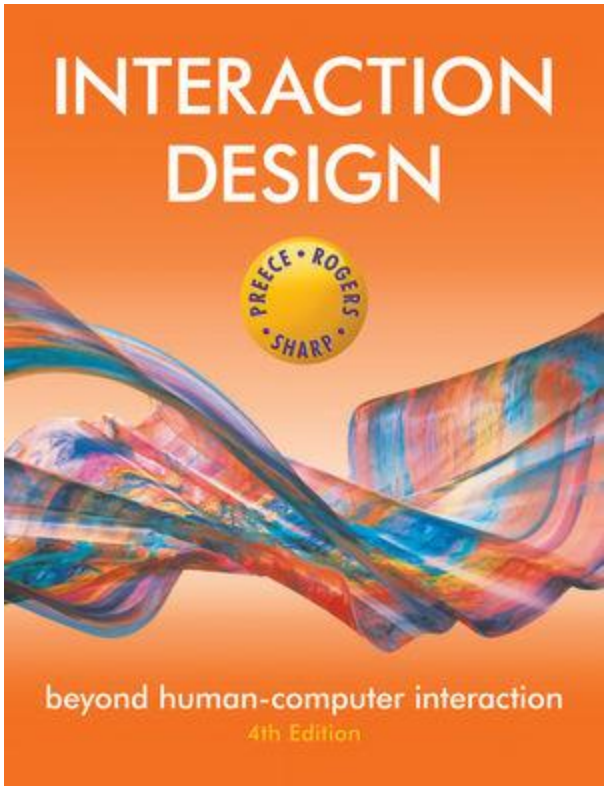


Chapter 3

COGNITIVE ASPECTS

RoadMap

- Chapter (3): Cognitive Aspects
  - 3.1 Introduction
  - 3.2 What is Cognition?
  - 3.3 Cognitive Frameworks

Objectives

The main aims of this chapter are to:

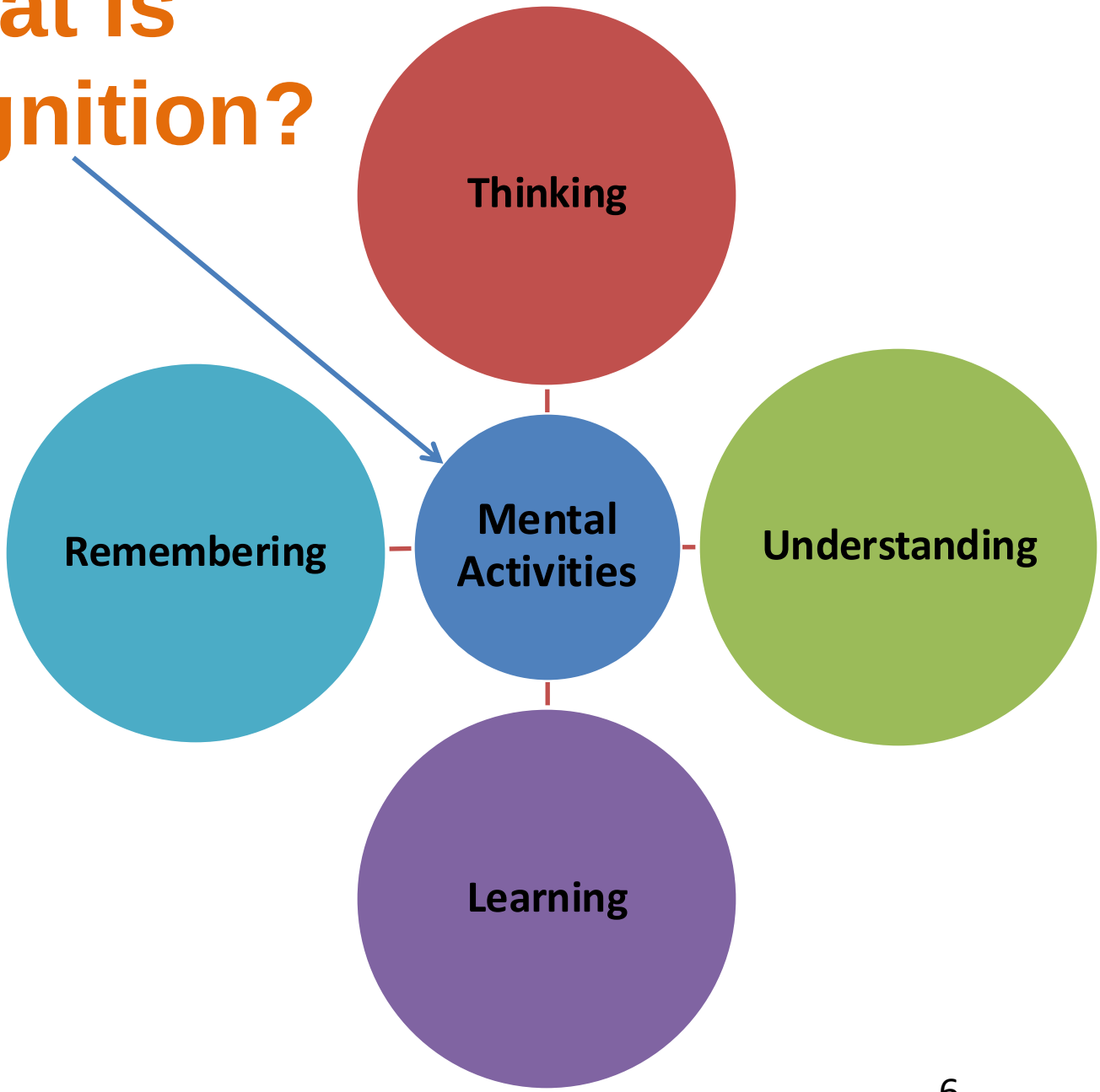
- Explain what cognition is and why it is important for interaction design.
- Discuss what attention is and its effects on our ability to multitask.
- Describe how memory can be enhanced through technology aids.
- Explain what mental models are.
- Enable you to try to elicit a mental model and be able to understand what it means.

Overview

- What is cognition?
- Cognitive Processes
- What are users good and bad at?
- Describe how cognition has been applied to interaction design
- Explain what are Mental Models
- Characteristics of Colors – Cognitive Processes

What is cognition?

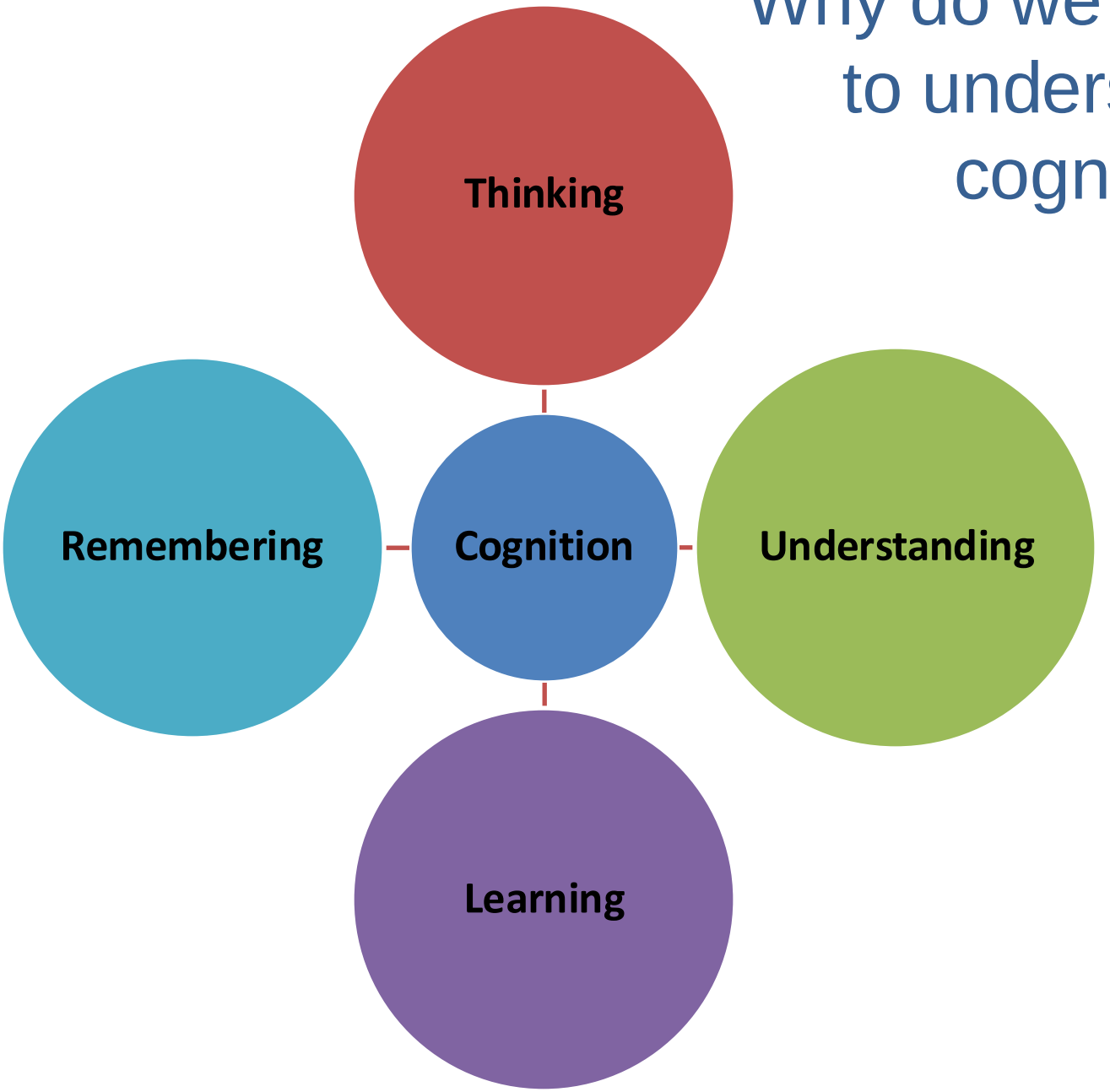
What is cognition?



What is cognition?

- Cognition :conscious mental activities
- the activities of thinking, understanding, learning, and remembering

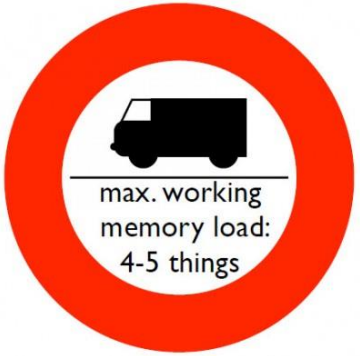
Why do we need to understand cognition?



