

Lecture 3

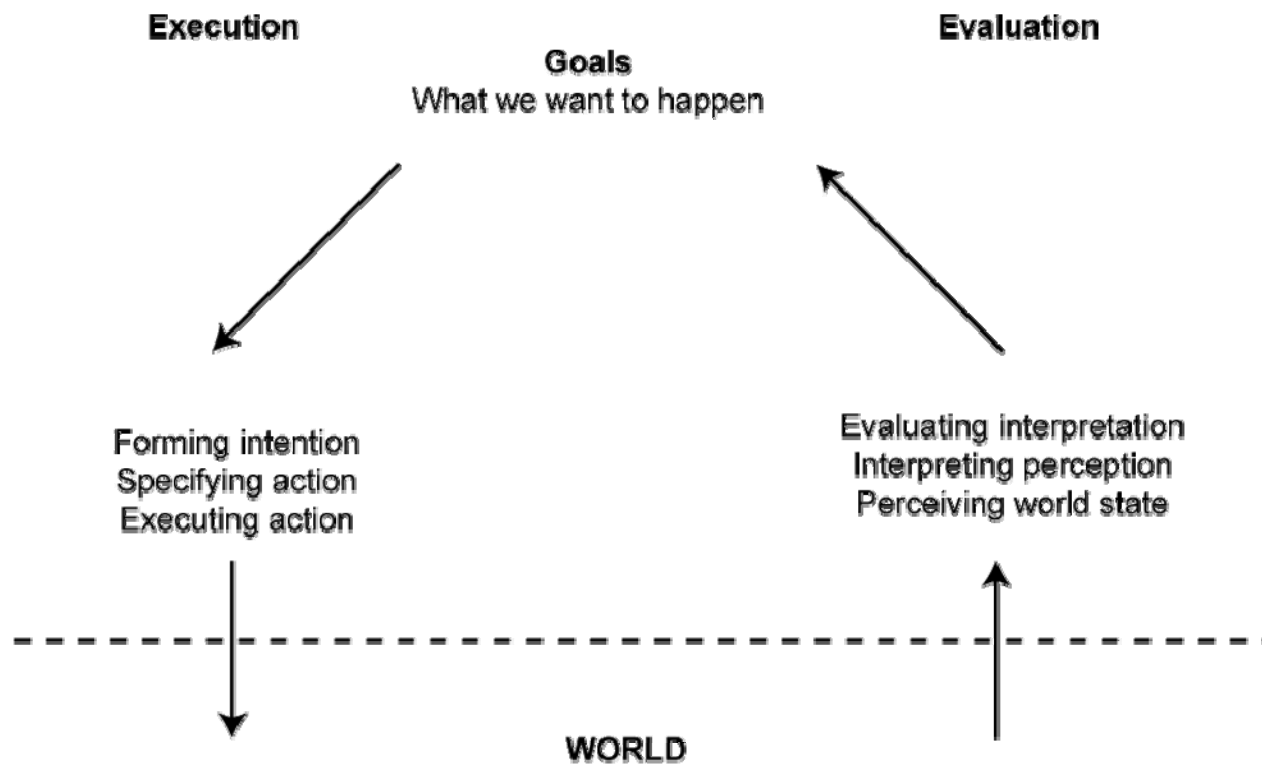
Chapter 2 (Heim)

