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Foresight in an Unpredictable World

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Agenda

- The message:
  - To understand the nature and implications of technology disruption, we have to clarify the ontological assumptions of foresight.
- The method:
  - Re-frame FTA in a socio-cognitive, developmental, evolutionary, and phenomenological context. Elaborate “the philosophical foundations” of FTA.
- The result:
  - “Grand challenge” -oriented and “evidence-based” policies need to be rethought. They are particularly problematic with transformative technologies such as ICTs. We need to revisit the ontological assumptions of FTA to grasp the opportunities, challenges, and available policy choices.
  - Modeling-based FTA has a limited domain of validity. We should not expect future-oriented models to provide much policy-relevant knowledge.
  - “Growth” -based policies miss the focal areas of value creation in the Knowledge Society transformation.
  - Methodologically, FTA needs to embrace unpredictability, instead of trying to manage it away. Analysis is possible, but first we need an innovative step.

Two Forms of Unpredictability

- Epistemic uncertainty
  - Lack of data and measurement error
  - Computational complexity
  - Inaccurate models and hidden variables
  - Assumes ontological certainty. “Our knowledge about the world may be limited.”
  - Example: the weather

- Ontological unpredictability
  - Creative evolution
  - Disruptive innovation
  - Examples: the telephone; GSM SMS; the Web; adaptive systems
  - The world, itself, is a process. Evolution invents new ontological realities.

Ontological Unpredictability

- A.G. Bell (Letters Patent No. 174,465, 1876)
  - “By these instruments two or more telegraphic signals or messages may be sent simultaneously over the same circuit without interfering with one another.”
  - “I desire here to remark that there are many other uses to which these instruments may be put, such as the simultaneous transmission of musical notes, differing in loudness as well as in pitch, and the telegraphic transmission of noises or sounds of any kind.”
- “For many decades after the telephone was invented, it was marketed mainly for business use. It was often understood as a broadcast medium. Telephone entrepreneurs tried to use the telephone to broadcast news, concerts, church services, weather reports, and stores' sales announcements. The telephone was also expected to be used for voting campaigns, long-distance Christian-Science healing, and to broadcast lullabies to put babies to sleep.”
- “Social conversations and 'visiting' over the telephone were not uses that telephone was supposed to serve, and industry sometimes resisted such use.”

- SMS: “Much of the revenue and most of the profits of telecom operators in Europe originate today from SMS text messages. When this technology was defined as a part of the GSM standard, no one imagined the various ways the users of this technology would appropriate it.”

