From weak and narrow to strong and general

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*THE REAL SCIENCE

AIGENTS
https://aigents.com

SingularityNET
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AI – where are we now?

Programmable → Adaptive

Guided → Autonomous

194? 2019 20??

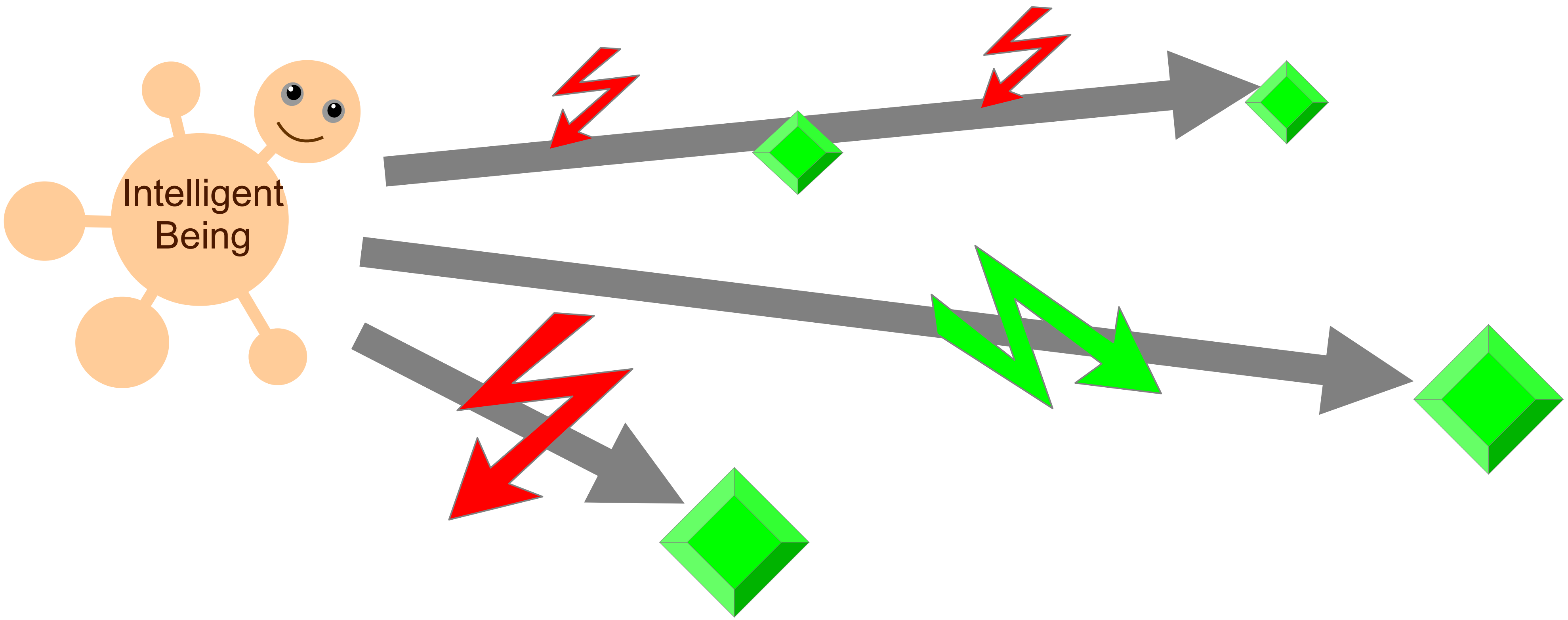
Weak → Strong

Big Data,
Machine Learning,
Experimental Statistics → Human-level AI (HLAI) → Super-human AI

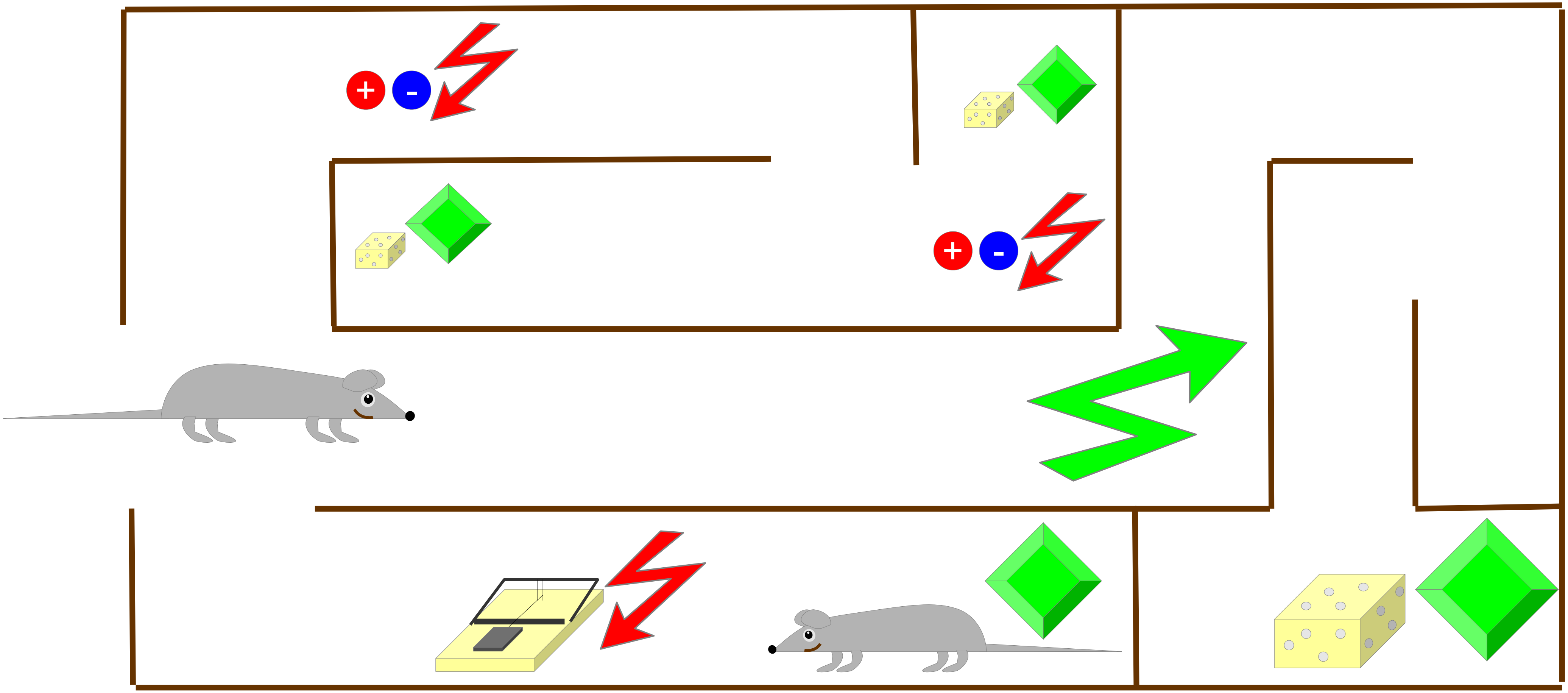
Narrow Artificial Intelligence (AI) → Artificial General Intelligence (AGI)