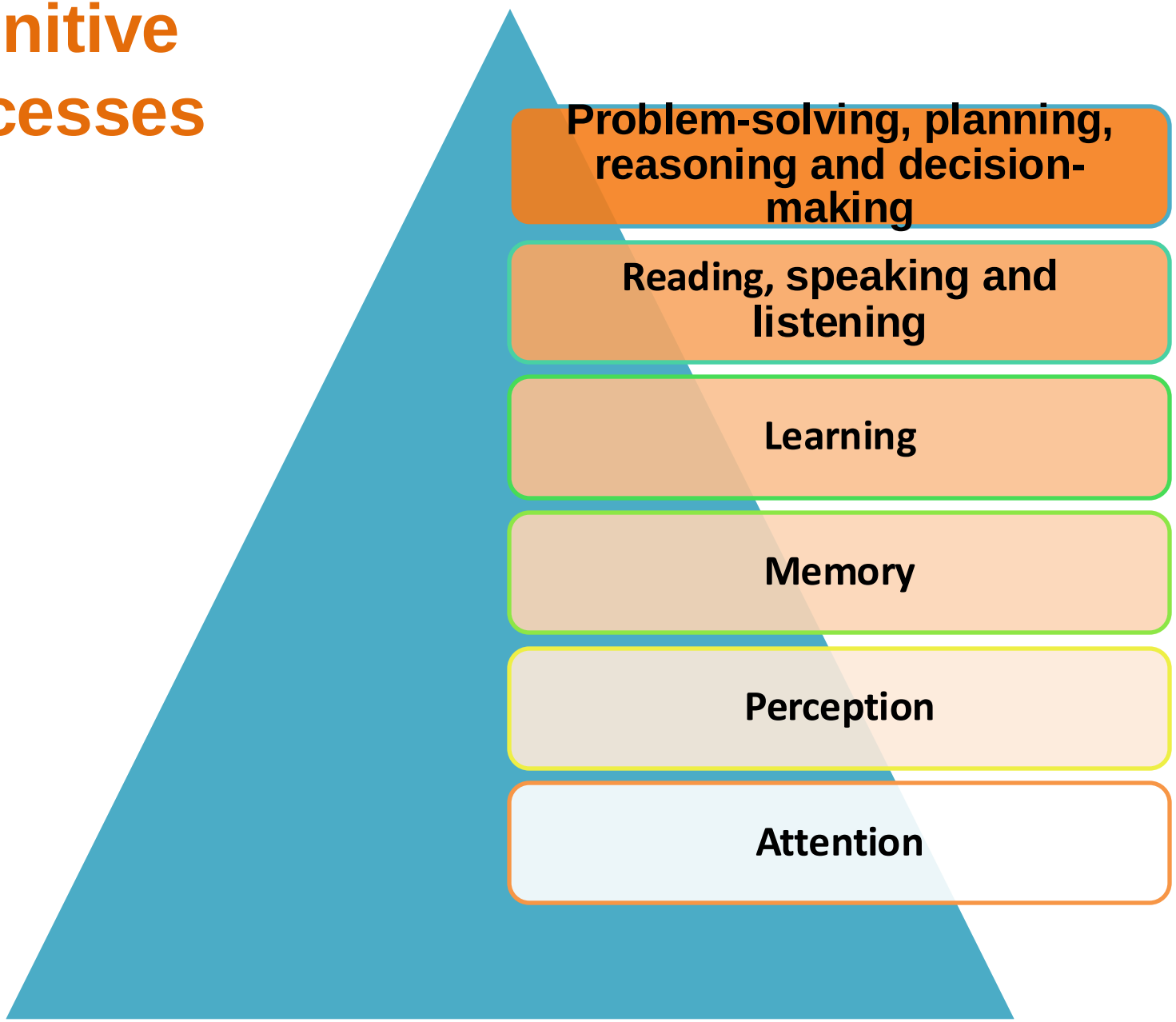
Why do we need to understand cognition?

Why do we need to understand cognition?

- Interacting with technology is cognitive
- Need to take into account cognitive processes involved and cognitive limitations of users
- Provides knowledge about what users can and cannot be expected to do
- Identifies and explains the nature and causes of problems users encounter
- Apply conceptual frameworks and cognitive theories in designing user interfaces and predicting user performance.



Cognitive processes



Cognitive processes

- Cognition has been described in terms of specific kinds of processes. These include:
  - Attention
  - Perception
  - Memory
  - Learning
  - Reading, speaking and listening
  - Problem-solving, planning, reasoning and decision-making

Cognitive Processes

- It is important to note that many of these cognitive processes are interdependent: several may be involved for a given activity. It is rare for one to occur in isolation. For example, when you try to learn material for an exam, you need to attend to the material, perceive and recognize it, read it, think about it, and try to remember it. Below we describe the various kinds in more detail, followed by a summary box highlighting core design implications for each. Most relevant for interaction design are attention and memory which we describe in greatest detail.

Attention ?

Attention

- Allows us to focus on information that is relevant to what we are doing
- Involves audio and/or visual senses

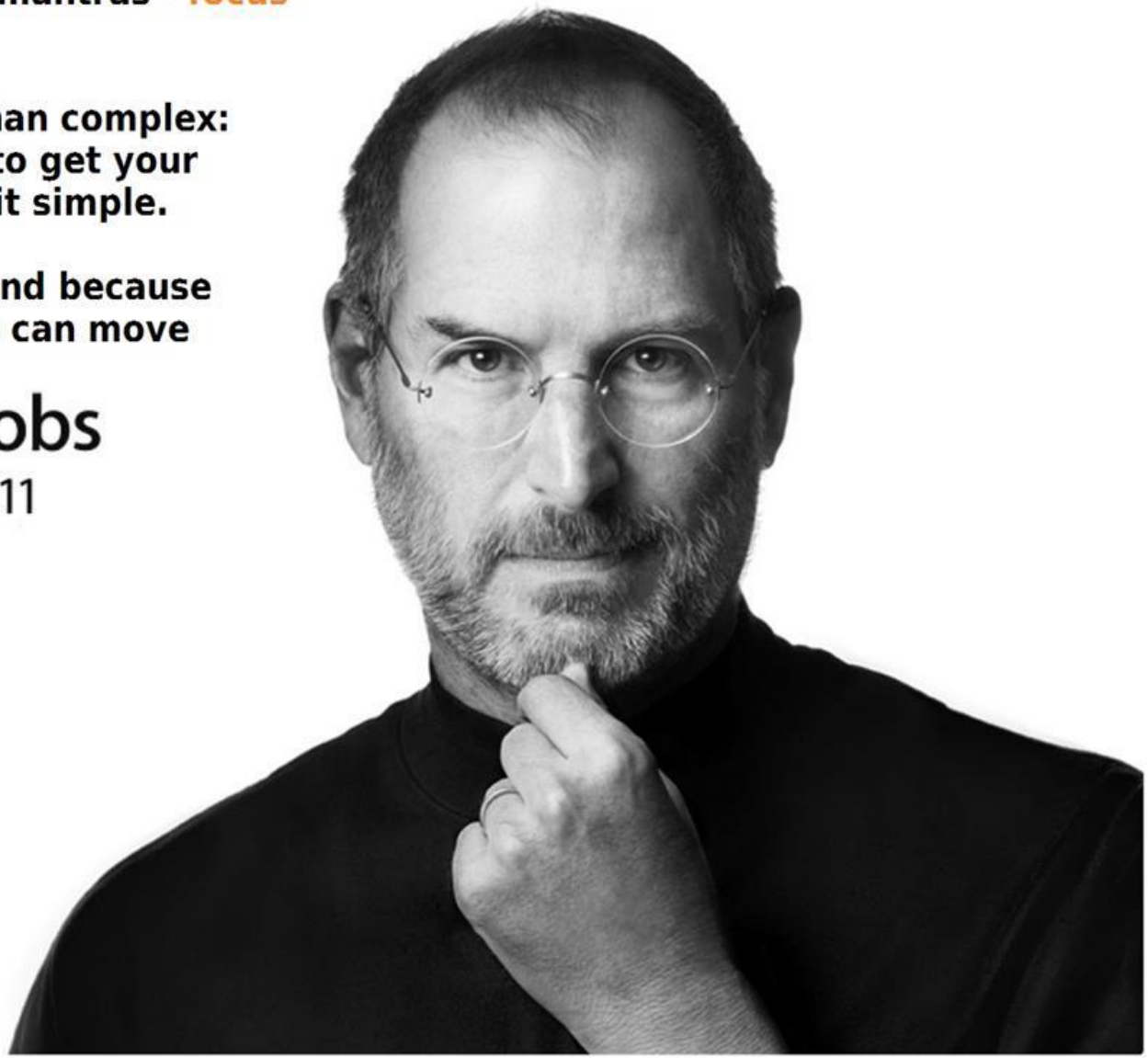
"That's been one of my mantras - focus and simplicity.

Simple can be harder than complex: You have to work hard to get your thinking clean to make it simple.

But it's worth it in the end because once you get there, you can move mountains."

Steve Jobs

1955-2011

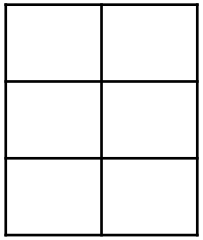


How Can we Capture User Attention ?

Capture User Attention

perceptual boundaries (windows)

Spacing



Attention

- Information Presentation at the interface should be structured to capture users' attention, e.g. use perceptual boundaries (windows), spacing, colour, reverse video, sound and flashing lights

Activity: Find the price for a double room at the Four Points in Dubai

Abu Dhabi

Nassima Royal Hotel D:$158 S:$200

Sofitel Dubai The Palm Resort D:$319 S:$400

Emirates Grand $75

Ramada Jumeirah $104

JA Jebel Ali Beach Hotel D: $238 S:$300

Radisson Blu Hotel, Creek $120

Cosmopolitan Dubai $95

Dubai

Sheraton Dubai Creek $179

Elvoline $258

Hyatt Regency Dubai $121

Movenpick Bur Dubai $108

Four Points by Sheraton D:$169 S:$230

Grand Hyatt Dubai $184

Jumeirah Beach Hotel $598

Dubai Grand $79

Dusit Thani $163

Ramada Plaza Jumeirah Beach $205

Activity: Find the price for a double room at the Movenpick in Dubai

		Price	
City	**Hotel**	**Double**	**Sweet**
Abu Dhabi	Emirates Palace	$640	$550
Abu Dhabi	Khalidiya Palace	$116	$221
Abu Dhabi	Rayhaan by Rotana	$212	$329
Abu Dhabi	Premier Inn Abu	$77	
Abu Dhabi	Hotel ibis Abu Dhabi Gate	$49	
Abu Dhabi	Nassima Royal Hotel	$158	$245
Dubai	Sofitel Dubai The Palm Resort	$319	$456
Dubai	Hyatt Regency Dubai	$121	$209
Dubai	Movenpick Bur Dubai	$108	$179
Dubai	Emirates Grand	$75	
Dubai	Ramada Jumeirah	$104	
Dubai	JA Jebel Ali Beach Hotel	$238	$320
Dubai	Four Points by Sheraton	$169	
Dubai	Grand Hyatt Dubai	$184	

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 (suggestions) for attention

- What are the design implications (suggestions) to be used in an interface to drive attention?

Attention

Design suggestions	Heuristic
1. Make information very noticeable	?
2. Use techniques that make things stand out like color, ordering, spacing, underlining, sequencing and animation	?
3. Avoid cluttering the interface with too much information	?
4. Search engines and form fill-ins that have simple and clean interfaces are easier to use	?

Attention

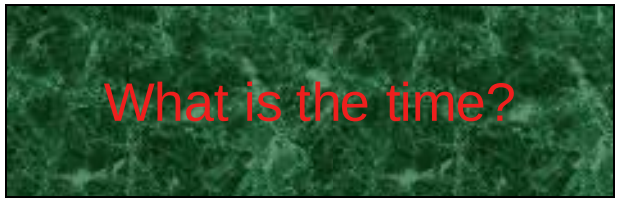
Design suggestions	Heuristic
1. Make information very noticeable	Aesthetic, Clean & Functional Design
2. Use techniques that make things stand out like color, ordering, spacing, underlining, sequencing and animation	
3. Avoid cluttering the interface with too much information	
4. Search engines and form fill-ins that have simple and clean interfaces are easier to use	

Perception ?

Perception

- The ability to understand or notice something easily.
- How information is acquired from the world and transformed into experiences
- Obvious implication is to design representations that are readily perceivable, e.g.
  - Text should be clear
  - Icons should be easy to distinguish and read

Which is easiest to read and why?



What is the time?

What is the time?

