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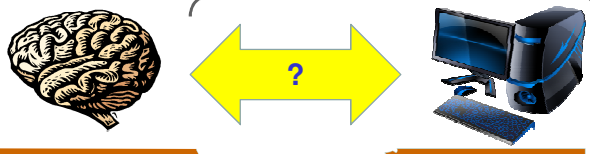
1. Let's Team

You know how to measure this

We know how to build a dynamically equivalent algorithm



Human Sensemaking (Carbon) — **Cognitive Computation (Silicon)**

2. Approaches to Bridging the Gap

2a. Structural?

Symbolic, e.g.,
- **EAA** (situated BDI)
- **ACT-R** (procedural vs. declarative)
- **Soar** (LT vs. ST memory)

Connectionist, e.g.,
- **SOM** (localization in cerebral cortex)
- **ANN** (neuron synapse, activation)

???







sociological **cooperation & competition**

gnoseological **cognition & mind**

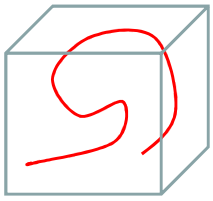
psychological **stimulus-response**

biological **evolution**

physical **energy**

Todd Hylton

2b. Dynamical!



Big ideas: State space, Trajectory, Attractor

Takens' Theorem (1981):
- Given ***any*** **observation function** that satisfies benign conditions
- Then the **topology** of the attractor can be **reproduced** from a *time series* of this *single* function, ***without the state variables***

Idea:
- **Observe biological sensemaking** activity **at *any* accessible level**
- **Construct a computational system** (of ***any* structure**) that replicates its dynamics

Takens lets us **rigorously connect computation to biology** at **any level** of the hierarchy

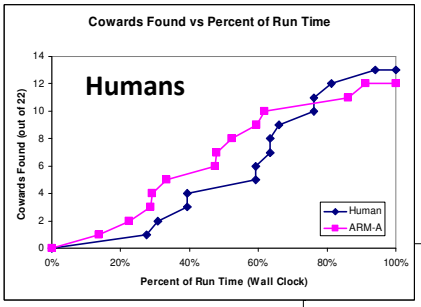
3. Evolutionary Fitting

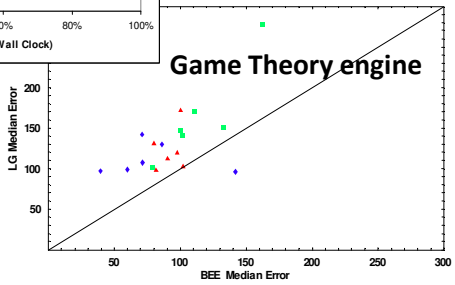
1. **Identify** an **accessible biological observable** $\mathbf{O}$ (at level of neuron, circuit, analyst, team, …)
2. **Construct** a **parameterizable representation** $\mathbf{R}$ in your favorite cognitive model (several options)
3. Use **population-based search** (GA, PSO) to **evolve** $\mathbf{R}$ to match observed dynamics of $\mathbf{O}$ while doing sensemaking
4. **Execute** $\mathbf{R}$ to do computational sensemaking

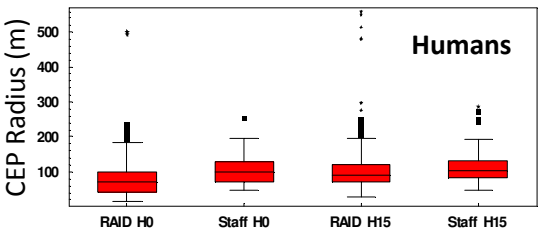
Continue training $\mathbf{R}$ while running to **track nonstationarity** in $\mathbf{O}$

4. Results

We have evolved models of combatants whose behavior forecasts the actual entities better than experienced humans and other software.







5. Our Objective

Join our world-class computer science, artificial life, and software expertise to a winning neurophysiological team