General Intelligence: Reaching complex goals in *different* complex environments, using limited resources and *minimizing risks*

(Ben Goertzel, Pei Wang, et al.)



Biological Intelligence: Reaching food and parents for self-reproduction in natural environments using limited physical resources and minimizing existential risks



Personal Internet Assistant Aigents®: Reaching information in online environments using limited CPU and RAM resources, minimizing risk of being banned

AIGENTS®
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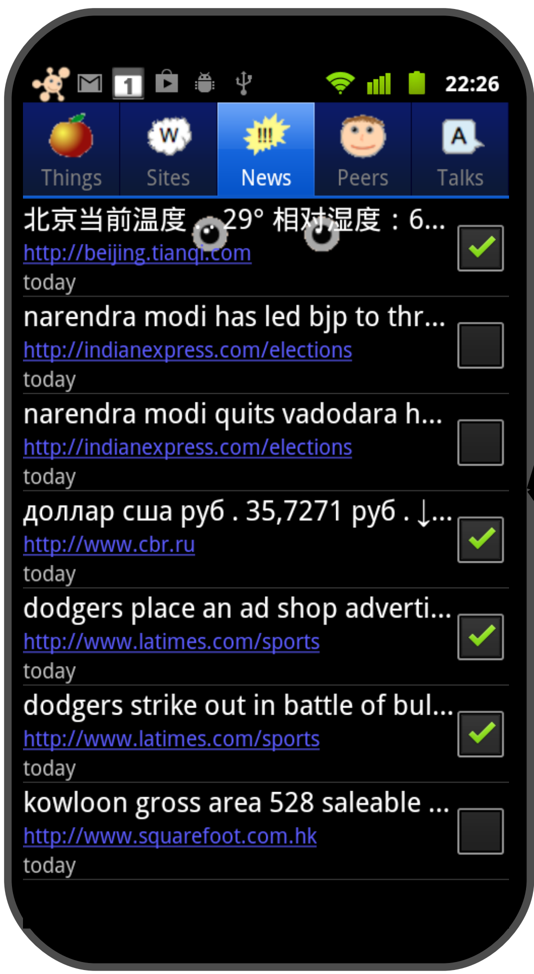
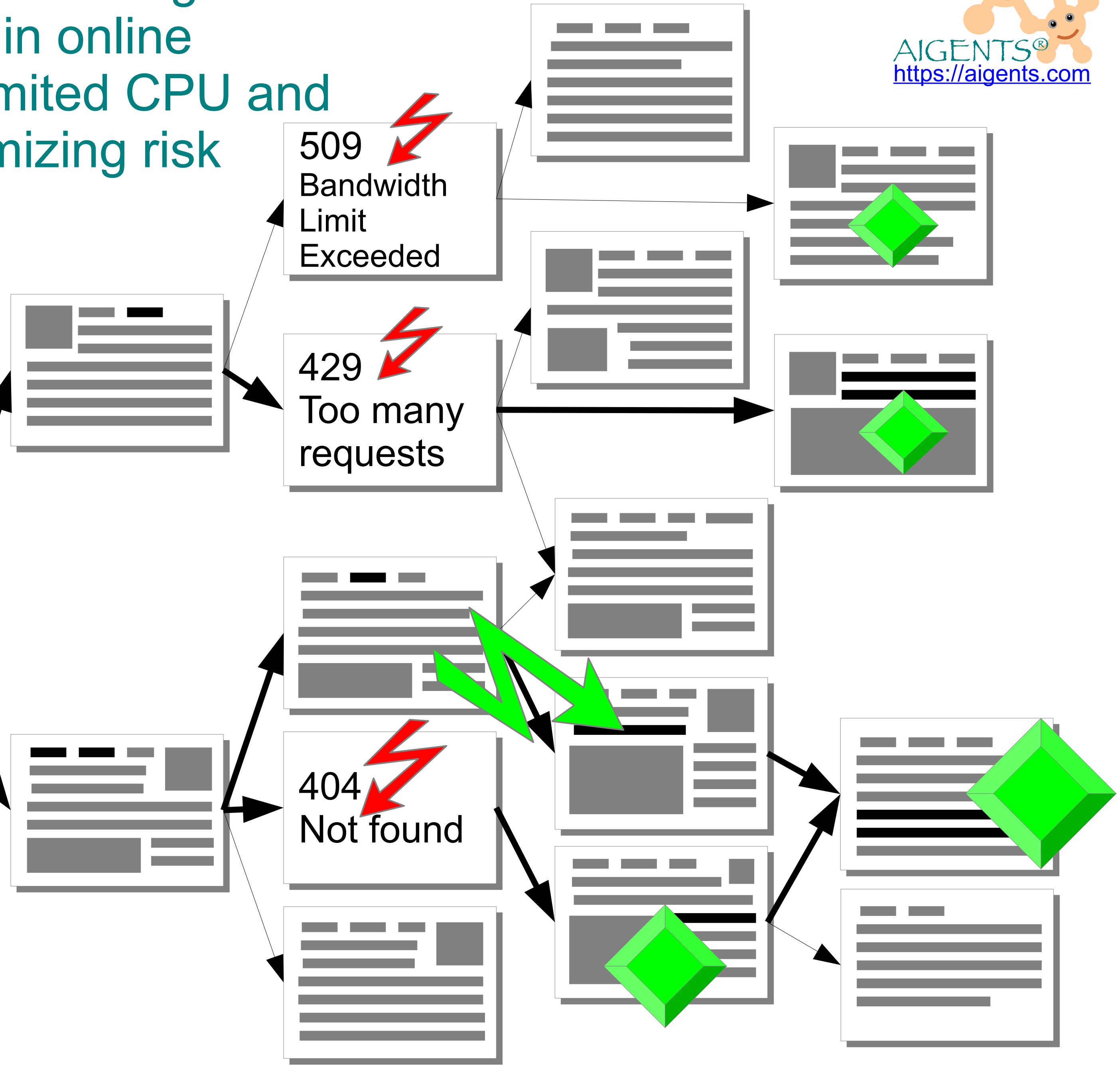




