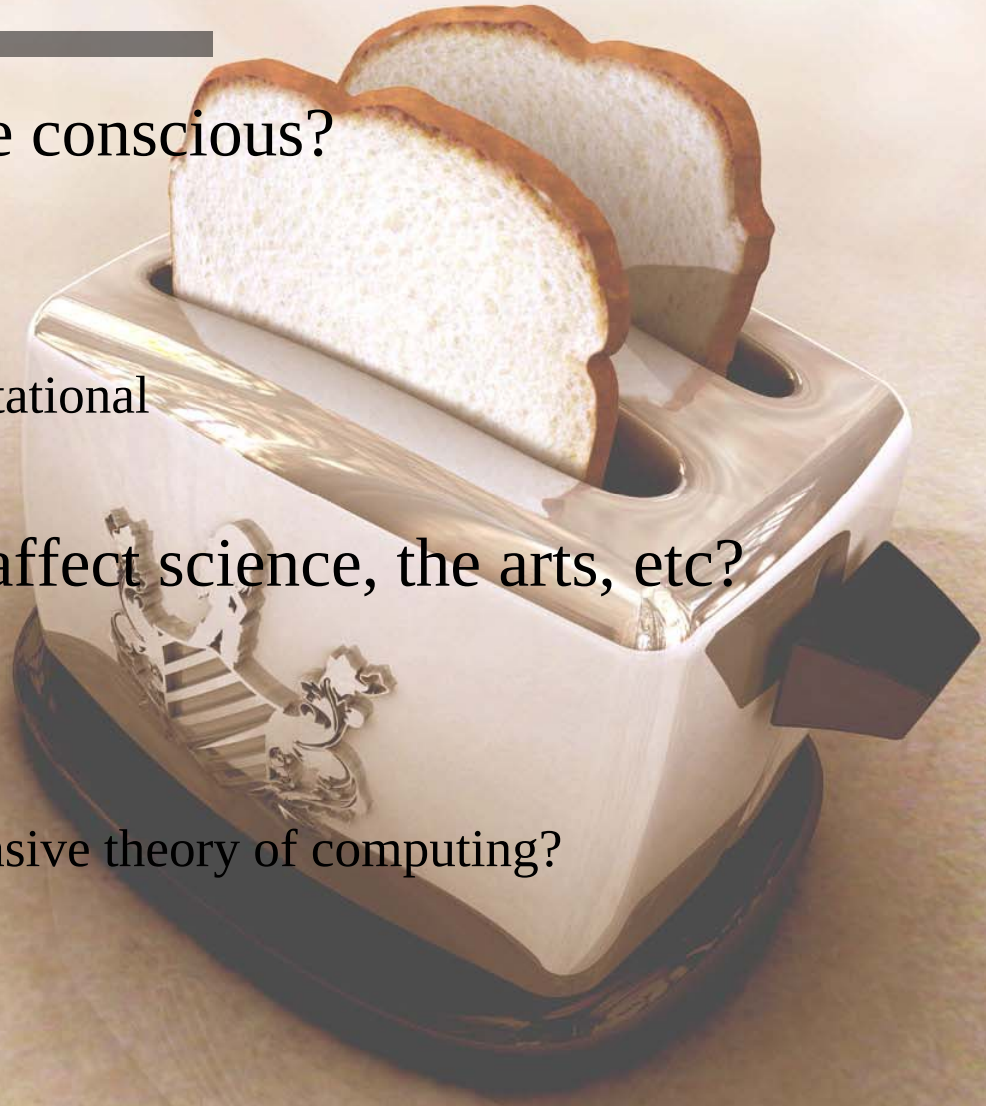
The Foundations of Computing

Brian Cantwell Smith

2001-11140 전윤호

1. Introduction



- Will computer ever be conscious?
- What is mind?
  - Mind ←→ Computational
- How will computing affect science, the arts, etc?

→ What is Computing?

  - Is there a comprehensive theory of computing?

