

Human Computer Interaction

Lecture 1 Introduction

Manasawee Kaenampornpan

manasweek@gmail.com

About this course

► Purpose

This subject examines the design, evaluation and implementation of interactive computing systems for human use (HCI) and the major phenomena surrounding them. Also considered are joint performance of tasks by humans and machines, structure of human machine communication, social and organizational interactions with machine design, human capabilities to use machines including their learn ability, engineering concerns that arise in designing interfaces, the process of specification design, implementation and evaluation of interfaces and design tradeoffs.

► Assessment

- courseworks (40%)
- Quiz (10%)
- Final (50%)

About this course

► Topics

- Introduction
- Frameworks for Cognition and Theories
- Usability
- Graphics and Sound
- Design Methods and Process
- Usability testing
- CSCW
- Mobile and Ubiquitous Interaction

Resources

- ▶ Books:
 - ▶ Preece, J., Rogers, Y., Sharp, H., Benyon, D., Holland, S. & Carey, T. (1994) Human-Computer Interaction: Concepts And Design, Addison Wesley, ISBN 0-201-62769-8
 - ▶ Preece, J., Sharp, H. & Rogers, Y. (2002) Interaction design, Wiley, ISBN 0-471-49278-7
 - ▶ Alan Dx, Janet Finley, Gregory D. Abowd, Russell Beale (2004) Human-Computer Interaction, Pearson Education Limited
 - ▶ Ubiquitous Computing: Smart Devices, Environments and Interactions (2009) prof. Stefan Poslad, ISBN 0-470-03560-9

Resources

The Web:

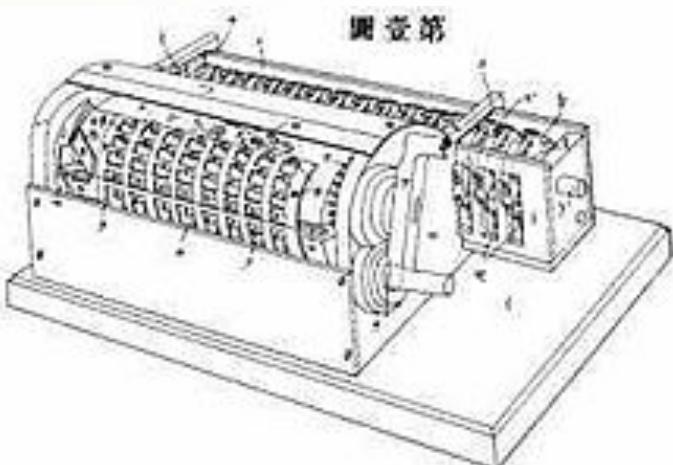
- ▶ www.italpha.msu.ac.th/manasawee/teaching/HCI
- ▶ www.interaction-design.org/
- ▶ www.usability.gov
- ▶ www.hcibib.org/hci-sites
- ▶ www.ucc.ie/hfrg/resources/
- ▶ www.dialogdesign.dk/
- ▶ <http://www.webpagesthatsuck.com/>
- ▶ www.baddesigns.com/examples.html

Steve Job

- ▶ iGenious – How Steve Jobs Changed the World at 3.18min
<http://www.youtube.com/watch?v=VdRvV1hIYfQ>
 - ▶ MAC – Apple 1 6.20min
 - ▶ Reinvented Mouse 6.50min
 - ▶ Meaningful command 7.10min
 - ▶ Macintosh – DESKTOP 8.45min
 - ▶ PIXAR 15min
 - ▶ Music industry 17.10min
 - ▶ Phone

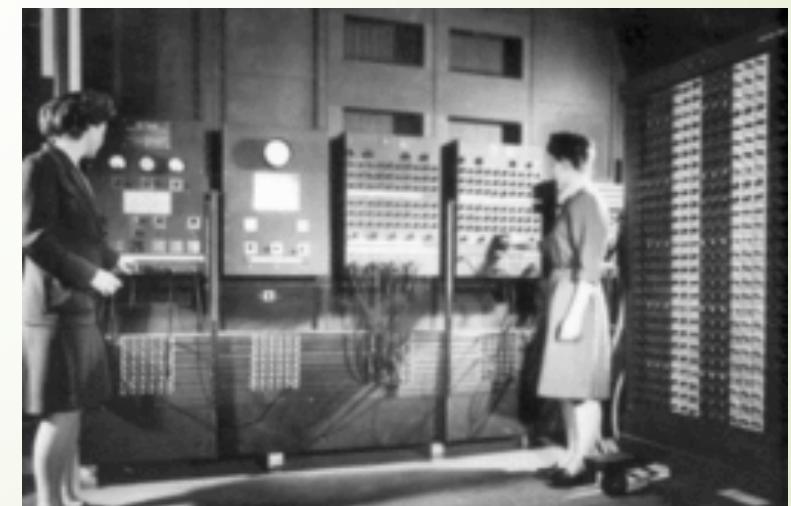
History of HCI

- ▶ Digital Computer grounded in ideas from 1700's & 1800's
 - ▶ **1623 Schickard makes "Calculating Clock".**
6-digit machine can add, subtract, bell indicates overflow.
 - ▶ **1820 de Colmar makes "Arithmometer"**
First mass-produced calculator. Does multiplication & division.
It is also the most **reliable** calculator yet.
Continue to be sold for about 90 years.



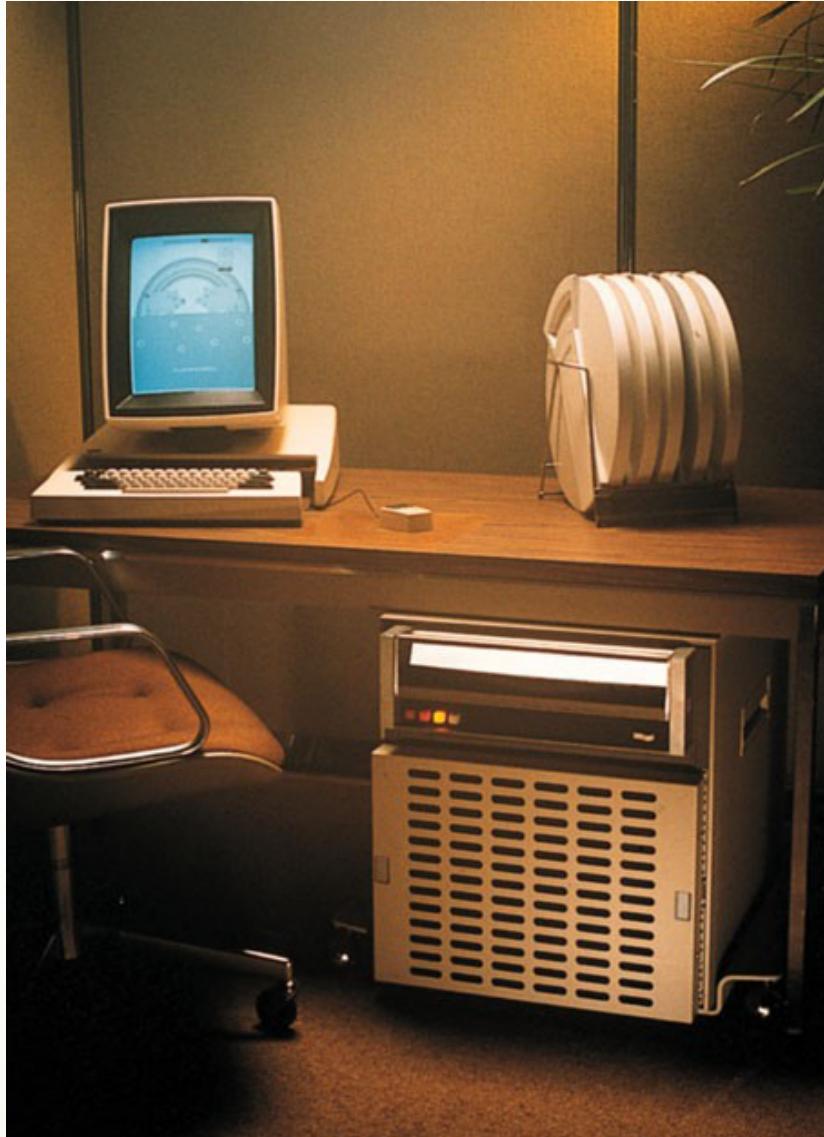
History of HCI

- ▶ Technology became available in the 1940's and 1950's
 - ▶ **1935 IBM introduces "IBM 601", punch card machine** capable of 1 multiplication /second. 1500 are made.
 - ▶ **1945 Mauchly & Eckert "ENIAC"** for ballistics.
30 tons, 1000 ft² of floor, 140 kilowatts of electricity,
17,468 vacuum tubes
 - ▶ Batch processing >> No interaction



History

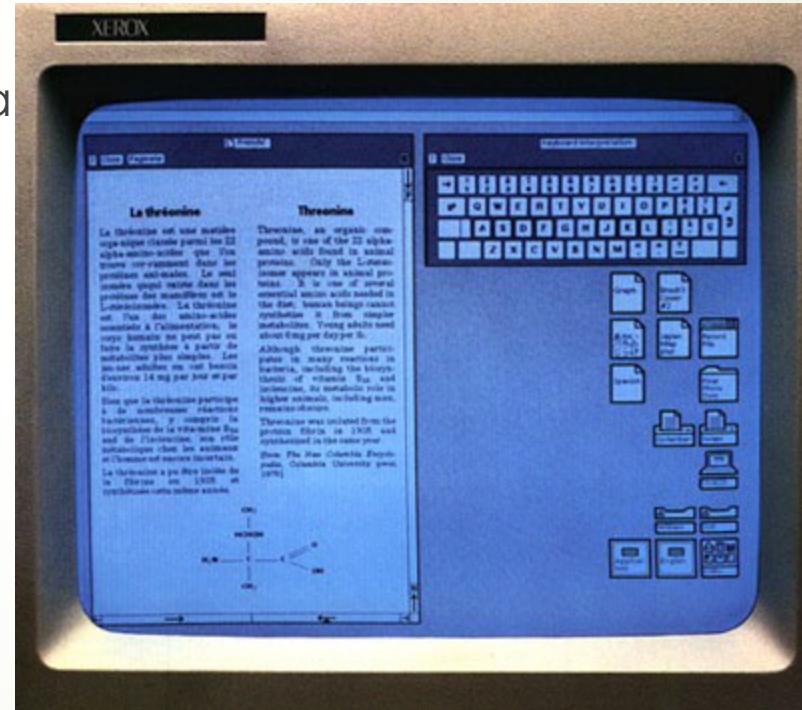
In 1973, the highly unsuccessful Xerox Alto
– First “personal” workstation



Xerox Star

From the Alto, Xerox had a demonstration of the capabilities of a advance in computing

- ▶ GUI became a term
 - ▶ Computing in the public realm was still in its infancy
- Xerox Star, 1978-80



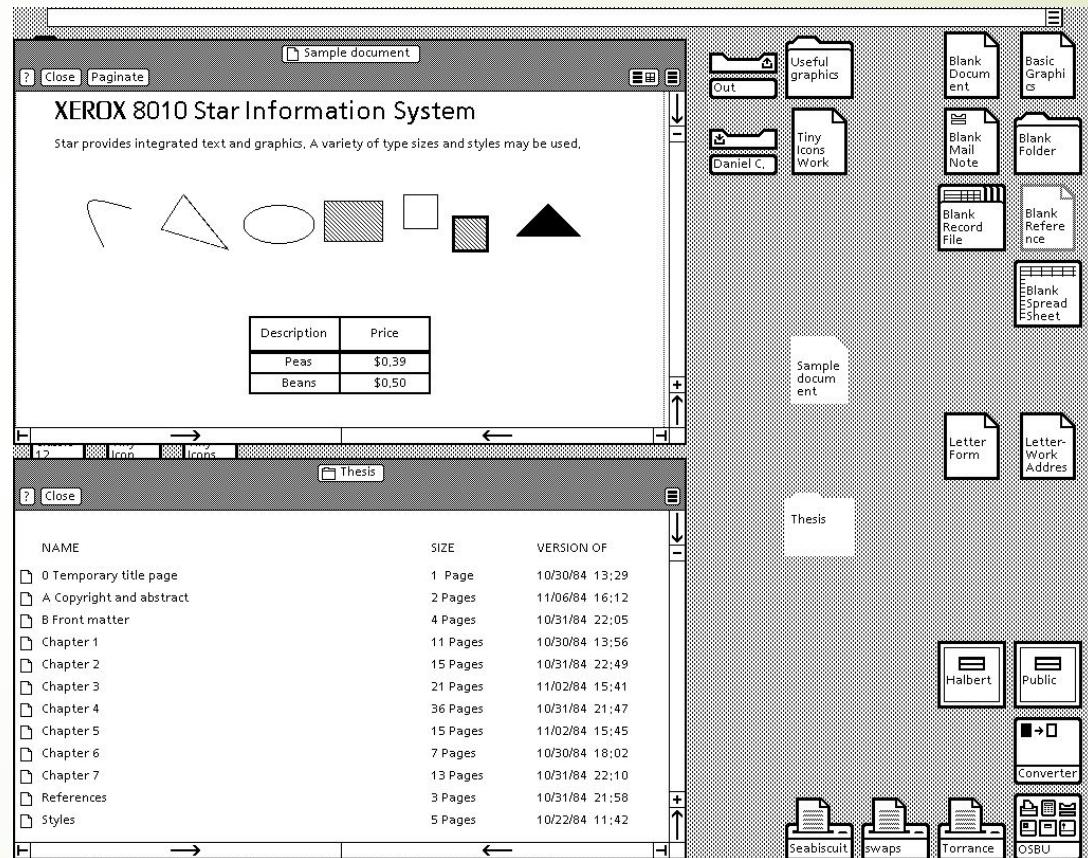
WIMP: Windows, Icon, Menus, Pointers

Xerox Star

What the Star got right:

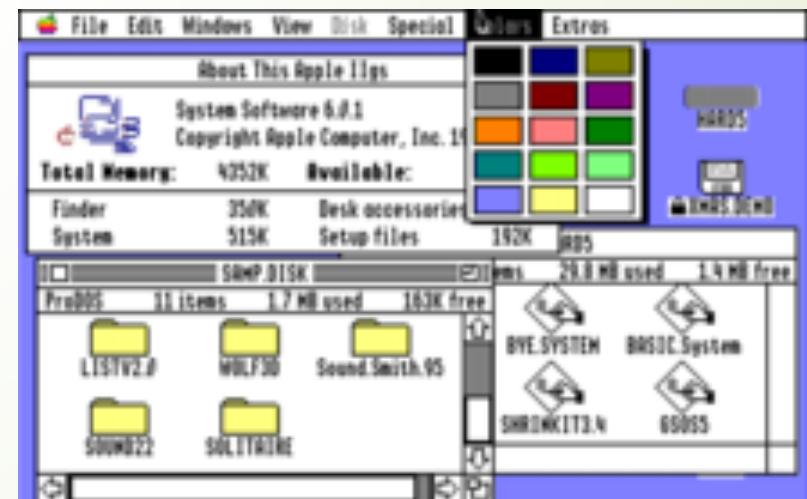
The interface!

