



formal futures

ubiquity and physicality

From Formalism to Physicality, Alan Dix, UPC North, 30 April 2008

changing nature of the interface

- ubiquitous computing
computers everywhere!
- many simple systems
+ complex interactions
- sounds like a job for
formalism

an example ...

- understanding the tangible
- the physical world
 - we live in it
 - we are good at it!
 - we understand it
- properties of physicality
 - directness of effect – push and it moves
 - locality of effect – here and now
 - visibility of state – small number of relevant parameters

study the old to design the new

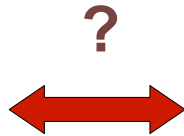
work with Masitah Ghazali
& DEPTH project

- look at ordinary consumer devices
 - washing machine, light switch, personal stereo
- why?
 - we are used to using them ourselves
 - they have been 'tested' by the marketplace
 - they embody the experience of designers



fluidity

- 'naturalness' of device-logical mapping



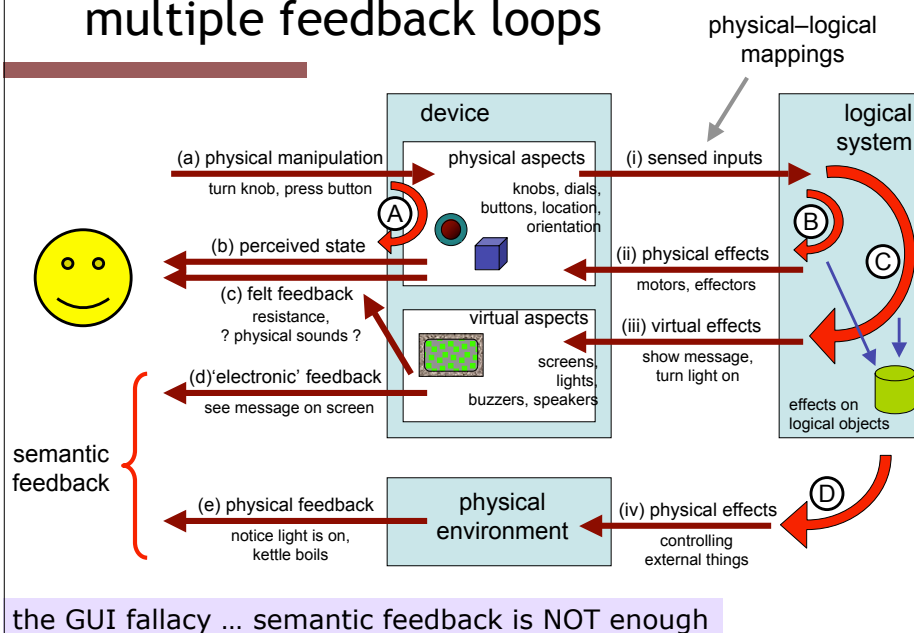
half empty?

- not the first ...
 - Norman – DOET/POET
 - Thimbleby – FSM for video, microwave
- often used as HCI strawman
 - emphasise for design flaws
- we are looking for the good lessons
 - how mundane devices exploit physicality

models of AR & tangiblity

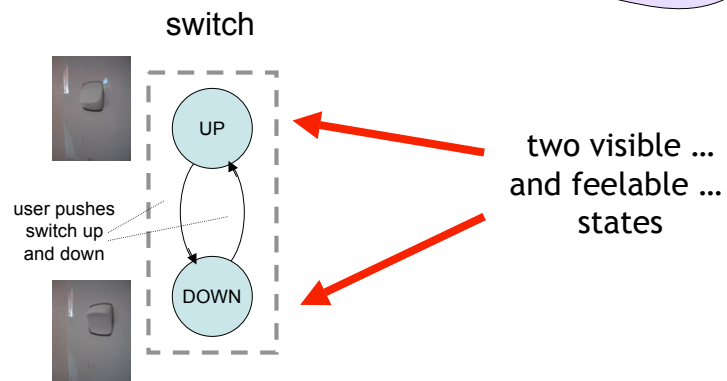
- Ullmer and Ishii – MCRpd
 - architectural interaction model
- Benford et al. – sensible/sensable/desirable
 - exploring design space
- Koleva et al. – TUI framework
 - 'coherence' between the physical and digital

