HUMAN-COMPUTER INTERACTION THIRD EDITION

DIX FINLAY ABOWD BEALE

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
(places ring on womans finger)
Woman: With this ring I thee wed *(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 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

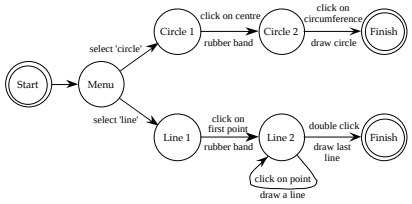
- dialogue gets buried in the program
- in a big system can we:
  - analyse the dialogue:
    - can the user always get to see current shopping basket
  - change platforms (e.g. Windows/Mac)
  - dialogue notations helps us to
    - analyse systems
    - separate lexical from semantoc
- … and before the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

graphical notations

state-transition nets (STN)
Petri nets, state charts
flow charts, JSD diagrams

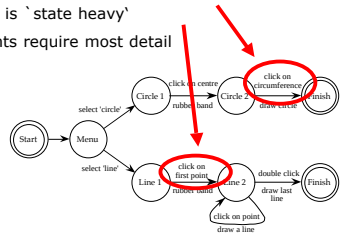
State transition networks (STN)

- circles - states
- arcs - actions/events



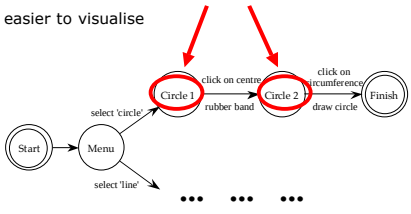
State transition networks - events

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



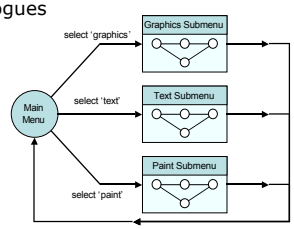
State transition networks - states

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



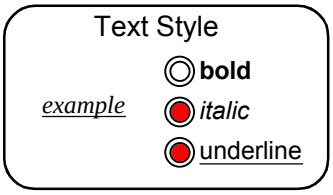
Hierarchical STNs

- managing complex dialogues
- named sub-dialogues



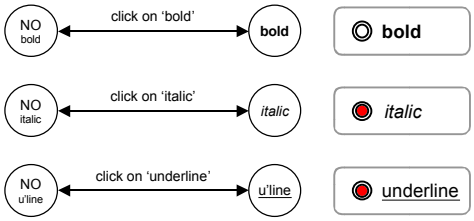
Concurrent dialogues - I

simple dialogue box



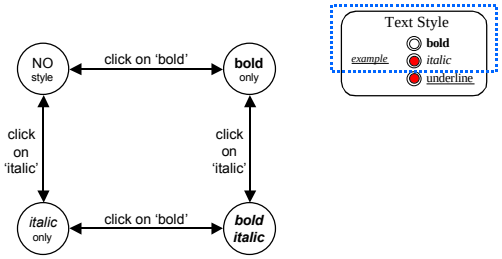
Concurrent dialogues - II

three toggles - individual STNs



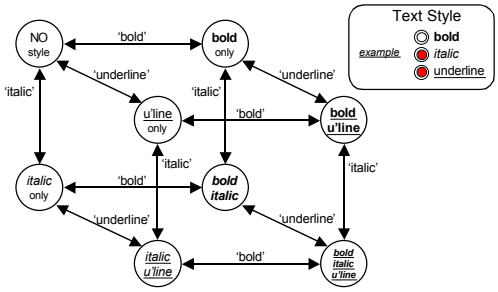
Concurrent dialogues - III

bold and italic combined



Concurrent dialogues - IV

all together - combinatorial explosion



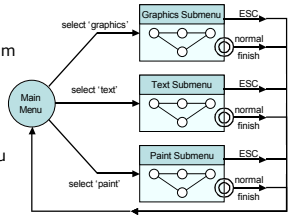
escapes

- '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

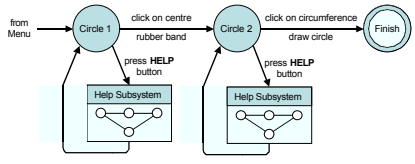
'normal' exit for each submenu

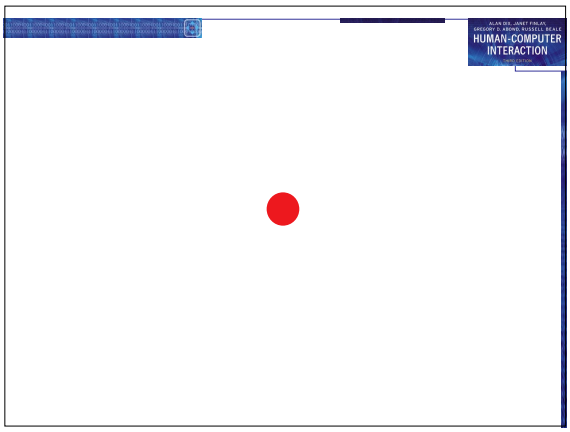
plus separate escape arc active 'everywhere' in submenu