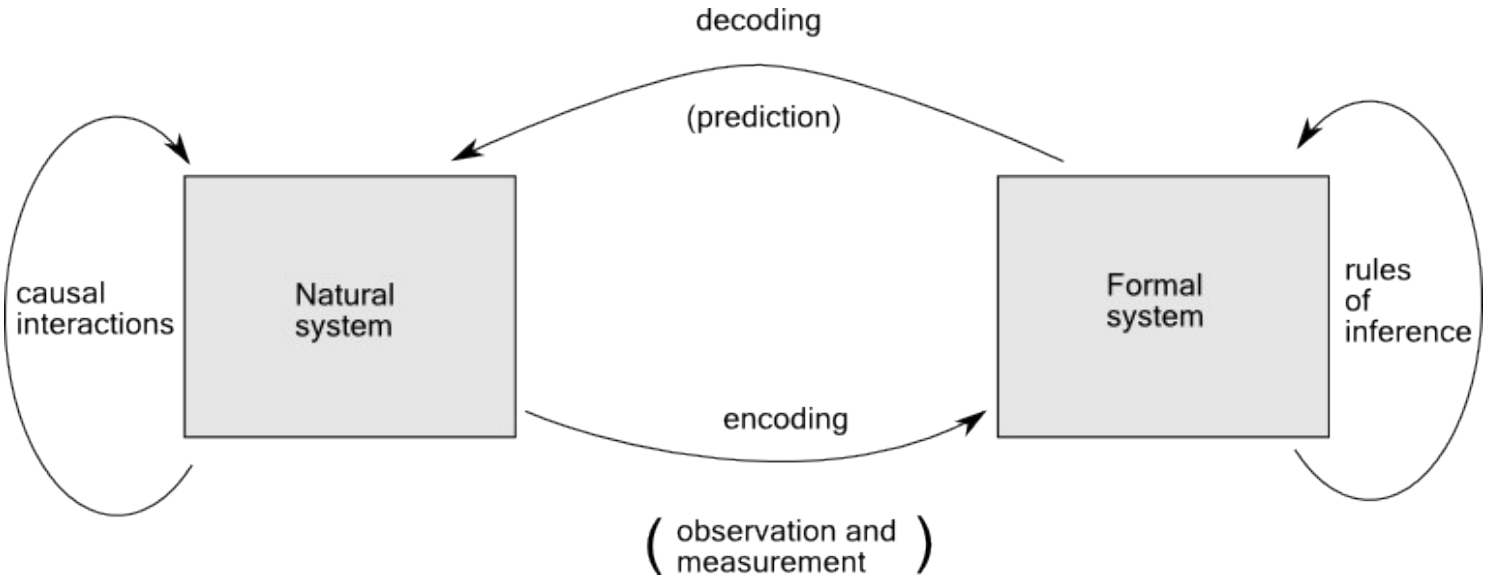
Tuomi, I. (2002) Networks of Innovation. Oxford University Press, p. 11.

The Mystery of an Eye

- How can the nature invent a complex system such as the human eye?
- The Bergsonian story:
  - Proto-eye is used for a different biological function (use GSM SMS for control and broadcast messages).
  - It evolves to point where it becomes useful for vision (kids start to misuse SMS for their own purposes).
  - At that point, a new domain of action emerges, linked with the new capability for making distinctions based on vision (SMS starts to change social practices).
  - At the same point, “a world of vision” is created, simultaneously with the functional organ that we now can call “the eye.” (“Messaging” becomes a verb, telecom operators start to write “messaging products” in their strategies.)
  - After the eye emerges, we can retrospectively describe things as “precursors” to an eye. (“SMS was devised by clever engineers in the GSM standardization groups.”)
  - In other words, at some point in time, evolution creates a qualitatively new domain of being. The ontology changes, in parallel with the possibilities for action. (Technology has produced a discontinuity. The “phone” is not anymore what it used to be.)

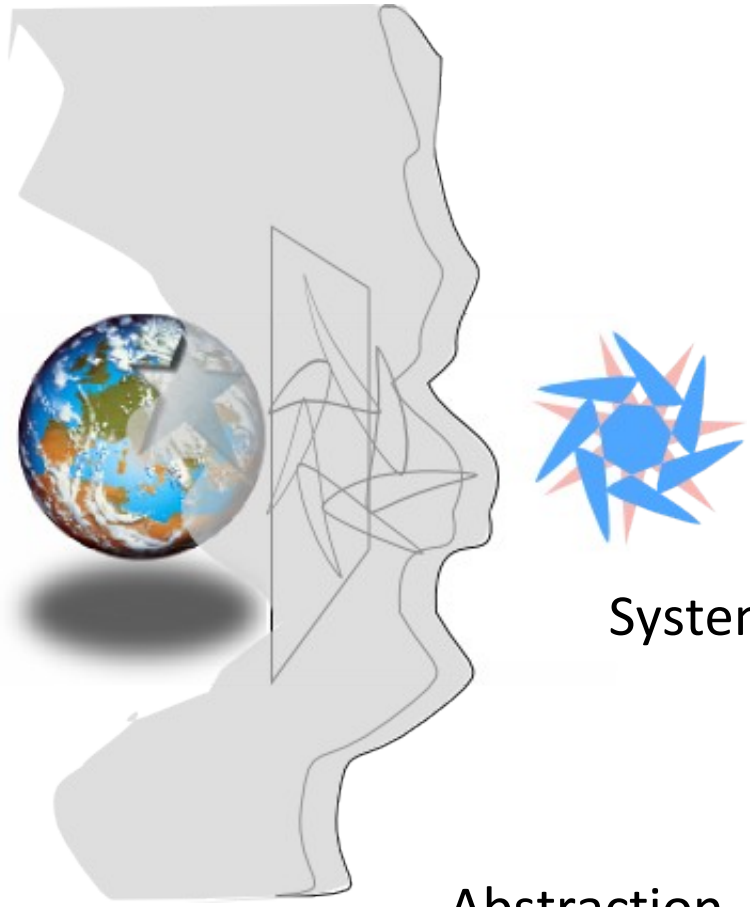
Tuomi, I. (1999) Corporate Knowledge. Helsinki, Metaxis.