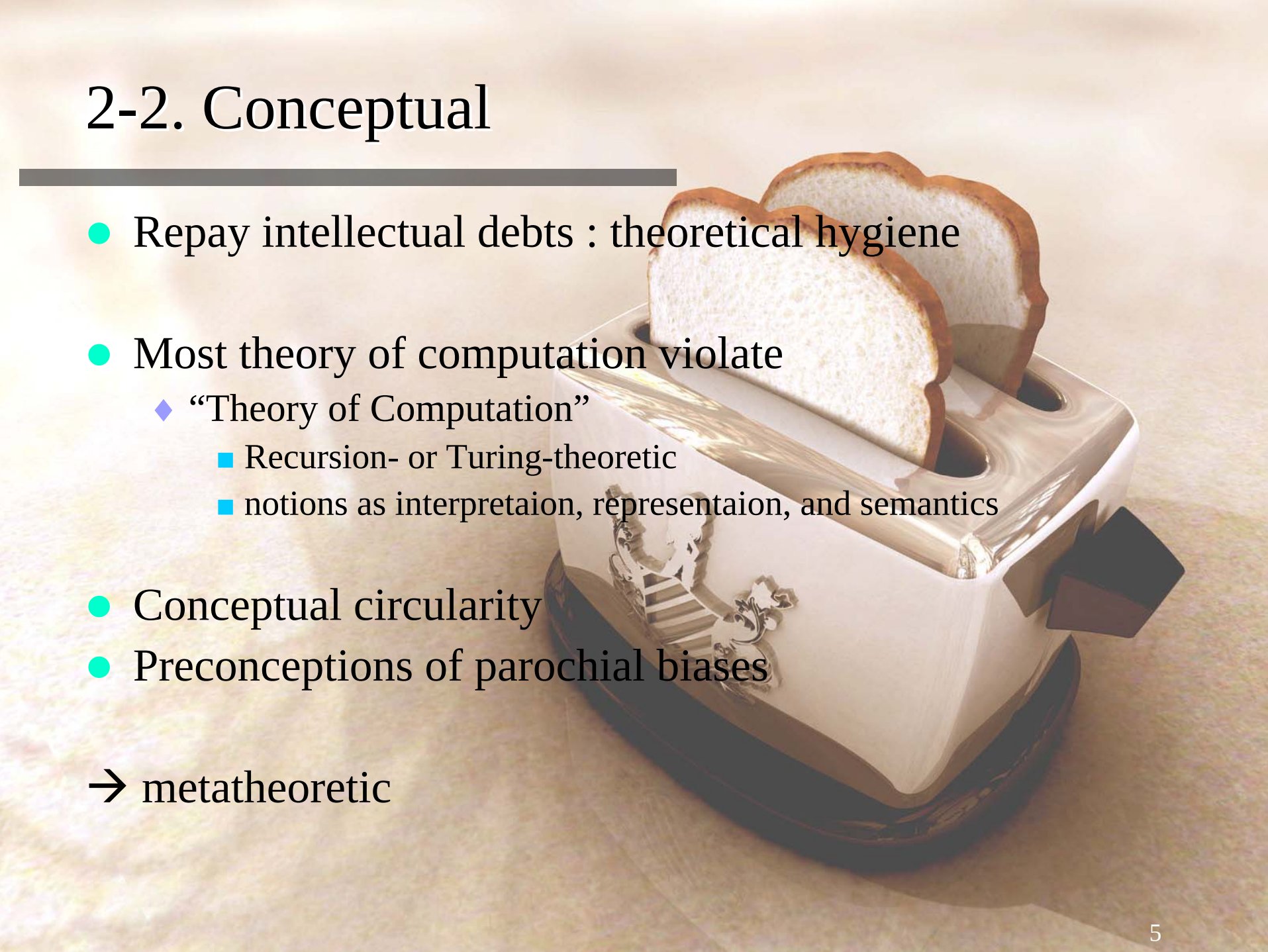
2. Three criteria

- Empirical
- Conceptual
- Cognitive

2-1. Empirical

- Explain the real-world examples
- Comprehensive in scope
- ex) Windows XP
  - How it works, What it does, How it is used, etc.

