



IIT ROORKEE



NPTEL ONLINE  
CERTIFICATION COURSE

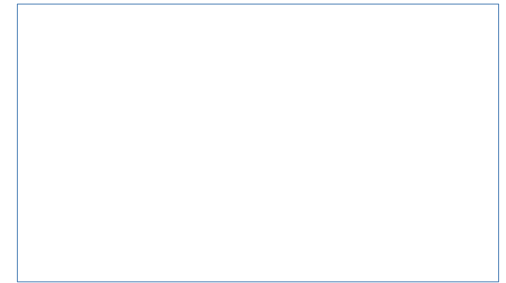
# INTRODUCTION TO INTERACTION DESIGN

## Lecture 07 Role of Cognition

Prof. Sonal Atreya  
DEPARTMENT

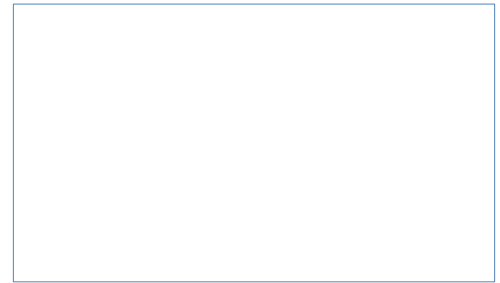


# Role of Cognition In Interaction Design



# Cognition

Cognition refers to the mental processes and activities related to acquiring, processing, storing, and using information. It involves a range of higher mental functions such as perception, attention, memory, language, problem-solving, decision-making, and reasoning.



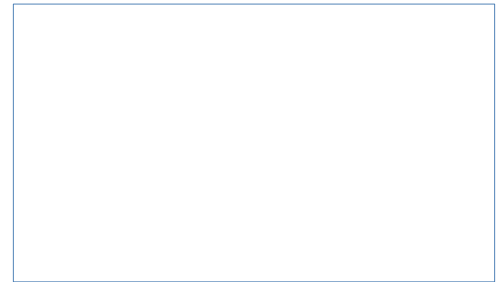
# COLOR EMOTION GUIDE



Source: mindsea.com



Source: Lesmor design



# LINE



A line is a mark between two points. There are various types of lines, from straight to squiggly to curved and more. Lines can be used for a wide range of purposes: stressing a word or phrase, connecting content to one another, creating patterns and much more.

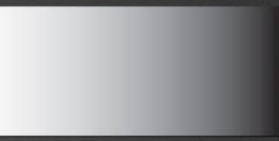
# SHAPE



Height + width = shape. We all learned basic shapes in grade school - triangles, squares, circles and rectangles. Odd or lesser seen shapes can be used to attract attention.

There are three basic types of shape: geometric (triangles, squares, circles etc), natural (leaves, animals, trees, people), and abstracted (icons, stylizations, graphic representations etc).

# VALUE



Value is how light or how dark an area looks. A gradient, shown above, is a great way to visualize value - everything from dark to white, all the shades in-between, has a value. Use value to create depth and light; to create a pattern; to lead the eye, or to emphasize.

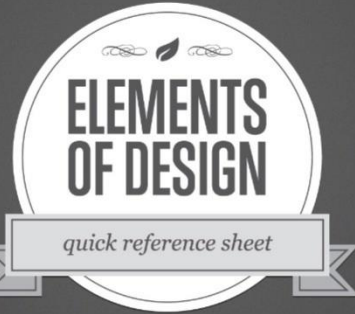
# COLOR



Color is used to generate emotions, define importance, create visual interest and more. CMYK (cyan/magenta/yellow/black) is subtractive; RGB (red/green/blue) is additive.

Some colors are warm and active (orange, red); some are cool and passive (blue, purple).

There are various color types (primary to analogous) and relationships (monochromatic to triad) worth learning more about as well.



**ELEMENTS OF DESIGN**  
quick reference sheet



Space is the area around or between elements in a design. It can be used to separate or group information. Use it effectively to: give the eye a rest; define importance; lead the eye through a design and more.

