

Human Computing

Steve Russ
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A Vision

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

JCR Licklider *Man-Computer Symbiosis* 1960

New Ways of Thinking about Computers

- ♦ An understanding-oriented perspective
- ♦ A modelling machine as well as a programmable machine: modelling within ODA framework
- ♦ Computer as reliable, interpretable, state-changing machine: requires complement of the human
- ♦ Computation not only evaluation of a function but presentation of *something* in the world

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New Ways of Using Computers

- ♦ Human 'user' as essential participant (with machine) in a computation
- ♦ Warehouse management (Chen, PhD 2002) humans in 'participative business process re-engineering'
- ♦ Restaurant management (Rasmequan, PhD 2002) human makes booking decisions while interacting with model of restaurant bookings
- ♦ Not really 'new' cf. spreadsheets: also very many EM models can be thought of this way

3

Humans as Computers

- ♦ Hobbes: 'When a man *reasoneth*, he does nothing else but conceive a sum total, from *addition* of parcels;...For reason, in this sense, is nothing but *reckoning*, that is adding and subtracting....(Leviathan, 1651)
- ♦ Computationalism: the brain/mind is a computer; cognition is computation, etc
- ♦ (Cf. M. Scheutz, *Computationalism*, 2002)

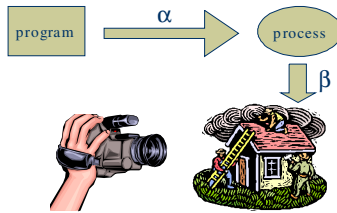
Early Vision ...

People 'track' during every conscious moment ... alignment processes, in which the alignment error serves as datum for its own annihilation, are forever being carried out in the familiar operations of living ... The needs and nature of the interpretive and computing equipment cannot finally be separated from those of tracking controls

George Philbrick, 1945

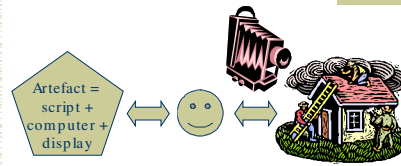
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Semantic Relations (I)



5

Semantic Relations (II)



6

Machine Computing

- ♦ Machine metaphor and engineering paradigm
- ♦ Focus of conventional computing has been on program and process – on maps α and β
- ♦ Essence of computing seen in the algorithmic or the automatic – so beginning with the specification of a

7

More Vision

The main aims are 1) to let computers facilitate formulative thinking ... and 2) to enable men and computers to cooperate in making decisions and controlling complex situations without in flexible dependence on predetermined programs.

JCR Licklider *Man-Computer Symbiosis*, 1960

What Is Computing?

- ♦ Can also use computers to explore and identify new, reliable patterns of interaction
- ♦ Such activity is *prior* to programming
- ♦ Motivates model development on basis of meanings derived from comparison of experiences of artefact and world
- ♦ Modeller mediates the correlation of artefact and referent: experiment, and the user, establishes meaning

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User As Semantic, Computational Agent

- ♦ Continuous, connected interaction (contrast with *alternation*)
- ♦ User interaction constituent of computation
- ♦ Interaction informed by meanings, knowledge and context
- ♦ Interaction may give rise to new knowledge

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Human Computing



- ♦ Not something humans alone can do, nor is it computing for human affairs, nor 'soft' computing, nor HCI, nor human-centred computing
- ♦ Computing that only proceeds with the essential and continuous engagement of human cognitive processes - symbiosis of the human and electronic
- ♦ Most computing has not been of this kind, 9

Research Programme

- ♦ Human computing and Empirical Modelling
- ♦ Human computing and other disciplines
- ♦ Modelling and software system development
- ♦ Object-orientation and methodology 10

Empirical Modelling

EM as a framework for movement between the unreliable and the reliable:

- state
 - behaviour
 - experience  abstraction
 - modelling  programming
 - experiment construction
- 11

