

ELL 788
Computational Perception & Cognition
July – November 2015

Module 0

Understanding mind

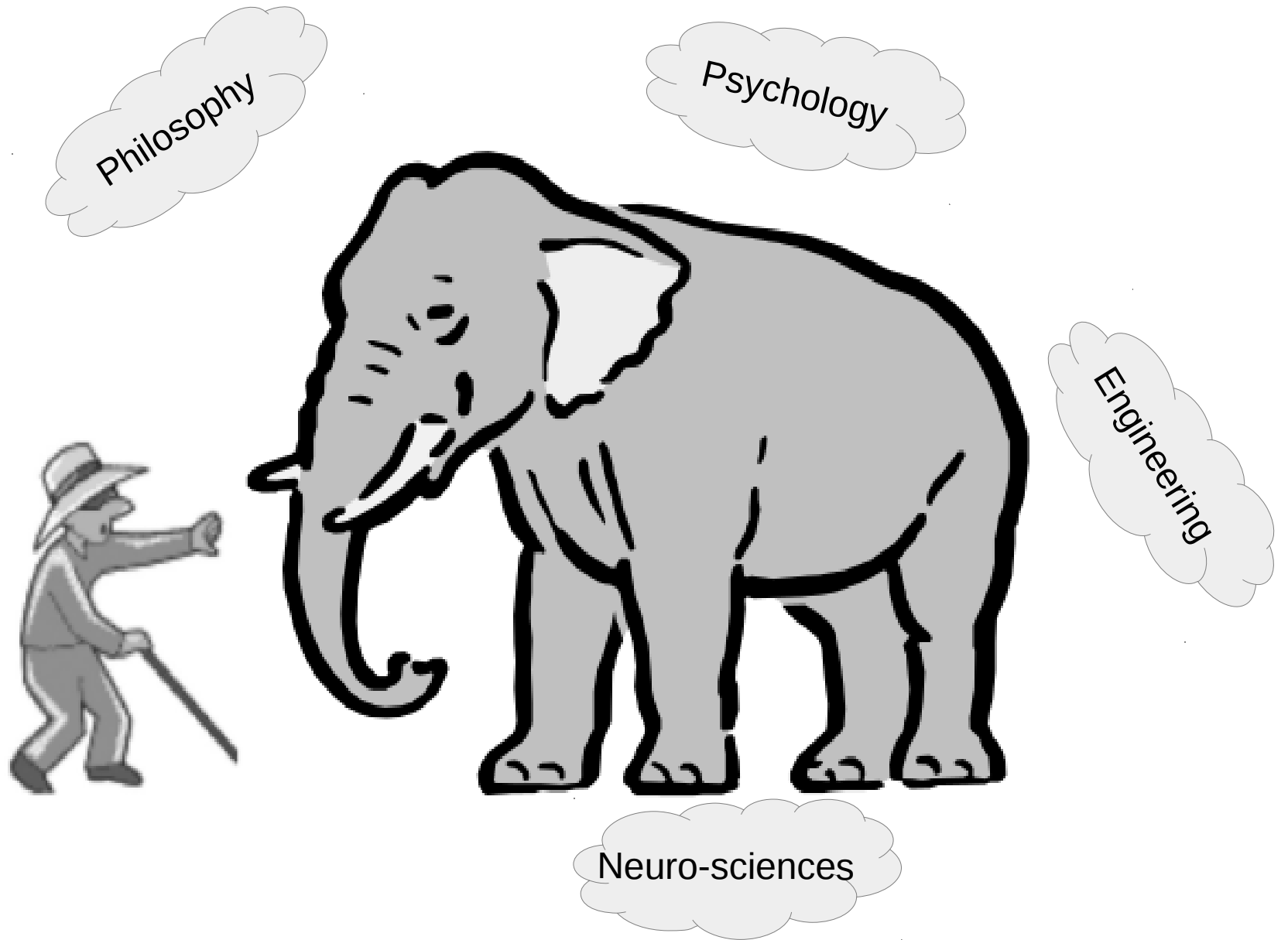
Several approaches to understand mind

- Philosophical [Since ancient times (Aristotle ~300 BC)]
 - Allows to ask broader and more fundamental questions
 - Uses reasoning tools (deductive and inductive logic)
 - Does not use scientific methods (experimentation)
- Psychological [Developed during the 20th century]
 - Based on systematic experimentation
 - Dealt with difficult to quantify items
 - Lack of measuring tools – reliance on theories
- Neuroscientific [Late 20th century]
 - Mind = Brain [+ Nervous System]
 - Study of Brain damaged patients, autopsy, EEG, CAT SCAN, PET SCAN ...
 - Brain anatomy, structure and properties of neurons