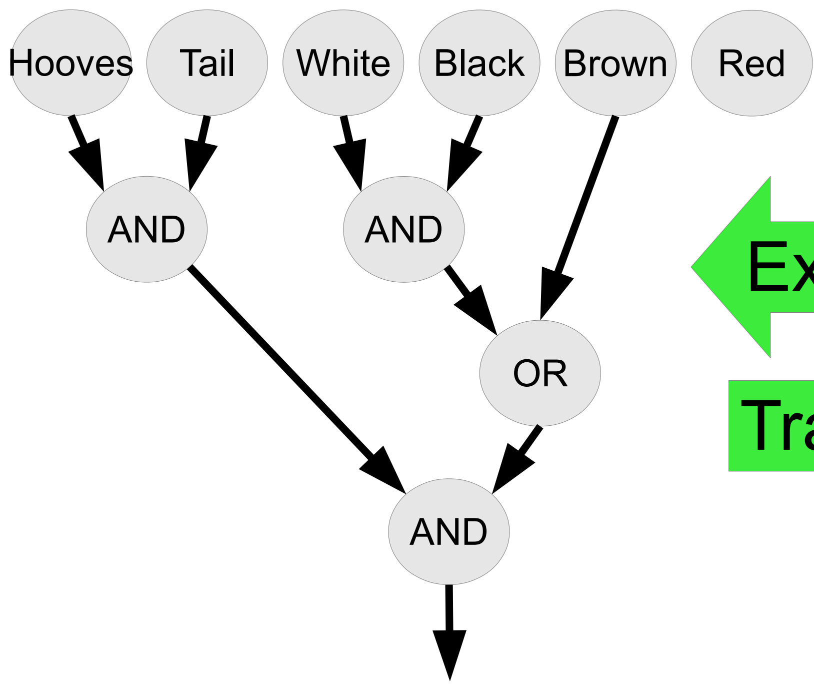
Current AI/AGI frontiers

- Neuro-Symbolic integration – progress in 2019
- Explainable AI – progress in 2019
- Transfer learning – progress in 2019
- One shot (few-shot) learning
- Strong generalization
- Generative models
- Structured prediction and learning
- Fighting catastrophic forgetting (and catastrophic remembering)
- Incremental learning and life-time learning
- New “Turing Test” (e.g., “Baby Turing Test”)
- Solving the “consciousness” problem