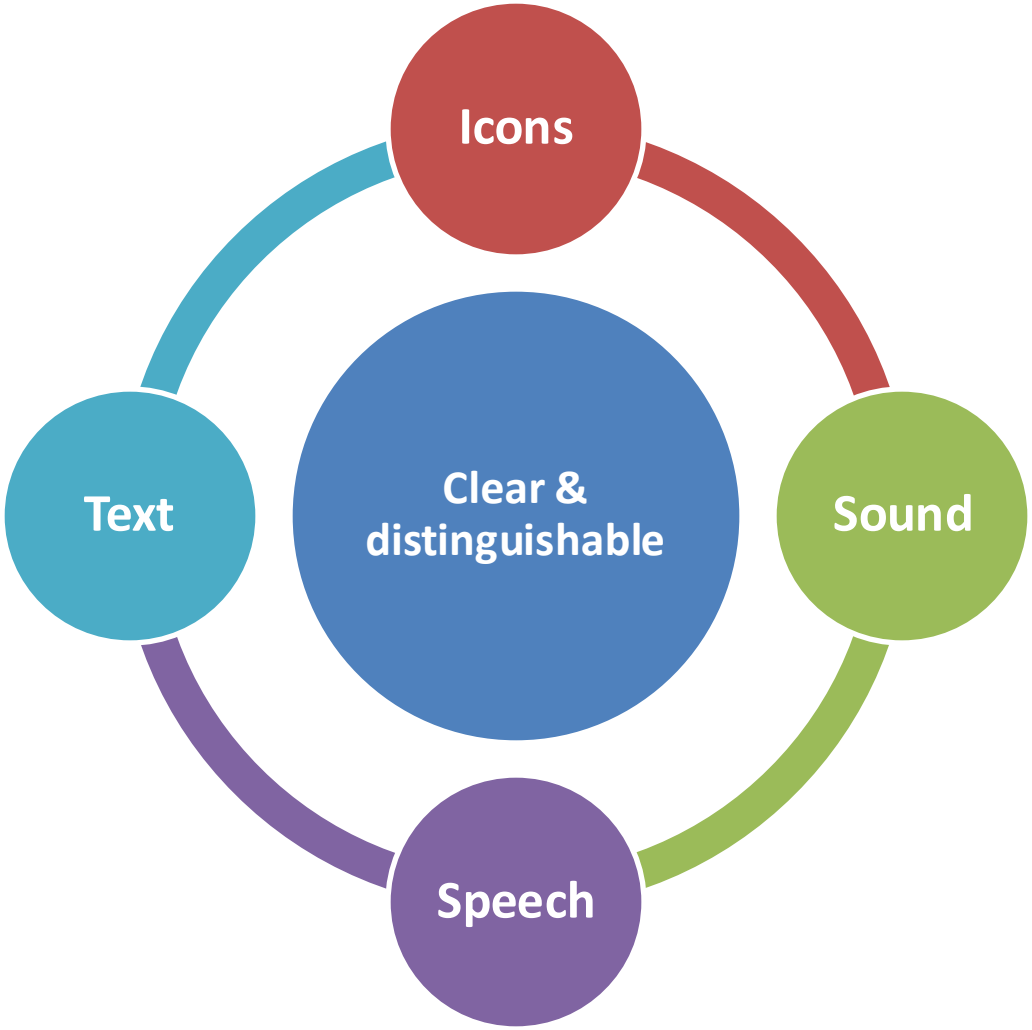
What is the time?

What is the time?

Design implications (suggestions) for Perception

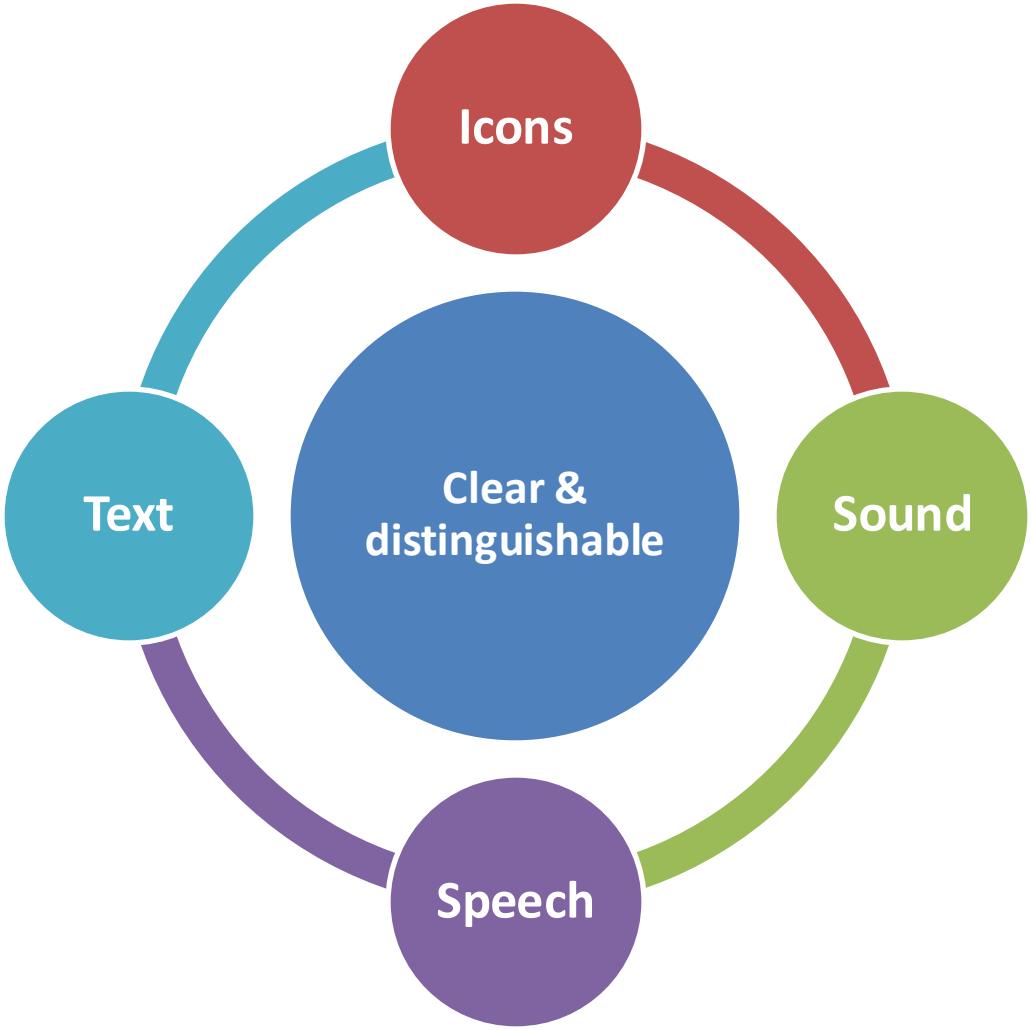
- What are the design implications (suggestions) to be used in an interface to drive perception?

Design implications for Perception



Design Heuristic ?

