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The two AI: conscious and unconscious

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CoDE-IRIDIA, ULB

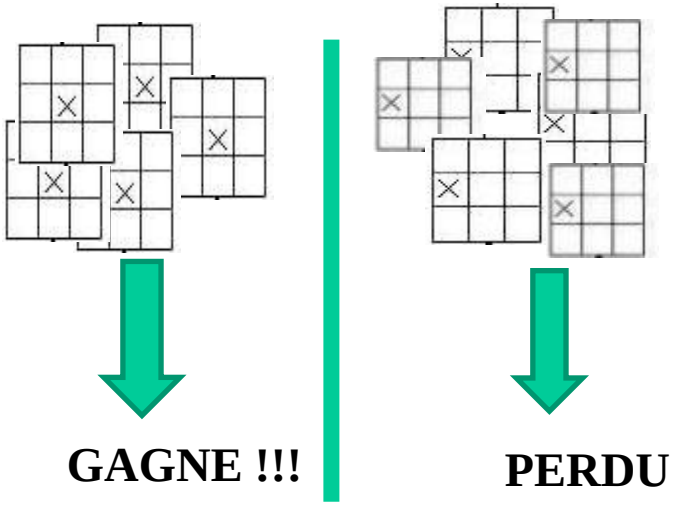
A cocktail of:

