

**EUCogII, Members' Conference, Hamburg 10/11.10.2009**  
**Workshop B "AI as a formal science"**

**Summary of Discussion**

By workshop chair: Vincent C. Müller

**Jürgen Schmidhuber: "AI as a formal science"**

**Gregor Schöner (respondent): "Can a 'new AI' become a formal science?"**

**'Flash Talks' [see their slides]**

**Characteristics brought out in the discussion**

*Aim:* AI as a formal science: the optimal general problem solver in arbitrary environments

*Solution:* New General AI, the Gödel machine (a formal approach to AI, not just a formal theory of a cognitive system)

- general
- top down
- assumptions made:
  - cognition is information processing, namely problem solving
  - "any kind of problem is a utility maximizing problem"

**Problems raised**

*Application & Correctness*

- Real cognitive systems have limited resources (space, time)
- Where does the utility come from, the preferences?
- The world (and probably our brains) are continuous systems, not digital computers
- Cognition is not action selection: there is often no "next action" to be selected, actions are contiguous and changing continuously
- "Deep embodiment" (di Paolo) and situatedness: cognition is not problem solving (even less utility maximization)
- material dynamics not captured in this model

*Status of the theory*

- AI is not a formal theory and should not be; it is engineering or empirical science
- This looks unfalsifiable, all-embracing (Schmidhuber agreed with most points raised in presentations)
- This is theoretical AI, how does it relate to practical AI? (As maths to physics?)
- Is this what real systems are actually doing? Empirical support for the theory?
- What is this theory doing? It seems neither empirical, nor engineering, nor formal.
- Will this Bayesian system lead to a system that successfully pursues goals; flexible (adaptive) and autonomous? (The main challenge for AI)