The
Learning Process

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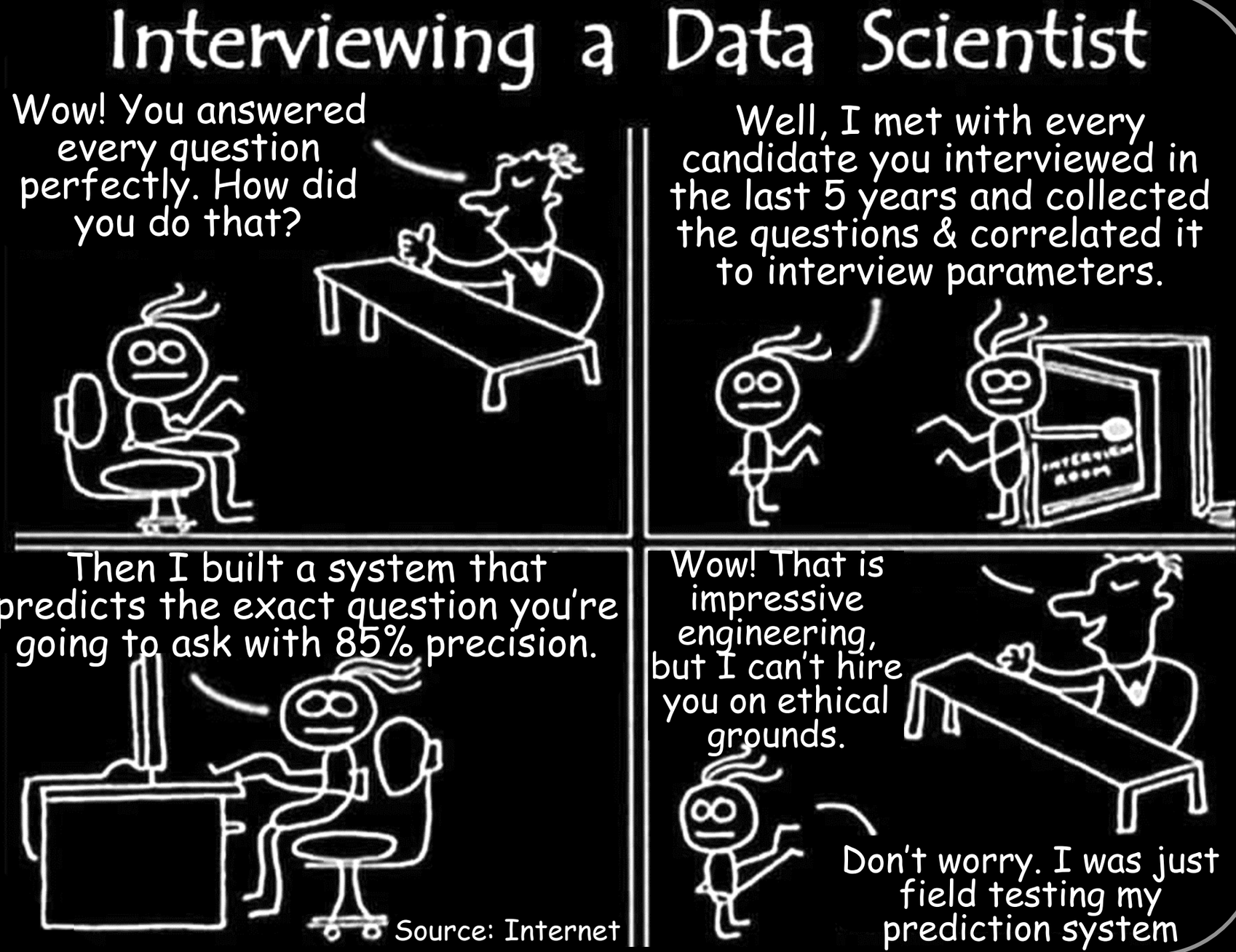
Its all about learning...

So, what is learning?



Agenda

- What is Learning?
- Types of Learning
- The Steps of the Learning Process
- Theories of Learning
- Brain Based Learning
  - Biological Neural Networks (BNN)
- Computer Simulated Learning
  - Artificial Neural Networks (ANN)
- The Machines Learning Process
- Artificial Intelligence

Learning...

is an intellectual, emotional and physical process

Begin learning process

↓

Acquire new emotions, knowledge and skills

↓

Continues through modifications of the way we feel, think or do things

↓

Make changes in attitudes, decisions and behaviors

↓

End learning process

Types of Learning

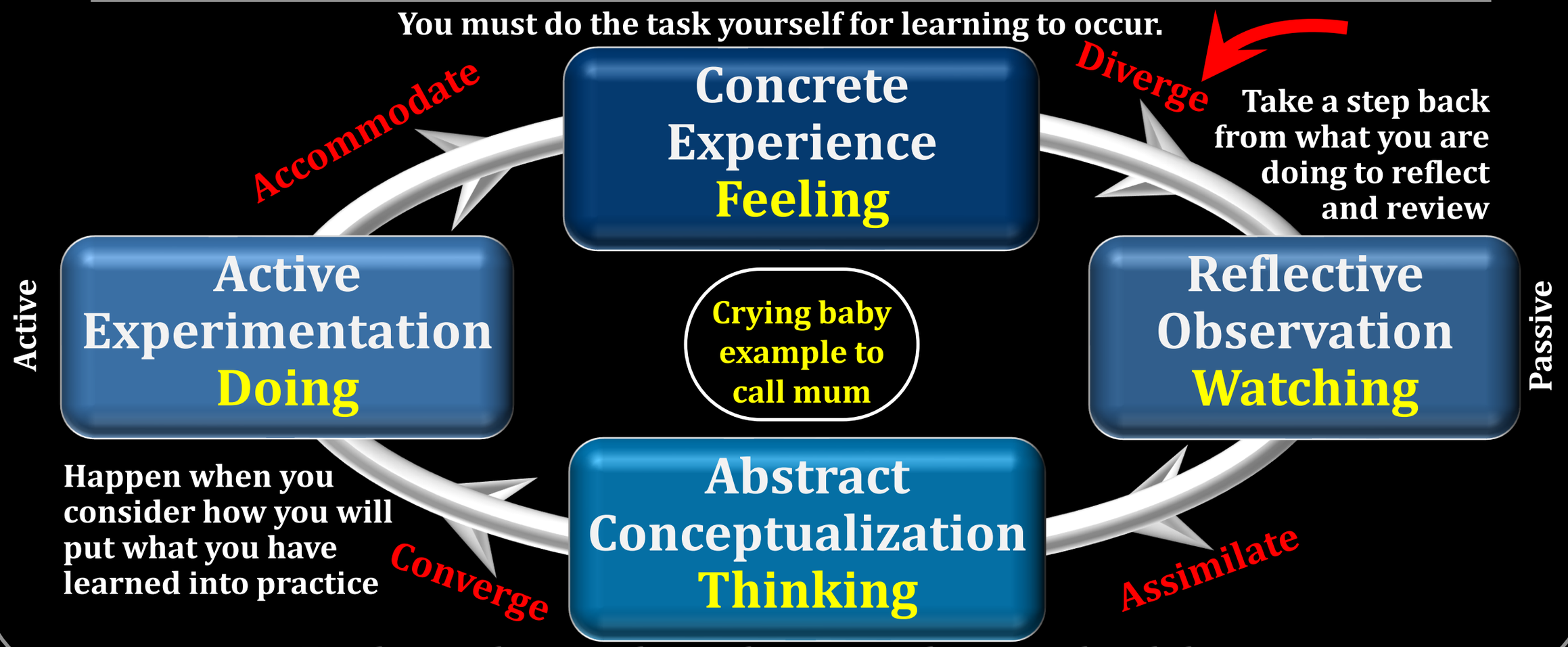
Affective Learning
Attitude
Deals with feelings, attitudes, opinions or values