Interaction Frameworks+

Interaction Styles

Interaction Frameworks recap

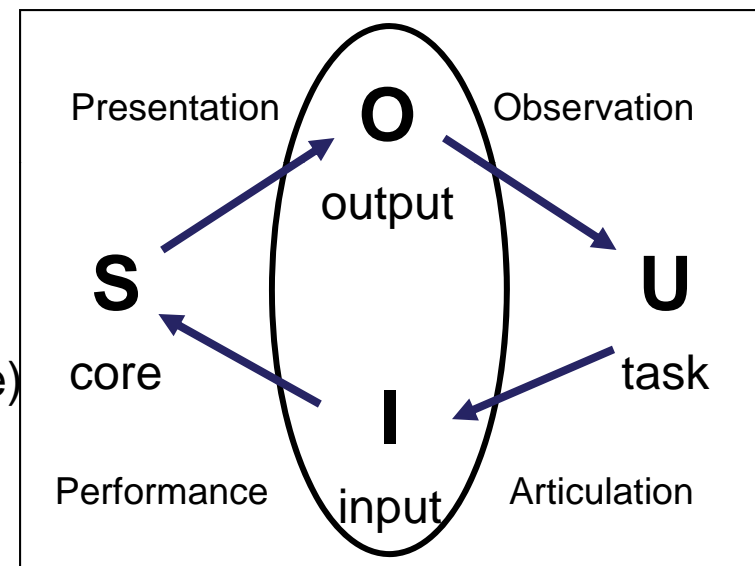
- EEAC: Seven stages of action form a cycle.



A&B Interaction Framework

- Abowd and Beale expanded on the EEC to include the system

- **System (S)**—Uses its core language (computational attributes related to system state)
- **User (U)**—Uses task language (psychological attributes related to user state)
- **Input (I)**—Uses its input language
- **Output (O)**—Uses its output language



- each has own unique language.
interaction means: translation between languages.
- problems in interaction = problems in translation

A&B Interaction Framework

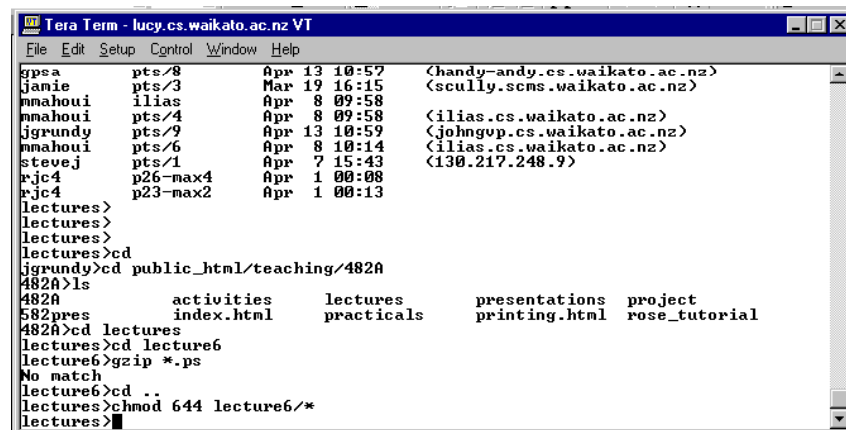
- general framework for understanding interaction
 - not restricted to electronic computer systems
 - identifies all major components involved in interaction
 - allows comparative assessment of systems
 - an abstraction

Interaction Styles

- Command Line
- Form Fill-In
- Direct Manipulation & Metaphors, Affordances
- Web Navigation
- Three-Dimensional Environments
- Natural Language

Command Line Interfaces

- Command-line interfaces are fast and powerful.
 - Many commands are abbreviated
 - quick and efficient
 - Commands can be applied to many objects simultaneously
 - fast input
 - Some commands have multiple parameters that can be set and altered
 - precise and flexible



```
Tera Term - lucy.cs.waikato.ac.nz VT
File Edit Setup Control Window Help
gypsa pts/8 Apr 13 10:57 <handy-andy.cs.waikato.ac.nz>
jamie pts/3 Mar 19 16:15 <scully.scms.waikato.ac.nz>
mmahoui ilias Apr 8 09:58
mmahoui pts/4 Apr 8 09:58 <ilias.cs.waikato.ac.nz>
jgrundy pts/9 Apr 13 10:59 <johngup.cs.waikato.ac.nz>
mmahoui pts/6 Apr 8 10:14 <ilias.cs.waikato.ac.nz>
stevej pts/1 Apr 7 15:43 <130.217.248.9>
rjc4 p26-max4 Apr 1 00:08
rjc4 p23-max2 Apr 1 00:13
lectures>
lectures>
lectures>
lectures>cd
jgrundy>cd public_html/teaching/482a
482a>ls
482a activities lectures presentations project
582pres index.html practicals printing.html rose_tutorial
482a>cd lectures
lectures>cd lecture6
lectures>gzip *.ps
No match
lectures>cd ..
lectures>chmod 644 lecture6/*
lectures>
```

