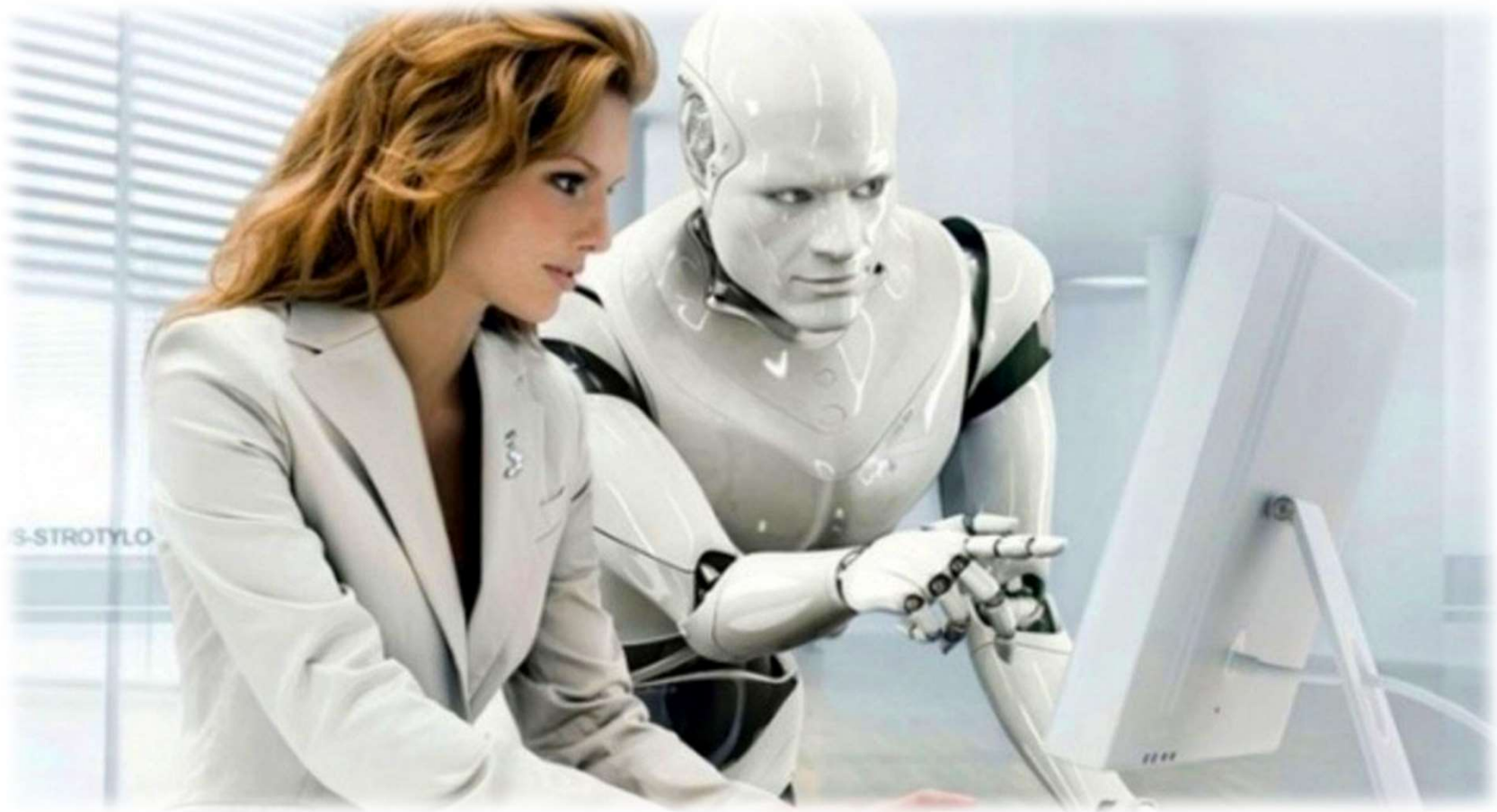


“STRONG” Artificial Intelligence



Afonso DIELA

ID - TD2 - TP3

ITI Cycle

2015-16

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SOURCES USED

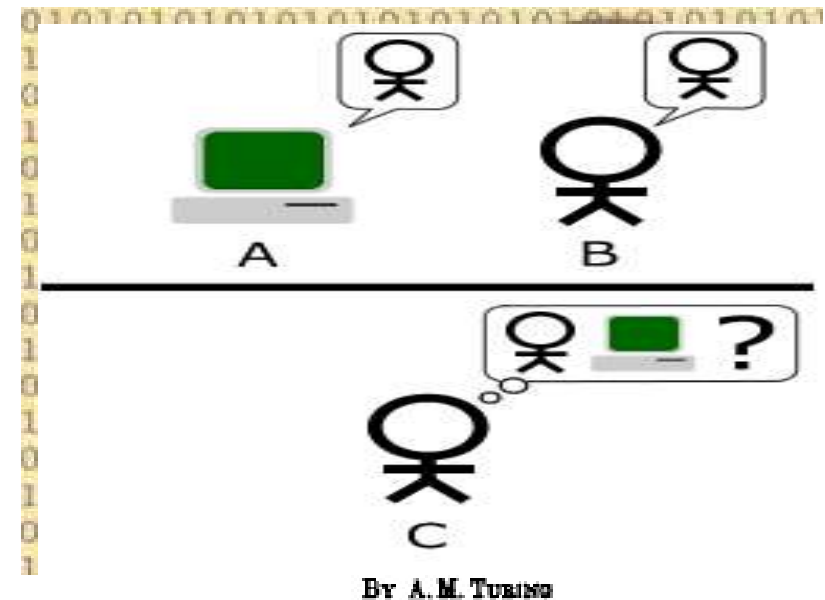
INTRODUCTION

II Choice of subject

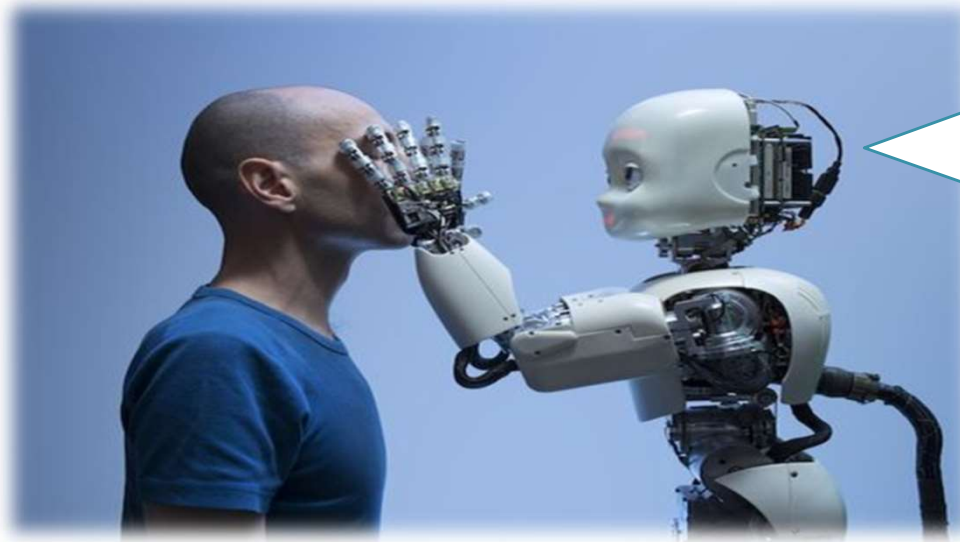


I.II. History

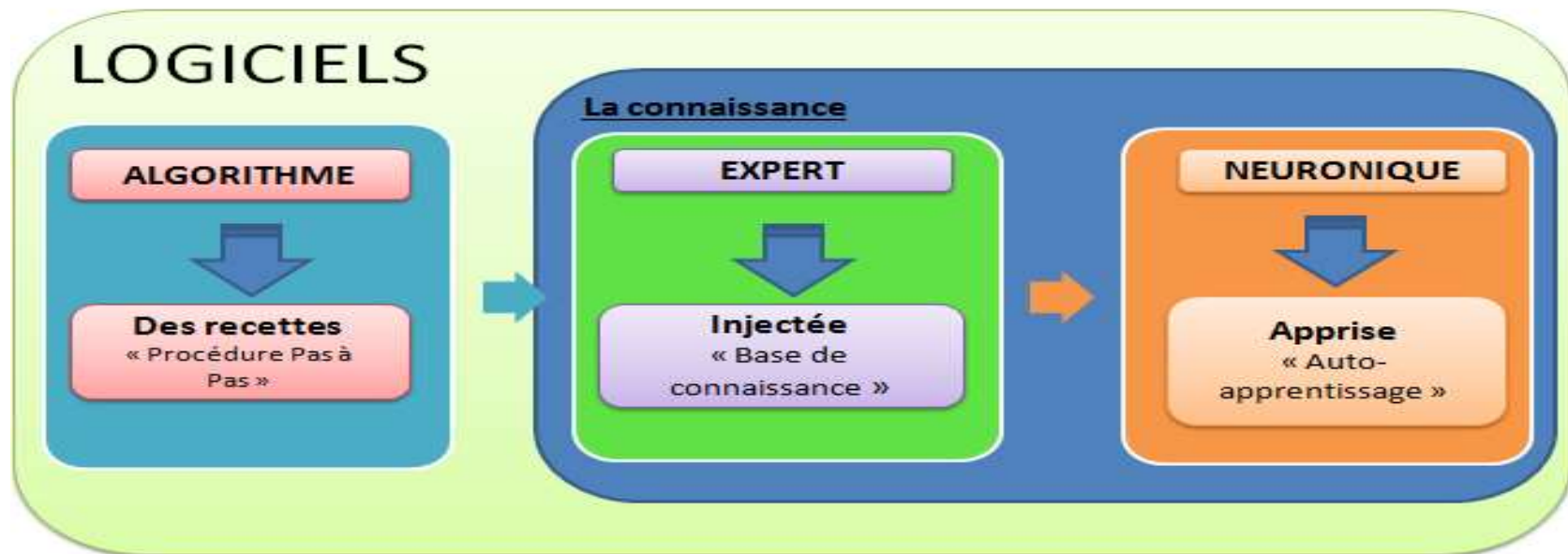
- **1950:** Turing Test “Can machines think?” (**Alan Turing** 1912-1954).
- **1955-56:** Logic Theorist (**Herbert Simon, Allen Newell**).
- **1956:** Dartmouth Conference (**Marvin Minsky , John McCarthy**).
- **1958 – 59:** List processing “ **LISP**” (**John McCarthy**).
- **1960-80:** The years of crises.
- **1983 - 1999: Swarm Intelligence** “distributed intelligence” The birth of a new field of research.



I.III. What is Artificial Intelligence?

