chapter 16
dialogue notations and
design
extract for MSc/MRes AISD

Dialogue Notations and Design

- Dialogue Notations
  - Diagrammatic
    - state transition networks, JSD diagrams, flow charts
  - Textual
    - formal grammars, production rules, CSP
- Dialogue linked to
  - the semantics of the system – what it does
  - the presentation of the system – how it looks
- Formal descriptions can be analysed
  - for inconsistent actions
  - for difficult to reverse actions
  - for missing actions
  - for potential miskeying errors

what is dialogue?
- conversation between two or more parties
  - usually cooperative
- in user interfaces
  - refers to the structure of the interaction
  - syntactic level of human–computer ‘conversation’
- levels
  - lexical – shape of icons, actual keys pressed
  - syntactic – order of inputs and outputs
  - semantic – effect on internal application/data

structured human dialogue
- human-computer dialogue very constrained
- some human-human dialogue formal too …

Minister: do you man’s name take this woman …
Man: I do
Minister: do you woman’s name take this man …
Woman: I do
Man: With this ring I thee wed
(Woman places ring on womans finger)
Woman: With this ring I thee wed
(Minister places ring ..)
Minister: I now pronounce you man and wife

lessons about dialogue
- wedding service
  - sort of script for three parties
  - specifies order
  - some contributions fixed – “I do”
  - others variable – “do you man’s name …”
  - instructions for ring
c  - concurrent with saying words “with this ring …”
- if you say these words are you married?
  - only if in the right place, with marriage licence
  - syntax not semantics

… and more
- what if woman says “I don’t”? 
- real dialogues often have alternatives:

Judge: How do you plead guilty or not guilty?
Defendant: either Guilty or Not guilty
- the process of the trial depends on the defendants response
- focus on normative responses
  - doesn’t cope with judge saying “off with her head”
  - or in computer dialogue user standing on keyboard!
dialogue design notations

- dialogue gets buried in the program
- in a big system can we:
  - analyse the dialogue:
    - can the user always get to see current shopping basket
  - change platforms (e.g. Windows/Mac)
  - dialogue notations helps us to
    - analyse systems
    - separate lexical from semantic
- ... and before the system is built
  - notations help us understand proposed designs

graphical notations

state-transition nets (STN)

- Petri nets, state charts
- flow charts, JSD diagrams

State transition networks (STN)

- circles - states
- arcs - actions/events

State transition networks - events

- arc labels a bit cramped because:
  - notation is `state heavy`
  - the events require most detail

State transition networks - states

- labels in circles a bit uninformative:
  - states are hard to name
  - but easier to visualise

Hierarchical STNs

- managing complex dialogues
- named sub-dialogues
Concurrent dialogues - I
simple dialogue box

Text Style
- bold
- italic
- underline

example

Concurrent dialogues - II
three toggles - individual STNs

Click on 'bold'
- bold

Click on 'italic'
- italic

Click on 'underline'
- underline

Concurrent dialogues - III
bold and italic combined

Click on 'bold'
- bold

Click on 'italic'
- italic

Concurrent dialogues - IV
all together - combinatorial explosion

Click on 'bold'
- bold

Click on 'italic'
- italic

Click on 'underline'
- underline

Escapes

- 'back' in web, escape/cancel keys
  - similar behaviour everywhere
  - end up with spaghetti of identical behaviours

- try to avoid this
  - e.g. on high level diagram
  - 'normal' exit for each submenu
  - plus separate escape arc active
  - 'everywhere' in submenu

Help menus

- similar problems
  - nearly the same everywhere
  - but return to same point in dialogue
  - could specify on STN ... but very messy
  - usually best added at a 'meta' level
**Action properties**

- completeness
  - missed arcs
  - unforeseen circumstances
- determinism
  - several arcs for one action
  - deliberate: application decision
  - accident: production rules
- nested escapes
- consistency
  - same action, same effect?
  - modes and visibility

**Checking properties (i)**

- completeness
  - double-click in circle states?

**Checking properties (ii)**

- Reversibility:
  - to reverse select `line`
  - click - double click
Checking properties (ii)

- Reversibility:
  - To reverse select ‘line’
  - click - double click - select ‘graphics’
  - (3 actions)
- N.B. not undo

State properties

- Reachability
  - Can you get anywhere from anywhere?
  - And how easily
- Reversibility
  - Can you get to the previous state?
  - But NOT undo
- Dangerous states
  - Some states you don’t want to get to

Dangerous States

- Word processor: two modes and exit
  - F1 - changes mode
  - F2 - exit (and save)
  - Esc - no mode change

  but ... Esc resets autosave

Dangerous States (ii)

- Exit with/without save ⇒ dangerous states
  - Duplicate states - semantic distinction
  - F1-F2 - exit with save
  - F1-Esc-F2 - exit with no save

Lexical Issues

- Visibility
  - Differentiate modes and states
  - Annotations to dialogue
- Style
  - Command - verb noun
  - Mouse based - noun verb
- Layout
  - Not just appearance ...

Layout matters

- Word processor - dangerous states
- Old keyboard - OK
layout matters

• new keyboard layout

intend F1-F2 (save)
finger catches Esc

layout matters

• new keyboard layout

intend F1-F2 (save)
finger catches Esc
F1-Esc-F2 - disaster!

Digital watch – User
Instructions

• two main modes
• limited interface
- 3 buttons
• button A changes mode

Digital watch – User
Instructions

• dangerous states
  • guarded  
    … by two second hold
• completeness
  • distinguish depress A 
    and release A
  • what do they do 
    in all modes?

Digital watch – Designers
instructions

and ...

that’s just 
one button