- Used networking to
 - ▶ share files and collaborate on documents
- Standard interface
 - ▶ components across All applications
- Standard operations on all objects
- WYSIWYG everywhere



Apple & Macintosh

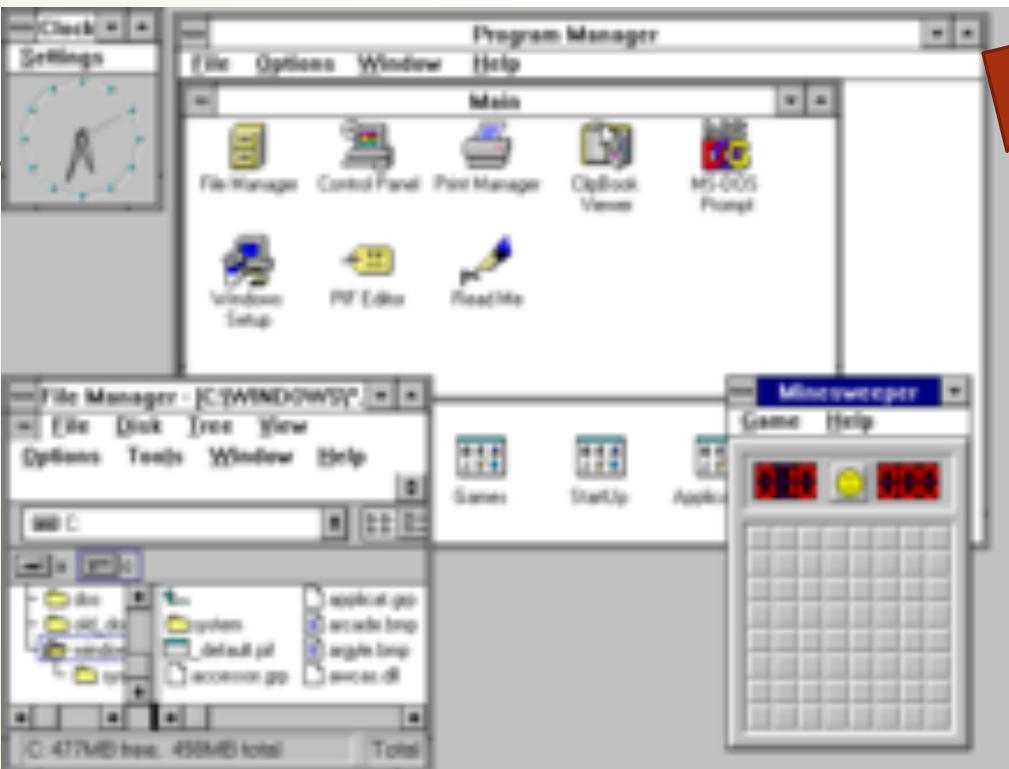
- ▶ Macintosh Desktop 1984
 - ▶ The leaders of the developer team
 - ▶ Desktop metaphor was used.
- ▶ Apple GS/OS Desktop 1986
 - ▶ A Finder-like GUI
 - ▶ similar to Macintosh series
 - ▶ but it deals with the advanced



Microsoft Windows (16 bit versions)

13

- ▶ Windows 1.0, 1981
- ▶ Windows 1.1, 1985

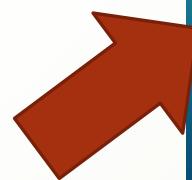


Added maximized status

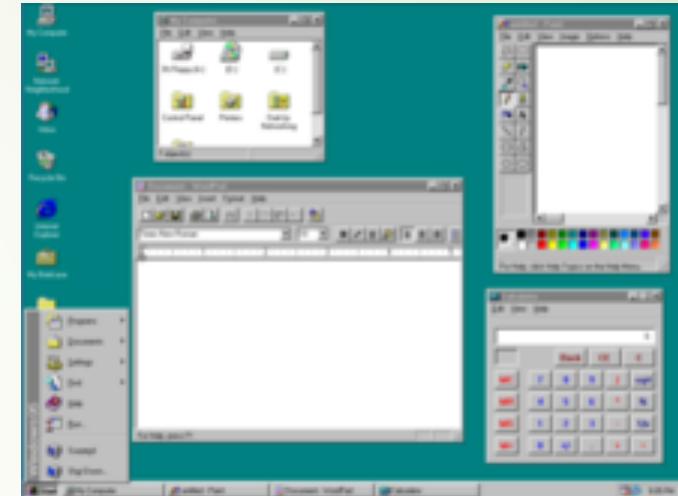
- switch between maximized applications using the Alt+Tab keyboard shortcut
- no alternative with the mouse except for de-maximize.

Windows 95 (32 bit versions)

- ▶ Windows 95, 1995
 - ▶ new consumer-oriented version
 - ▶ Exploit the abilities of multitasking
- ▶ Windows 7, 2009
 - ▶ Active Desktop theme was introduced



New sidebar
Widget engine



What is HCI?

The study of interaction between people and computer-based systems

Words for HCI:

- ▶ Human-computer interaction (HCI)
- ▶ Computer-Human Interaction (CHI)

HCI vs User Interface

- ▶ “Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.”
(ACM SIGCHI, 1992 p.6)
- ▶ User Interface is concerned with the physical aspects of a computer system which the user experiences directly. These include the input and output devices and the dialogue structures.

HCI Job

- HCI relevant jobs are
 - Usability Designer/Tester
 - Software Designer/Tester
 - User Experience Consultant/ Specialist
 - User Interface Designer
 - Interaction Design
 - User experience Designer/Manager/Expert
 - Human Performance Consultant
 - Human factors consultant, etc.

Why HCI?

- ▶ Changes of technology from MMI to HCI
- ▶ Better usability leads to potential requirement of new technology
- ▶ Interface is acting like the marketing part of the software
- ▶ On average, 70% of code for any real application is devoted to the Graphical User Interface.
- ▶ Similar figures can be attributed to cost/effort during development
- ▶ Poor design limits the actual usage of the System
- ▶ Worst case: the System developed might not be used at all!

Videos

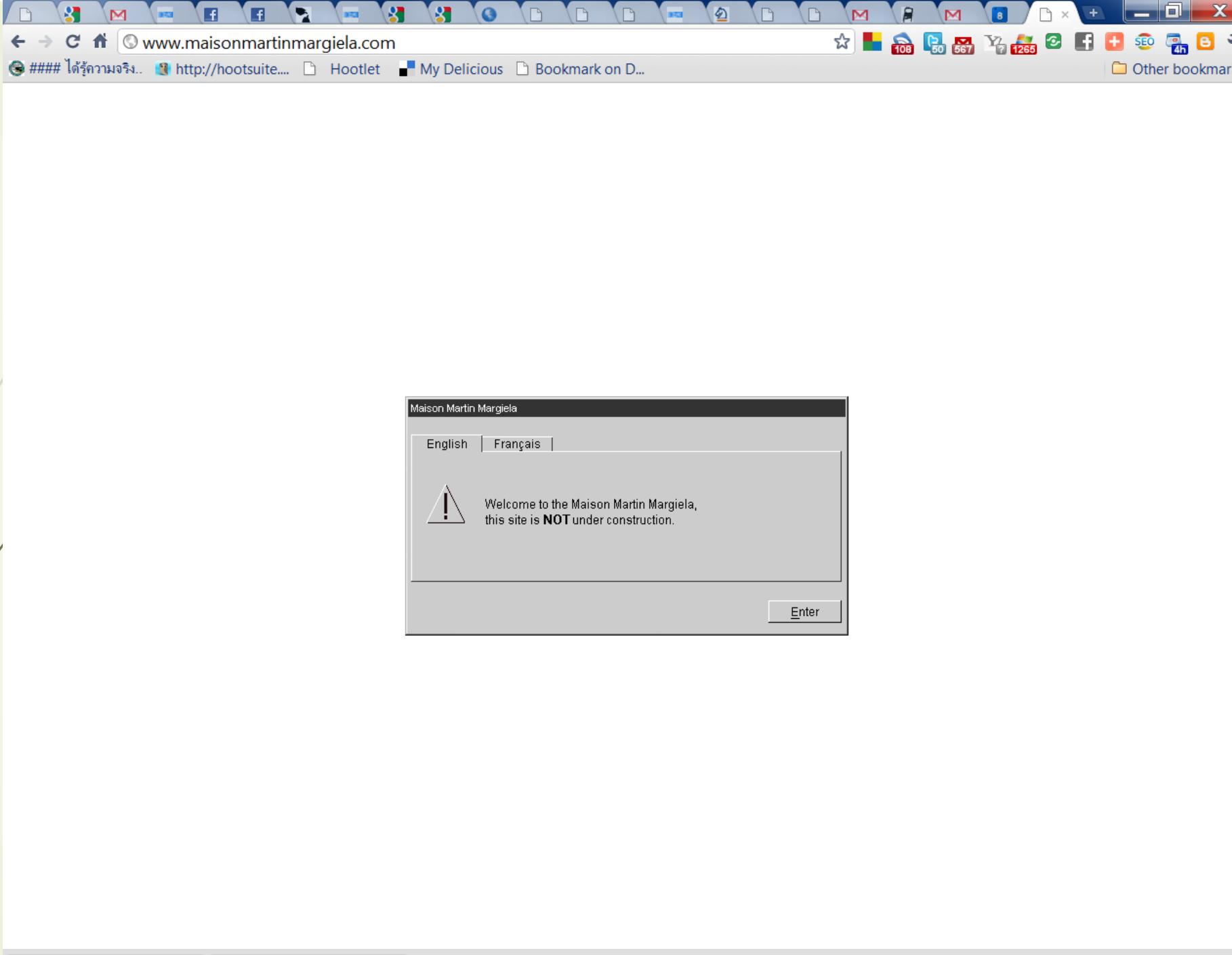
- ▶ Don Norman The three ways that good design makes you happy

Look at some bad designs



Look at some bad designs

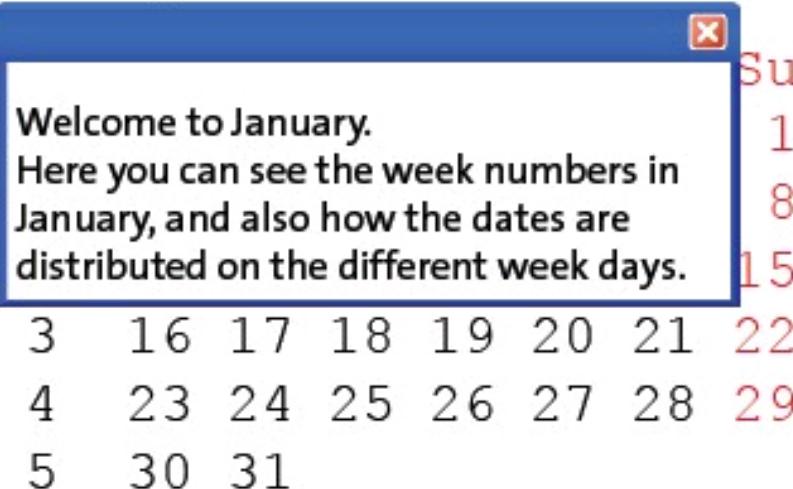
- ▶ <http://www.joneschijff.com/>
- ▶ <http://www.maisonmartinmargiela.com/>



Look at some bad designs

Avoid pop-ups. They cover up the content and leads to unnecessary clicks for the users.

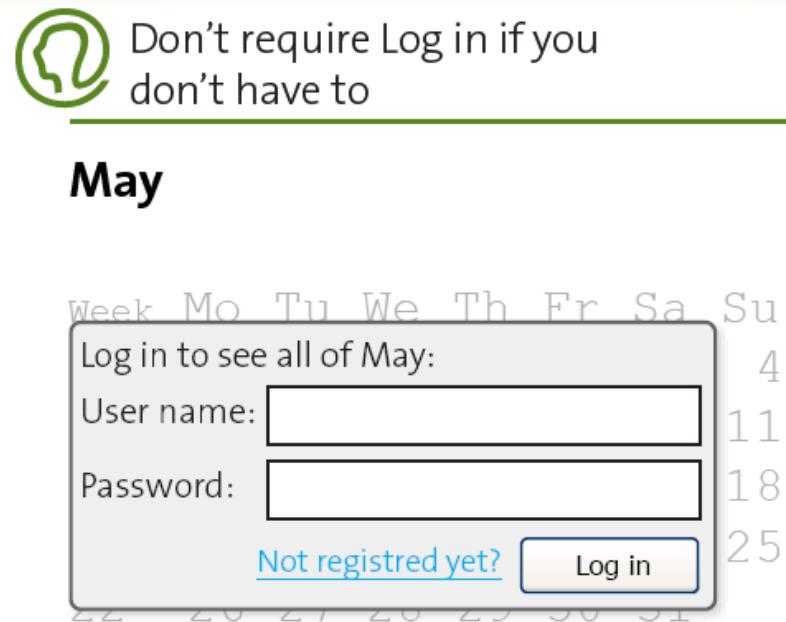
January



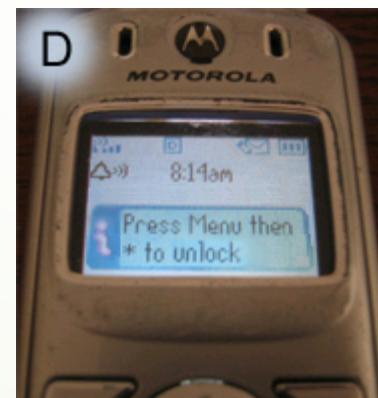
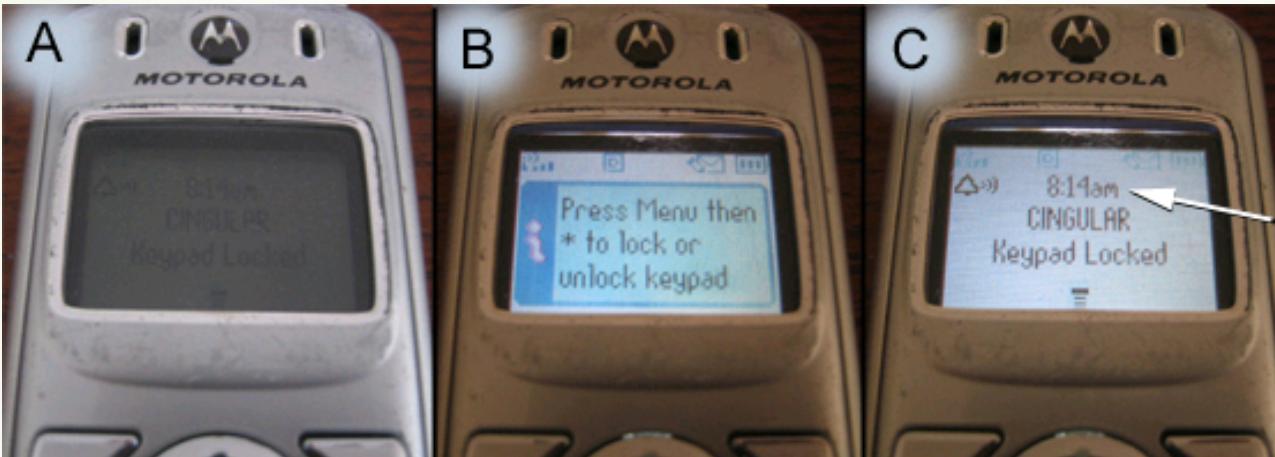
Welcome to January.
Here you can see the week numbers in
January, and also how the dates are
distributed on the different week days.

Su	1	8	15				
3	16	17	18	19	20	21	22
4	23	24	25	26	27	28	29
5	30	31					

Look at some bad designs



Look at some bad designs



Compare amazon.com

The screenshot shows the Amazon.com homepage with a search bar set to 'All Departments'. Below the search bar, there's a section titled 'More to Explore' which includes recommendations like 'Human-Computer Interaction', 'Database Systems: A Practical...', and 'Computer Networks and Internets'. To the right, there's a 'Statistics for Business and...' book recommendation with a price drop from \$189.00 to \$168.81. A red speech bubble on the left says 'Grouping made easy explore'.

Hello. Sign in to get personalized recommendations. New customer? Start here.

Your Amazon.com | Today's Deals | Gifts & Wish Lists | Gift Cards

Shop All Departments

Books >

Movies, Music & Games >

Digital Downloads >

Kindle >

Computers & Office >

Electronics >

Home & Garden >

Grocery, Health & Beauty >

Toys, Kids & Baby >

Apparel, Shoes & Jewelry >

Sports & Outdoors >

More to Explore

You looked at

Human-Computer Interaction

Database Systems: A Practical...

Computer Networks and Internets

You might also consider

Statistics for Business and...

14 posts since yesterday

Read posts

View or edit your browsing history

ADVERTISEMENT

Father's Day Get what Dad wants at a great price

Done

Find things easy with search engine

Online shopping in Vietnam?



HCI vs User Interface

- ▶ “Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.”
(ACM SIGCHI, 1992 p.6)
- ▶ User Interface is concerned with the physical aspects of a computer system which the user experiences directly. These include the input and output devices and the dialogue structures.

