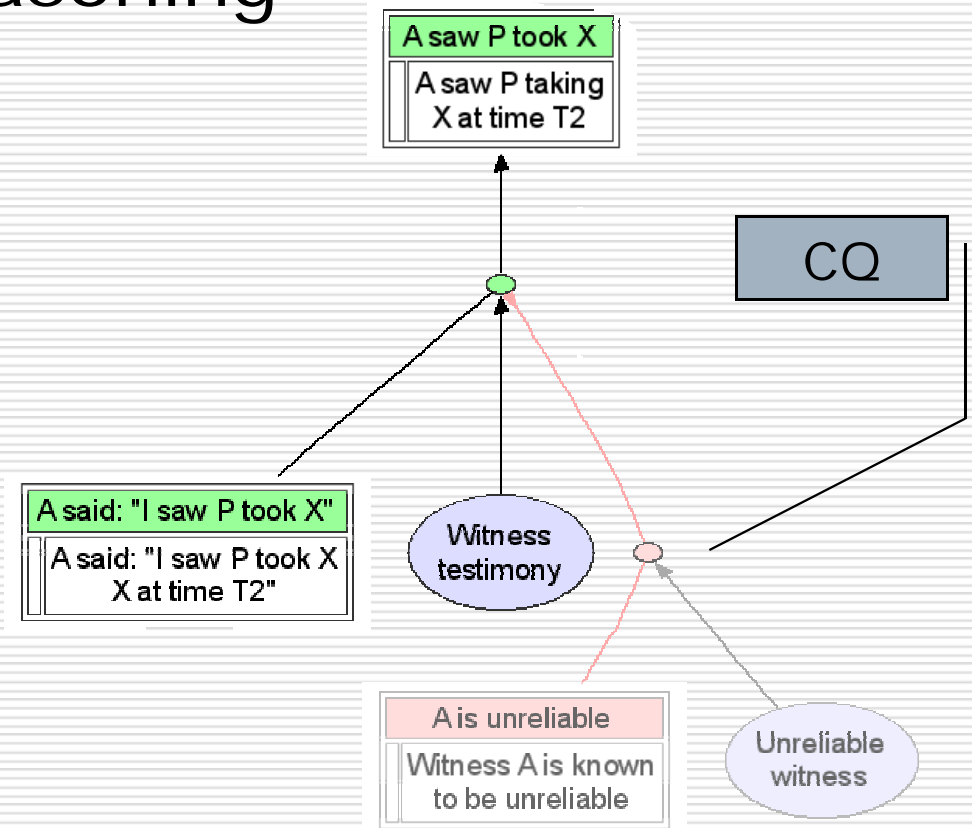
AIF ontology

- Argument Interchange Format
 - Knowledge about a case is stored in two kinds of nodes
 - I-nodes
 - S-nodes



Argumentation schemes

- Pre-defined patterns of reasoning that often occur in evidential reasoning
 - Premises
 - Conclusion
 - Critical questions