Back to Prediction: The Modeling Relation

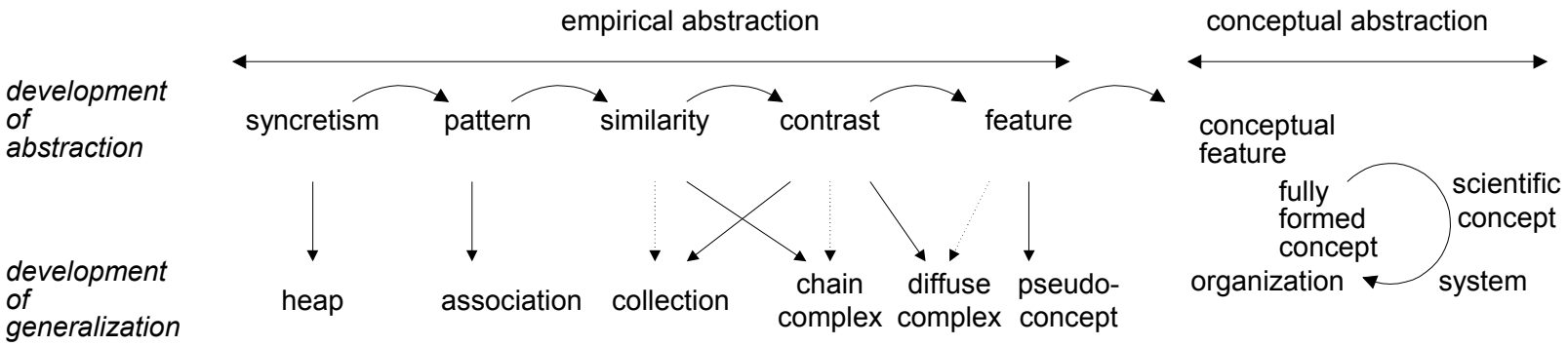


Rosen, R. (1985) Anticipatory Systems. Oxford: Pergamon Press, p. 74.