- History of technologies
- Philosophy
- Cognitive Science
- Engineering AI

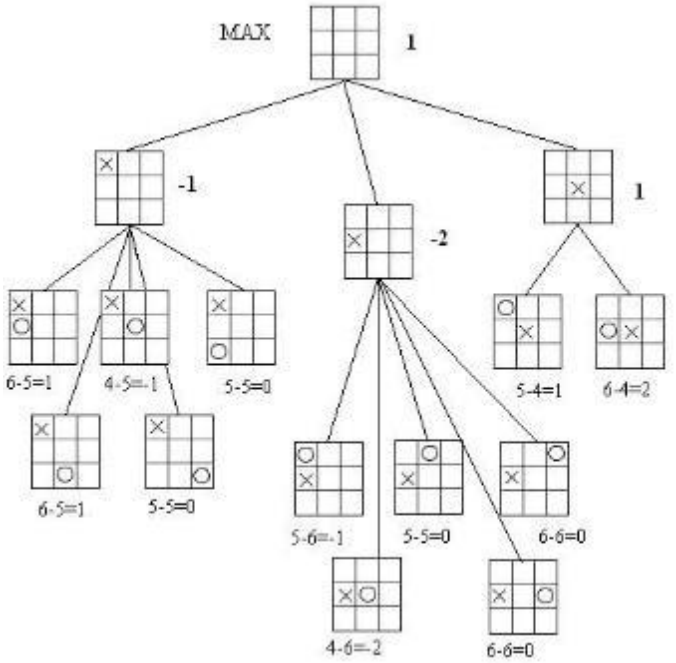
Three examples of the two AI

The tic-tac-toe

IA that learns and performs

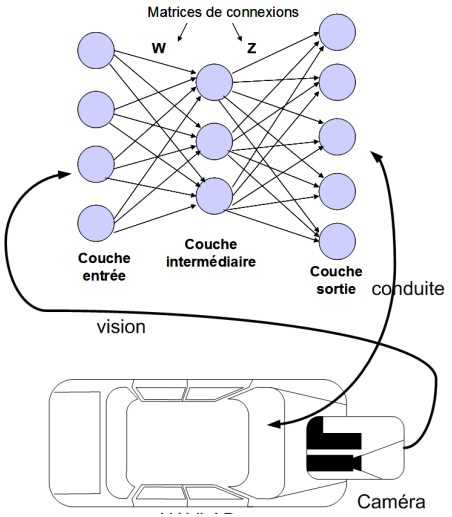


IA that thinks and understands



The automatic car

IA that learns and performs



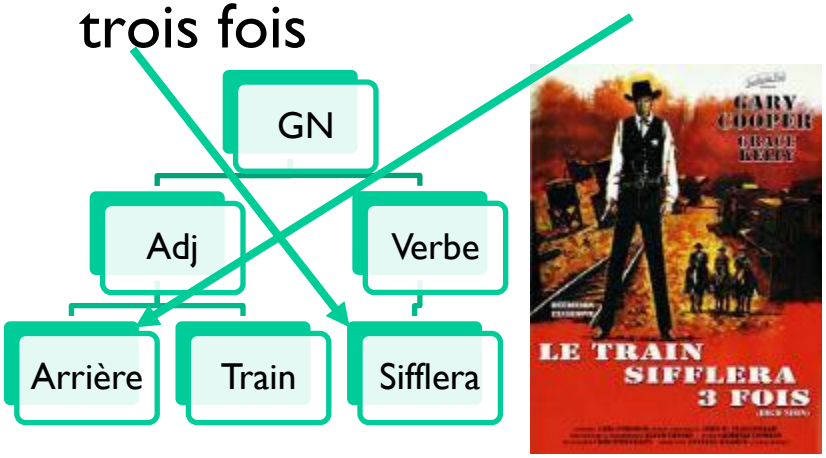
Control Theory

- dx/dt = F(x,u)
- Y = G(x)
- Objectif: min $\int_{-\infty}^{\infty} x + u \, dt$
- u* = K(x,t)

Automated translation

IA that understands

- Après ce plat de fayots, mon arrière-train sifflera trois fois



IA that learns and performs

- After this dish of baked beams, my hindquarters whistle three times

Français **Anglais**

The two AI

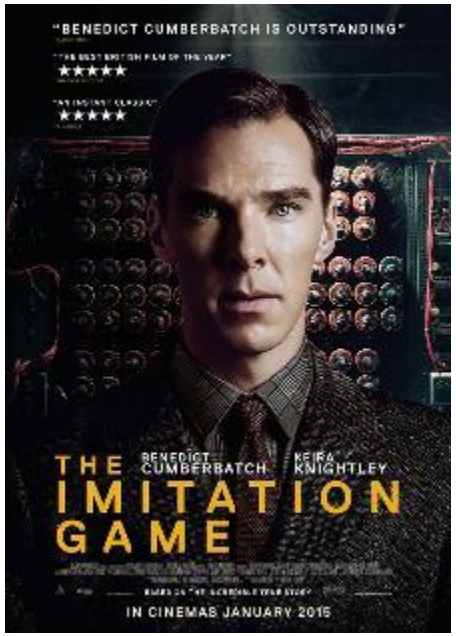
Conscious

- Intrusion of sequence and knowledge inferences
- Problem decomposition
- Complexity reduction
- Explicitation and exploitation of human's expertise
- Brute force guided by human knowledge

Unconscious

- Big Data
- Machine Learning
- Parallel Processing
- Blinded Brute force
- High Tech
- Indifference to human's expertise
- Black box

AI Definition: An original ambiguity



Whom I'm talking too?

1965: Eliza -> The software psy

Joseph Weisenbaum

Le patient: "My boyfriend made me come here"

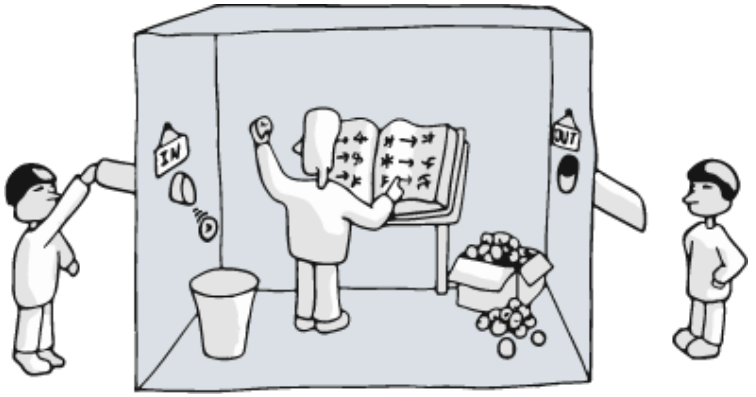
Le psy: Your boyfriend made you come here