Interface

Case "L-1156" Table **Graph** Hierarchy Schemes Sources Logout Help

Menu

Graph view

Edit screen

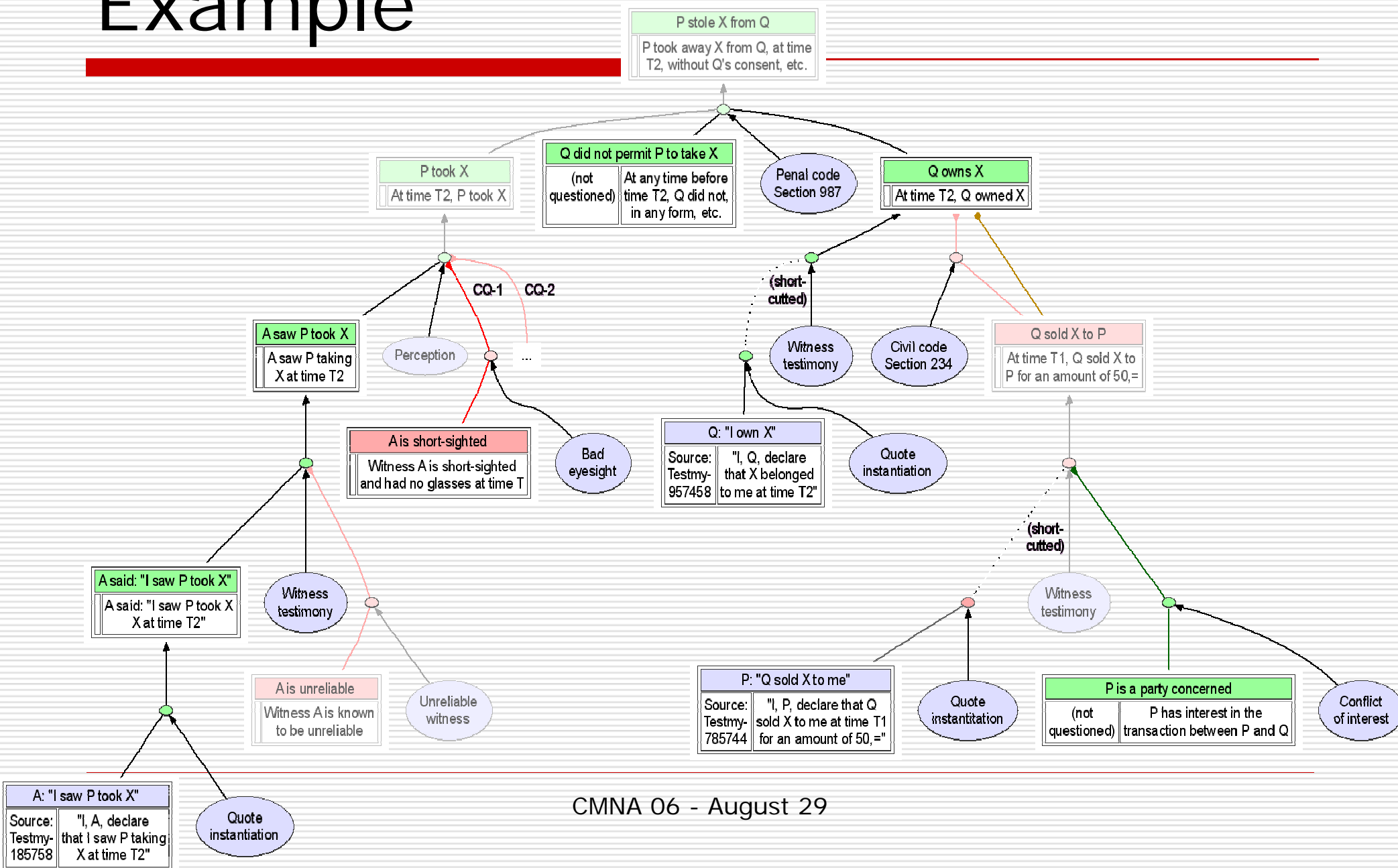
Node "P Took X" Attributes Properties Scheme instantiations Explanation Annotations

Title: P took X Change

Text: At time T, P took X

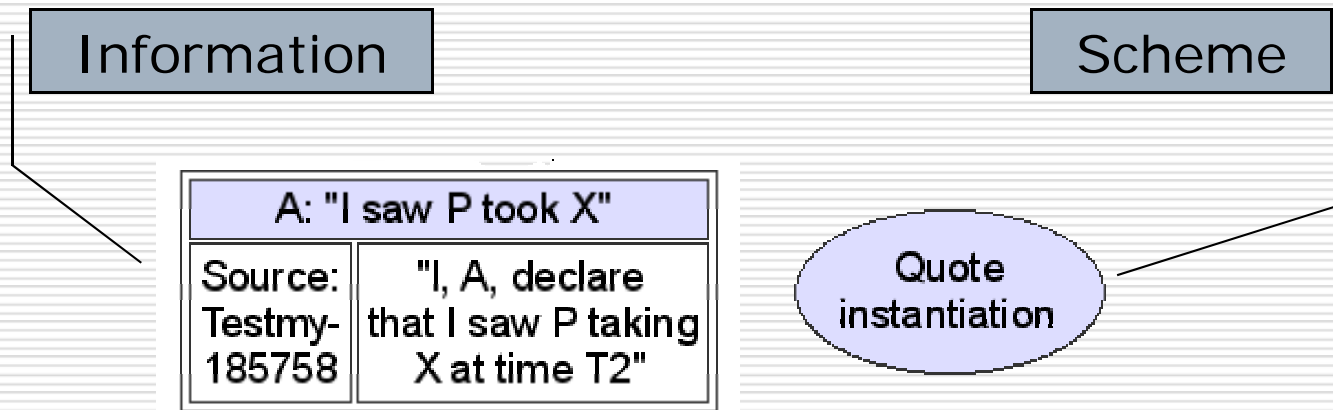
Delete node "*" (and connections between "*" and other nodes)
Modify connections between "*" and other nodes

