Computer Graphics and Human Computer Interaction

Lecture 2 Cognitive Models and Theories

Manasawee Kaenampornpan
manasaweek@gmail.com
http://www.italpha.msu.ac.th/manasawee

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

Human Cognition

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.

Human Cognition

The Problem of Introspection

Perception

- 5 senses: Sight, Hearing, Touch, Taste, Smell.
- Only first three are involved in HCI.

Memory

- Sensory, Short, Long term
- Procedural versus Declarative

Reasoning

- Deduction/Induction/Abduction/Analogy/Skill Acquisition

Frameworks for Cognition

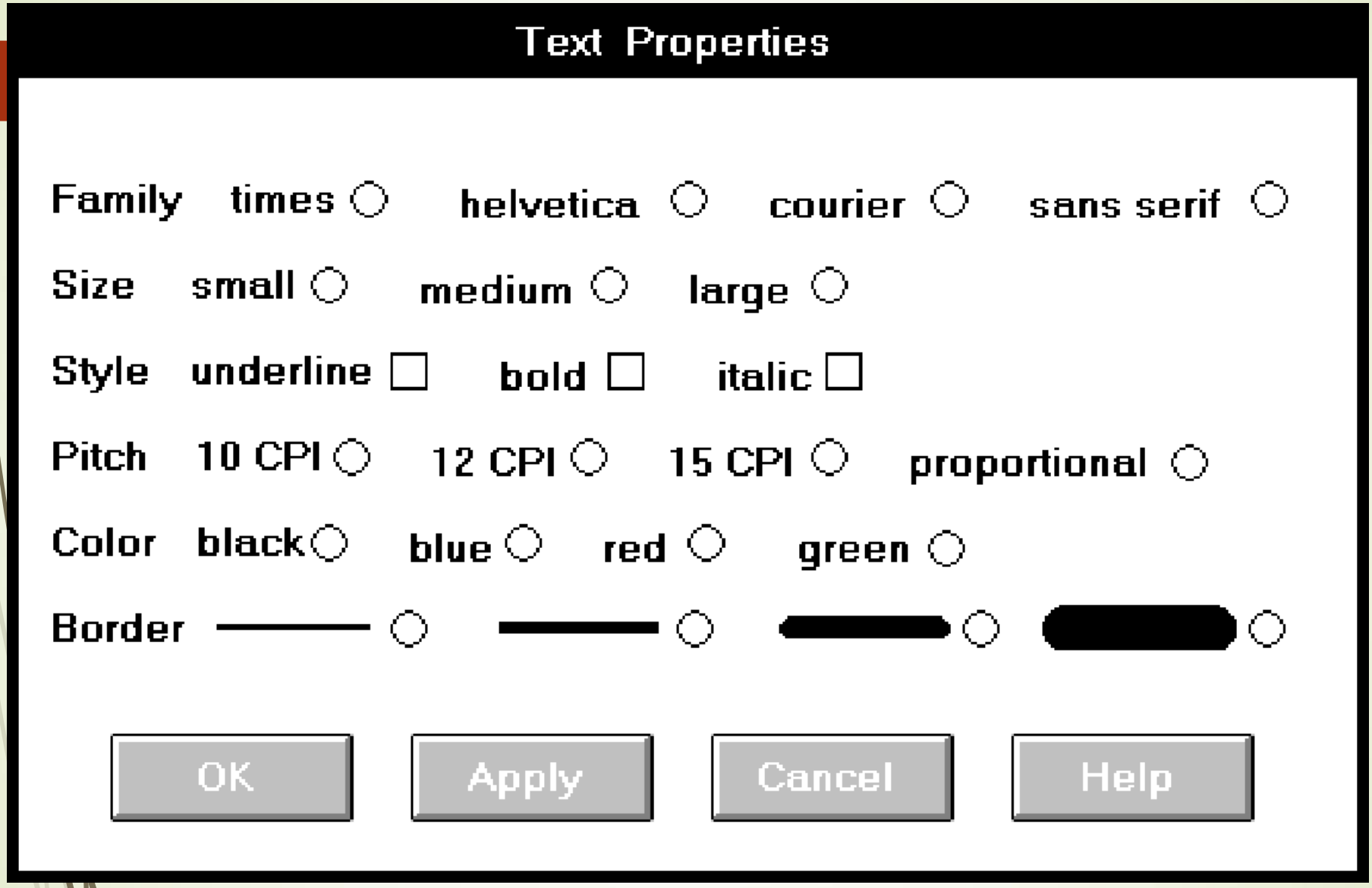
- Information Processing including memory, perception, attention (see lecture note 1)
- Cognitive modeling
- External Cognition
- Distributed Cognition
- Mental Models
- Conceptual model
- Metaphors
- Personas
- Scenarios

Information Processing

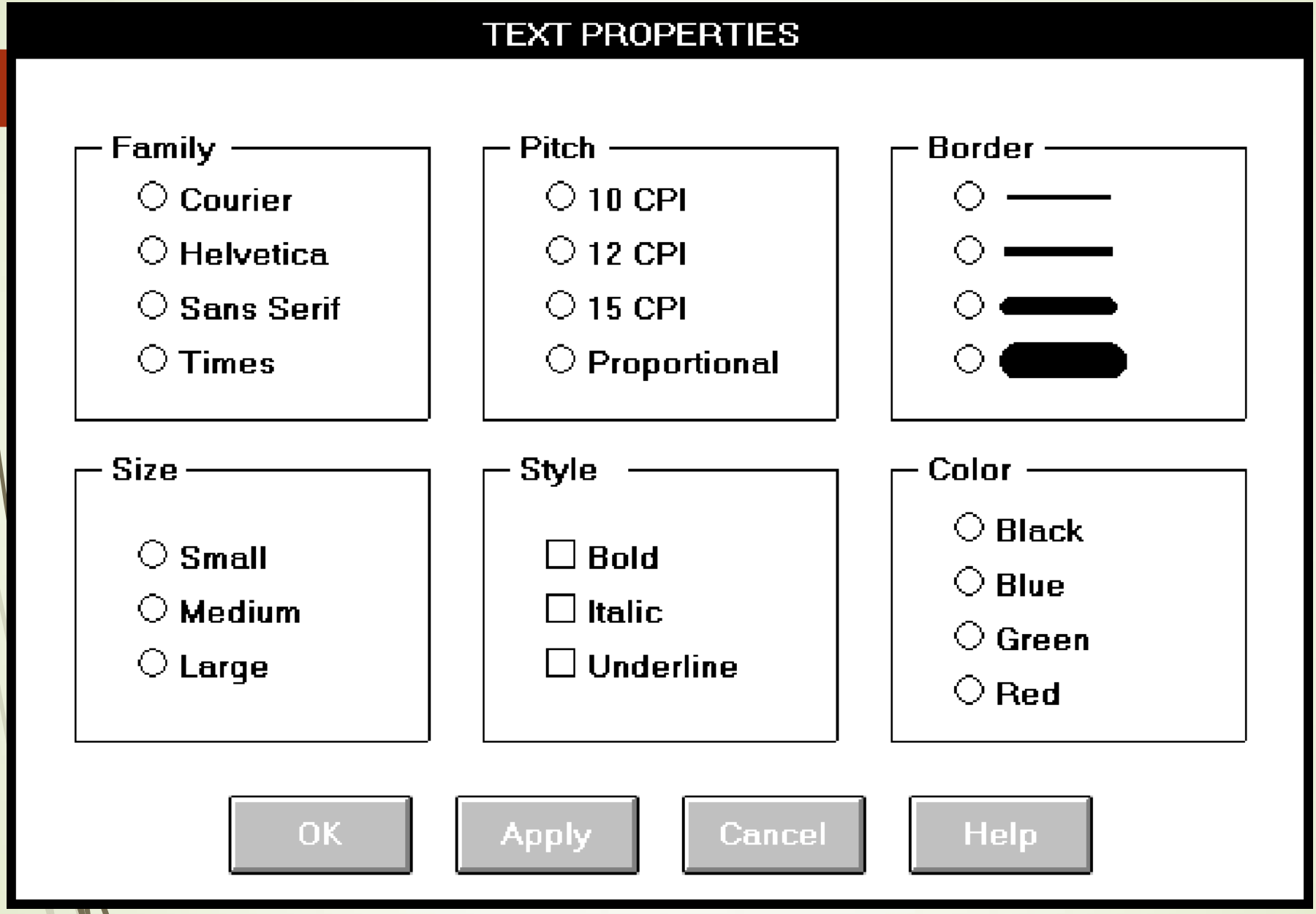
- Perception – sight
- Memory – SM, STM, LTM
  - Overload
  - Meaningful
  - Attention

Count the ball passes

- How many times that students pass the balls in total?
- Watch VDO: Cognitive Bias and Pattern Seeking clip



The Essential Guide to User Interface Design 3rd edition by Wilbert O Galitz


TEXT PROPERTIES
Family
Courier
Helvetica
Sans Serif
Times
Pitch
10 CPI
12 CPI
15 CPI
Proportional
Border
Size
Small
Medium
Large
Style
Bold
Italic
Underline
Color
Black
Blue
Green
Red
OK
Apply
Cancel
Help

Activity: Find the price of a double room at the Holiday Inn in Bradley

Pennsylvania
Bedford Motel/Hotel: Crinaline Courts
(814) 623-9511 S: $18 D: $20
Bedford Motel/Hotel: Holiday Inn
(814) 623-9006 S: $29 D: $36
Bedford Motel/Hotel: Midway
(814) 623-8107 S: $21 D: $26
Bedford Motel/Hotel: Penn Manor
(814) 623-8177 S: $19 D: $25
Bedford Motel/Hotel: Quality Inn
(814) 623-5189 S: $23 D: $28
Bedford Motel/Hotel: Terrace
(814) 623-5111 S: $22 D: $24
Bradley Motel/Hotel: De Soto
(814) 362-3567 S: $20 D: $24
Bradley Motel/Hotel: Holiday House
(814) 362-4511 S: $22 D: $25
Bradley Motel/Hotel: Holiday Inn
(814) 362-4501 S: $32 D: $40
Breezewood Motel/Hotel: Best Western Plaza
(814) 735-4352 S: $20 D: $27
Breezewood Motel/Hotel: Motel 70
(814) 735-4385 S: $16 D: $18