Incremental development and **Baby Turing Test**

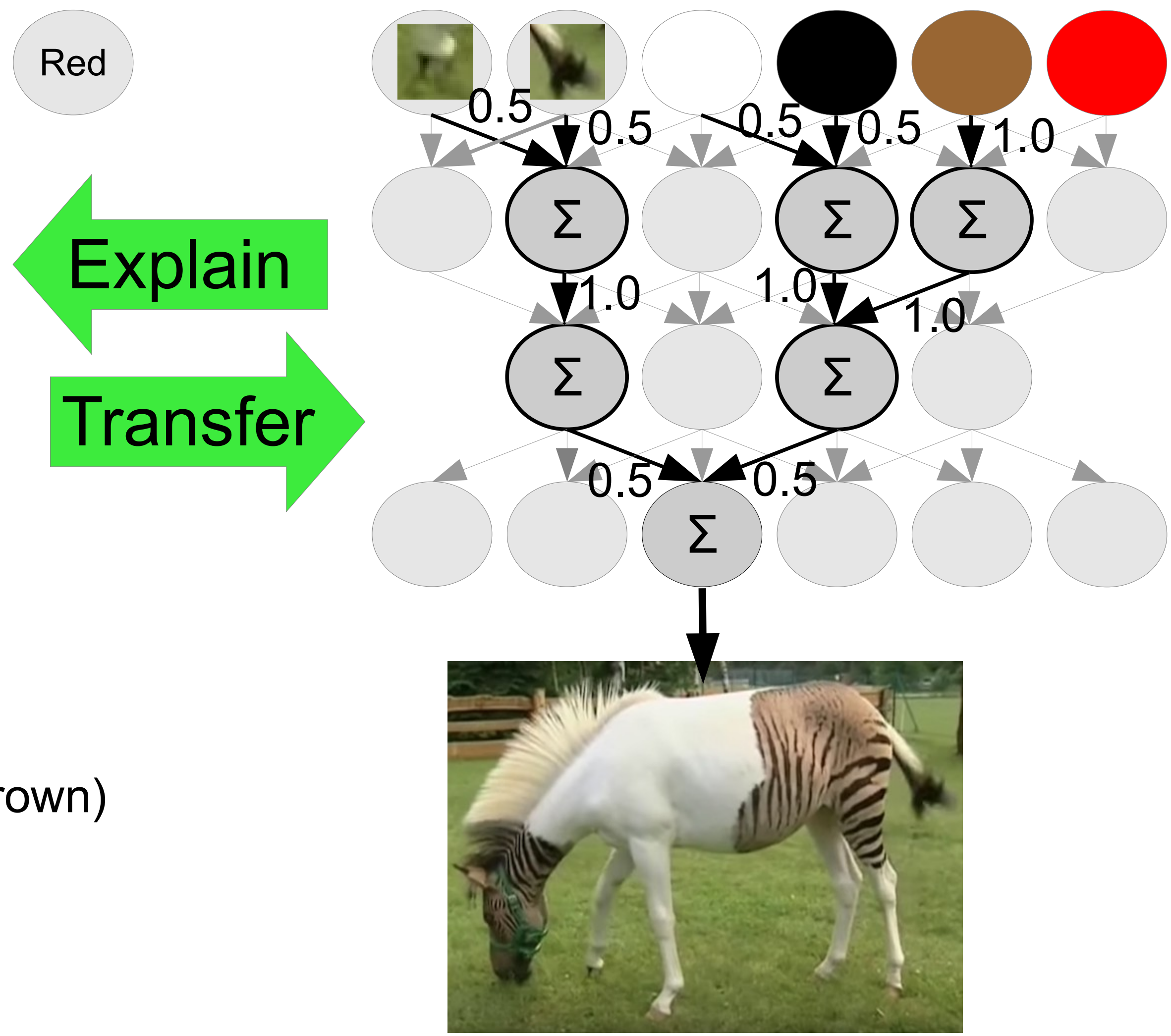
https://files.eric.ed.gov/fulltext/ED261533.pdf

Bridging the Symbolic-Subsymbolic gap for “explainable AI” and “transfer learning”



(Hooves AND Tail) AND
((White and Black) OR Brown)