Human vs Computer

- ▶ Humans and Computers are designed very differently.
- ▶ Computers: fast, efficient, rigid, finite.
- ▶ Humans: Slower, inefficient, flexible, expansive.
- ▶ Naturally, there will be difficulties communicating

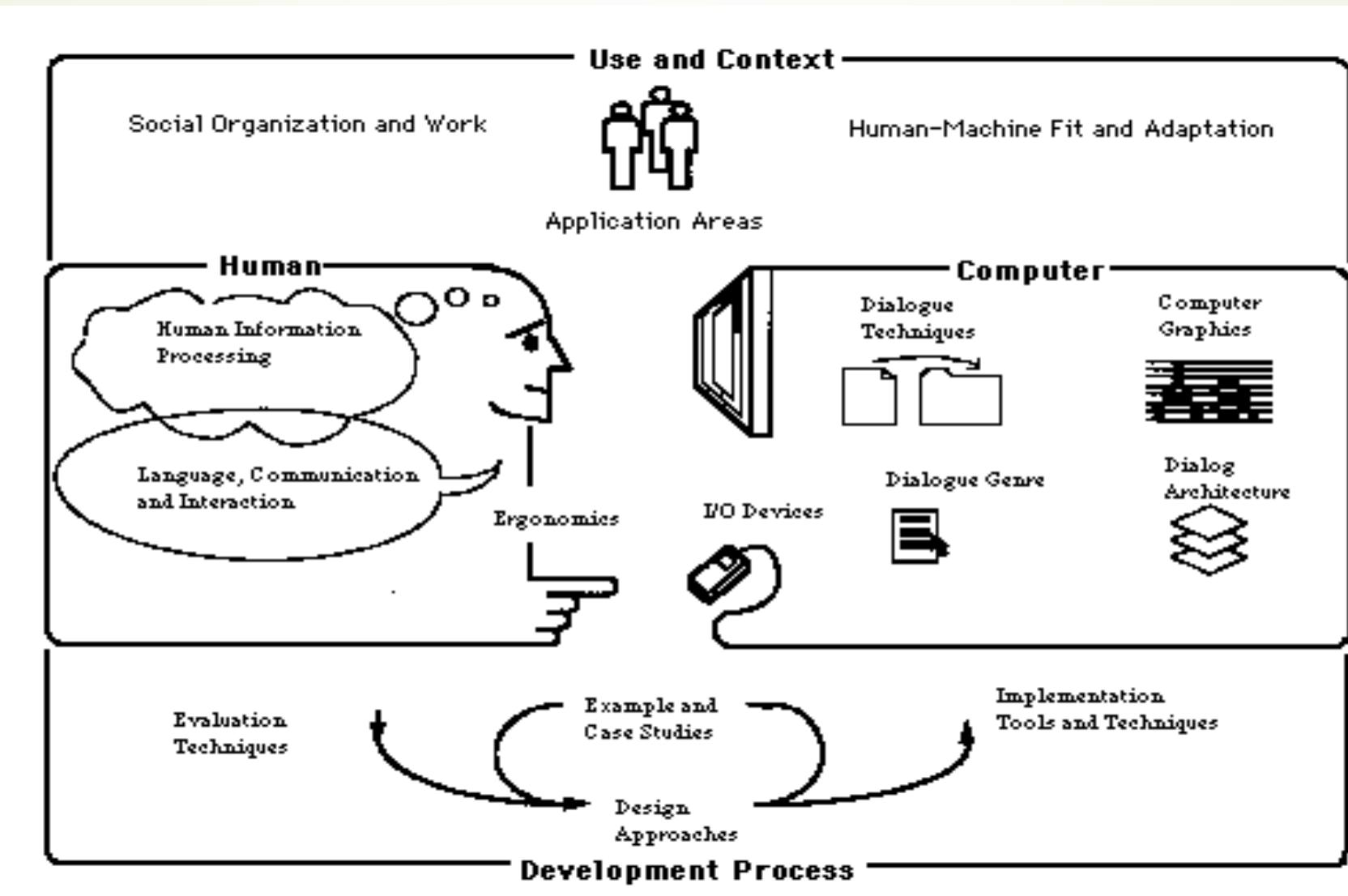
Goals of HCI

- ▶ Functional
- ▶ Safe
- ▶ Usable
 - ▶ Easy to learn
 - ▶ Easy to use

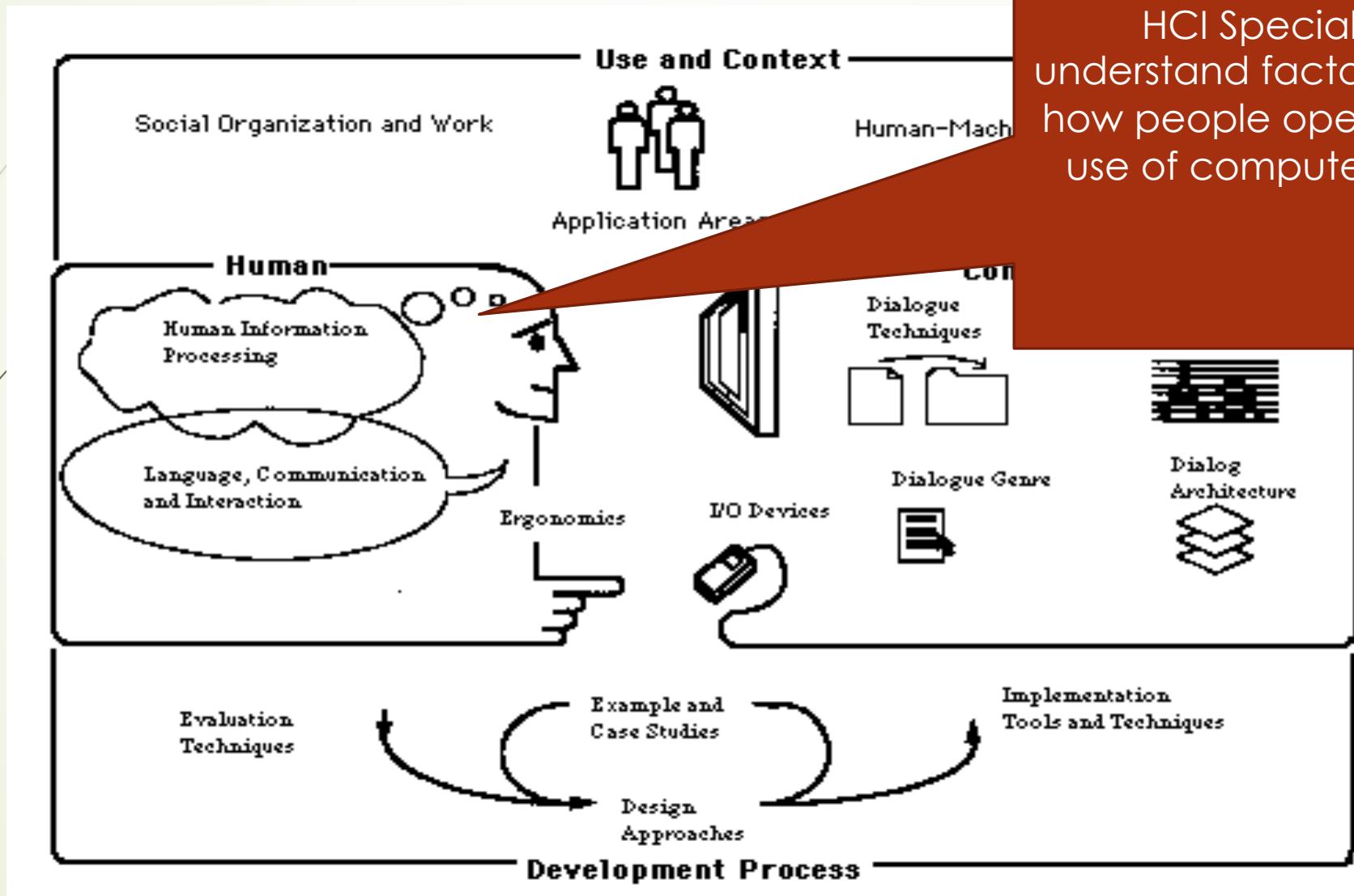
HCI Specialists should

- ▶ Understand: the factors
- ▶ Develop: tools and techniques
- ▶ Achieve: efficient, effective, safe interaction both individual & group interactions

Related subjects to HCI



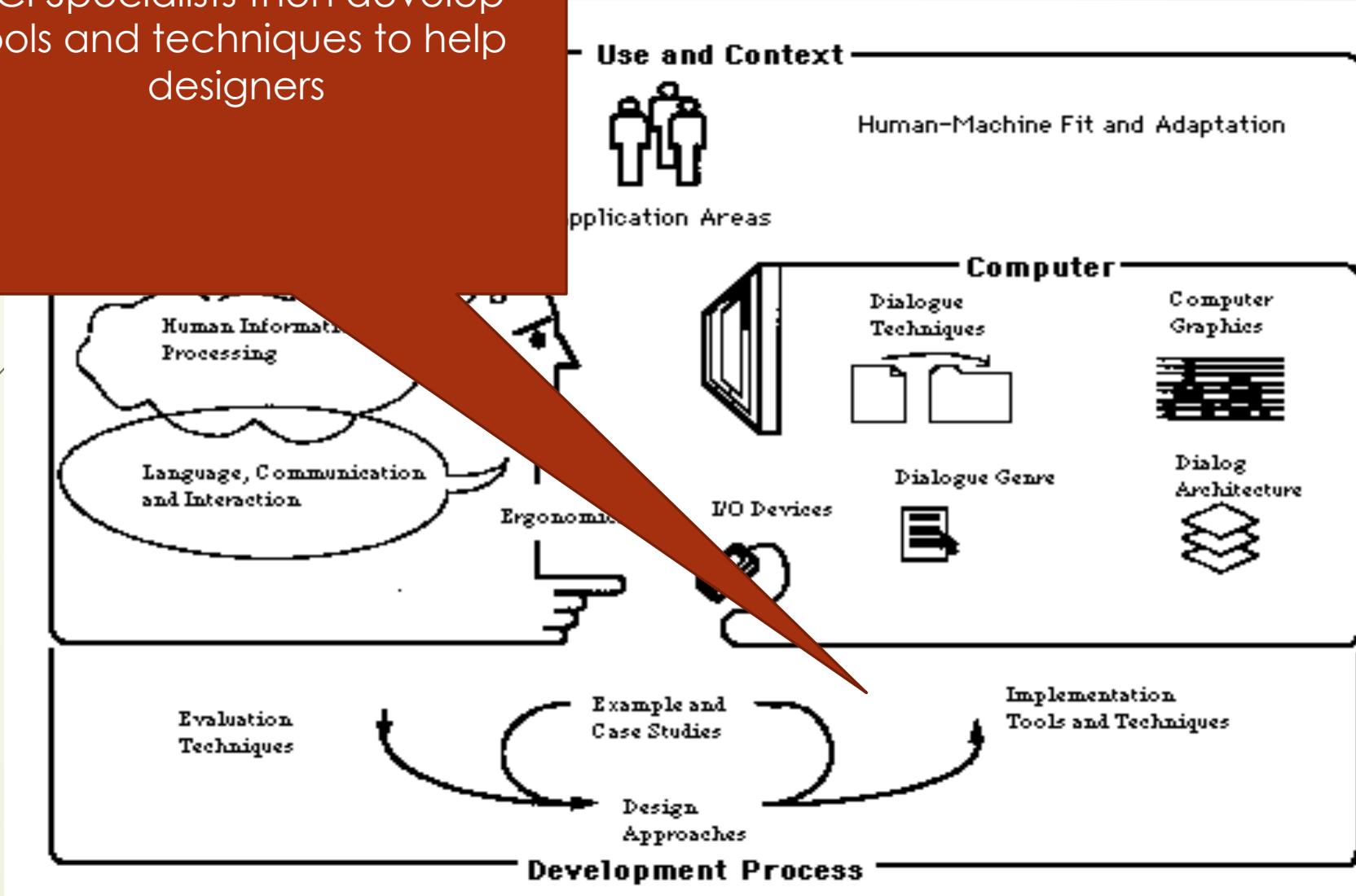
Related subjects to HCI



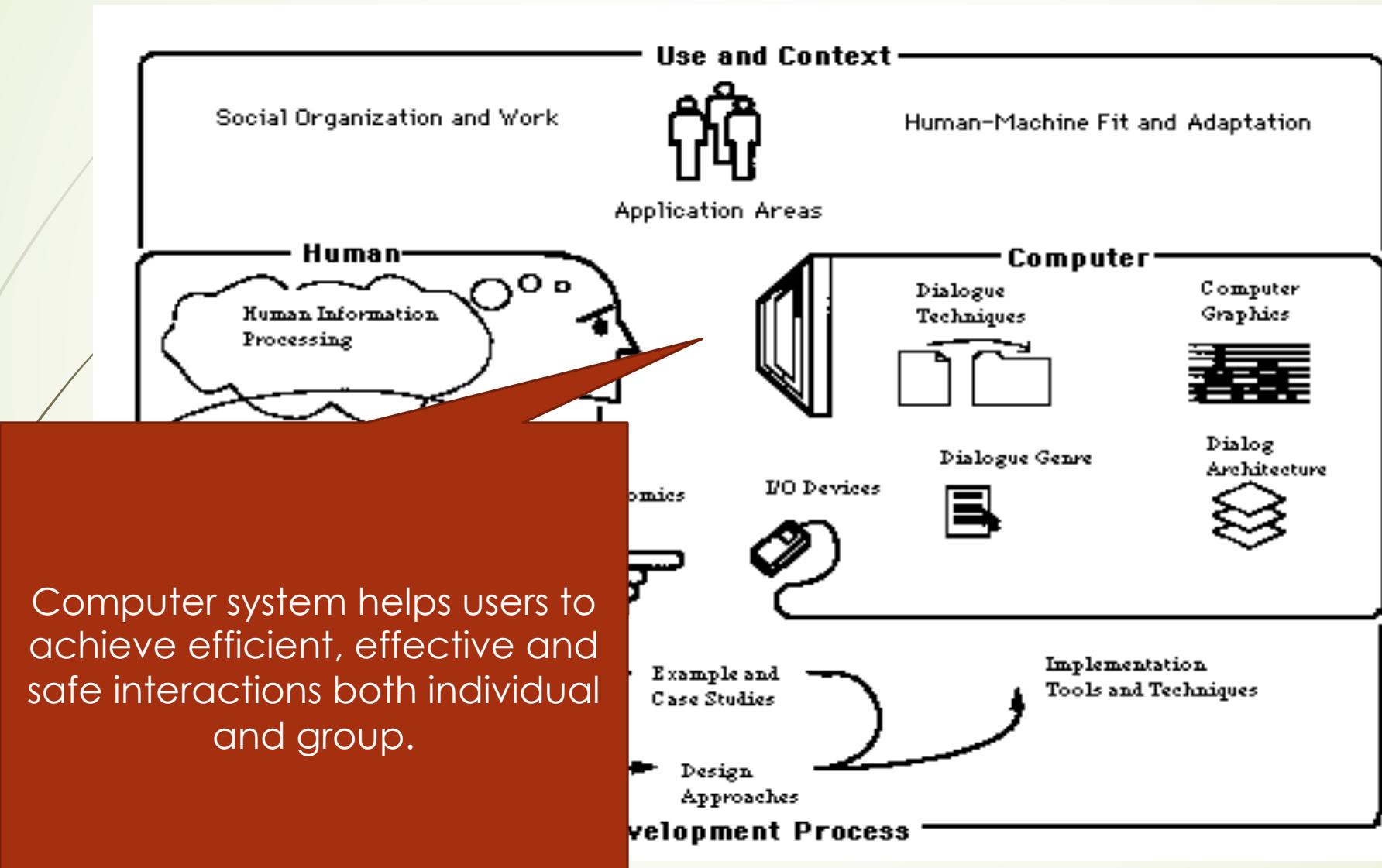
HCI Specialists should understand factors (influence on how people operate and make use of computer technology)