Le patient: He says I'm depressed all the time

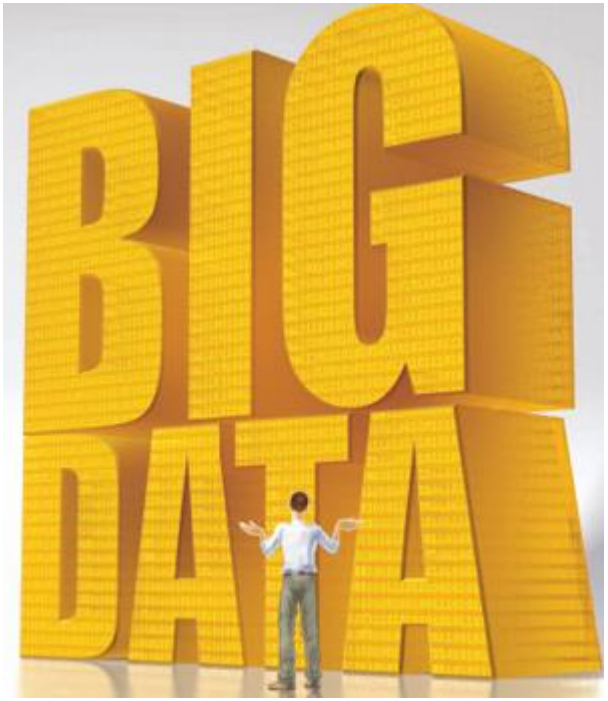
Le psy: I am sorry to hear you are depressed

