

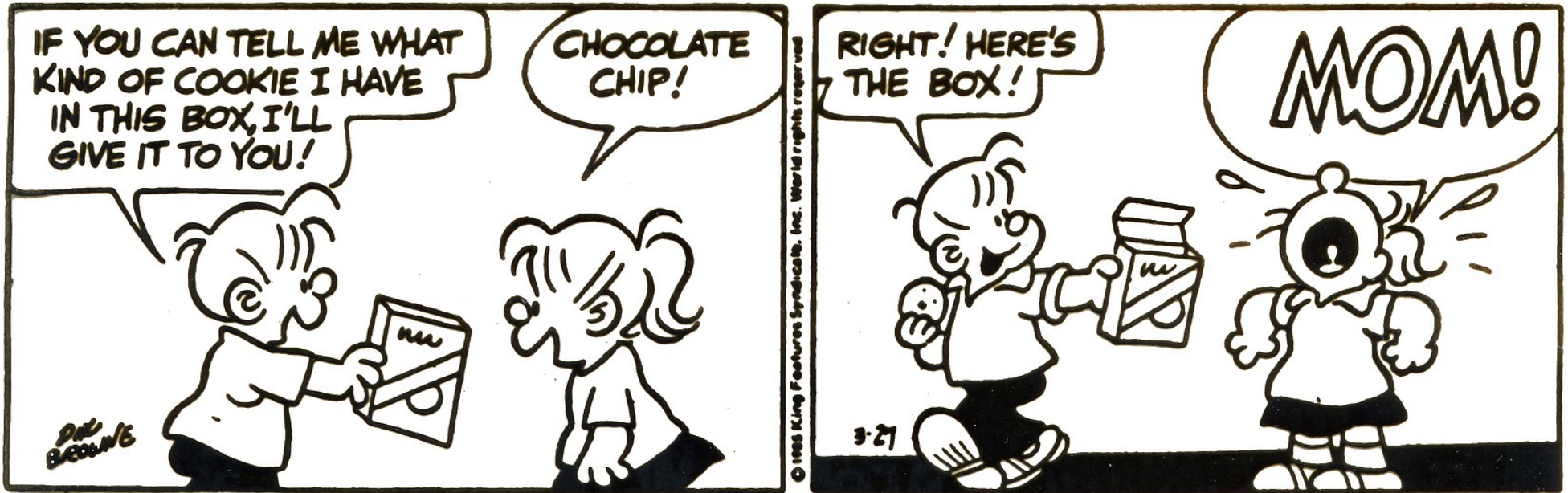
Ontology Summit 2018

Contexts, Representations, and Applications

17 January 2018

Context in Language

Hi & Lois

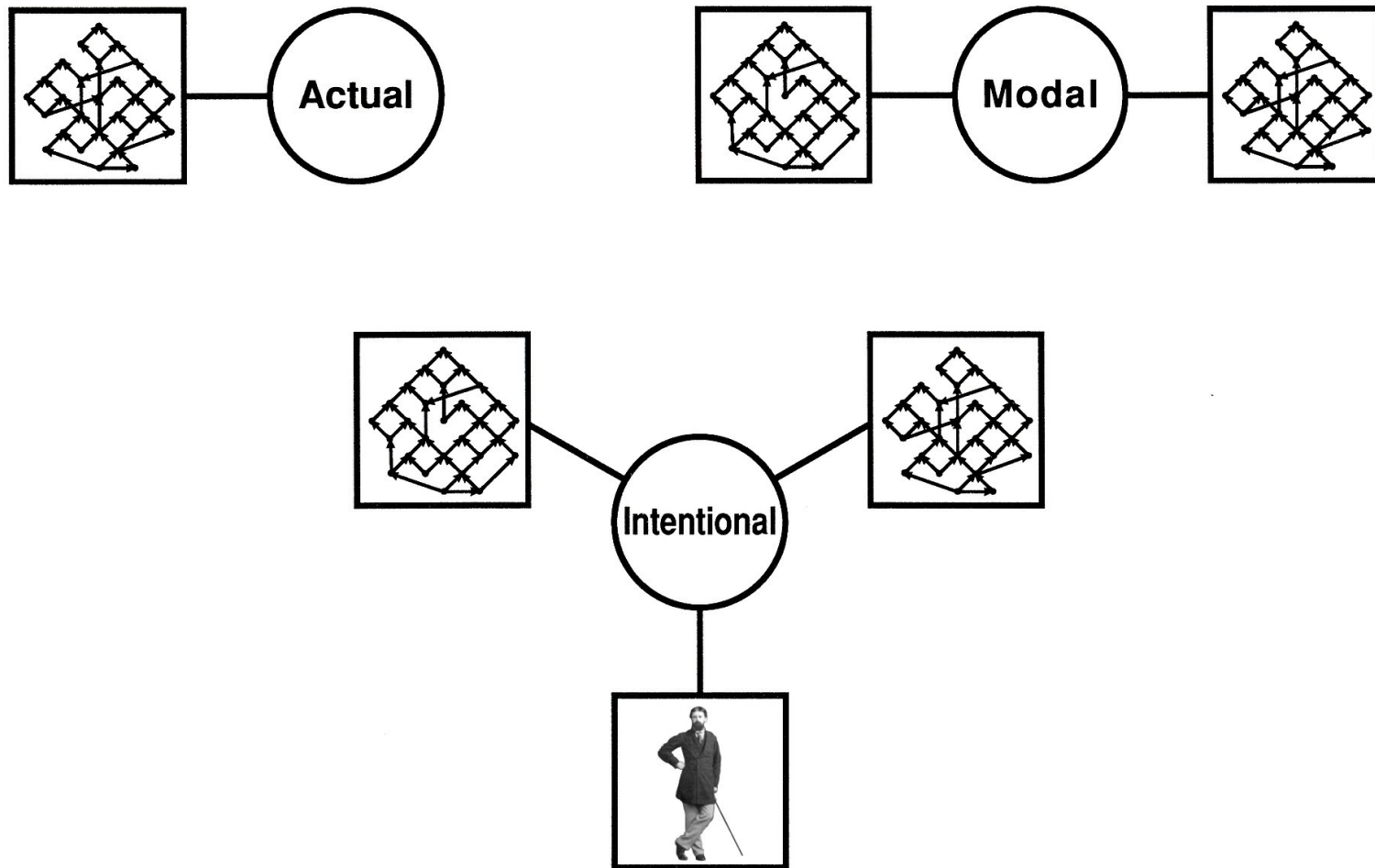


Four kinds of context: The text or discourse; the situation; common background knowledge; and the intentions of the participants.

Linguistics: Parse the sentences, resolve the referents of noun phrases, and determine the literal meaning of the text.

Pragmatics: Determine the implications by relating the meaning to the situation, the background knowledge, and the intentions.

