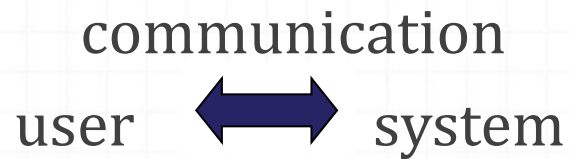


Chapter-3

The Interaction

What is interaction?



communication between the user and the system

terms of interaction

The purpose of interactive system is to help user in accomplishing goals from some domain.

domain – the area of work under study

e.g. graphic design

goal – what you want to achieve

e.g. create a solid red triangle

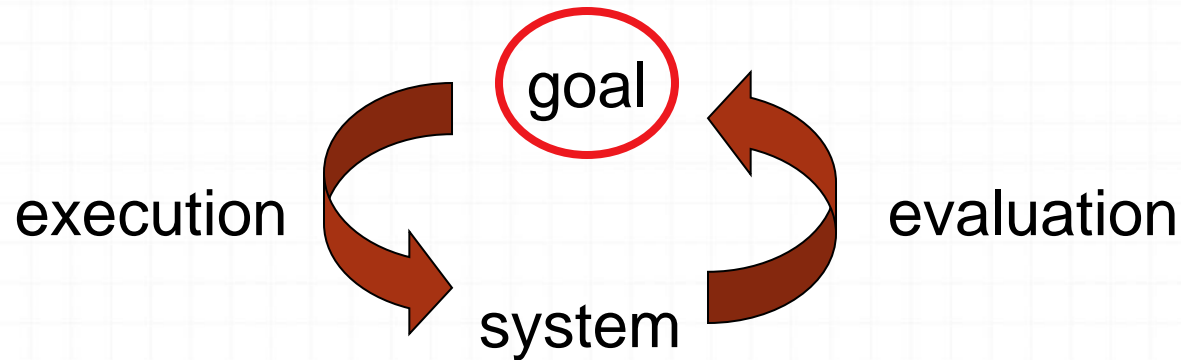
task – how you go about doing it
– ultimately in terms of operations or actions

e.g. ... select fill tool, click over triangle

Donald Norman's model

- o Interactive cycle divided into 2 major phases: execution and evaluation
- o Seven stages
 - o user establishes the goal
 - o formulates intention
 - o specifying the action sequence
 - o executes action
 - o perceives system state
 - o interprets system state
 - o evaluates system state with respect to goal
- o Norman's model concentrates on user's view of the interface

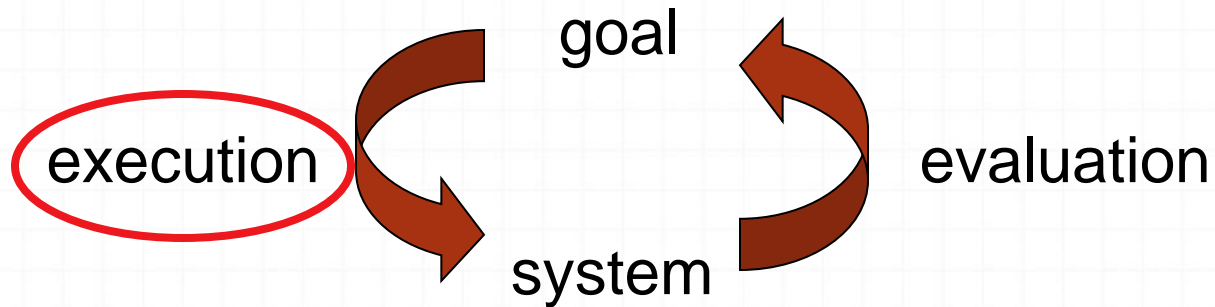
Execution/Evaluation loop



- o* user establishes the goal
- o* formulate intention
- o* specifies actions at interface
- o* executes action
- o* perceives system state
- o* interprets system state
- o* evaluates system state with respect to goal