1980: John Searle and the Chinese room

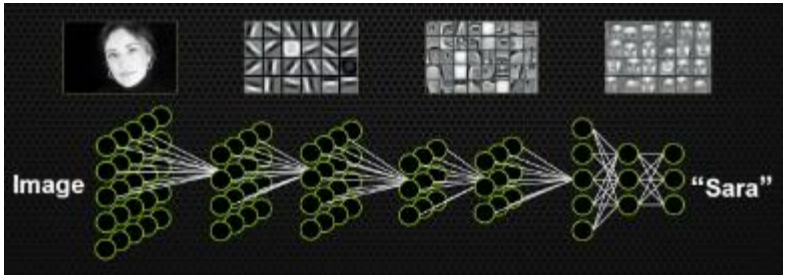
John Searle

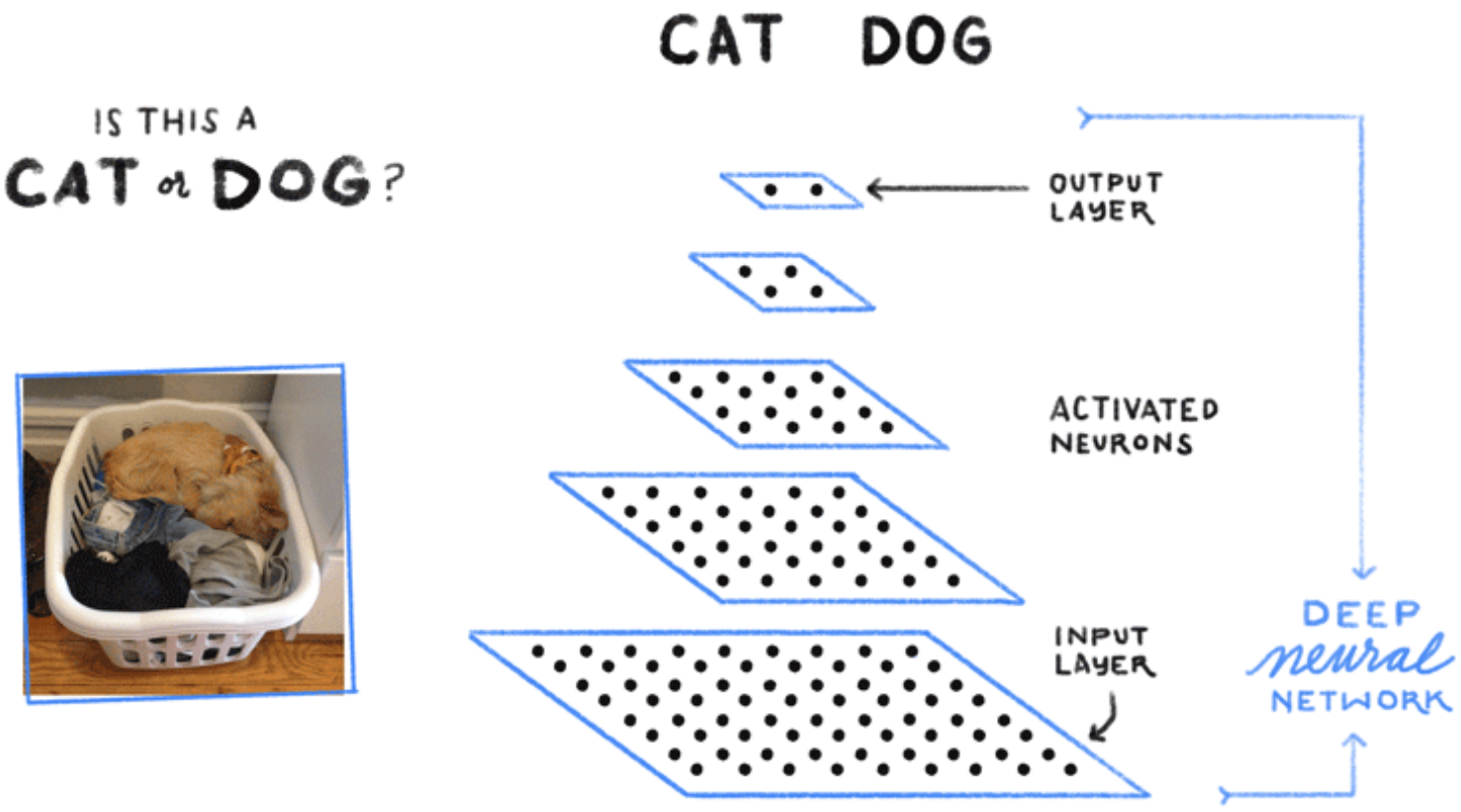


The unconscious AI that learns and performs so well



Deep Learning




IS THIS A
CAT or DOG?
CAT DOG
OUTPUT LAYER
ACTIVATED NEURONS
INPUT LAYER
DEEP neural NETWORK

Google

Automatic description of images

"man in black shirt is playing guitar."

"construction worker in orange safety vest is working on road."

"two young girls are playing with lego toy."

"boy is doing backflip on wakeboard."

"girl in pink dress is jumping in air."

"black and white dog jumps over bar."

"young girl in pink shirt is swinging on swing."

"man in blue wetsuit is surfing on wave."

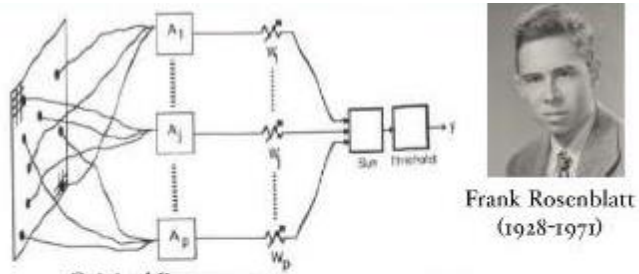
Andrej Karpathy and Li Fei-Fei, http://cs.stanford.edu/people/karpathy/deepimagesent/