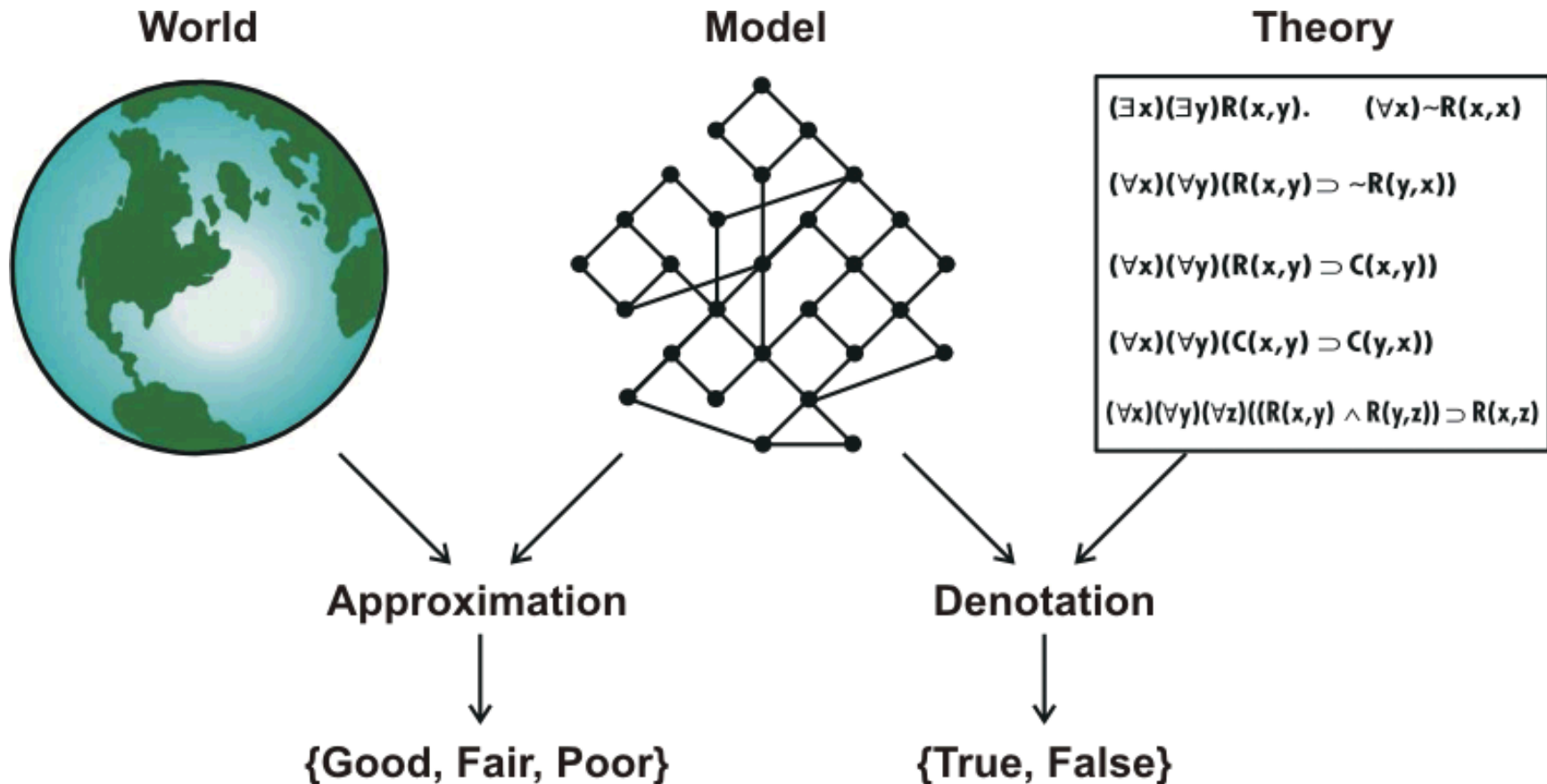
Actual, Modal, and Intentional Contexts



Three kinds of contexts, according to the source of knowledge:

- **Actual:** Something factual about the world.
- **Modal:** Something possible, as determined by some hypothesis.
- **Intentional:** Something an agent believes, desires, or intends.

Models of Worlds, Real or Possible



A Tarski-style model evaluates axioms of a theory in terms of a world, which may be described by a set, a network, or a database of facts. For modal logic, the model may consist of a family of possible worlds. In computer applications, possible worlds are represented by sets of propositions that are true (facts) or necessarily true (laws).

Theories of Situations

Worlds and possible worlds are far too big:

- No human can comprehend or talk about an entire world.
- Perception, action, language, and thought are limited to situations.