The cognitive approach

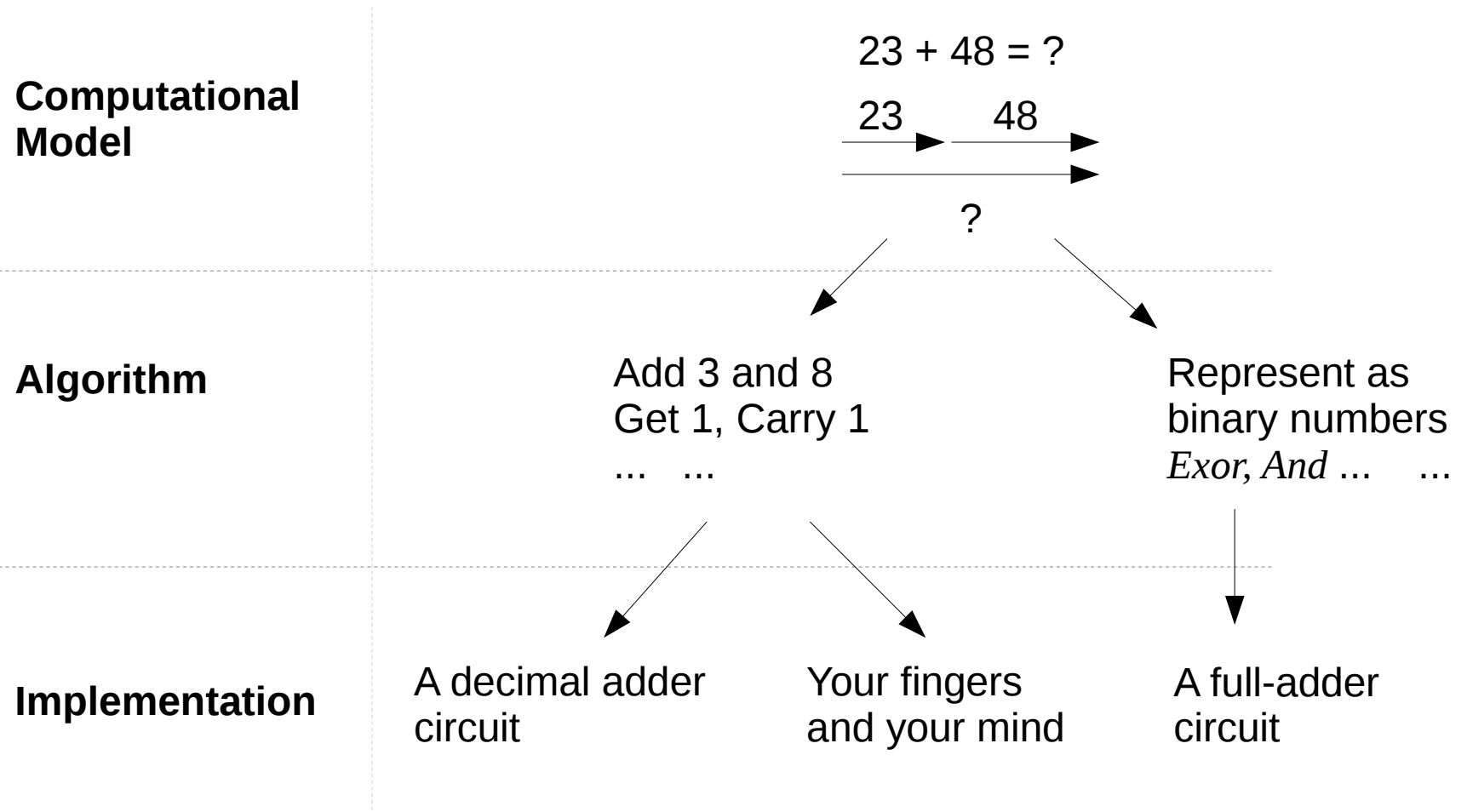
[David Marr, ~1975]

- Mind as an information processing system
 - Represents and operates on information
- Modularity
 - Different and distinct functional modules
 - Works independently, in parallel to each other
 - Interacts – Process models
- Classical view vs. Network view
- Consciousness: An emergent property of these interactions



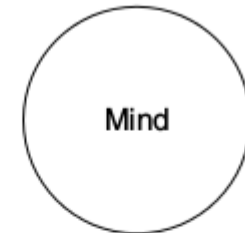
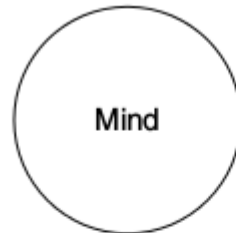
Blind men perceiving an elephant ?

Levels of abstraction

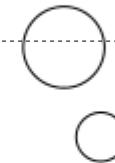
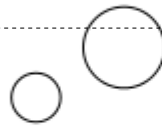