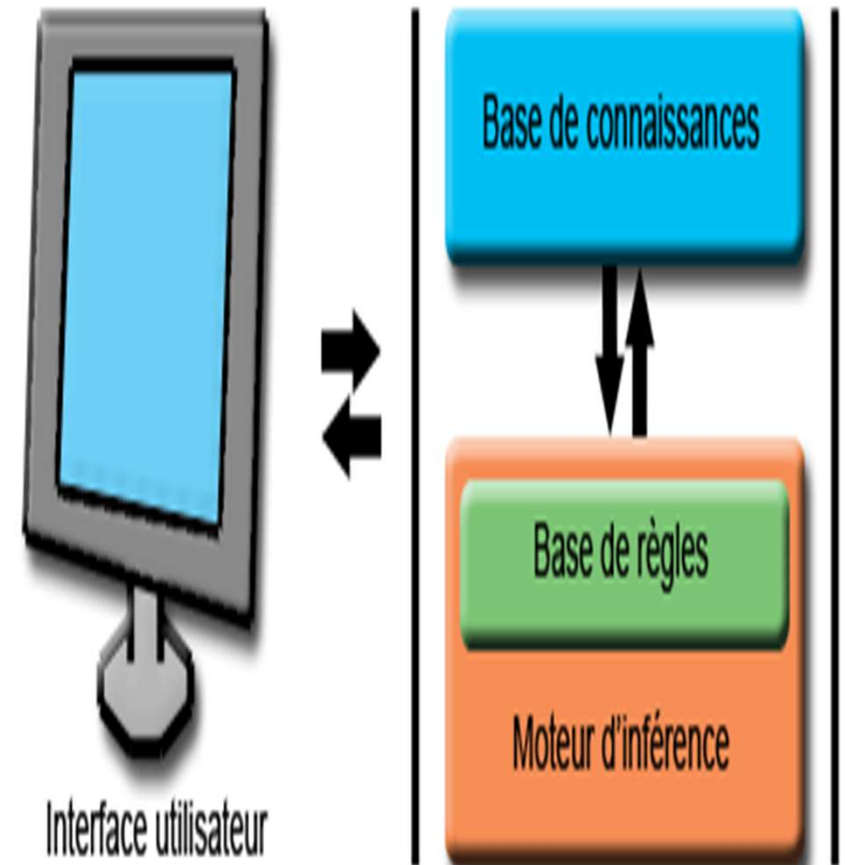


Computer systems
Understanding.
Reasoning.
Dialogue.
Adaptation to new situations.
Learning.



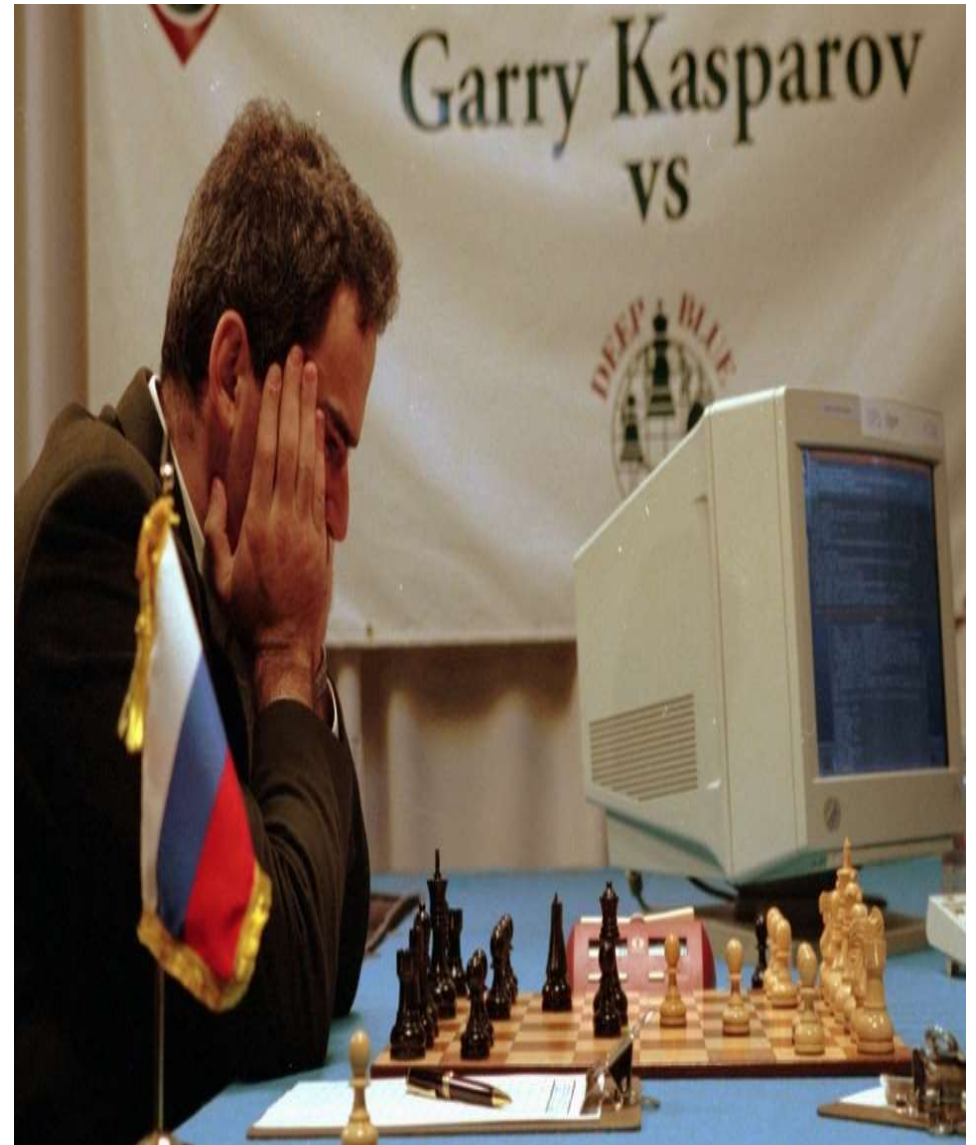
WEAK AI

- Human intelligence.
- Scheduled in advance.
- No evolution.
- Widely used by businesses (quick to manufacture and cost less \$)
- Based on the expert system:
 - ***A database***
 - ***an inference engine***
 - ***a user interface***