Cognitive Learning
Knowledge
Deals with intellectual behavior and requires thinking

Psychomotor Learning
Skill
Involves acquiring skills required in integration of mental and muscular activities

https://www.fiddleheads.ca/articles/post/q-and-a--is-upper-arm-movement-during-bowing-okay

Kolb's Experiential Learning Cycle



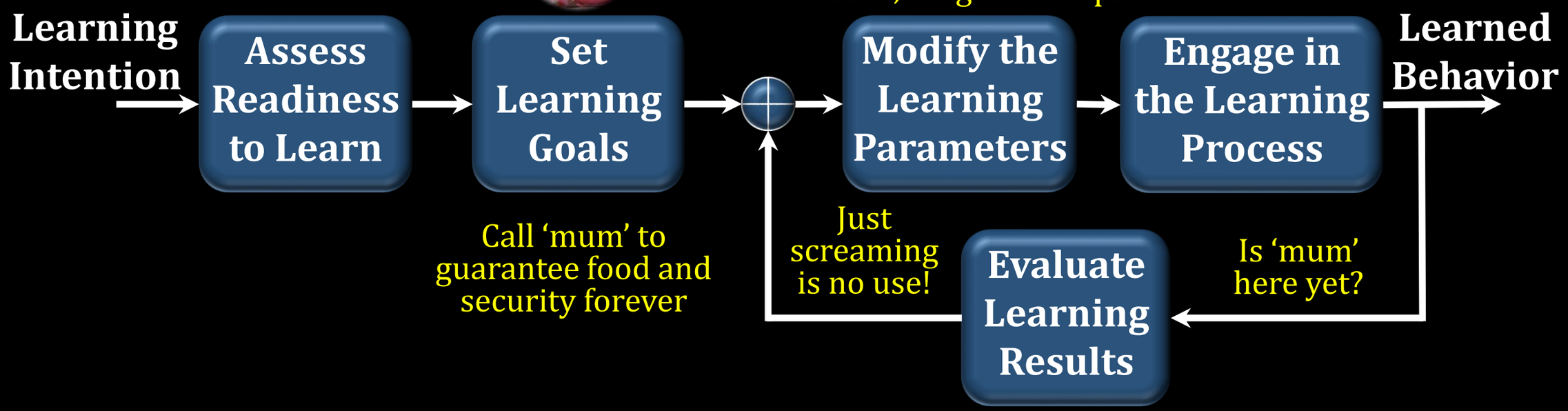
Source: skillsyouneed.com

The Steps in the Learning Process

assess readiness, set goals, modify params, learn, assess, modify params

https://www.facebook.com/permalink.php?story_fbid=257829889686039&id=100063770887871

