

Preliminaries

CS5540 HCI
by
Rich Riesenfeld
Fall 2004

What is the HCI Issue?

- Is the interface the concern?
- Is the issue a matter of accomplishing work, some set of tasks?
- Are we focusing on wrong thing?
- We don't discuss telephone interfaces often.

“Doing Work” View - 2

- Need to understand the user and human behavior
- How does an architect approach a custom home design for a new client?

What good interface principles do we already know? - 1

- Interesting, pleasing, attractive, inviting
- Effective to use
- Intuitive: Alan Kay's children
- Organized, hierarchically structured, clean

What good interface principles do we already know? - 2

- Help functions, Search, etc
- Consistent form (aka design integrity)
- Automatic assistance
 - Completions
 - Spelling

Fall 2003

Utah School of Computing

Student Name Server

slide 5

What good interface principles do we already know? - 3

- Lead the user
 - Prompts
 - Indicate nature of any problem
 - Specific communication
- Navigational aids: systems often huge

Fall 2003

Utah School of Computing

Student Name Server

slide 6

Bookmark

Pick up here...

Fall 2003

Utah School of Computing

Student Name Server

slide 7

What good interface principles do we already know? - 4

- Meaningful error msgs
 - Don't send you elsewhere
 - Give useful number
 - Area of inadequate traditions
- Multiple paths to a function
- Keep it simple

Fall 2003

Utah School of Computing

Student Name Server

slide 8

What good interface principles do we already know? - 5

- Gain user's trust
- Bottom up is probably most acceptable
- Simple tasks should be simple
- WYSIWYG – easy to get started
 - Piano v violin

Fall 2003

Utah School of Computing

Student Name Server

slide 9

Our history hurts us... - 1

- Developed some poor communications habits
- Natural language is terribly ambiguous
- Resources were scarce
- Other priorities, historically

Fall 2003

Utah School of Computing

Student Name Server

slide 10

Our history hurts us... - 2

- Error Messages
 - Early computing: "Compiler error"
 - Even now: Sys Error EM732851
 - Error from wrong module: Latex
- Small road signs
- Confusing directions
 - 400 S HOV Interchange on I15

Fall 2003

Utah School of Computing

Student Name Server

slide 11

Our history hurts us: KE007 - 3



Fall 2003

Utah School of Computing

Student Name Server

slide 12

Our history hurts us... KE007 - 4

- Korean Airlines Flight 007
- 269 onboard, veered over Soviet airspace in Pacific, and was shot down
- Pilot/Navigator keyed in numerical coordinates by hand for flight plan!

Fall 2003

Utah School of Computing

Student Name Server

slide 13

Our history hurts us... KE007 - 5

How about:

- Automatic download?
- Picking from a menu?
- Symbolic names?
- Confirmation playback?

Fall 2003

Utah School of Computing

Student Name Server

slide 14

Our history hurts us... KE007 - 6

How about:

- Context check (like type-checking...)?
 - Pilot, run, time, plane, schedules, assignments, etc

Fall 2003

Utah School of Computing

Student Name Server

slide 15

Our history hurts us... KE007 - 7

How about:

- Monitors, Alarms, Inhibitors?
- Confirmation message?
 - Aviation tower communications
 - Telephone technical conversations
- Parity checks?

Fall 2003

Utah School of Computing

Student Name Server

slide 16

Our history hurts us... - 8

Audi

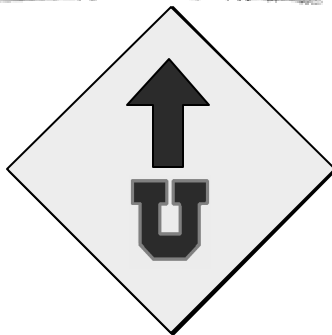
- Cars took off from a standing position
- Driver error, claimed Audi...
- Whose error was it?

Our history hurts us... - 9

- NASA space probe
- Lost major mission over units mistake
- JPL group worked in SI units
- Colorado group worked in English units
- Combining the results led to bad numbers
- Type checking issues?

