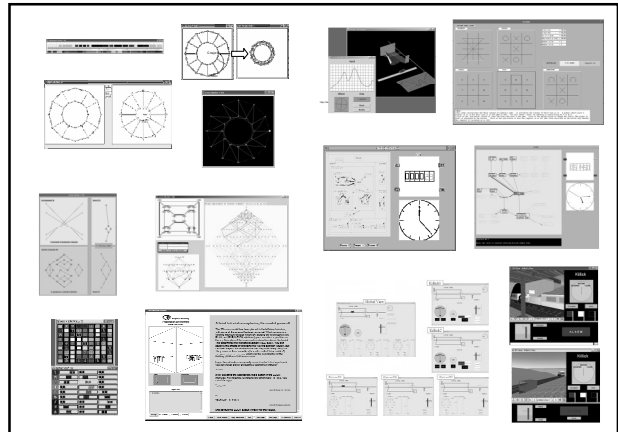


Illustrating Empirical Modelling principles and tools

EM artefacts for representing state



Affective state

Mathematical state

Cognitive / physical states

Mathematical state

- visualising geometric relationships
- visual exposition of abstract mappings
- cognitive support for puzzle solving

Visualisation of 3D to 2D transformation within a presentation environment

Empirical Modelling Presentation Environment

A brief tutorial on exploring the model yourself

The 3D room model has been placed in the left hand window, with some of the original furniture removed. What remains is a viewing interface through which (by clicking the left mouse in the PLAN and ELEVATION windows) you can select a position on the X-Y floor plan of the room and an elevation above that point. This determines the viewing position (view_pos). You can observe the effects of changing the viewing position visually, but can also inspect the redefinitions that they effectively carry out. They concern three variables (horizontal radius 'radius', vertical height 'height', and 'view_pos', which are the coordinates of the viewing position in the world frame.

Inspection of values is normally carried out in 'viewer' input mode - you can select this by pressing a segment of input by `set:en`

or by selecting the appropriate radio button in the EDEN interface. For instance, to inspect the observable `view_pos`, you can enter type

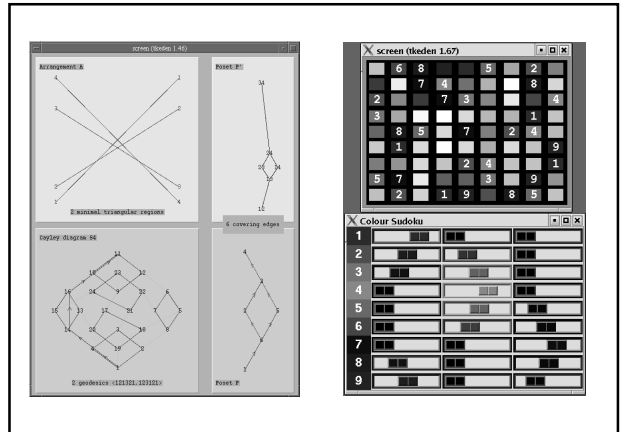
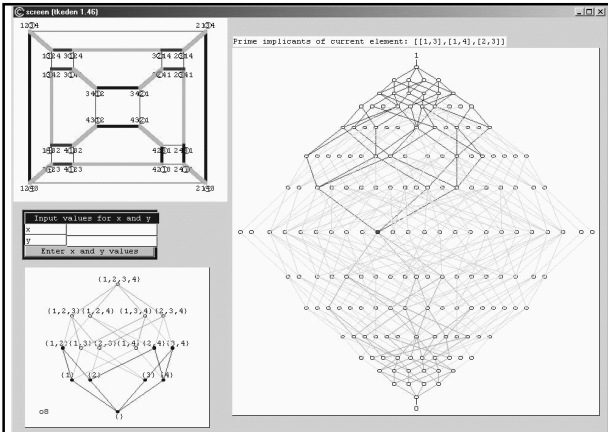
```
view_pos;
```

or

```
view([x] [y] [z]);
```

and consult the EDEN output window for the values.

Digital watches: statechart vs. informal model of state



Cognitive states Physical situations

- visualising the states of a digital watch
- perception and cognition in game playing
- visualising the use of an obsolete instrument
- understanding historic railway operation

Perception and Cognition in playing noughts-and-crosses

Visualising a planimeter in operation

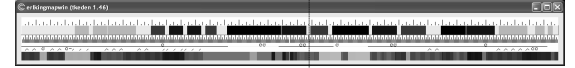
An accident at the Clayton Tunnel August 1861

Affective state

Visualising the singer's role
and the harmonic progressions
in Schubert's song *Erkönig*

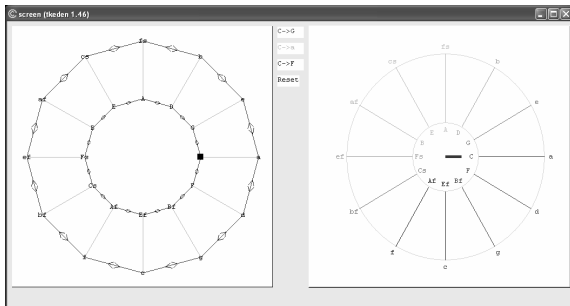
A map of *Erkönig*, together with a cartoon script version of the ballad

The horse rides in the night ... The child fears shadows ... The Erkönig entices
The father asks after the child ... he dismisses the fear ... the c. cries out ...

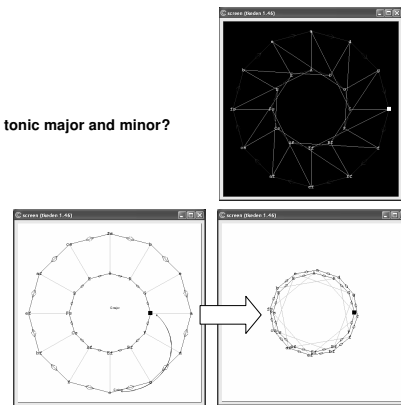


... the f. reassures ... the c. cries in anguish ... the E. compels ... the f. drives the horse ...
... the E. beguiles ... the f. rebuts fear fiercely ... the c. despairs ... The c. is dead

Visualising the cycle of keys



Conflating tonic major and minor?



Conceptual issues illustrated ...

room3dMacdonald	mechanics, time
planimeterCare	analogue
digitalwatchFischer	formal specification
digitalwatchRoe	cognitive aspects
claytontunnelSun <i>et al</i>	concurrency
linesBeynon	continuity
oxoGardner	learning

Technical issues illustrated ...

room3dMacdonald	"3D donald"
planimeterCare	sasami
"erlkoenigBeynon"	integration (Sonar)
claytontunnelSun <i>et al</i>	distributed EDEN
linesBeynon	pure definitive script
mbf4Beynon	combination eddi
graphicspresHarfield	gel html
sudokucolourHarfield	prototyping (Flash)