multiple feedback loops



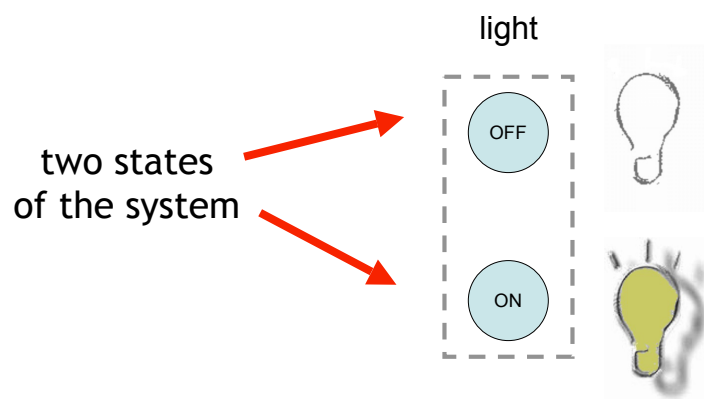
model physical device states

physigram

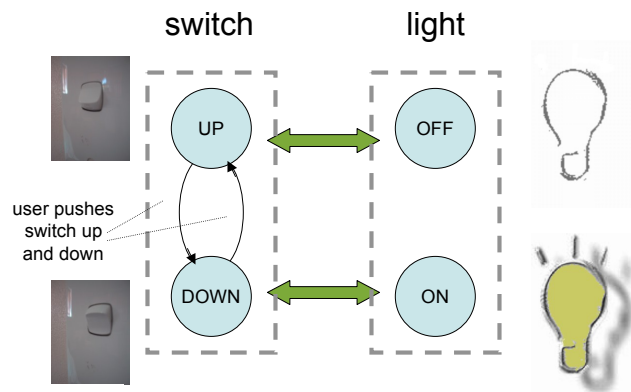


- the device 'unplugged'

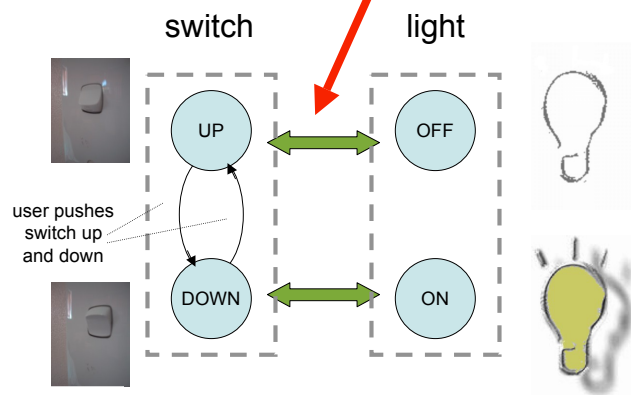
model logical system



physical-logical mapping

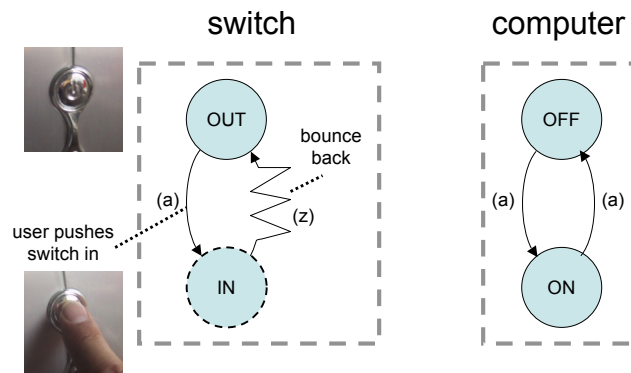


exposed state = mapping 1-1



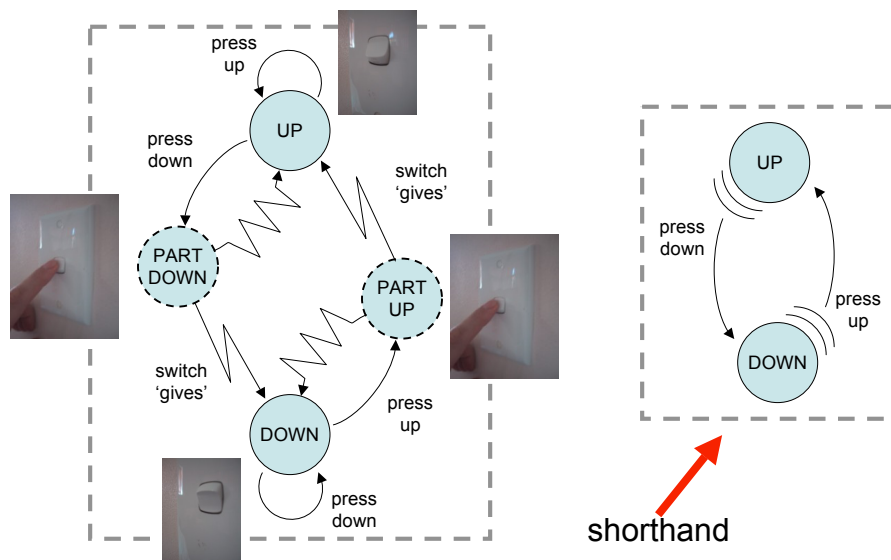
particularly easy to understand and use
but not always 1-1