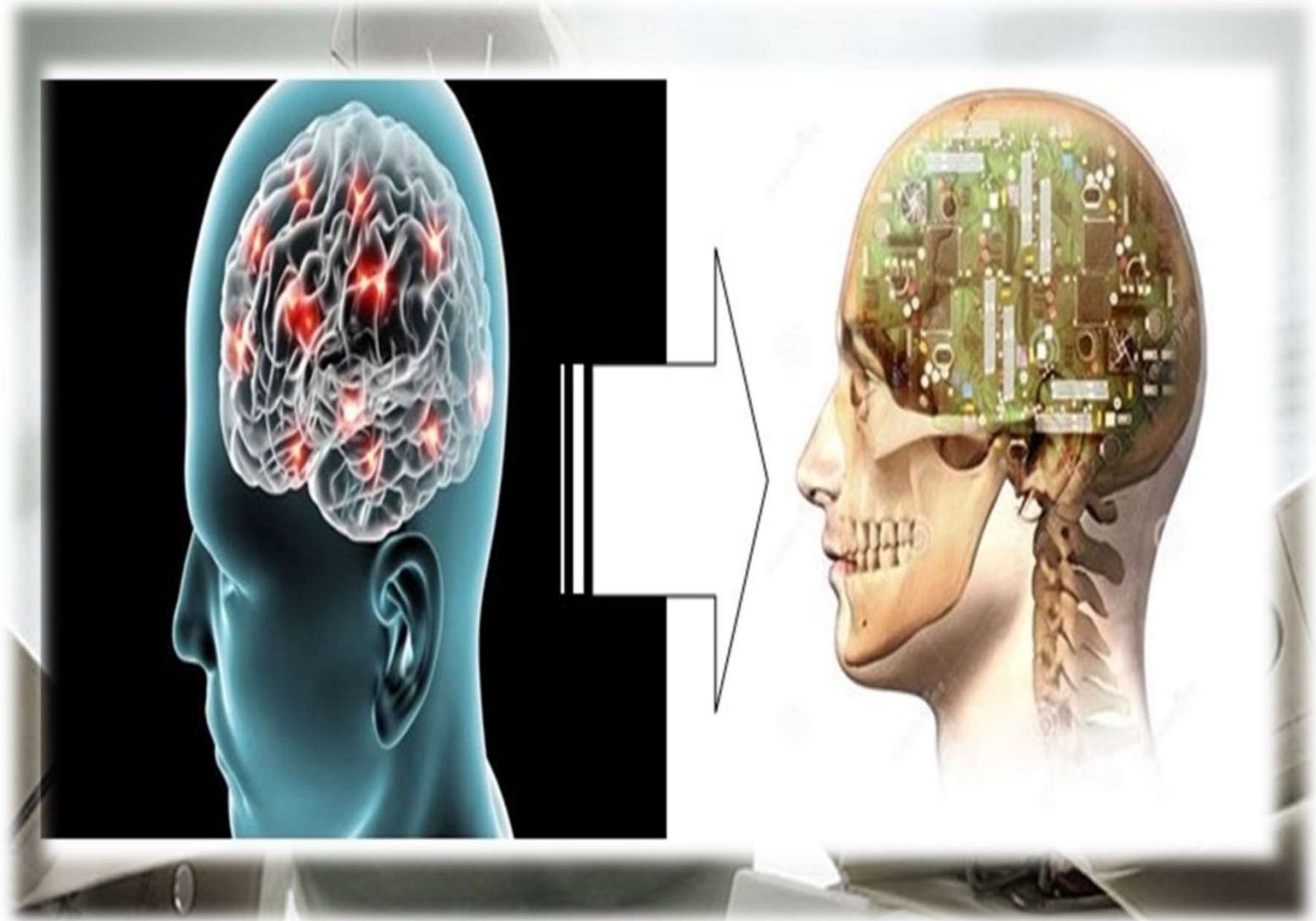


Examples of Weak AI

- Eliza created by **Joseph Weizenbaum** (1964 - 1966).
- First AI program
- Chess game
- **Deep Blue**

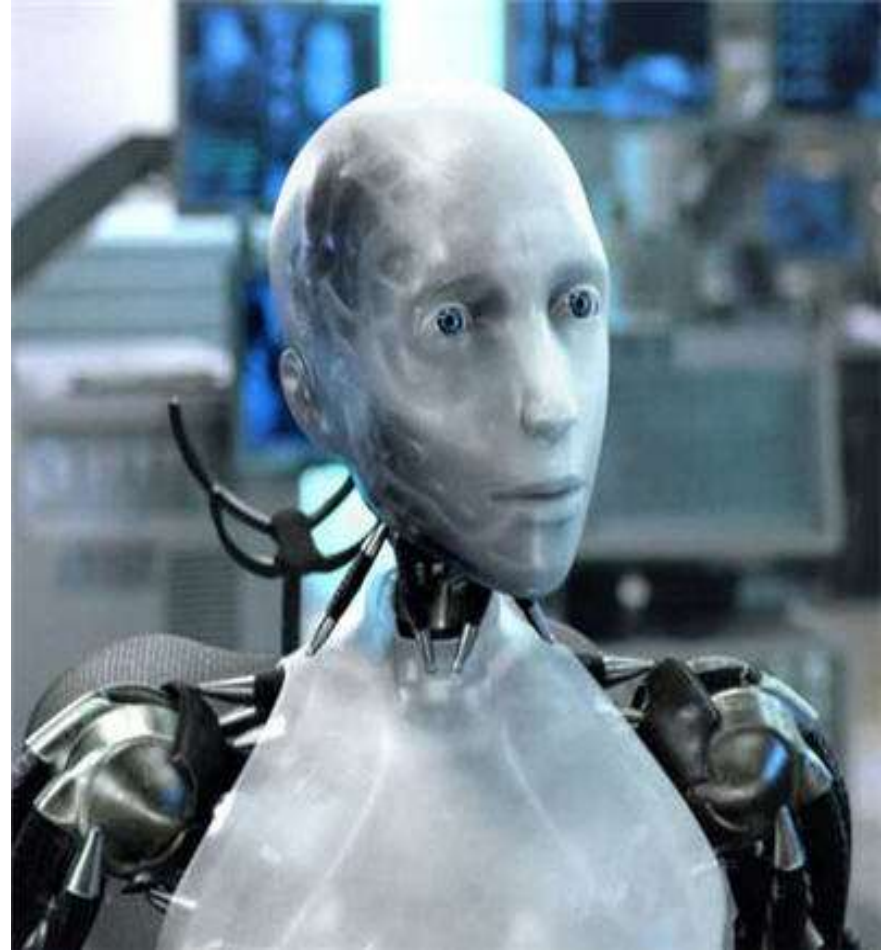


STRONG AI



STRONG AI

- Intelligent program (logical reasoning close to human)
- Program simple tasks to then do complex tasks, to understand its own operations)
- **Deep learning** (deep learning)
- Machine learning methods.
- **Neural network**



Sonny , virtual example of strong AI (film I, robot)