Command Line Interfaces

- Command Line and the EEAC
 - Intention formation, specification of the action, and the execution stages are complex
 - Requires a rather accurate mental model of the computer's internal processing
- Command Line and the Interaction Framework
 - Translating the user's task language into the input language requires knowledge of the core language
 - The output language can be confusing for inexperienced users - there is very little feedback
- Articulatory distance is large because we are presented with only the command prompt - no indication of functionality

New Command Line Interfaces

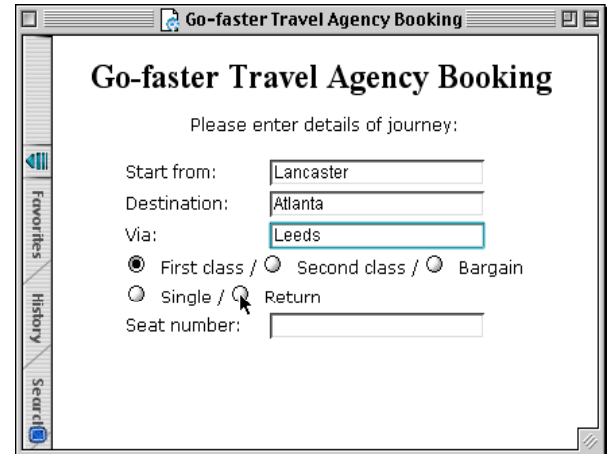
- Enso Launcher
<http://humanized.com/enso/>



- Aza Raskin, Toward a model of innovation, interactions
Volume 15 , Issue 1 (2008) Pages 19-22
- <http://portal.acm.org.ezproxy.auckland.ac.nz/citation.cfm?id=1330526.1330535&coll=ACM&dl=ACM&CFID=1577646&CFTOKEN=45865683>

Form Fill-In

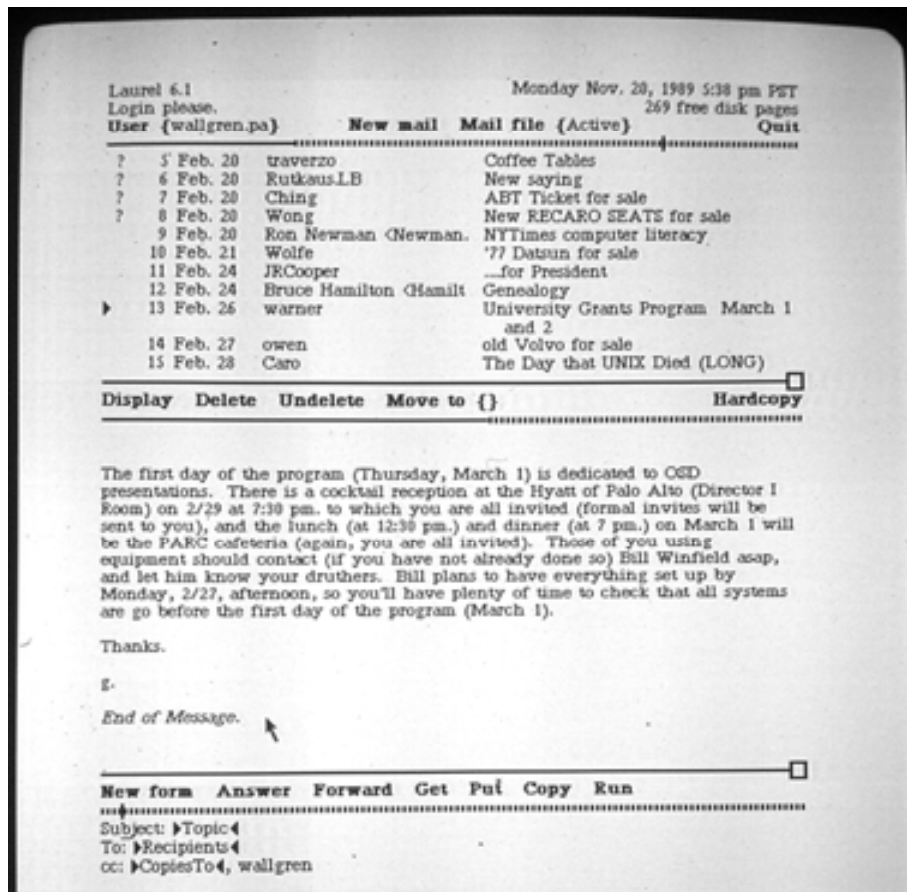
- Primarily for data entry/retrieval
- Presents screens of information
 - Like a paper form
- Will be discussed in detail in lecture on form-oriented analysis