Design implications for Perception

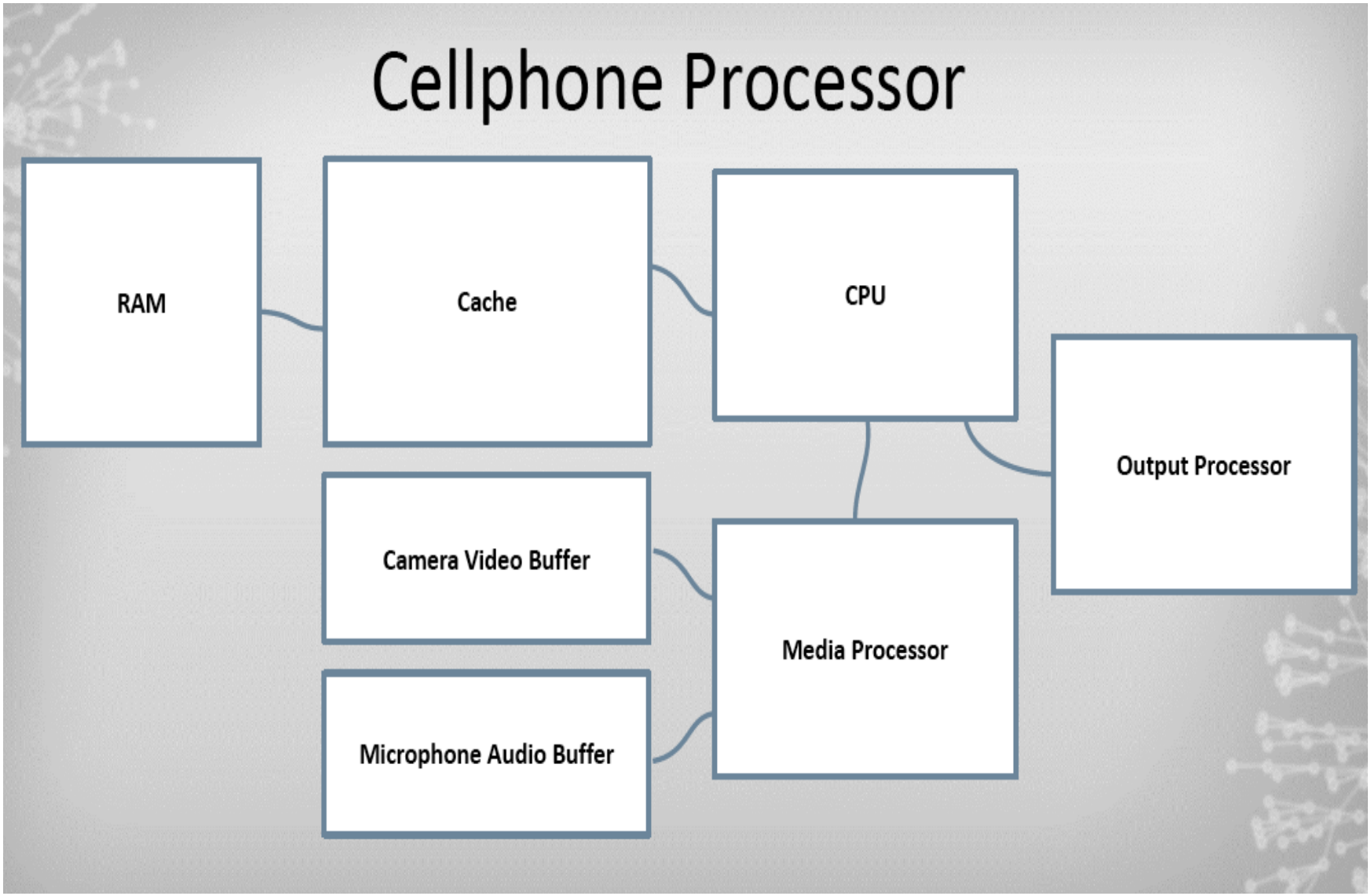


Design Heuristic:
Aesthetic, Clean & Functional Design

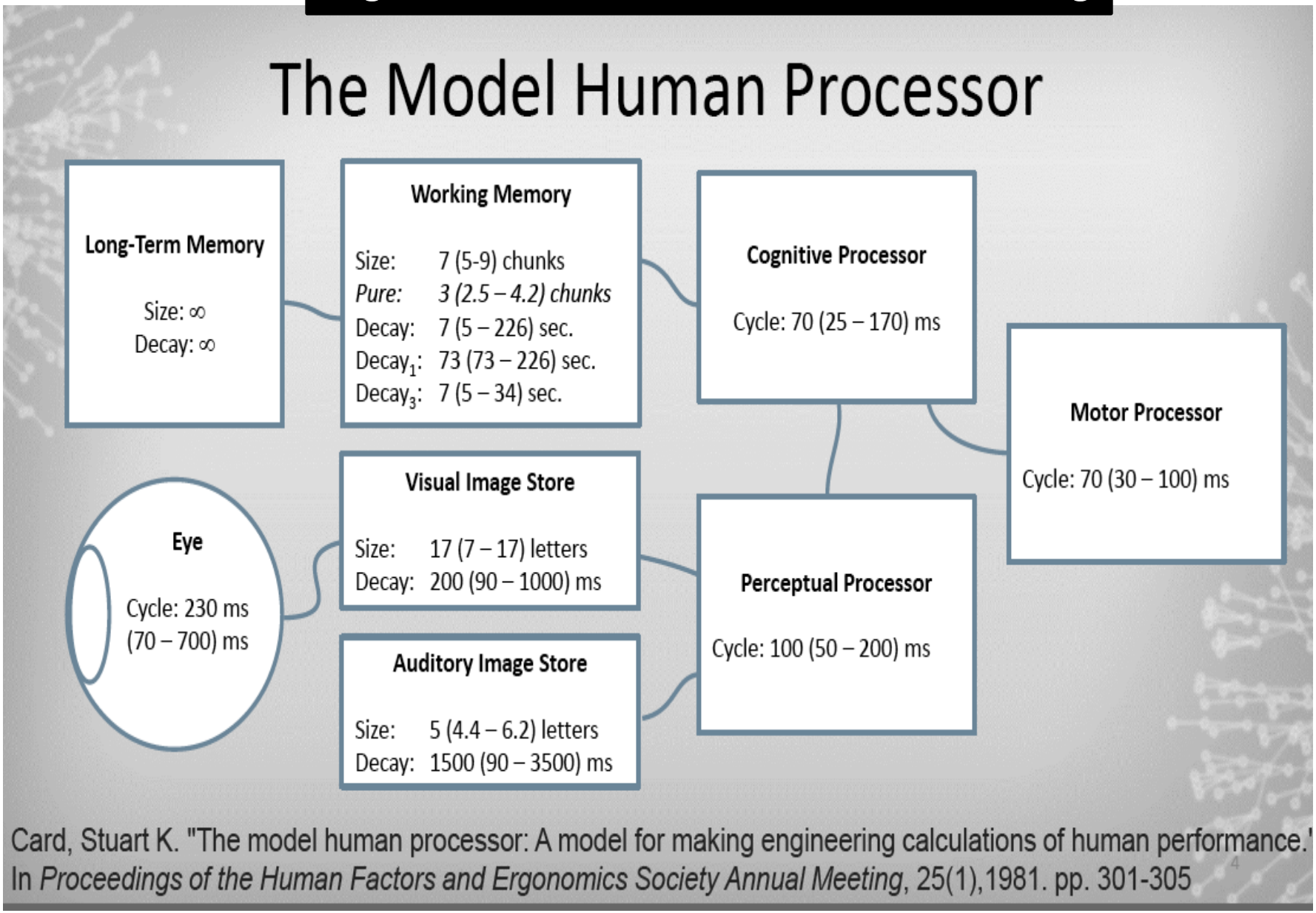
Design implications for Perception

1.	**Icons should enable users to readily *distinguish* their meaning**
2.	**Bordering and spacing are effective visual ways of grouping information**
3.	**Sounds should be audible and distinguishable**
4.	**Speech output should enable users to distinguish between the set of spoken words**
5.	**Text should be clear and distinguishable from the background**

What are the components of a Smart phone processor ?


Cellphone Processor
RAM
Cache
CPU
Output Processor
Camera Video Buffer
Media Processor
Microphone Audio Buffer

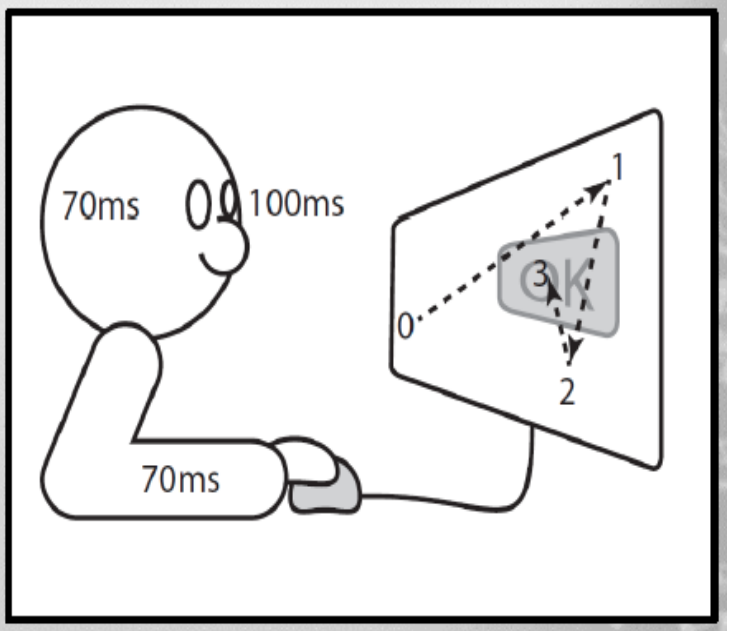
Cognitive Frame Work : Information Processing



Fitt's Law

- Kinesthesis: We know where our limbs are
- Larger movements are faster but less accurate than smaller ones

$$T \approx 600 \text{ ms} + 240 \text{ ms} \lg(1+D/S)$$



- D = distance to target
- S = size of target
- 240 ms = 70 ms to move your hand +
  100 ms to see the result +
  70 ms to decide how to correct it

Reading

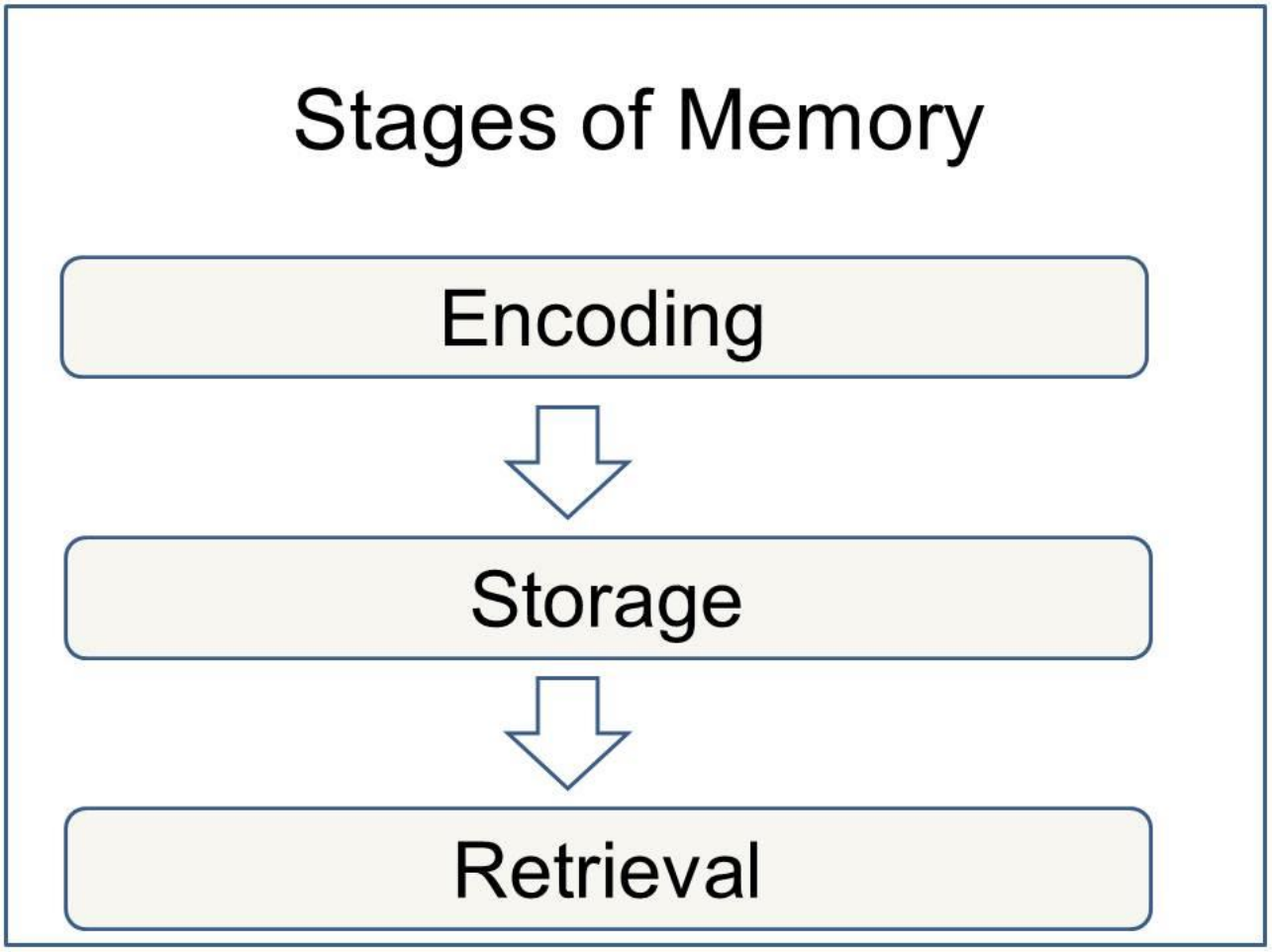
- *Saccades* - eye scans forward
- *Fixations* - eye is still
  - Perception happens
  - 94% of the time
- We do not perceive saccades
- 9pt,12pt equally legible
- We still read books faster than computers

Aoccdrnig to rscheearch at Cmabrigde Uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae. The rset can be a toatl mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe.

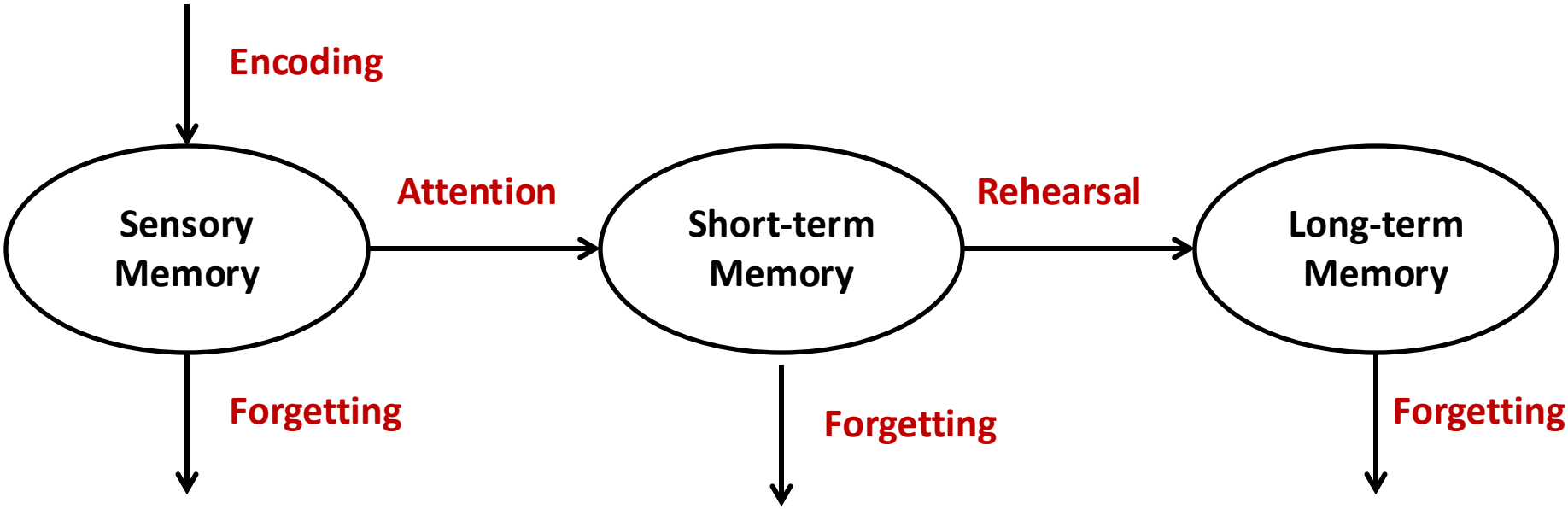
Memory

- Involves first encoding and then retrieving knowledge.
- We don’t remember everything - involves filtering and processing what is attended to
- Context is important in affecting our memory (i.e. where, when)
- We recognize things much better than being able to recall things
- we remember less about objects we have photographed than when we observe them with the an eye (Henkel, 2014)

Memory



Processing in Memory



Multi-Store Model

Atkinson and Shiffrin's Multi-Store model comprises of three different memory stores: **sensory memory, short term memory (STM) and long term memory (LTM).**

http://revisewithrachie.com/revision-sheets/memory/the-multi-store-model-of-memory/

Processing in memory

- There are three types of memory which are:
- sensory memory,
- short-term memory, and
- long-term memory.
- Those interact with information being processed and passes between the memory stores.

Processing in memory
Sensory memory

- Sensory memory:
  - Memories constantly overwritten by new information coming from the sensory channels
  - Encoding is first stage of memory done by the sensory memory that determines which information is attended to in the environment and how it is interpreted.
  - Information remains very briefly

Processing in memory
Short-term memory:

- Short-term memory: Also called working memory acts as a scratch-pad for temporary recall of memory

- like to calculate 35 X 7 in your head, you will need to have intermediate steps, those steps like multiplying first 30X7=210 + 5X7= 35 then 245 will utilize the short-term memory

- It can be accessed rapidly but also decay rapidly

Processing in memory

- Short-term memory:

- Has limited capacity.
- Capacity can be measured by determining the length of a sequence which can be remembered. The average person can remember 7±2 digits.