Example



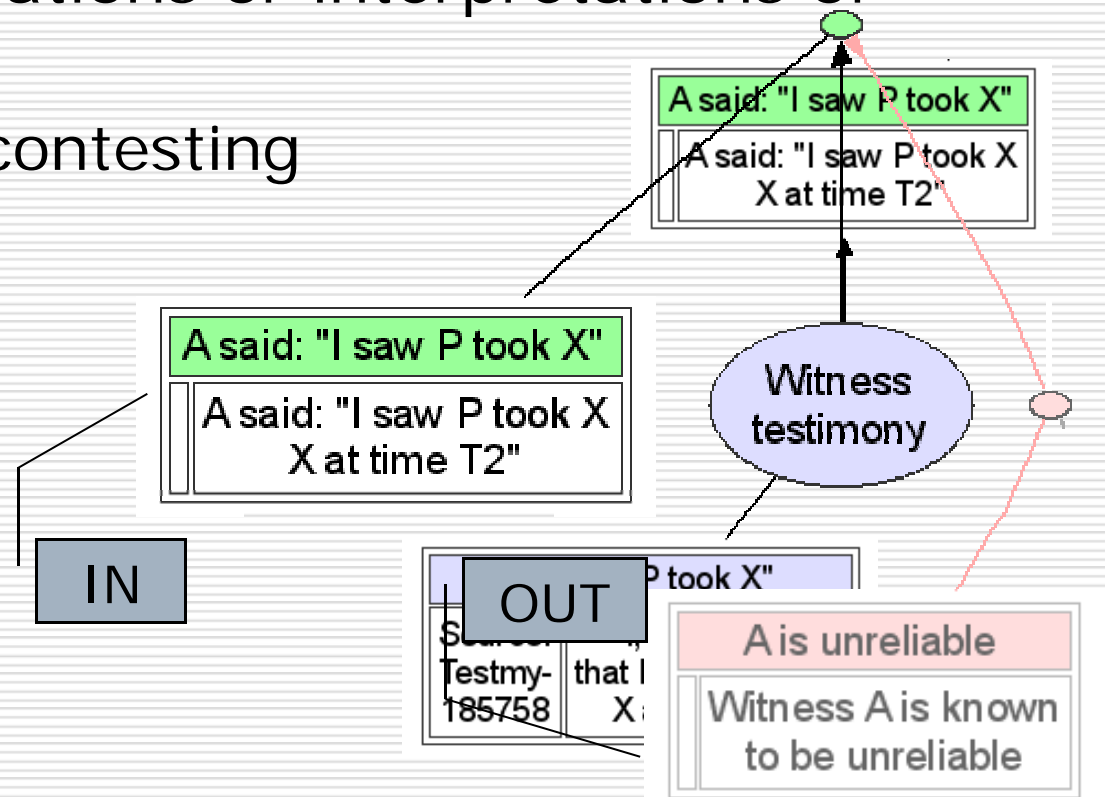
I-Nodes

- Quotation nodes
 - Represent fixed information from outside the system (testimonies, reports)
 - Information nodes
 - Scheme quotation nodes



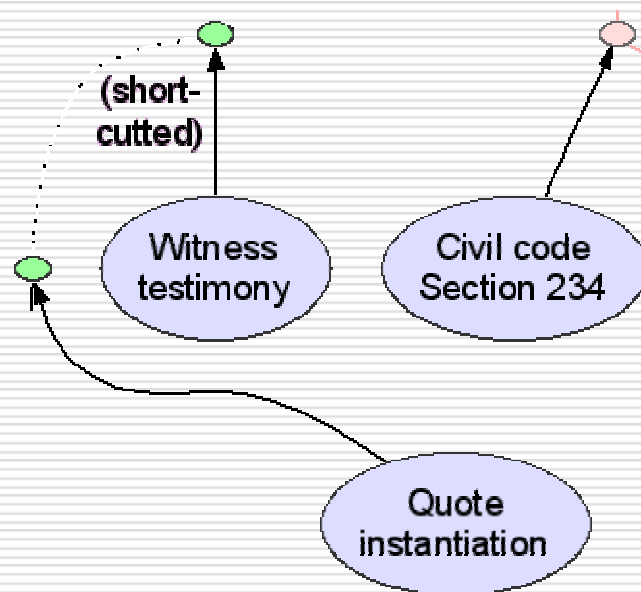
I-Nodes

- Interpretation nodes
 - Represent explanations or interpretations of quotation nodes
 - Supporting or contesting
 - IN or OUT



