Cognitive Context: Information + Environment + Emotion + . . . What else?

Victor Raskin
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Purdue University
Vincent Gripon
???
Cognitive Computing

- American Initiative” IJCC*CI:
  - Mathematicalization in First order logic
  - Diverse computation
- IARIA:
  - No clear vision yet
  - Need to work it out
Cognitive Computing

- Cognitive Computing:
  - Computer knows what it is doing
  - Knowledge-based
  - Semanticalization
  - Computing self-awareness
COGNITIVE CONTEXT:
INFORMATION + ENVIRONMENT + EMOTION + ..
WHAT ELSE?

Julia Taylor
Purdue University
emotion

Goals
Reasoning
Behavior

Information/knowledge

environment
WHAT IS NEEDED TO ANSWER THE QUESTION?

One of these things is not like the other.
Projection of the subjective cognition

the influence of subjective attitude in interaction as an additional cognitive context

Yoshimasa Ohmoto
Kyoto University, Japan
Car Driving

Tree Absorbing CO2

Human Walking

Pretty dog Following the person
Car Driving
Tree Absorbing CO2
Pretty dog Following the person
Human Walking
Information
Emotion
Cognition
Environment
The largest object

Shape

Near the car

Follow the person
Different cognition!

Road side trees Absorbing CO2

Small hatchback car Driving on the way home

Cool dog Following but not a pet

This is “me” Walking across the road
Small hatchback car
On the way home
Road side trees
Absorbing CO2

Internal, objective
Information

External, objective
Environment

External, subjective
Projection

Internal, subjective
Emotion

Cool dog
Following but not a pet

It is “me”
Walking across the road
The mental stances (Dennett, 1989)

When the guardian robot stands by a gate, a person who tries to pass the gate is caught by the robot.

**Intentional stance**
The robot thinks “I do not permit the passage because this gate is now broken.”

**Design stance**
When the sensors of the robot detect a person, the robot catches me.

**Physical stance**
The actuator and the computer controls the robot body.
Dynamic estimation of preference

• We proposed a method to dynamically estimate which factors were emphasized for decision-making.
  • Using keywords, nodding, SCR, electrocardiogram, skin temperature
• We could estimate the preference of the participants in human-agent interaction.
  • The participants were satisfied with the support of the agent based on the method.
• In many cases, the agent’s expressions obviously influenced for their interpretations of task elements.
  • Participants designed a mobile robot.
  • They are influenced for the interpretations of the parts.
Is information encoding in the brain analogic or digital?

Vincent Gripion

Mar. 24th, 2015
Analogic vs. digital

"The probability that a synapse fails to release neurotransmitter in response to an incoming signal is remarkably high, between 0.5 and 0.9"

"The spontaneous firing of spikes accounts for almost 80% of the metabolic energy consumed by the brain"

<table>
<thead>
<tr>
<th>Analogic</th>
<th>Digital</th>
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<tbody>
<tr>
<td>Performance in learning</td>
<td>Performance in storing</td>
</tr>
<tr>
<td>Robust when one component fails</td>
<td>Robust when all components are unreliable</td>
</tr>
<tr>
<td>Useful for signal processing</td>
<td>Useful for information processing</td>
</tr>
<tr>
<td>Sensori motor inputs are analogical</td>
<td>Language is digital</td>
</tr>
<tr>
<td>Model low-level</td>
<td>Model high-level</td>
</tr>
</tbody>
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Analogic vs. digital information in the brain
...or both?

Image from ‘“How to grow a mind: Statistics, structure, and abstraction”, Tenenbaum et al., Science 2011.”
...or both?