Activity: Find the price for a double room at the Quality Inn in Columbia

South Carolina

City	Motel/Hotel	Area code	Phone	Rates Single	Rates Double
Charleston	Best Western	803	747-0961	$26	$30
Charleston	Days Inn	803	881-1000	$18	$24
Charleston	Holiday Inn N	803	744-1621	$36	$46
Charleston	Holiday Inn SW	803	556-7100	$33	$47
Charleston	Howard Johnsons	803	524-4148	$31	$36
Charleston	Ramada Inn	803	774-8281	$33	$40
Charleston	Sheraton Inn	803	744-2401	$34	$42
Columbia	Best Western	803	796-9400	$29	$34
Columbia	Carolina Inn	803	799-8200	$42	$48
Columbia	Days Inn	803	736-0000	$23	$27
Columbia	Holiday Inn NW	803	794-9440	$32	$39
Columbia	Howard Johnsons	803	772-7200	$25	$27
Columbia	Quality Inn	803	772-0270	$34	$41
Columbia	Ramada Inn	803	796-2700	$36	$44
Columbia	Vagabond Inn	803	796-6240	$27	$30

Activity

- Tullis (1987) found that the two screens produced quite different results
  - 1st screen - took an average of 5.5 seconds to search
  - 2nd screen - took 3.2 seconds to search
- Why, since both displays have the same density of information (31%)?
- Spacing
  - In the 1st screen the information is bunched up together, making it hard to search
  - In the 2nd screen the characters are grouped into vertical categories of information making it easier

Design implications for attention

- Make information salient when it needs attending to
- Use techniques that make things stand out like colour, ordering, spacing, underlining, sequencing and animation
- Avoid cluttering the interface - follow the google.com example of crisp, simple design
- Avoid using too much because the software allows it

Student Gateway

- Arriving as a new student
- Visas and immigration
- Academic guidance
- Student life
- Fees, funding & living costs
- Health & welfare
- Examinations & assessments
- Graduation & leaving Oxford
- Student Notebook
- Latest news

Guide to registration

An essential part of being a student of the University is the annual completion of registration using Student Self Service.

You need to be registered in order to:

- Attend your course (programme of study)
- Release your loan from the UK Student Loans Company (SLC) or your sponsor/awarding body (where appropriate)
- Use your University email account
- Obtain your University Card/keep your University Card valid
- Check you have been correctly entered for any examinations and assessments and gain access to your results
- Print a certificate of enrolment

Student Self Service

- Login
- What is Student Self Service?
- Guide to registration

How do I...?

Order on-course transcripts

Select a question from the list and hit "Go".

Go

Resources

Exam Papers (OXAM)

Select a resource from the list and hit "Go".

Go

Registration

Each semester, current students register for classes for the next semester.

Register now.

There are three parts to the registration process at the university: academic advising with a faculty or staff member, registering for classes online, and paying a tuition and fee bill.

Before registering

Get ready: everything you need to know to prep for registration.

- Get advised
- Check your Registration Information Sheet
- Plan your class schedule
- Check for prerequisites
- Clear bars and take tests
- Update your emergency contact information

Registering for classes

You've done your homework; go grab some classes.

- Online registration
- Access periods
- Waitlists
- Late registration

In this section »

- Students
  - Registration
    - Before registering
    - Registering for classes
    - Finishing registration

มหาวิทยาลัยมหาสารคาม

Print Friendly : สำหรับพิมพ์

THAI ENGLISH

- เข้าสู่ระบบ
- ปฏิทินการศึกษา
- หลักสูตรที่เปิดสอน
- รายวิชาเปิดสอน
- ตรวจวิชาก่อนลงทะเบียน
- ตารางเรียนนิสิต
- ตารางสอนอาจารย์
- ตารางการใช้ห้อง
- คู่มือตารางเรียน
- วิทยานิพนธ์
- ผู้สำเร็จการศึกษา
- ตอบคำถาม
- แนะนำการลงทะเบียน
- ข้อความโต้ตอบ
- พิมพ์คำร้องทะเบียน

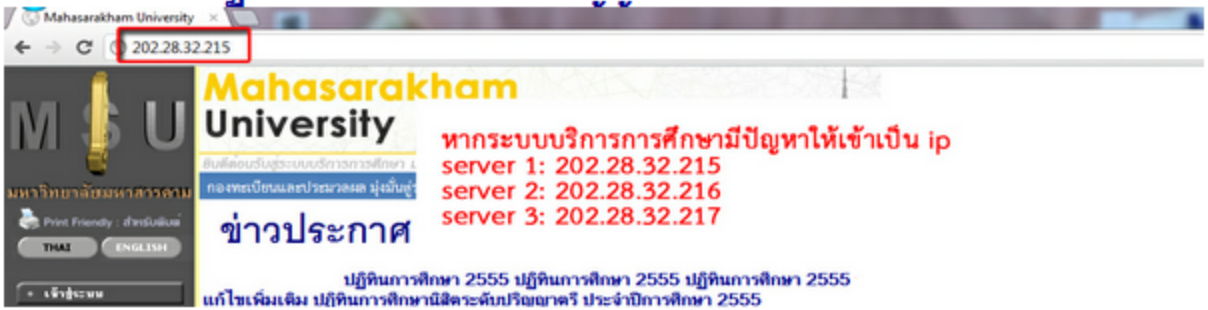
ข่าวประกาศ

ให้กรณีที่ login แล้วระบบฟ้องว่า login เกิน 15 นาที สามารถเลือก web site ดังนี้

Web 1
Web 2
Web 3

ปฏิทินการศึกษา 2555 ปฏิทินก

แก้ไขเพิ่มเติม ปฏิทินการศึกษานิสิตระดับปริญญาตรี ประจำปีการศึกษา 2555



ขอเชิญชวนนิสิต
ประเมินระบบบริการการศึกษา (reg.msu.ac.th)
มหาวิทยาลัยมหาสารคาม

Cognitive Modeling

- Producing a computational model for how people perform tasks and solve problems, based on psychological principles.
- For example, GOMS (*Card, Moran and Newell, 1983*) is a family of techniques for modeling and representing the knowledge necessary for a person to perform a task.

GOMS = Goals, Operators, Methods, and Selection Rules

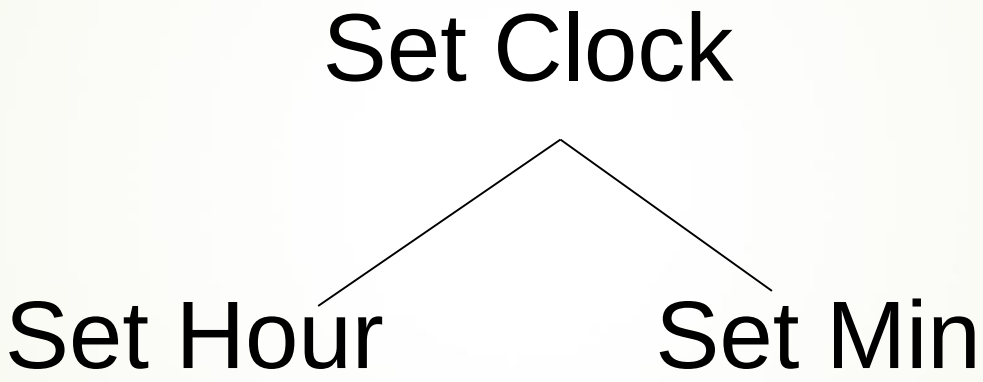
GOMS

Description of knowledge that a user must have in order to carry out tasks on a device or system procedural knowledge

- **Goal**
  - the state that the user wishes to achieve
- **Operator**
  - action that the user executes
- **Method**
  - sequence of steps that accomplishes a goal
- **Selection rule**
  - used to route control to the approriate method to achieve a goal

Example Set the clock

- Goals and subgoals



Example Set the digital clock

- Operators are the most elementary steps in which you choose to analyze the task.
- Reach <type> button
- Hold <type> button
- Release <type> button
- ClickOn <type> button
- Decide: if <x> then <y>
- Verify

