Artificial Consciousness

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Prologue

Atificial Part

Epilogue

1

3

5

2

4

6

Consciousness

Ethics

References

What defines human being?

- Consciousness && Intelligence

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What is Consciousness?

📖 Different Response:

Meaning:

- Core: what allows us to be aware of our surroundings and of our inner state
- Intuition : what you are experiencing here, right now

⚠ Brain is a nested web built by its DNAs ; of Consciousness and Intelligence.

Like many other features of human, our consciousness is evolved from less complex forms as a product of evolution by natural selection.

Origin

▷ Origin function of consciousness was probably to direct a mobile self that was short of energy to a supply of food.

Step 1

▷ Mobile selves started to move themselves directionally in the persuade of food

Step 2 👁

▷ Vision. In need of locating food

Step 3 🌍

> Needs to create some sort of inner representation. Here is the entrance of memory.

Step 4 🗺️

▷ Object Permanence: our awareness that things continue to exist even when we can`t see them.

👶 reach in 6 months

🐥 reach in 1 or 2 days

Step 5 ⌛

▷ Using this features need a sense of time. It enable a self to look forward from the present moment and anticipate the future.

chickens are able to resist a meal if they expect to receive a bigger one

western scrub jays hide their food and memorize its location for a long time. If he feels others realize food`s location, he will rehide it

Step 6

▷ mind reading, helps us become smarter than others by putting ourselves in their shoes

Step 7 ✏️

▷ Language!!!

to be conscious:

mind should be in a relatively high state of arousal whether in wakefulness or REM sleep.

Arousal

▷ State of being awaken or of sense organs stimulated to a point of perception.

common types of consciousness:

accessible

phenomenal

phenomenal

▷ Not accessible but seems to raw feeling, like qualia

Qualia:

▷ you see this shape and realize it is a red circle

Bernard Baars

▷ Functions: definition and context setting, adaption and learning, editing, flagging and debugging, recruiting and control, prioritizing and access control, decision making or executive function, analogy forming function, metacognitive and self-monitoring function, auto programming and self-maintenance function.

Igor Aleksander

▷ Components: state machine, inner neuron partitioning, conscious and unconscious states, perceptual learning and memory, prediction, the awareness of self, representation of meaning, learning utterances, learning language, will, instinct, emotion

Julian Jaynes

▷ Bicameral Mind: once upon a time human mind operates in a state which cognitive functions were divide between two parts:
      1- commander
      2- obeyer

David Chalmers

▷ Organizationally invariant: computers perform computations. Computations can capture other systems abstract causal organization. Systems with the same causal topology, will share their psychological properties.
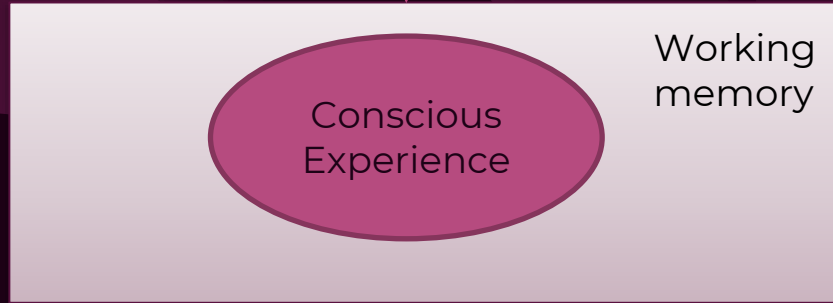
Global Work Space by Bernard Baars

▷ Human cognition is a multi agent system implemented by a multitude of relative small, special purpose processes, almost always unconscious. Collations of such processes find their way into a global workspace.

Theater metaphor

➢ In theater of consciousness, a spotlight of selective attention shines a bright spot on stage. The bright spot reveal the content of consciousness, actors moving in and out, making speeches or interacting with each other. The audience is watching in dark(i.e. unconscious).Behind the scene, also in the dark, are the director(executive processes), stage hands, script writers, scene designers and the like. They shape the visible activities in the bright spot, but are themselves invisible.