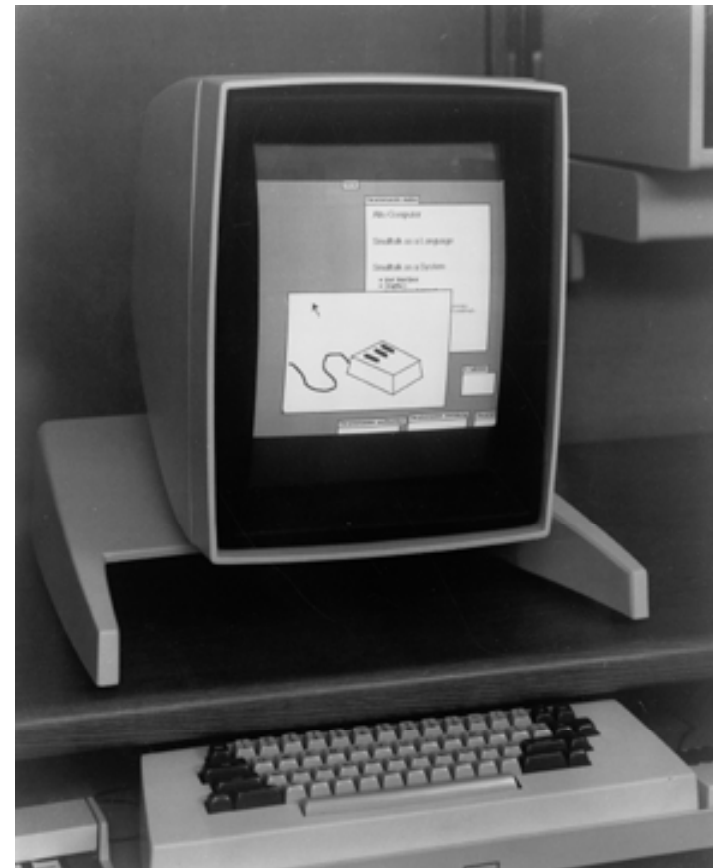
The screenshot shows a web browser window titled "Go-faster Travel Agency Booking". The page content includes the heading "Go-faster Travel Agency Booking" and the instruction "Please enter details of journey:". Below this, there are several input fields and radio buttons: "Start from:" with a text box containing "Lancaster"; "Destination:" with a text box containing "Atlanta"; "Via:" with a text box containing "Leeds"; a set of radio buttons for "First class / Second class / Bargain" (with "First class" selected); a set of radio buttons for "Single / Return" (with "Return" selected); and "Seat number:" with an empty text box. On the left side of the browser window, there is a vertical sidebar with buttons for "Favorites", "History", and "Search".

- Draheim, Weber “Form-Oriented Analysis”, Springer 2006.
- Jarrett et.al. “Forms that Work”, Morgan Kaufmann, 2008.
- Fits well to A&B Framework.

Personal Computing



The Xerox Alto mail program (1973)



The Xerox Alto computer (1973)

Personal Computing

- Desktop Computing



The Xerox Alto computer (1973)
Courtesy Palo Alto Research Center.