2-2. Conceptual



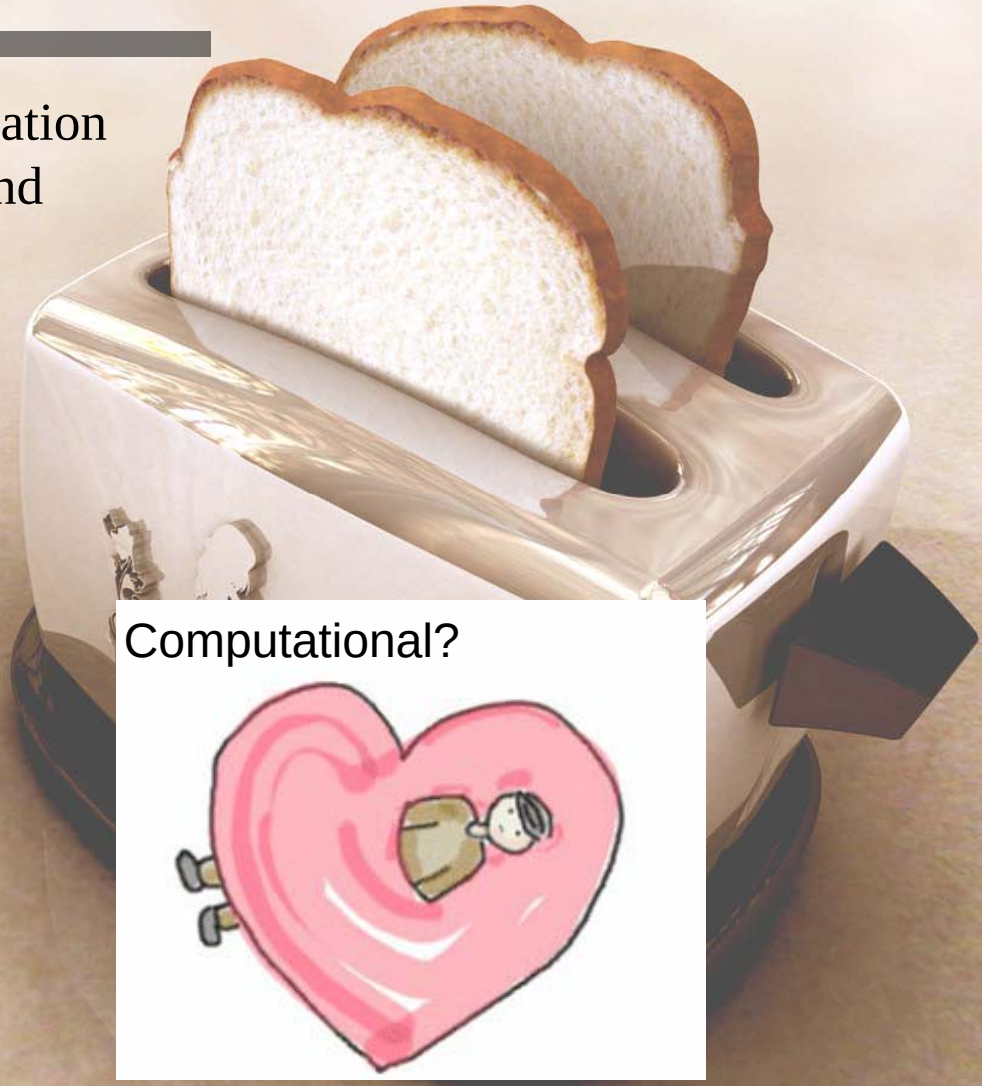
- Repay intellectual debts : theoretical hygiene
- Most theory of computation violate
  - “Theory of Computation”
    - Recursion- or Turing-theoretic
    - notions as interpretaion, representaion, and semantics
- Conceptual circularity
- Preconceptions of parochial biases