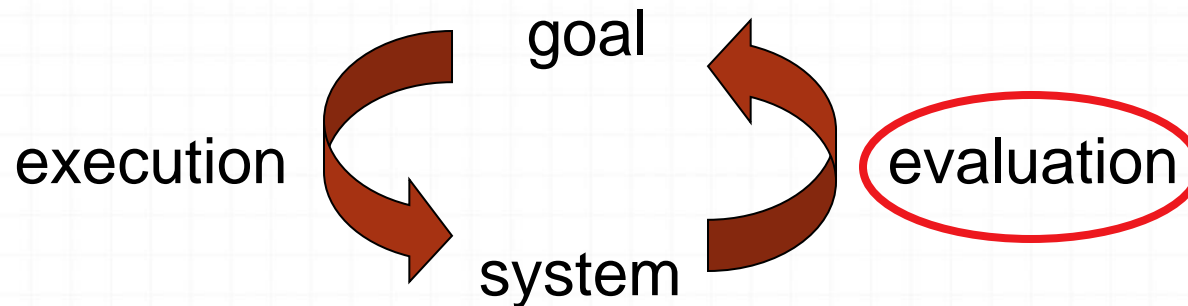
execution/evaluation

loop



- o formulates intention
- o specifying the action sequence
- o executes action
- o perceives system state
- o interprets system state
- o evaluates system state with respect to goal

execution/evaluation loop



- o* user establishes the goal
- o* formulates intention
- o* specifies actions at interface
- o* executes action

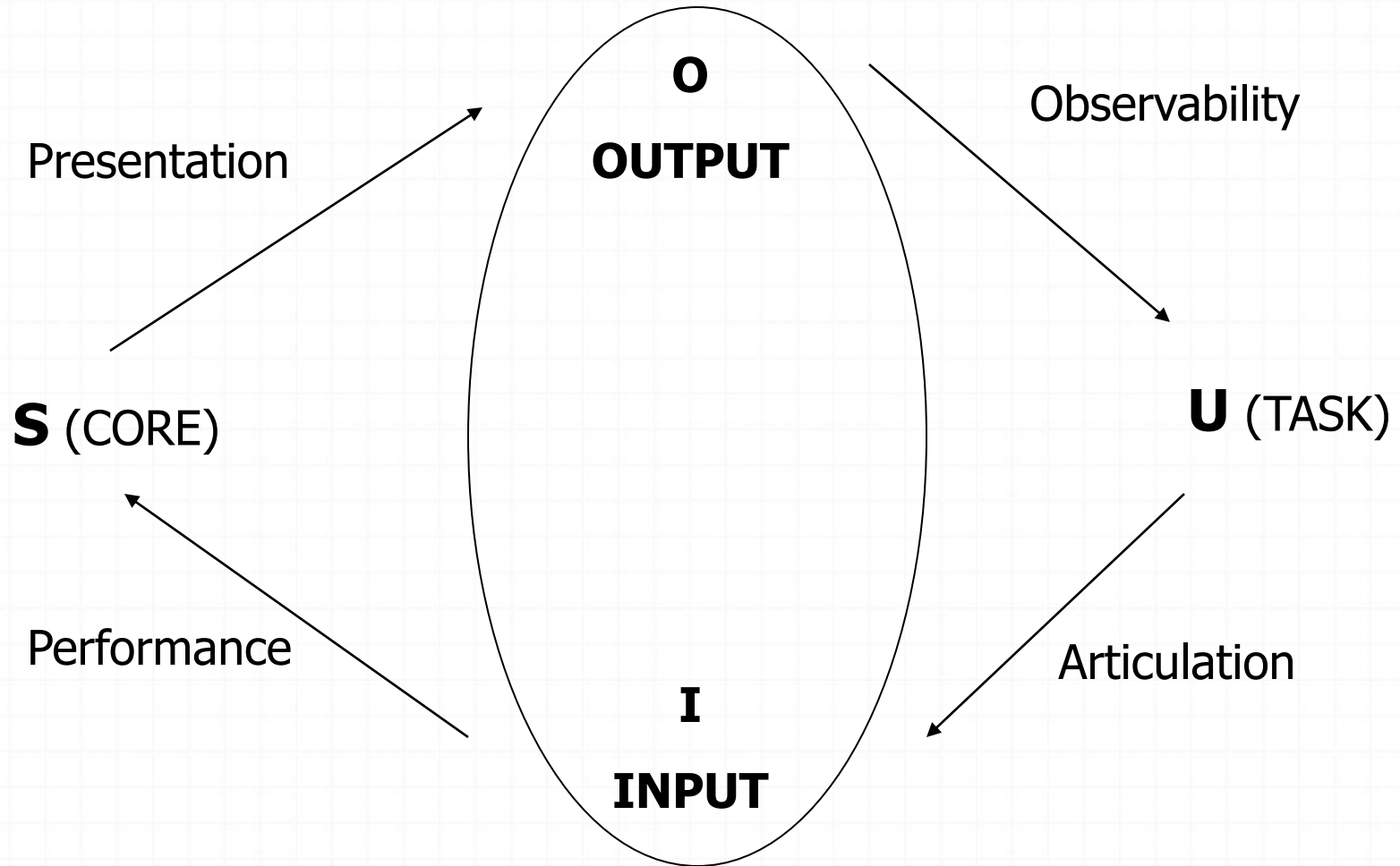
- o* perceives system state
- o* interprets system state
- o* evaluates system state with respect to goal