Contexts: self, intentions ,expectations, perceptual contexts
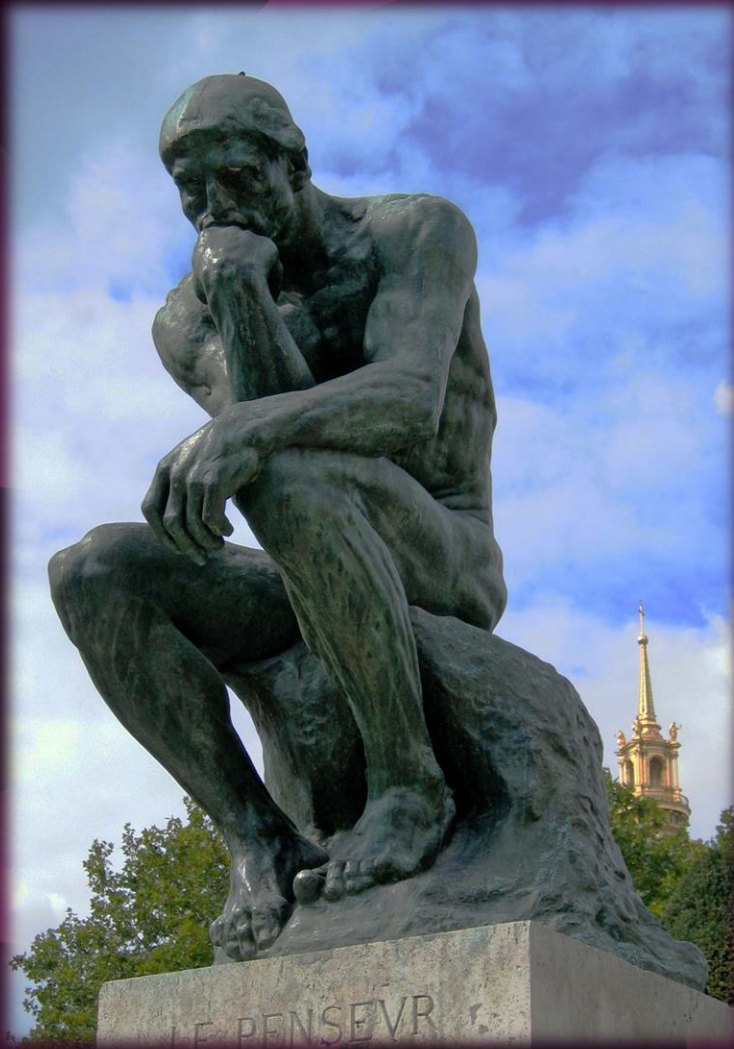
Input: sensory stimuli images and idea

Working memory

Conscious Experience

Output: speech and action

Unconscious recourses: interpreters, memories, language, automatisms

Intelligence

▷ Mechanism to solve problems.
▷ Basic Tools: Gather information, save it in a memory, use it to learn.
▷ Information gather by sensors: vision , sound, smell, touch and tase
▷ Sensors for state of our bodies such as hunger
▷ Library of knowledge(i.e.. different skills)
▷ Creativity, planning, culture

Dugesia Tigrina: The simple agent

```
IF hungry:
    move;
ElIF sated:
    rest;
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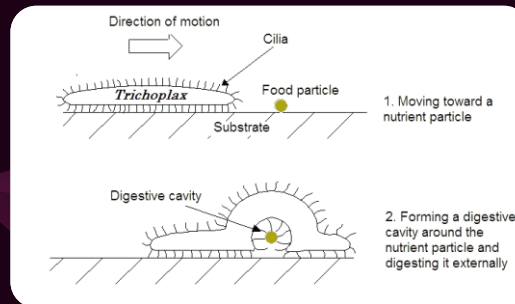
Trichoplax Adhaerens, one of the simplest of all animals, act like a simple agent using sort of Random Walk algorithm:

IF food:

speeds_down;

ELIF no food:

speeds_up;

Direction of motion
Cilia
Trichoplax
Food particle
Substrate
1. Moving toward a nutrient particle

Digestive cavity
2. Forming a digestive cavity around the nutrient particle and digesting it externally

Intelligence vs Consciousness

▷ Intelligence is an expression of an external behavior that we can measure with specific tests. Self- Consciousness is a property of an internal brain state, which we can not measure.

Artificial Consciousness:

- a system that emulate Neural Correlates Of Consciousness

Two approaches:
classic physics: neuronal level
quantum physics: quantum consciousness

⚠ We stick to neuronal approach in this lecture

Electrochemical Reaction

▷ At a neural level, the same electrochemical reactions present in machinery operate in the human brain. Each neuron automatically responds to its inputs according to fixed laws. Neural network replicate the brain`s basic electrical behavior and provide the proper support for realizing a processing mechanism similar to the one adopted by the brain.

Brain as Ant Colony

▷ Brain consists of billions of neurons that cooperate to achieve a common objective. Consciousness is not a property of individual neurons, which automatically operate as switches that respond to input signals. Rather, consciousness is a holistic property that emerges and flourishes from neural cooperation when the system reaches a sufficiently organized complexity

How?

▷ Scan Human`s brain: too long!

       using MRI, FMRI

▷ Built it from scratch: too hard!

      Using Game Theory, Cognitive Science, tatistical mechanics

Memory

▷ To replicate human brain:

- human brain`s neurons: 10^{12}

- synaptic connections of each neuron: 10^3

- each synapse: 4 byte

so:

human brain = 5 million GByte

maybe we should consider quantum computation!

Significant Approach

- Stan Franklin: IDA
- Ron Sun: CLARION
- Ben Goertzel: OPENCOG

Ethics

safety first!

Terminator

▷ Conscious robot will hurt us?!
▷ No.

  ▷ Askdelphi says no matter what crazy situation user say, computer response is true in 97.9% of times.

Robot Rights

▷ Social, Political and Economical right of conscious robots.

Human mind is the most complex structure in world.
Hardwares are not ready yet.
But approaches in quantom computing, game theory and cognitive science seems to help us in the story of reaching natur`s code.

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