→ metatheoretic

2-3. Cognitive

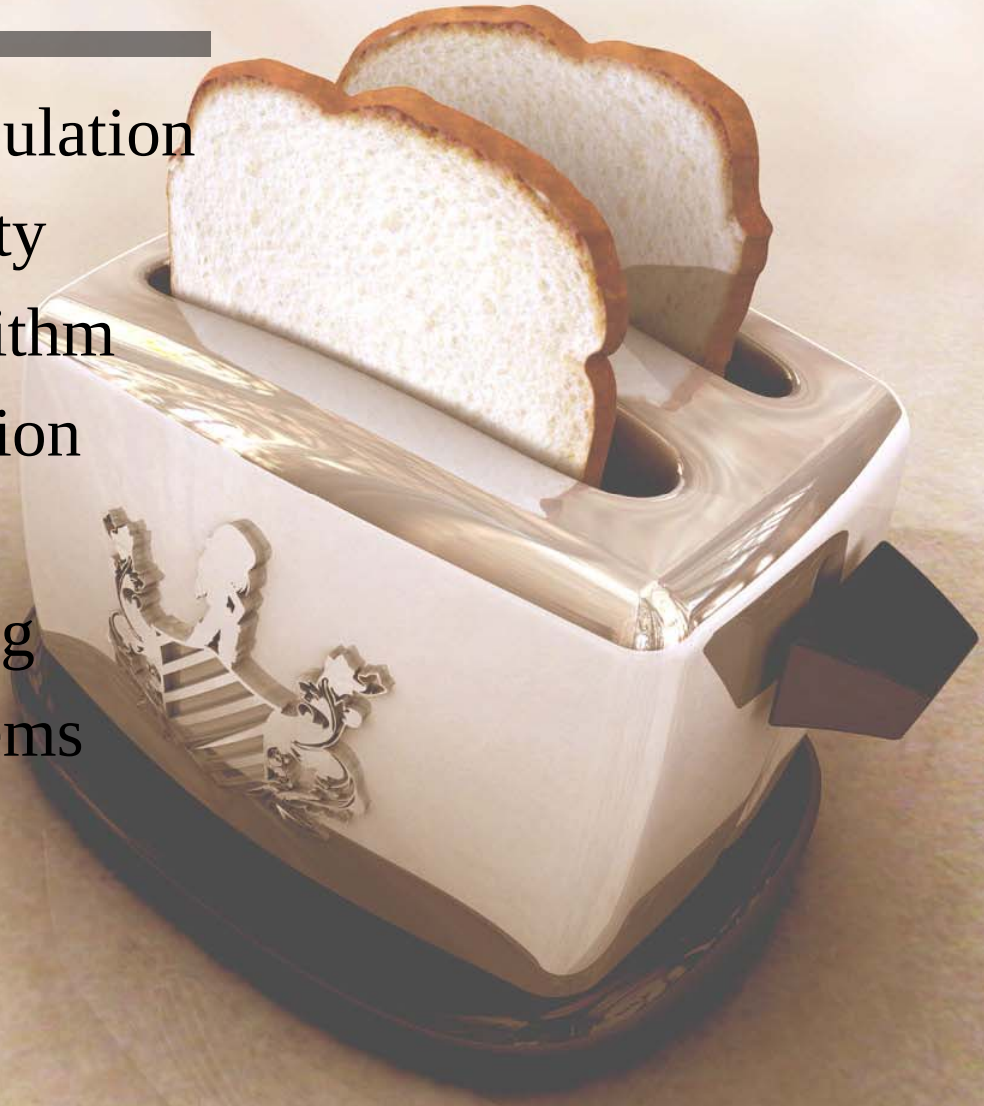
- Provide an intelligible foundation of computation theory of mind

- Reflexive
  - If mind is computational.