https://www.youtube.com/watch?v=3xZYN1UKPTY

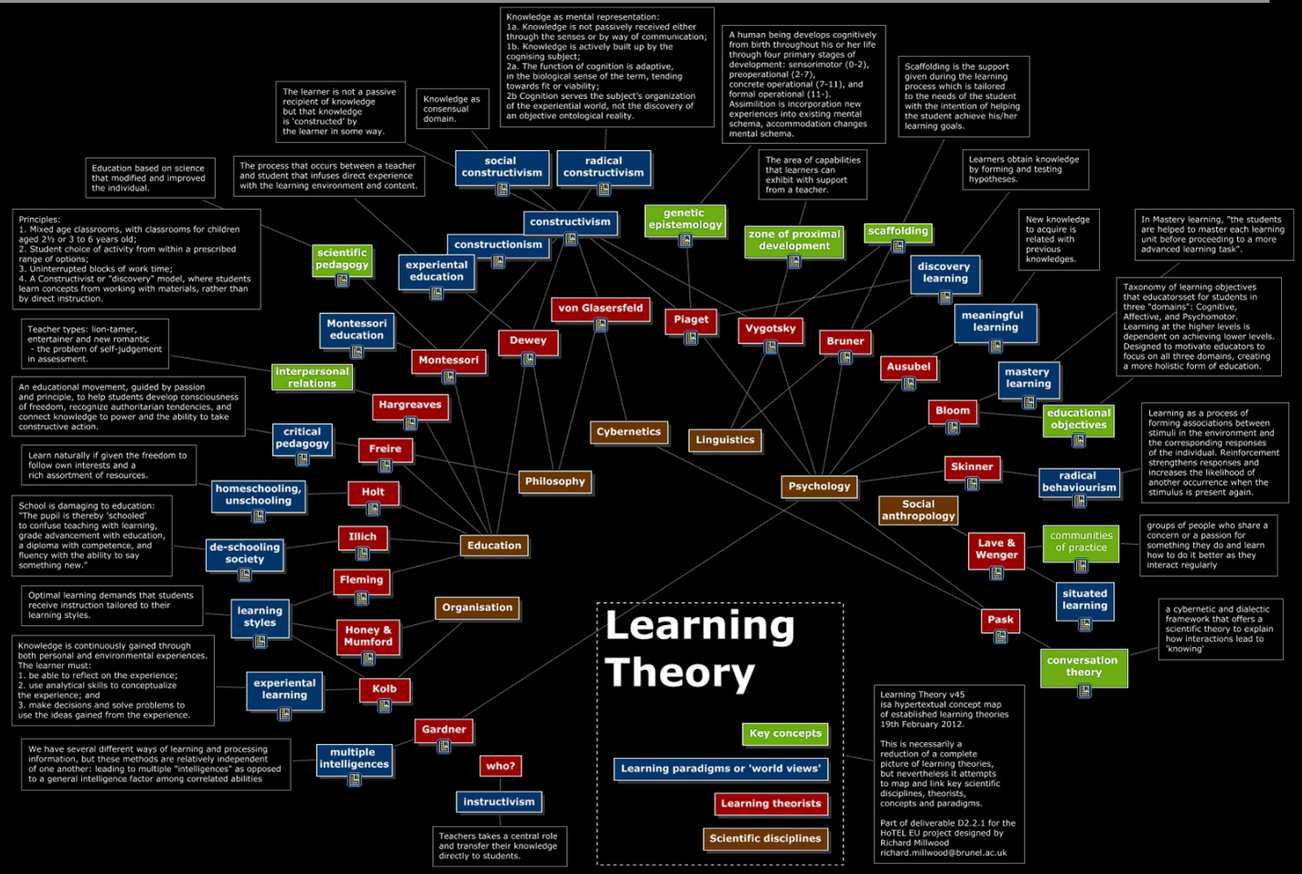


Case Study: A new-born baby intends to talk and the trials and the learning process continuous forever…

Theories of Learning

There are just too many of them!

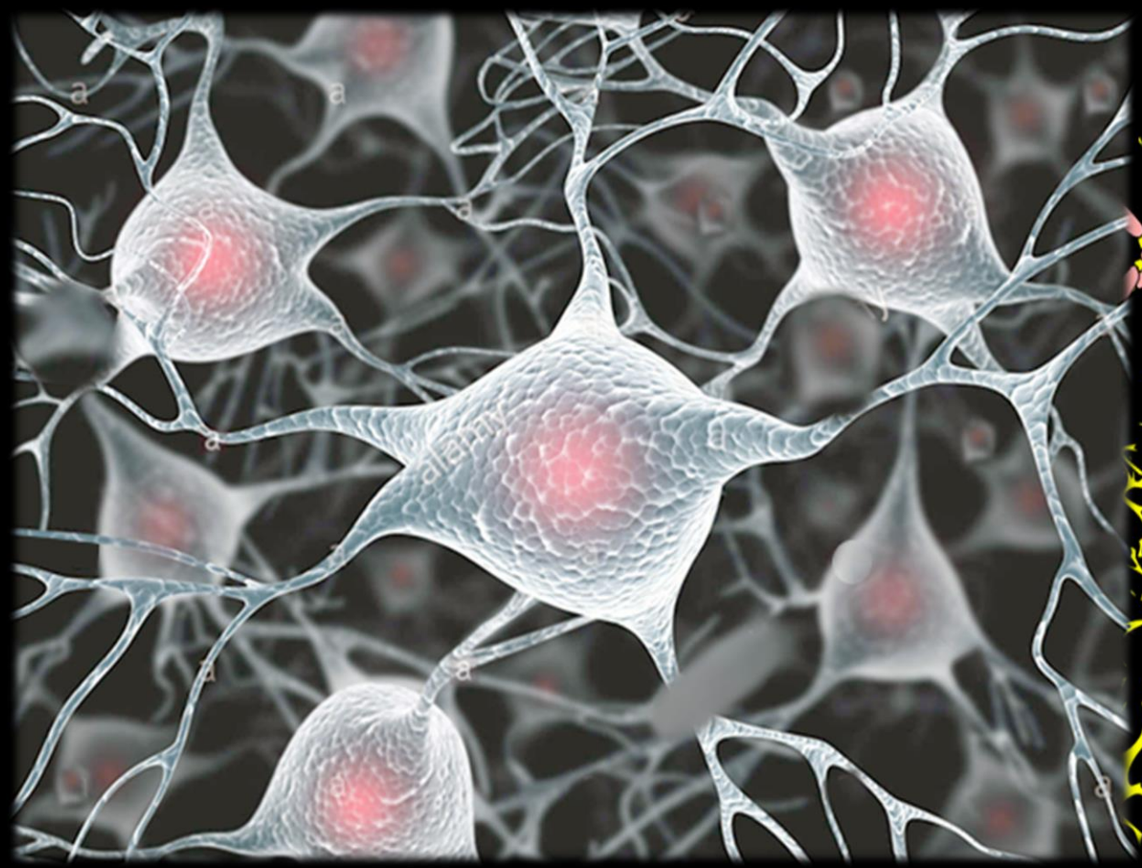
- Behaviorism
- Cognitivism
- Social Learning Theory
- Social Constructivism
- Multiple Intelligences
- Brain Based Learning