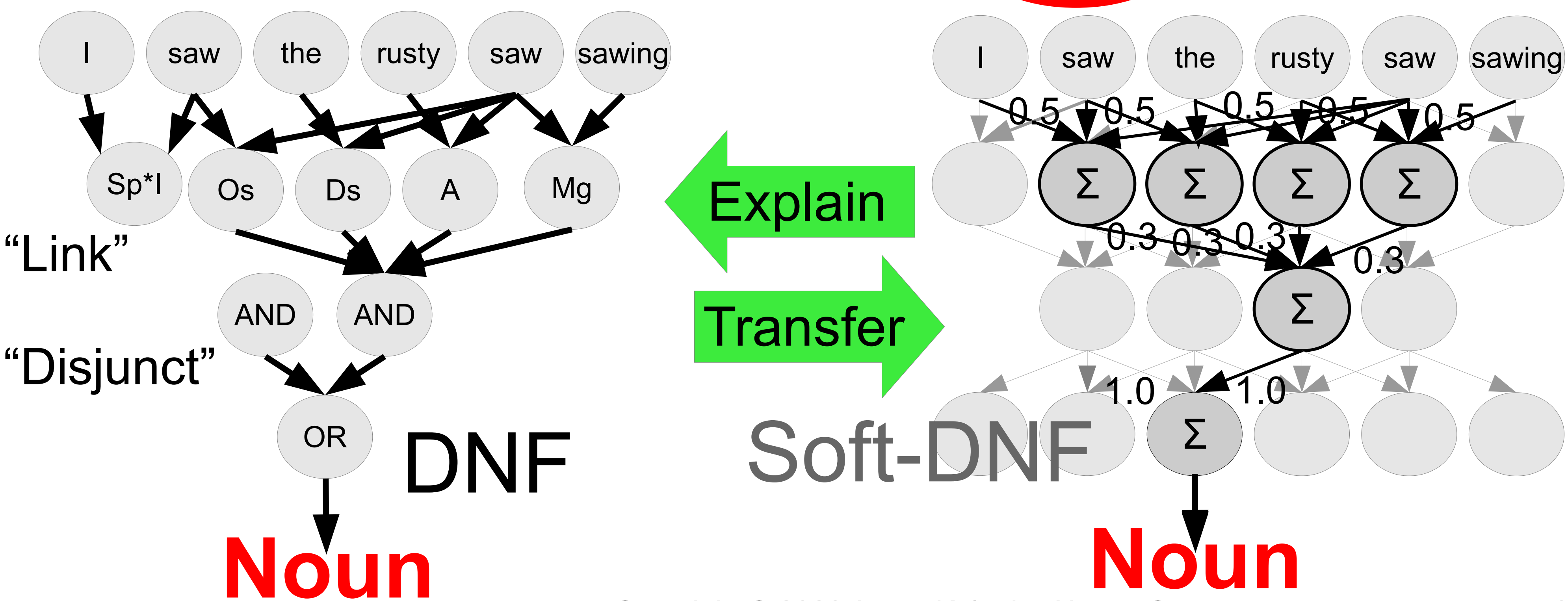
=> Horse



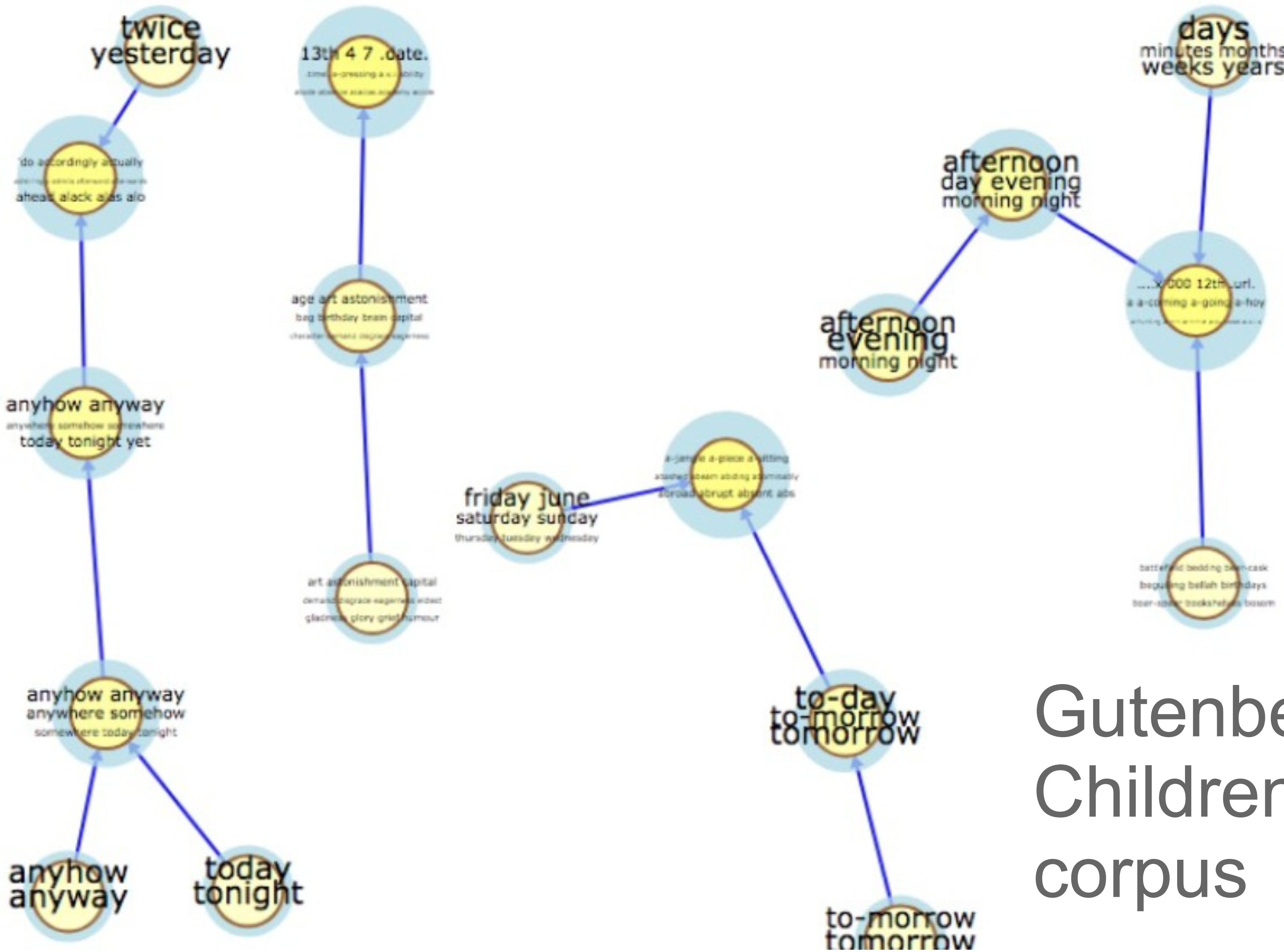
Bridging the Symbolic-Subsymbolic gap in NLP between distributed representations and formal grammars with ontologies

Link Grammar:

```
               +----------Os---------+
               |     +------Ds-------+
  +Sp*i+       |           +---A--+---Mg--+
  |    |       |           |      |       |
I.p saw.v the rusty.a saw.n sawing.v
```