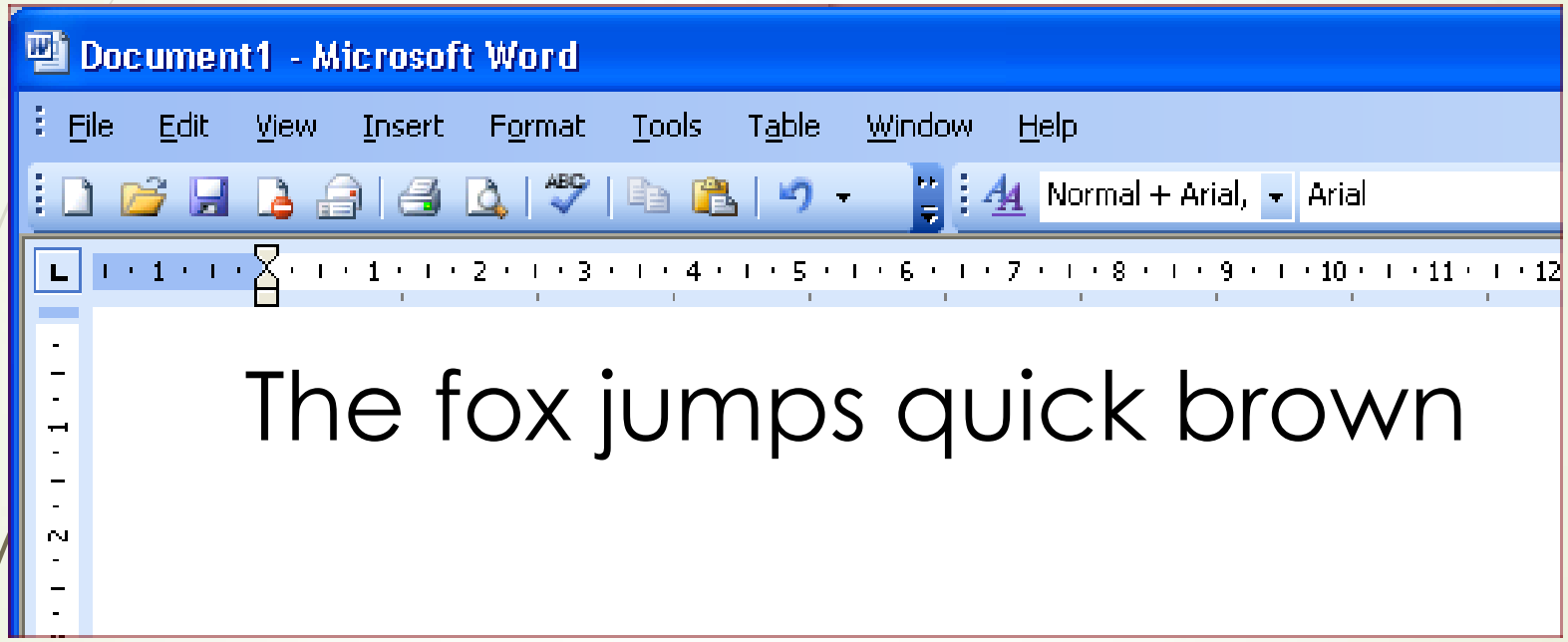
Example Set the clock

- Top-level user goals
  - SET-CLOCK
- Method for goal: SET-CLOCK
  - Step 1. Hold TIME button
  - Step 2. Accomplish goal: SET-HOUR
  - Step 3. Accomplish goal: SET-MIN
  - Step 4. Release TIME button
  - Step 5. Return with goal accomplished
- Method for goal: SET-<digit>
  - Step 1. ClickOn <digit> button
  - Step 2. Decide: If target <digit> = current <digit>, then return with goal accomplished
  - Step 3. Goto 1

Selection rules in clock example

- No selection rules in this example as this clock has only ONE method for accomplishing each goal

Move words “quick brown” to before “fox”



Example

Top-level goal	Edit manuscript, or, more specifically, move "quick brown" to before "fox"
Subgoal	Highlight text
Operators	Move-mouse Click mouse button Type characters (keyboard shortcuts)
Methods	For the editing goal: 1. Delete-word-and-retype (*retype* method) 2. Cut-and-paste-using-keyboard-shortcuts (*shortcuts* method) 3. Cut-and-paste-using-menus (*menus* method) For the highlighting subgoal: 1. Drag-across text (*dragging* method) 2. Double-click first; shift-click last (*all-clicking* method)
Selection rules	For the editing goal: If the text to be moved is one or two characters long, use *retype* method Else, if remember shortcuts, use *shortcuts* method Else, use *menus* method For the highlighting subgoal: If the text to be moved is not whole words, use *dragging* method Else, use *all-clicking* method

Possible GOMS elements in the fox task.

Apply GOMS

Analyse the task of making a telephone call from a public telephone. Call payment may be in cash, or by credit card, phone card or reverse charges.

What do we get out of GOMS?

- Functionality coverage and consistency
  - Does UI contain needed functions?
  - Are similar tasks performed similarly?
- Operator sequence
  - In what order are individual operations done?
  - Abstraction of operations may vary among models
- Execution time
  - By expert
  - Very good rank ordering
  - Absolute accuracy ~10-20%
- Procedure learning time
  - Accurate for relative comparison only
  - Does not include time for learning domain knowledge
- Error recovery

GOMS Techniques

- **KLM – Keystroke Level Model** Card, Moran, Newell (1983)

- **CMN-GMOS – Card, Moran and Newell GOMS**
- **CPM-GOMS – Cognitive Perceptual Motor GOMS** John (1990+)

KLM - Keystroke Level Model

- A finer grained "daughter" to GOMS developed by Card, Moran, & Newell (1983)
  - Looks at specific user actions, without consideration of overall goals (no hierarchical decomposition of tasks)
- Provides actual task performance times
  - Qualitative description to quantitative measure
- Based on Card, Moran, & Newell's empirically-derived times for basic human operations (e.g., keystrokes, homing)

KLM - Keystroke Level Model

Operator	Description	Time (sec)
K	Pressing a single key or button Average skilled typist (55 wpm) Average non-skilled typist (40 wpm) Pressing shift or control key Typist unfamiliar with the keyboard	 0.20 0.28 0.08 1.20
P P1 or K	Pointing with a mouse or other device on a display to select an object. This value is derived from Fitts' Law which is discussed below. Clicking the mouse or similar device	1.10 0.20
H	Bring 'home' hands on the keyboard or other device	0.40
M	Mentally prepare/respond	1.35
R(t)	The response time is counted only if it causes the user to wait.	t

Research papers: Extended KLM for mobile phone interaction: a user study result
http://doi.acm.org/10.1145/1753846.1754011

Example: Deleting a Word

Using Shift-Click

M
P [start of word]
K [click]
M
P [end of word]
K [shift]
K [click]
H [to keyboard]
M
K [Del]

Total: 3M + 2P + 3K + K[shift] + H
= 3*1.35 + 2*1.1 + 3*.20 + .08 + .40
= 7.33 sec

Using Delete

M
P [start of word]
K [click]
H
M
K [Del] x n [length of word]

Total: 2M + P + H + (n+1) K
= 2.7+1.1+.40+.2(n+1)
= 4.4 + 0.2n sec

KLM – Example: Replace all instances of a 4-letter word. (example from Hochstein)

Description	Operation	Time (sec)
Reach for mouse	H[mouse]	0.40
Move pointer to "Replace" button	P[menu item]	1.10
Click on "Replace" command	K[mouse]	0.20
Home on keyboard	H[keyboard]	0.40
Specify word to be replaced	M4K[word]	2.15
Reach for mouse	H[mouse]	0.40
Point to correct field	P[field]	1.10
Click on field	K[mouse]	0.20
Home on keyboard	H[keyboard]	0.40
Type new word	M4K[word]	2.15
Reach for mouse	H[mouse]	0.40
Move pointer on Replace-all	P[replace-all]	1.10
Click on field	K[mouse]	0.20
Total		**10.2**

According to this KLM model, it takes 10.2 seconds to accomplish this task.

Description	Operator	Duration (sec)
Mentally prepare by Heuristic Rule 0	M	1.35
Move cursor to "quick"	P	1.10
(no M by Heuristic Rule 1)		
Double-click mouse button	K	0.40
Move cursor to "brown"	P	1.10
(no M by Heuristic Rule 1)		
Shift-click mouse button	K	0.40
Mentally prepare by Heuristic Rule 0	M	1.35
Move cursor to Edit menu	P	1.10
(no M by Heuristic Rule 1)		
Click mouse button	K	0.20
Move cursor to Cut menu item	P	1.10
(no M by Heuristic Rule 1)		
Click mouse button	K	0.20
Mentally prepare by Heuristic Rule 0	M	1.35
Move cursor to before "fox"	P	1.10
(no M by Heuristic Rule 1)		
Click mouse button	K	0.20
Mentally prepare by Heuristic Rule 0	M	1.35
Move cursor to Edit menu	P	1.10
(no M by Heuristic Rule 1)		
Click mouse button	K	0.20
Move cursor to Paste menu item	P	1.10
(no M by Heuristic Rule 1)		
Click mouse button	K	0.20
TOTAL PREDICTED TIME		14.90

mark text to be moved

Two commands needed to complete a move. Should we consider a MOVE command instead?

cut text

indicate insertion point

paste text

FIGURE A Keystroke-Level Model for moving the text in Figure 4.2 using the CUT-AND-

Try

Use Google Toolbar to obtain list of web pages with keyword “University of Science and Technology of Hanoi”

Result

- Task: Use Google Toolbar to obtain list of web pages with keyword “Mahasarakham University”:
  1. Point at Google Toolbar: T_P = 1.10 sec
  2. Click in Google Toolbar: T_{P1} = 0.20 sec
  3. Home to keyboard: T_H = 0.40 sec
  4. Mentally prepare for typing: T_M = 1.35 sec
  5. Type in “University of Science and Technology of Hanoi”:

     T_k+T_{shift} = (45 * 0.20) + (4*0.08) sec
  1. Type return key: T_k = 0.20 sec
  2. Wait for system response: T_w = 0.5 sec (estimated)
  3. **Total**: **8.51 sec**

Try

Generate a KLM model for deleting a file from your desktop

Compare the predicted time with the actual time

Applications of GOMS analysis

- Compare UI designs
- Profiling
- Sensitivity and parametric analysis
- Building a help system
  - GOMS modelling makes user tasks and goals explicit
  - Can suggest questions users will ask and the answers

Advantages of using GOMS

- Gives several qualitative and quantitative measures
- Model explains **why** the results are what they are
- Less work than user study
- Easy to modify when interface is revised
- Research ongoing for tools to aid modeling process

Disadvantages of GOMS

- Not as easy as heuristic analysis, guidelines, or cognitive walkthrough
- Only works for goal-directed tasks
- Assumes tasks are performed by expert users
- Evaluator must pick users' tasks/goals
- Does not address several important UI issues, such as
  - readability of text
  - memorability of icons, commands
- Does not address social or organizational impact