The two AI have always existed since the fifties

Conscious

- Problem Solving
- Planning
- Inference
- Logics
- LISP

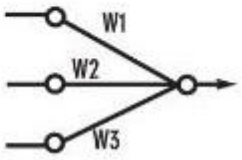
Unconscious



Original Perceptron

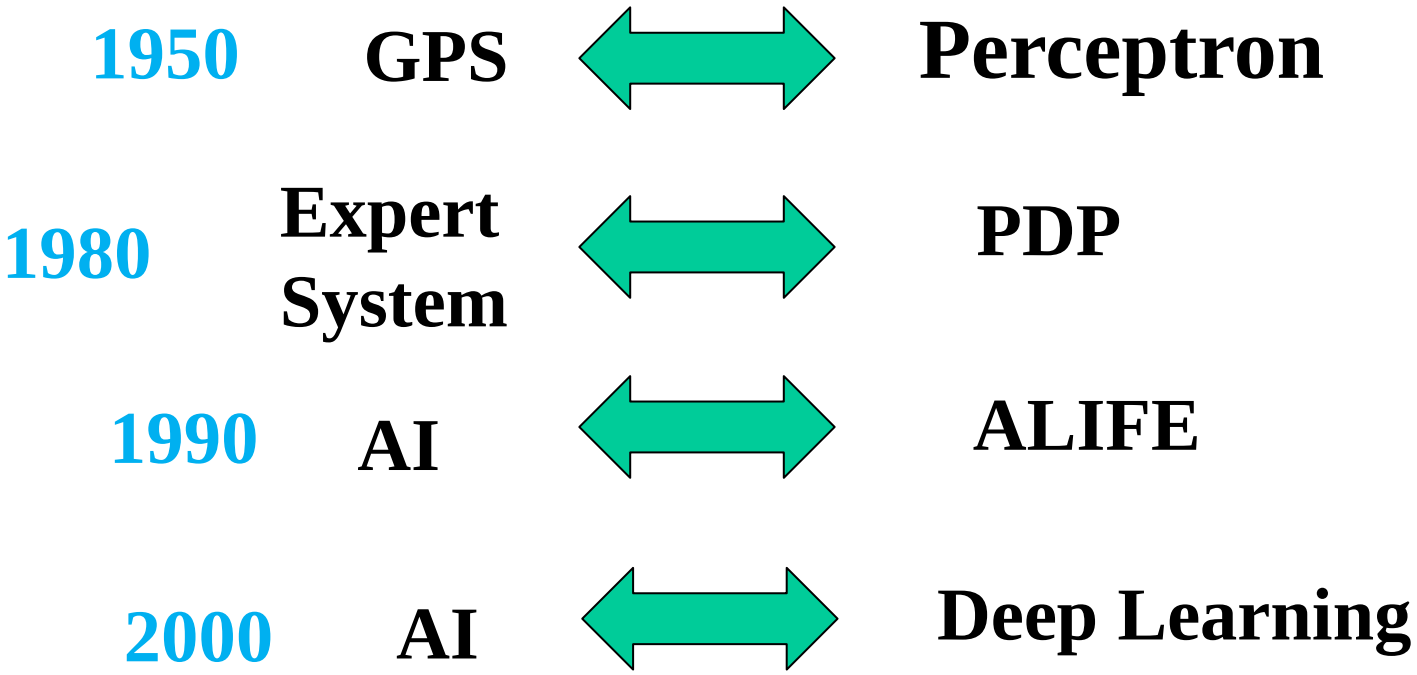
(From Perceptrons by M. L. Minsky and S. Papert, 1969, Cambridge, MA: MIT Press. Copyright 1969 by MIT Press.

Frank Rosenblatt
(1928-1971)



Simplified model:

The tension has always existed between both



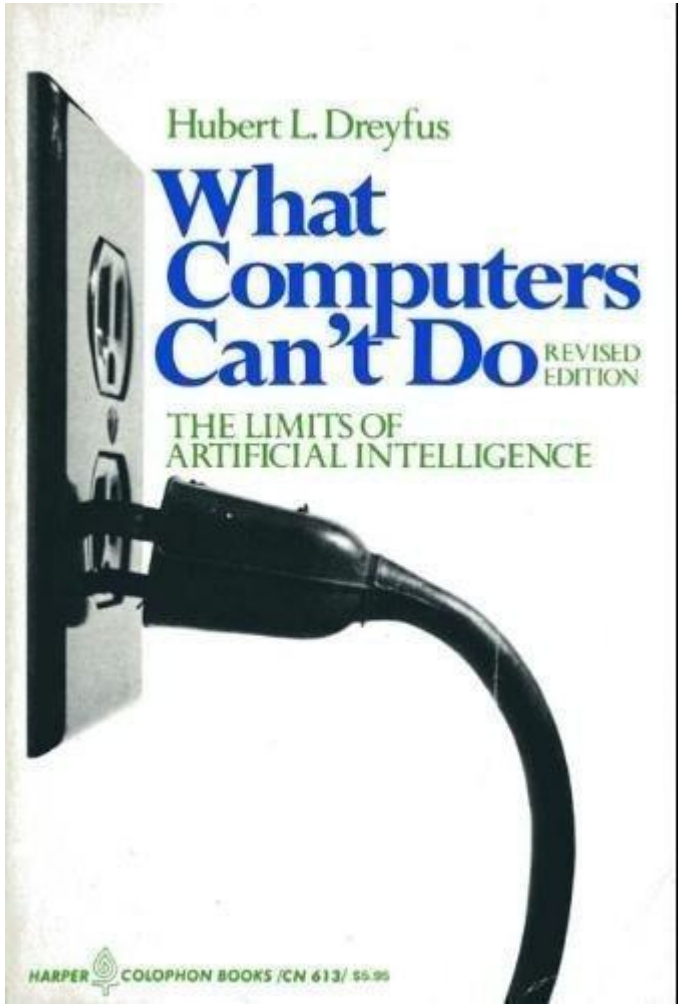
AI -> ALife

AI
Software
Cognitive Science

ALife
Hardware
Biology

My first AI book

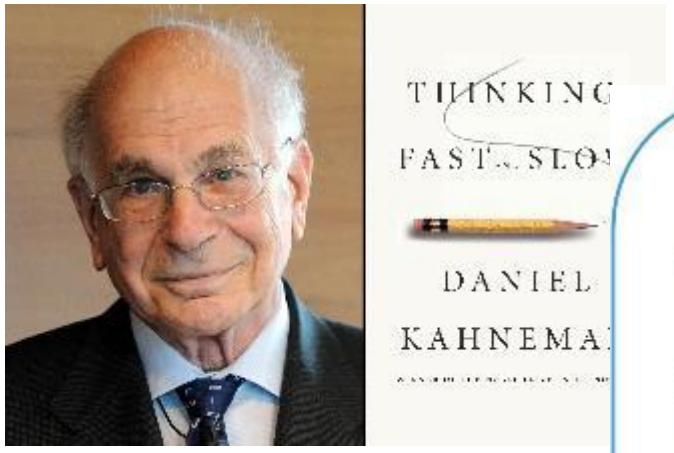
Before and after breakdowns (Bersini, ECAI 1990)

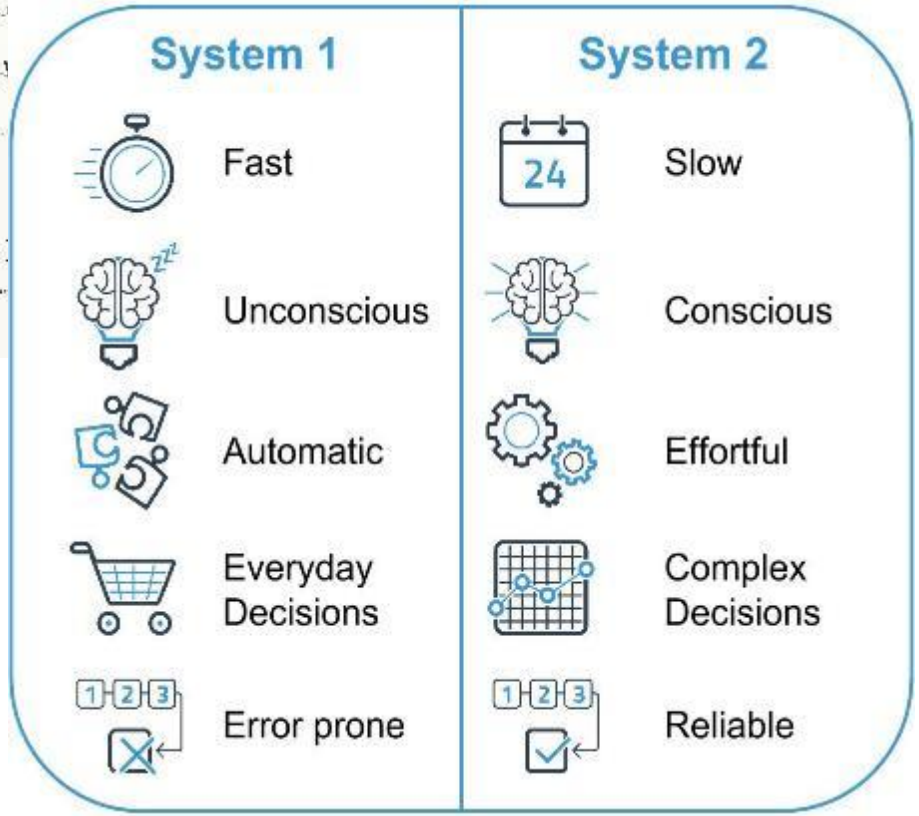


Human breakdowns

- Multiple paths
- No script
- Sequence obstacle
- Expectation failure
- Absolute surprise
- Anticipated risk

