



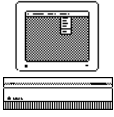
using formalism in HCI

from cognitive models
to placemats

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

what to model

- users
 - cognitive models
 - task models
- system
 - behaviour
 - architectural structure
- world
 - domain models



notations

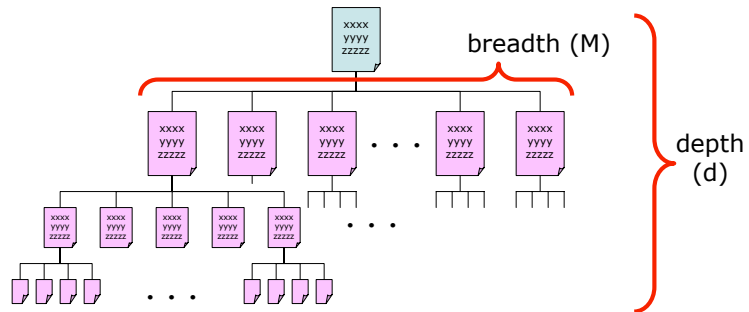
- graphical
 - digital watch STNs, Petri Nets, CTT, UML
- textual
 - production rules (used in UIMS and cog. models)
 - mathematical formulae, process algebras
- plain old sums
 - back of the envelope/placemat calculations

placemat math - menu sizes

- on-screen menus
 - e.g. web site navigation
- how many items per screen?
- frequent misapplication of Miller 7 ± 2
- but how many is right?

placemat math (ii)

- menu tree has N items
- number of items per screen = M (breadth)
- depth (d) = $\log_2(N) / \log_2(M)$



placemat math (iii)

$$T_{\text{total}} - \text{time to find an item} \\ = (T_{\text{display}} + T_{\text{select}}) \times d$$

$$T_{\text{display}} - \text{time to display screen (fixed)}$$

$$T_{\text{select}} - \text{time to select menu item} \\ = A + B \log(M) \quad (\text{Fitts' Law})$$

$$T_{\text{total}} = (T_{\text{display}} + A + B \log(M)) \times \log(N) / \log(M)$$

cancel

$$= ((T_{\text{display}} + A) \times \log(N)) / \log(M) + B \log(N)$$

best menu size?

$$T_{\text{total}} = ((T_{\text{display}} + A) \times \log(N)) / \log(M) + B \log(N)$$

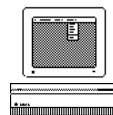
- larger M means shorter total time
- the bigger the better!

N.B. other factors

- visual search (linear if not expert)
- error rates
- minimum selectable size
- effective organisation of menu items

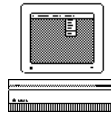
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types of system model

- dialogue – main modes
 - full state definition
 - abstract interaction model
- } specific system
- generic issues