NEURAL NETWORKS

Historical

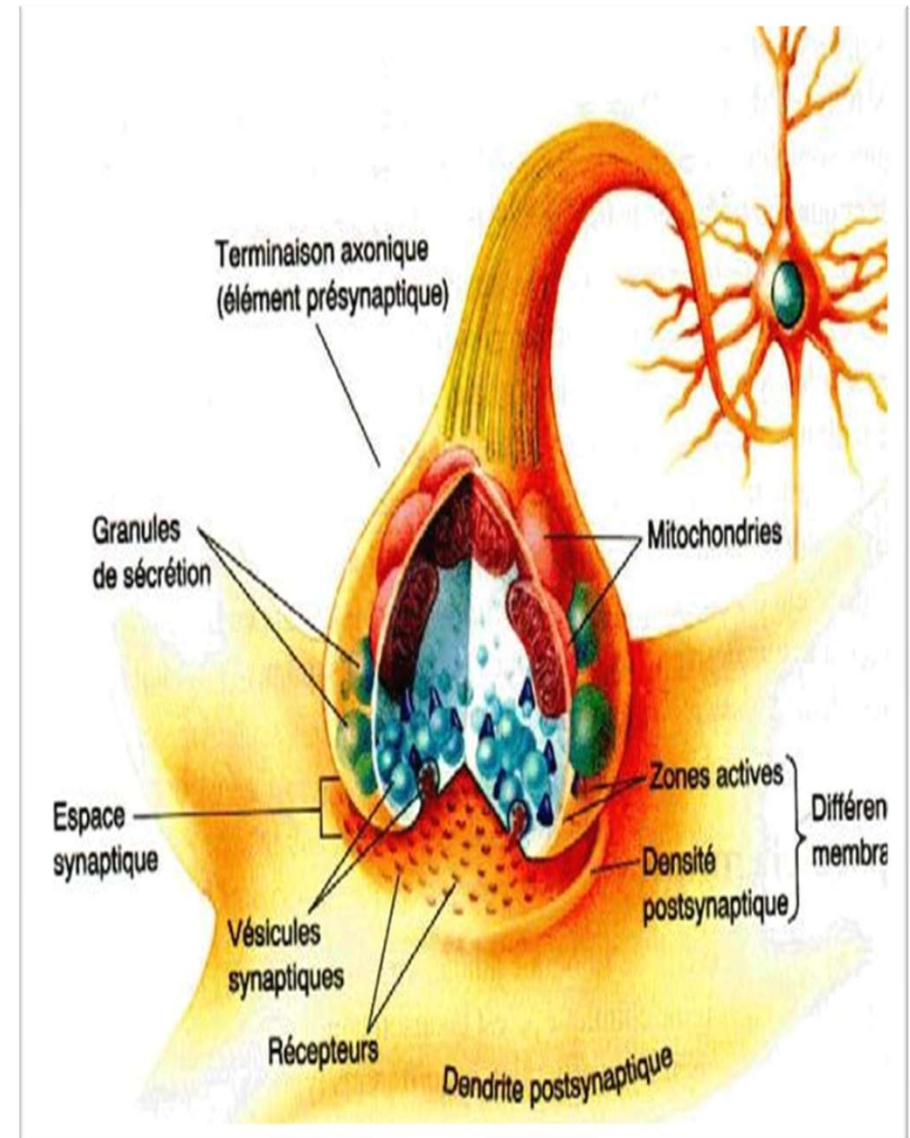
- 1943: **J.Mc Culloch and W. Pitts** establish the "logical model" of the neuron which opens the way to technical models.
- 1957 : **F. Rosenblatt** realizes the **Perceptron** , the first technical model based on the modification of weights.
- 1969 : **M.Minsky and S.Papert** criticize and demonstrate the limitations of **perceptron -type neural models** .
- 1982: **J. Hopfield** (physicist) proposes a new approach to neural networks based on the analogy with large particle media. This revives interest in neural networks

Applications

- Image processing
- Identification of signatures
- Character recognition (typists or handwritten)
- Speech recognition
- Recognition of acoustic signals (underwater noise, etc.)
- Extracting a signal from noise
- Control of non-linear (non-modelable) servo systems
- Robotics (task learning)
- Decision support (medical, banking, management, etc.)

