Back to School for Computing?
New Lessons for Computer Science, Lessons for a New Computer Science

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Reconciling formal and pragmatic aspects of computing

- JavaScript   formal semantics – layout
- RDBs   relational algebra – SQL
- Computing   TCS – ICT

The essential and the ephemeral … ?

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Character of computer science?

Computational thinking
    computation:
       reliable agency and protocols for interaction
       stable contexts for
          observing and interpreting state

How things are? vs. how things are *construed* to be

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Scope of computational thinking?

Computational thinking can be regarded
- as a universal paradigm for describing the world (cf. Wolfram)
- as the intellectually most significant component of all interaction in the world
- as one of many different and equally important ways of construing interactive phenomena

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Beyond computational thinking?

- Turing's intention in modelling states of mind
Can content of a cell be read instantaneously?
States of a mind *"following rules"*
Misread and over-interpreted?

cf. spreadsheet, real-time systems
    contextual semantics can't be abstracted?

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The formal is not enough ...

Crucial significance for computing of informal **in addition to** formal semantics as seen by:
- Winograd and Flores
- Peter Naur
- David Harel
- Michael Jackson
- David West
- Brian Cantwell-Smith

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Dual semantics

Dealing with the contextual semantics
- William Kent – DB paradigms and DB design
- Willard McCarty on *Humanities Computing*
  - Music and formal and informal semantics
- Cantwell-Smith
  - computing as/and the science of intention
  - mysterious nature of intentional meaning
- William James 'we cannot begin to understand'

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Mathematics

Richness of algorithmic contributions to maths:
   Galois, Gauss, Euclid, Turing, ...
Aesthetic aspect of great mathematical insights
Contrast nature of 'optimal' algorithms for esoteric probs with Valiant's *#P-completeness*
... mathematics not merely a formal discipline
   experience / intuition crucially significant

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Emil Post – posthumously (1965)

... perhaps the greatest service the present account could render would stem from its stressing of its final conclusion that mathematical thinking is, and must be, essentially creative. It is to the writer's continuing amazement that ten years after Gödel's remarkable achievement [1940s] current views on the nature of mathematics are thereby affected only to the point of seeing the need of many formal systems, instead of a universal one. Rather has it seemed to us to be inevitable that these developments will result in a reversal of the entire axiomatic trend of the late nineteenth and early twentieth centuries, with a return to meaning and truth. Postulational thinking will then remain as but one phase of mathematical thinking.

Absolutely unsolvable problems and relatively undecidable propositions, in M Davis, The Undecidable, Raven Press Books, 1965

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Empirical Modelling

Key concepts
   observable, dependency, agency
   grounding the formal in the experiential

William James – radical empiricism
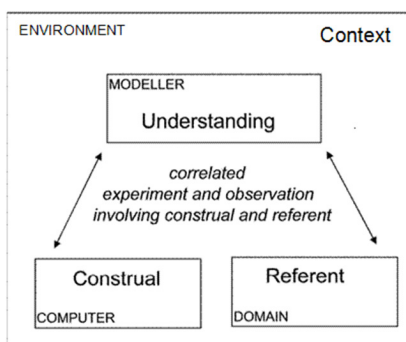David Gooding – construal
Latour - constructivism

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References

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- Modelling with experience: construal and construction for software (Jan 2012)
  go.warwick.ac.uk/em/publications/papers/114
- Realising Software Development as a Lived Experience (Oct 2012)
  go.warwick.ac.uk/em/publications/papers/121
- Redressing the past
  http://www.dcs.warwick.ac.uk/report/pdfs/cs-rr-421.pdf

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