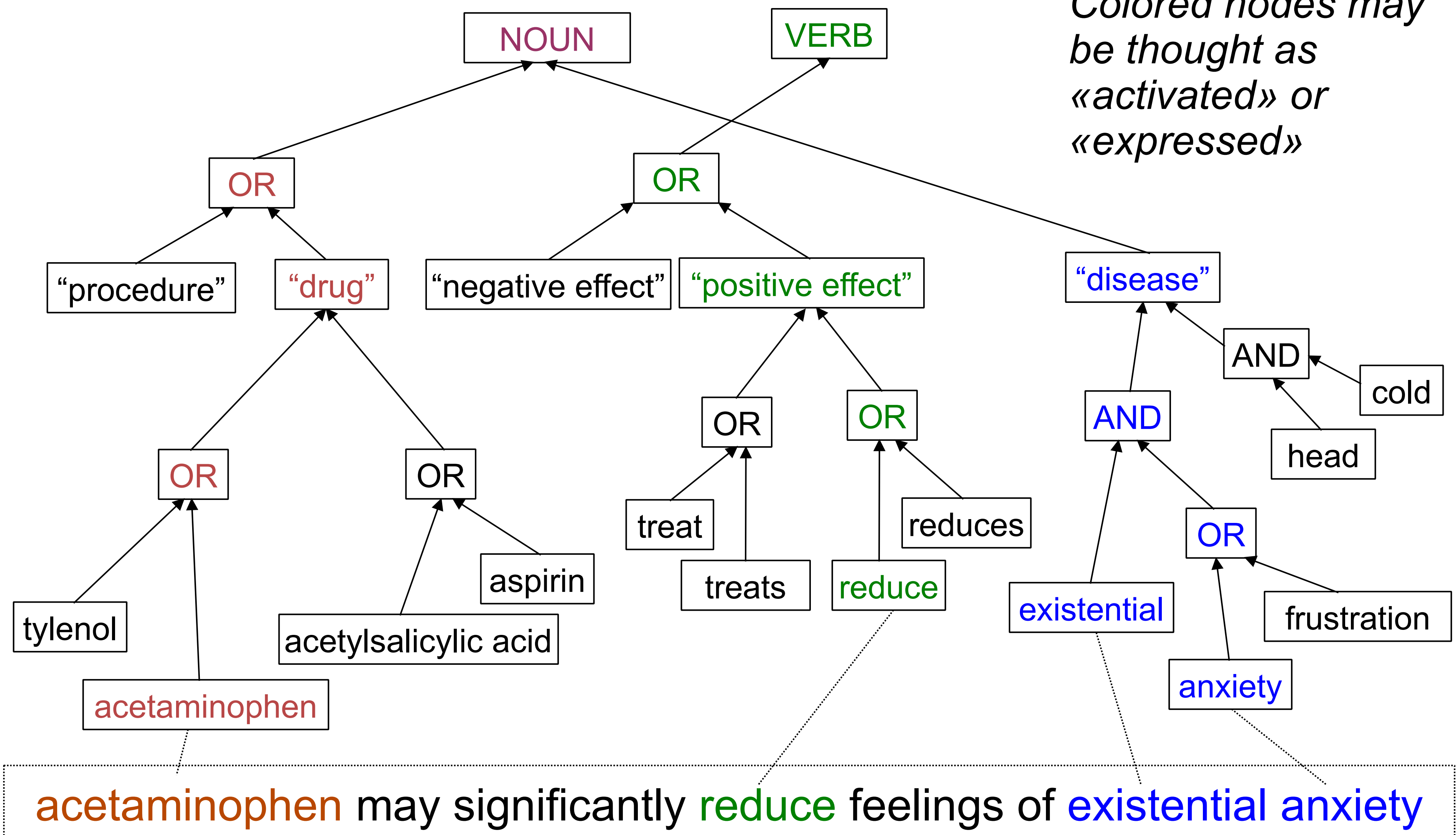
Grammar Ontology from Parses



Gutenberg Children corpus

Aigents® "Deep Patterns" - Language Model

Colored nodes may be thought as «activated» or «expressed»



https://www.youtube.com/watch?v=J9u2V2Mn42w

Aigents® “Deep Patterns” - Text Mining

<set> := <disjunctive-set> | <conjunctive-set> | <M-skip-N-gram>
<disjunctive-set> := { <pattern> * }
<conjunctive-set> := (<pattern> *)
<N-gram> := [<pattern> *]
<pattern> := <token> | <regexp> | <variable> | <set>

Variables may have domain restrictions in ontology and/or refer to other patterns as subgraphs

Example:

{[$description catheter] [$coating coating] [$inner-diameter {diameter inner-diameter}] [$tip tip] [$pattern pattern]}