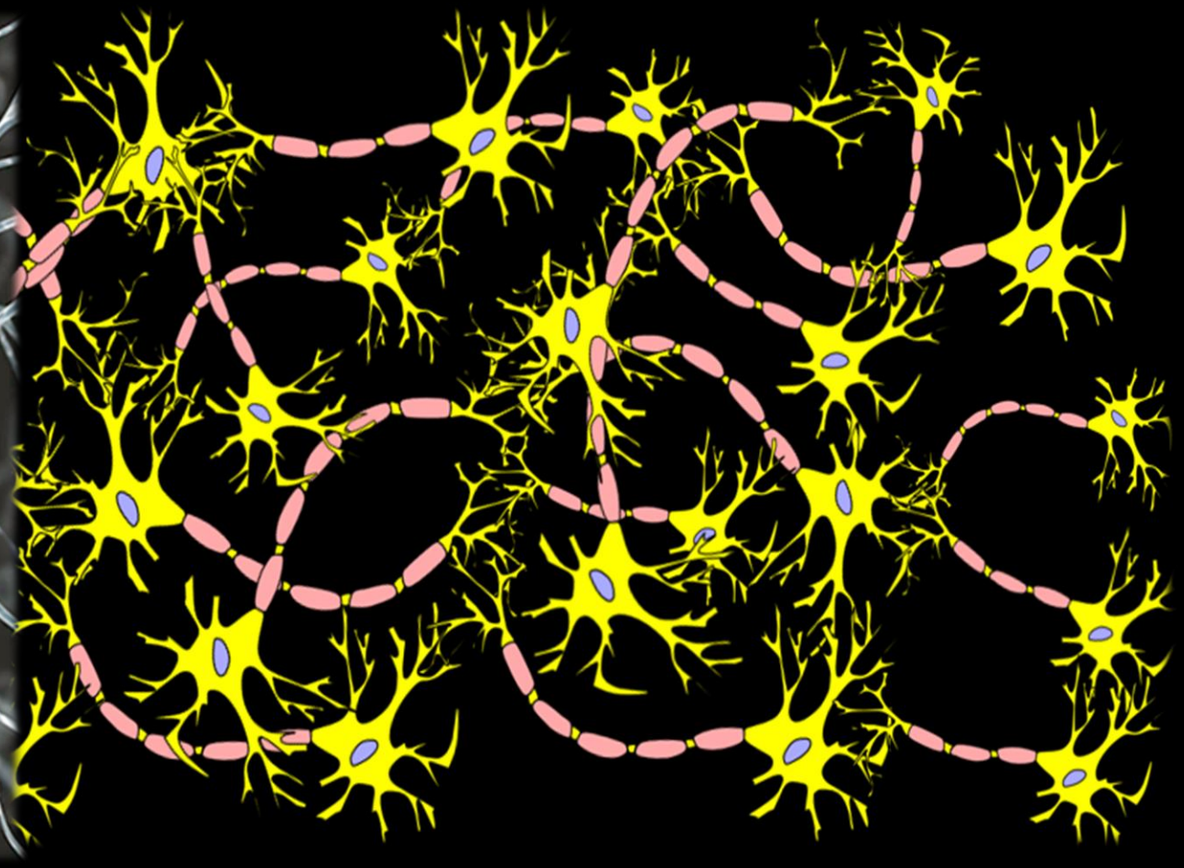
- Let's have a look at the "Brain Based Learning"

https://www.teachthought.com/learning/a-visual-summary-the-most-important-learning-theories/

Brain Based Learning
Biological Neural Network (BNN)



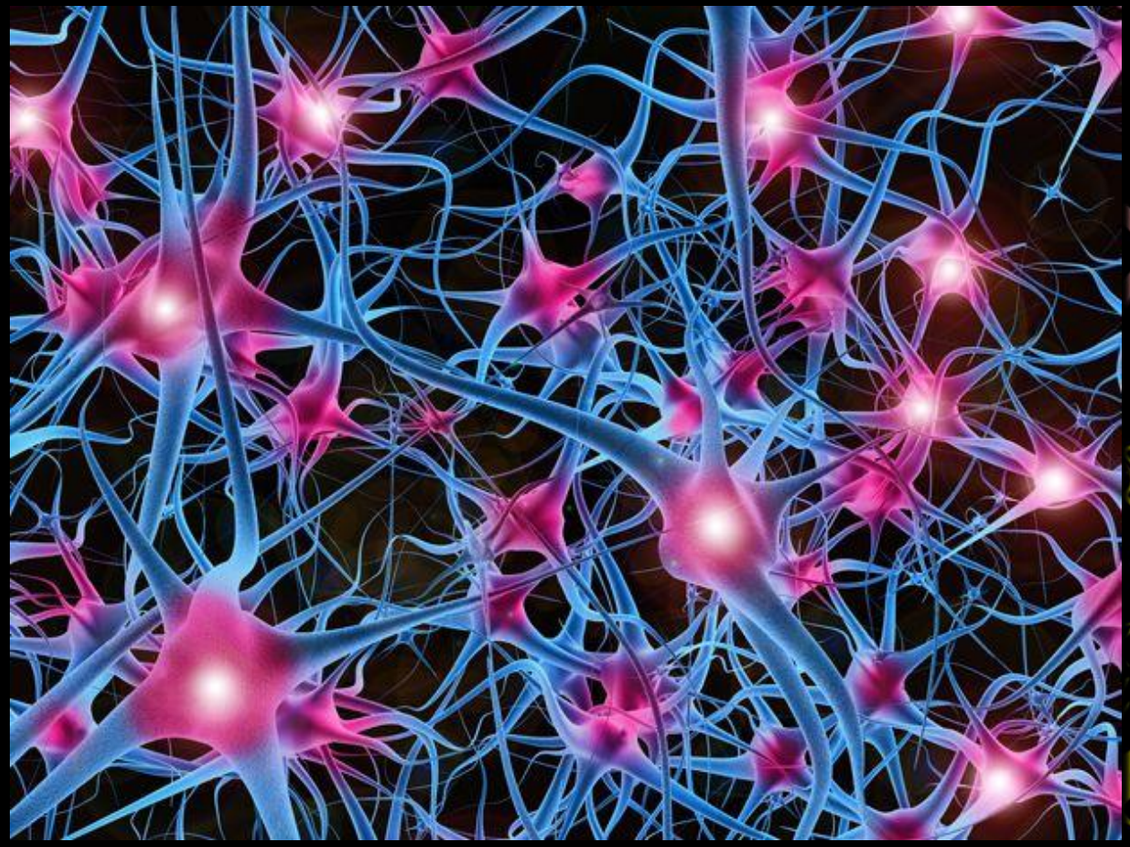
Actual Picture of Human **Neurons**



Model Representing Human **Neurons**

https://www.alamy.com/stock-photo-image-concept-of-a-network-of-neurons-in-the-human-brain-144400787.html

Brain Based Learning
Biological Neural Network (BNN)



