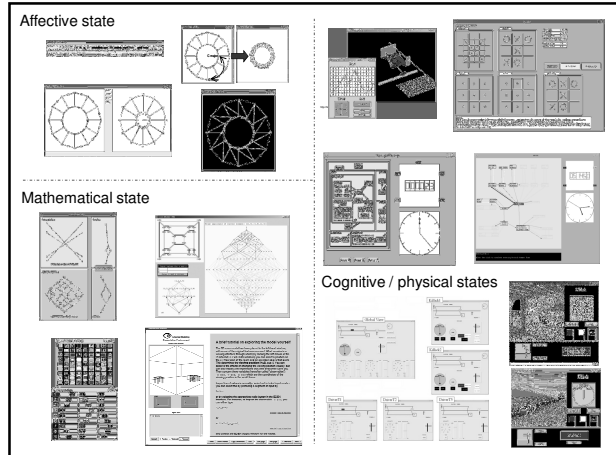Getting from …

modelling with definitive scripts

to

a conceptual framework
for very general computing applications

Affective state

Mathematical state

Cognitive / physical states

Single-agent modelling

Archetypal use of MWDS
      human-computer-environment interaction

Variables in a definitive script represent
- the values that the 'user' can observe
- the parameters that the 'user' can manipulate
- the way that these are linked indivisibly in change

a definitive script can imitate physical experiments
[cf. the role of spreadsheets in describing and predicting]

Environment not document

A script = an **environment** rather than a document.

In a document:

- meaning of a symbol has to be represented in a stateless fashion
- the **reader** animates it by studying the contexts in which it occurs

In a definitive script:

    can explore the significance of 'symbols' via experiment and observation (hence "observables")

Variable values, observations and state

Definitive variables

- correspond to observables of phenomena external to the computer system
- have an identity and a value that can change according to the circumstances of observation.

The term *state* refers to what we understand by
  a set of observations made 'simultaneously'

Interpreting the current state

The current state =
  what I deem to be simultaneous observations

The concept of state is
  - relative to the observer ("observing agent")
  - relative to focus of attention and mode of observation

A definitive script can represent several states at once …

Several states at once …

Who is the agent?

What is the focus of their attention? their intention?

What mode of observation is being adopted?

What metaphors available within the modelling medium?

Different modes of observation …

roomYung1989
… primitive DIY support for the designer and user
roomviewerYung1991
… enhancing the interface for the designer and user
room3dMacDonald1998
… introducing physical and mechanical concerns
graphicspresHarfield2007
… studying the projection from 3D to 2D
room3dsasamiCarter1999
… experimenting with lighting in rendering the room

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cubesymWong2001

Model illustrates combined use of ARCA and SASAMI

Note the many possible interpretations of nodes in S4:
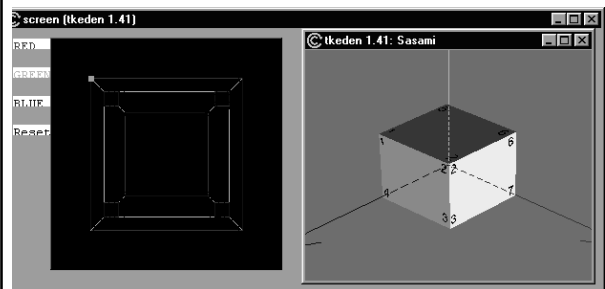points in 2-space and 3-space
permutations of {1,2,3,4}
transformations of cube
matrices (see the text output window)

Matrix algebra manipulation implicit in model: re-use

---

cubesymWong2001

Recall …

Single agent modelling

Archetypal use of MWDS
human-computer-environment interaction

Variables in a definitive script represent   ORACLE
- the values that the 'user' can observe
- the parameters that the 'user' can manipulate   HANDLE
- the way that these are linked indivisibly in change

    DERIVATE
definitive script can model physical experiments
[cf. the role of spreadsheets in describing and predicting]

LSD

"Language for Specification and Description"

Appropriate way to distinguish the perspectives of different agents on a single state …

… classify observables so as to discriminate between ORACLES that can be observed by the agent (if only conditionally and imperfectly), HANDLES that can be changed (perhaps conditionally), and what dependencies pertain in the view of the agent DERIVATES

… possibly also identify routine patterns of response that an agent might make (e.g. how a button works, user guides)

Beyond single agent modelling …

Motivate multi-agent modelling …

- dependency serves to identify state-change for which the observer/modeller can presume responsibility

- in most environments, there are (apparently!) other sources of state-change: attribute to other agents

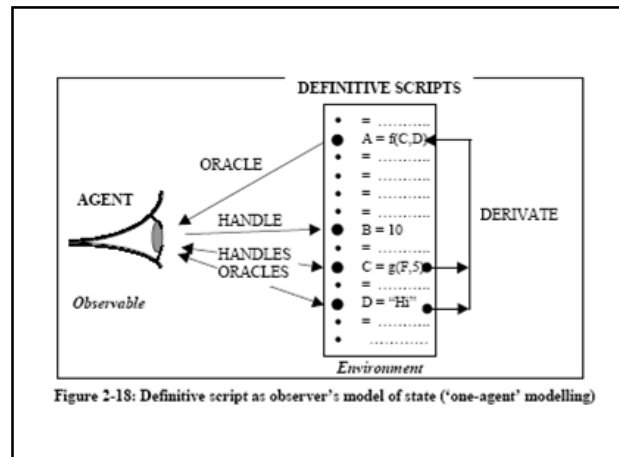state-changes can occur concurrently through agent action

Figure 2-18: Definitive script as observer's model of state ('one-agent' modelling)

Multi-agent Modelling

In EM for multi-agent modelling, model concurrency

- generalise MWDS for the user-computer interface to model the relationship between all interacting agents

- each agent-environment interface is treated as a domain for experiment
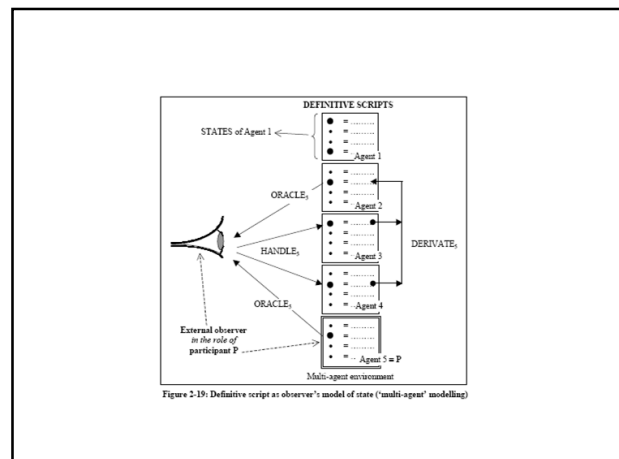

Figure 2-19: Definitive script at observer's model of state ('multi-agent' modelling)

Broad objective in MWDS

Use as a basis for

universal agent-oriented modelling …

capture human-like and machine-like agency
not typically closed-world and system-like

Very general applications of computing can be
treated as specialisations e.g. programming as a
specialisation of concurrent systems modelling