External Cognition

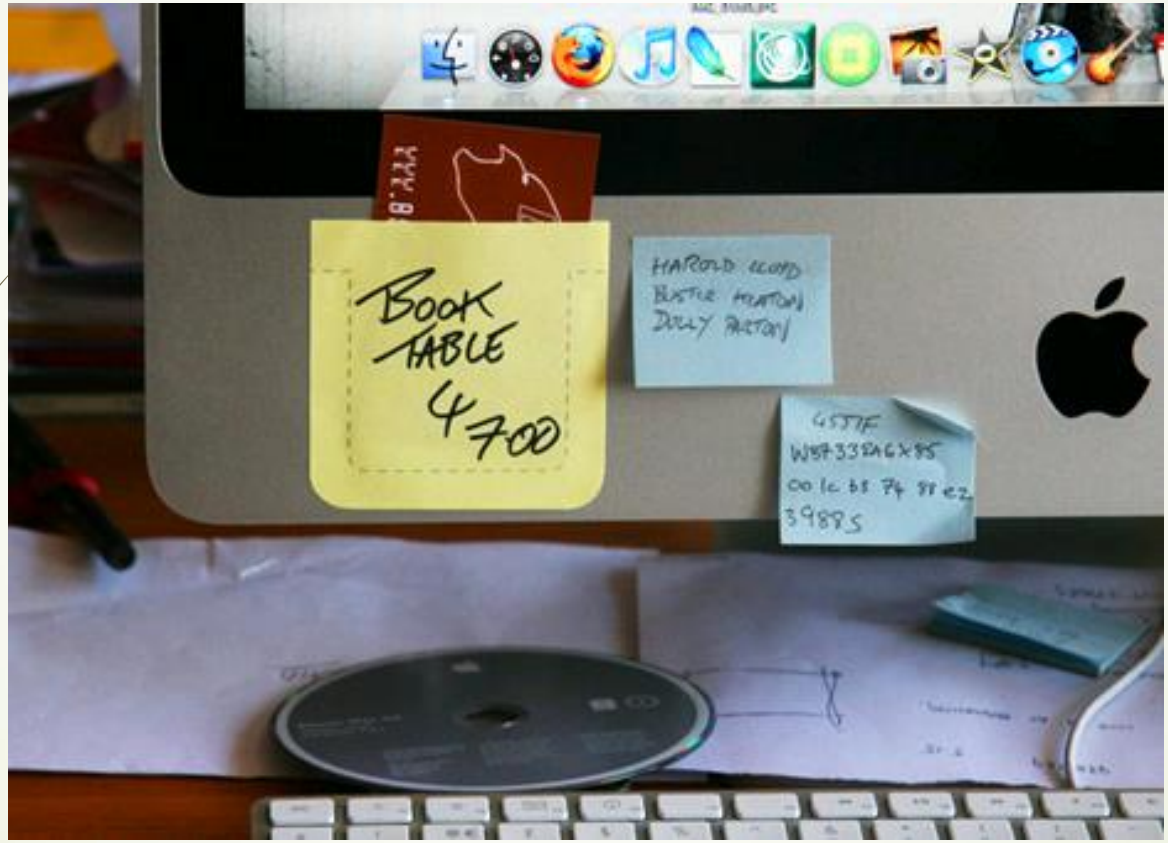
Cognitive process involved when we interact with different external representation (Scaife and Rogers, 1996)

- the cognitive processing involved when interacting with external representations
- the properties of the internal and the external structures
- the cognitive benefits of different ERs.

Goal is to explain the cognitive benefits of using different representations for different cognitive activities and the processes involved

- Externalizing to reduce memory load
- Computational offloading
- Annotating and cognitive tracing

Externalizing to reduce memory load

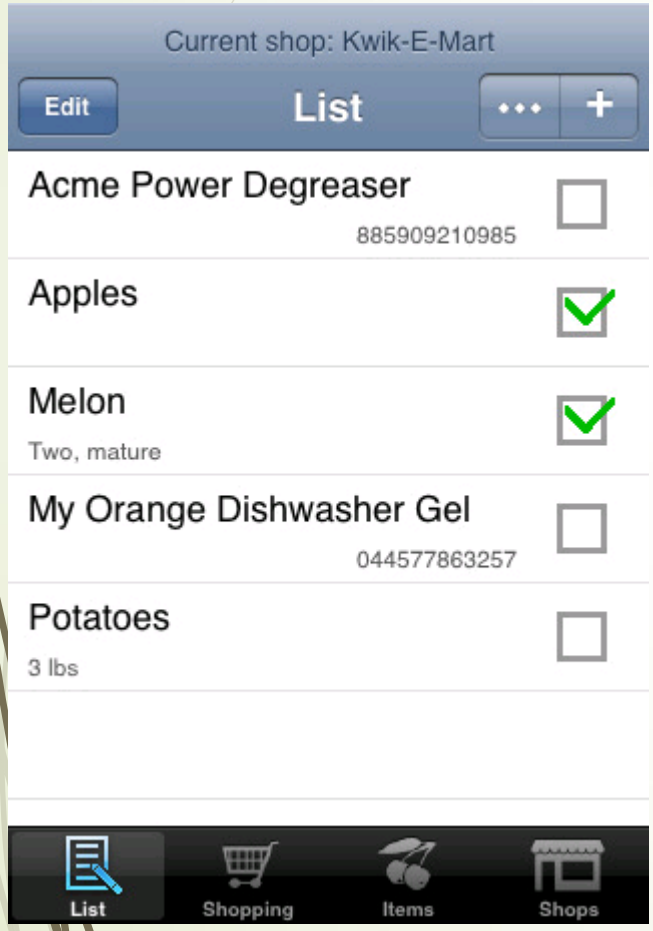


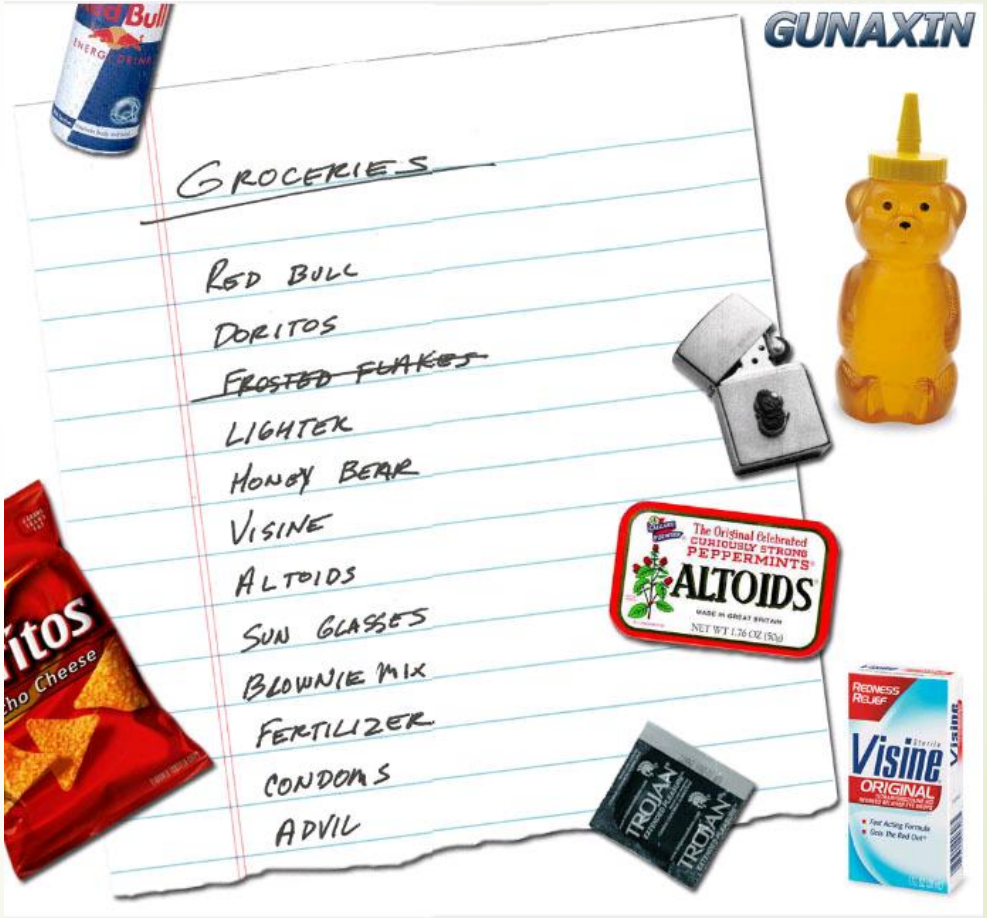
Computational offloading

- 25689 * 256 =?

Try to calculate in your head without paper or calculator.

Annotating and cognitive tracing





Watch Clip

- Augmented (hyper) Reality Domestic Robocop

Mental Models

- Mental representations of how an object/system operates สิ่งที่มนุษย์คาดว่าควรจะเป็น
- Help us predict the outcomes of our actions
- Help us identify and fix problems
- Developed by experience (trial and error), training and feedback
- Interaction with system should help user develop an accurate mental model of how the system works and what to expect

The way the machine **presents itself** to the user.

For example:

"*Enter your name and password and press go*"

or

"*Enter your username and password; then, take your password and compare it to this existing algorithm to encrypt it. Transfer the encrypted version of your password via JDBC drivers to another server; if that server is busy, keep trying servers 1-100; when you find one that is free, log into the Oracle database and perform a query to determine which user is accessing the system. Compare the encrypted password with the query results . . .*"

Mental Models: The Designers Challenge

- User Interfaces that conform to the implementation model are bad.
- As a designer, you have no control over the implementation model, and very little control over the mental model.