ปสาขาวิชา HCI

HCI Specialists then develop tools and techniques to help designers



Related subjects HCI



Areas of HCI

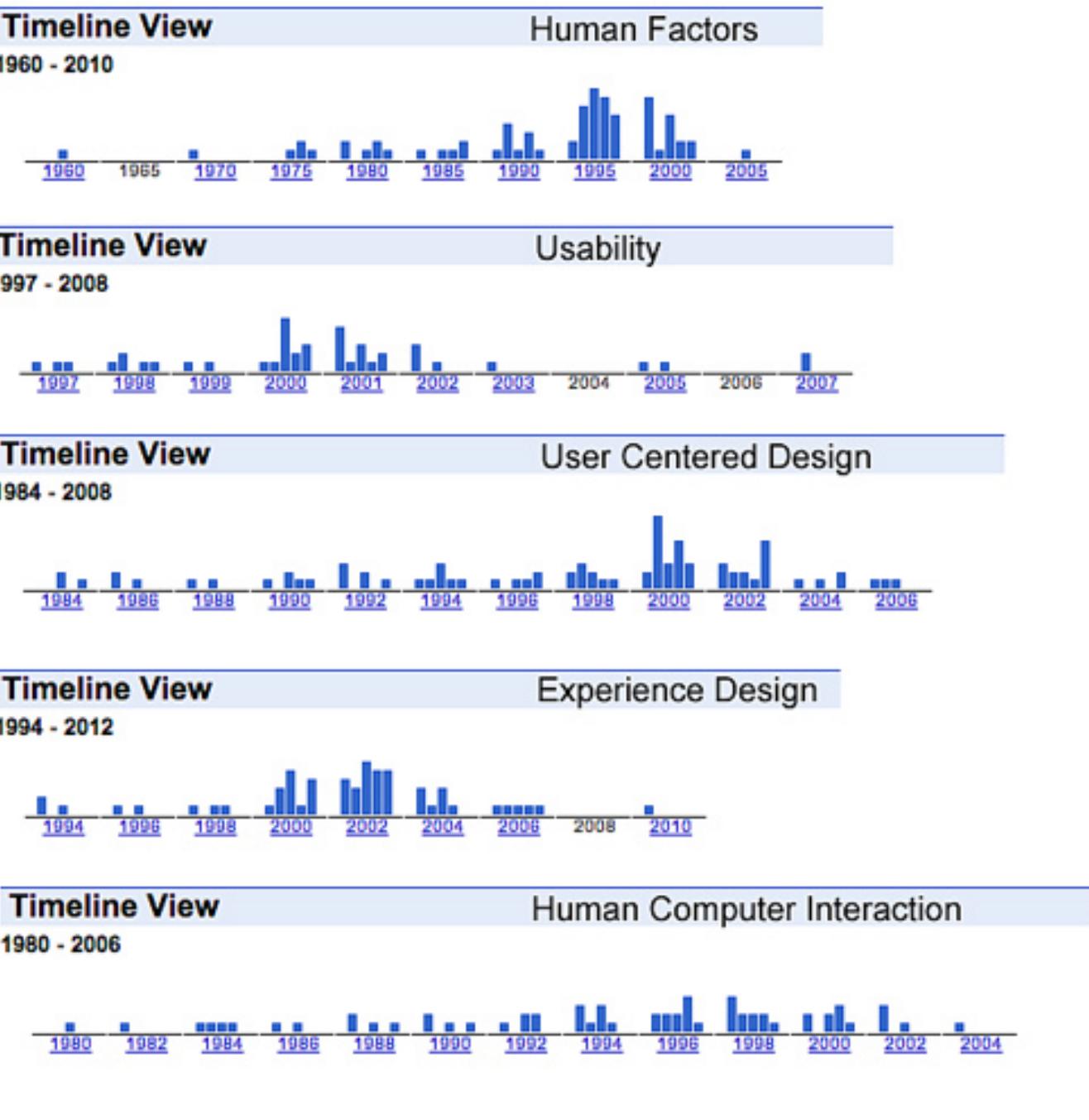


Areas of HCI

- ▶ Research into Cognitive psychology
 - ▶ Information processing: attention, memory, learning, thinking and problem solving
- ▶ Research into Organizational Impact
 - ▶ What impact does a new system make to an organization?
- ▶ Interactional Hardware and Software
 - ▶ Ergonomic design to virtual reality
- ▶ Research into Design and Development
 - ▶ Software engineering and Design: model building, empirical testing AND creative skills

HCI Trend

38



Issues in HCI

- ▶ More and more about user experience
- ▶ Social impact
- ▶ Expert system

The 3 important Elements in HCI

- Human
- Computer
- Interaction

Human Factor (User)

“The science of understanding the properties of human capability”

The Human is the most important aspect & the most complex.

Cognition is what is going on in our heads when we carry out our everyday activities.

Everything that is sensed (sight, hearing, touch, smell, taste) was considered to be information which the mind processes.

Cognition

Cognitive perspective focuses on studying: internal mental processes such as

Perception

- 5 senses: Sight, Hearing, Touch, Taste, Smell.

Memory

- Sensory, Short, Long term

Attention

- Our senses are various: problem with overloaded with information

Recognition

Learning

Reading, speaking and listening

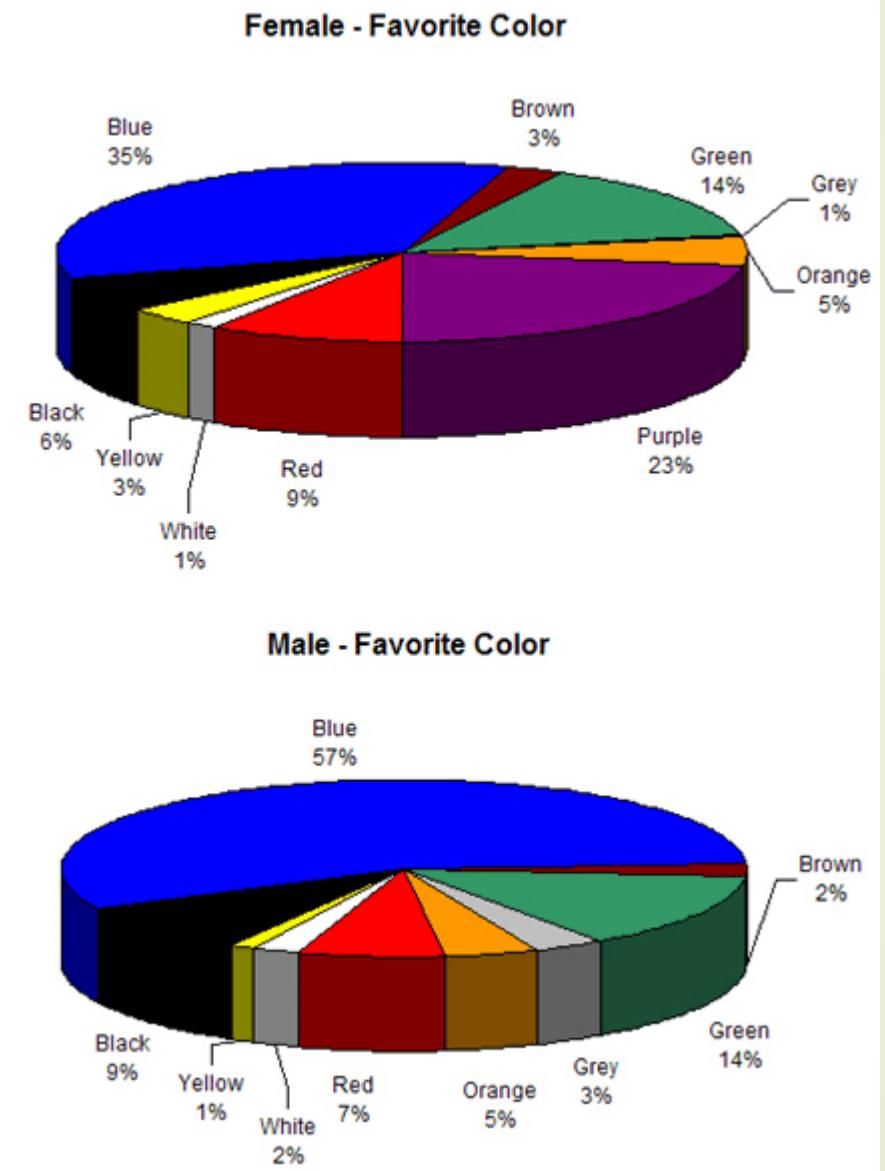
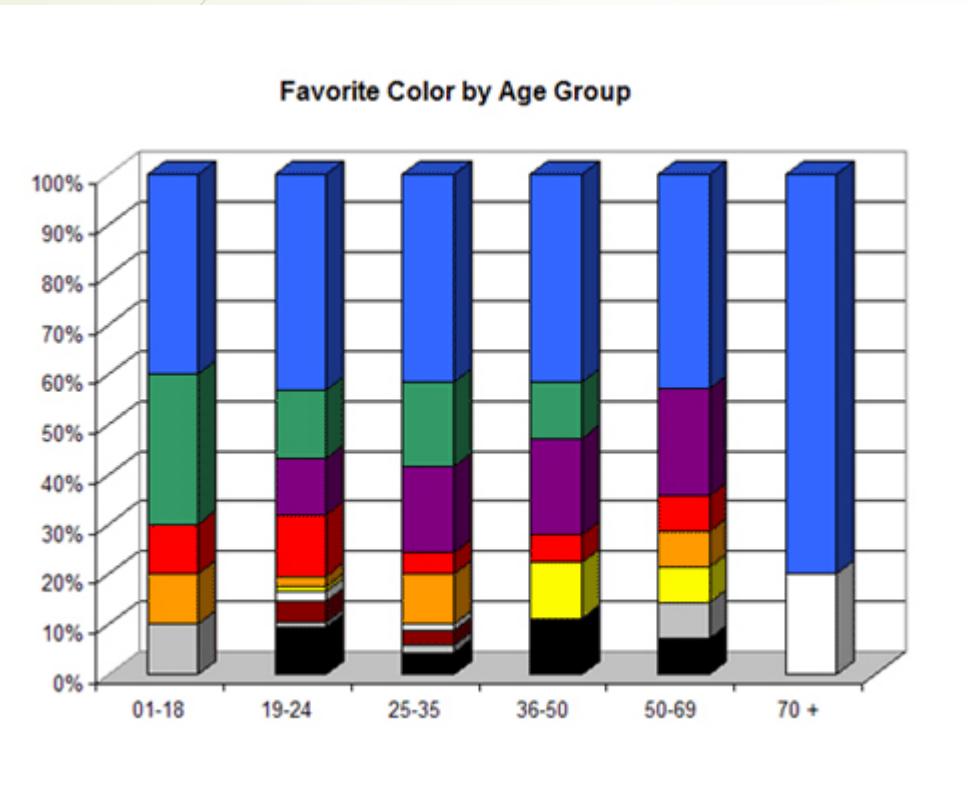
Problem solving, planning, reasoning and decision making

Perception - Sight

- ▶ Color blind
- ▶ Gender related color
- ▶ emotion related color
- ▶ Sizes



Perception - Sight



Quiz

- The Stroop effect (Gleitman, 1991)
- Time how long does it take to read these columns

1 control

dog
chair
boat
window
block
fan
wheel
tray
bottle
fence

2 compatible

red
yellow
green
blue
red
blue
yellow
green
blue
red

3 incompatible

yellow
green
blue
red
blue
yellow
green
blue
red

Visual Perception

Constructivist approach: Perception involves the intervention of representations and memories > visual system constructs a model of the world by transforming, enhancing, distorting and discarding information จำได้

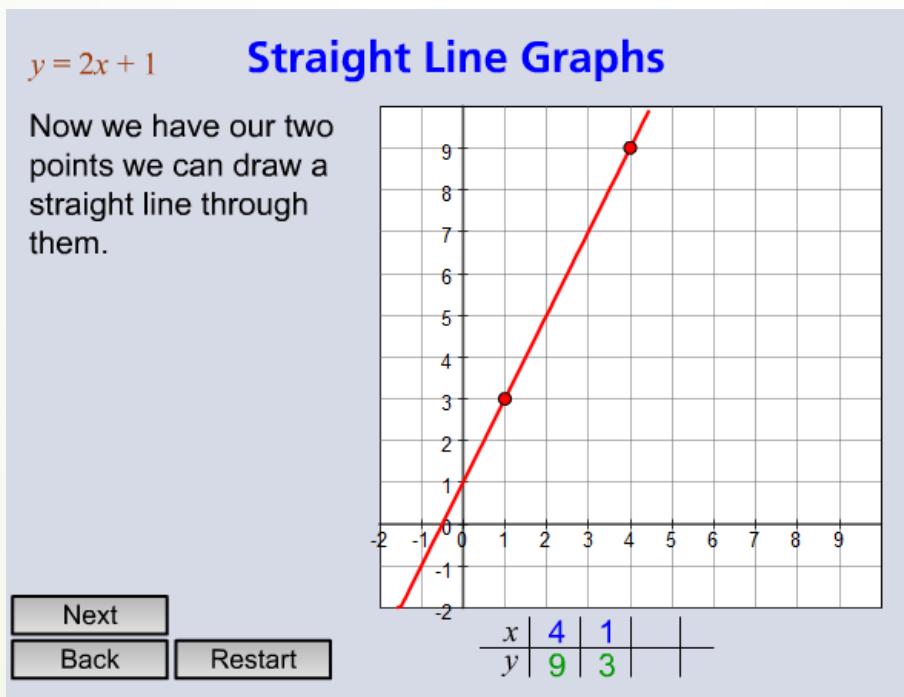
For example, understanding difficult handwriting is easier when reading complete sentences than when reading single and isolated words. This is because the meaning of the surrounding words provide a context to aid understanding.

Ecological approach: Perception is a direct process, in which information is simply detected rather than being constructed (Gibson, 1979)

*Research paper: Two visual systems and two theories of perception: An attempt to reconcile the constructivist and ecological approaches
<http://users.auth.gr/paki/files/soundscape/references/download.pdf>

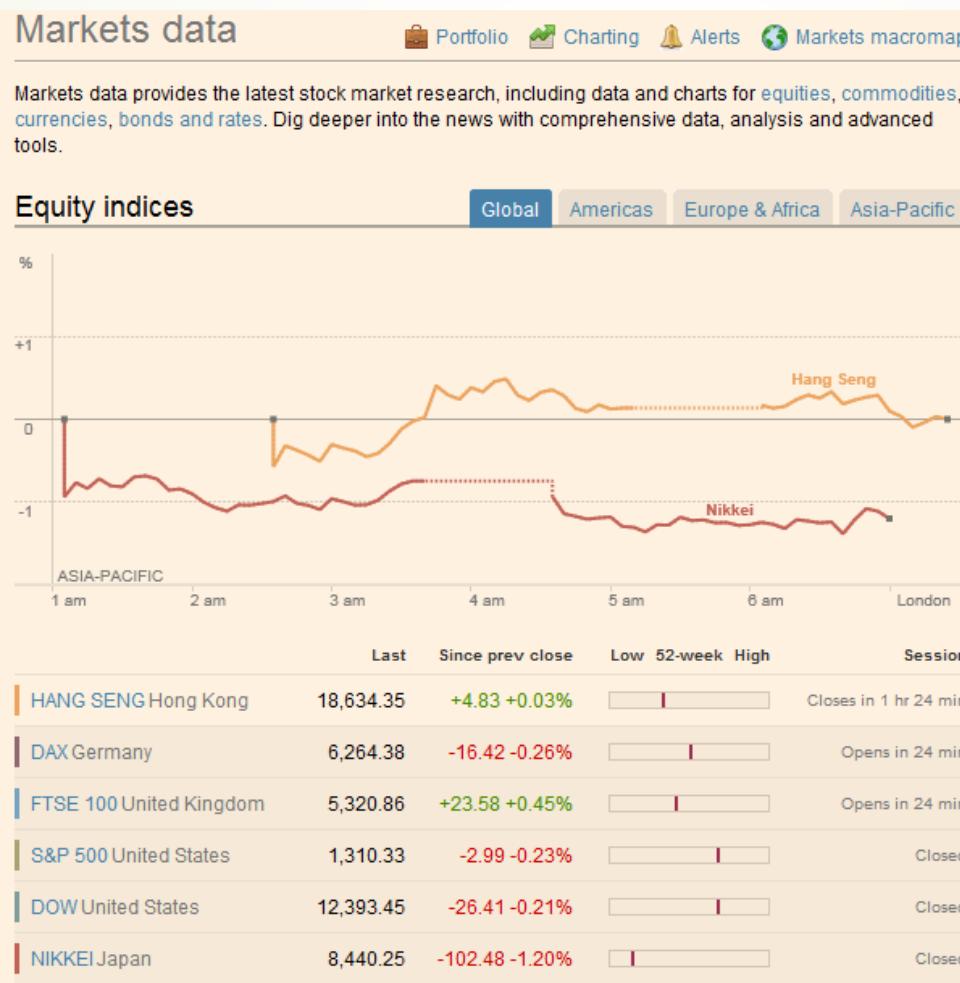
Dynamic visualizations

- **Model based visualization:** mathematical relationships to be visualized (model, program or simulation directly under the user's control) e.g. Transparent Prolog Machine (TPM)



