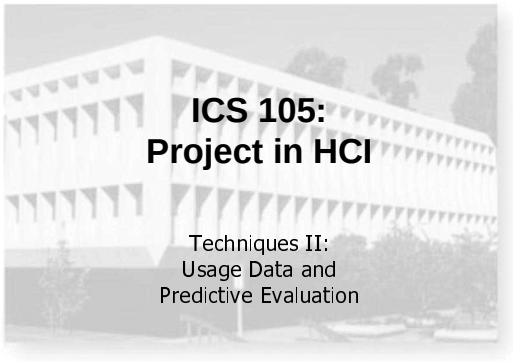


ICS 105: Project in HCI

Techniques II:
Usage Data and
Predictive Evaluation

project status

- team assignments are pretty much done
- however:
  - still need to know what you're working on
  - still need to know who's taking which role
  - tell me BEFORE MONDAY

schedule

- paper prototypes will get pushed back
  - originally planned for next Thursday
  - now we'll do them Wed 5/2 and Fri 5/4
  - *NB: there's a test Tues 5/1*
- we'll organise sessions explicitly
  - six teams on Wednesday, six on Friday
  - three teams at a time, with others as users
  - going to be pushed for time…

schedule

- right now…
  - be working on the design
    - take a user-centered approach
    - what tasks does it need to perform?
    - who are the users who're going to be using it?
      - scenarios might help!
  - what kind of interface approach will you take
    - be radical!
    - but… think about how you're going to test it
      - telepathic interfaces probably aren't going to fly
    - focus on the interface rather than the back-end for now
      - but bear in mind constraints that the back-end might impose

outcomes

- report on paper prototypes
  - short (~5 pages) report on exercise
    - your basic design approach
    - how it fared in the prototype
      - what worked, what didn't work, what were people's impressions
- I don't want the pieces of paper…
- grading
  - I'll give you feedback
  - no explicit grade on this section
    - it'll feed into an overall grade for the project

more techniques

- last time
  - paper prototypes
  - cognitive walkthroughs
- this time
  - more on predictive prototyping
    - GOMS and KLM
  - usage data approaches
  - questions are:
    - what do these techniques tell you?
    - when you should choose one or another?
    - what are the pitfalls?

predictive techniques

- predictive techniques
  - when you can't run a user trial
  - expert inspection of the interface
  - theory-based evaluation of performance

cognitive theory

- cognitive psychology
  - from *behaviour* to *mental processing*
  - a mechanistic/computational account of cognition
  - so, cognition amenable to
    - mechanical investigation
    - mathematical modeling
    - engineering design
- relevant questions
  - how much can people remember in the short term?
  - how complex are different calculations?
  - how long will it take people to perform tasks?

human info. processor (sparky)

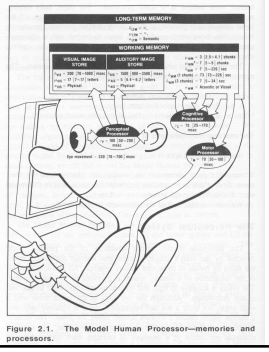


Figure 2.1. The Model Human Processor—memories and processors.

from Card, Moran & Newell, 1983

GOMS

- a model of cognitive interface activity
  - Goals
  - Operations
  - Methods
  - Selection roles
- too complex for us to consider here, so…

keystroke level model

- KLM is simplified version of GOMS
  - single-layer model (no nested goals/subgoals)
  - focus on brief operations
  - combination of mental and motor actions
  - largely developed independent of GUI

keystroke level model

- basic operation classes
  - keystroking (K)
  - pointing (P)
  - homing (H)
  - drawing (D)
  - mental operations (M
  - response (R)
- so
  - $T_{execute}=T_k+T_p+T_d+T_m+T_h+T_r$

why should we care?

- times can be experimentally determined
  - T_k = 0.35s (depends on skill)
  - T_p = 1.10s
  - T_m = 1.35s
  - T_r = 1.2s
  - T_h = 0.4s
  - T_d is too variable to measure

tricky part

- where to put T_m
  - where do the "think" pauses go?
  - intricate set of heuristics
    - place M before all K's not part of command strings
    - place M before all P's that select commands
    - for each M
      - delete if operator anticipated (e.g. PMK -> PK)
      - if string of Ms belong to cognitive unit, delete all but first
      - if K is redundant terminator, delete M
      - if K terminates constant string (e.g. command), delete it
      - if K terminates variable string (e.g. arg), keep it

example

- to do "save as…"
  - initial homing: T_h
  - select "file": Tm plus T_p
  - select "save as"
    - click, select, click
    - $T_k + T_m + T_p + T_k$
  - enter filename
    - system prompt, typing
    - $T_r + T_m + T_k$ (foo.doc) + T_k(return)
  - total:
    - 0.4 + 2.33 + 3.15 + 7.05 = 13.05s

problems

- fail to account for context
- fail to account for errors
- fail to account for learning