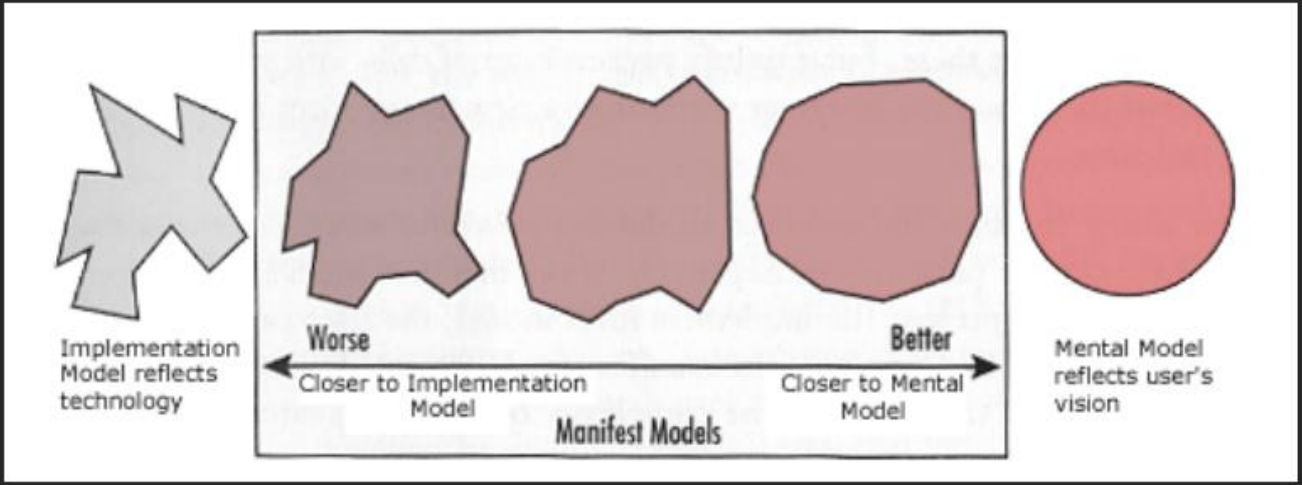
However, you have almost complete control over the Manifest Model!

- **Your Challenge: Determine the user's Mental Model** *(but remember – The User Is Not Like Me)*

Research paper: **Millennial Students' Mental Models of Search: Implications for Academic Librarians and Database Developers** http://dx.doi.org/10.1016/j.acalib.2010.10.003

Mental Models: The Designers Challenge

The way somebody thinks a process or machine works.



(illustration taken from About Face by Alan Cooper)

Mental Models: The Designers Challenge

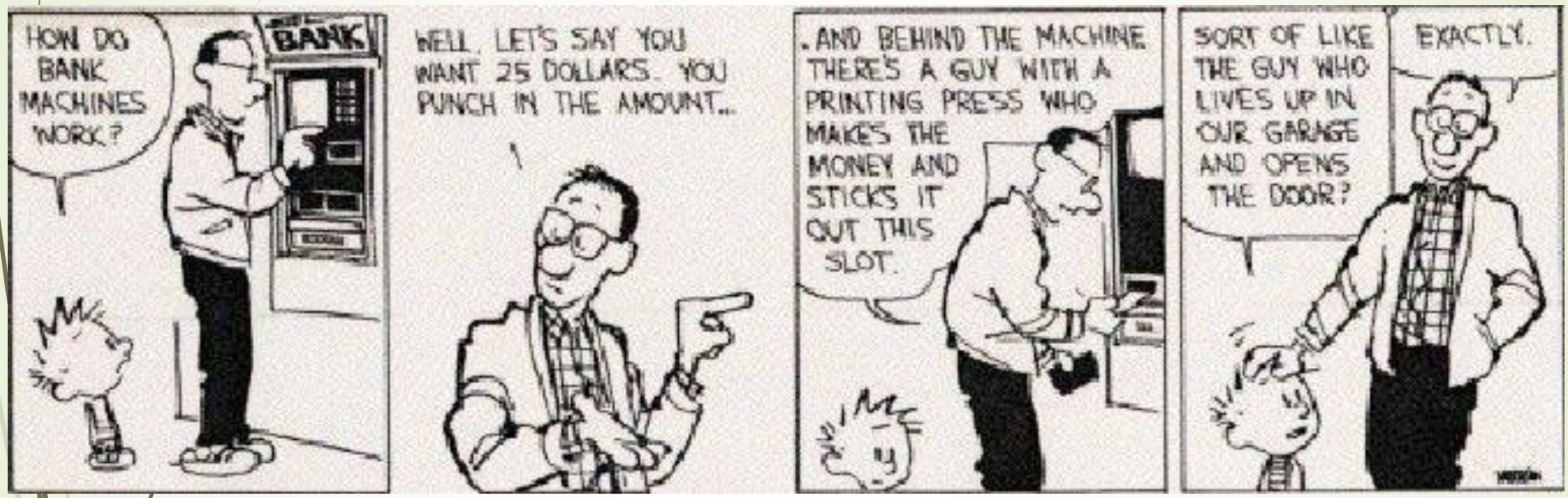
Manifest Model:

The way the product presents itself to the user.

"Put your key here and turn"

"Go get various shaped really small wedges, and, one by one, stick them into the key hole; make sure to line up the wedges with the pins, so each pin contracts just enough; once you have all the pins contracted equally, turn all the wedges simultaneously until you can turn the knob; then, slowly remove the wedges one by one, letting the pins drop back into their expanded positions"

ATM Mental model



Snickers bar at B10: What keys would you press in the machine keypad to get it?

Parking Ticket – Where to start?

Train Ticket - Bad vs Good

Vending machines

Distributed Cognition

- Edwin Hutchins, pioneer of Distributed Cognition
- Starting point is the basic information processing of cognitive science: the orderly manipulation, transformation, combination and propagation of symbolic representations to accomplish cognitive tasks (Lecture 1)
- But the target is not an individual person but a whole

(distributed) system

The goal of Distributed Cognition is then to identify and explain the extra tools, resources, and social relations that people draw on to carry out their work.

Distributed Cognition

- The resources deployed in solving the task define the boundary of the distributed system:
  - to make sense of tasks done and computations performed, you will normally have to extend the scope of study beyond a single individual or artifact
  - Cognition is distributed over persons and artifacts,
    - with regard to representing, storing and transferring information in various forms, and with regard to the computations taking place in solving the task

Distributed Cognition

- Situation Awareness (Norman, 1993)
  - Micro-level analysis in Distributed cognition
- Breakdown concept (Rogers, 1993)
  - Problems, incidents, inefficient, misshapes and accidents that arise in the work setting

The ways it is distributed

Cognition is distributed within a computational system. It can be distributed into three ways :

- Between internal and external representations.
- Across the members of a social group.
- Through time, such that the results of earlier events can transform the nature of later events.

Distributed Cognition

Where is this happening?

Who else is in that space, does the person have any colleagues?

What other resources do they help to support them in their work?

Desks, maps, pin-boards, telephones?

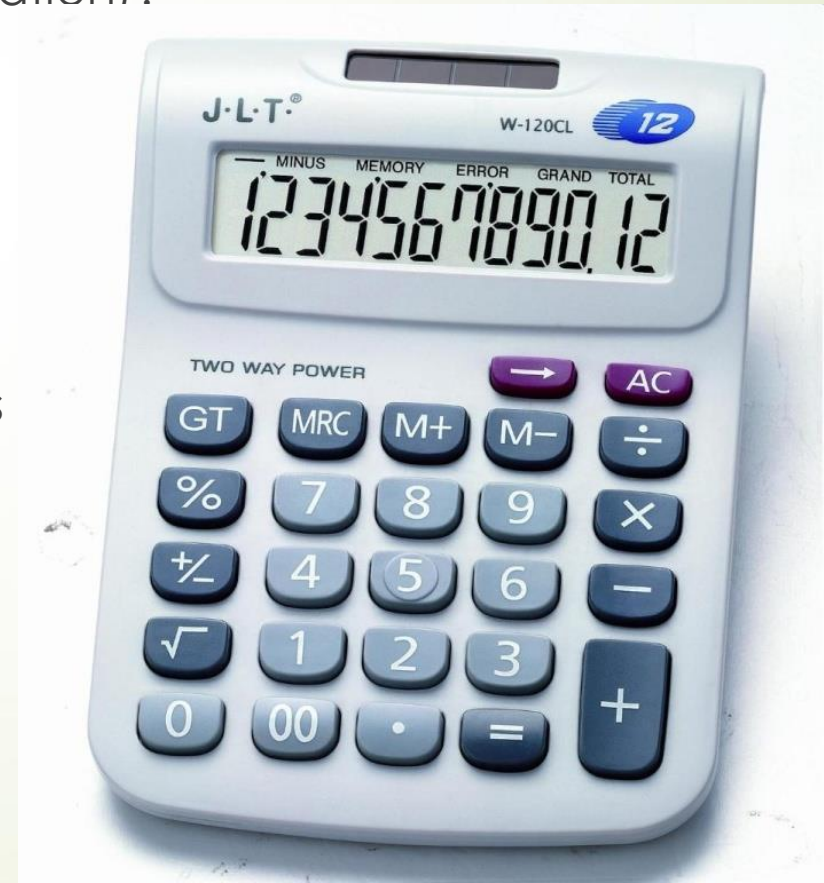
What is the cognitive system of a couple trying to navigate to an unfamiliar location?

What is Representations?

- Why do we need so many different representations (for basically same information)?

Differ with respect to (e.g.)

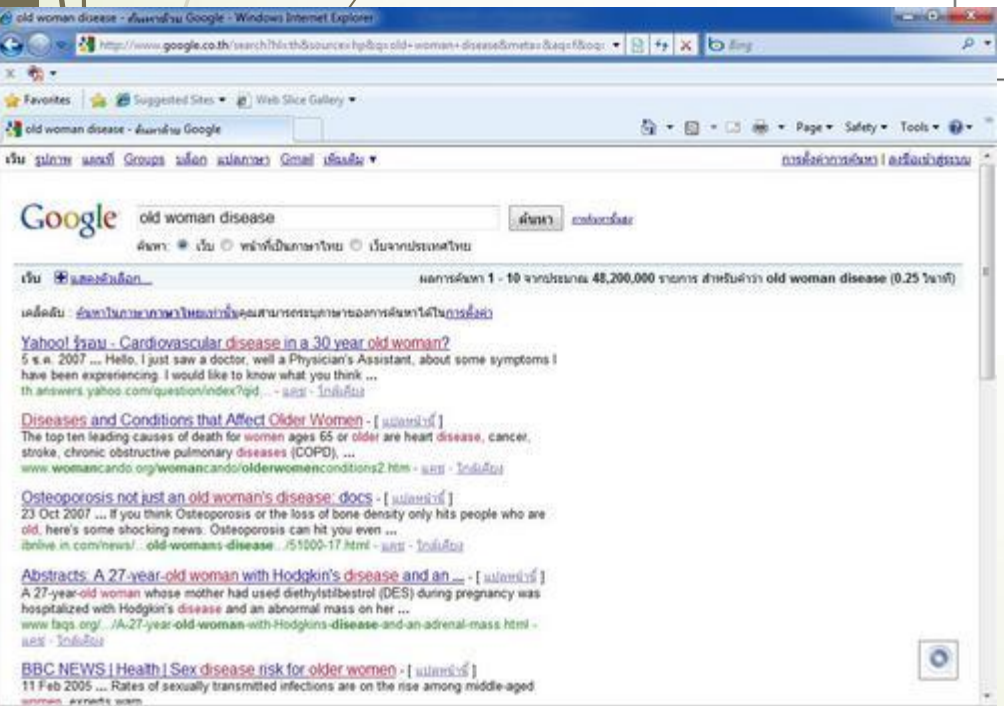
- Permanency
- Modality
- Robustness
- Computational properties



What makes a representation “good”?