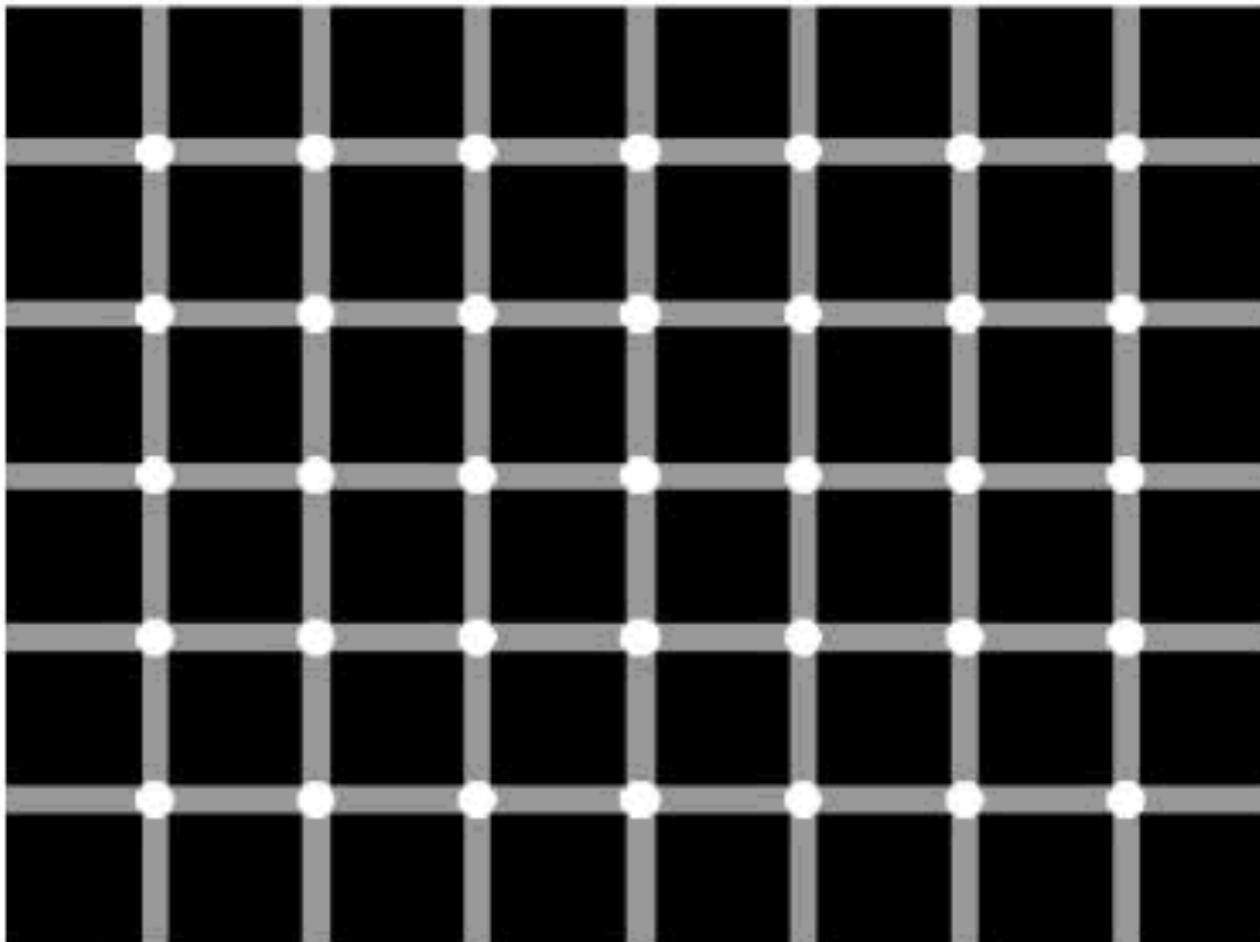
Dynamic visualizations

- ▶ **Visualization of external data:** Stock market data (beyond direct computer control)

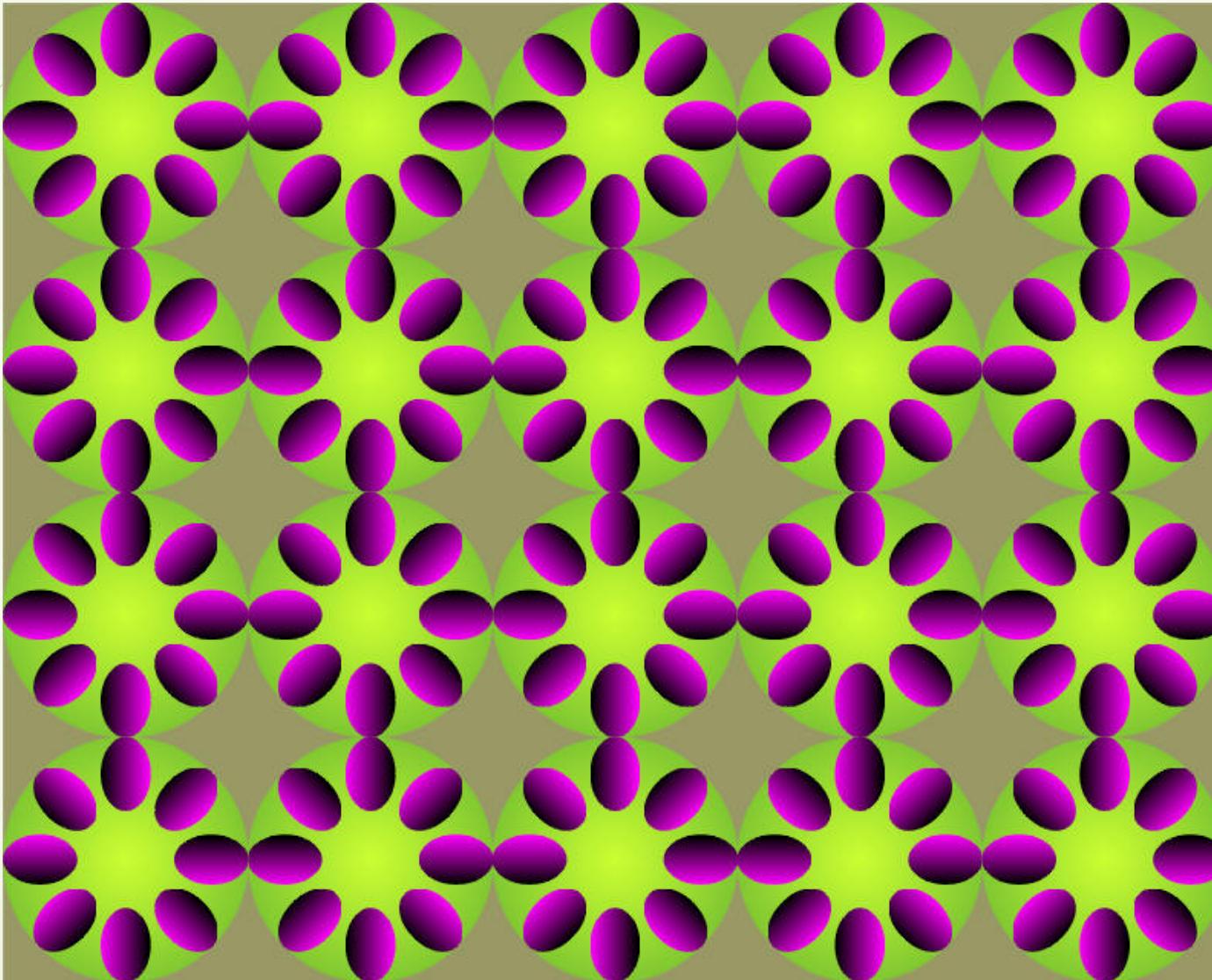


Illusion

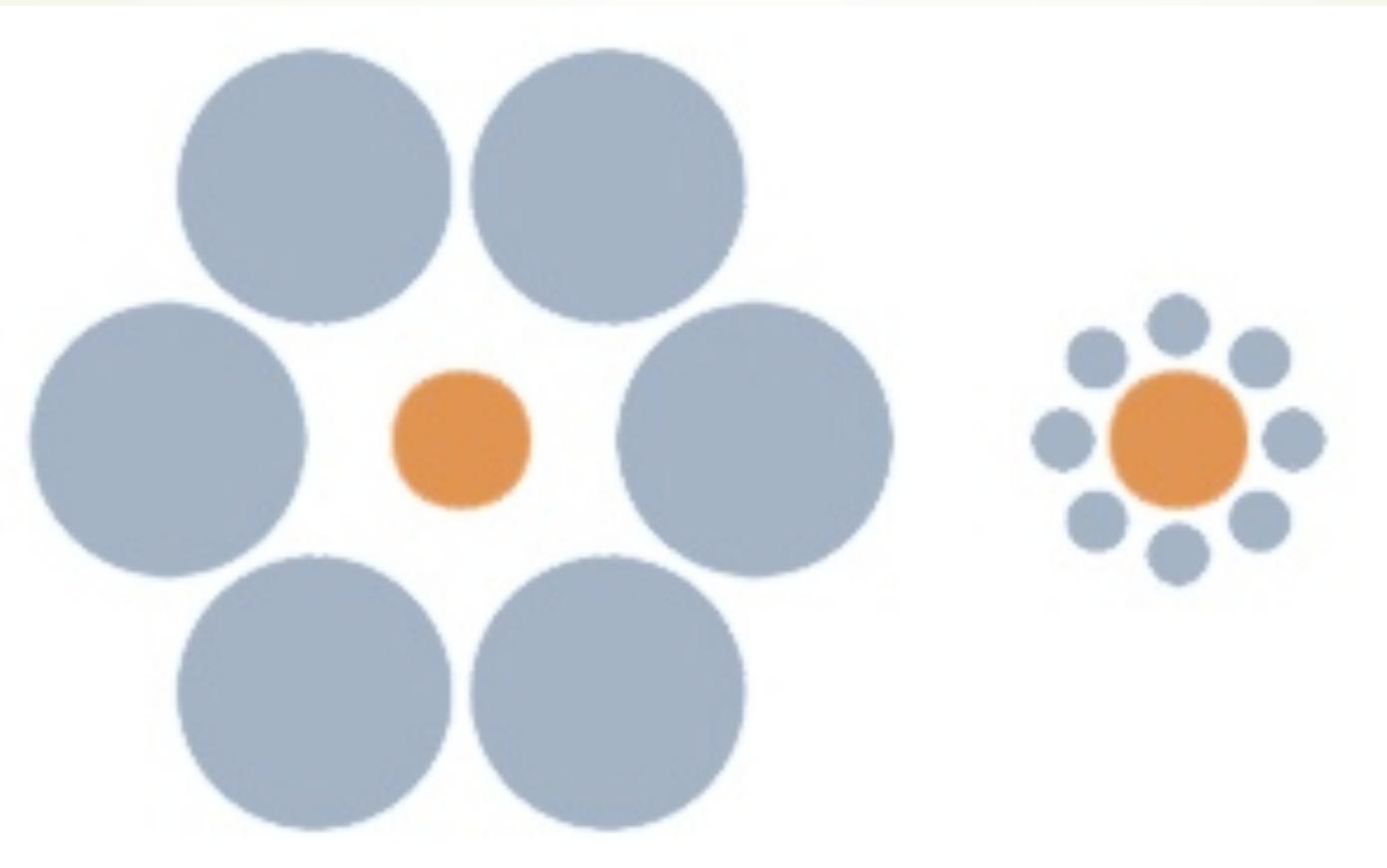
How many black dots do you see? There are none...



Motion Illusion



Ebbinghaus illusion



Which orange circle is bigger?

Perception - Hearing

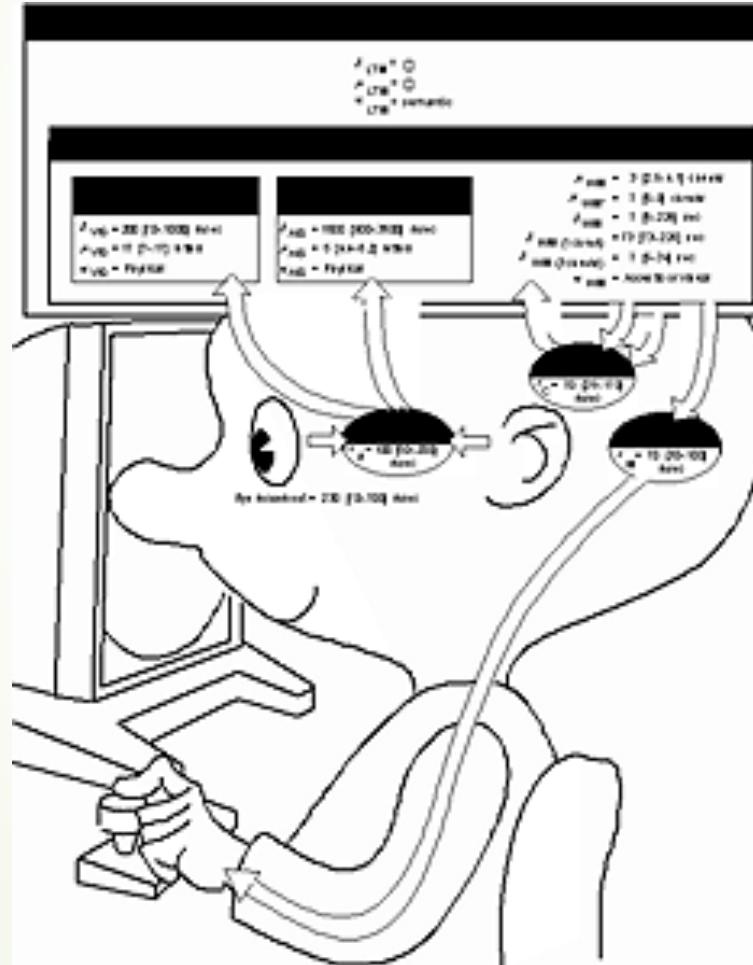
- ▶ Environment noise
- ▶ Limitation – elderly
- ▶ Pitch
- ▶ 20Hz – 15KHz frequency
- ▶ Human is less accurate in distinguishing high frequencies than low ones
- ▶ Amplitude and loudness
- ▶ Loudness is a psychological property of sound
- ▶ Our ears are capable to cope with 0 to 160db (pain at 130db!)