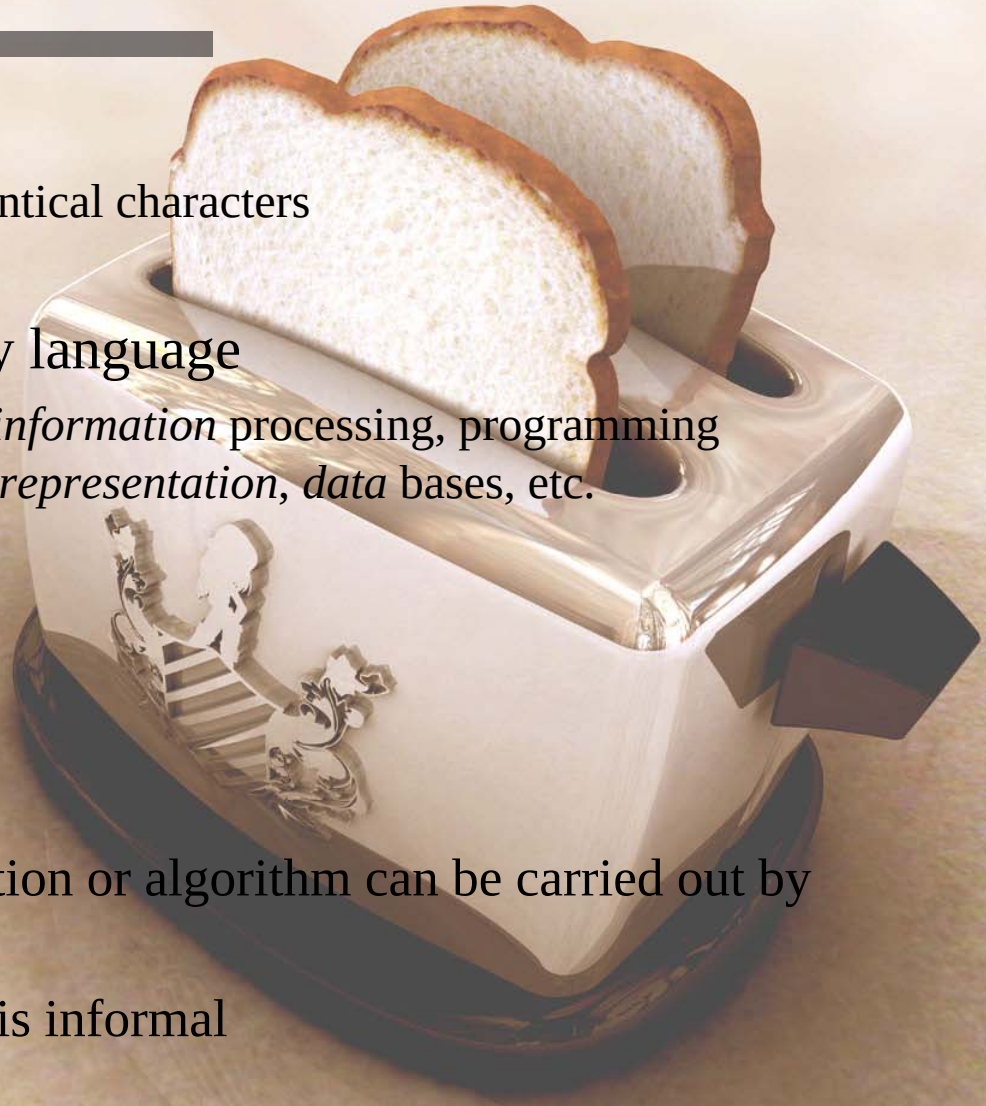


3. Seven Construals of Computation

- Formal symbol manipulation
- Effective computability
- Execution of an algorithm
- Calculation of a function
- Digital state machine
- Information processing
- Physical symbol systems



3-1. Main problem



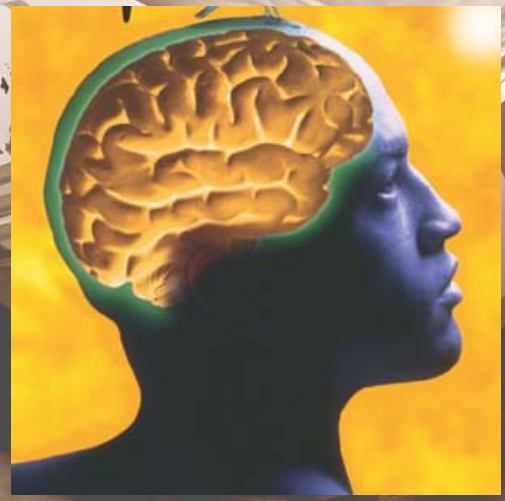
- Semantics
  - Computation has semantical characters
- Computation explained by language
  - *Symbol* manipulation, *information* processing, programming *languages*, *knowledge representation*, *data* bases, etc.
- Conceptual criteria
- Ex) Church-Turing thesis
  - every effective computation or algorithm can be carried out by Turing machine

→'effective computation' is informal

3-2. Motive of computationalism

- Computer is semantical and intentional
  - *“Symbol”*, *“information”*, *“languages”*, *“knowledge”* etc.
- We also deal with “symbols”, “languages”,…

equal?

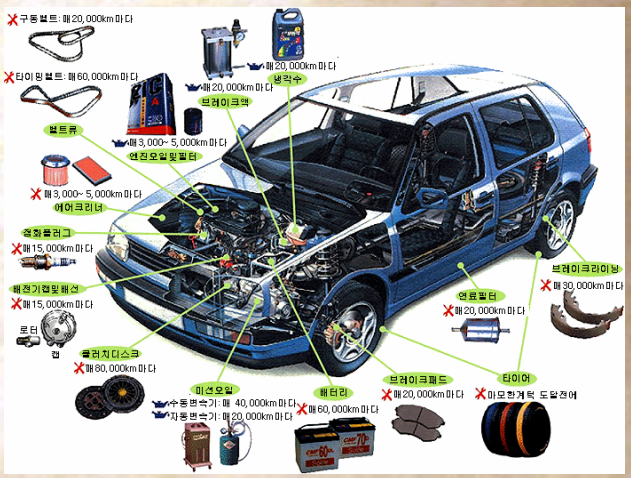


→We must await the development of semantics.

4. Conclusion

- There is no bread.

- Computation is not subject matter
  - Ex) like cars
- Negative conclusion but interesting.



engine, break, handle, tire…
Turn left, right, accelerate …

social, political, economic, personal importance