- Capture important features
- Remove irrelevant details
- Provide external memory
- Replace computation with perception
- Appropriate to task

Google development



News results for **mobile phones**

Techtree.com

Dell **mobile phone** launching "in days" - 13 hours ago
Not content with being one of the top PC-makers on the planet, Dell looks set to push its way into the world of **mobile phones** - starting this week! ...
Mirror.co.uk - 54 related articles »
Doing More with Your Cell **Phone** - PhysOrg.com - 94 related articles »
Samsung Reclaim: Nice Idea, But Who Recycles **Phones**? - PC World - 354 related articles »

Mobile phone - Wikipedia, the free encyclopedia
A **mobile phone** or **mobile** (also called cellphone and handphone, as well as cell **phone**, wireless **phone**, cellular **phone**, cell, cellular telephone, ...
en.wikipedia.org/wiki/**Mobile_phone** - Cached - Similar

Mobile & Cell **Phone** Reviews, Videos, & News
Aug 10, 2009 ... Information about cell **phones** and smartphones for the US and Europe. Reviews and news of cell **phones** and Bluetooth headsets.
Nokia - Samsung - Sony Ericsson - HTC
www.**mobile**burn.com/ - Similar

Cell **Phones**,Cellular **Phone** Plans,Prepaid Cell **Phones**,Free Cell ...
T-**Mobile**: Cell **phones** you love, plans you want. Offering the best deals on cellular **phone** service, prepaid cell **phones**, cell **phone** accessories, free cell ...
www.t-**mobile**.com/ - Cached - Similar

Nokia - Nokia on the Web
Nokia is the world's leading **mobile phone** supplier and a leading supplier of **mobile** and fixed telecom networks including related customer services. Show stock quote for NOK
www.nokia.com/ - Cached - Similar

Mobile Phones » Coolest Gadgets
Mobile phones are probably the most popular consumer gadget available today. As a new more advanced and smaller **phones** seem to be released on a dailywe ...
www.coolest-gadgets.com/category/**mobile-phones**/ - Cached - Similar

New Cell **Phones**, CPO Cell **Phones**, Prepaid Cell **Phones**, Cell **Phone** ... - Aug 9
Offers cell **phones**, PDAs, wireless **mobile phone** plans, data plans in the United States and parts of Mexico and Canada.
www.verizonwireless.com/ - Cached - Similar

Cell **Phones** and cell **phone** plans - | Wireless from AT&T, formerly ...
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Official Boost **Mobile** site. Get Prepaid plans and prepaid **phones** or Reboost your minutes on your existing plan. Download ringtones, wallpapers and games; ...
www.boost**mobile**.com/ - Cached - Similar

Mobile Phones | SAMSUNG
Samsung Smart **Phones** are pure genious with your choice of Windows **mobile** OS or Android, QWERTY keyboards with Turbo Scroll, intuitive touchscreens, ...
www.samsung.com/.../type.do?...**mobilephones**...**mobilephones** - Cached - Similar

Shopping results for **mobile phones**

Nokia N78 Cell **phone** with two digital cameras / digital player / FM...	$240 new, $219 used - 74 stores
Sony Ericsson W810i Walkman Cell **phone** with digital camera / digital ...	$160 new, $140 used - 21 stores
Nokia N95 8GB Cell **phone** with two digital cameras / digital player ...	$323 new, $411 used - 117 stores

Book results for **mobile phones**
Mobile phones: pricing structure and trends - by Sam Paltridge, Organisation for Economic Co ... - 102 pages
The **mobile** connection: the cell **phone**'s impact ... - by Richard Seyler Ling - 244 pages
Mobile communications: re-negotiation of the ... - by Richard Seyler Ling, Per Egil Pedersen - 454 pages

Searches related to: **mobile phones**

boost mobile phones	mobile phones **reviews**	**nokia** mobile phones	**history of** mobile phones
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en.wikipedia.org/wiki/**Mobile_phone** - Cached - Similar

Cell **Phones**, **Mobile Phones**, and Wireless Calling Plans from Sprint
From cell **phones** to family plans, Sprint has the **mobile phones**, calling plans, and accessories you need to enjoy life at SprintSpeed. Show stock quote for S
www.sprint.com/ - Cached - Similar

Mobile & Cell **Phone** Reviews, Videos, & News
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Mobile Phones Guide
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www.more**mobile**.co.uk/ - Cached - Similar

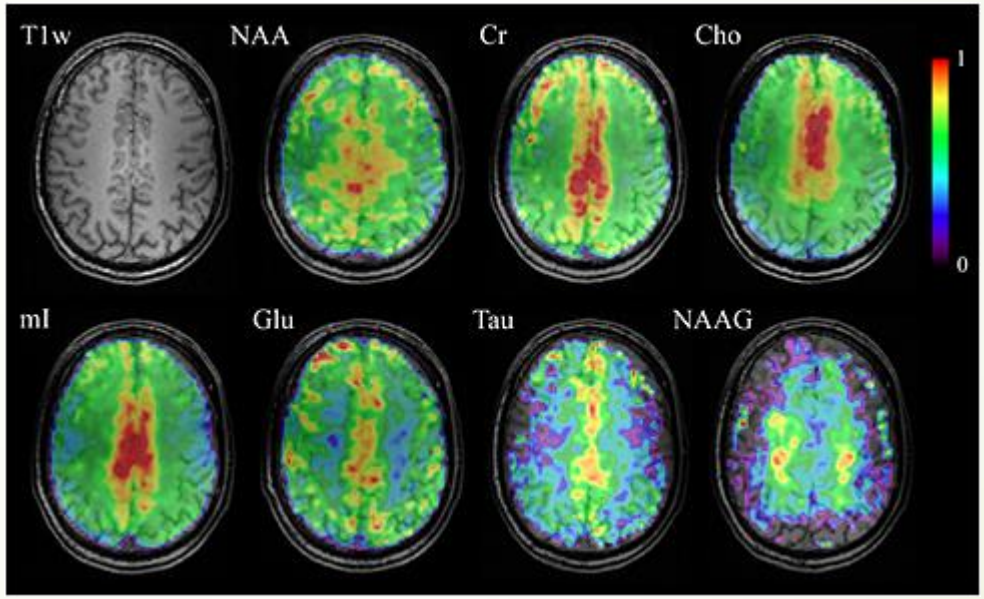
Cell **phone** reviews: Cellphones, **mobile phones** & wireless **phone** ...
Cell **phone** and wireless **phone** reviews and ratings, video reviews, user opinions, most popular **phones**, cell **phone** buying guides, prices, and comparisons from ...
reviews.cnet.com/cell-**phones**/ - Cached - Similar

Searches related to: **mobile phones**

boost mobile phones	mobile phones **reviews**	**nokia** mobile phones	**history of** mobile phones
compare mobile phones	**sony ericsson**	**samsung**	**motorola**

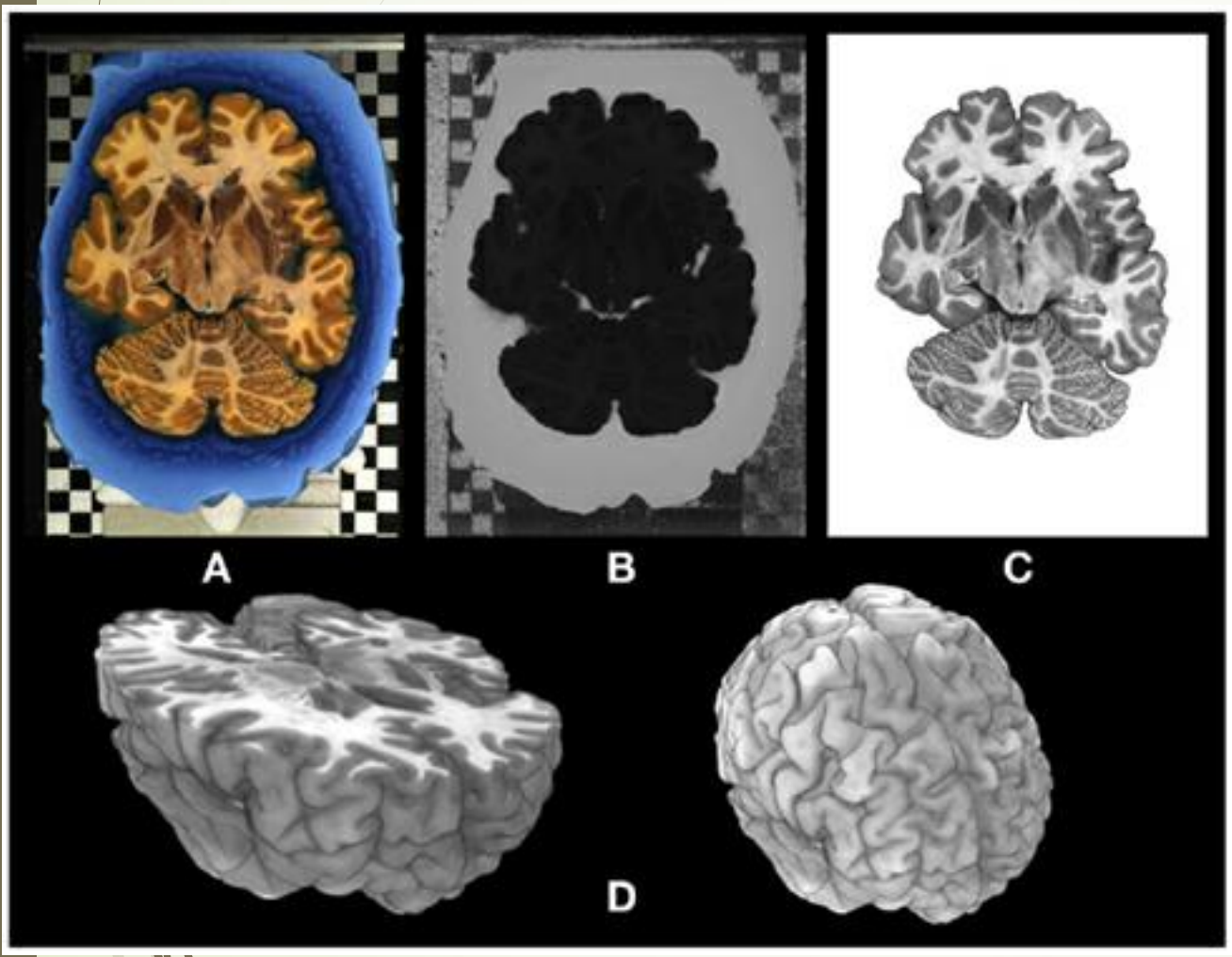
Represent the same data in many different ways