The Ontological Side



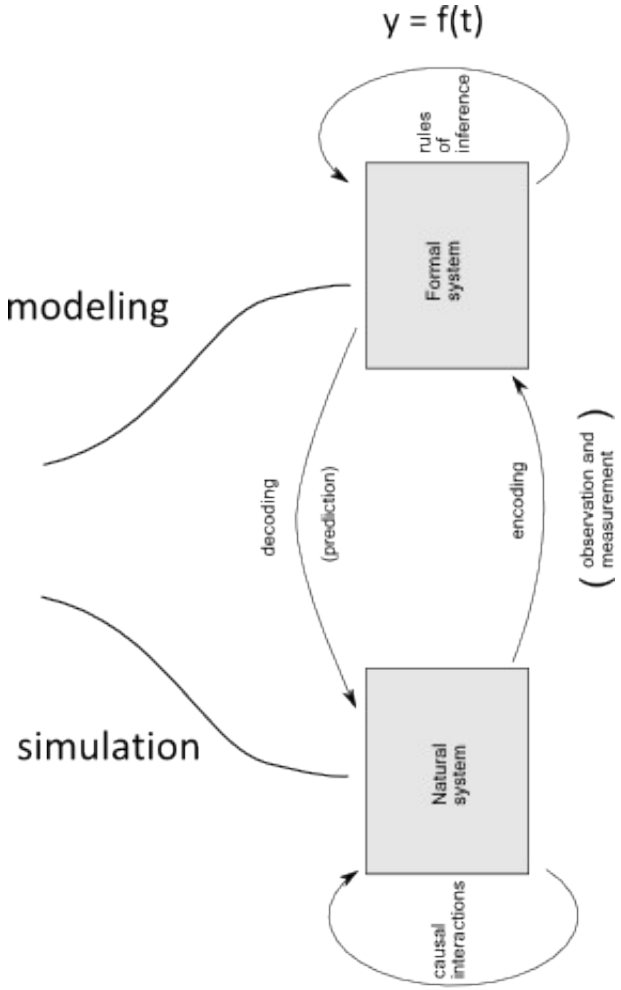
Abstraction and Generalization:
Vygotskian Model of Cognitive Development of Child



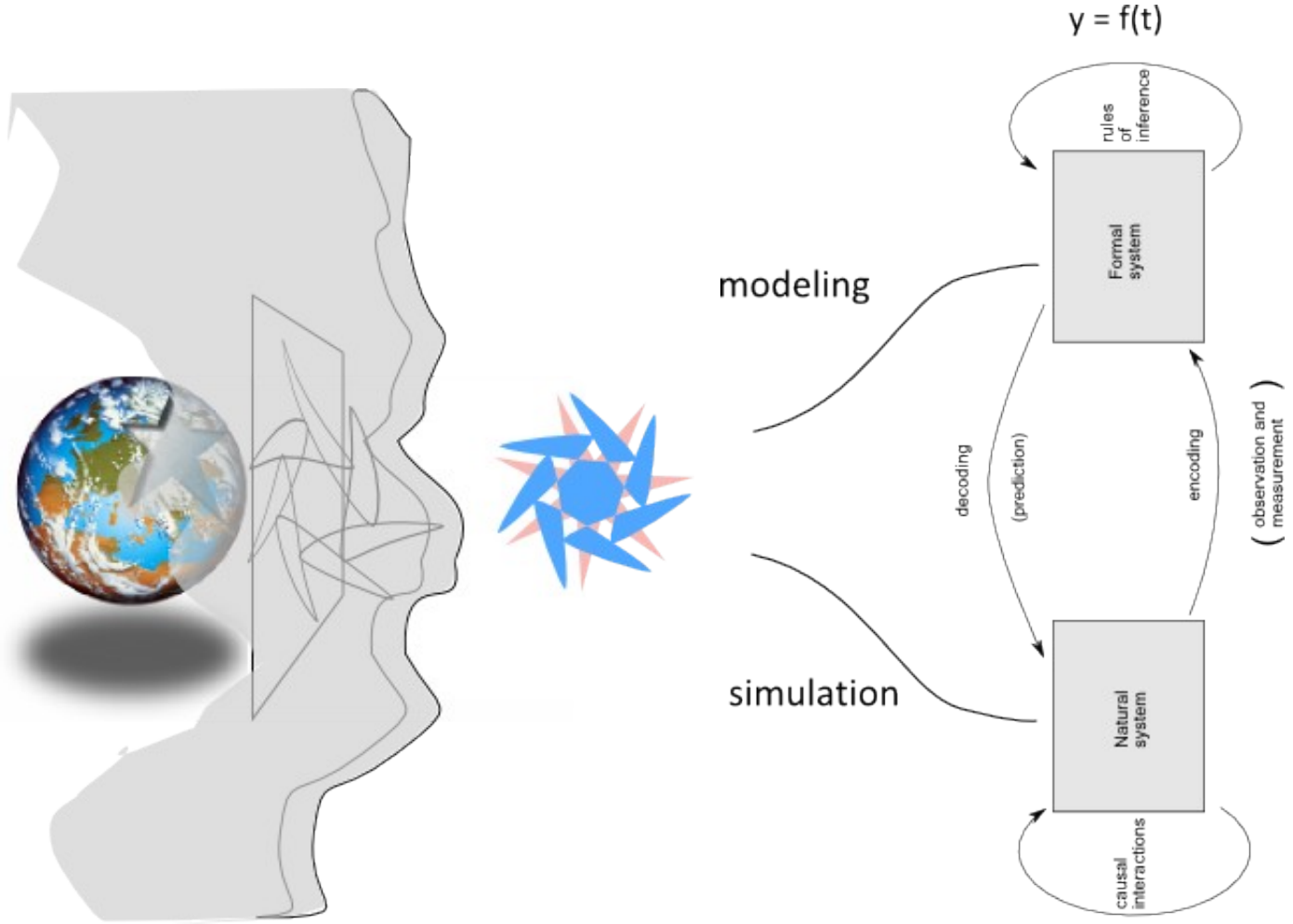
Reason finds difference where it is not; imagination finds similarity where it is not.
Ibn 'Arabī