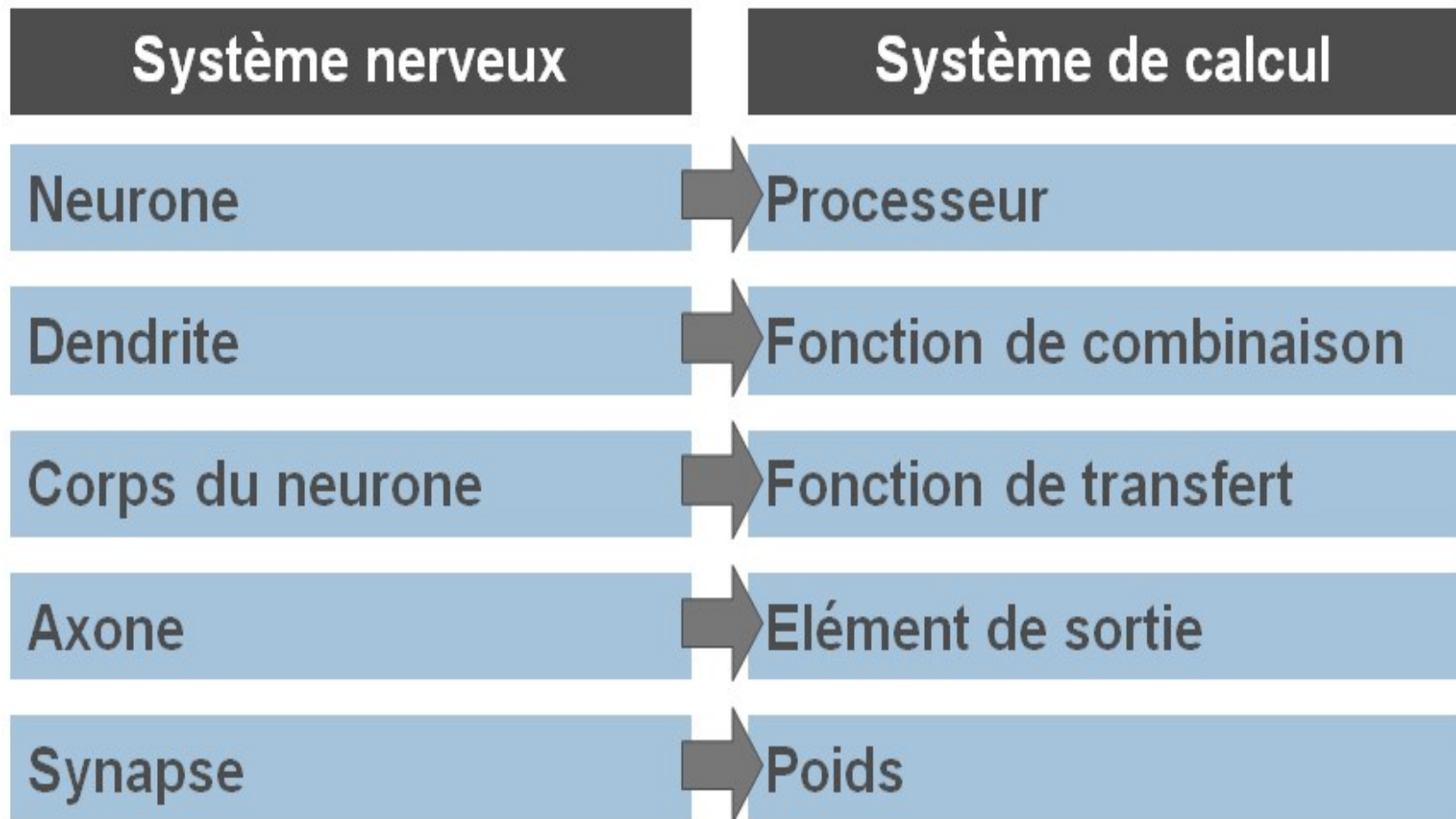
Biological

- In a brain there are 10^{12} neurons with 10^3 to 10^4 connections per neuron.
- **Dendrite** : receiver of messages
- **Nucleus** : generates the action potential (the response)
- **Axon** : transmits the signal to the following cells
- **Synapse** : axon-dendrite junction (more or less active)



Logical model of the neuron

The modeling of the biological nervous system is based on the following correspondence



Modeling Levels



- NEURAL CIRCUITS



- MENTAL MECHANISMS

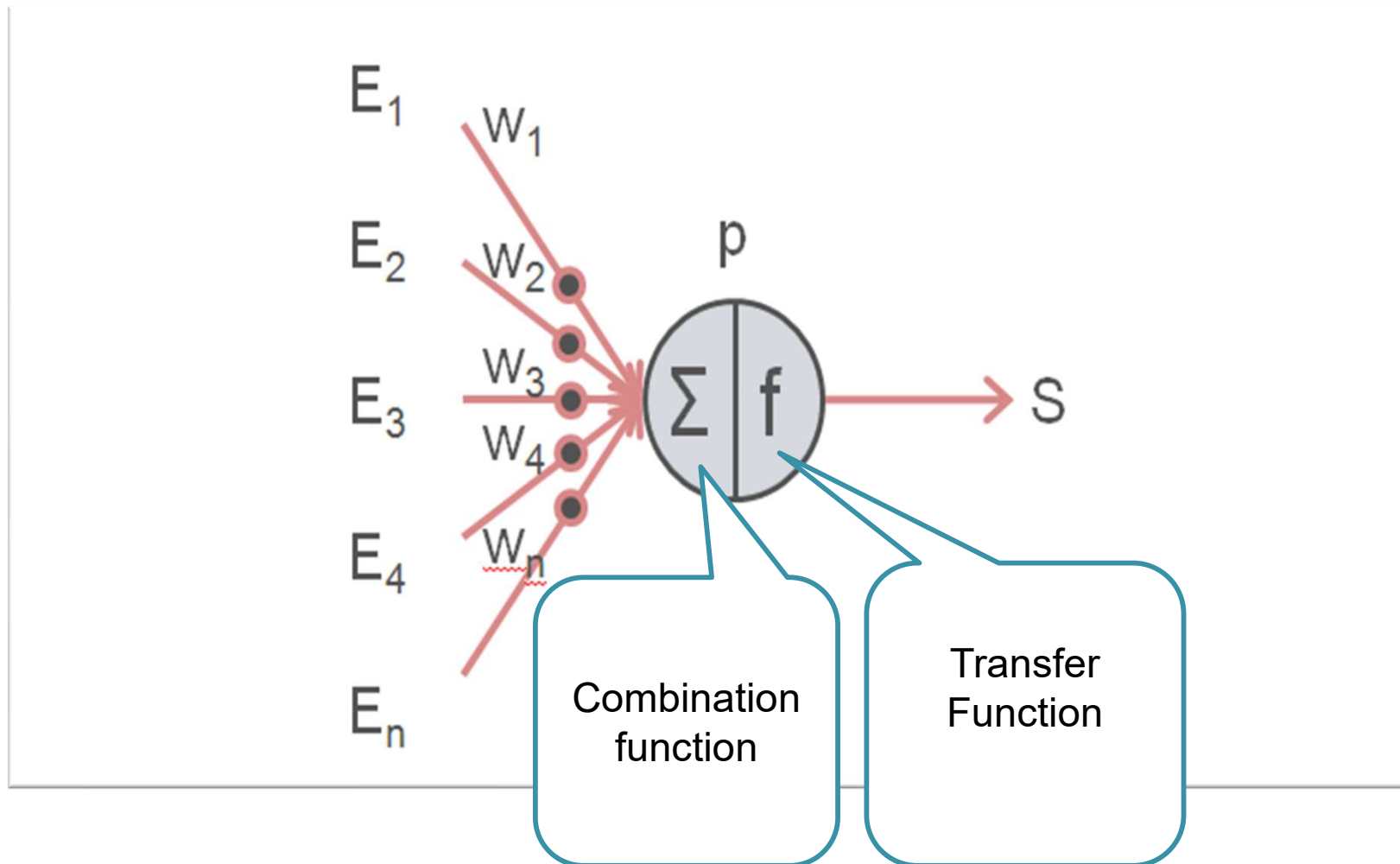


- SMART BEHAVIOR

Graphical representation

The Combination Function calculated the influence of each input taking into account its weight . It sums the weighted