bounce-back button



- mapping is on events not states

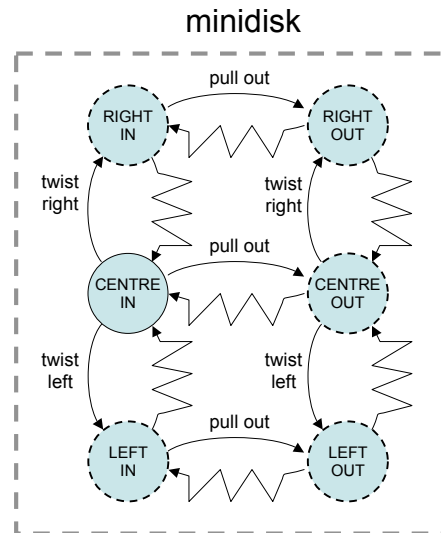
in detail: initial pressure on exposed state switch



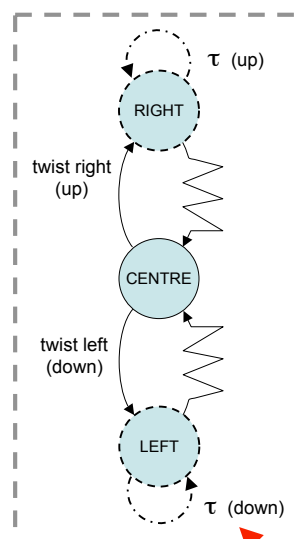
time-dependent devices



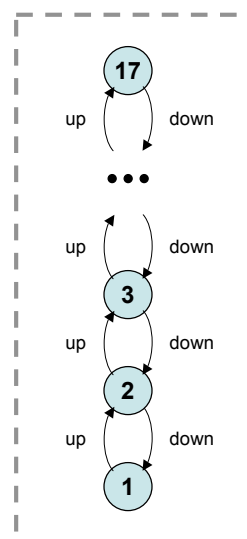
N.B. continued pressure during interaction