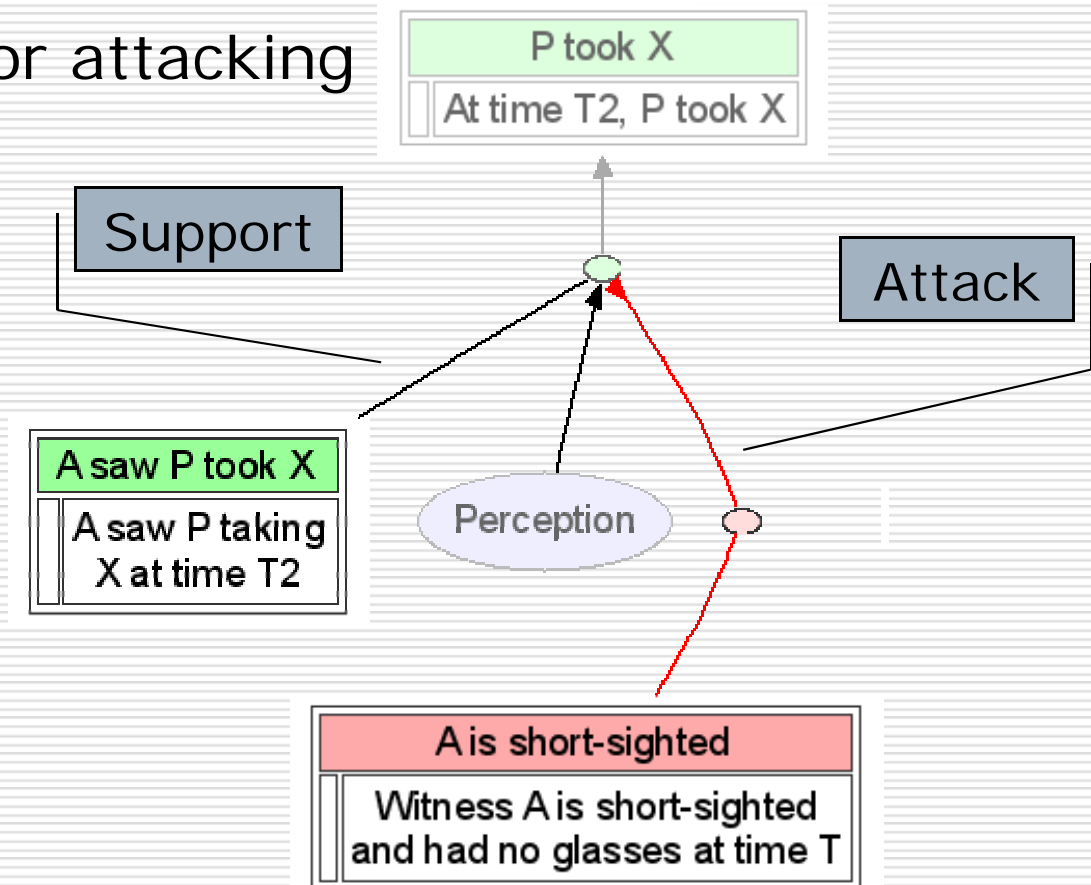
Schemes

- Argumentation schemes
 - Represent predefined patterns of reasoning
 - An inference
 - Prerequisites for the inference
 - Critical questions



