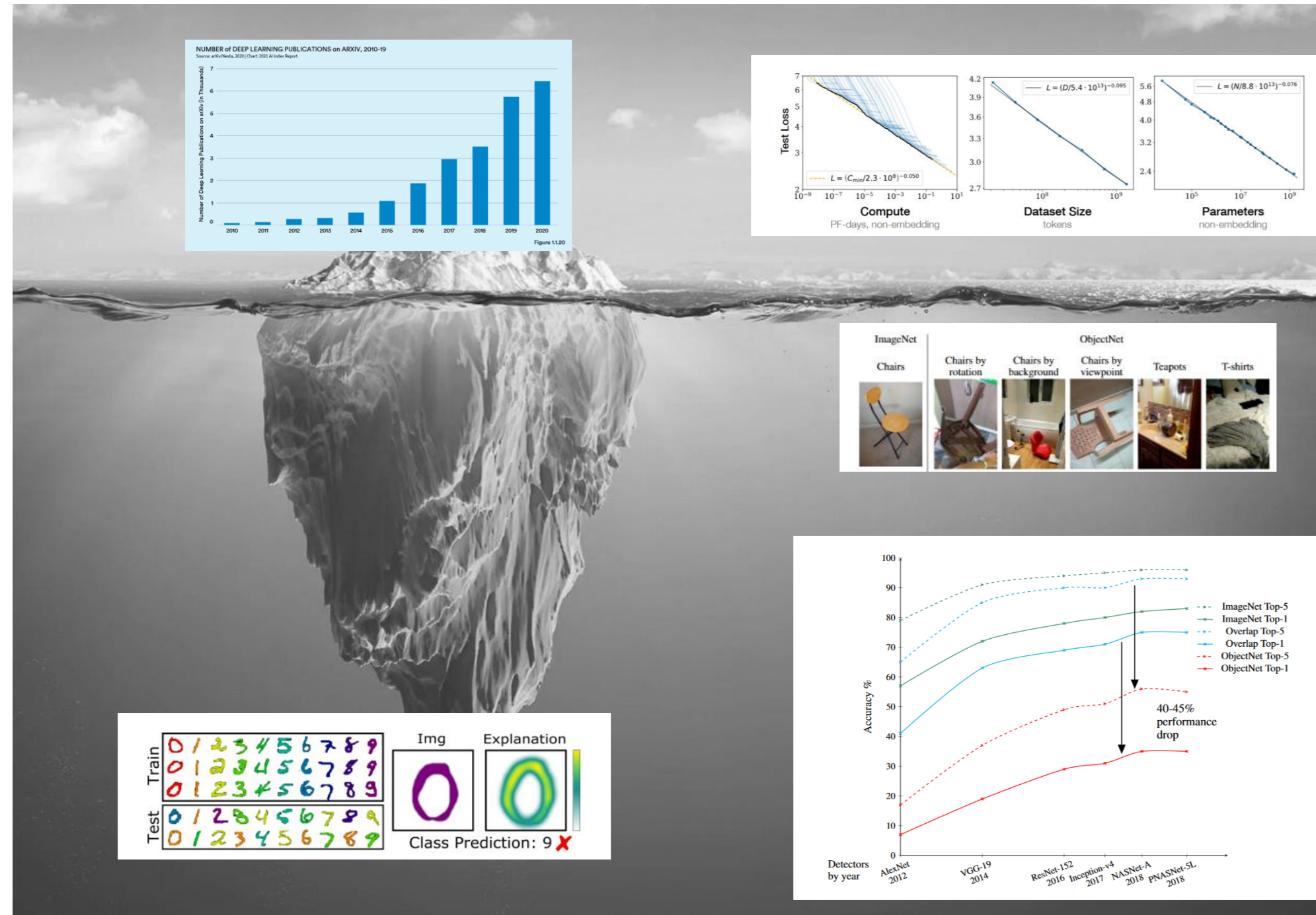


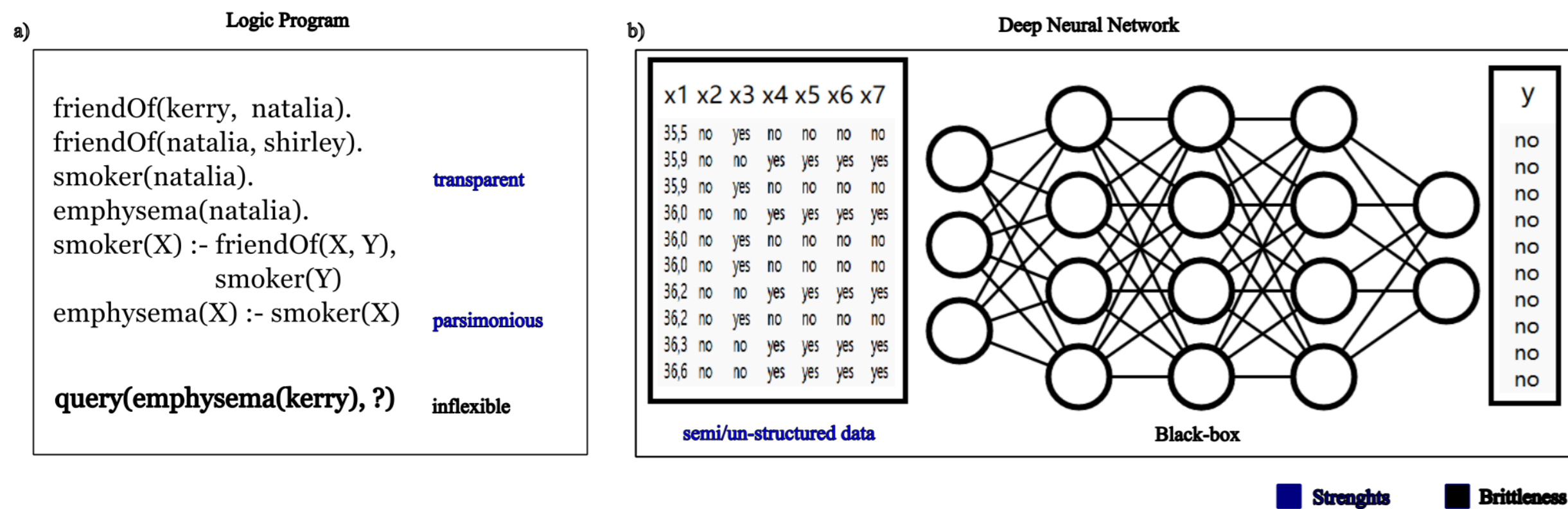
# Charting the Landscape of Neuro-Symbolic Reasoners