Interaction Framework

extension of Norman...proposed by Abowd and Beale....
their interaction framework has 4 parts

- o user
- o input
- o system
- o output

Interaction Framework



Ergonomics

- Ergonomics are human factors
- Ergonomics are used in defining standards and guidelines for constraining the certain design aspects of systems.
- Study of the physical characteristics of interaction:
 - how the controls are designed
 - physical environment in which interaction takes place
 - the layout & physical qualities of the screen
 - Ergonomics also touch upon human psychology and system constraints.

Ergonomics - examples

- o arrangement of controls and displays
 - e.g. controls grouped according to function or frequency of use, or sequentially
- o surrounding environment
 - e.g. seating arrangements adaptable to cope with all sizes of user
- o health issues
 - e.g. physical position, environmental conditions (temperature, humidity), lighting, noise,
- o use of colour
 - e.g. use of red for warning, green for okay, awareness of colour-blindness etc.

Interaction Styles

- o List of Interaction Styles:
 - o Command line interface
 - o Menus
 - o Natural language:
 - o Question/answer and query dialogue
 - o Form-fills and spreadsheets
 - o WIMP
 - o Point and click
 - o Three-dimensional interfaces

Interaction Styles

o command line interface

- o It provides a means of expressing instructions to the computer directly, using function keys, single characters, abbreviations or whole-word commands.

o Menus:

- o the set of options available to the user is displayed on the screen, and selected using the mouse, or numeric or alphabetic keys

o natural language:

o question/answer and query dialogue:

- o Question and answer dialog is a simple mechanism for providing input to an application in a specific domain.

o form-fills and spreadsheets

- o Form-filling interfaces are used primarily for data entry but can also be useful in data retrieval applications

o WIMP

o point and click

o three-dimensional interfaces

Command line interface

- o Way of expressing instructions to the computer directly
 - o function keys, single characters, short abbreviations, whole words, or a combination
- o suitable for repetitive tasks
- o better for expert users than novices
- o offers direct access to system functionality
- o command names/abbreviations should be meaningful!
- o **Typical example: the Unix system**

Menus

- o **Set of options displayed on the screen**
- o Options visible
 - o less recall - easier to use
 - o rely on recognition so names should be meaningful
- o Restricted form of full WIMP system

