Synthesis I
Topic Outline

Ontology Summit 2026
Ontologies: Past, Present, Future

Ken Baclawski

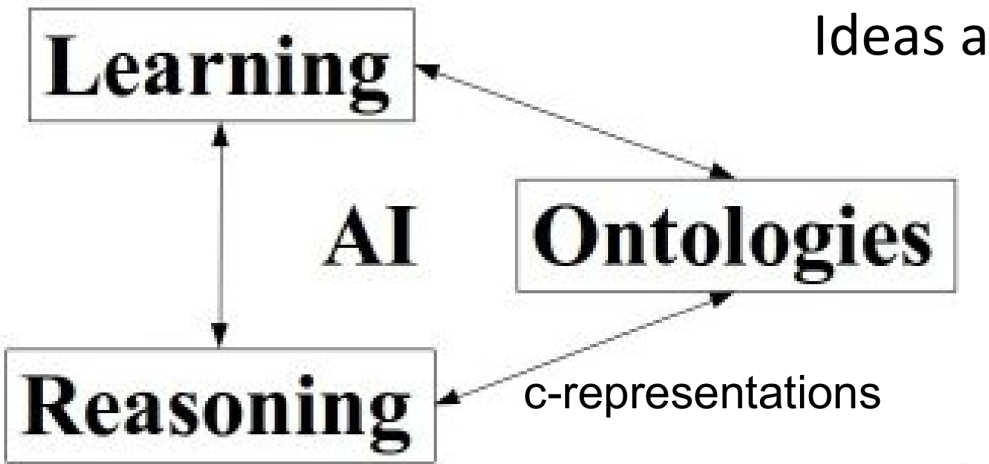
Some Notes on Our Ontologies and AI Track

Gary Berg-Cross, Board Member Ontolog Forum
(Retired Knowledge Engineer)

Intelligence = Learned Knowledge from Data & Experience + Reasoning???

Ideas advancing rapidly

(Knowledge representation Stand in for Semantics...)



Many such connections...

" ..knowledge representation, which is not a fashionable concept in modern neural net AI." Ben Goertzel

Ram D. Sriram

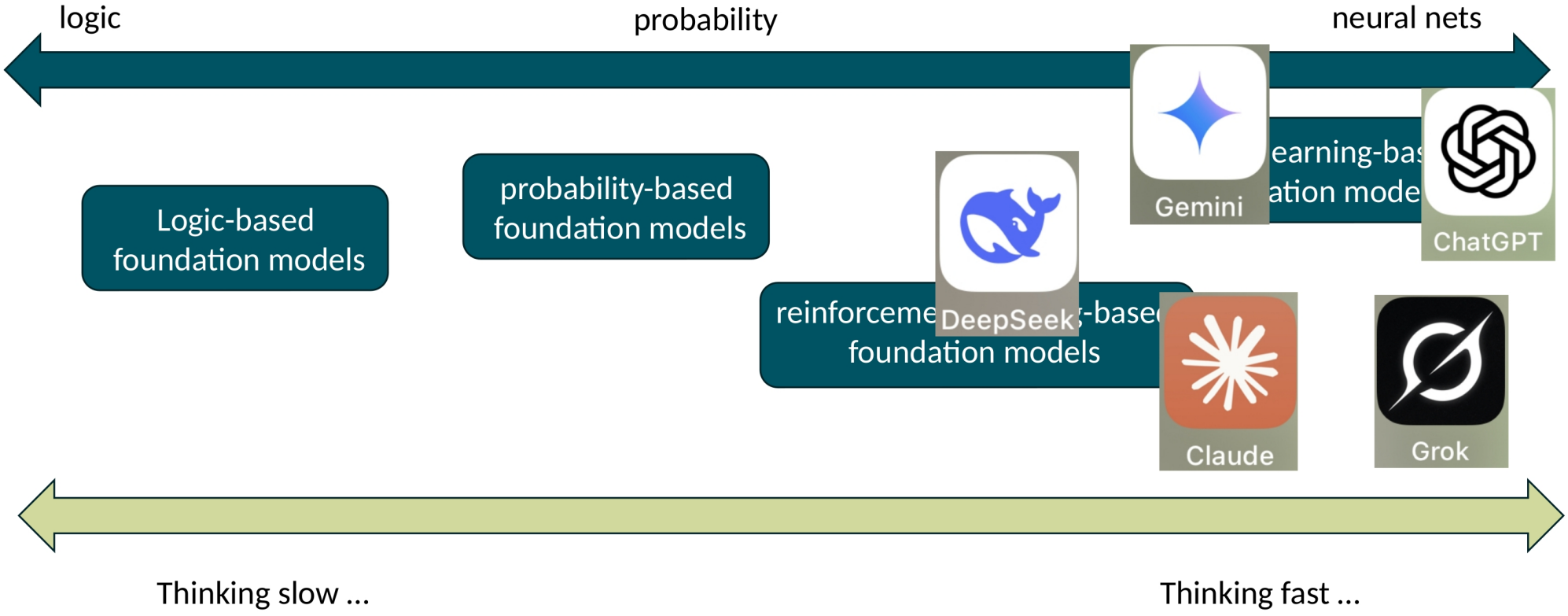
Category Theory And Ancient Indian Philosophy