Activity
Short-term memory

- Look at the following number sequence:

  - 265397620853

Activity
Short-term memory

- Now write down as much as of the sequence as you can remember.

  - Did you get it all? If not how many digits could you remember
  - If you remembered between 5 and 9 digits your digit span is average.

Activity
Short-term memory

- Now try the following sequence:
  - 74219

Activity
Short-term memory

- Now try the following sequence:
  - 958 398 45 113

Activity
Short-term memory

- Did you recall that more easily?

- Here the digits are grouped or chunked.
- A generalization of the 7+2 rule that we can remembered 7+2 chunks of information.

- Therefore chunking (grouping) information can increase the short-term memory capacity To efficiently utilizing the short-term memory.

Design Focus

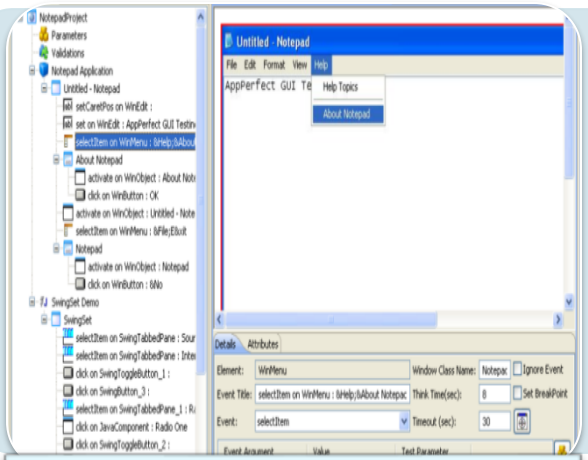
7±2

When we looked at short-term memory, we noted the general rule that people can hold 7±2 items or chunks of information in short-term memory. It is a principle that people tend to remember but it can be misapplied.

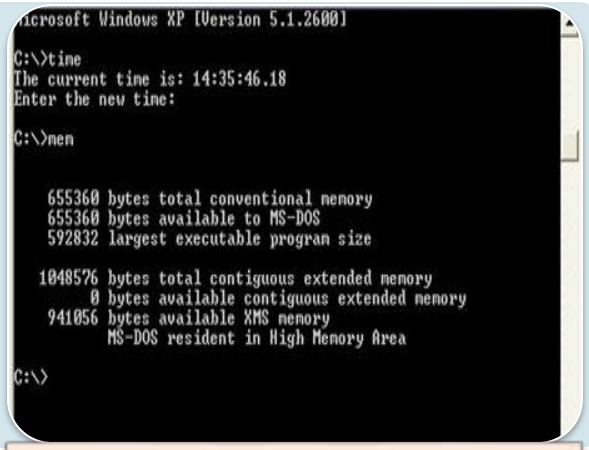
For example, it is often suggested that this means that lists, menus and other groups of items should not be designed to include more that 7 items long.

But menus and lists has little to do with short-term memory, they are available in the environment and does not need to be remembered.

Recognition versus recall



GUIs provide visually-based options that users need only browse through until they recognize one



Command-based interfaces require users to recall from memory a name from a possible set of 100s

Design Focus -Short-term memory

- Cashing in
  - When we complete some part of a task, we reach to a closure state to indicate that we have done the task, then our minds have tendency to flush (flow away) short-term memory in order to get on with the next job.
  - Early ATMs gave the customers money before returning their card. On receiving the money the customer will reach to a closure and hence forget to take the card.
  - Therefore, nowadays, most ATMs return the card first.

Digital content management

- Is a growing problem for many users
  - vast numbers of documents, images, music files, video clips, emails, attachments, bookmarks, etc.,
  - where and how to save them all, then remembering what they were called and where to find them again
  - naming most common means of encoding them
  - but can be difficult to remember, especially when have 1000s and 1000s
  - How might such a process be facilitated taking into account people's memory abilities?

Digital content management

- Memory involves 2 processes
  - recall-directed and recognition-based scanning
- File management systems should be designed to optimize both kinds of memory processes
  - e.g. Search box and history list
- Help users encode files in richer ways
  - Provide them with ways of saving files using colour, flagging, image, flexible text, time stamping, etc.

Is Apple's Spotlight search tool any good?

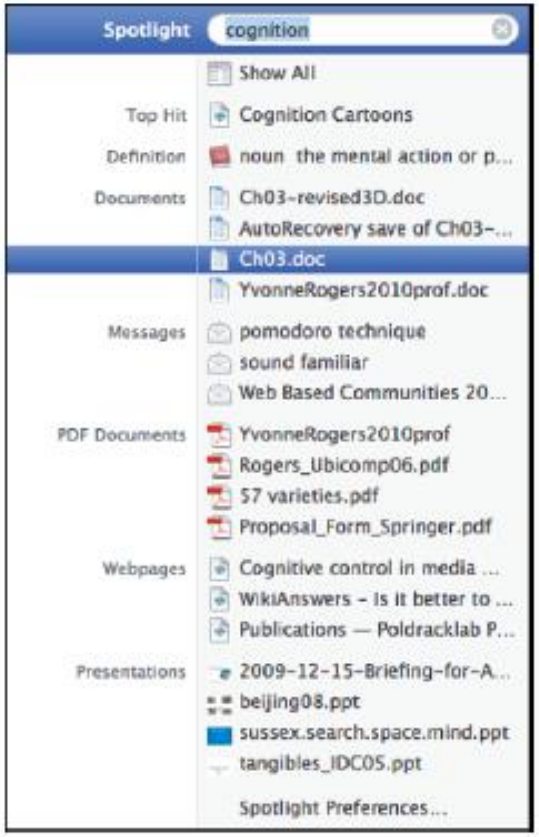


Figure 3.3 Apple's Spotlight search tool

Long-term memory

- Long-term memory

- The more attention paid to something…
- The more it is processed in terms of thinking about it and comparing it with other knowledge…
- The more likely it is to be remembered
  - e.g. when learning about HCI, it is much better to reflect upon it, carry out exercises, have discussions with others about it, and write notes than just passively read a book, listen to a lecture or watch a video about it

Long-term memory

- Long-term memory is our main resource that has huge capacity and slower access time, so forgetting occurs more slowly.
- The information placed in the long-term storage through rehearsal

Design implications (suggestions) for Memory

- What are the design implications (suggestions) to be used in an interface to aid memory?

Memory

Design implications for Memory	Heuristic
1. Don't overload users' memories with complicated procedures for carrying out tasks	Use Familiar Metaphors & Language
2. Design interfaces that promote recognition rather than recall	Recognition Over Recall
3. Provide users with various ways of encoding information to help them remember • e.g. categories, color, flagging, time stamping	Aesthetic, Clean & Functional Design

Problem - Memorable or secure?

- As online activities become more widespread. People have to remember many access information such as passwords. Remembering these passwords is not easy.
- For security, it is important that passwords are random. Words and names are easy to crack, hence the recommendation that passwords are frequently changed and constructed from random strings and letters but then it will be very difficult to remember.
  - Safety (security) is in conflict with memorability!

Solution - Memorable or secure?

- A solution to this is to construct a nonsense password out of letters or numbers that will have meaning to you but will not make up a word in a dictionary.
- Then what is remembered is the meaningful rule for constructing the password and not the meaningless string of alphanumeric characters.

- Learning
  - Learn by doing
  - encourage exploration
  - constraint and guide

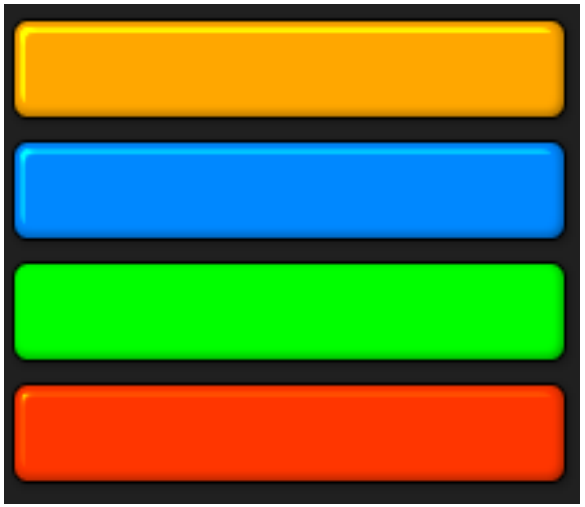
- Reading, Speaking, Listening
  - Provide opportunities for making text large on a screen
  - Speech-based menus and instructions should be short
  - artificially generated speech voices should be clear

- Problem-solving, planning, reasoning and decision-making
  - Provide additional information/functions for users who wish to understand more about how to carry out an activity more effectively
  - Use simple computational aids to support rapid decision-making and planning for users on the move
  - **Example: Bubble plot map**
  - http://bluedot.global/work

Characteristics of Colors : Hue, Saturation , Brightness

Hue

Corresponds to the normal meaning of color. Red, green, blue, yellow, and orange are a few examples of different hues. The different hues have different wavelengths in the spectrum.



Characteristics of Colors : Hue, Saturation , Brightness

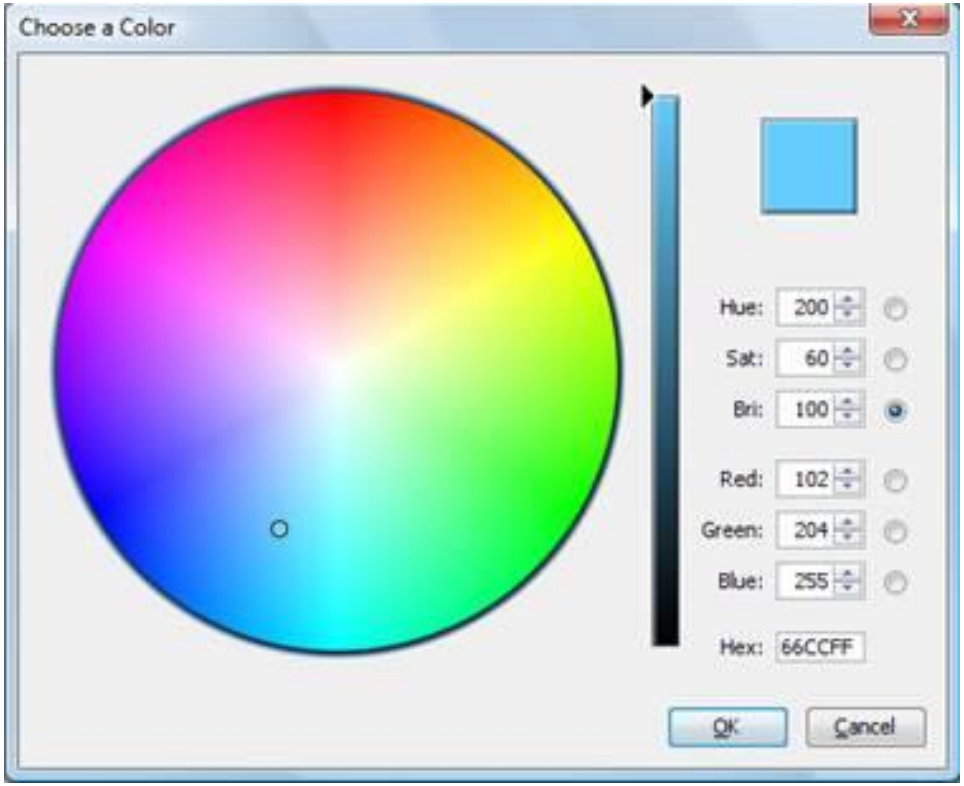
Saturation

Is the relative amount of pure light that must be mixed with the white light to produce the perceived color. Saturation can also be called a color's intensity. Saturation is not really a matter of light and dark, but rather how pale or strong the color is.

