

# UNCONVENTIONAL APPROACHES TO AI

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# INSIGHTS FROM THE PAST

- UNCONVENTIONAL APPROACHES IN AI: COMPLEX SYSTEMS PERSPECTIVES, COGNITIVE PSYCHOLOGY, SOCIAL SCIENCES, COMPUTATIONAL MODELS OF CREATIVITY AND OTHER UNCONVENTIONAL MODELS
- THIS IS AI OR CLASSICAL AI BEFORE BIG DATA. THE TIME IS NOW RIPE TO REVISIT THESE WONDERFUL IDEAS AND THINK ABOUT HOW TO INCORPORATE THEM IN MODERN AI/DEEP LEARNING. INSIGHTS FROM THE PAST CAN INFORM FUTURE APPROACHES TO AI, ESPECIALLY IN THE AGE OF BIG DATA.
- LOOKING AT THE HERITAGE OF COMPUTING AND ITS INTERDISCIPLINARY PAST CAN INSPIRE NEW APPROACHES FOR THE FUTURE. WE NEED TO LEARN LESSONS FROM THE HISTORY OF AI, WHAT APPROACHES WORKED AND DID NOT WORK IN THE PAST AND HOW AI WENT THROUGH MULTIPLE WINTERS.
- THESE APPROACHES CAN BE USED TO DEVELOP TECHNIQUES THAT CAN INSPIRE EXPLAINABLE AI.

# INSIGHTS FROM THE PAST

- WE ARE TOLD OF EUREKA MOMENTS (ARCHIMEDES, NEWTON, ...)
- IN REALITY WE ALWAYS BUILD ON THE WORK OF OTHERS
- THERE IS A PREPARATION STAGE
- INCUBATION STAGE
- RETRIEVAL/INDEXING (KEKULE DREAMING OF A SNAKE AND THEN LINKING IT TO BENZENE RINGS)

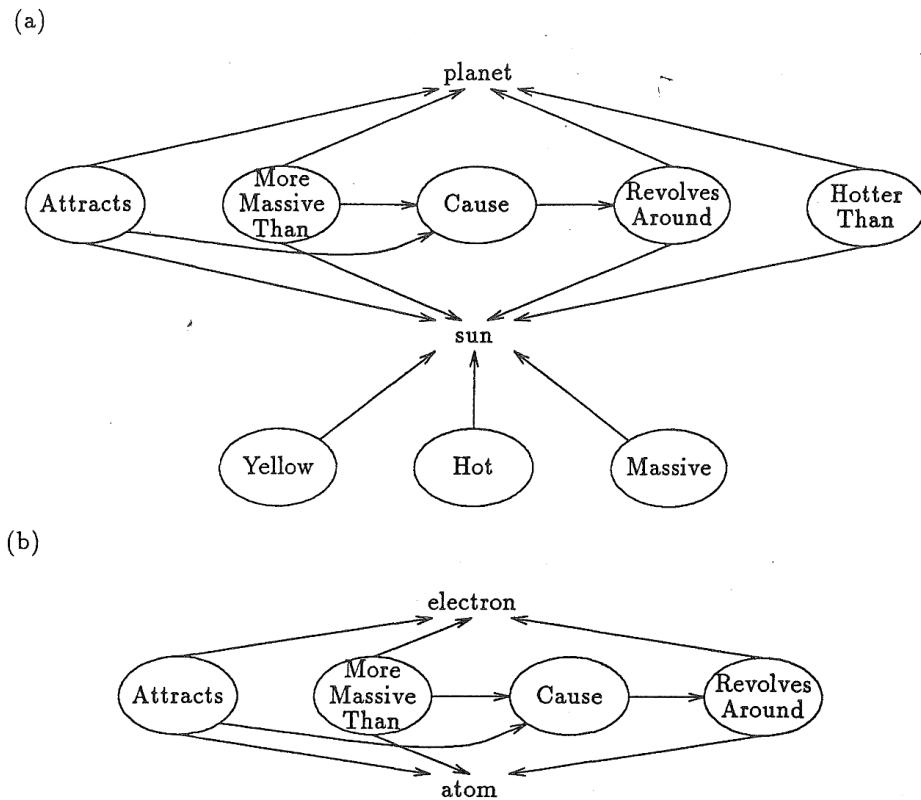
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- PERCEPTRONS
- COGNITIVE PSYCHOLOGY
- NEUROSCIENCE
- LINGUISTICS