Modern Category Theory	Ancient Indian Philosophy	Conceptual Link
Objects defined by Morphisms	Buddhist *Pratityasamutpada*	Reality is relational; entities have no isolated internal essence.
Functors	Nyaya *Vyapti* / *Udaharana*	Truth-preserving mappings of structure from one domain to another.
Topos Theory	Jain *Syadvada* / *Anekantavada*	Truth is dependent on the specific logical universe/standpoint.
Categorical Logic	Vaisheshika *Padarthas*	The formal structuring of universals, particulars, and properties.

Generated by Gemini

A spectrum of AI development models

Randy Goebel



Pascal Hitzler

- **LLM-based KGOE is a very promising and exciting direction at the moment.**
- **We posit that modularity may be a key ingredient. Our preliminary investigations support that.**
- **Generally, we should spend more time investigating how common ontology and KG paradigms could be *easily improved* to make hard KGOE tasks easier.**
- **Neurosymbolic slack, over 1,300 researchers, email me at hitzler@ksu.edu to join.**

Manas Gaur

- Counterlogic Dataset – https://arxiv.org/abs/2505.22318 (IJCNN'26)
- Theory of Computation:
  - ReDFA Dataset → https://arxiv.org/abs/2601.13392 (under review TMLR'26)
- Truly Rationale-driven LLMs (Presented at Bloomberg Law Symposium)
  - Rationales are driven by KG [**https://yashsaxena21.github.io/IMRNNs-web/**]
  - Filters out junk and provides better contextualization
  - Simplify the model architecture and make it interpretable.
- Memory-driven Agents:
  - Modeling lifelong memory of individuals as Multimodal Knowledge Graphs
  - Infuse the knowledge graph into LLMs through Semantic Mechanistic Interpretability for Domain Adaptation
  - With Memory Knowledge graph, we can minimize the size of LLMs, make them compact, and more personalizable.
- Cognitive Behavioral Therapy:
  - LLMs fall into the trap of "Validation and Reflection."
  - It forgets to do Socratic Questioning and Cognitive Restructuring
  - Dataset (upon request)

Luis Lamb

Building broader, safe AI Technologies

Neurosymbolic AI represents:

A paradigm shift (scale was never all that you needed).

A unification of (true, sound) reasoning and learning.

A solution to explainability and robustness.

The foundation for trustworthy AI systems.

NeSy/ Third Wave aims for AI that is **intelligent, interpretable, data-efficient, and safe.**

Ken Baclawski

- Topos theory has the potential to be a foundation for mathematics.
- However, there are many incompatible topos theories proposed as foundation.
- For the vast majority of mathematicians, the lack of a single foundation topos is not a problem.
- Modern set theory and category theory are very deep and successful.
- A foundation ontology could serve as the foundation for ontologies.
- However, there are many (possibly) incompatible foundation ontologies.
- For many ontologists, the lack of a foundation ontology is not a problem.

Devika P. Madalli

Facet Analysis

- FA is an intellectual process leading to analysis of a subject into its facets according to postulates and principles (S.R.Ranganathan)
- It results in sorting of terms in a given domain into *homogeneous*, *mutually exclusive facets*, each derived from the parent universe (CIU) by a single characteristic of division at each level in a hierarchy.

Mark Musen

What can we do to quell these concerns?

- Acknowledge that ontology engineering is hard, but that good tools can make it easier
- Accept that OWL may not be the “one ring to rule them all”
- Educate people about the importance of standards for data management
- Accept that important terminological standards come in forms that are not ontological

Nicola Guarino

Ontological analysis as a search for truthmakers

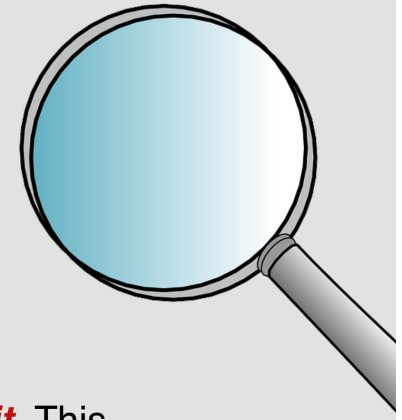
What to include in our ontology?

Ontological answer: those entities that are responsible for the truth of our propositions.

Ontological analysis as a search for hidden entities: ***truthmakers***

- ***What*** makes our statements about the world ***true***?

- ***How do we believe the world is***, when we say
  - John is married with Mary
  - This rose is red
  - My name is Nicola



- Ontological analysis is all about ***making truth-makers explicit.*** This means ***reifying*** them by putting them in the domain of discourse.