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



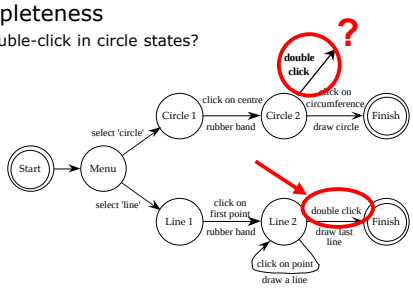


Action properties

- 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

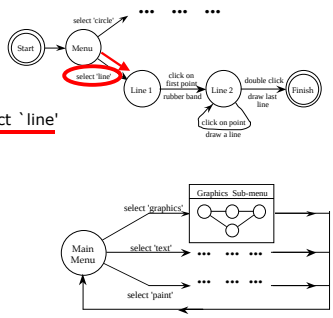
Checking properties (i)

- completeness
  - double-click in circle states?



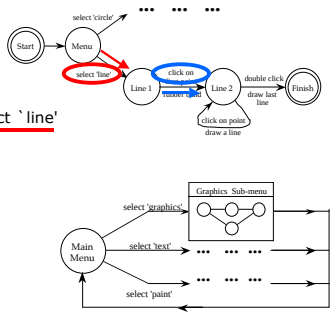
Checking properties (ii)

- Reversibility:
  - to reverse select `line'



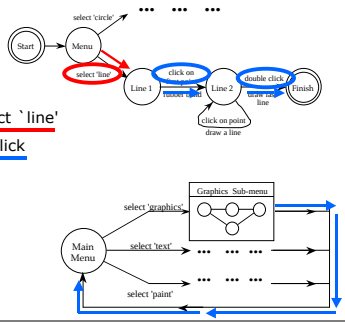
Checking properties (ii)

- Reversibility:
  - to reverse select `line'
  - click



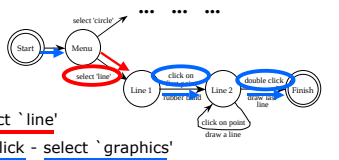
Checking properties (ii)

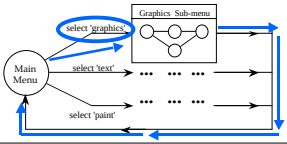
- Reversibility:
  - to reverse select `line'
  - click - double click



Checking properties (ii)

- Reversibility:
  - to reverse select `line'
  - click - double click - select `graphics'
  - (3 actions)
- N.B. not undo





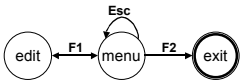
State properties

- 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

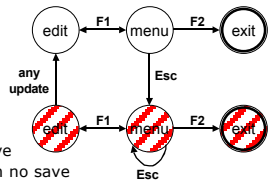
F1 - changes mode
F2 - exit (and save)
Esc - no mode change



but ... Esc resets autosave

Dangerous States (ii)

- exit with/without save ⇒ dangerous states
- duplicate states - semantic distinction



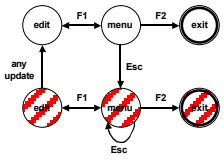
F1-F2 - exit with save
F1-Esc-F2 - exit with no save

Lexical Issues

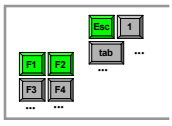
- visibility
  - differentiate modes and states
  - annotations to dialogue
- style
  - command - verb noun
  - mouse based - noun verb
- layout
  - not just appearance ...

layout matters

- word processor - dangerous states

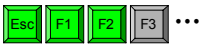


- old keyboard - OK



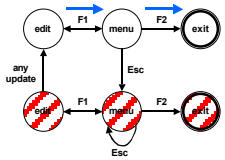
layout matters

- new keyboard layout



intend F1-F2 (save)

finger catches Esc



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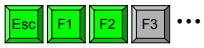
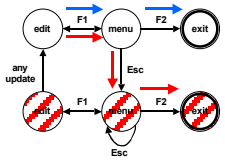


intend F1-F2 (save)

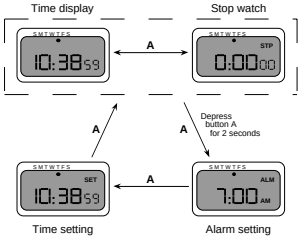
finger catches Esc

F1-Esc-F2 - disaster!



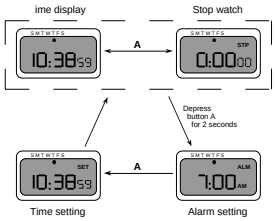
Digital watch – User Instructions

- 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