# APPROACHES

- NARRATIVES AND STORIES
- COMPUTATIONAL MODELS OF CREATIVITY AND INSIGHT
- ANALOGIES
- DREAMS
- COMMONSENSE REASONING

# APPROACHES



**Figure 2.** Creating a representation for the atom from the statement, "The atom is like the solar system." Higher order relations are carried over and simple attributes are ignored.

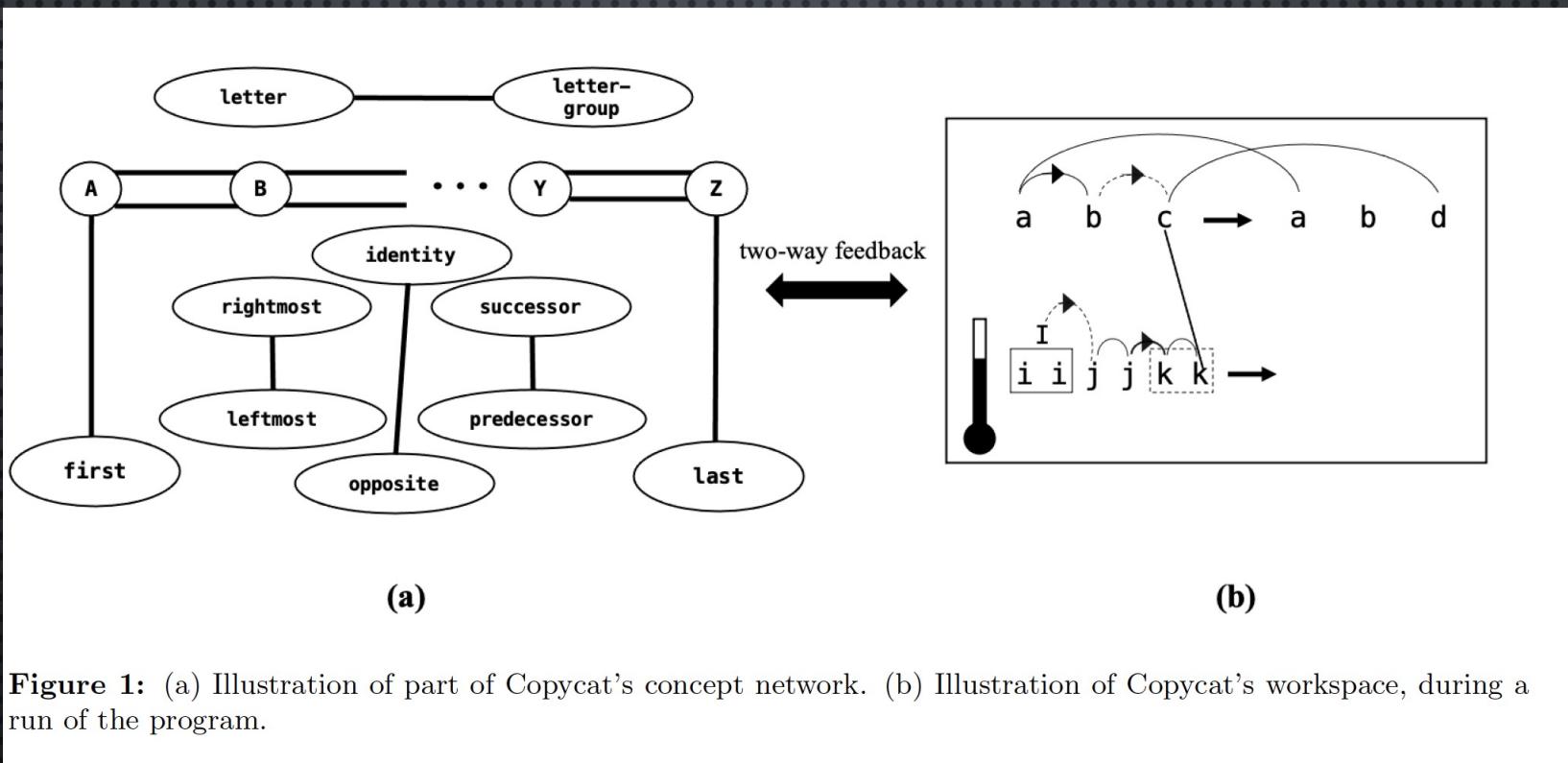
# APPROACHES

- EXPLAINABILITY (INSIGHTS FROM SOCIAL SCIENCES)
  - MILLER, 2019
- HOW DO YOU GENERATE EXPLAINABLE MODELS BY WORKING WITH DOMAIN EXPERTS
  - RUDIN, 2019
  - IMPORTANT FOR HIGH STAKES DECISIONS IN DOMAINS LIKE HEALTHCARE, RECIDIVISM PREDICTION
- CASE BASED REASONING
  - HOW HUMANS REASON
- WE CAN TAKE INSPIRATION FROM OTHER DISCIPLINES AND DEVELOP NEW XAI APPROACHES