Perception - Touch

- ▶ Disability
- ▶ Body sizes
- ▶ Movement
- ▶ Pain

Memory

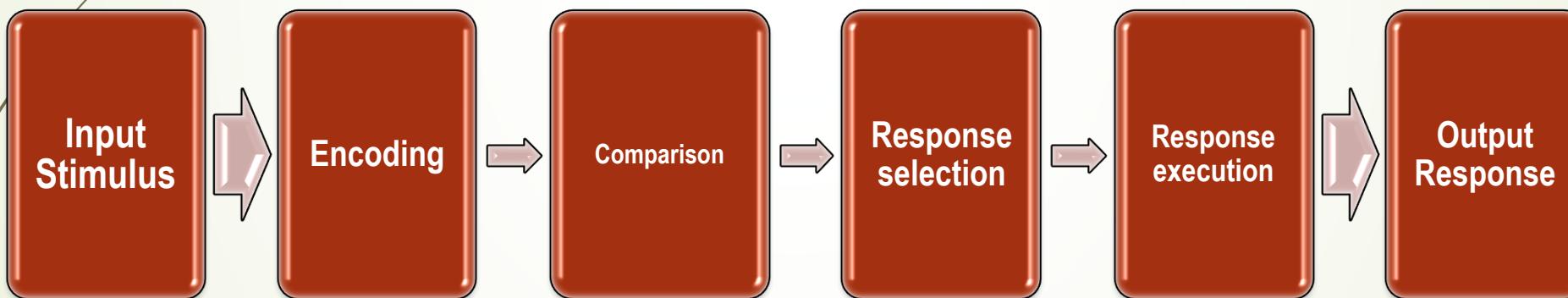
► Human Information Processing Models



The Human Information Processor by Card, Moran and Newell (1983)

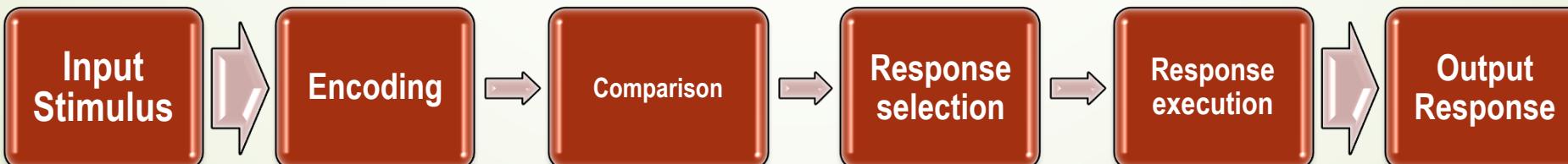
Human Information Processing Model (Lindsay and Norman, 1977)

- Human Information Processing : (Lindsay and Norman, 1977) defined human information processing model into 4 stages

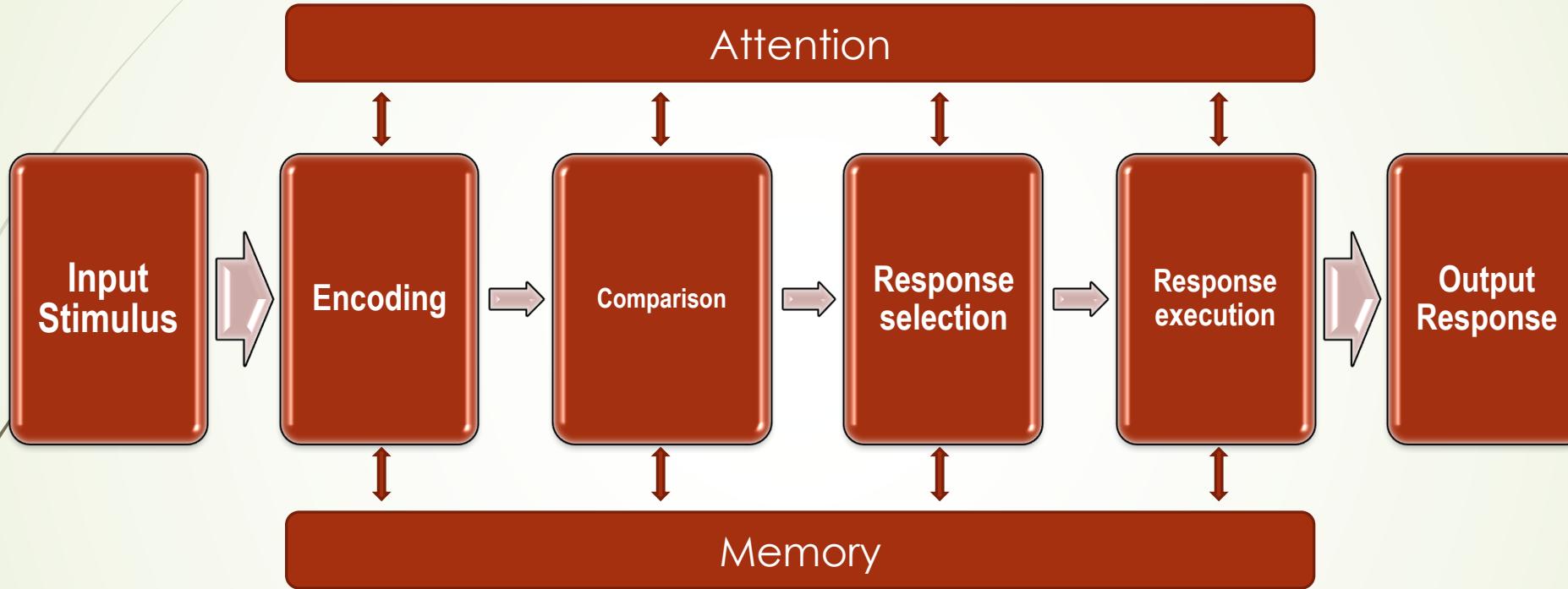


Human Information Processing Model (Lindsay and Norman, 1977)

- contains 4 stages
 1. Encodes info from environment into some form of internal representation
 2. Internal representation of the stimulus is compared with memorized representation that stored in the brain
 3. Deciding on a response to the encoded stimulus
 4. When an appropriate match is made the process passes on to stage 4, which deals with organization of the response and the necessary action



Extended Human Information Processing Model (Barber, 1988)

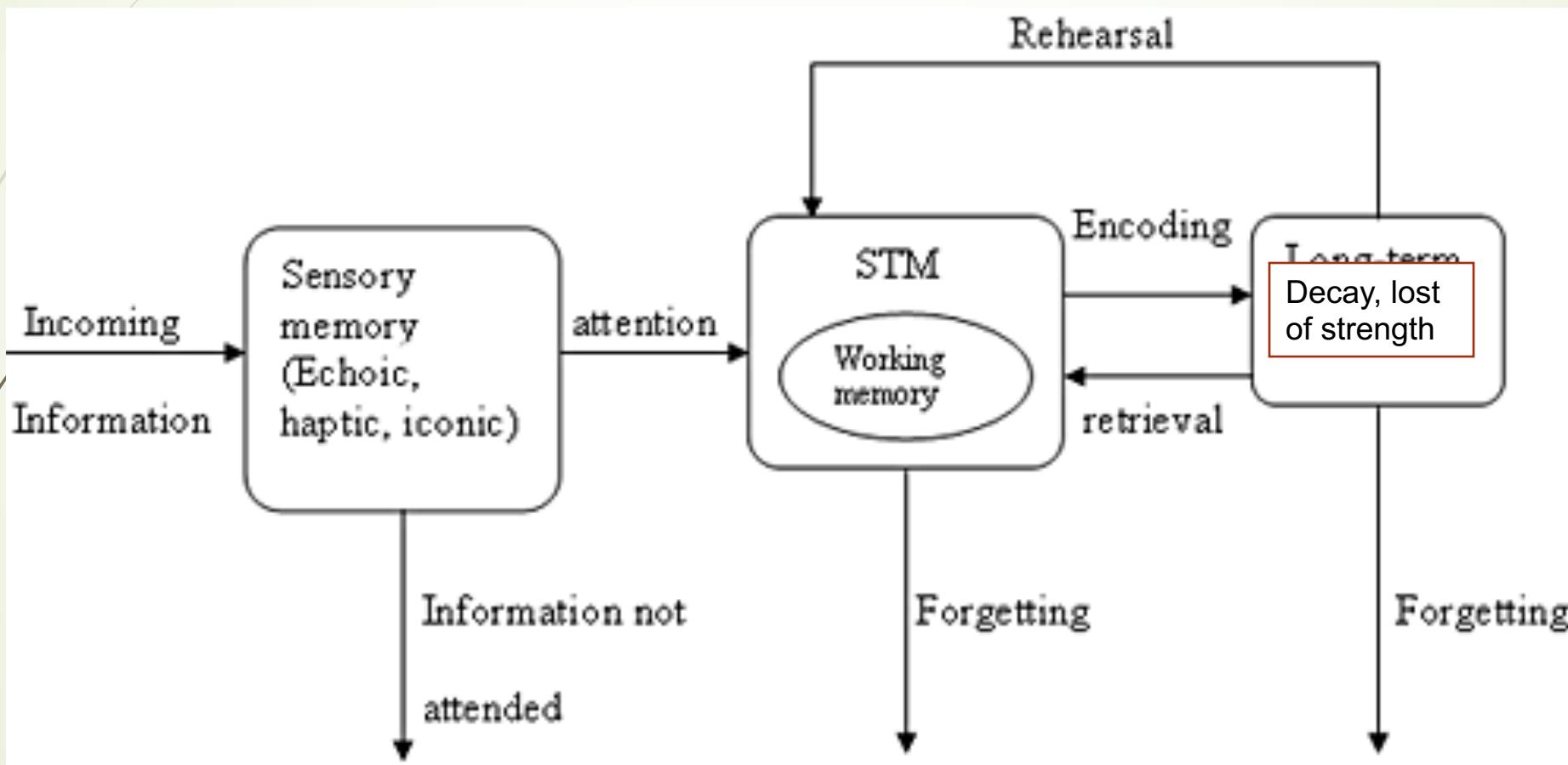


The basic model was extended (Barber, 1988) to include the processes of **attention** and **memory**, which interact with information processing stages of processing.

Extended Human Information Processing Model (Barber, 1988)

- In this model, cognition is viewed in terms of:
 1. How information is **perceived** by the perceptual processors
 2. How that information is **attended** to
 3. How that information is processed and stored in **memory**

Multi-store model of memory (Atkinson and Shiffrin, 1968)



Memory

Multi-store model of memory (Atkinson and Shiffrin, 1968)

Information flows through a series of stores in which it is attended to and processed;

- ▶ **Sensory memory** lasts a few seconds and holds a limited amount of information that is lost if not attended to
- ▶ **Short-term memory** has a capacity of $7 +/−2$ chunks of information that lasts about 20 seconds
- ▶ **Permanent long-term memory** is potentially infinite in capacity and can last a lifetime
- ▶ Rehearsal is necessary to maintain information in STM or transfer it to LTM

Memory Constraints

- ▶ “meaningfulness”
- ▶ **Level of Processing theory** : information can be processed at different levels.
- ▶ The more meaningful of an item, the deeper the level at which it is processed when first encountered and the more likely it is to be remembered over time.

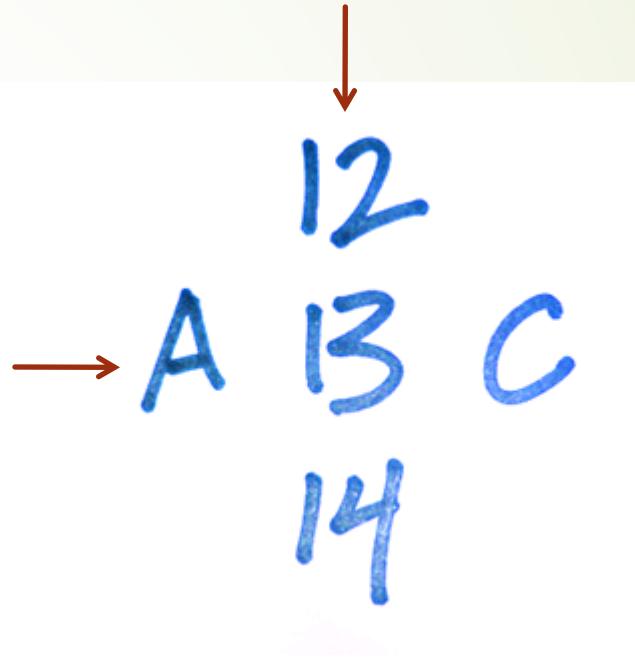
Meaningfulness

- Attributes that influences meaningfulness are:
 - **Familiarity** : frequency that it occurs in everyday e.g. door, read, stop **vs** compile
 - **Imagery** : ability with which the word can elicit images in one's mind e.g. eat, sleep **vs** begin, increase

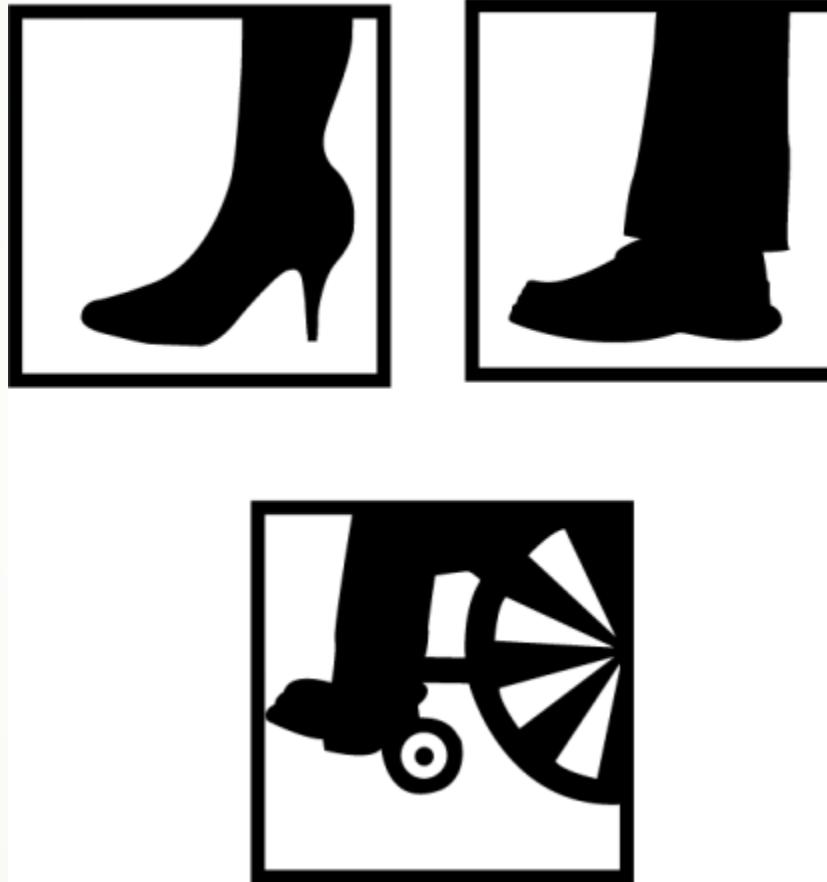
Best is to design “Meaningful Interfaces”

Meaningful Interfaces

- ▶ Designing meaningful contexts
 - ▶ Context
 - ▶ Function
 - ▶ Representational form
 - ▶ Resemblance icons 
 - ▶ Exemplar icons
 - ▶ Symbolic icons
 - ▶ Arbitrary icons



What does it mean?