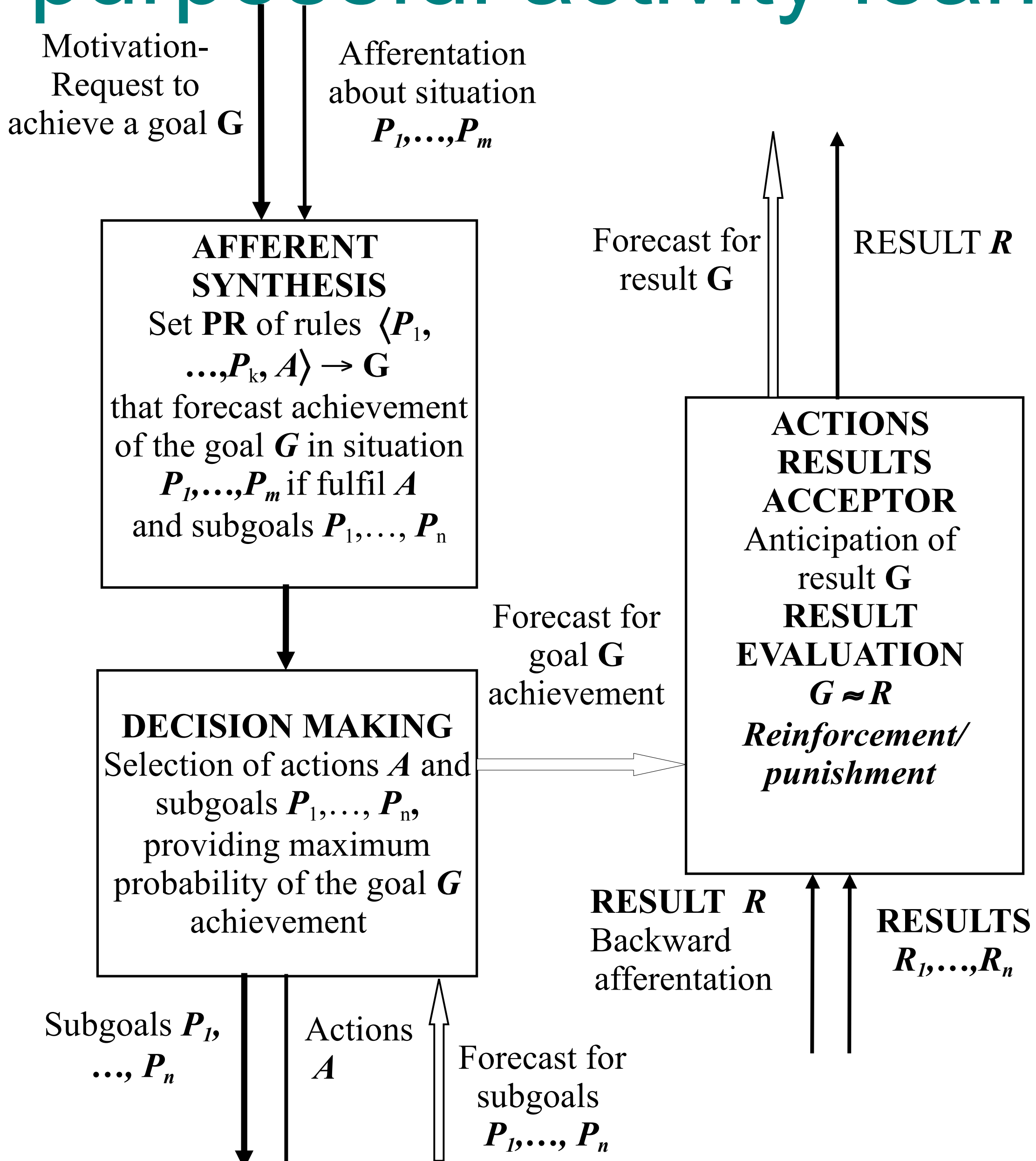
X

“Convey Guiding Catheter. Unique hydrophilic coating. Small atraumatic soft tip. Ultra-thin 1 × 2 flat wire braid pattern”

=

{ **coating** : "hydrophillic", **description** : "convey guiding", **pattern** : "ultra-thin 1 × 2 flat wire braid", **tip** : "soft" }

Applying theory of functional systems for purposeful activity learning (P.Anokhin)



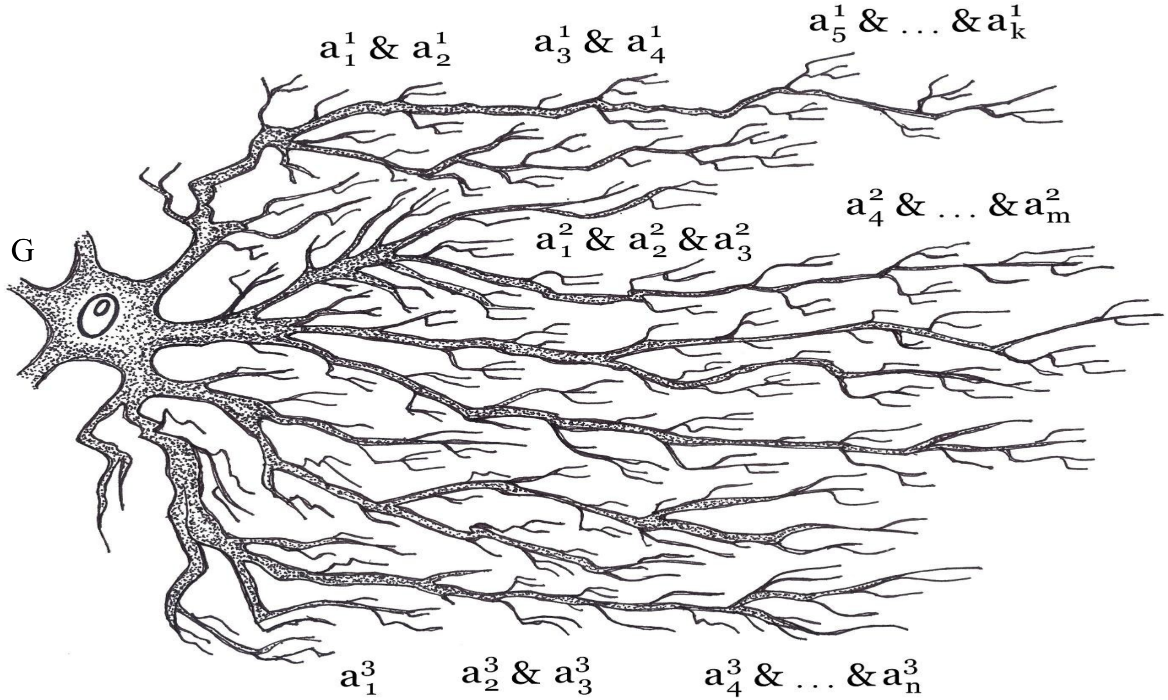
$$Prob(G \mid P_1,...,P_k, P_1,...,P_n, A) = Prob(rule) \cdot Prob(P_1) \cdot ... \cdot Prob(P_n)$$

Evgenii Vityaev, Alexander Demin: Adaptive Control of Modular Robots // Conference Paper in Advances in Intelligent Systems and Computing, Conference: First International Early Research Career Enhancement School on Biologically Inspired Cognitive Architectures, Springer, August 2018

Evgenii E. Vityaev: Purposefulness as a Principle of Brain Activity // Anticipation: Learning from the Past, (ed.) M. Nadin. Cognitive Systems Monographs, V.25, Chapter No.: 13. Springer, 2015, pp. 231-254.

Витяев Е.Е. Логика работы мозга. Подходы к моделированию мышления. (сборник под ред. д.ф.-м.н. В.Г. Редько). УРСС Эдиториал, Москва, 2014г., стр. 120-153.