minidisk knob



track selected

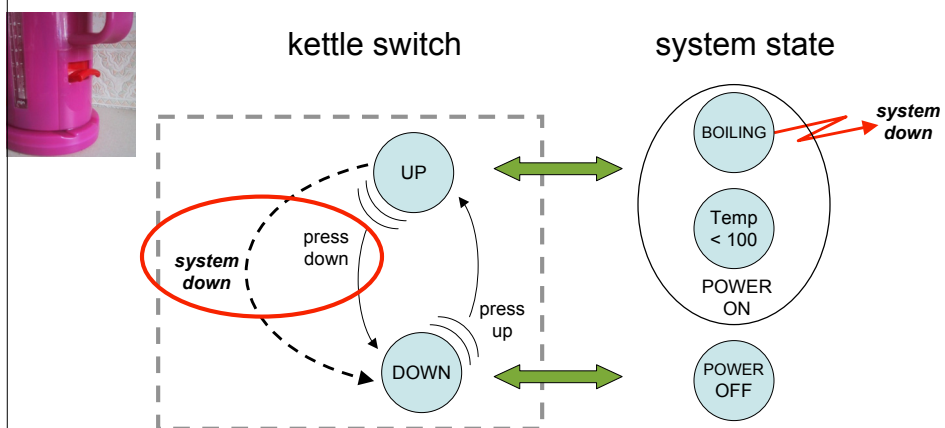


‘virtual’ time event added

controlled state



compliant interaction



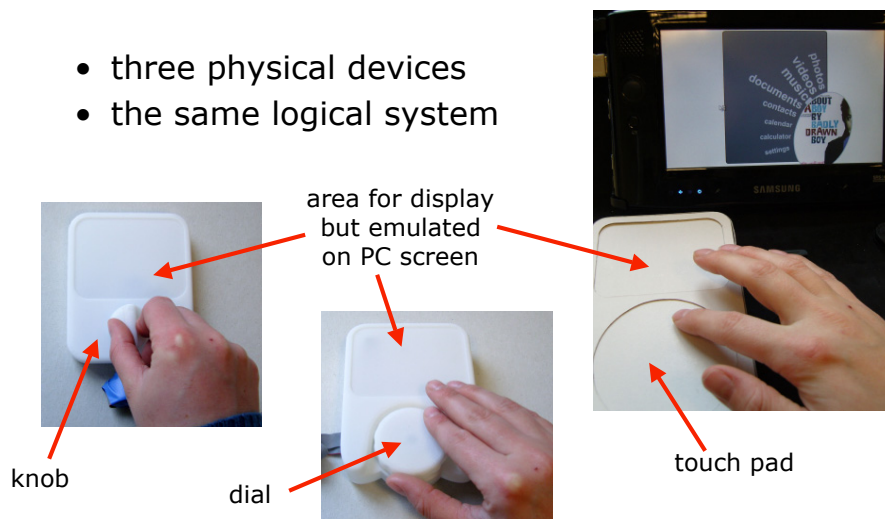
- (1) system state visible through control
- (2) system and user have similar effects

is it enough?

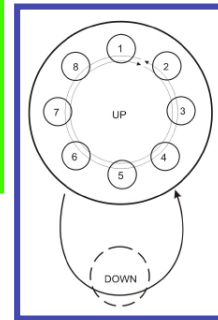
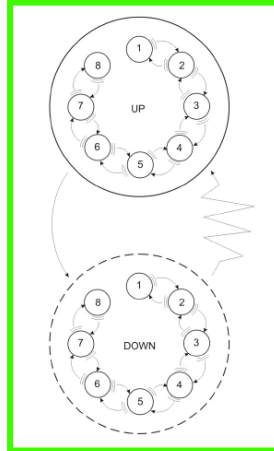
- need to represent rich physical interaction
- decorated STNs – go some way
... but still simplistic
- need to model pressure/force
status–event analysis ... naturally!

physigrams in action ...

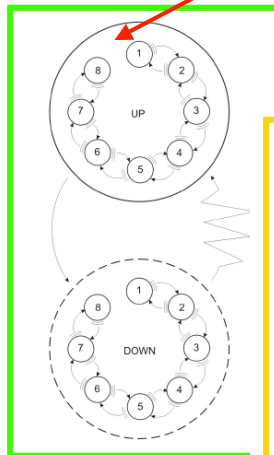
- three physical devices
- the same logical system



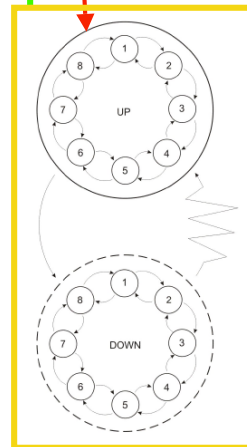
obvious differences



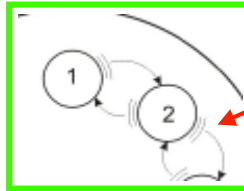
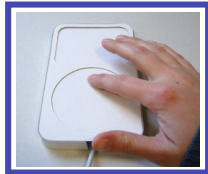
less obvious



knob has end stop
dial rotates freely

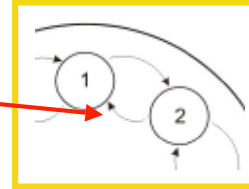


... and subtle

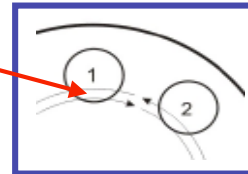


bounce-back resistance on knob

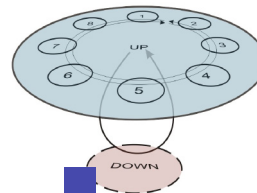
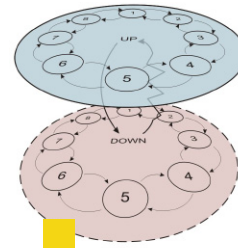
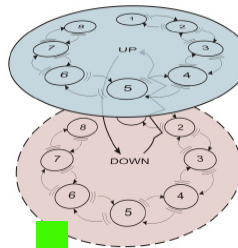
felt transitions but no resistance on dial



continuous with no felt transitions on touch pad



designers like it pretty!



now do it yourself ...