The Alto, developed at the Xerox Palo Alto Research Center in 1973, was the first computer to use a GUI that involved the desktop metaphor: pop-up menus, windows, and icons

Direct Manipulation

- 1982 – Shneiderman describes appeal of graphically-based interaction
 - Visibility of objects
 - Incremental action and rapid feedback
 - Reversibility encourages exploration
 - Syntactic correctness of all actions
 - Replace language with action
- Three phases in Direct Manipulation - Cooper, Reimann (2003)
 - **Free Phase**—How the screen looks before any user actions
 - **Captive Phase**—How the screen looks during a user action (click, click-drag, etc.)
 - **Termination Phase**—How the screen looks after a user action

Direct Manipulation

- Direct Manipulation and the EEAC
 - The range of possible intentions is consistently wide
 - Users usually have multiple options for specifying action sequences
 - Can be overwhelming of novice users
 - Provide multiple ways of executing action sequences

Metaphors

- GUIs use visual relationships to real-world objects (metaphors)
- Metaphors can help people relate to complex concepts and procedures by drawing on real-world knowledge
- Real-world affordances can be reflected
- What metaphors are used by contemporary GUIs?

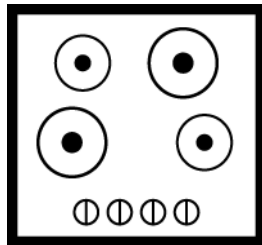
Metaphors

- A metaphor's function must be consistent with real-world expectations
- Don't force a metaphor!
- Metaphors that do not behave the way people expect will cause confusion and frustration
- Examples:
- Trashcan, eject button

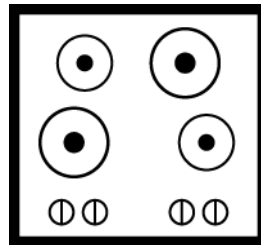


Mapping

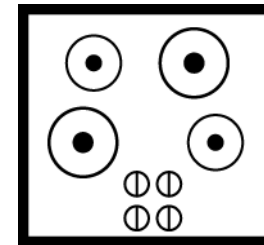
- The concept of mapping describes how we make connections between things
- Proper mapping can increase the usability of an interface
- Use natural mapping whenever possible



Arbitrary mapping



Arbitrary mapping
improved



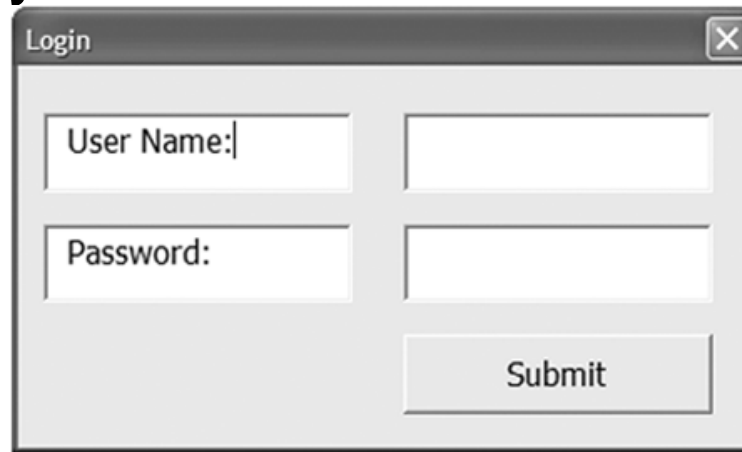
Natural mapping

Affordances

- The **affordances** of some interfaces can be intuitively understood: a steering wheel affords turning, and a door bell affords pushing.
- These connections allow us to make predictions about the results of our actions and help us to create usable mental models.

Affordances

- **Affordance Confusion** - when certain aspects of an object do not work in a way in which we assume they should



The image shows a standard web login form. It consists of a title bar labeled 'Login' with a close button (X) in the top right corner. Below the title bar are two input fields: 'User Name:' and 'Password:'. The 'User Name:' field has a cursor at the end of the text. Below these fields is a 'Submit' button. The form is enclosed in a light gray border.