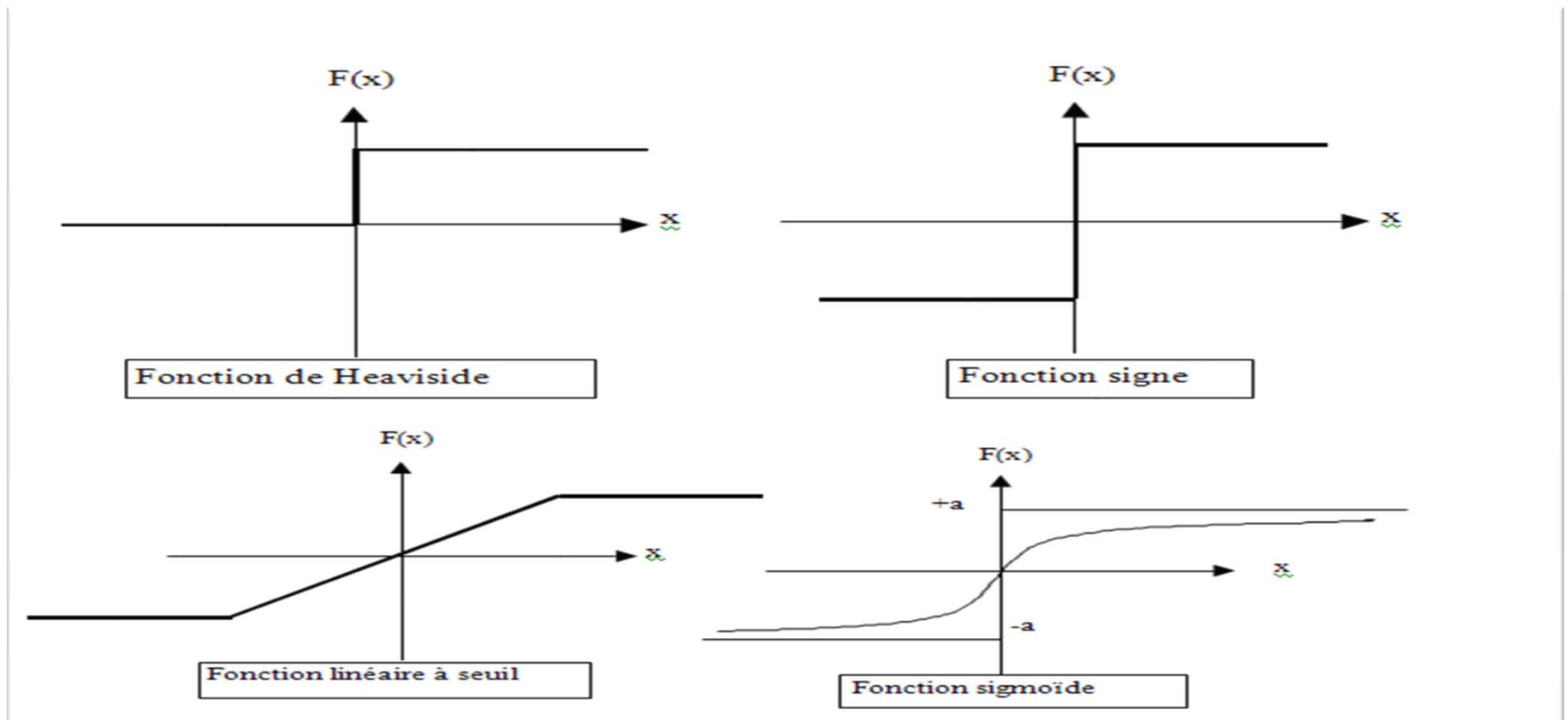
$$p = \sum W_i E_i$$



Transfer functions

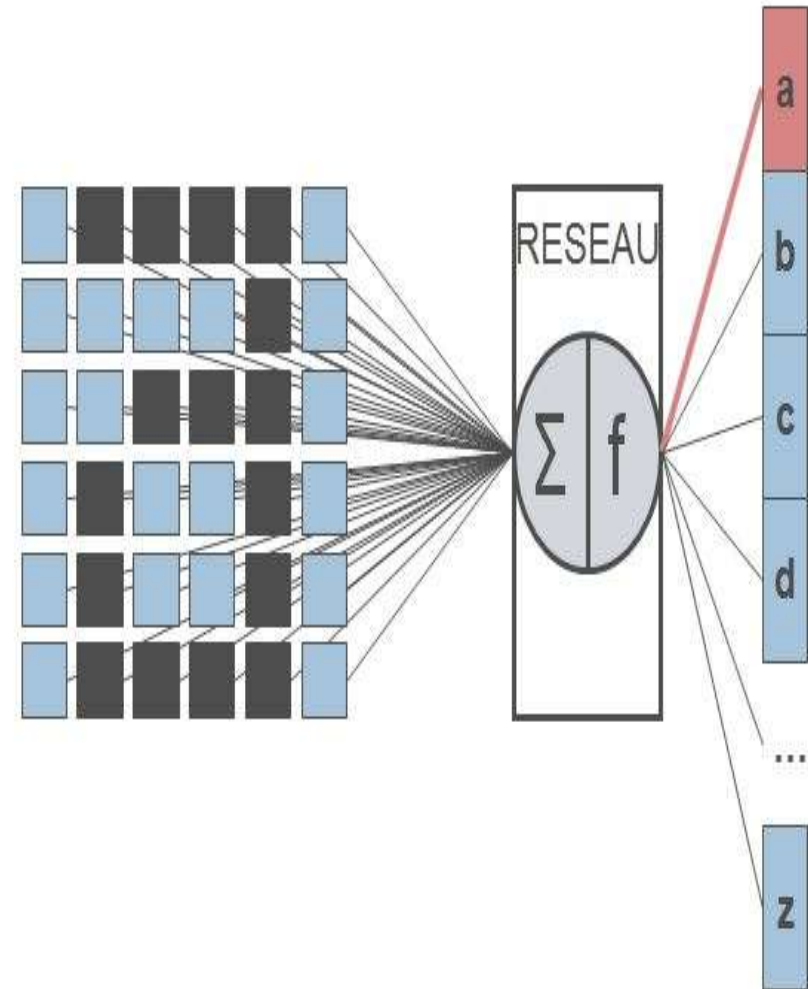
- **The Transfer Function** determined the state of the neuron (output)

$$S = f(p) \text{ or } S = f(\sum W_i E_i)$$



MACHINE LEARNING

- Supervised Learning (more widespread)
- Unsupervised Learning (less used)
- **OCR** (Operating Character Recognition or Text Recognition)



AlphaGo



The challenges of strong AI

Questions we ask ourselves about this type of AI

Can we build a conscious AI?	No, consciousness would be the property of living organisms. This position is defended mainly by philosophers.
Do we have the algorithms required to build such intelligence?	No, current computers are not capable of this. It does not have the appropriate "language"
Is "thinking" applicable to a machine?	No, a machine calculates. But thought is a fact that constantly evolves over time: these two processes are, to say the least, incompatible.