# APPROACHES

- ABSTRACTION AND REASONING
- PSYCHOLOGY OF INVENTION
  - KEKULE
  - POINCARE

# APPROACHES



# APPROACHES

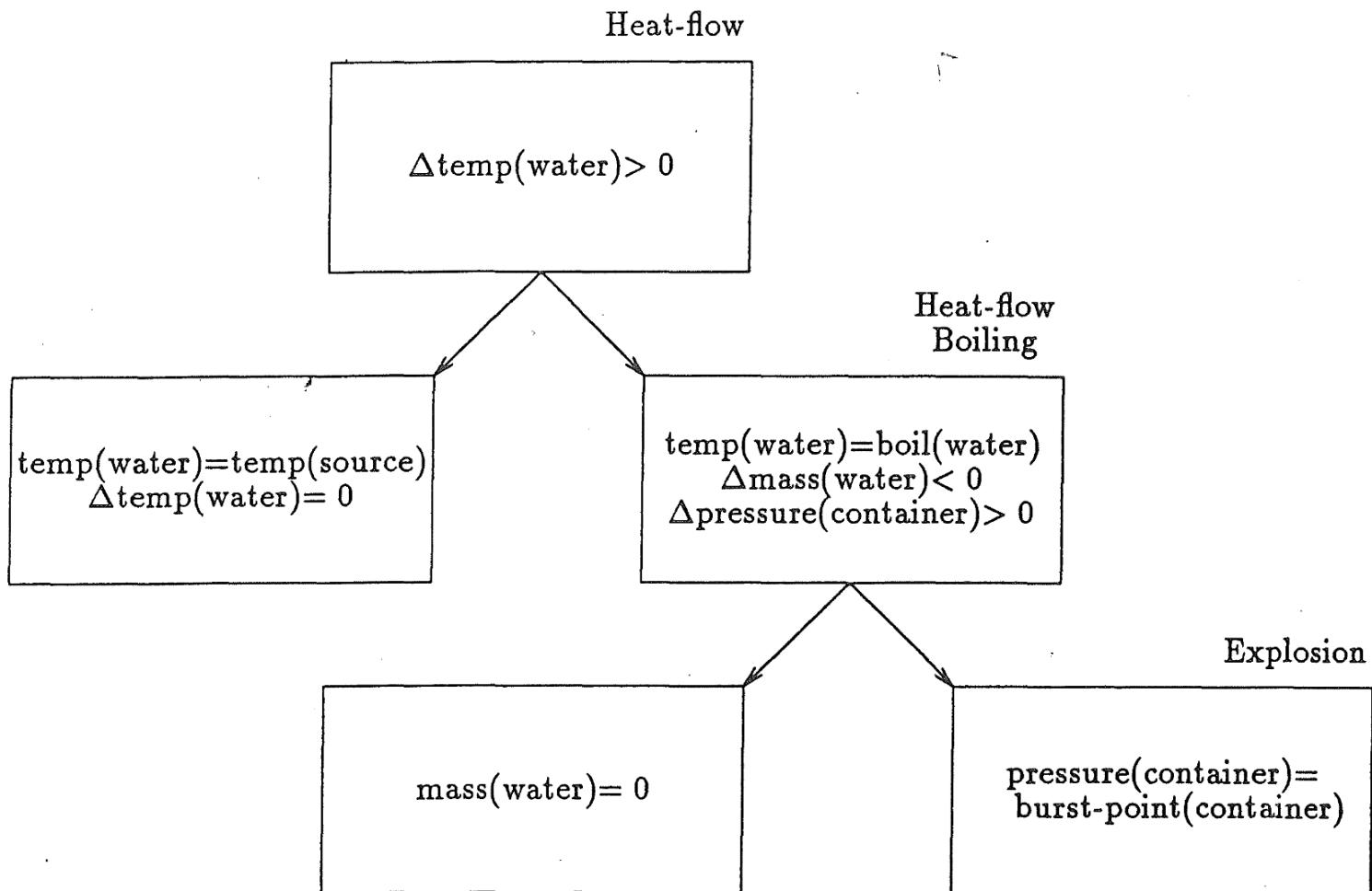


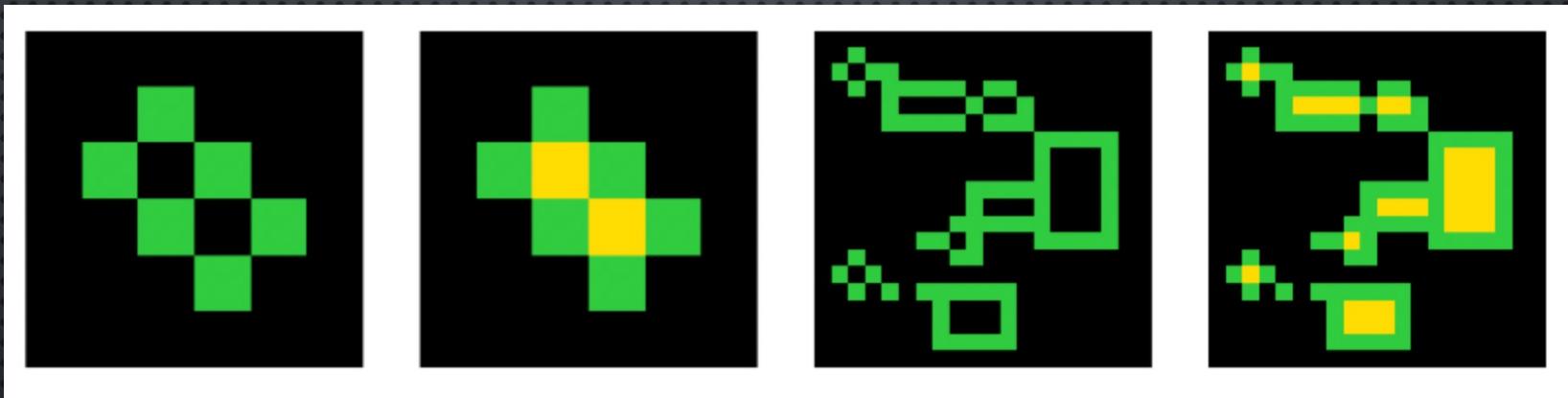
Figure 3. An envisionment for boiling water.

QUALITATIVE PROCESS MODELS

# APPROACHES

- OTHER IDEAS
  - OTHER PATHS TO INTELLIGENCE (IN OTHER SPECIES)
  - ABSTRACTION AND REASONING CORPUS AND CHALLENGES

# APPROACHES



ABSTRACTION AND REASONING CORPUS

# RESOURCES

- [HTTPS://GITHUB.COM/NEELSOUMYA/SPECIAL\\_TOPICS\\_UNCONVENTIONAL\\_AI](https://github.com/neelsoumya/SPECIAL_TOPICS_UNCONVENTIONAL_AI)