

HUMAN-COMPUTER INTERACTION THIRD EDITION **DIX FINLAY ABOARD BEALE**

chapter 16

dialogue notations and design

HUMAN-COMPUTER INTERACTION

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

2

HUMAN-COMPUTER INTERACTION

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

3

HUMAN-COMPUTER INTERACTION

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

4

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

5

... 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!

6

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

7

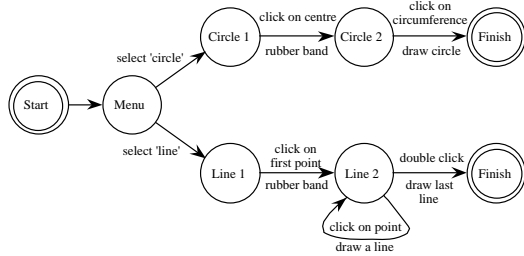
graphical notations

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

8

State transition networks (STN)

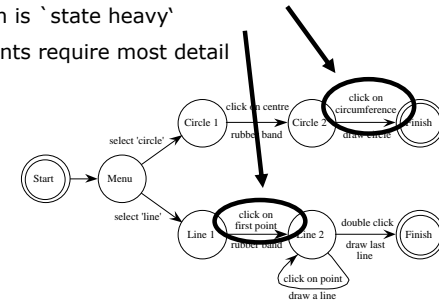
- circles - states
- arcs - actions/events



9

State transition networks - events

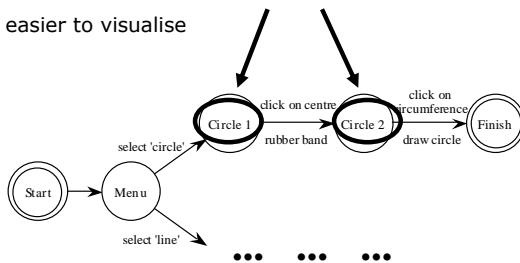
- arc labels a bit cramped because:
 - notation is 'state heavy'
 - the events require most detail



10

State transition networks - states

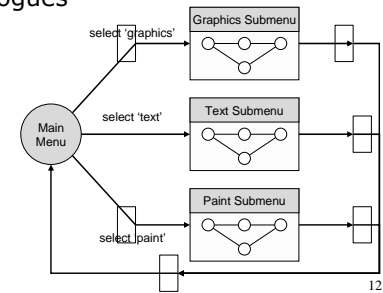
- labels in circles a bit uninformative:
 - states are hard to name
 - but easier to visualise