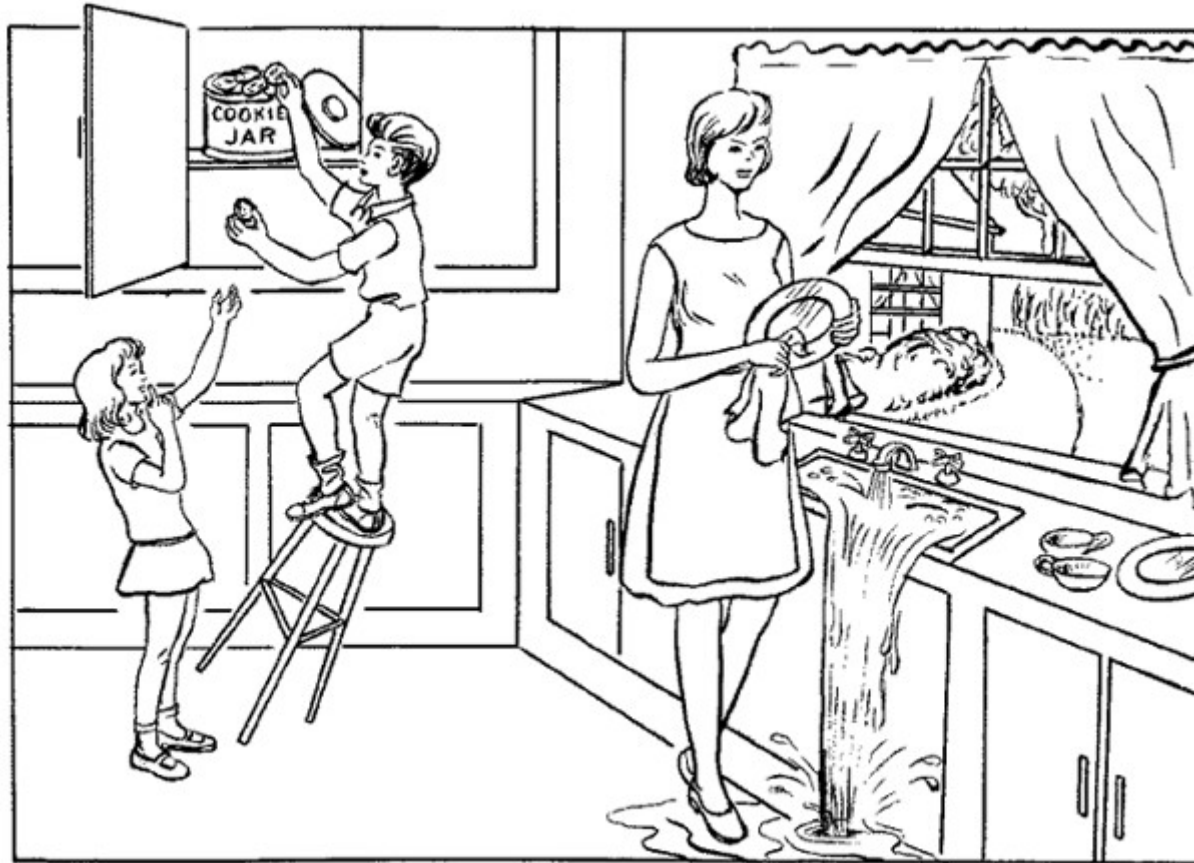
Theories for AI reasoning systems by John McCarthy:

- Situation calculus (1963).
- Notes on formalizing context (1993).

Situation semantics and situation theory.

- Focus on natural language semantics by Barwise & Perry (1980, 1983).
- Later shift to a more abstract situation theory by Keith Devlin (1991).
- Studies of information flow by Barwise & Seligman (1997).
- Observations about the **unlimited effects of context** by Devlin (2005).

Example of a Situation



This is a test picture used to diagnose patients with aphasia. A patient's description of the situation can show the effects of lesions caused by wound, stroke, tumor, or infection.

The "cookie theft" picture was adapted from Goodglass & Kaplan (1972).

Meaningful Aspects of the Situation

Space-time region of the “cookie theft” picture:

- Afternoon in the kitchen of a private home.

Agents:

- Girl, boy, woman.

Goals of the agents:

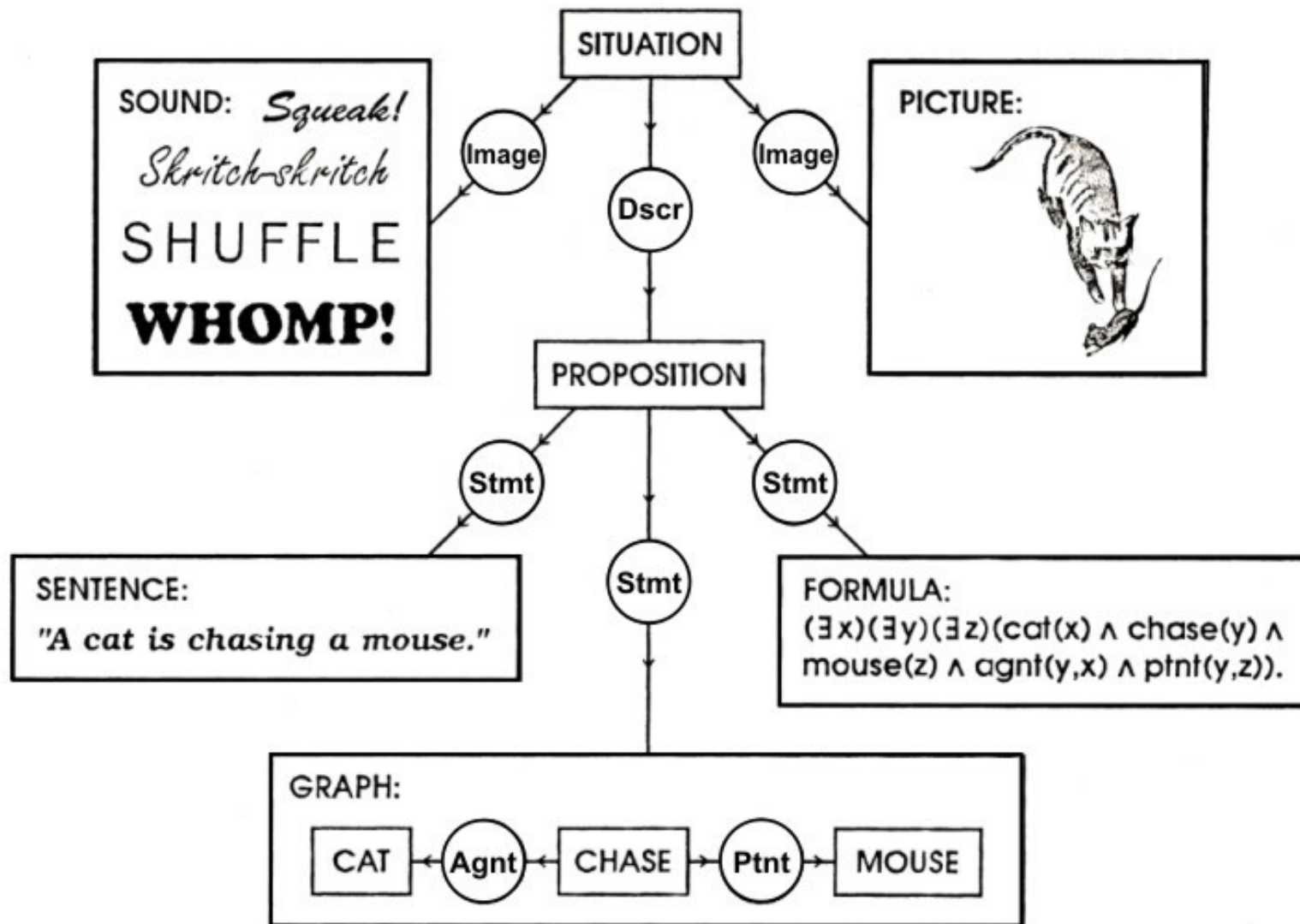
- Girl, boy: get cookies.
- Woman: wash dishes; maintain discipline.

Actions:

- Wiping, spilling, reaching, holding, grasping, tipping, falling.

Question:

- How can we represent this situation in logic?



In the display form, a conceptual graph (CG) may contain images. In this example, the CG states that a situation has a sound image and a picture image. The situation has a description (Dscr) by a proposition, which has a statement (Stmt) as an English sentence, a formula in predicate calculus, and a conceptual graph.

Five Presentations

**12:15 Domain Specific Needs for Context,
by David Whitten and Ravi Sharma**

**12:30 Upper Ontologies for Specifying Context,
by Mike Bennett and David Whitten**

**12:45 Contexts in the Open Knowledge Network,
by Ram D. Sriram and Gary Berg-Cross**

**1:00 Contexts for Integration and Interoperability,
by Cory Casanave and Ravi Sharma**

**1:15 Harmonizing diverse conceptualizations in multi-context
systems engineering, by Janet Singer and Jack Ring**