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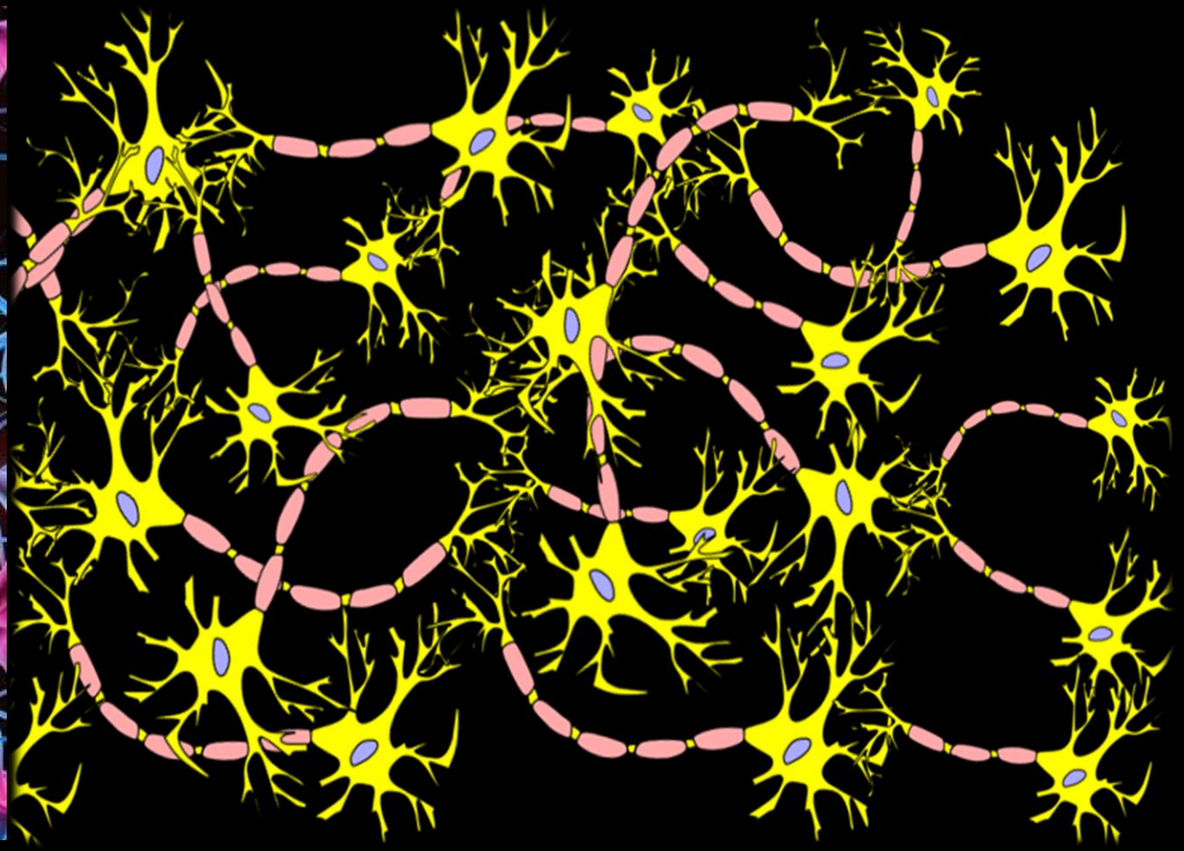

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Neurons
The Fundamental Units of BNNs

- Neurons are responsible for carrying the signals to perform certain activities such as pattern recognition, perception, and motor control

Pattern Recognition

VectorStock.com/26631293

Perception

https://www.goconqr.com/quiz/3448871/six-blind-men-and-an-elephant-

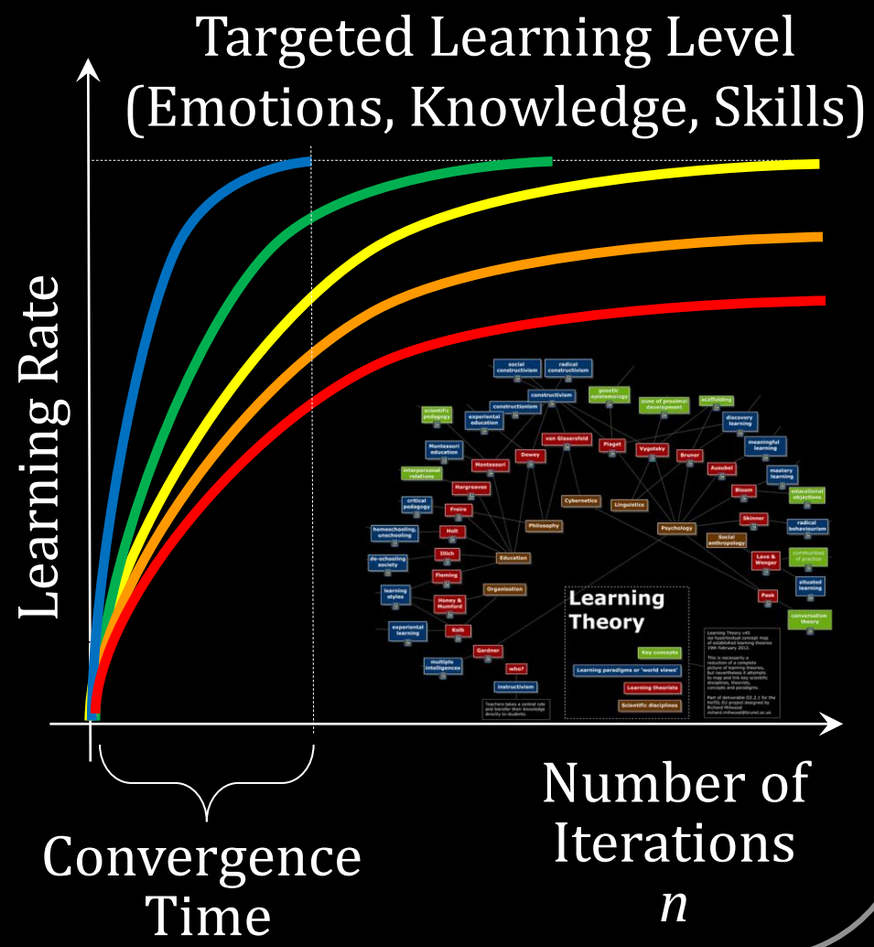
Motor Control

https://www.purdue.edu/hhs/hk/Biomechanics-MotorBehavior/research/motor-control/

Learning Algorithms

The Learning Curves

- The convergence behavior of
  - *a* **learning algorithm**
  - under varying environmental conditions is
  - shown by the **learning curve**