Natural language

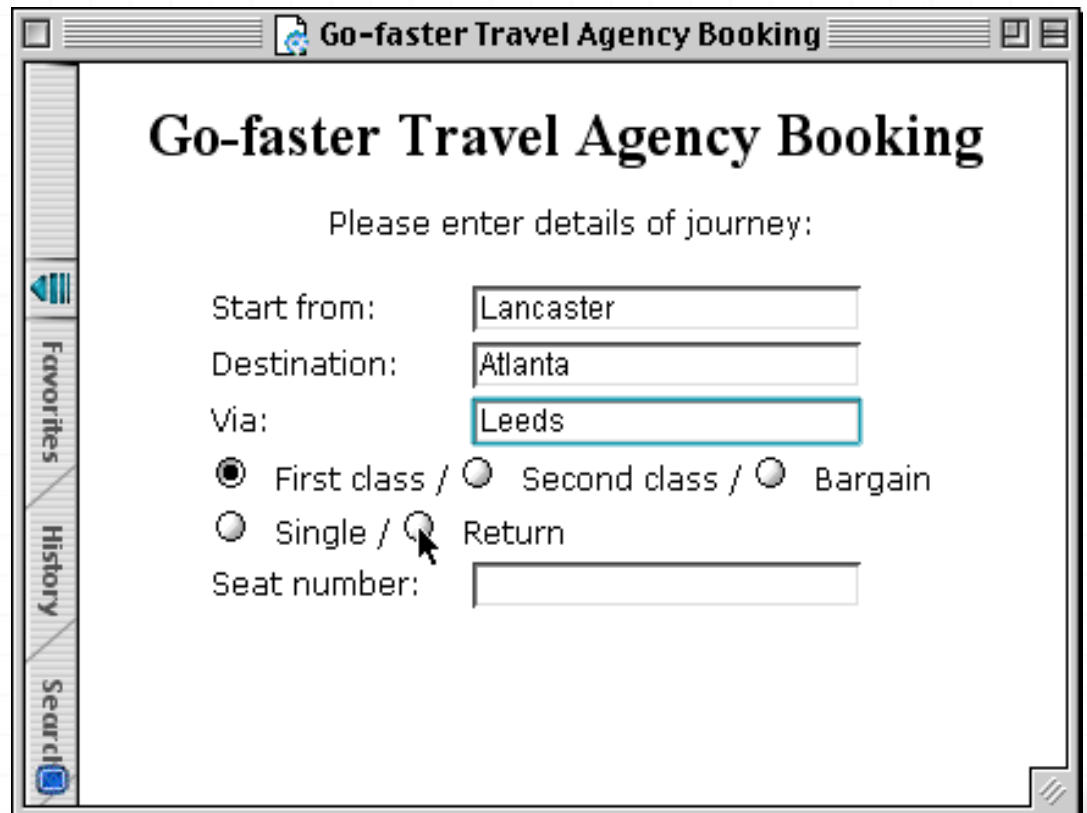
- o Familiar to user
- o speech recognition or typed natural language
- o Problems
 - o vague
 - o ambiguous
 - o hard to do well!
- o Solutions
 - o try to understand a subset
 - o pick on key words

Query interfaces

- Question/answer interfaces
 - user led through interaction via series of questions
 - suitable for novice users but restricted functionality
 - often used in information systems
- Query languages (e.g. SQL)
 - used to retrieve information from database
 - requires understanding of database structure and language syntax, hence requires some expertise

Form-fills

- Primarily for data entry or data retrieval
- Screen like paper form.
- Data put in relevant place
- Requires
 - good design
 - obvious correction facilities



The screenshot shows a web browser window with the title "Go-faster Travel Agency Booking". The page content includes the heading "Go-faster Travel Agency Booking" and the instruction "Please enter details of journey:". The form fields are as follows:

- Start from: Lancaster
- Destination: Atlanta
- Via: Leeds
- Class: First class / Second class / Bargain
- Travel type: Single / Return
- Seat number: (empty field)

The browser's address bar is empty. The left sidebar contains "Favorites", "History", and "Search" buttons. A mouse cursor is positioned over the "Return" radio button.

Spreadsheets

- o sophisticated variation of form-filling.
 - o grid of cells contain a value or a formula
 - o formula can involve values of other cells
e.g. sum of all cells in this column
 - o user can enter and alter data spreadsheet maintains consistency
 - o MS Excel most common today

WIMP Interface

- o Windows
- o Icons
- o Menus
- o Pointers
- o default style for majority of interactive computer systems, especially PCs and desktop machines
- o Appearance + behaviour = look and feel

Point and click interfaces

- o just click something!
 - o icons, text links or location on map
 - o minimal typing
- o used in :
 - o multimedia
 - o web browsers
 - o hypertext

Windows

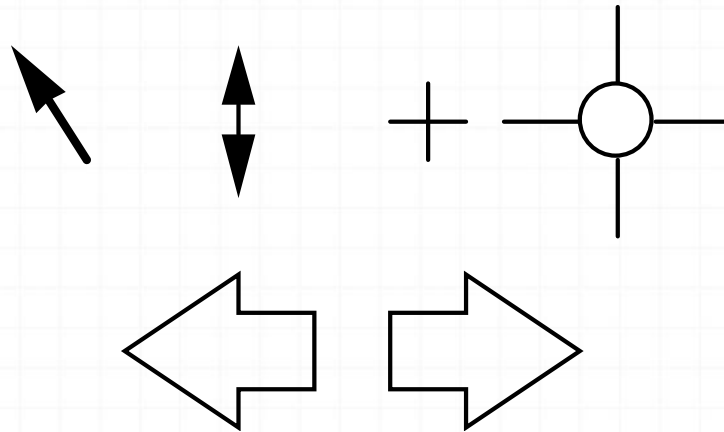
- Windows are areas of the screen that behave as if they were independent
 - can contain text or graphics
 - can be moved or resized
 - can overlap and obscure each other, or can be laid out next to one another (tiled) allowing performing multiple tasks
- Scrollbars
 - are one such attachment allow the user to move the contents of the window up and down or from side to side
- title bars
 - describe the name of the window

Icons

- o small picture or image
- o represents some object/image on the interface
 - o often a window or action
- o icons can be many and various
 - o highly stylized
 - o realistic representations.