Semantic probabilistic inference as the formal model of neuron (E.Vityaev)



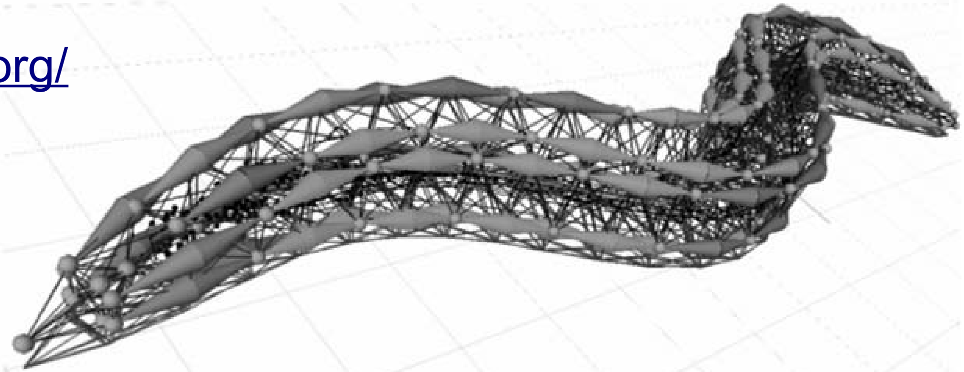
The learning causal relations along the dendrites and the goal feature G may be presented by semantic probabilistic inference – it add to the premise of causal relation all new features that increase the conditional probability of the goal feature G excitation.

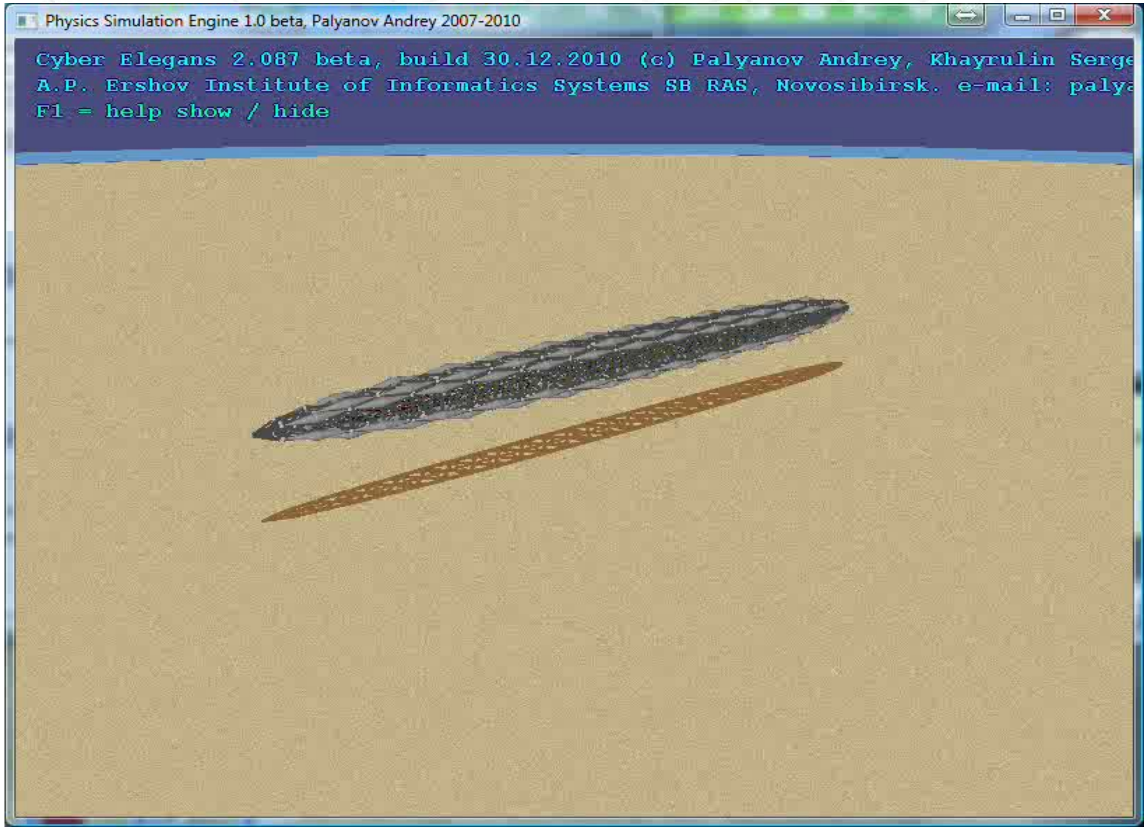
Vityaev E.E. A formal model of neuron that provides consistent predictions // Biologically Inspired Cognitive Architectures 2012. Proceedings of the Third Annual Meeting of the BICA Society. 196, Springer: Heidelberg, New York, Dordrecht, London. 2013, pp. 339-344.

E.E. Vityaev, L.I. Perlovsky, B.Y. Kovalerchuk, S.O. Speransky. Probabilistic dynamic logic of cognition // Biologically Inspired Cognitive Architectures. Special issue: Papers from the Fourth Annual Meeting of the BICA Society (BICA 2013), v.6, October, Elsevier, 2013, pp.159-168

C. elegans nematode model learning

http://openworm.org/





A.V. Demin, E.E. Vityaev. Learning in a virtual model of the C. elegans nematode for locomotion and chemotaxis // *Biologically Inspired Cognitive Architectures*. (2014) v.7, pp.9–14.

https://www.youtube.com/watch?v=eMqt_E4uKbI

Thank you stay in touch!

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