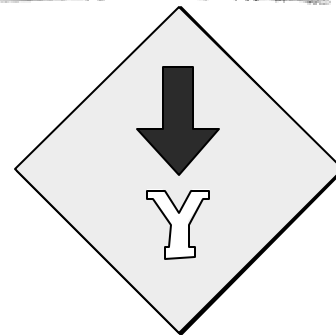
Culture -1

What does this sign mean?



Culture -2

What does this sign mean?



Culture -3

- Up is better than down
 - Religion, Dante, ...
- When we refer to ourselves
 - We point to our noses?
 - Our chests?
- Point with index finger or hand ?

Fall 2003

Utah School of Computing

Student Name Server

slide 21

Critical Interfaces

- Nuclear power plants
 - Interface had better be clear
- Airplane cockpit
 - Computer graphics has simplified controls, information
- Power saw, laser indicator

Fall 2003

Utah School of Computing

Student Name Server

slide 22

Effect of *Function*: Examples

- Water faucets in a sink
- Manual gear shift: 4 on the floor
- Chords on a guitar: hard!
- Interface is dictated (confused) by needed function

Fall 2003

Utah School of Computing

Student Name Server

slide 23

Other Historical Examples

- Books are essentially linear
- Stories or communications needs are not
- Hyper-text
 - Breaks the shackles of linear text stream
 - Digress as needed, desired

Fall 2003

Utah School of Computing

Student Name Server

slide 24

HCI is a *Design Problem*

- Design is old subject
- Well studied, rich traditions
- Apply design methodologies to build better interfaces
- We will look at this viewpoint

Fall 2003

Utah School of Computing

Student Name Server

slide 25

Important Operational Issues

- Reliability
- Availability
- Security
- Data integrity

Fall 2003

Utah School of Computing

Student Name Server

slide 26

Important Basics

- Standardization across app's
 - Apple did this first
- Integration of packages and tools
 - Unix does this well
- Consistency in actions, design style, terms, menus, color, fonts, etc
- Portability across platforms
 - Less than advertised (Quicken, eg)

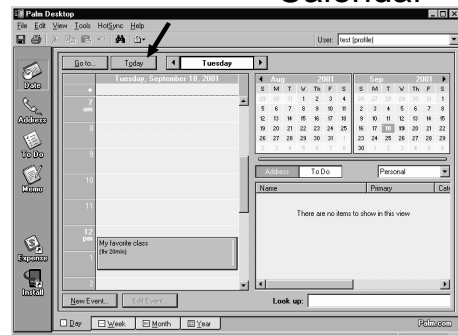
Fall 2003

Utah School of Computing

Student Name Server

slide 27

Palm Desktop Calendar



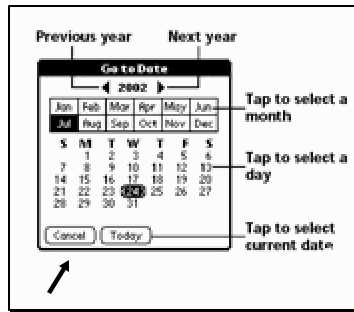
Fall 2003

Utah School of Computing

Student Name Server

slide 28

Palm Handheld Calendar



Important Stats -1

- Time to learn
- Speed of performance
 - How much coffee can one drink?
- Rate of errors by users
 - "The user is always right!"

Important Stats -2

- Retention over time
 - Do you have to start at square 1?
- Subjective satisfaction
 - Do you like it (no explanation needed!)
 - Can you develop attachment for it?

Dramatically Different Needs - 1

- Life-critical systems
 - Air traffic; nuclear reactors; cockpits; power utilities; emergency, military, medical, operations
- Commercial
 - Banks, resv's, inventory, point-of-sales (Hertz, Fedex,..), registration,..

