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Cognition, Cognitics, and Team Action – Five Theses for a Better World

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1. Cognition to perceive, explore and model the world

GOAL → PROCESS → ACTION

ACTIVE PERCEPTION

INNATE GOAL → INNATE PROCESS → CURRENT GOAL

CURRENT PROCESS

EXPLORATION ↓ ↑ EXPERIENCE

Reality, incl. Self
(BODY, INFRASTRUCTURE, COGNITIVE ENGINE, INFORMATION REPOSITORIES)

In cognition, backtracking is the rule. From the selected goal, specifications are derived, which then lead the cognitive process, and in particular an active perception (“exploration”) faculty capable of acquiring the non-physical experience necessary for action and possibly later improvements.

Current goals and processes may result from exploration performed and/or experience acquired by an agent running a given cognitive process in a certain domain of reality. Initial goals and processes are innate (or “wired”).

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2. Cognition to define alternative worlds and possible futures, visions, triggering anti-causality

- Cognition is *not* bound to address only models of *physical reality*
- Extraordinary capability to define alternative conceptual worlds, assumptions, possible futures...
- ... “visions”, capable to inspire and trigger the autonomous action of cognitive agents
- => **anti-causality** ; re also Kant: freedom, from a transcendental rational source rather than from the perceived reality

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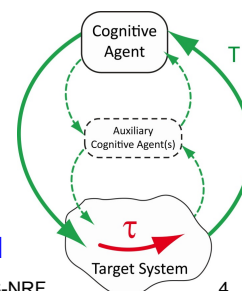
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3. Cognition for effective control

- Capabilities **essentially cognitive, in perception, modeling, decision-making, and concretization**
- Consider a cognitive system driving a target system
 - “open-loop”, i.e. as a sequence of commands defined a priori
 - “Closed-loop”, whereby corrective actions are dynamically generated as functions of the perceived effects of unforeseen disturbances
 - **incl. cascaded, hierarchical, multi-agent, autonomous or “social” systems (re. below)**
- Robotics for grounding and deploying automated **cognition in the real world**



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4. Automated cognition – Cognitics for large scale deployment

- **For ages, mostly performed by humans**
- **Now, starting, by artificial cognitive systems (ACS)** (digital systems, e. g. computers, service-oriented comm. networks, smart systems or robots)
- **=> Drastic changes in people's life, as if a much larger number of human workers were available for service**
- **And better!, with technical support E.g.:**
 - **Leg => transportation (car, etc.)**
 - **Eye => augmented vision ("x"-scopes, etc.)**
 - **Brain => augmented cognition, ICT and cognitics (examples in paper)**



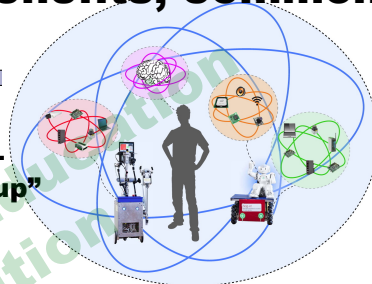
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5. Social cognition for team forming, and achieving more benefits, common as well as individual

- **Consider consolidating multiple, individual ACS's into a novel, meta-level, self-coordinated ACS, a "group"**
=> more actions and benefits.
- **Among new problems**
 - **relationships across levels, e.g. between an individual member, and the group as a whole;**
 - **conflict management when an individual ACS is simultaneously a member of multiple groups, different in culture (scope, shared values, etc.).**
- **A property arising from groups : only at a single level, they can be physically defined; in cognitive world though, these difficulties do not apply**
- **Further progress in science and engineering are required in social technologies and cognition.**



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Conclusion

- **Mankind has gained a decisive advantage with cognition**
- **Now we have to Foster Research and Education in Cognition, for at least the 5 reasons just given:**
 - **to know the world, to explore and perceive, to model**
 - **for defining alternative worlds and possible futures, visions, anti-causality**
 - **for effective control**
 - **for large scale, technical deployment of ACS (cognitics)**
 - **as a foundation for team action and increased momentum for change (social cognitics)**
- **The five theses can be seen both**
 - **as a roadmap for the development of simultaneous and iterative processes capable to freely forge a better future.**
 - **and as paths towards better insights in human and social nature**

Text and slides, with comments: <http://lara.heig-vd.ch>