Bibliography

Papers distributed in lecture +

Philip Agre, *Computation and Human Experience*, CUP, 1997

David Mindell, *Between Human and Machine*, John Hopkins University Press, 2002

Willard McCarty, *Humanities Computing*, Palgrave, 2005

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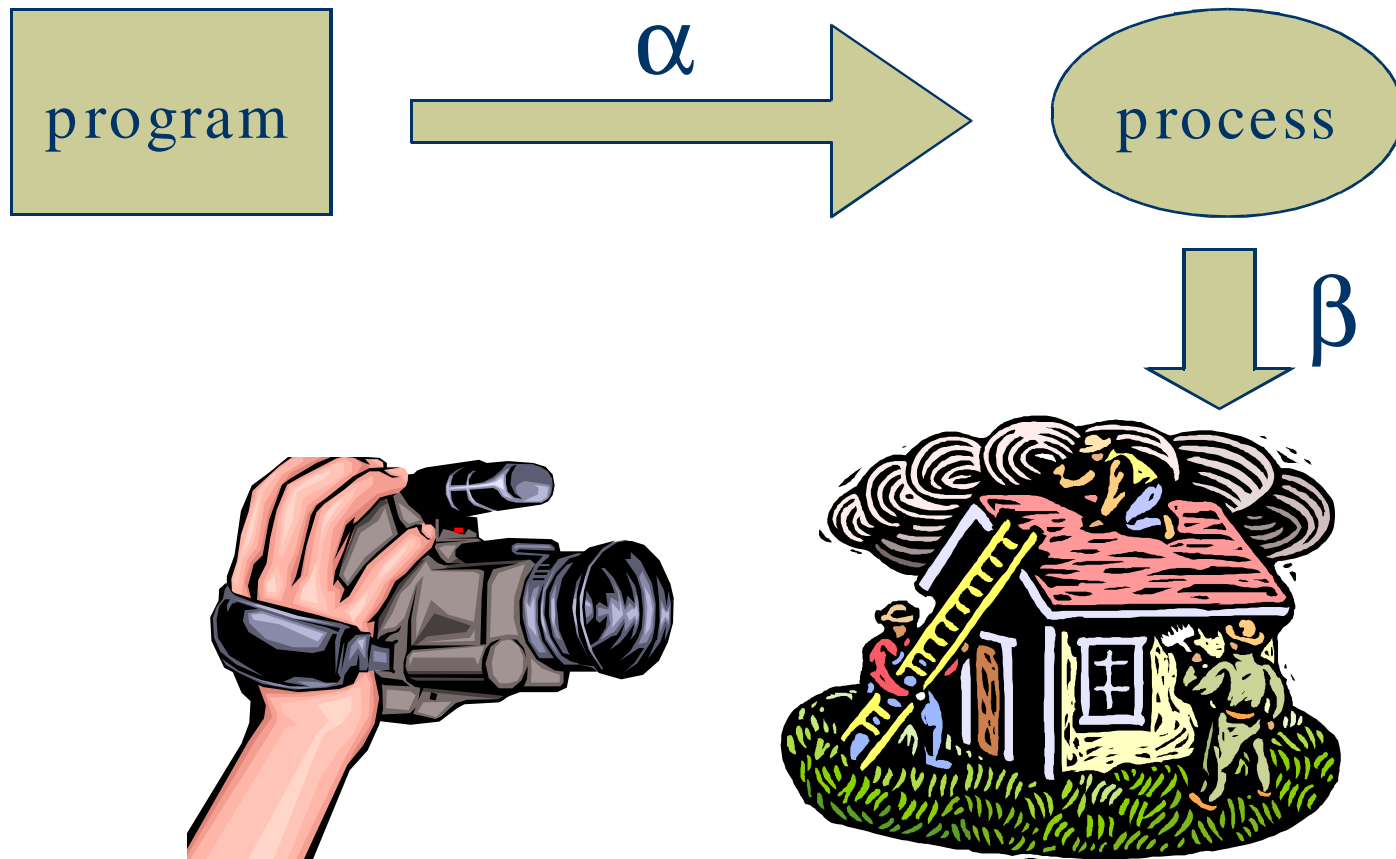
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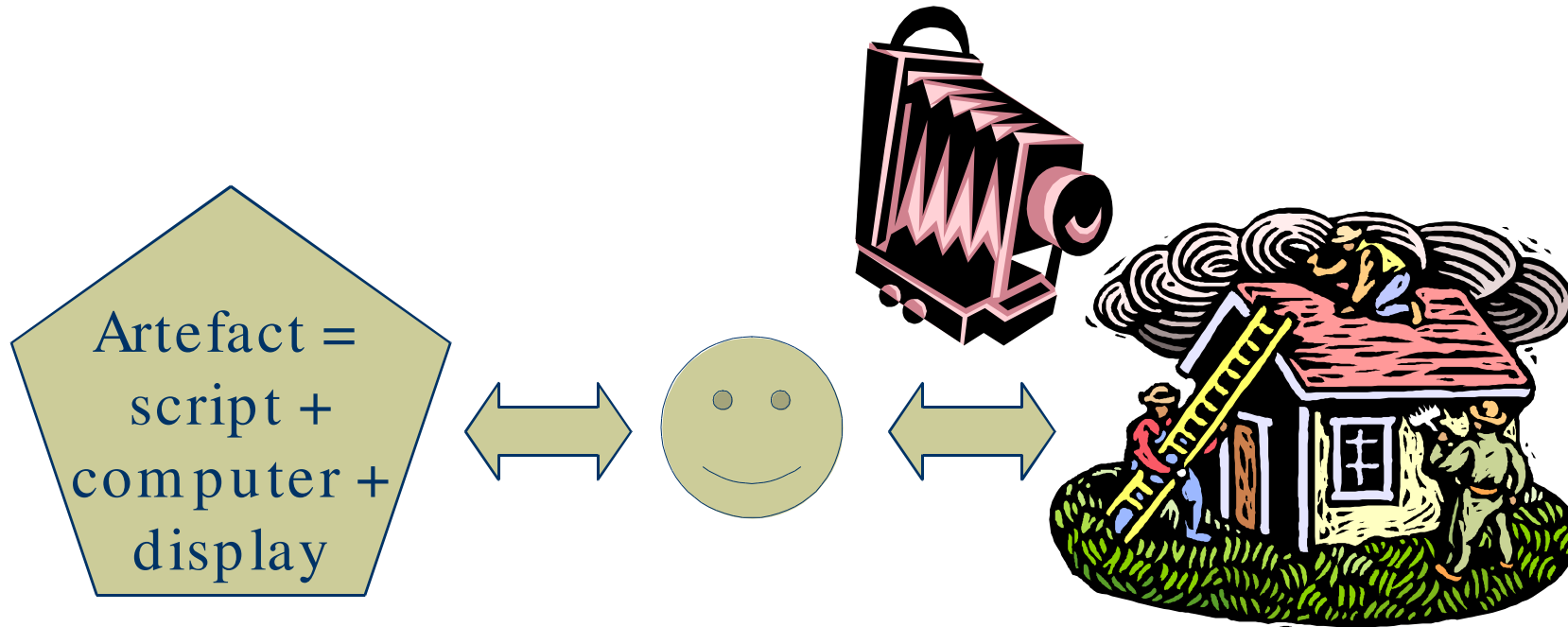
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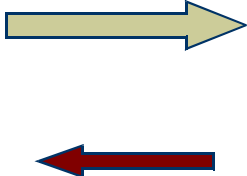


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