## Whydunit?

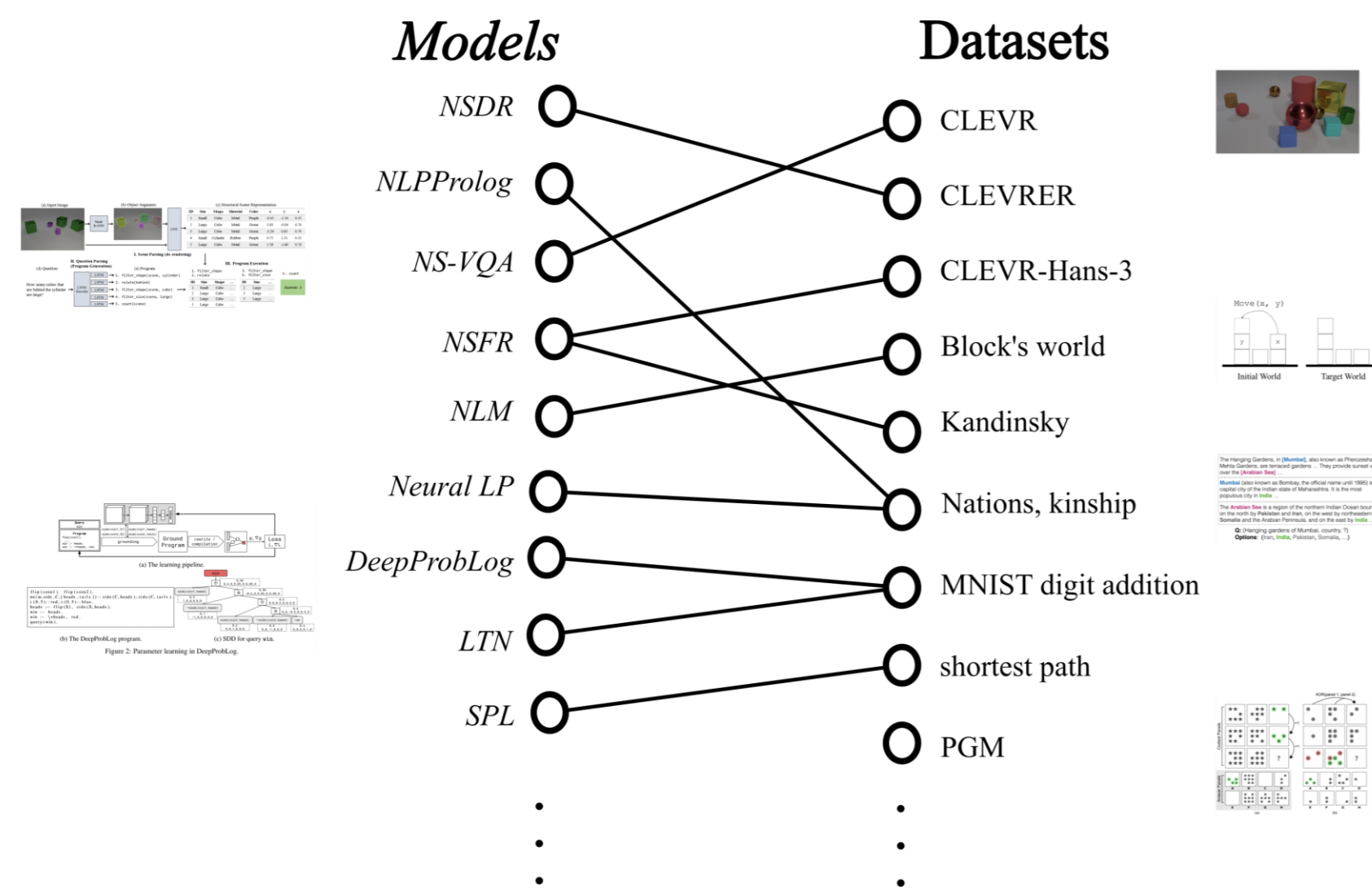
### 1. Deep Neural Networks have strengths and weaknesses