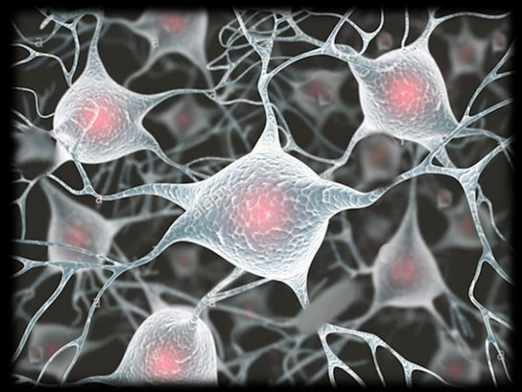


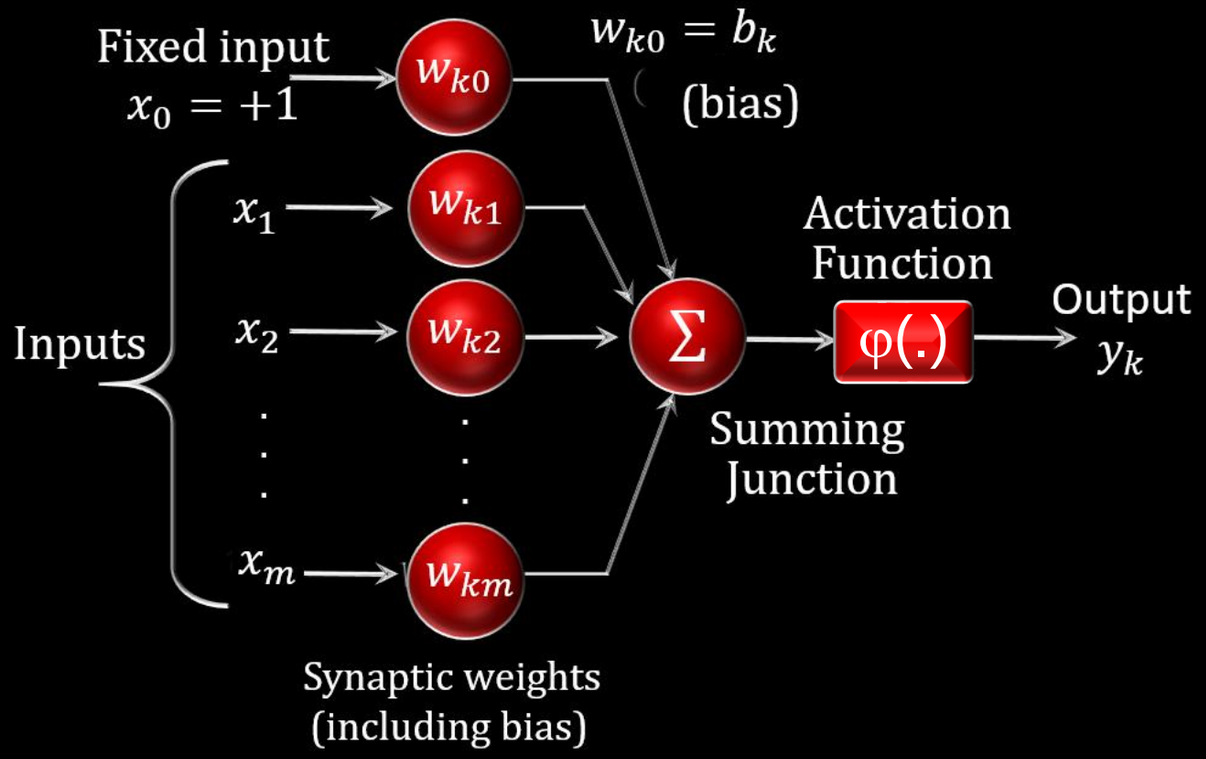
Artificial Neural Network

Model to Simulate the Brain Activities

- The strength of the neurons is represented by w_i and the amount of information "received" by the neuron is the product $w_i x_i$
- The total contributions are combined together, along with a bias b , forming the sum

$$b + \sum_i w_i x_i$$





The Machine Learning Process

Machines Can Learn…

- Machines Can Learn from Data,
  - Identify Patterns and Make Decisions with
  - Minimal Human Intervention.
- To achieve good performance,
  - neural networks employ massiv interconnection of computing cells (neurons).

Artificial Intelligence

Definition

- Artificial intelligence is
  - the **simulation of human intelligence** processes by computing machines
  - to perform the tasks normally requiring human

The robot, identifies itself as Chloe, (in **Detroit Become Human**) talks to the interviewer about its abilities, giving credit to the humans who have developed it...

Watch YouTube video: https://www.youtube.com/watch?v=AjOiYIjxoCE

4 Categories of Artificial Intelligence

1. Reactive Machines

- This type of AI has **no ability to form memories** or use past experiences to form current decisions
- Example: **IBM Deep Blue** chess-playing supercomputer, which beat grandmaster Garry Kasparov in late 1990s.

2. Limited Memory

- Machines which can **look into the past**
- Self-driving cars can observe other cars' speed and direction
- which **requires identifying specific objects** and monitoring them in time.

3. Theory of Mind

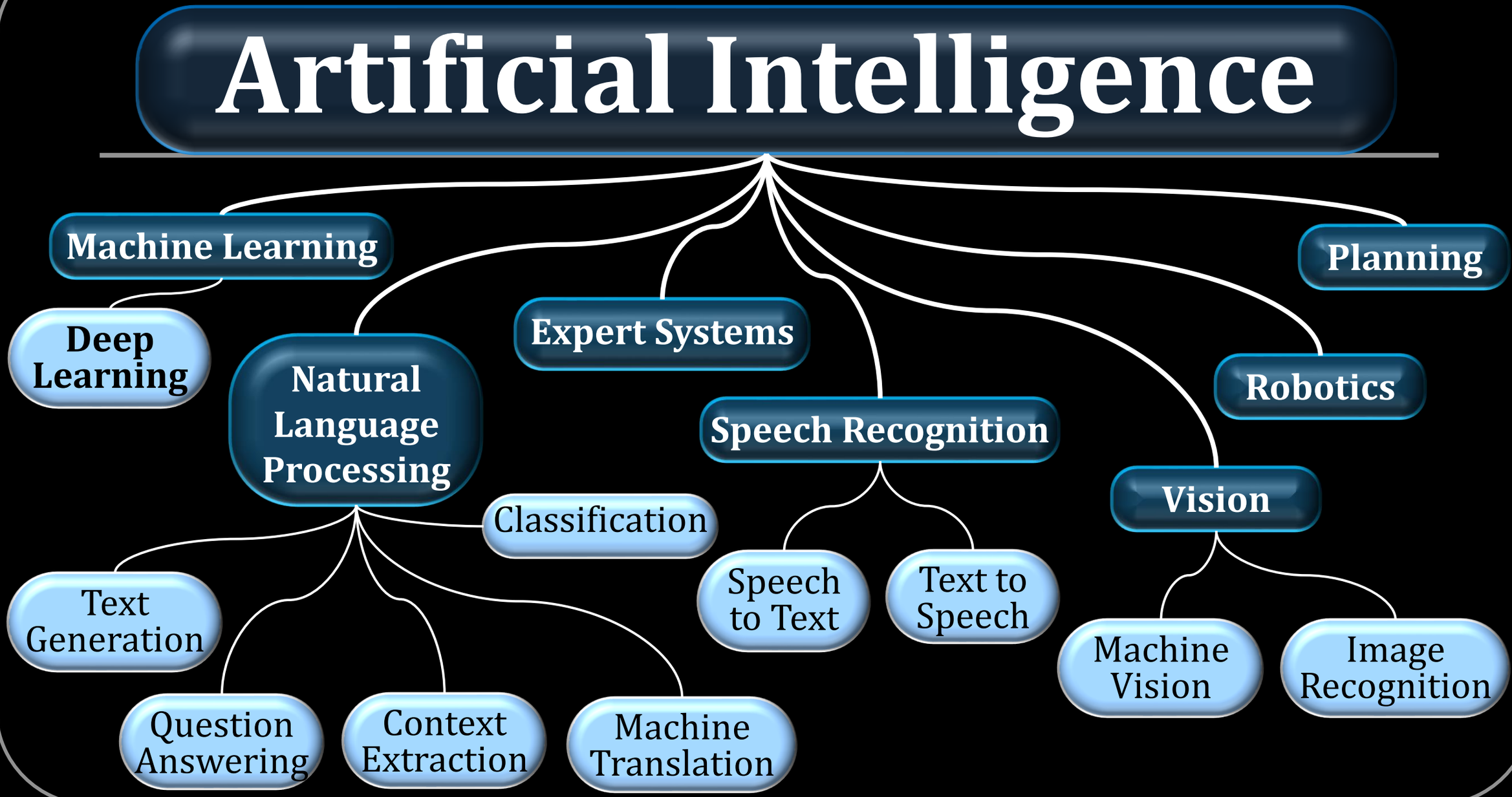
- Machines form **representations about the world and other entities** in world
- In **psychology**, understanding of people and creatures in the world can have **thoughts & emotions** that affect their behavior