# SPACE

# TEXTURE



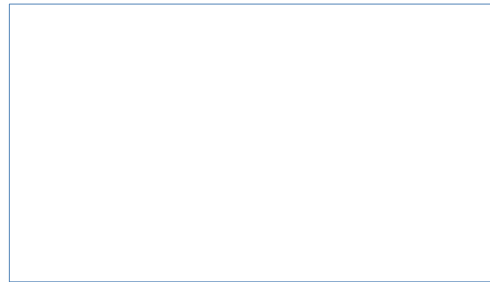
Texture relates to the surface of an object, the look or feel of it. Concrete has a rough texture; drywall has a smooth and subtle texture. Using texture in design is a great way to add depth and visual interest. Printed material has actual, textile texture while screen material has implied texture.

# SIZE



Size is how small or large something is: a small shirt vs. an extra large shirt, for example. Use size to define importance, create visual interest in a design (via contrasting sizes), attract attention and more.

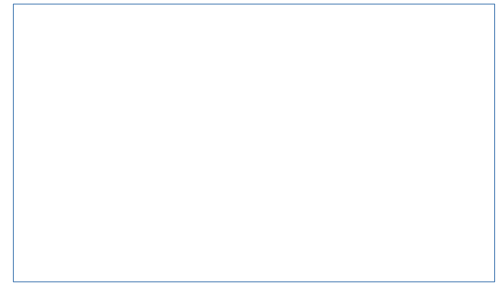
*paper-leaf*  
created by Paper-Leaf Design, www.paper-leaf.com

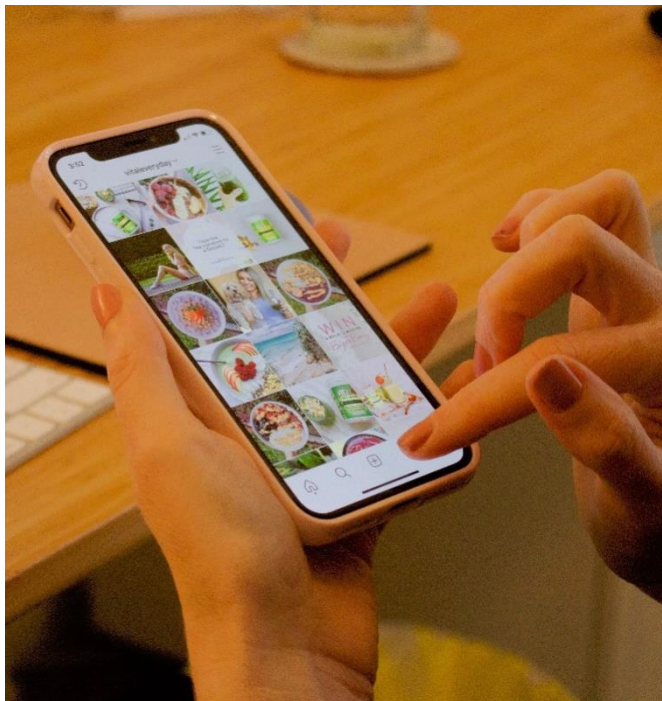


Source: Paper-leaf



**Experiential cognition** is a state of mind where people perceive, act, and react to events around them intuitively and effortlessly. It requires reaching a certain level of expertise and engagement. Examples include driving a car, reading a book, having a conversation, and watching a video.



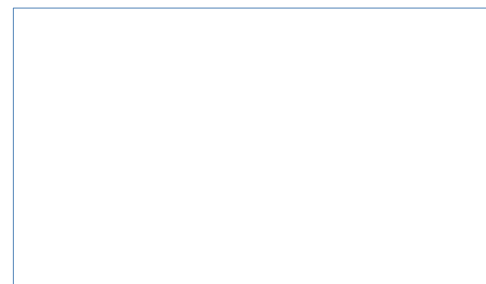


Scrolling through Social media

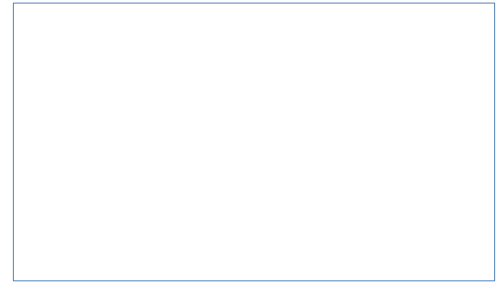


Driving a car

Examples of experiential cognition



**Reflective cognition** involves mental effort, attention, judgment, and decision-making, which can lead to new ideas and creativity. Examples include designing, learning, and writing a report.