### 2. Complementarity of school of connectionism and symbolism



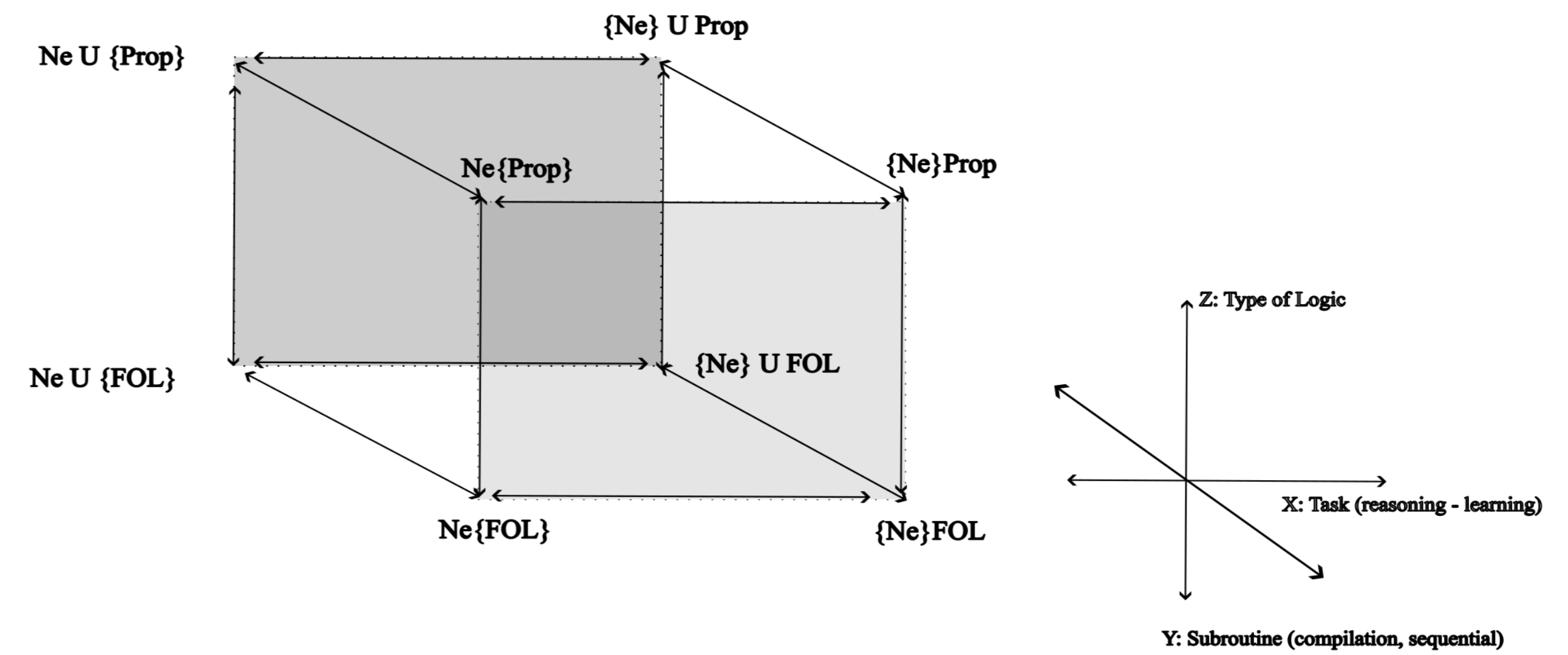
#### 2.1 Glimpse of disparate successes



“NeSy AI is in need of standard benchmarks ... [to] provide a fair comparative evaluation of different approaches...(Garcez & Lamb, 2020)

## Contributions

### 3. Taxonomy of NeSy model architectures



### 4. Taxonomy of NeSy datasets

Nature of Reasoning Task	Challenge	Input-output during inference	Datasets
Object-centric relational reasoning	<ul style="list-style-type: none"> <li>Multiple visual confounders</li> <li>Natural language queries</li> </ul>	Query and image - answer	CLEVR, CLEVR-Hans, Kandinsky Patterns
Task-driven reasoning	<ul style="list-style-type: none"> <li>New rules may have to be proposed</li> <li>Satisfiability and tractability</li> </ul>	Axioms-goal completion	Sorting arrays, Clustering (LTN), Block's World problem
Knowledge-graph reasoning	<ul style="list-style-type: none"> <li>Multi-hop queries over KG.</li> <li>Satisfiability and tractability</li> </ul>	Query-Answer	Wiki-hop KB, Med-Hop KB
Object-centric abstract reasoning	<ul style="list-style-type: none"> <li>Complete IQ like patterns</li> </ul>	Image - Image	Procedurally Generated Matrices
Counterfactual reasoning	<ul style="list-style-type: none"> <li>Hypothetical queries</li> </ul>	Images and query - answer	CLEVRER

### 5. SaSSy-CLEVR

### 6. Object-centric reasoning

Model	Train %	Val.%	Test %
ResNet18	1±0	0.972±0.003	0.662±0.002
Slot Attention + ResNet18	0.929±0.002	0.922±0.003	0.831±0.014
Slot Attention + Set Transformer	0.984±0.003	0.985±0.003	0.8±0.021
Slot Attention + Forward Reasoner	0.915±0.082	0.911±0.088	0.915±0.084