4. Self-Awareness

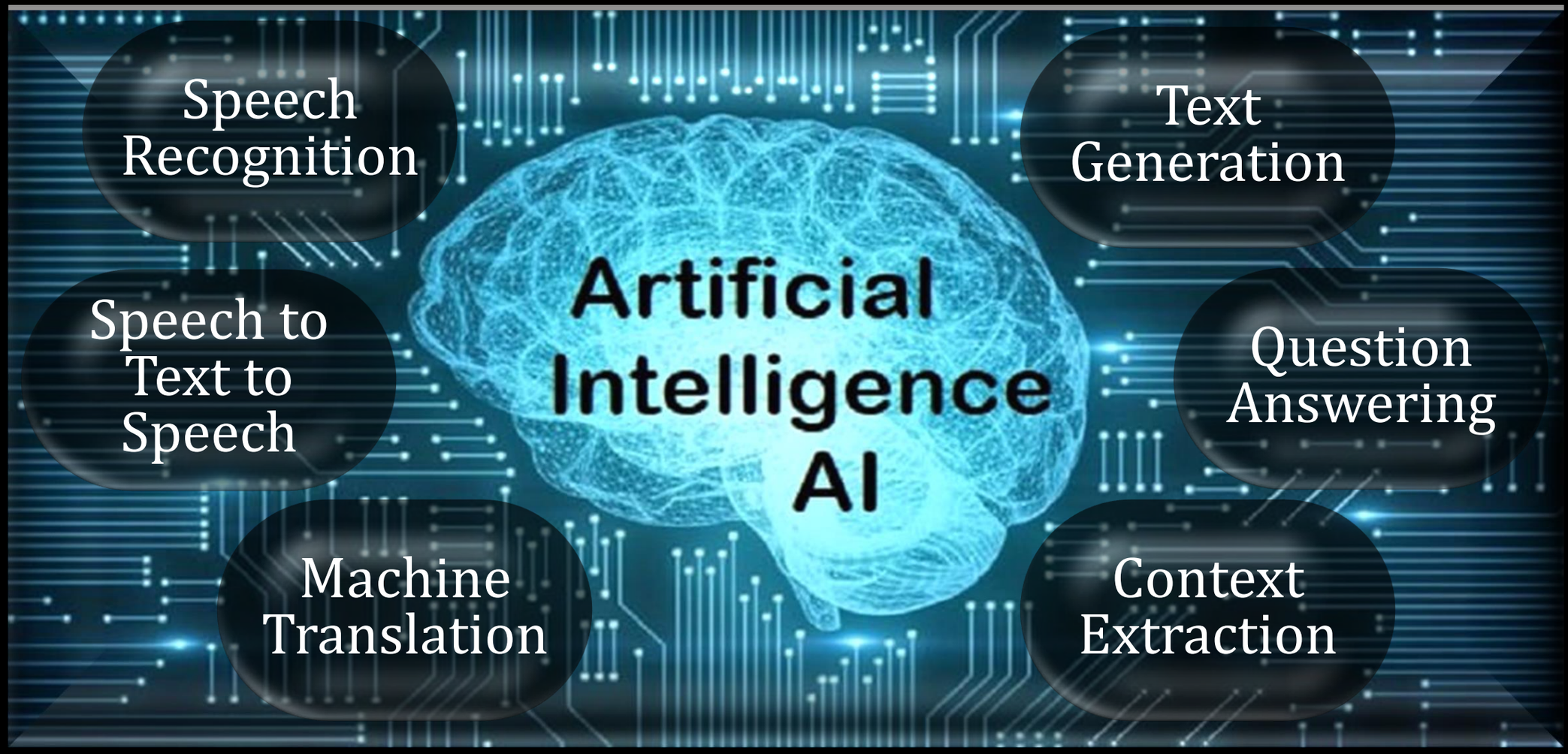
- Top level of AI development can build systems that **can form representation about themselves**.
- Leads to understanding **consciousness** and build **self-conscious** machines.

https://www.govtech.com/computing/understanding-the-four-types-of-artificial-intelligence.html