- Norman considers an affordance to be a relationship between an object and a user, not a property of an object

Affordances

- What may be an affordance to one person may not be to another
- The perception of affordance fosters usability
- The affordances a user may need must be present
- Affordances must not contradict the user's expectations

3D Environments



Virtual Reality - *Immersive*



Sketching a virtual world in the VR design tool ShadowLight.

CAVE automated virtual environment at the National Center for Supercomputing Applications (NCSA).

<http://brighton.ncsa.uiuc.edu/~prajlich/cave.html>



Sensics piSight
Virtual Reality (VR) system.

<http://www.sensics.com/>

Photographs and ShadowLight application courtesy of Kalev Leetaru.

- designed to create a sense of “being” in a world populated by virtual objects.
- to create a convincing illusion, they must use as many human perceptual channels as possible.

Augmented Reality

- AR I/O devices
 - Heads Up Displays (HUD)
 - Optical see through
 - Video see through
- Criteria for AR environments
 - The virtual information must be:
 - Relevant to and
 - in sync with the real-world environment.

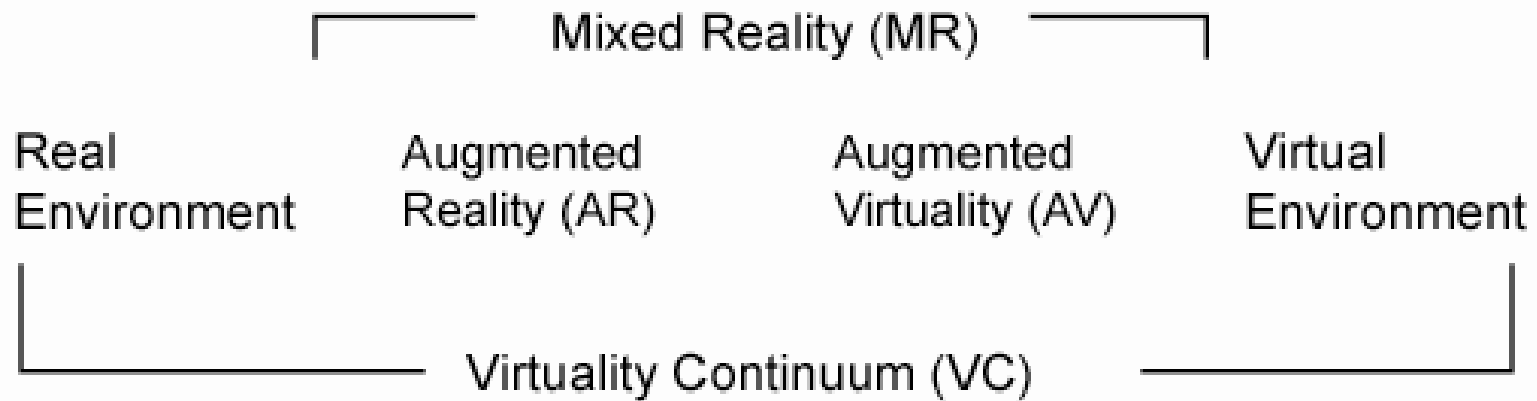


MicroOptical MD-6
Critical Data Viewer.
<http://microoptical.net/>



Sportvue MC1 motorcycle helmet
heads-up display.
<http://www.sportvue.com/>

Virtuality Continuum



Natural Language

- Natural Language Interaction (NLI) - Interacting with computers using everyday language
- Obstacles
 - Language is ambiguous
 - Meaning depends on context
 - “Search results”
 - “She said she did not know”
 - Dependant on visual cues

Natural Language

- Applications for NLI
 - Speech Input
 - Hands-free operation
 - Poor Lighting Situations
 - Mobile Applications
 - In the home
 - Speech Output
 - On-board navigational systems

Web Navigation

- Two basic interaction styles
 - Link-based navigation
 - Sensitive to articulatory distance
 - Ambiguous link labels increase the gulf of evaluation
 - Search
 - Sensitive to semantic distance
 - Inadequate search engine algorithms increase the gulf of execution
 - Slight advantage in development of mental models

Summary

- We have looked at many interaction styles today
 - Can use our knowledge of interaction frameworks & styles to inform design