- but…
  - rules of thumb are useful
  - useful to think about the NUMBER of operations
  - useful to think about what people need to do

observation

- interviews rest on a questionable assumption
- direct observation
  - observe without interference (as far as possible)
  - the dangers of misinterpretation
    - we're used to looking at the world and ascribing intent
    - perception is a complex cognitive process
    - what we see is often what we expect to see

observation

- video observation
  - can allow for repeated analysis
  - can be coordinated with other forms of data
    - e.g. keystroke logging
- the hawthorne effect
  - the Uncertainty Principle for social science…

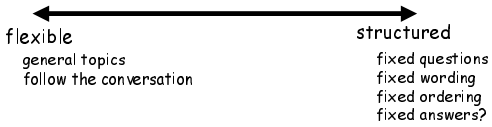
think-aloud protocols

- a "protocol" is a log of intermediate states
  - the steps you go through to accomplish a task
- various mechanisms for eliciting a protocol
  - software logging, video analysis
- think-aloud procotols
  - user
  - interfering with the task
- post-event protocols
  - like video analysis, but with the user

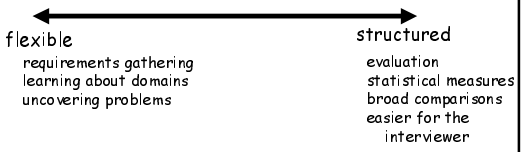
usage data

- collecting usage data is easy
  - you can generate enormous amounts very quickly
- analyzing usage data is hard
  - you need to know what you're looking for
  - you need to decide in advance how you'll analyse it
    - looking at task performance? time to competion?
    - looking for interface problems? dead-ends?
    - looking for contextual factors?
    - how are you going to "code" it?

interviews



interviews



semi-structured interviews

- more common approach
  - in advance, prepare an interview guide
    - some basic questions
    - ask *open* questions – not yes or no answers
      - often useful to ask about specific experiences
    - prompts & follow-ups
  - during the interview
    - be prepared to follow where it goes
      - ask follow-up questions…
      - your goal is to find things out, not to get done a.s.a.p.!
    - structure is a guide
      - complete it, but use it as a starting point

neilsen's structure

- why do you do this? (get the user's goal)
- how do you do it (get the subtasks; recurse)
- why do it this way? (suggest alternatives)
  - don't criticise, but get the rationale
- what are the preconditions for doing this?
- what are the results?
- can we see your work product?
- do errors ever occur?
- how do you resolve them?

variations

- prompted interviews
  - people find it easier to work with specifics
  - use artifacts to guide the discussion
    - show me some examples of recent work
    - how did you do this?
    - what might have caused that?
    - what prompted such-and-such an action?

variations

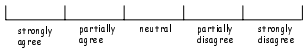
- card sorting techniques
  - users asked to sort cards according to various factors
  - cards can indicate categories, actions, people, data…
  - the cards are an *external* representation
    - easier to reflect on
    - sharable between many people

questionnaires

- focus on unambiguous answers
  - questionnaires are normally looking for broad trends
  - need to be able to aggregate results
- structured answers
  - multiple choice
  - yes/no
  - likert scales

questionnaires

- focus on unambiguous answers
  - questionnaires are normally looking for broad trends
  - need to be able to aggregate results
- structured answers
  - multiple choice
  - yes/no
  - likert scales
    - ICS 105 is the best class ever



questionnaires

- questionnaire design is deceptively complex
  - provides necessary information for making decision?
  - consider respondent and environment
  - work to make it interesting
  - focus on "need to know"
  - keep a specific respondent in mind
  - reduce the need for interpretation
  - beware of prestige bias

questionnaires

- how often do you eat at a restaurant?
  - very often
  - often
  - sometimes
  - rarely
  - never

questionnaires

- how often do you eat at a restaurant?
  - every day
  - 2-6 times per week
  - about once a week
  - about once a month
  - never

questionnaires

- how would you rate this interface?
  - superb
  - excellent
  - great
  - good
  - fair
  - not so great

questionnaires

- is this the best interface you've ever used?
  - yes
  - no

questionnaires

- the interface was easy to understand
  - strongly agree
  - partly agree
  - neither agree nor disagree
  - partly disagree
  - strongly disagree

questionniares

- I believe we should protect the environment
  - strongly agree
  - partially agree
  - neutral
  - partially disagree
  - strongly disagree

questionnaires

- questionnaires are useful when
  - need to gather large amounts of information
    - but watch out: 20% response rate is high
  - need to find broad trends
  - situation is well-understood
- less valuable when:
  - need detail
  - doing more exploratory work

for next time

- make appointment times with Doshi
  - by the end of this week, we want to know everything!
    - who's on what team
    - what you're doing
- next time
  - interpretive approaches