Represent the same brain in many different ways



Resource: High-resolution mapping of human brain metabolites by free induction decay 1H MRSI at 7 T http://onlinelibrary.wiley.com/doi/10.1002/nbm.1805/abstract

Data representation in Medical field



Resource: Resolving nuclear magnetic resonance data of complex mixtures by three-way methods:: Examples of chemical solutions and the human brain
http://www.sciencedirect.com/science/article/pii/S0169743998001725

Segmentation and 3D reconstruction of the blockface image data set.

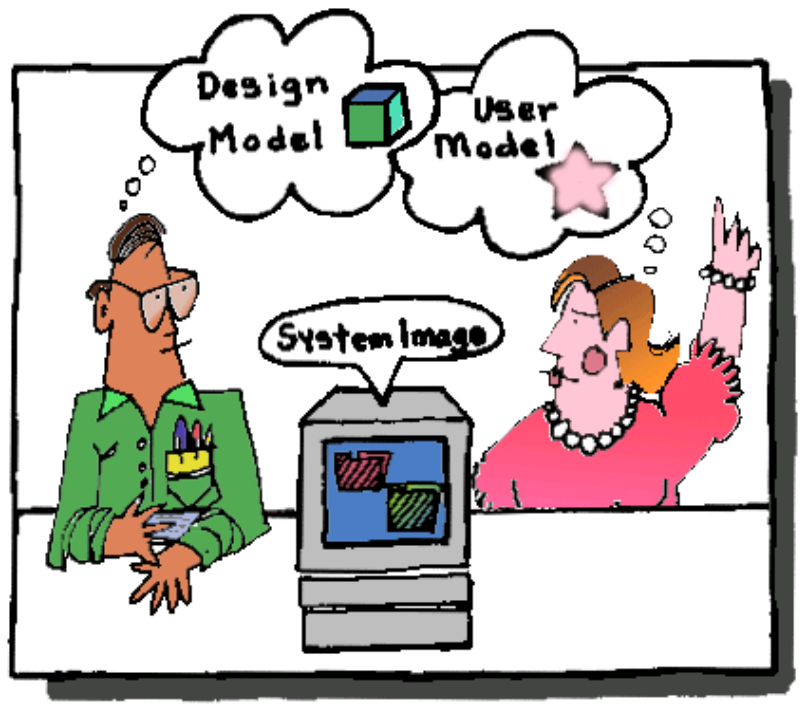
(A) Blockface image of a horizontally cut postmortem human brain represented in RGB (red-green-blue) color space.

(B) Transformation of the RGB image into the HSV-color space enables an accurate segmentation of the image into tissue and background.

(C) Segmented brain section.

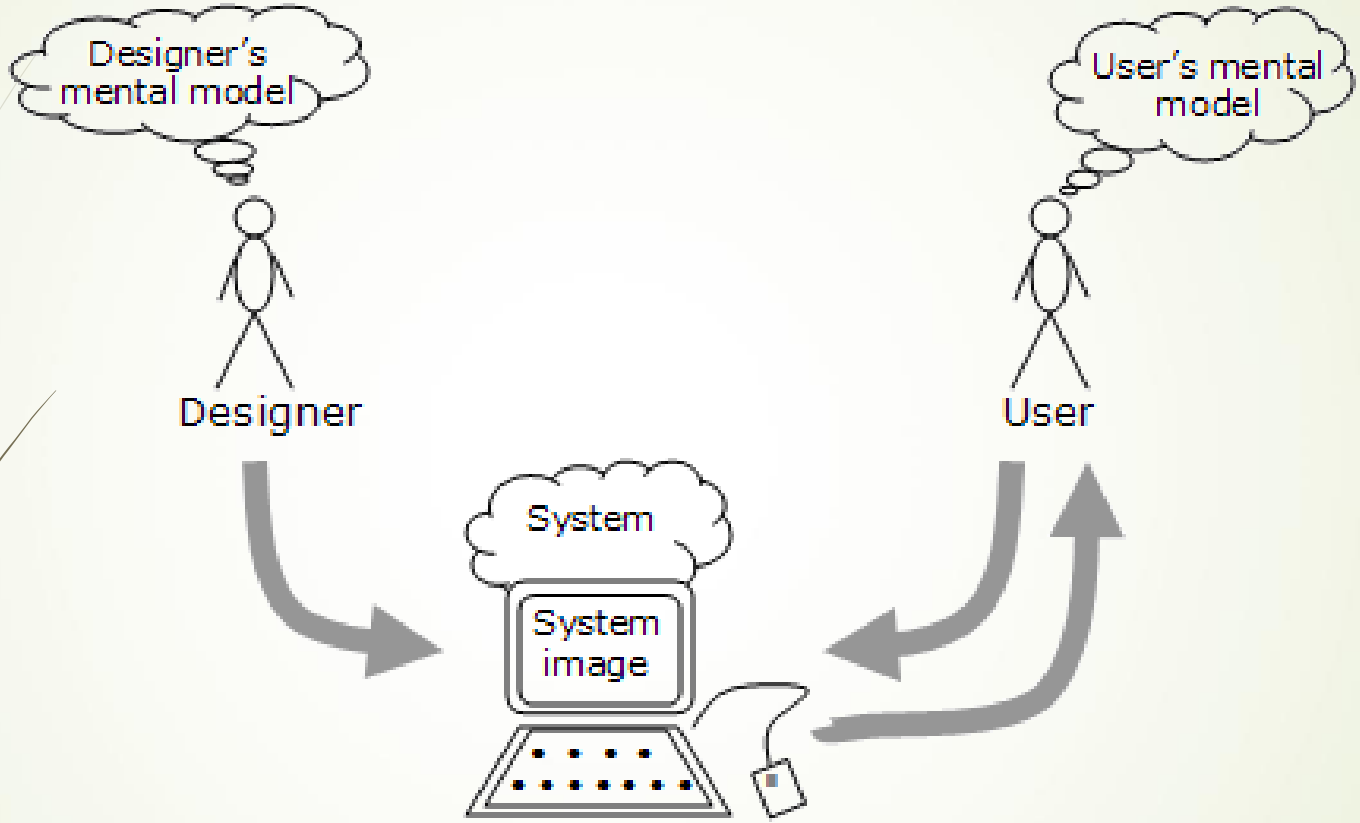
(D) 3D representations of the reconstructed blockface brain.

Conceptual model (Norman, 1986)



"Description of the proposed system in term of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended"

Conceptual model



Users can fail in two different ways in their attempts to accurately recreate the Design Model:
The user ends up with a fragmented model.
The user ends up with a complete model, but it is wrong.

Conceptual Model

Conceptual model

- *Conceptual models based on activities*
  - *Instructing*
  - *Conversing*
  - *Manipulating and navigating*
  - *Exploring and browsing*
- *Conceptual models based on objects*
- *Conceptual models based on mix and match*

Metaphors

Metaphor is the process of using objects and events in a software system that are taken from a noncomputer domain.