The **Mind Map** Revealing the Specific Applications of Artificial Intelligence



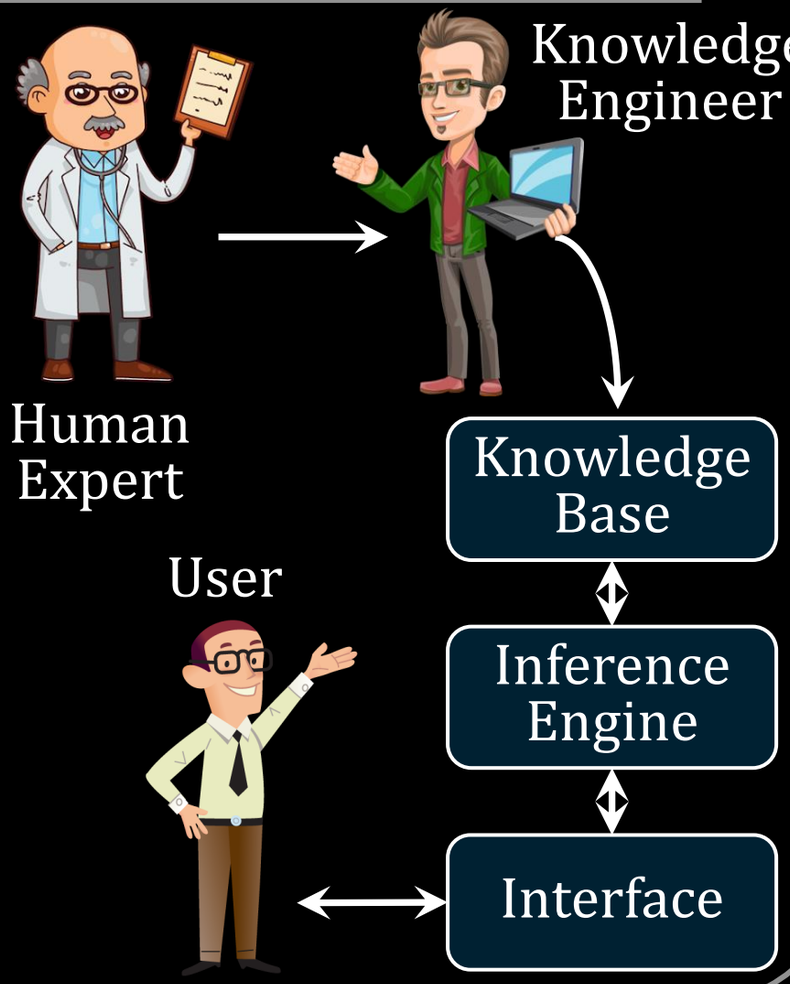
Artificial Intelligence
in Social Sciences



https://medium.com/@teztecch/artificial-intelligence-is-the-simulation-of-human-intelligence-processes-by-machines-especially-5ca1b0c828ec

AI - Application Areas
Expert Systems

- Specific applications of AI include
  - **expert systems,**
  - natural language processing,
  - machine vision,
  - visual perception,
  - speech recognition,
  - decision-making.



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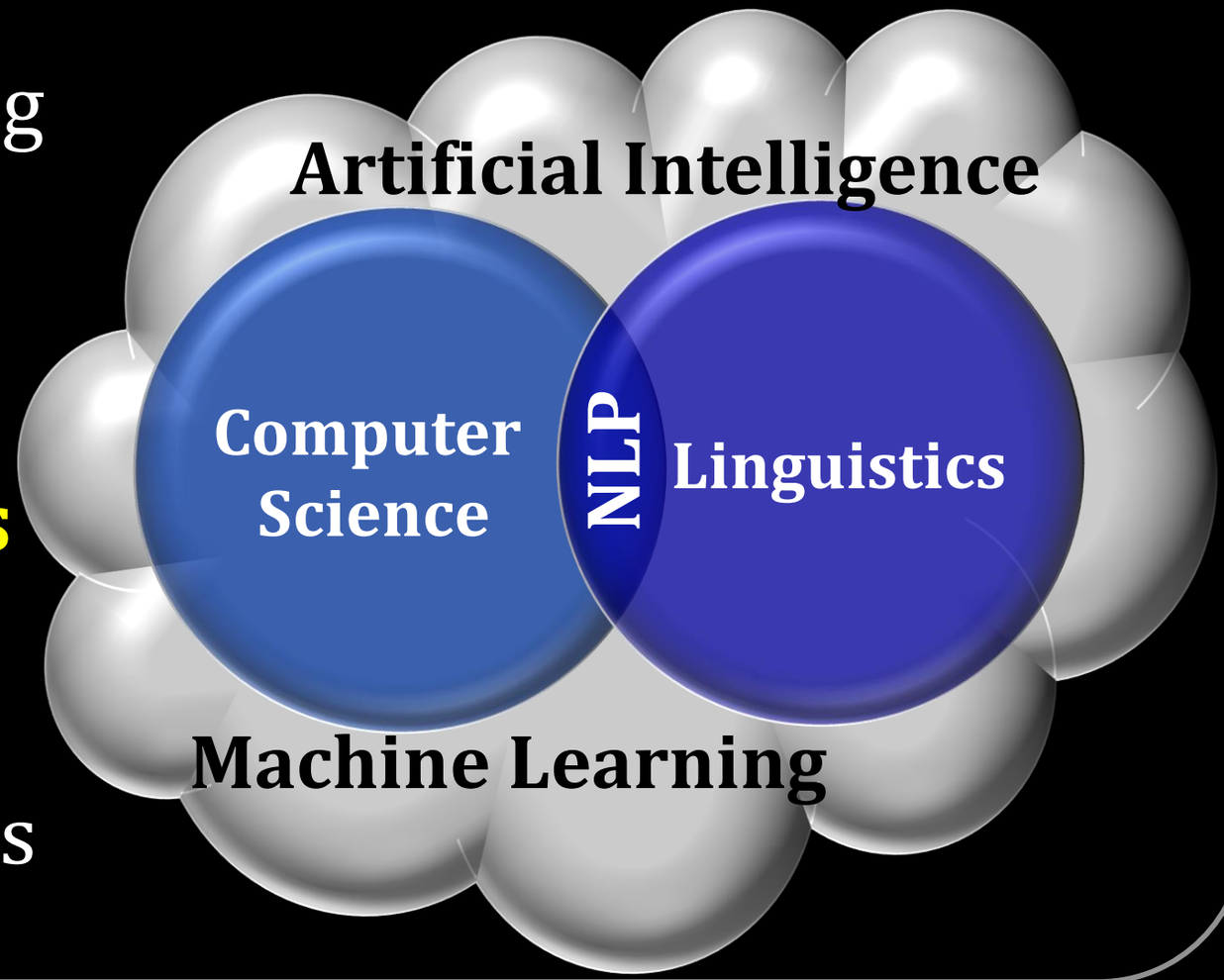
AI - Application Areas
Natural Language Processing

- Natural Language Processing (NLP) refers to
  - the branch of Artificial Intelligence
  - concerned with **machines ability to understand text and spoken words**
  - same way as human beings



https://clevertap.com/blog/natural-language-processing/

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Thank You

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