On the need to better understand our computers...

Fresco, Nir (2007) On the need to better understand our computers....

Abstract

This discussion deals with the question: What are the criteria that an adequate theory of computation has to meet?

1. Smith's answer: an adequate theory of computation has to meet the empirical criterion – it has to do justice to computational practice, the conceptual criterion – it has to explain all the underlying concepts and the cognitive criterion – it has to provide solid grounds for computationalism.

2. Fodor & Pylyshyn's answer: an adequate theory of computation has to meet the semantic level criterion – it has to explain the semantics of computation, the symbol level criterion – it has to explain the information processing aspect and the physical level criterion – it has to explain the underlying physical realization.

3. Piccinini's answer: an adequate theory of computation has to meet the objectivity criterion – it has to identify computation as a matter of fact, the explanation criterion – it has to explain the computer's behaviour, the right things compute criterion, the miscomputation criterion – it has to account for malfunctions, the taxonomy criterion – it has to distinguish between different classes of computers and the empirical criterion.

4. Von Neumann's answer: an adequate theory of computation has to meet the precision and reliability of computers criterion, the single error criterion – it has to address the impacts of errors to computation and the distinction between analogue & digital computers criterion.

5. " Everything " computes answer: an adequate theory of computation has to meet the implementation theory criterion – it has to properly explain the notion of implementation.

There's a widespread tendency to compare minds to computers, but a better understanding of computation is required beforehand. I outline some of the competing answers and argue that Smith's criteria are inadequate and over demanding. My aim is to show why he's eventually concluded that an adequate theory of computation is unlikely.

Keywords:	cognition; computation; computationalism; computers; implementation; practice; subject matter; theory; Turing machines
Subjects:	General Issues: Technology Specific Sciences: Computer Science
ID Code:	3777
Deposited By:	Fresco, Nir
Deposited On:	30 December 2007