Example of meaningful commands

Dos Based Interface: Dos Commands

- ▶ Ver
- ▶ Copy
- ▶ DIR
- ▶ DIR /P /W
- ▶ /P

```
Welcome to FreeDOS

CuteMouse v1.9.1 alpha 1 [FreeDOS]
Installed at PS/2 port
C:>>ver

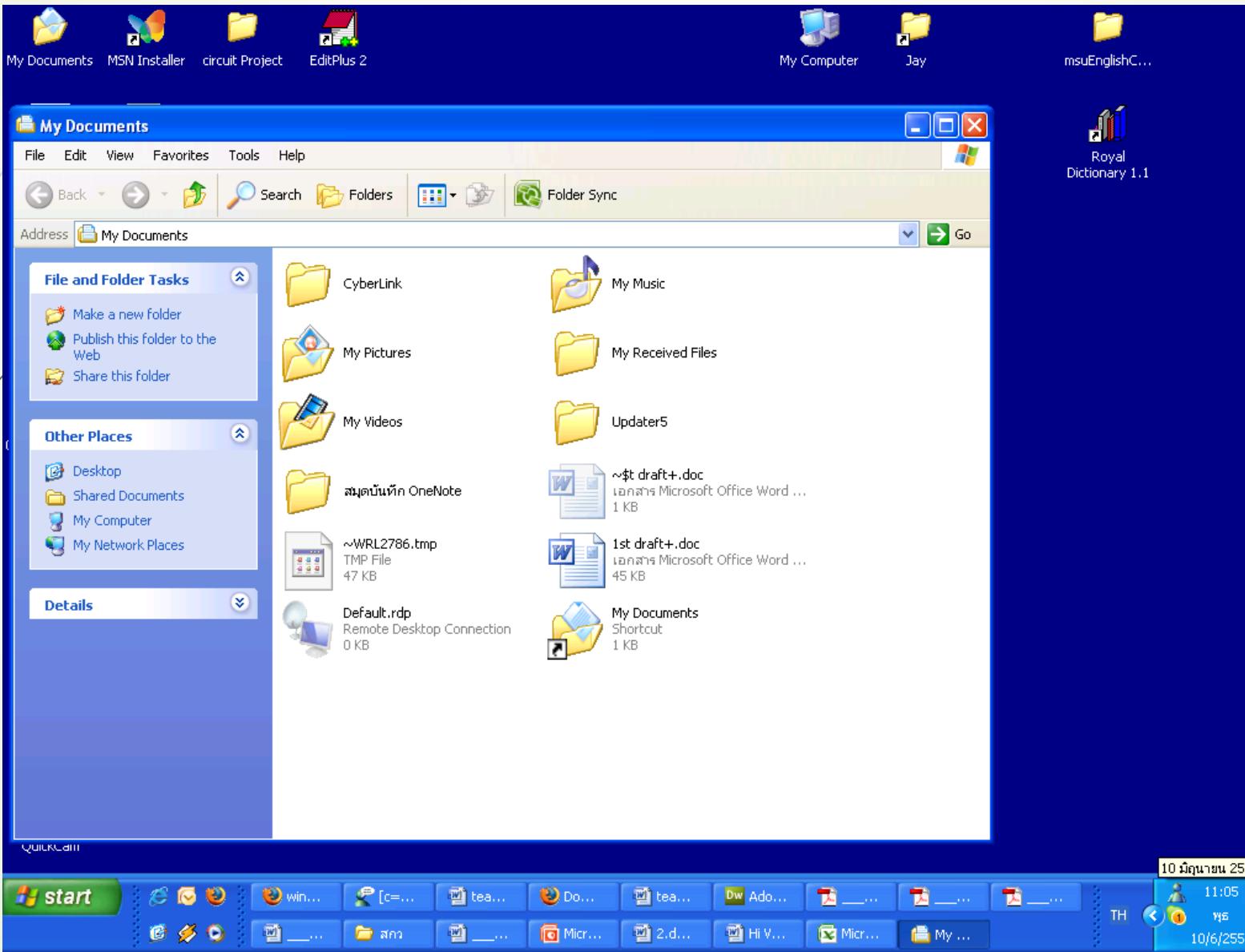
FreeCom version 0.82 pl 3 XMS_Swap [Dec 10 2003 06:49:21]

C:>>dir
Volume in drive C is FREEDOS_C95
Volume Serial Number is 0E4F-19EB
Directory of C:\

FDOS          <DIR>  08-26-04  6:23p
AUTOEXEC.BAT      435  08-26-04  6:24p
BOOTSECT.BIN      512  08-26-04  6:23p
COMMAND.COM     93,963  08-26-04  6:24p
CONFIG.SYS       801  08-26-04  6:24p
FDOSBOOT.BIN      512  08-26-04  6:24p
KERNEL.SYS     45,815  04-17-04  9:19p
               6 file(s)    142,038 bytes
               1 dir(s)  1,064,517,632 bytes free

C:>>_
```

Example of meaningful menu: Windows based interface



Quiz

- ▶ How many family members' birthday can you remember?
- ▶ What is on the cover of your lasts magazine you bought ?
- ▶ Which one is easier?

Attention

- ▶ **Focused Attention:** This is the ability to respond discretely to specific visual, auditory or tactile stimuli. Normally, it tends to be relevant to the activities and intentions that we have at that time.
- ▶ **Divided Attention:** Attempt to attend more than 1 thing at a time >> Drive while having conversation with passenger

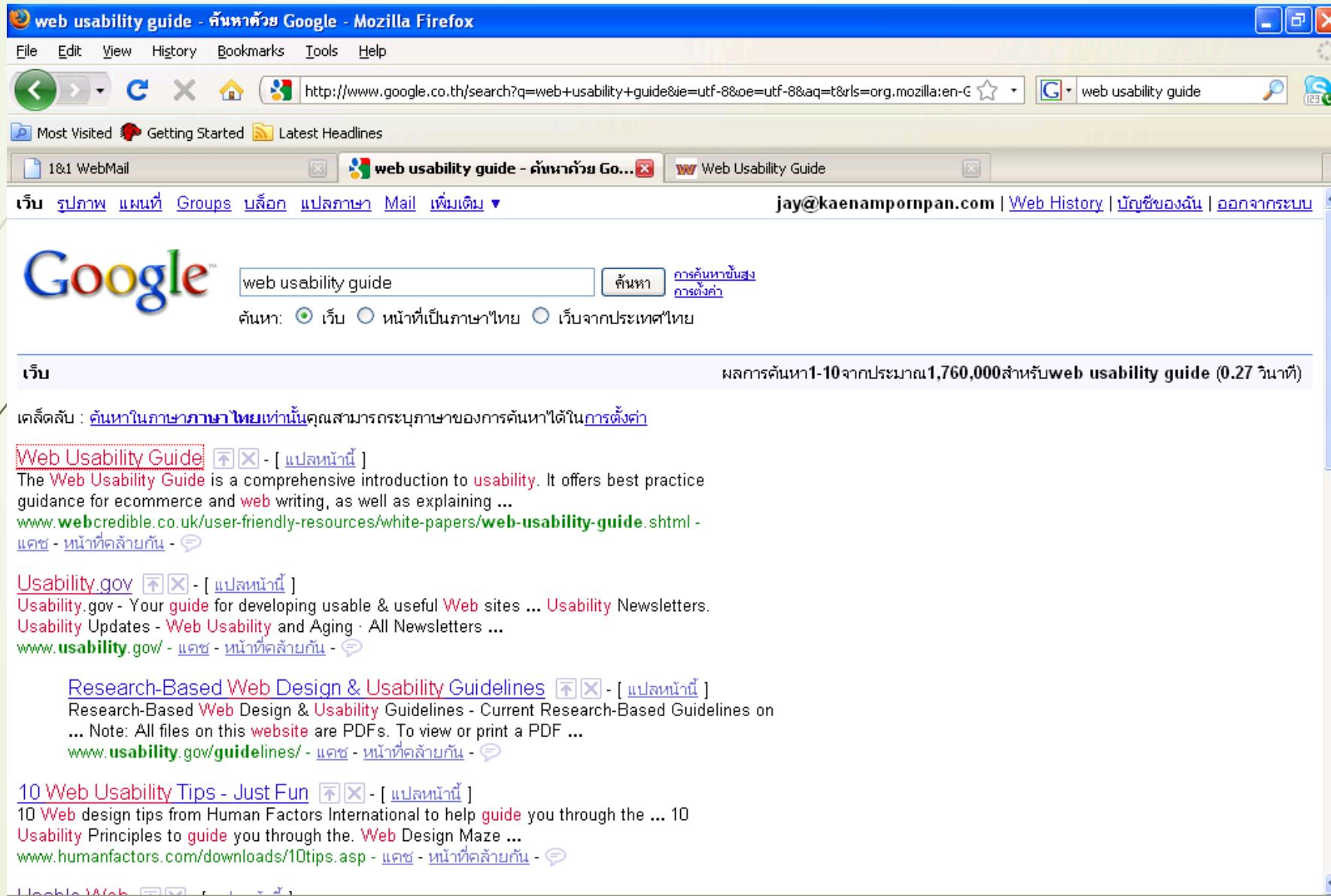
Research paper: Attention design: Eight issues to consider

<http://www.sussex.ac.uk/Users/sharonw/papers/WoodCoxCheng.pdf>

Focusing attention at the interface

- ▶ Structuring information: make information so it is easy to navigate
 - ▶ Presenting not too much or too little information
 - ▶ It should be grouped and ordered into meaningful parts
- ▶ Techniques for guiding attention
 - ▶ Spatial and temporal clues
 - ▶ Color
 - ▶ Altering techniques such as flashing and auditory warnings

Attention

A screenshot of a Mozilla Firefox browser window. The title bar reads "web usability guide - ค้นหาด้วย Google - Mozilla Firefox". The address bar shows the URL "http://www.google.co.th/search?q=web+usability+guide&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US". The search term "web usability guide" is entered in the search field. The page content is a Google search results page for the query. The first result is a link to "Web Usability Guide" from "Webcredible.co.uk", which is highlighted with a red box. Other results include links to "Usability.gov", "Research-Based Web Design & Usability Guidelines", and "10 Web Usability Tips - Just Fun". The interface includes standard Firefox navigation buttons (back, forward, search, etc.) and a toolbar.

Goals of Information Processing studies

71

in HCI Design is to:

- ▶ Aid human cognition
- ▶ Reduce cognitive load
- ▶ Get human attention

EXAMPLE: Information Processing

Student				
<u>sid</u>	name	addr	age	GPA
301	John	183 Westwood	19	2.1
303	Elaine	301 Wilshire	17	3.9
401	James	183 Westwood	17	3.6
208	Esther	421 Gayley	20	3.1



GradStudent				
<u>sid</u>	name	addr	age	GPA
501	Raymond	180 Westwood	23	3.9
502	Amy	301 Wilshire	35	3.4
503	Jack	220 Gayley	22	3.5
504	Dan	220 Gayley	25	3.3

Class				
<u>dept</u>	<u>enum</u>	<u>sec</u>	title	instructor
CS	143	01	DB Systems	John Cho
CS	112	01	Modeling	Dick Muntz
EE	301	01	Signal	James Dean
EE	183	01	Mechanics	Dick Muntz

Enroll			
<u>sid</u>	<u>dept</u>	<u>enum</u>	<u>sec</u>
301	CS	143	01
301	EE	301	01
303	CS	112	01
401	EE	183	01

The Student Database

EXAMPLE: Aid human cognition

Student				
<u>sid</u>	name	addr	age	GPA
301	John	183 Westwood	19	2.1
303	Elaine	301 Wilshire	17	3.9
401	James	183 Westwood	17	3.6
208	Esther	421 Gayley	20	3.1

Enroll			
<u>sid</u>	dept	cnum	sec
301	CS	143	01
301	EE	301	01
303	CS	112	01
401	EE	183	01

Student.sid	name	addr	age	GPA	Enroll.sid	dept	cnum	sec
301	John	183 Westwood	19	2.1	301	CS	143	01
301	John	183 Westwood	19	2.1	301	EE	301	01
301	John	183 Westwood	19	2.1	303	CS	112	01
301	John	183 Westwood	19	2.1	401	EE	183	01
303	Elaine	301 Wilshire	17	3.9	301	CS	143	01
303	Elaine	301 Wilshire	17	3.9	301	EE	301	01
303	Elaine	301 Wilshire	17	3.9	303	CS	112	01
303	Elaine	301 Wilshire	17	3.9	401	EE	183	01
401	James	183 Westwood	17	3.6	301	CS	143	01
401	James	183 Westwood	17	3.6	301	EE	301	01
401	James	183 Westwood	17	3.6	303	CS	112	01
401	James	183 Westwood	17	3.6	401	EE	183	01
208	Esther	421 Gayley	20	3.1	301	CS	143	01
208	Esther	421 Gayley	20	3.1	301	EE	301	01
208	Esther	421 Gayley	20	3.1	303	CS	112	01
208	Esther	421 Gayley	20	3.1	401	EE	183	01

EXAMPLE: Reduce cognitive load and get attention

Student				
<u>sid</u>	name	addr	age	GPA
301	John	183 Westwood	19	2.1
303	Elaine	301 Wilshire	17	3.9
401	James	183 Westwood	17	3.6
208	Esther	421 Gayley	20	3.1

Enroll			
<u>sid</u>	dept	cnum	sec
301	CS	143	01
301	EE	301	01
303	CS	112	01
401	EE	183	01

Student.sid	name	addr	age	GPA	Enroll.sid	dept	cnum	sec
303	Elaine	301 Wilshire	17	3.9	301	CS	143	01
303	Elaine	301 Wilshire	17	3.9	301	EE	301	01
303	Elaine	301 Wilshire	17	3.9	303	CS	112	01
303	Elaine	301 Wilshire	17	3.9	401	EE	183	01
401	James	183 Westwood	17	3.6	301	CS	143	01
401	James	183 Westwood	17	3.6	301	EE	301	01
401	James	183 Westwood	17	3.6	303	CS	112	01
401	James	183 Westwood	17	3.6	401	EE	183	01

Find students that might get Honor degree:
Select GPA > 3.5 && CS
What would you represent to user?

Example: Menu Design in Mobile



One item at a time menu



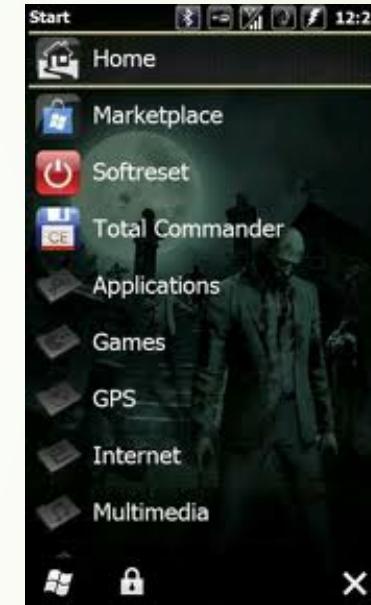
Barrel menu



Two-Dimensional Matrix



Hub-and-Spoke menu style
after Two dimensional matrix



Vertical lists menu style

Research paper: **Barrel menu: a new mobile phone menu for feature rich devices**
<http://dl.acm.org/citation.cfm?id=2072221.2072233&coll=DL&dl=ACM&CFID=86649511&CFTOKEN=53355116>

Computer Technology

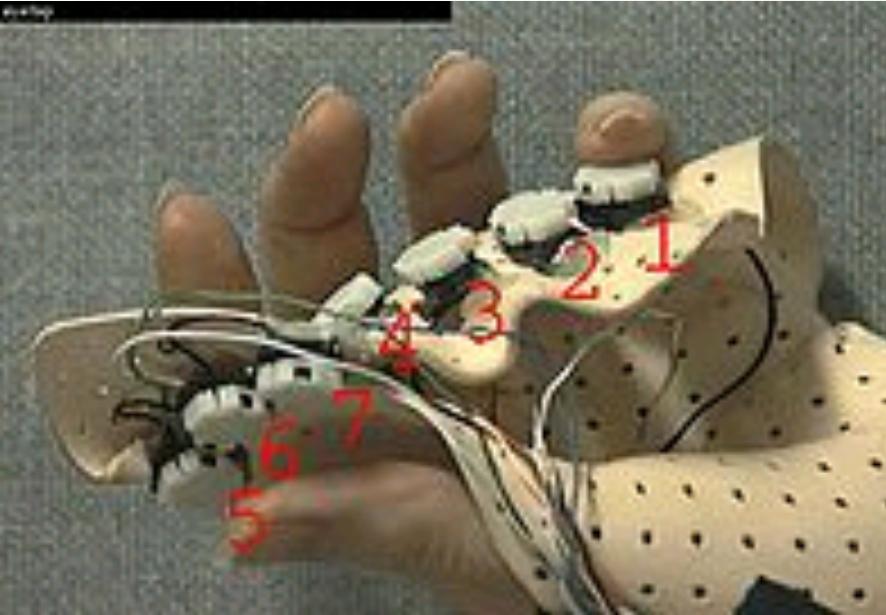
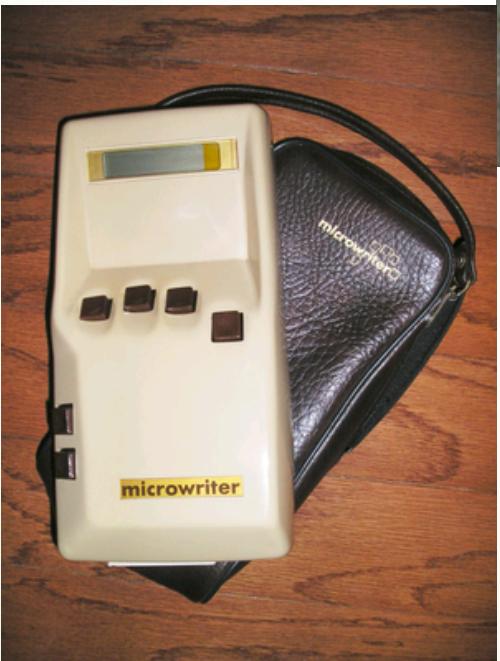
- Input
- Output

Input

Input device : Devices to send data to the computer.