Cognitive Sciences

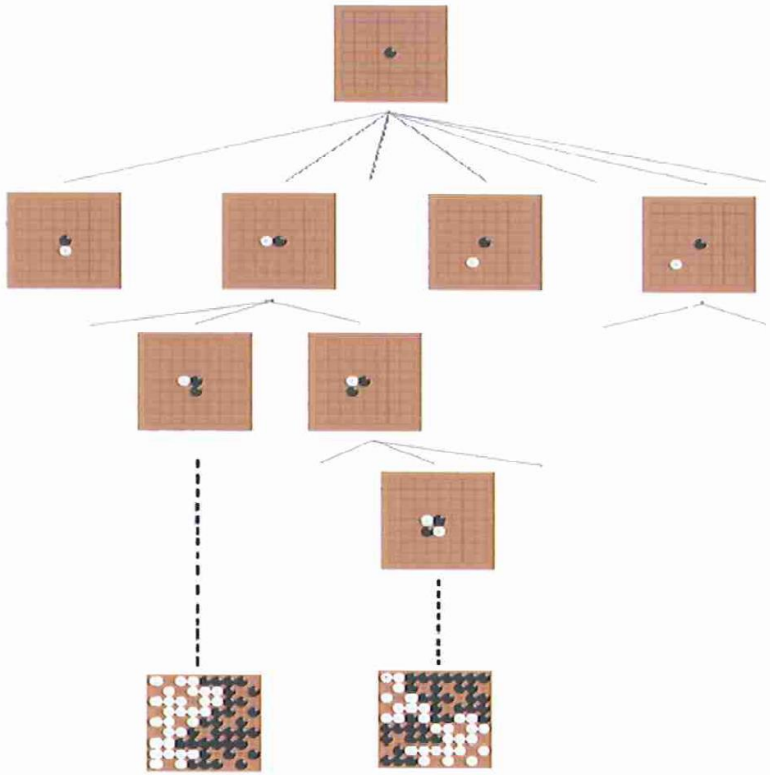


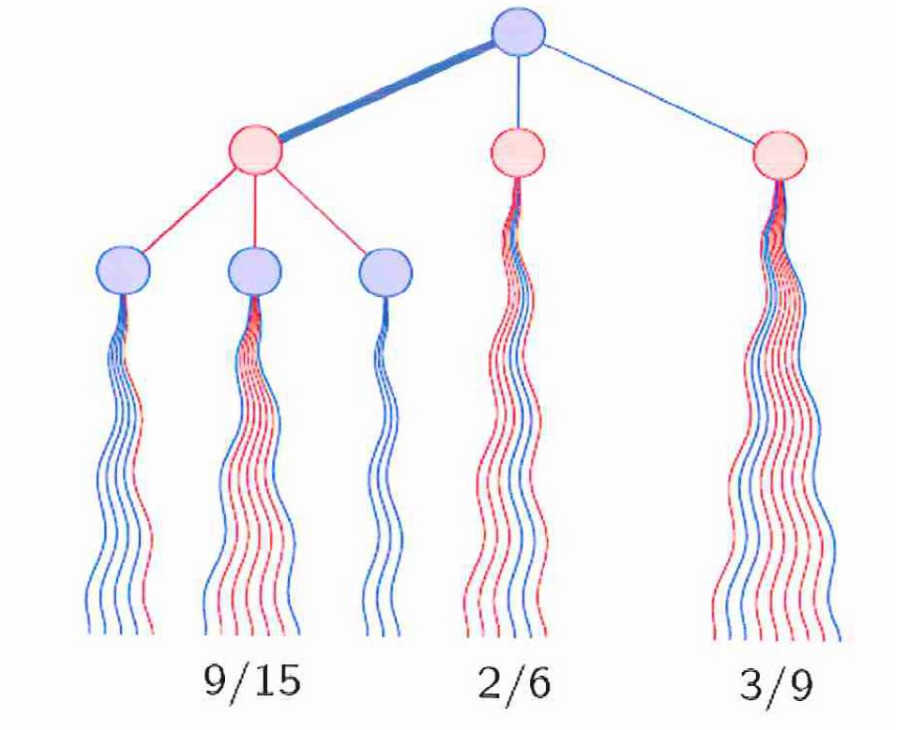


The Engineering AI

- Brute Force Machine Learning tries to avoid occurrence of breakdowns while treating complex problems
- Try to avoid to rely on misleading human expertise
- Machine Learning really tends to escape expertise explicitation

AlphaGO





Conclusions

Paradoxe

Complexity, novelty

Human unconsciouness

Machine consciousness

Human consciousness

Machine unconsciousness

Responsibility goes with accountability: We need to be able to open the unconscious huge black box

And understand why and how it decides!