11

Hierarchical STNs

- managing complex dialogues
- named sub-dialogues



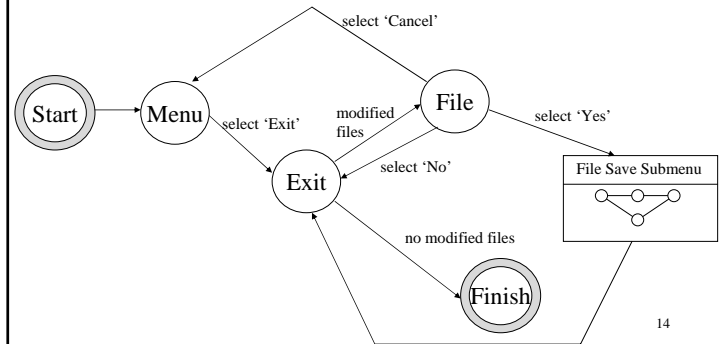
12

Exercise on STNs

- Model the File | Exit dialogue in MS Word

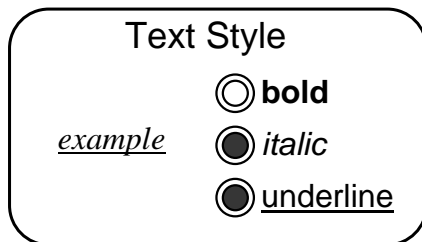
13

Exercise on STNs answers



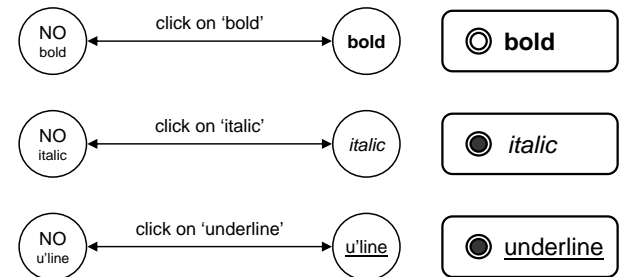
14

Concurrent dialogues - I simple dialogue box



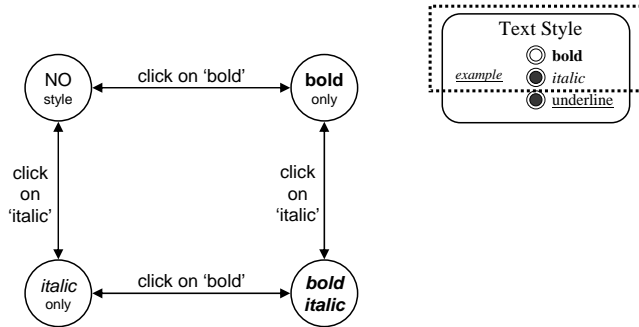
15

Concurrent dialogues - II three toggles - individual STNs



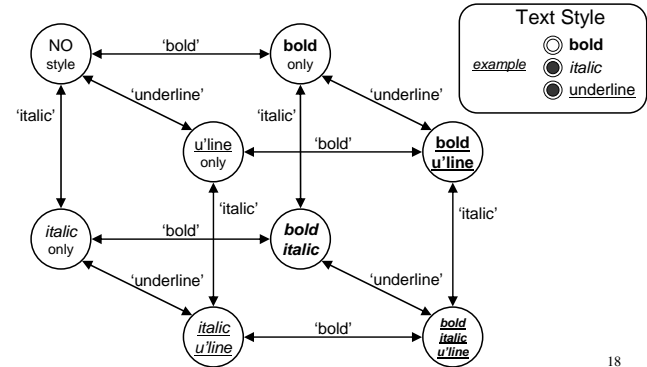
16

Concurrent dialogues - III bold and italic combined



17

Concurrent dialogues - IV all together - combinatorial explosion

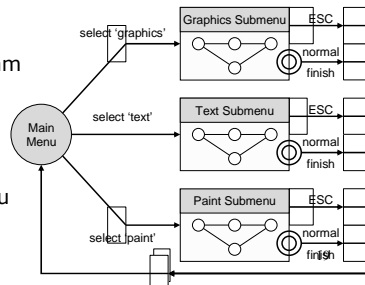


18

escapes

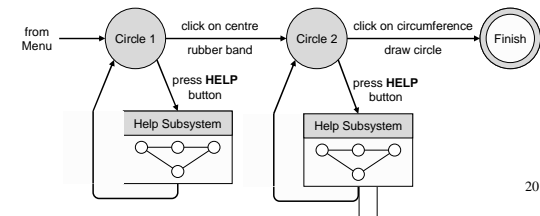
- 'back' in web, escape/cancel keys
 - similar behaviour everywhere
 - end up with spaghetti of identical behaviours
- try to avoid this

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



help menus

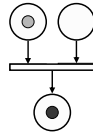
- similar problems
 - nearly the same everywhere
 - but return to same point in dialogue
 - could specify on STN ... but very messy
 - usually best added at a 'meta' level



20

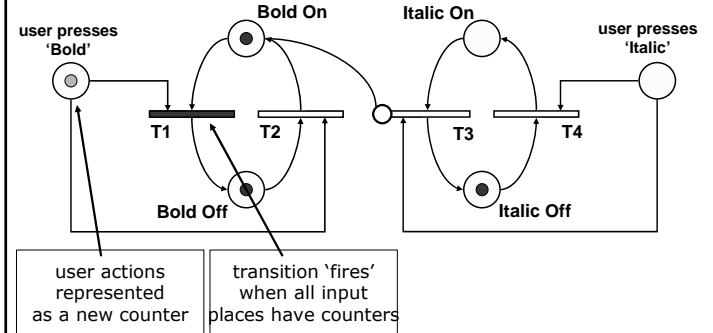
Petri nets

- one of the oldest notations in computing!
- flow graph:
 - places - a bit like STN states
 - transitions - a bit like STN arcs
 - counters - sit on places (current state)
- several counters allowed
 - concurrent dialogue states
- used for UI specification (ICO at Toulouse)
 - tool support - Petshop



21

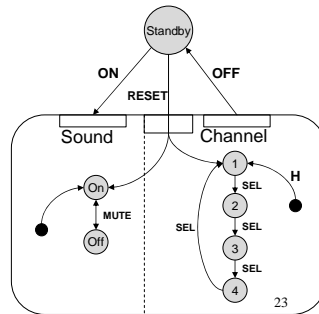
Petri net example



22

State charts

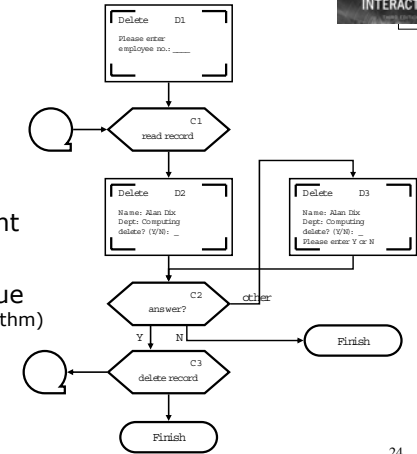
- used in UML
- extension to STN
 - hierarchy
 - concurrent sub-nets
 - escapes
 - OFF always active
 - history
 - link marked H goes back to last state on re-entering subdialogue



23

Flowcharts

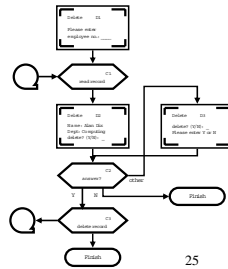
- familiar to programmers
- boxes
 - process/event
 - not state
- use for dialogue (not internal algorithm)



24

it works!

- formal notations – too much work?
- COBOL transaction processing
 - event-driven – like web interfaces
 - programs structure ≠ dialogue structure
- used dialogue flow charts
 - discuss with clients
 - transform to code
 - systematic testing
 - 1000% productivity gain
- formalism saves time!!



25

JSD diagrams

- for tree structured dialogues
 - less expressive
 - greater clarity