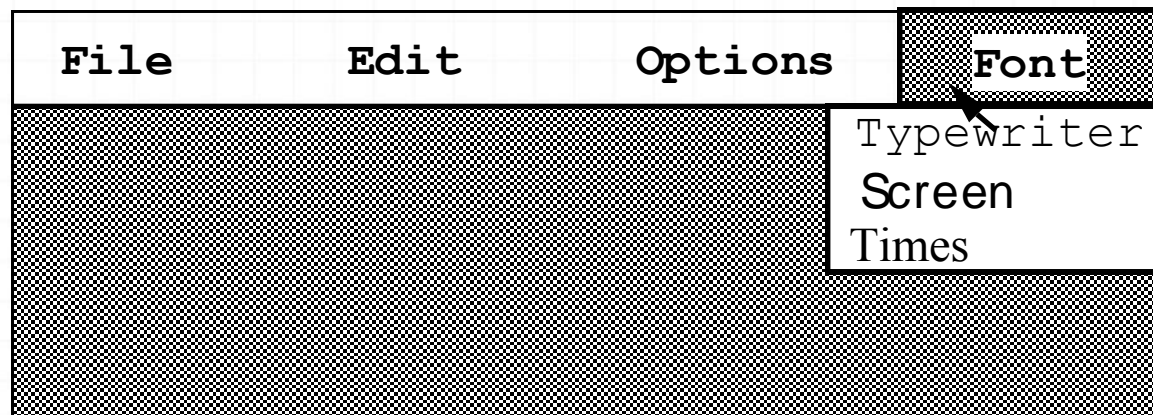
Pointers

- o important component
 - o WIMP style relies on pointing and selecting things
- o uses mouse, trackpad, joystick, trackball, cursor keys or keyboard shortcuts
- o wide variety of graphical images



Menus

- o Choice of operations or services offered on the screen
- o Required option selected with pointer



problem – take a lot of screen space

solution – pop-up: menu appears when needed

Kinds of Menu

- o Menu Bar at top of screen (normally), menu drags down
 - o pull-down menu - mouse hold and drag down menu
 - o drop-down menu - mouse click reveals menu
 - o fall-down menus - mouse just moves over bar!
- o Contextual menu appears where you are
 - o pop-up menus - actions for selected object
 - o pie menus - arranged in a circle
 - o easier to select item (larger target area)
 - o quicker (same distance to any option)
... but not widely used!

Menu extras

- o cascade menus

 - o hierarchical menu structure

 - o menu selection opens new menu

- o Keyboard accelerators

 - o key combinations - same effect as menu item

 - o two kinds

 - o active when menu open – usually first letter

 - o active when menu closed – usually Ctrl + letter

usually different !!!

Menu design issues

- o which kind to use
- o what items to include in menus at all
- o words to use (action or description)
- o how to group items
- o choice of keyboard accelerators

Buttons

- o individual and isolated area within a display that can be selected to invoke an action
- o Special kinds
 - o radio buttons
 - set of mutually exclusive choices
 - o check boxes
 - set of non-exclusive choices

Gender: Male Female

Interests: web development user interfaces music

Toolbars

- o long lines of icons
- o fast access to common actions
- o Customizable:
 - o User can choose *which* toolbars to see
 - o User can choose *what* options are on it

Dialogue boxes

o Dialog boxes are information windows that pop up to inform of an important event or request information.

e.g: when saving a file, a dialogue box is displayed to allow the user to specify the filename and location. Once the file is saved, the box disappears.

Interactivity

easy to focus on look
what about feel?

Speech-driven interfaces

- o rapidly improving ...
... but still inaccurate
- o how to have robust dialogue?
... interaction of course!

e.g. airline reservation:
reliable “yes” and “no”
+ system reflects back its understanding
“you want a ticket from New York to Boston?”

Look and ... feel

o WIMP systems have the same elements:
windows, icons., menus, pointers, buttons, etc.

o but different window systems
... *behave* differently

e.g. MacOS vs Windows menus