Characteristics of Colors : Hue, Saturation , Brightness

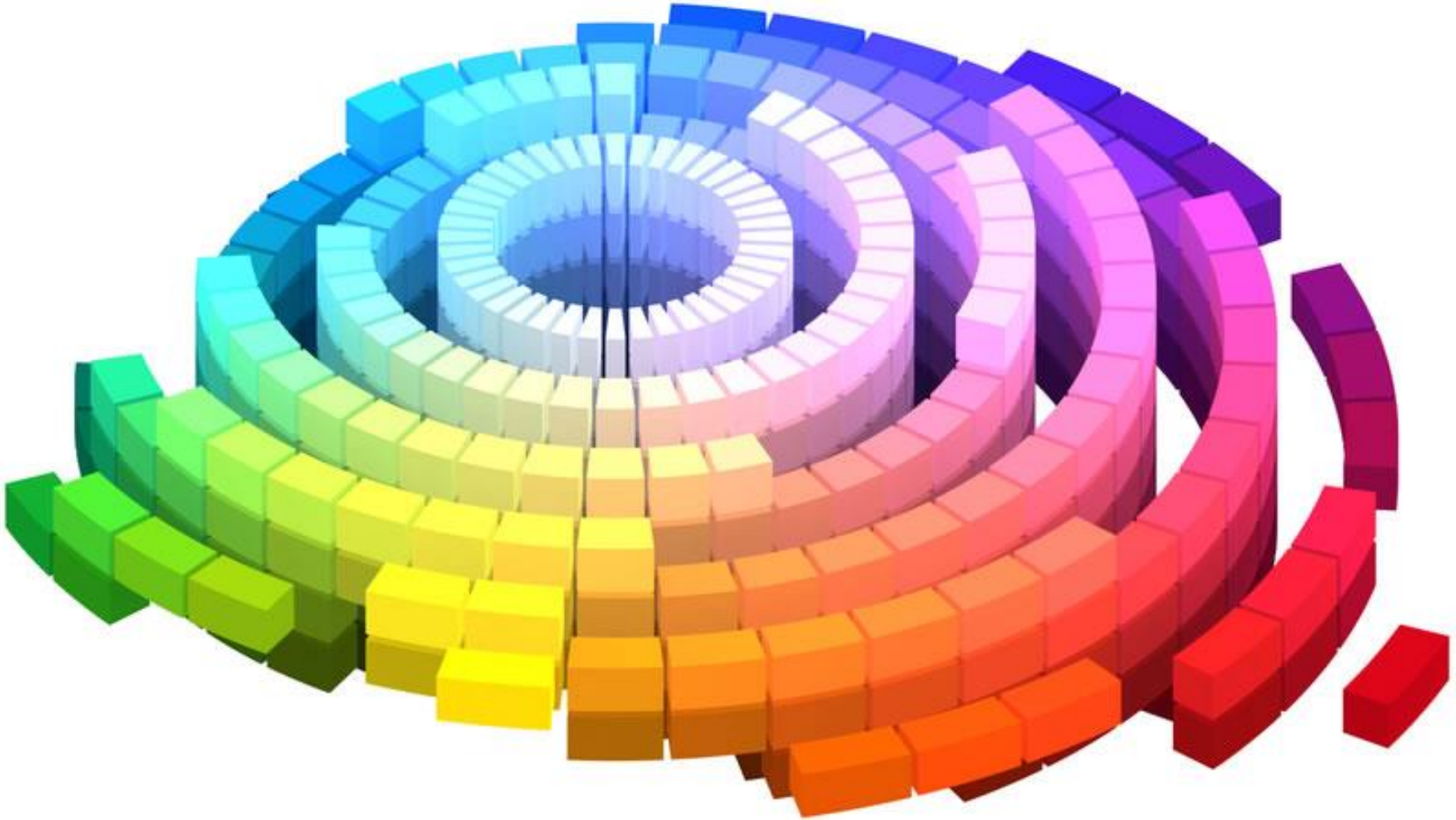
Brightness (Value)

Refers to the shades of gray decreasing from white through gray to black. The value is a measurement of the brightness of a color. The brighter a color is, the higher is its value and the more light it emits. For instance, a vivid yellow is brighter than dark blue, therefore its value is higher than that of the blue.




HUE
SATURATION
VALUE

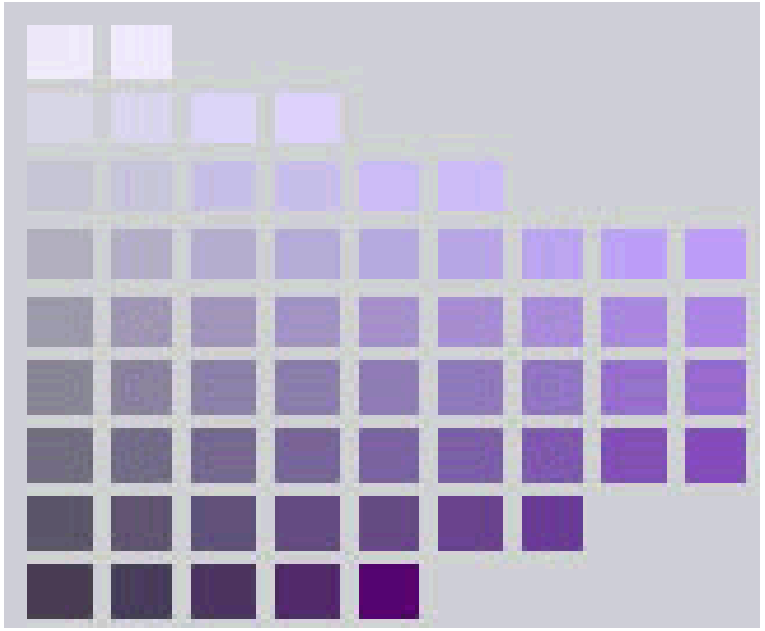
Munsell 3D Color Model



- In Munsell 3D color model:
  - Hues change as you move around the center.
  - Brightness (Value) changes from top-to-bottom;
  - Saturation (Chroma) changes as you move from the center outward

This is a Munsell constant hue chart — a slice or a plane of the Munsell color solid.

- Here the Hue is purple.
- There are 60+ colors here, but all of them are purple-hued colors.
- Saturation (Chroma) changes from left-to-right. Low chroma colors are on the left. mid-chroma colors near the center. high chroma colors on the right.
- Brightness (Value) changes from bottom-to-top. Low values (shades) near the bottom. High values (tints) near the top.



Colors are effective in calling

Attention	Recognition	Comprehension	Memory
To specific information on a display.	Differentiating information types	Understanding and grouping similar information	Helps memory by adding cues to data and building more associations
?	?	?	?

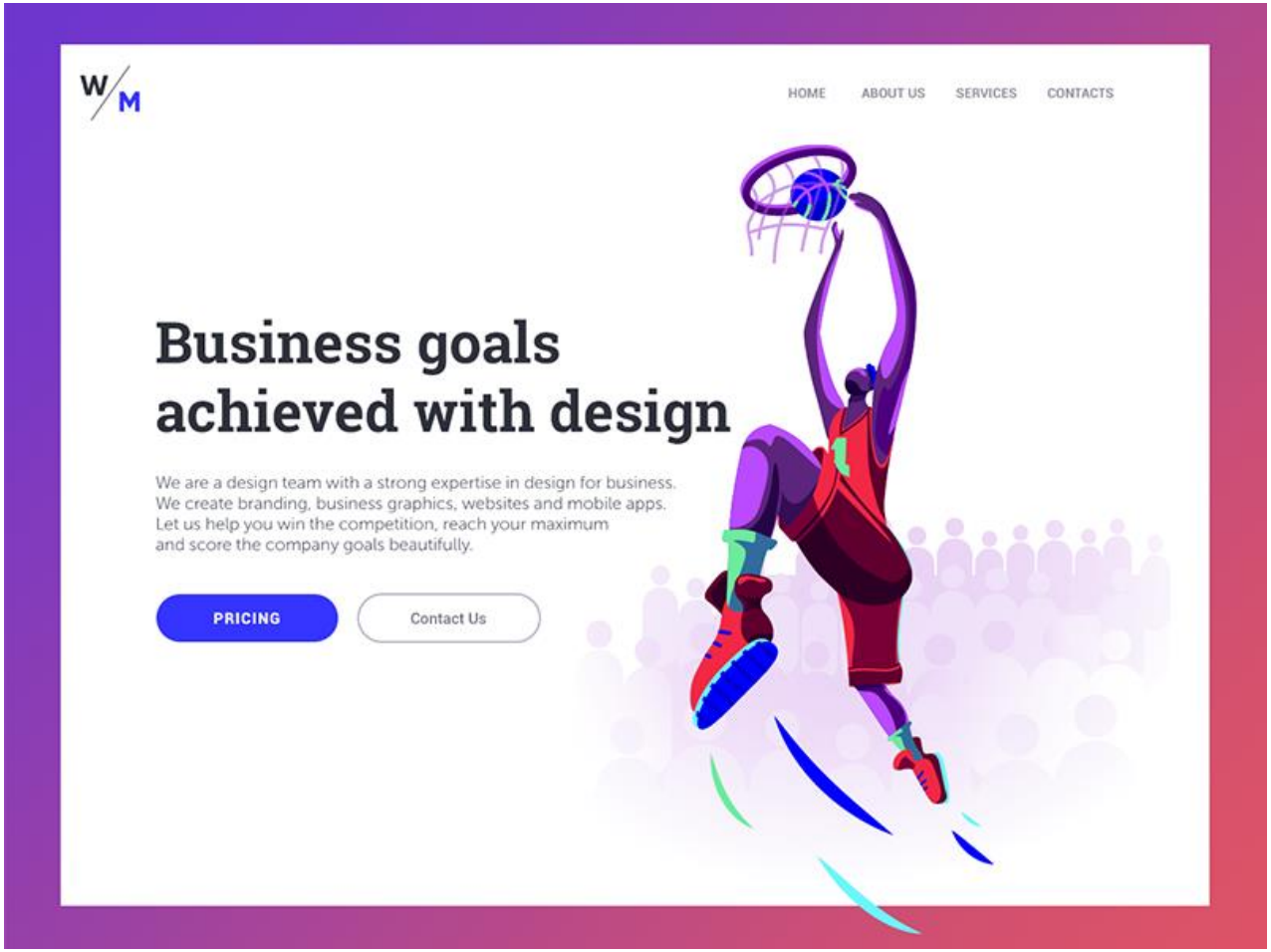
Colors are effective in calling

Attention	Recognition	Comprehension	Memory
To specific information on a display.	Differentiating information types	Understanding and grouping similar information	Helps memory by adding cues to data and building more associations
For drawing attention, colors that are high on both saturation and brightness are most effective.	Colors differentiated by hue. Use as many colors as you wish but not more than 11	Colors differentiated by hue. Use between one and five colors at most	Use the following sequence: red, orange, yellow, green, blue, indigo, and violet

