

*Introduction*

# **Cognitive Systems**

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# PSI 3560 – COGNITIVE SYSTEMS

*class F1*

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# Object of study

- Cognitive Systems and Cognition:
  - The study of
    - cognitive capacities
      - memory, language, attention, learning, inference, reasoning, understanding, consciousness
    - cognitive identity
      - Consciousness as self-awareness – the self and mind
    - What / Why / How
      - Structure, mechanisms, dynamics, implementations (natural and artificial)

# Cognitive science

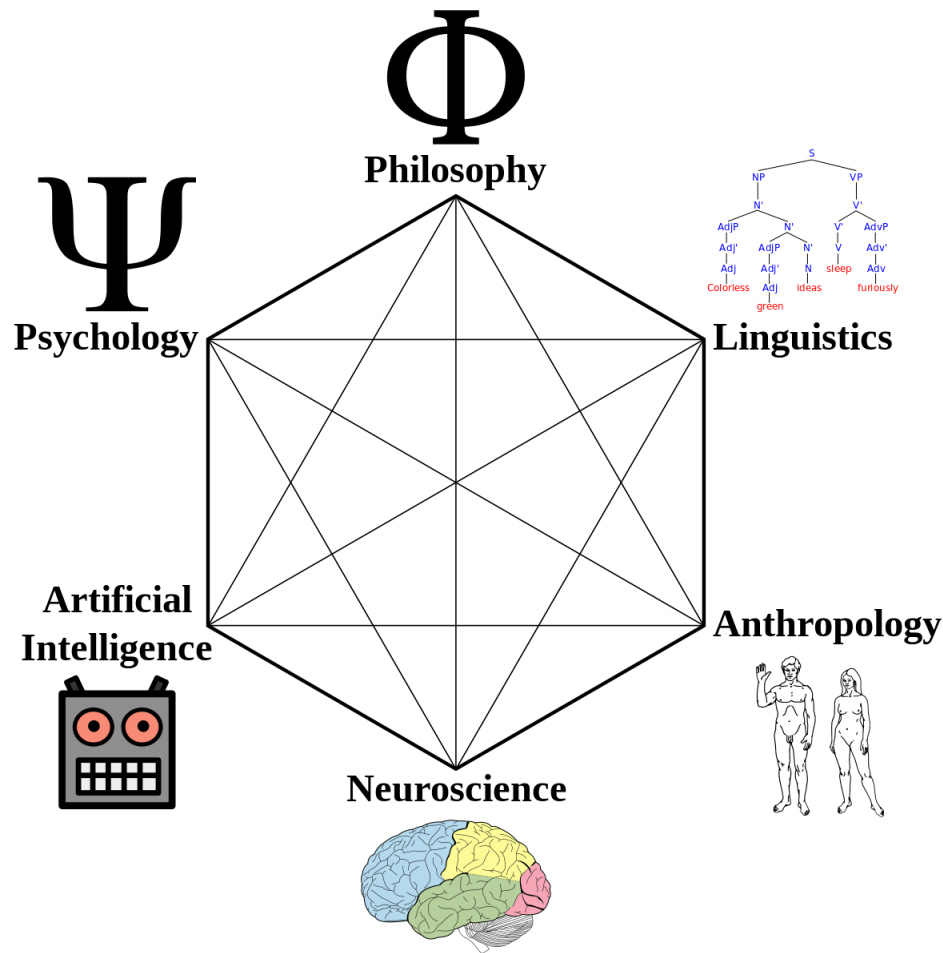


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# Cognitive science

- **Interdisciplinary character**
  - Requires a new unifying language
  - There is a conflict of views of the same concepts by differing disciplines
    - Example: “representation”, “communication”, and “information”
- **Multidisciplinary approach**
  - Specialists working together in their distinct areas of specialization to understand the same object
- **Transdisciplinary realization**
  - Build a single theory or project (ex: a cognitive robot) involving contributions of components from distinct areas

# Cognitive capacities

- Perception:
  - sensing the world to guide the acts..
- Cognition itself:
  - acquiring knowledge, understanding the world, producing proposals used as base to consequent acts
- Intelligence and Reasoning:
  - problem solving; plans or strategies; learning and inference.
- Memory:
  - not just a mechanism to keep information, but to build a (spatial & temporal) relationship network
- Emotion and Feeling:
  - Modulation of perception, cognition and reasoning
- Consciousness:
  - Cognitive identity, emergent self-awareness
- Attention:
  - Behavior directed to information selection, goal fulfillment
- Language:
  - Communicating experience and sharing knowledge

# Cognitive foundational mechanisms

- **Adaptation**
  - How established processes adapt to cope with changes in the world
- **Emergence**
  - How the joint effect of many parts lead to innovation
  - Complexity – non trivial interaction of many parts
- **Embodiment**
  - How the body shapes cognition – the effect of the surrounding anatomy and physiology on cognitive processes
- **Embedding**
  - How the environment shapes cognition while the cognitive action affects the world – a closed loop of dependencies
- **Enaction**
  - How knowledge (concepts) built by cognition is grounded in the world events
- **Autonomy**
  - How the agent controls its own behavior defining its own goals
- **Life / Evo-devo**
  - Evolution – how species evolution led to cognition
  - Development – how the individual development builds cognition

This is all for today !

See you next week !