Metaphors can help the designer communicate the mental model based on the user's prior understanding

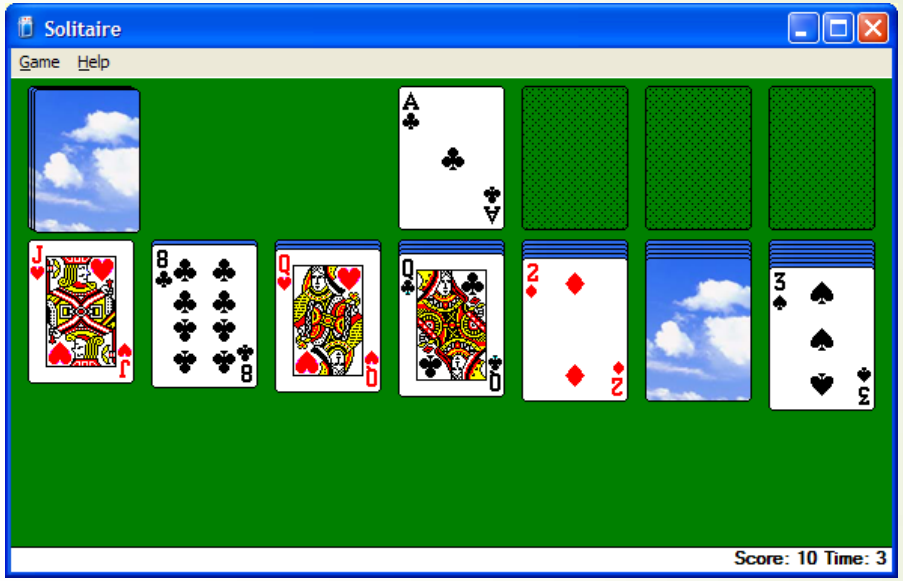
Metaphors

- *Definition*
  - represents a system object as if it were another type of object
    - disc / network file structure *represented as* file folders
- *Purpose*
  - leverages our knowledge of familiar, concrete objects to understand abstract computer and task concepts
- *Problem*
  - metaphor portrays inaccurate/naive conceptual model of the system
- For instance, "desktop" metaphors, publishing metaphors with "cut and paste", "chat rooms"

Metaphors

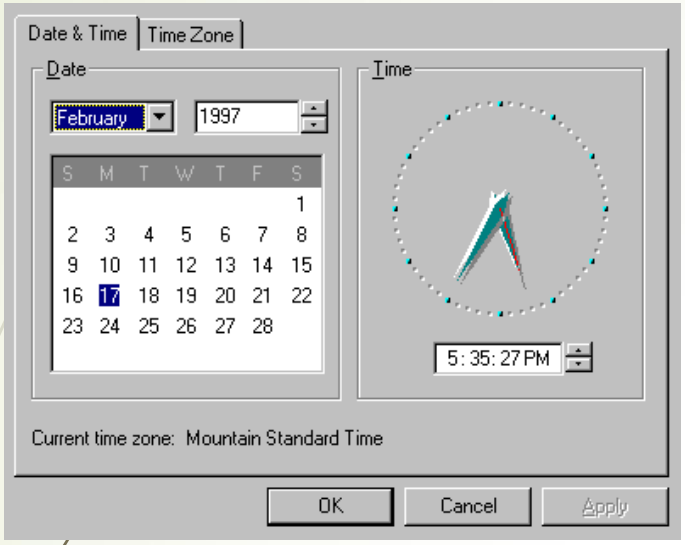
	A	B	C	D
1	Market value	Land	Improvement	Total assess
2	140.0	65,850.	73,120.	138,970.
3	147.0	77,780.	72,070.	149,850.
4	151.0	74,850.	88,740.	163,590.
5	152.0	80,110.	99,410.	179,520.
6	155.0	79,050.	109,130.	188,180.
7	170.0	94,750.	50,960.	145,710.
8	172.0	82,150.	106,250.	188,400.
9	178.0	78,560.	132,660.	211,220.
10	180.0	92,840.	105,670.	198,510.
11	180.0	80,090.	103,130.	183,220.
12	182.0	76,650.	115,210.	191,860.
13	185.0	75,590.	152,710.	228,300.
14	185.0	85,870.	105,330.	191,200.
15	185.0	80,060.	113,600.	193,660.
16	193.4	80,140.	131,340.	211,480.
17	194.5	73,400.	176,210.	249,610.
18	197.0	84,960.	129,800.	214,760.
19	203.0	91,600.	119,170.	210,770.
20	205.0	79,460.	137,250.	216,710.
21	213.0	87,060.	124,350.	211,410.
22	221.0	97,330.	167,500.	264,830.
23	225.0	87,160.	157,290.	244,450.
24	245.0	79,520.	144,840.	224,360.
25	248.0	89,470.	183,500.	272,970.
26	278.0	82,150.	168,720.	250,870.
27	302.5	118,500.	109,800.	228,300.
28	308.0	83,100.	141,730.	224,830.

Spreadsheet



games (literal world)

Metaphors



Control Panels with familiar controls

Name:_____

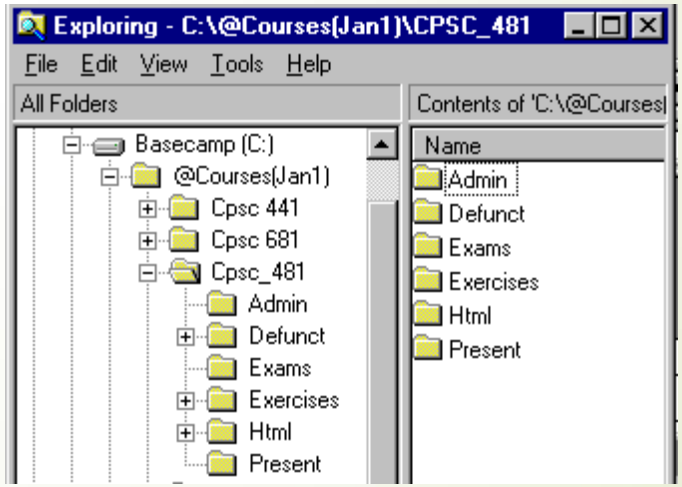
Address:_____

City:_____

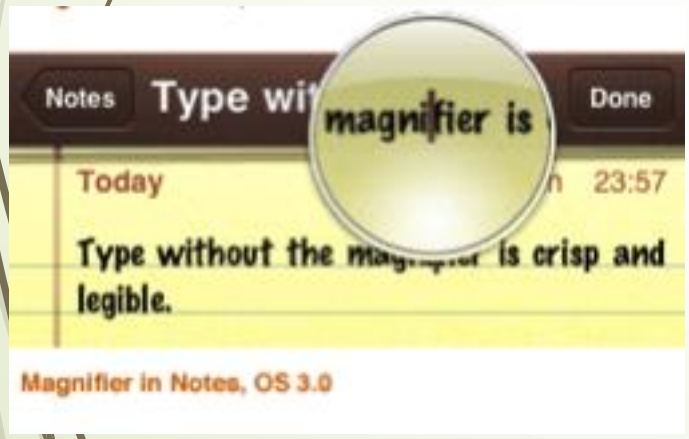
Province:_____

Postal Code:_____

Forms

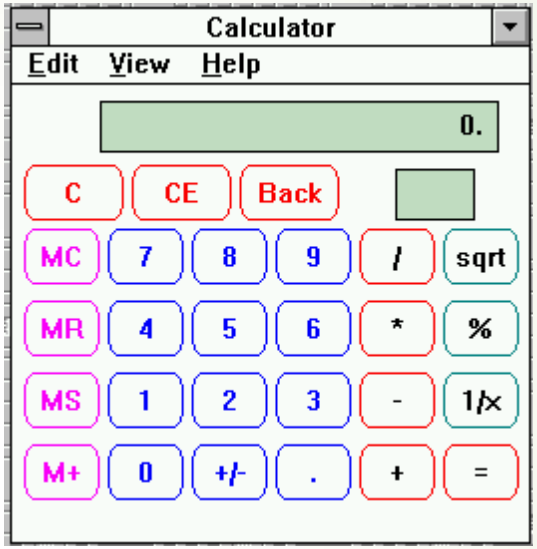


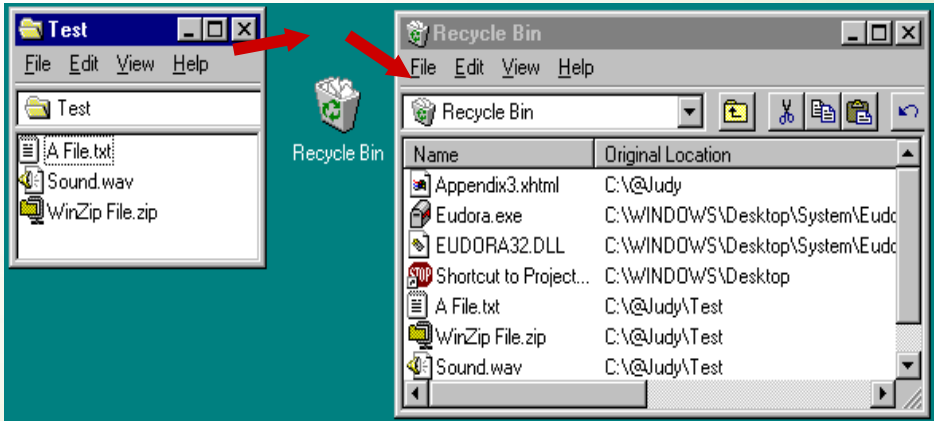
Hierarchical Folders



Metaphors in interfaces

- Common pitfalls
  - overly literal
    - unnecessary fidelity
    - excessive interactions
    - unnecessary restrictions
  - overly cute
    - novelty quickly wears off
  - mismatched
    - does not match user's task and/or thinking





Metaphors

- Example ?
- What are the physical equivalent actions for
  - Clicking
  - Pointing
  - Selecting
  - Dragging
- Further Example:
  - http://turbomilk.com/blog/cookbook/reviews/10_outstanding_icon_metaphors/
  - http://www.smashingmagazine.com/2010/05/20/web-design-trends-2010-real-life-metaphors-and-css3-adaptation/

Examples

Table 7.1 Examples of applications and associated metaphors.

Application area	*Metaphor*	*Familiar knowledge*
Operating environment	The desktop	Office tasks, file management
Spreadsheets	Ledger sheet	Columnar tables
Object-oriented environments	Physical world	Real-world behaviour
Hypertext	Notecards	Flexible organization of structured text
Learning environments	Travel	Tours, guides, navigation
File storage	Piles	Categorizing objects in terms of urgency, projects and so on
Multimedia environments	Rooms (each associated with a different medium/task)	Spatial structure of buildings
Computer supported cooperative work	Multi-agents	Travel agents, butlers and other serving roles

Summary

- Cognitive modeling
- External Cognition
- Mental Models
- Distributed Cognition
- Conceptual model
- Metaphors

Sources

- The Essential Guide to User Interface Design 3rd edition by Wilbert O Galitz
- http://www.id-book.com/
- Jay Kaenampornpan

Individual work I

- Find a bad design example of Interface or Home page of a new application or website
  - Write down:
    - Who is the target user group of this application or website
    - Discuss the design issues in detail
      - May base your discussion on (but not limit to)
        - Perception
        - Memory
        - Attention
        - (See lecture 1&2)