Some tips for choosing UI colors

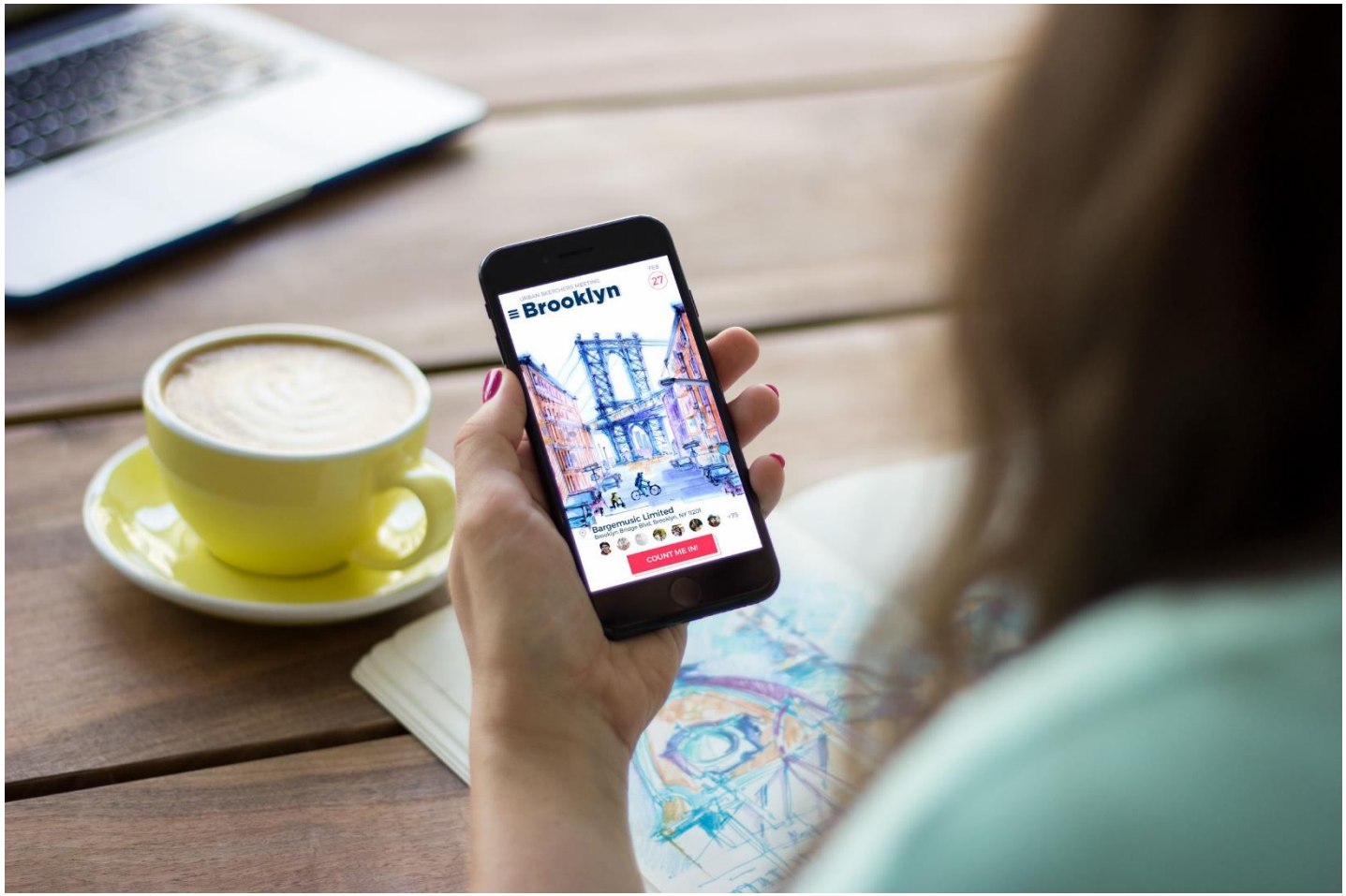
Tip 1. Learn 60–30–10 rule

- This rule, or technique, came from the interior design, so it is often applied for house decorating. To bring the balance into the composition, the colors should be combined in the proportion of 60%–30%–10%.
- The biggest part should go to the dominant hue, the third of the composition takes secondary color and 10% percent goes to the color which helps to make the accents.
- Such a proportion is thought to be pleasant for human eyes since it allows perceiving all the visual elements gradually. Knowing the appropriate proportion designers can successfully combine the colors without risks of turning UI into a colorful mess.


W/M
HOME
ABOUT US
SERVICES
CONTACTS
Business goals achieved with design
We are a design team with a strong expertise in design for business.
We create branding, business graphics, websites and mobile apps.
Let us help you win the competition, reach your maximum
and score the company goals beautifully.
PRICING
Contact Us

Tip 2. Color Contrast is a friend

- Color contrast is a key part of any visual composition. It brings the individuality for each UI element and makes all of them noticeable. User interfaces containing only shades from the same color family have fewer chances to draw users' attention. Moreover, copy content in this UI will look illegible which make the interactions with a product almost impossible.
- Designers control the level of contrast depending on the goals it is supposed to accomplish. For example, if you need users to pay special attention to the specific UI elements, it's a good idea to apply two highly contrasting colors such as blue and red. High contrast is often used for CTA buttons design.
- However, speaking of UI as a whole composition, high level of color contrast may not always work well. If copy content and the background colors contrast each other too much, it will be difficult to read or scan the text. That's why designers are recommended to create a mild level of contrast and apply high contrasting colors only for highlighting elements. User-testing on various devices can help designers to make sure of the effectiveness of their solutions.


Brooklyn
27
Bargemusic Limited
COUNT ME IN!

Tip 3. Consider psychology of colors

- Psychology is one of the basic studies helping in design workflow. There is a branch of psychology showing the influence of colors on human mood and behavior called color psychology. It states that our mind reacts to colors while we usually do not notice it. When human eyes perceive a color, our brain gives signals to the endocrine system releasing hormones responsible for the mood and emotions.
- Each color has its own influence on our mind and the knowledge of the possible reactions can help designers to transfer the right message and call users to make the expected action. Here is a short list of color meanings.

Tip 3. Consider psychology of colors

Red. It symbolizes both good and bad feelings including love, confidence, passion, and anger.
Orange. An energetic and warm color bringing the feelings of excitement.
Yellow. This is the color of happiness, the sunlight, joy, and warmth.
Green. The color of nature which brings calming and renewing feelings.
Blue. It often represents some corporate images. May be associated with distance and sadness.
Purple. Long associated with royalty and wealth. It's also a color of a mystery and magic.
Black. It associates with a tragedy and death and signifies a mystery. At the same time, it can be traditional and modern.
White. The color means purity and innocence, as well as wholeness and clarity.

- In addition, designers need to remember that visual perception is quite individual for everyone. Such factors as age and gender have a great impact on color preferences, so it's vital to know the target audience peculiarities.


OPTIMISM
CLARITY
WARMTH
FRIENDLY
CHEERFUL
CONFIDENCE
EXCITEMENT
YOUTHFUL
BOLD
CREATIVE
IMAGINATIVE
WISE
TRUST
DEPENDABLE
STRENGTH
PEACEFUL
GROWTH
HEALTH
BALANCE
CALM
Nikon
ups
NBC
Google
DIVERSITY
IMDb
Sprint
amazon
Payless
SUBWAY
ebay
Kellogg's
Nintendo
kmart
Coca-Cola
CNN
Syfy
monster
Exxon
Fanta
IKEA
DELL
JPMorgan
LOWE'S
Barbie
LEGO
BEST BUY
starz
ACE
orkut
LYNX
DHL
Hertz
Tropicana
OREO
Welch's
Canon
facebook
IBM
Walmart
shutterfly
AVIS
Gulf
bp
Oral-B
Pfizer
vimeo
TACO BELL
puma

Tip 4. Don’t forget cultural differences

Colors are effective in calling

Signal meaning
The same color can be valued in one culture and not in another.
Be aware of cultural sensitivity of color.

Colors are effective in calling

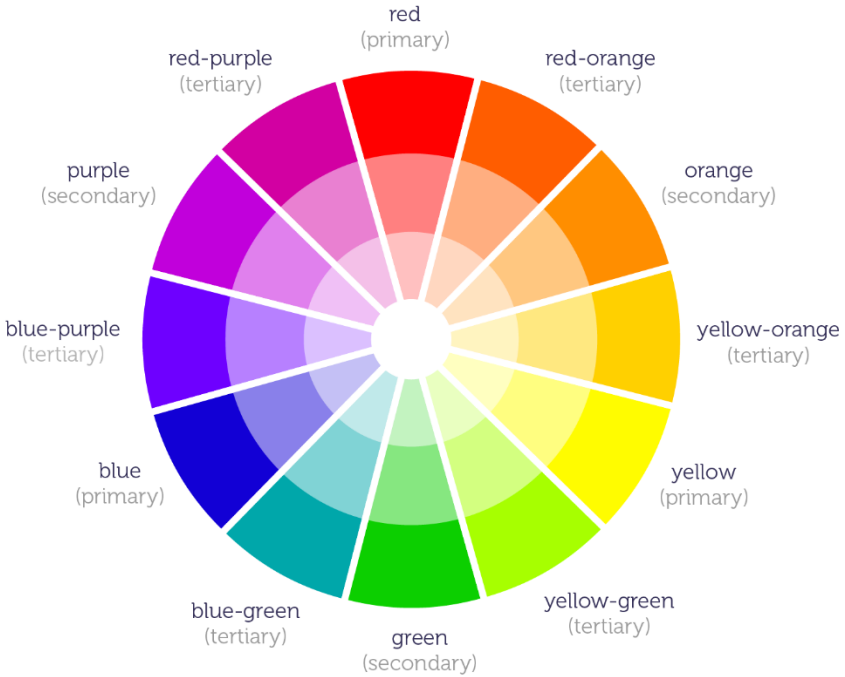
Mode: Appeal
Facilitates positive effect that is appealing and convincing and is often pleasant to the eye.
Pastel colors are known to **calm**
have high value (brightness) and low to intermediate saturation.

Tip 5. Strive to color harmony

Harmony is what UI design strives to. To make users feel pleased and comfortable

- designers try to bring the balance into user interface design. The color harmony is about the arrangement of the colors in design in the most attractive and effective way for users' perception. Harmonic colors contribute to a nice first impression from the website or application.
- Designers distinguished the basic color schemes that work effectively:
  - **Monochromatic**. Color harmony is based on one color with various tones and shades of it.
  - **Analogous**. The scheme applies colors located right next to each other on the color wheel.
  - **Complementary**. It is the mix of colors placed in front of each other on the color wheel and it aims to produce high contrast.

The basic colors



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Cognitive Frameworks

A number of conceptual frameworks and theories have been developed to explain and predict user behavior based on theories of cognition.

These are:

- **Internal** : mental models, gulfs of execution and evaluation, and information processing.
- **External**: distributed cognition, external cognition, embodied interaction.

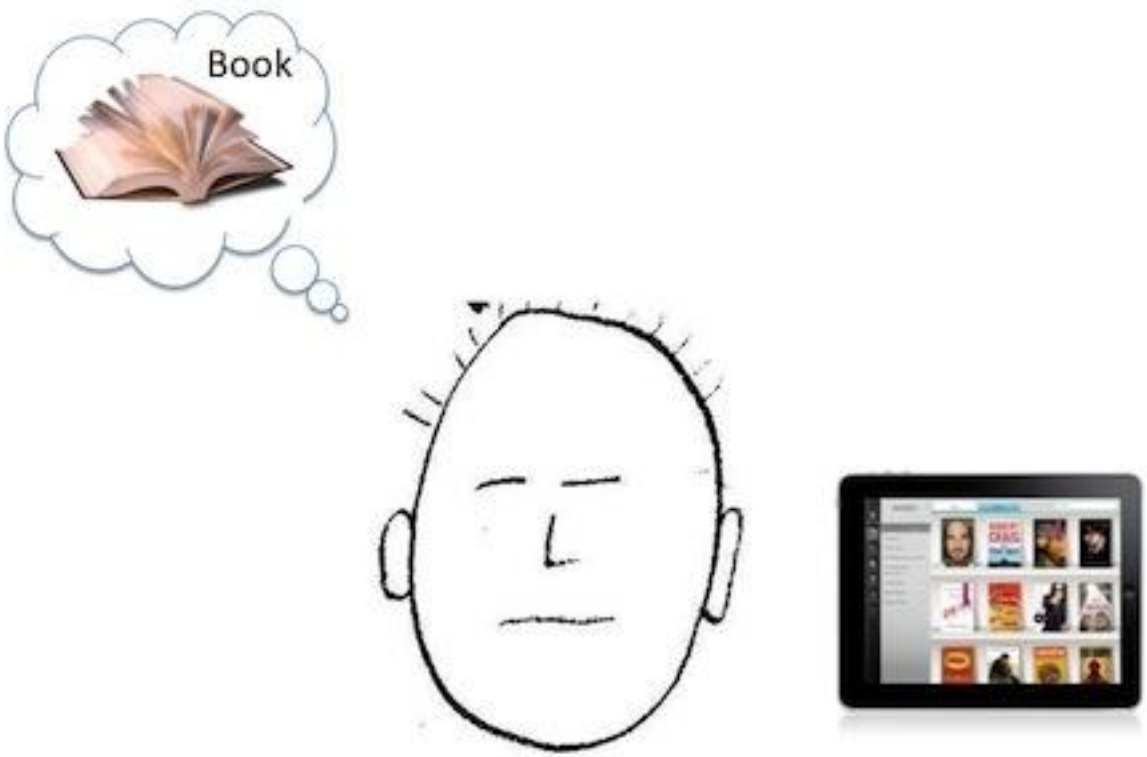
Mental models

- Originates from Scottish Psychologist **Kenneth Craik** that suggests the mind constructs "small-scale models" of reality (1943).
- Mental models can be constructed from :
  - **perception,**
  - **imagination, or**
  - **Comprehension**
- of a conversation/ situation

Mental Model

- **Constructs visual images**

A “Mental Model” of reading a book on the iPad



Will you drive this car?