Dramatically Different Needs - 2

- Home, office, entertainment
 - Obvious needs
- Exploratory, creative, cooperative systems
 - Bad interface (computer or otherwise) can destroy the process

Fall 2003

Utah School of Computing

Student Name Server

slide 33

Human Diversity

- Ergonomics, anthropometry
 - Anyone here "average?"
- Physical consideration
 - Height, stiffness, posture, shapeness, size of working area
 - IPD, headsize, light sensitivity

Fall 2003

Utah School of Computing

Student Name Server

slide 34

Cognitive Processes (from Engineering Abstracts) - 1

- Short-term memory
- Long-term memory
- (Over 40 year old users...)
- Problem solving
- Decision making

Fall 2003

Utah School of Computing

Student Name Server

slide 35

Cognitive Processes (from Engineering Abstracts) - 2

- Attention and set (scope of concern)
 - ADHD, Ritalin population (5%)...
- Search and scanning
- Time perception

Fall 2003

Utah School of Computing

Student Name Server

slide 36

Perceptual and Motor Performance Factors (ibid) - 1

- Arousal and vigilance
- Fatigue
- Perceptual (mental) load
- Knowledge of results
- Monotony and boredom

Fall 2003

Utah School of Computing

Student Name Server

slide 37

Perceptual and Motor Performance Factors (ibid) - 2

- Sensory deprivation
- Sleep deprivation
 - New driving regulations
 - Medical interns/residents
- Anxiety and fear
- Isolation

Fall 2003

Utah School of Computing

Student Name Server

slide 38

Perceptual and Motor Performance Factors (ibid) - 3

- Aging
- Drugs and alcohol
- Circadian rhythms

Fall 2003

Utah School of Computing

Student Name Server

slide 39

Gender Differences

- Males and Females are different!
- Much has been observed
- Firm principles are scarce

Fall 2003

Utah School of Computing

Student Name Server

slide 40

Carl Jung's Personality Differences - 1

- Extrovert v Introvert
 - Extroverts like action
- Sensing v Intuition
 - Routine v discovering new

Fall 2003

Utah School of Computing

Student Name Server

slide 41

Carl Jung's Personality Differences - 2

- Perceptive v judging
 - New situations v planning
- Feeling v thinking
 - Sensitive v logical

Fall 2003

Utah School of Computing

Student Name Server

slide 42

Recent Study Result ...

- Multi-tasking does not work!
- Ergo, one should not:
 - Drive a car
 - Talk on a mobile phone
- Q: Is driving a car a single task??

Fall 2003

Utah School of Computing

Student Name Server

slide 43

Cultural & International Diversity - 1

- Characters, numerals, special characters, diacriticals
- Left-to-right v right-to-left v vertical in reading
- Date and time formats
- Numeric and currency formats

Fall 2003

Utah School of Computing

Student Name Server

slide 44

Cultural & International Diversity - 2

- Weights and measures
- Telephones and addresses
- Names and titles
 - Mr., Ms., Mme, M., Dr.
- SSNs, national IDs,
- Capitalization and punctuation

Fall 2003

Utah School of Computing

Student Name Server

slide 45

Cultural & International Diversity - 3

- Sorting sequences
- Icons, buttons, colors
- Pluralization, grammar, spelling
- Etiquette, policies, tone, formality, metaphors.

Fall 2003

Utah School of Computing

Student Name Server

slide 46

Users with Disabilities

- Can truly open doors
 - Man with ALS who uses head to type
- Doing it well requires good client model
- Designer challenges

Fall 2003

Utah School of Computing

Student Name Server

slide 47

Evaluating Interfaces - 1

- Understanding of a practical problem
- Lucid statement of a testable hypothesis
- Manipulation of small number of independent variables
- Measurement of specific dependent variables

Fall 2003

Utah School of Computing

Student Name Server

slide 48

Evaluating Interfaces - 2

- Careful selection and assignment of subjects
- Control for bias in subjects, procedures, and materials
- Application of statistical tests
- Interpretation of results, refinement of theory, and guidance for experimenters

Fall 2003

Utah School of Computing

Student Name Server

slide 49

Possible Research Directions - 1

- Reduced anxiety of computers
- Graceful evolution of systems
- Specification and implementation of interaction
- Direct manipulation

Fall 2003

Utah School of Computing

Student Name Server

slide 50

Possible Research Directions - 2

- Input devices
- Online assistance
- Information exploration

Fall 2003

Utah School of Computing

Student Name Server

slide 51

Utah School of
Computing

End of Lecture Set 1
Preliminaries