

Lecture 5

Interface design – interaction decisions; error handling

User communication with the computer

- user interacts with computer to perform task
- user and machine are in *dialogue*
 - two-way *communication*
- communication is required
 - in every application
 - in any style of interaction
- successful communication has certain requirements

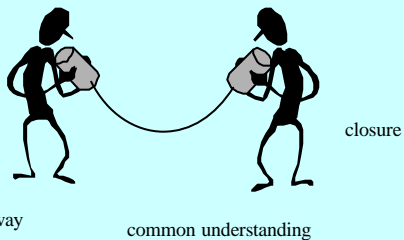
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Communication

feedback



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Communication (2)

- the nature of communication
- two-way
 - sender
 - receiver
- common understanding
 - shared terms/meanings
- feed-back
 - communication received & understood
- closure
 - OK and finished

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User interaction with the computer system

- user communicates to machine
 - keystrokes/mouse clicks
- machine communicates to user
 - screen output
 - audio signal
- requires
 - feed-back
 - common understanding

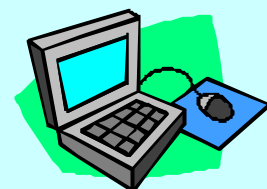
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Range of I/O devices

- input
 - keyboard
 - mouse
 - microphone
- output
 - screen
 - sound
- specialist
 - concept keyboard



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Dialogue & interaction styles

- command languages
- form fill-in, spreadsheets
- menu based
- query languages
- direct manipulation - GUIs
- natural language interfaces

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Command languages

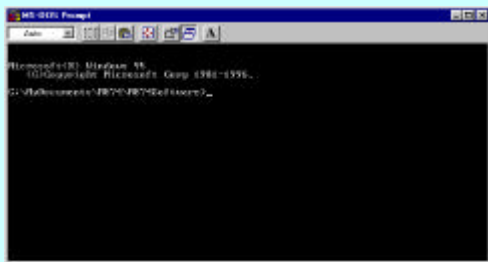
- standard in main-frame systems
 - examples
 - DOS
 - UNIX
 - Linux
- commands entered at keyboard
- command line syntax
 - type a:\myfile.dat | more
 - cp myfile myfile2
- batch file programming ability
 - autoexec.bat, config.sys

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Command line example



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Command languages (2)

- advantages
 - fast for skilled users
 - total control for skilled users
- disadvantages
 - high memory load
 - little help offered
 - difficult/impossible for non-experienced users

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Command-language-based applications

- DOS-based applications
 - WordStar
 - Word Perfect
 - menu & command based
 - not WYSI WYG
 - WordStar example
 - This word is in bold.
- modern parallel - HTML

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Form fill-in

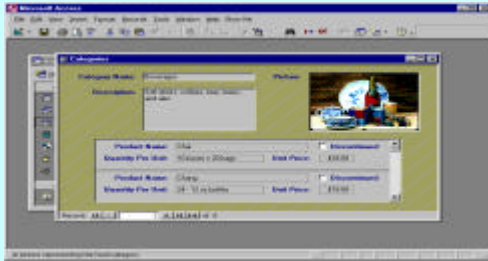
- good in appropriate applications
- easy, little training required
- can be used to interface with query languages
 - QBE

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Form fill-in example



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Query languages

- database systems
- need specialist training
- as for command-language interfaces
- some in wide-spread use (SQL)
 - many RDBMS use forms (QBE) interface
 - system translates to and acts on SQL query

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Spreadsheets

- among the most successful user interfaces
- Lotus 1-2-3 first big-selling PC application after wp
- mimics paper input
 - squared paper
 - rows/columns
- most users find them intuitive

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Menu-based systems

- usually hierarchical
 - each menu option opens up another menu
- menus used in many types of system
 - with GUIs
 - with form fill-in
 - with most other software systems
- design of menu structure is crucial

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Issues in menu design

- use of screen space
 - fixed
 - pop-up/drop-down
 - menu mode
- access to menu
 - GUI - mouse point/click
 - non-GUI - F keys, modes (Word Perfect)
 - joy-stick, cursor keys
- overall design/structure

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Design informed by task analysis

- breadth versus depth
 - many top-level choices, each one with fewer levels OR
 - fewer choices, each with greater depth
- grouping of choices & functions
 - determined by HTA or layered analysis
- vocabulary - names for things/actions
 - model task domain
 - Task Action Grammar
 - standard Windows look & feel

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Design informed by task analysis (2)

- frequency of tasks
 - things we do often must be quick/easy
 - things we do only occasionally can take longer
- 'importance' of tasks
 - important things
 - can take more time
 - need checks/confirmation, reversal
 - eg *Delete file*

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Menu structure

- class-inclusion matching
 - where will I find ?
 - should model task domain
- sign-posting
- back-tracking, orientation
- help & error recovery
- application to web site design

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Direct manipulation interfaces

- intuitive (should be)
- reduce memory burden
- have been shown to
 - reduce learning times
 - increase user confidence
- faster for novices/intermittent users
- slower for experts

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Issues in direct manipulation interfaces

- effectiveness of task model
 - desk-top metaphor
 - see Shneiderman: Object-Action interface model
- icon design
- short-cuts for experts
- issues for special needs

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Natural language interfaces

- the ultimate goal?
 - limited use currently in voice input systems
 - translation, grammar/spell-checkers
- currently sci-fi
- subject of much AI research
- voice/text input
- Turing test

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Summary

- all interactions must meet basic communications requirements to succeed
- many different dialogue designs/methods, appropriate to different tasks/systems

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Importance of **error handling**

our attitude to a system is affected by our experience of its error handling

- **ERRORS WILL OCCUR**
 - users will make mistakes
- the goal in error handling
 - simple explanation
 - easy recovery
 - stress reduction
 - 'don't make a drama out of a crisis'

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Error messages

- simple explanation
 - what has occurred
 - how to recover
- style and courtesy
 - minimise stress
 - fairly formal language
 - do not blame the user

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Some examples

HOW NOT TO DO IT

- 'Crashed again you berk'
- 'Unrecoverable error #00FF37AB'
- 'User input error at location XXX'

Instead try

Data input error: try deleting the last input and repeating. For help on input formats go to

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The 8 golden rules of interface design (Shneiderman 1998)

- be consistent
- allow short-cuts
- give feed-back
- provide closure
- provide error prevention & error handling
- permit easy reversal
- support internal locus of control
- reduce short-term memory load

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