Tuomi, I. (1999) Corporate Knowledge. Helsinki, Metaxis, p. 147

The Epistemic Side



The Full Picture



Time as Creator

Time as Parameter

The Linear Model

- Tim Berners-Lee created the World Wide Web
- Bardeen, Brattain and Shockley created the transistor
- Bell created the telephone
- James Watt created the steam engine
- … and God created every thing that creepeth upon the earth

Genesis

- **1:24 And God said, Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth after his kind: and it was so.**
- **1:25 And God made the beast of the earth after his kind, and cattle after their kind, and every thing that creepeth upon the earth after his kind: and God saw that it was good.**

vs. Ontological Expansion

- World Wide Web was born as a (badly designed) hypertext document management system.
  - It is constantly being re-invented by thousands of creative users.
- The telephone was invented by Mid-West housewives on isolated farms who started to “visit” each other over the phone. It was reinvented by teenagers in the 1990s.
- With creative evolution, our relationship with the beast can change, and it can morph to cattle.
- Data on beasts therefore tell us very little about future cattle.

- Fact-based policies have a similar ontological challenge: They structure knowledge and information in categories that used to be important. They can tell very little about ontological realities that will be important.
- In practice, evidence-based policies are not only blind to future opportunities; They also limit our possibilities to interpret the present and the past with their strong tendency to constrain retrospection to those aspects of the world about which we have data. We have time-series data on those historical trends that were considered to be important long time ago. National statistics and income accounts create continuity also where it does not exist, and collect data mainly on activities that were important in the industrial age. The combination of FTA and evidence-based approaches is not a trivial task.

Foresight in an Unpredictable World

- Technological evolution is creative, it produces new ontological domains that did not exist in the past.
- No amount of data is enough to predict or open up these novel domains; You know only afterwards and retrospectively what types of data would have been relevant. You can count cows only after cows exist.
- When based on currently existing categories, "future" challenges are necessarily extrapolations of history. These extrapolations require complex systems of contextual assumptions. The assumptions often remain unquestioned because they used to be the most relevant assumptions of the past.
  - E.g., "The problem of aging EU population": Assuming the 20th century systems of employment, education, public financing, and healthcare, the growing relative size of >65 generates a "sustainability gap."
    - i.e., other things being equal, aging leads to socio-economic problems
    - the social and economic meaning of "age" remains as it was in the Industrial Age
    - no change in life-patterns, value creation systems, industrial organization of work... i.e. no knowledge society transformation
- FTA, therefore, needs to become highly innovative and creative, in itself. It has to imagine new categories, systems of abstraction, and ontologies. After this innovative step, the analysis can start.