The limits

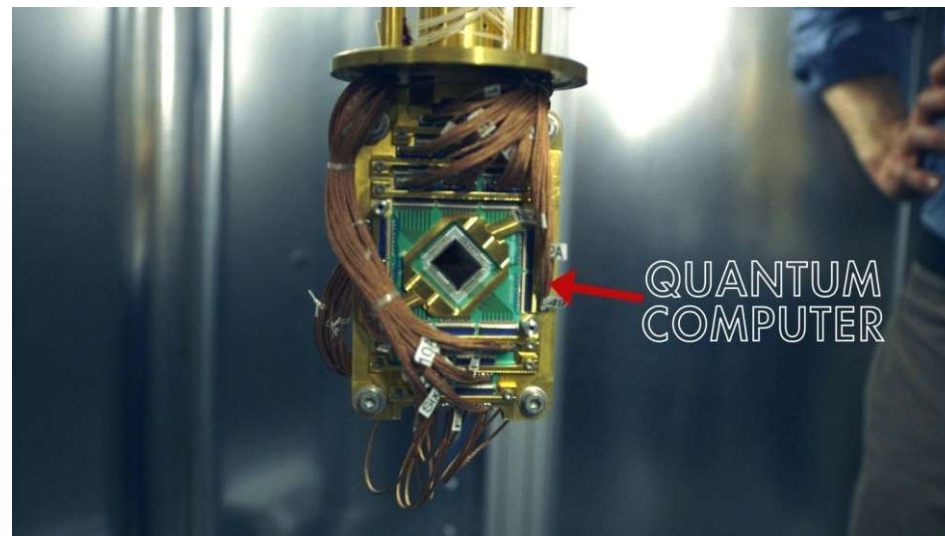
Limits of neuroscience



Moore's Law vs. Component Miniaturization



Limit of computing power



ADDITIONAL ASPECTS

IV.II. Our disappearance or our future?!

- If she would take control of herself.
- Autonomous drones



IV.II. Legal and ethical issues

- Self-driving cars



CONCLUSION

- Revolutionize our humanity.
- Many applications.
- Technology of the future.
- Very large area.
- Scary technology.

SOURCES USED

Supervised personal work (TPE):

- <https://sites.google.com/site/int3llig3nc3artifici3ll3/une-opposition-entre-ia-forte-et-ia-faible>
- <http://tpe-intelligence--artificielle.e-monsite.com/pages/il-intelligence-artificielle/conception-de-l-ia-1.html>

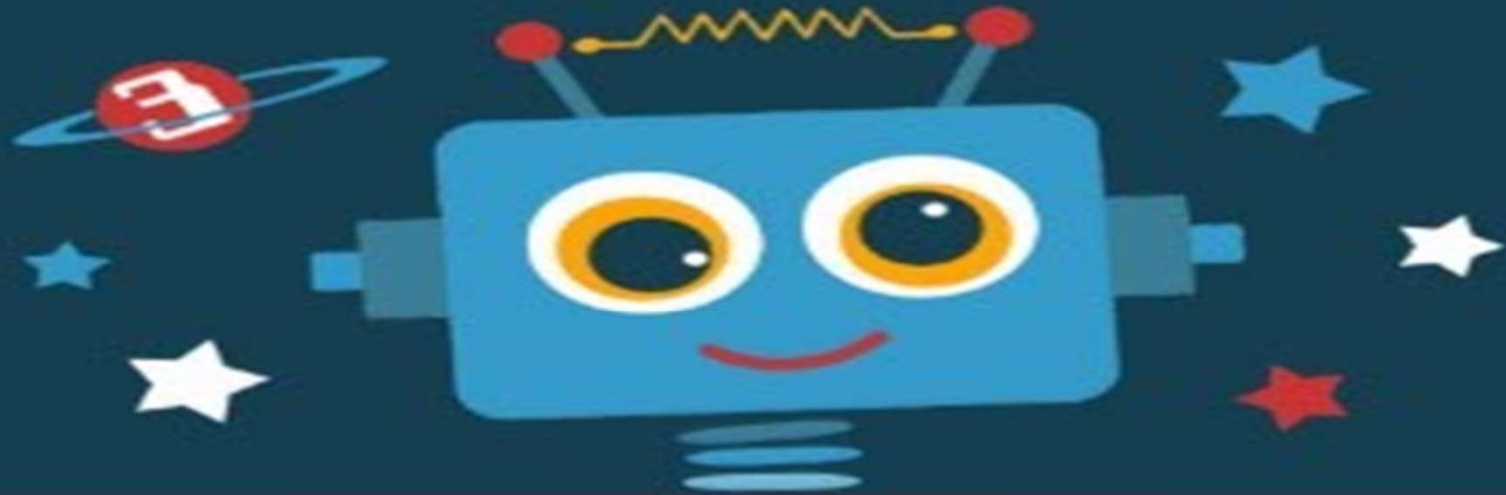
Wikipedia:

- <https://fr.wikipedia.org/wiki/ELIZA>
- https://fr.wikipedia.org/wiki/ELIZA#/media/File:GNU_Emacs_ELIZA_example.png
- irobot.wikia.com:
- <http://soocurious.com/fr/cortana-imitation-human-logiciel/>

Books:

- Artificial Intelligence - Jack Challoner
- Superintelligence - Nick Bostrom

Thank



You!