Functionalism

Computational Model

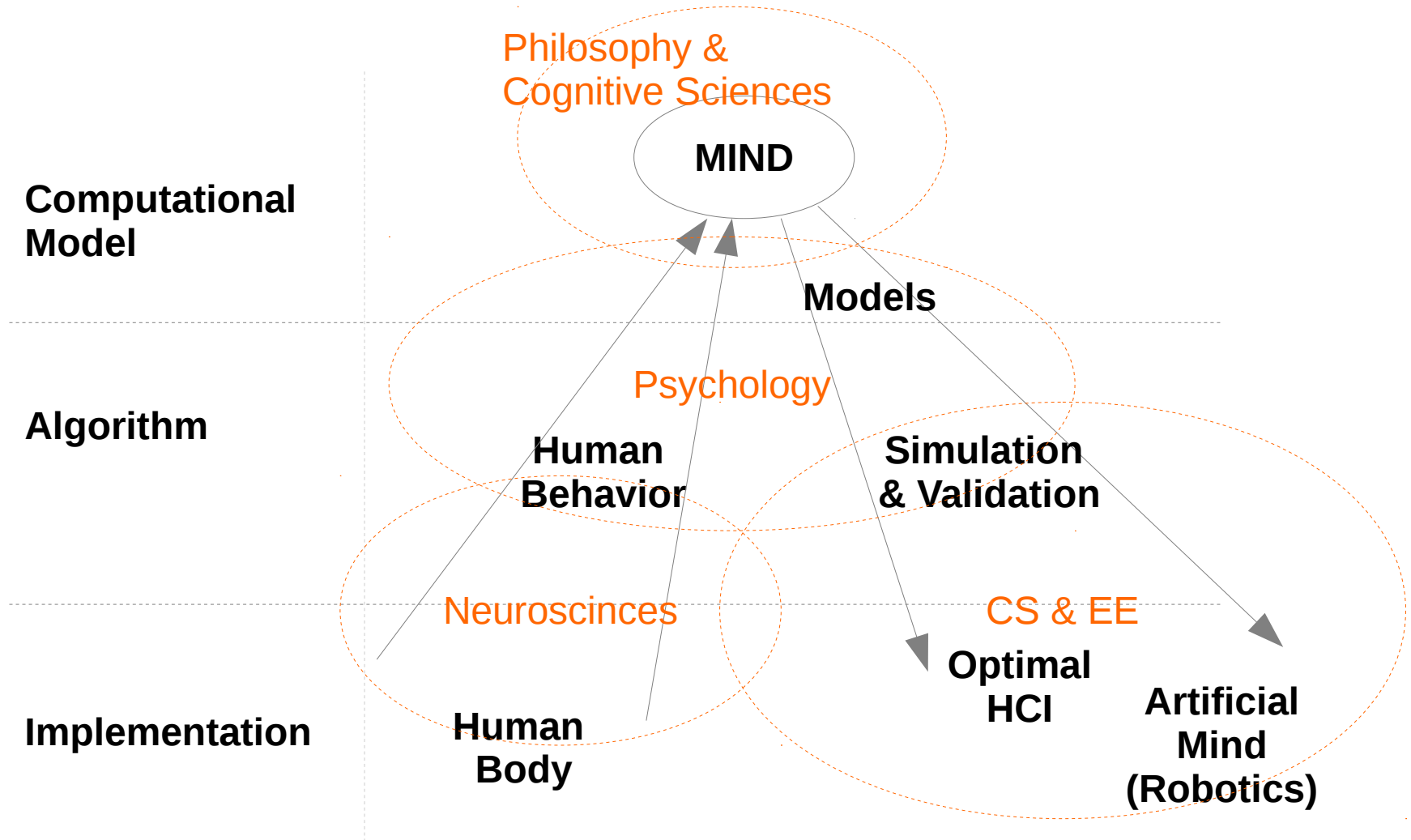


Implementation



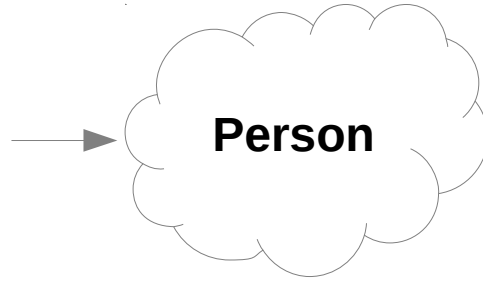
Justification for studying computational model

Why and how to study mind ?



Information Processing and Symbolism

Hiranmay
(Male, Age = ... ,
Nationality =)

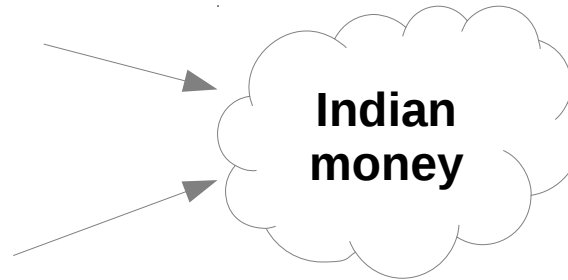


Rupee

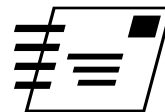


Unicode
representation

Social acceptability



Graphic symbols in everyday life



Limits of mind:

Computational and physical states

- A computer has a finite number of possible and distinct states
- Each state of a computer can be viewed as a symbolic representation of some real world entity
- How many different states this laptop can have?
 - 8 GB of RAM
 - 1 TB of disk
- How many physical states do we deal with?
 - For example, a chess game?
- **How many possible states human mind has?**

References

Interesting Reading

- E-book: Fiedenberg. Cognitive Science