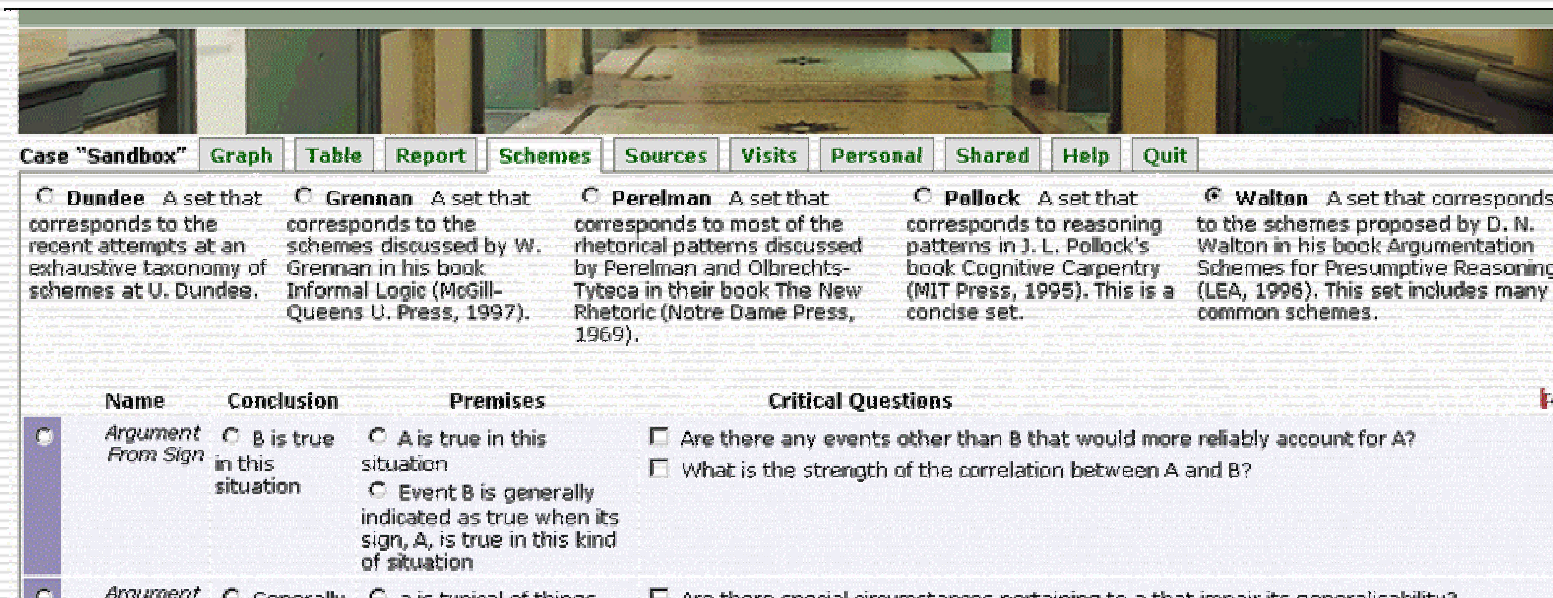
Links

- Inferential links
 - Supporting or attacking



Links

- Inferential links
 - Created by scheme instantiations
 - From conclusion to premises
 - From premises to conclusion

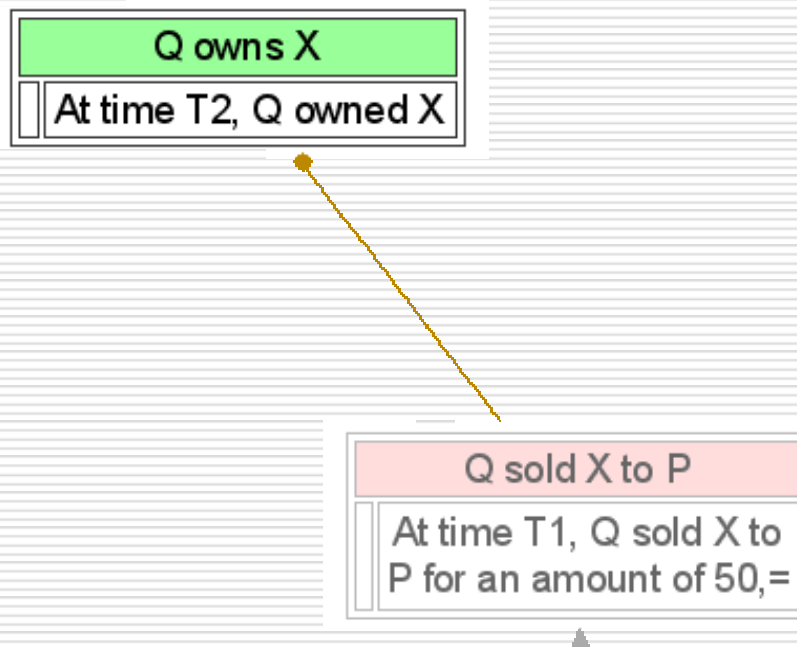


The screenshot shows a software interface with a menu bar at the top containing: Case "Sandbox", Graph, Table, Report, Schemes, Sources, Visits, Personal, Shared, Help, and Quit. Below the menu bar, there are five columns of text describing different argument schemes: Dundee, Grennan, Perelman, Pollock, and Walton. Each column includes a radio button, a name, and a brief description of the scheme's source and scope.

Name	Conclusion	Premises	Critical Questions
<input type="radio"/> <i>Argument From Sign</i>	<input type="radio"/> B is true in this situation	<input type="radio"/> A is true in this situation <input type="radio"/> Event B is generally indicated as true when its sign, A, is true in this kind of situation	<input type="checkbox"/> Are there any events other than B that would more reliably account for A? <input type="checkbox"/> What is the strength of the correlation between A and B?
<input type="radio"/> <i>Argument</i>	<input type="radio"/> Generally	<input type="radio"/> is typical of things	<input type="checkbox"/> Are there special circumstances pertaining to A that impair its generalisability?

Links

- Temporal links
 - Represent temporal relations between nodes
 - Story: sequence of temporally structured nodes



Stories

- A set S of nodes that satisfies:
 - S is conflict-free and self-defending
 - The underlying temporal digraph T of S is internally and temporally consistent