Summary of Orientation

Computer Science and Empirical Modelling as two perspectives on computing activity

CS emphasises algorithm: correctness and efficiency

EM emphasises construal, personal understanding of a phenomenon: faithfulness and efficacy

Both perspectives useful: EM hitherto neglected

1

Three layers

Theory layer of concepts and methods

Practical layer of construction

Contextual layer of principles

2

Contextual layer of EM

Computing as 'making sense' (cf Brian Cantwell Smith)

Prominence of observation and experiment (empirical)

Fundamental nature of 'live experience' and state
Ambiguity of interaction/interpretation
Personal – public, informal – formal, process – product

3

Cantwell-Smith: Foundations I

"Six construals of computation:
Formal symbol manipulation, effective computability,
Execution of an algorithm, digital state machines,
Information processing, physical symbol systems
…….
All six construals fail, for deep, …overlapping reasons.
……
Computation is not an autonomous subject matter .."

4

Foundations II

For sheer ambition, physics does not hold a candle to computer or cognitive - or rather, as we should now call it, in order to recognise that we are dealing with something on the scale of natural science - epistemic or intentional science.

Hawking (1988) is wrong. It is we, not the natural scientists, who must develop a theory of everything..

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Transitions

Transitions from construal to algorithm and back again are to be found everywhere

'pattern of behaviour' becoming formalised and then being dismantled and re-assembled

Human behaviour has become very well-adapted to such transitions : walking, talking, OXO, equations, business, McDonalds etc

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Some Examples

Solution of a [quadratic equation] problem:

" do this, then that …. and that …. And that number is the answer. **This is the procedure**." (Babylonian 2000BC)

[D. Knuth Ancient Babylonian Algorithms in ACM Communications 1972]

Making a cup of tea : think of 'standard' steps in terms of agencies of person, mains water, electricity, dependencies of capacity of kettle, how many cups etc. Observables?

7

Prelude to Human Computing

See Licklider *Man-Computer Symbiosis* (1960)

"The hope is that, in not too many years, human brains and computing machines will be coupled together very tightly, and that the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the information-handling machines we know today."

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