Will you drive this car?

Deep versus shallow models

e.g. how to drive a car and how it works

A **mental model** represents a person's thought process for how something works (i.e., a person's understanding of the surrounding world and past experience).

Mental models

- People develop knowledge of how to interact with a system and to a lesser extent how that system works.
- These two kinds of knowledge are referred to as a user's mental model.
- Knowledge is sometimes described as a mental model:
  - How to use the system (what to do next)
  - What to do with unfamiliar systems or unexpected situations (how the system works)
- People make inferences using mental models of how to carry out tasks
- Mental models are often partial. The person does not have full understanding of the working of the whole.

Mental Model

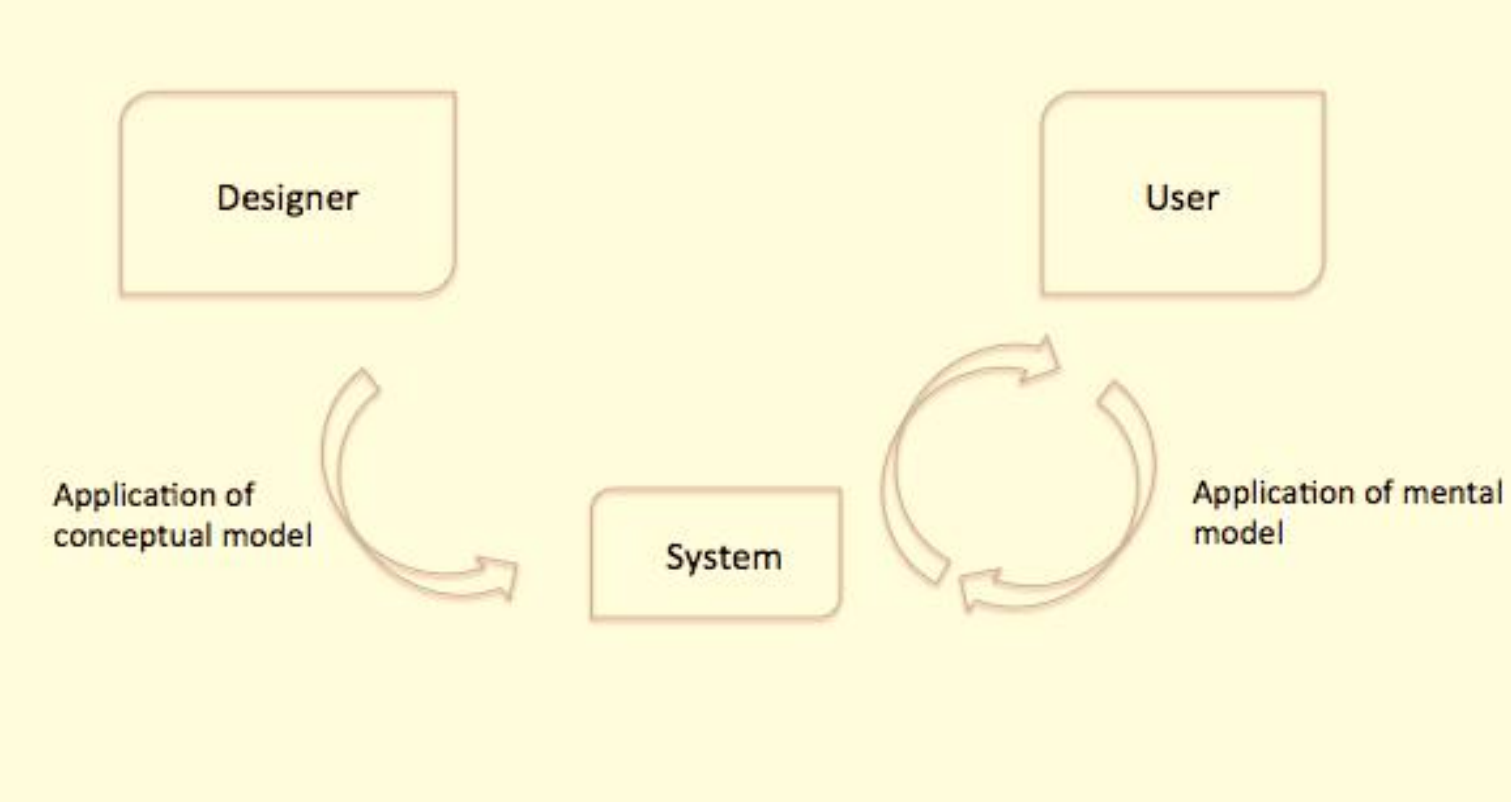
- There are many definitions for mental models that have been around for at least the last 25 years or so. One of those from Susan Carey's 1986 journal article, Cognitive science and science education, which says:

- A mental model represents a person's thought process for how something works (i.e., a person's understanding of the surrounding world).
- Mental models are based on incomplete facts, past experiences, and perceptions.
- They help shape actions and behavior, influence what people pay attention to in complicated situations, and define how people approach and solve problems.

What is a mental model in interface design?

- In the field of user interface design, a mental model refers to the representation of something—the real world, a device, software, etc.—that the user has in mind.
- Users create mental models very quickly, often before they even use the software or device.
- Users' mental models come from their prior experience with similar software or devices, assumptions they have, things they've heard others say, and also from their direct experience with the product or device.
- Users refer to mental models to predict what the system, software, or product is going to do, or what they should do with it.

Match the Mental Model to the Conceptual Model



- The actual interface is representing the conceptual model.
- The designed user interface is communicating to you the conceptual model of the product.

Mental Model ⟷ Conceptual Model

- If the product's conceptual model doesn't match the user's mental model, then the user will find the product hard to learn and use.
- If the designers of the conceptual model didn't take the user's mental model into account then it is highly likely that the product will be hard to learn and use.

- If there are multiple user groups (people who have used a Kindle before, people who have never read books electronically, etc.) and the conceptual model is designed to match just one mental model, then the other users will find the device hard to learn and use.

- If the conceptual model was not really designed, but is just a reflection of the underlying hardware or software or database, then the conceptual model will not match the user's mental model very well, and the users will find the device hard to learn and use.

Summary

- Cognition involves several processes including attention, memory, perception and learning
- The way an interface is designed can greatly affect how well users can perceive, attend, learn and remember how to do their tasks
- Theoretical frameworks, such as mental models and external cognition, provide ways of understanding how and why people interact with products
- This can lead to thinking about how to design better products

CASE STUDY

The aim of this assignment is to elicit mental models from people. The goal is to understand the nature of people's knowledge about an interactive product in terms of how to use it and how it works.

a) First, elicit your own mental model. Write down how you think contactless cards work- where customers wave their debit or credit card over a card reader instead of typing a PIN. Then answer the following questions:

1. What information is sent between the card and the card reader when it is waved in front of it?
2. What is the maximum amount you can pay for something using a contactless card?
3. How many times can you use a contactless card in a day?
4. Can you use your smartphone to pay in the same way? If so how is that possible?
5. What happens if you have two contactless cards in the same wallet?
6. What happens when your contactless card is stolen and you report it to the bank? What does the bank do?

b) Next, ask other people the same set of questions?

c) Now analyze your answers. Do you get the same or different explanations? What do the findings indicate? How accurate are people's mental models of the way contactless cards are work?

d) What other ways might there be for paying for purchases instead of using cash, debit, or credit cards?

e) Finally, how might you design a better conceptual model that would allow users to develop a better mental model of contactless cards (assuming this is a desirable goal) ?

CASE STUDY

The aim of this assignment is to elicit mental models from people. The goal is to understand the nature of people's knowledge about an interactive product in terms of how to use it and how it works.

CASE STUDY

a) First, extract your own mental model. Write down how you think contactless cards work- where customers wave their debit or credit card over a card reader instead of typing a PIN. Then answer the following questions:

1. What information is sent between the card and the card reader when it is waved in front of it?
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3. How many times can you use a contactless card in a day?
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a) First, extract your own mental model. Write down how you think contactless cards work- where customers wave their debit or credit card over a card reader instead of typing a PIN. Then answer the following questions:

1. What information is sent between the card and the card reader when it is waved in front of it?
   - The card number.
2. What is the maximum amount you can pay for something using a contactless card?
   - 500 BD
3. How many times can you use a contactless card in a day?
   - As much as I need.
4. Can you use your smartphone to pay in the same way? If so how is that possible?
   - Yes, take an image of the card and send it to an address.
5. What happens if you have two contactless cards in the same wallet?
   - May be will be spoiled.
6. What happens when your contactless card is stolen and you report it to the bank? What does the bank do?
   - The bank will deactivate the card.

CASE STUDY

b) Next, ask other people the same set of questions?

1. What information is sent between the card and the card reader when it is waved in front of it?
2. What is the maximum amount you can pay for something using a contactless card?
3. How many times can you use a contactless card in a day?
4. Can you use your smartphone to pay in the same way? If so how is that possible?
5. What happens if you have two contactless cards in the same wallet?
6. What happens when your contactless card is stolen and you report it to the bank? What does the bank do?

CASE STUDY

c) Now analyze your answers. Do you get the same or different explanations?

What do the findings indicate?

How accurate are people's mental models of the way contactless cards are work?

(c)

Now analyze your answers.

Do you get the same or different explanations?

- I got different explanations.

What do the findings indicate?

- Different people have different mental models a bout any product.

(c)

How accurate are people's mental models of the way contactless cards are work?

Not very accurate as follows:

1. What information is sent between the card and the card reader when it is waved in front of it?
   - The card serial number, and other stored information such as security information.
2. What is the maximum amount you can pay for something using a contactless card?
   - 500 BD, 5-100 $, or more.
3. How many times can you use a contactless card in a day?
   - As much as I need. You just need to have sufficient fund.

(c)

4. What happens if you have two contactless cards in the same wallet?
   - May be will be spoiled., A contactless smart card is a card in which the chip communicates with the card reader through an induction technology similar to that of an RFID (at data rates of 106 to 848 kbit/s). These cards require only close proximity to an antenna to complete a transaction. They are often used when transactions must be processed quickly or hands-free, such as on mass transit systems, where a smart card can be used without even removing it from a wallet. The standard for contactless smart card communications is ISO/IEC 14443. When two or more contactless cards are in close proximity the system may have difficulty determining which card is intended to be used. The card-reader may charge the incorrect card or reject both.
5. What happens when your contactless card is stolen and you report it to the bank? What does the bank do?
   - The bank will deactivate the card.

CASE STUDY

d) What other ways might there be for paying for purchases instead of using cash, debit, or credit cards?

CASE STUDY

d) What other ways might there be for paying for purchases instead of using cash, debit, or credit cards?
   - PayPal
   - Benefit
   - Apple Pay
   - Google Pay
   - Samsung Pay
   - or ….ect.

CASE STUDY

e) Finally, how might you design a better conceptual model that would allow users to develop a better mental model of contactless cards (assuming this is a desirable goal) ?

CASE STUDY

e) Finally, how might you design a better conceptual model that would allow users to develop a better mental model of contactless cards (assuming this is a desirable goal) ?

- Reader will give feedback about the maximum amount to use or it can be printed on the card, how many more times to be used but it might make things slower. Keep a network signal image on the card to indicate the information transferred through signals, write a message call incase of stolen or loss where the number can be stored in the smartphone.

Contactless Card

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