Keyboards

- ▶ Computer keyboard
- ▶ Keyer
- ▶ Chorded keyboard
- ▶ LPFK



Pointing devices

- ▶ 3D mice
- ▶ Joysticks
- ▶ pointing sticks

Touch Screens



High-degree of freedom input devices



Audio input devices

- ▶ Microphone
- ▶ MIDI keyboard

Other input devices

82

- ▶ Webcam
- ▶ Image scanner
- ▶ Fingerprint scanner
- ▶ Barcode reader
- ▶ 3D scanner
- ▶ Laser rangefinder
- ▶ Location finder (GPS)
- ▶ Sensory devices

Development in Input

- ▶ Speech recognition
- ▶ Touch screens
- ▶ Handwriting recognition
- ▶ Gesture recognition
- ▶ Sensors recognition

Matching input devices with work

- Suitable device
 - For disabled: eyes tracker
 - For environment of use: pen
recognizes hand printed character for
outdoor medical

Output Devices

output device is any piece of computer hardware equipment used to communicate the results of data processing carried out by an information processing system (such as a computer) to the outside world.

Visual Output

- Physical aspects for perception: brightness, color combinations, selection of colors with regard to color-blindness
- Visual feedback on user actions
 - User needs to know what is happening on computer's side of interaction: processing, confirm input, not suitable input (feedback)

Sound output

- ▶ Speech
- ▶ Musical sounds E.g. phone ring tones
- ▶ Natural sounds E.g. email arrival in the background of daily tasks

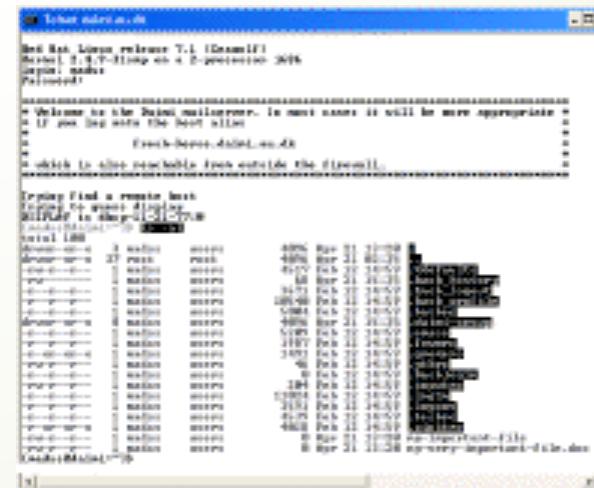
Interaction Styles

- ▶ Batch interface
- ▶ Command-line user interface
- ▶ Graphical user interface
- ▶ Direct manipulation
- ▶ Tangible interfaces / Ubicomp: person interacts with digital information through the physical environment
- ▶ Touch User Interface (TUI): touchscreen display as a combined input and output device
- ▶ Noncommand user interfaces: observe the user to infer his / her needs and intentions, without requiring that he / she formulate explicit commands.
- ▶ Gesture interface: accept input in a form of hand gestures, or mouse gestures sketched with a computer mouse or a stylus.

Command line user interface

Advantages Shneiderman (1997) and Preece et al. (1994)

- ▶ Flexible.
- ▶ Appeals to expert users.
- ▶ Supports creation of user-defined "scripts" or macros.
- ▶ Is suitable for interacting with networked computers even with low bandwidth.



Command line user interface

Disadvantages Shneiderman (1997) and Preece et al. (1994)

- ▶ Retention of commands is generally very poor.
- ▶ Learnability of commands is very poor.
- ▶ Error rates are high.
- ▶ Error messages and assistance are hard to provide because of the diversity of possibilities plus the complexity of mapping from tasks to interface concepts and syntax.
- ▶ Not suitable for non-expert users.

Form Fillin

Advantages

- ▶ Simplifies data entry.
- ▶ Shortens learning in that the fields are predefined and need only be 'recognised'.
- ▶ Guides the user via the predefined rules.

Disadvantages

- ▶ Consumes screen space.
- ▶ Usually sets the scene for rigid formalisation of the business processes.



A screenshot of a Windows-style application window containing a form with the following fields:

Name:			
Address:			
City:	State:	Zip:	

Menu Selection

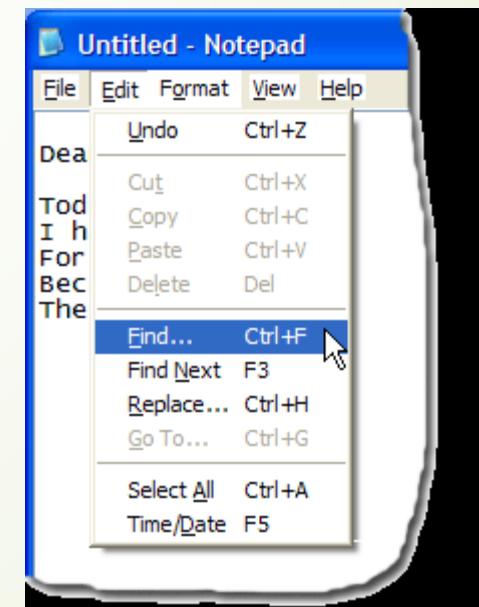
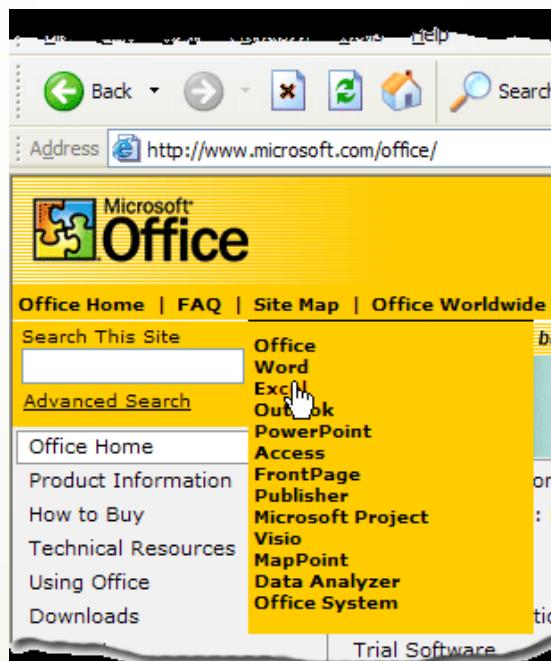
Advantages

- ▶ Ideal for novice or intermittent users.
- ▶ Can appeal to expert users if display and selection mechanisms are rapid and if appropriate "shortcuts" are implemented.
- ▶ Affords exploration
- ▶ Structures decision making.
- ▶ Allows easy support of error handling as the user's input does not have to be parsed (as with command language).

Menu Selection

Disadvantages

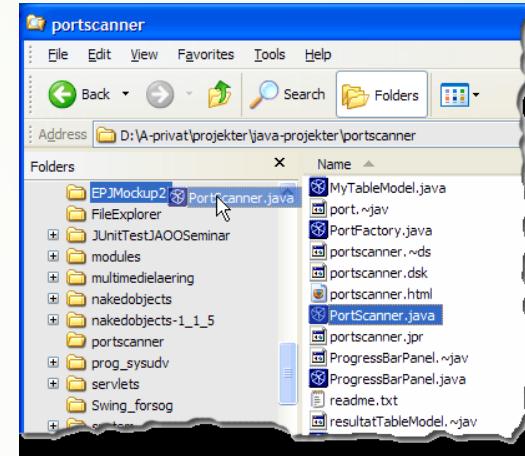
- ▶ Too many menus may lead to information overload or complexity of discouraging proportions.
- ▶ May be slow for frequent users.
- ▶ May not be suited for small graphic displays.



Direct Manipulation

Advantages

- ▶ Visually presents task concepts.
- ▶ Easy to learn.
- ▶ Errors can be avoided more easily.
- ▶ Encourages exploration.
- ▶ High subjective satisfaction.
- ▶ Recognition memory (as opposed to cued or free recall memory)

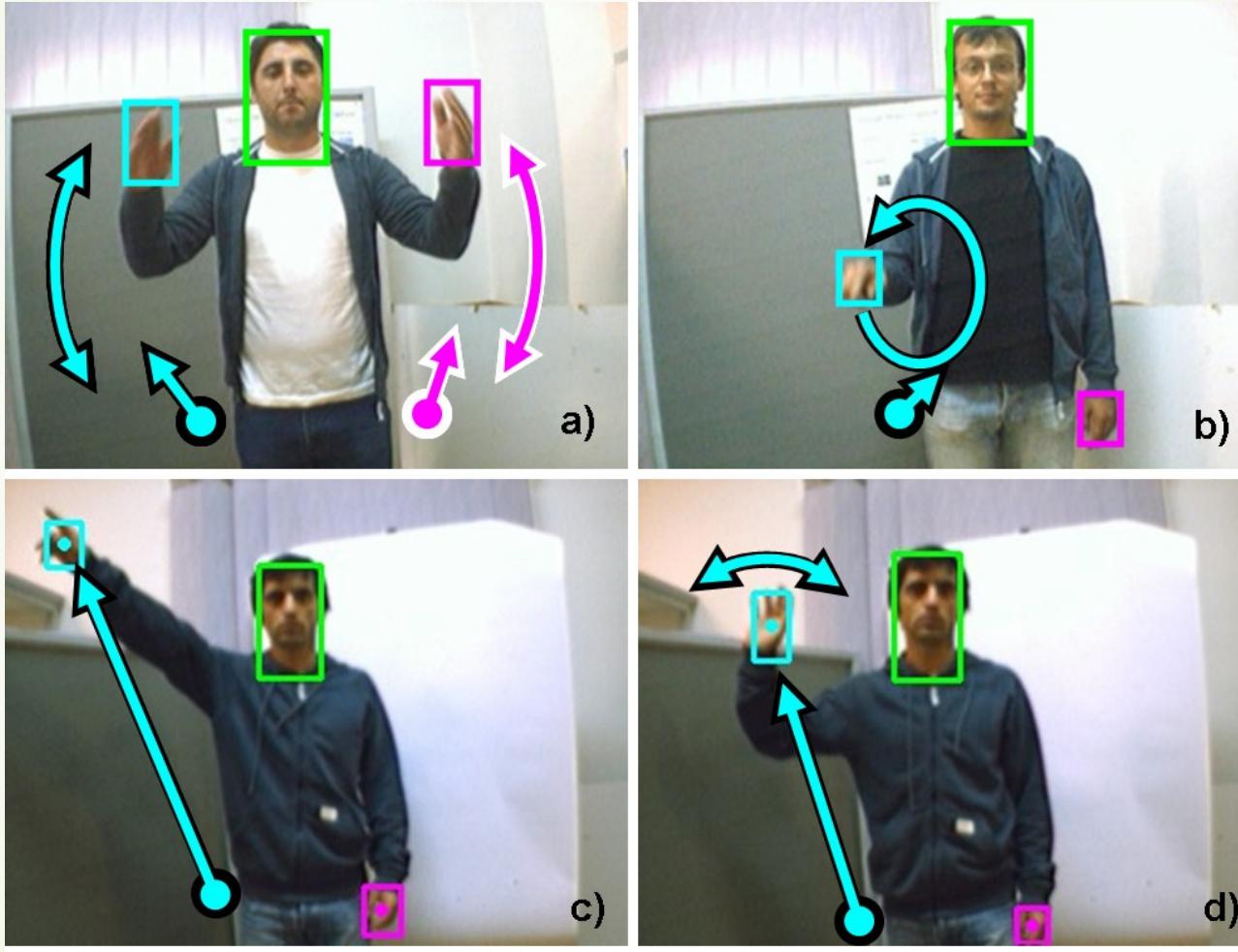


Direct Manipulation

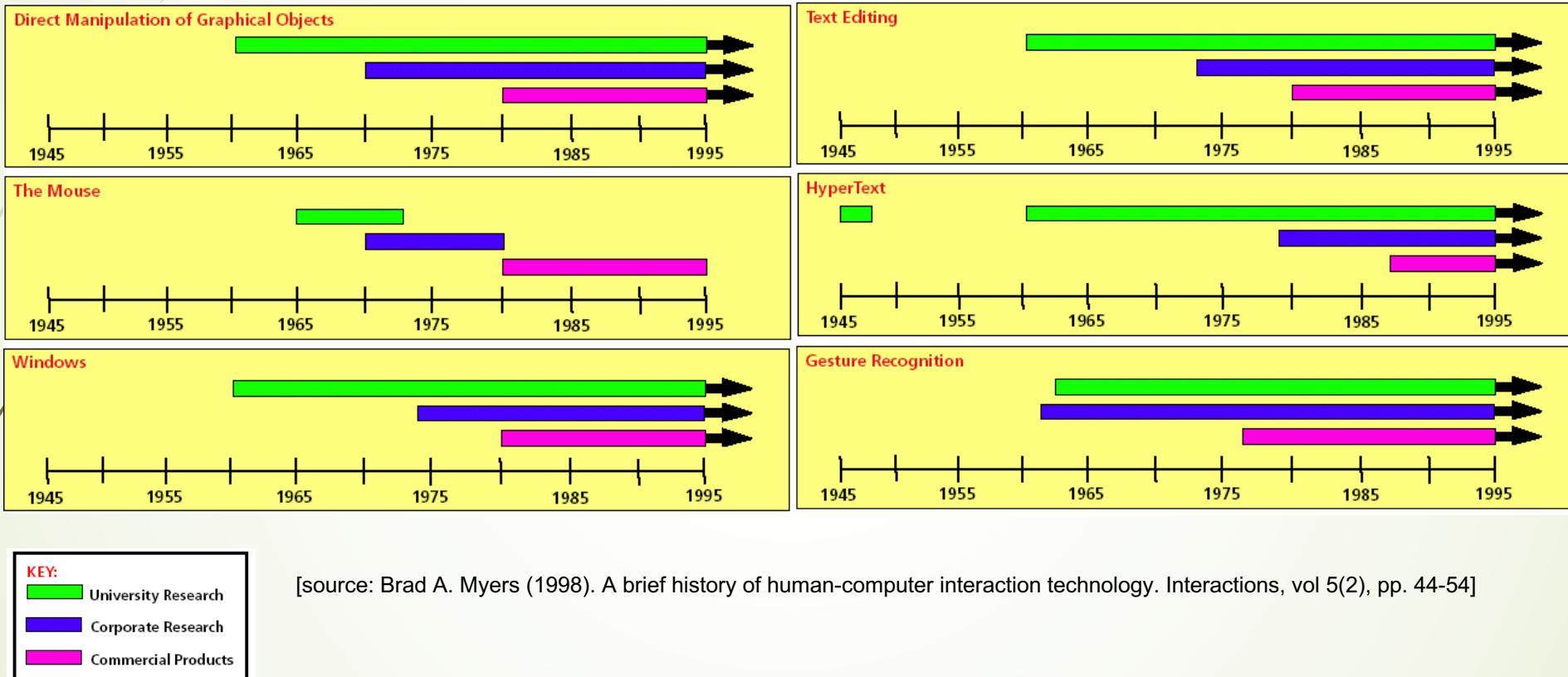
Disadvantages

- ▶ May be more difficult to programme.
- ▶ Not suitable for small graphic displays.
- ▶ Spatial and visual representation is not always preferable.
- ▶ Metaphors can be misleading
- ▶ Compact notations may better suit expert users.

Gesture Interaction



Historical Overview (1945-1995)



Videos

- ▶ Microsoft envisions the future
- ▶ The future of Social and Collaborative Computing

Summary

- ▶ Definitions of HCI
- ▶ The importance of HCI
- ▶ Examples of bad design
- ▶ Human Factor
 - ▶ Human Information Processing
 - ▶ Memory
 - ▶ Attention
 - ▶ Perceptions
- ▶ Computer
- ▶ Interaction
 - ▶ Interaction Styles

Sources

- ▶ Preece, J., Rogers, Y., Sharp, H., Benyon, D., Holland, S. & Carey, T. (1994) Human-Computer Interaction: Concepts And Design, Addison Wesley, ISBN 0-201-62769-8
- ▶ <http://www.id-book.com/>