Compare REDMI 11 Prime (Playful Green, 64 GB) vs others  
3 items

REDMI 11 Prime (Playful Green, 64 GB)  
₹10,999 ₹14,999 26% off  
**Assured**

realme C55 (Sunshower, 64 GB)  
₹10,999 ₹12,999 15% off  
**Assured**

MOTOROLA G32 (Mineral Gray, 64 GB)  
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	₹649 after Exchange	₹649 after Exchange	₹549 after Exchange
<b>Ratings &amp; Reviews</b>	<b>4.3★</b> 327 Ratings & 21 Reviews All 21 reviews <a href="#">BUY NOW</a>	<b>4.4★</b> 16,410 Ratings & 1,063 Reviews All 1063 reviews <a href="#">BUY NOW</a>	<b>4.2★</b> 36,890 Ratings & 3,451 Reviews All 3451 reviews <a href="#">BUY NOW</a>
<b>Delivery</b>	10 May, Wednesday for Free	12 May, Friday for Free Standard Delivery for Free	10 May, Wednesday for Free
<b>GENERAL FEATURES</b>			
<b>SIM Type</b>	Dual Sim	Dual Sim	Dual Sim, 4G LTE WCDMA GSM
<b>Network Type</b>	4G VOLTE, 4G, 3G, 2G	2G, 3G, 4G	4G, 3G, 2G
<b>Removable Battery</b>	No	-	-
<b>Sensors</b>	Ambient Light Sensor, Proximity Sensor, Accelerometer, Electronic Compass, Side Fingerprint Sensor, IR Blaster	Magnetic Induction Sensor, Light Sensor, Proximity Sensor, Gyrometer (Software Gyroscope), Acceleration Sensor	Fingerprint Reader, Proximity Sensor, Accelerometer, Ambient Light Sensor, SAR Sensor, Gyroscope, Sensor Hub, E-Compass
<b>PLATFORM &amp; PERFORMANCE</b>			
<b>OS</b>	Android 12	Android 13	Android 12
<b>Processor</b>	Helio G99 Octa Core 2.2 GHz	Helio G88 Octa Core 2 GHz	Qualcomm Snapdragon 680 Octa Core 2.4 GHz
<b>Graphics</b>	ARM Mali-G57 MC2	Mali-G52, 391	Qualcomm Adreno 610

Comparing products

**Review Product**

Wildcraft Helios\_Trolley Cabin & Check-in Set - ...  
★★★★☆

Rate the following aspects based on your experience with the product

**Quality**

1 2 3 4 5

**Design & Features**

1 2 3 4 5

**Storage Space**

1 2 3 4 5

**Looks**

1 2 3 4 5

**Value for Money**

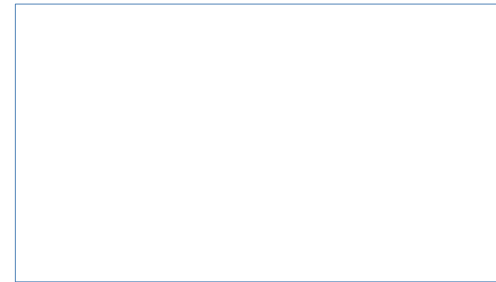
1 2 3 4 5

**Write a Review**

How is the product? What do you like? What do you hate?

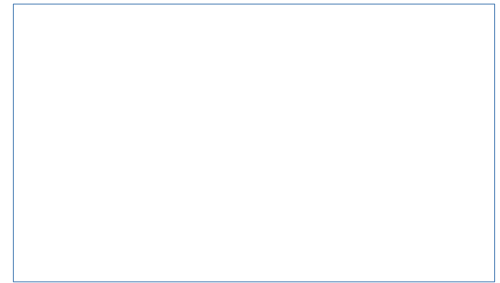
Writing reviews or feedback, or any other content

## Examples of reflective cognition



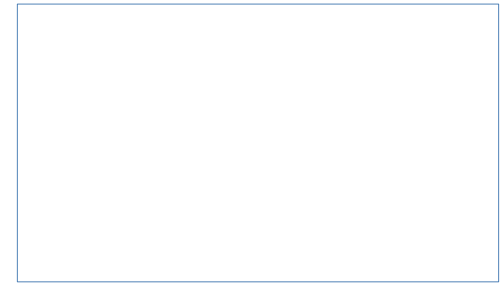
Cognition has been described in terms of specific kinds of processes These include the following:

- Attention
- Perception
- Memory
- Learning
- Reading, speaking, and listening
- Problem-solving, planning, reasoning, and decision-making



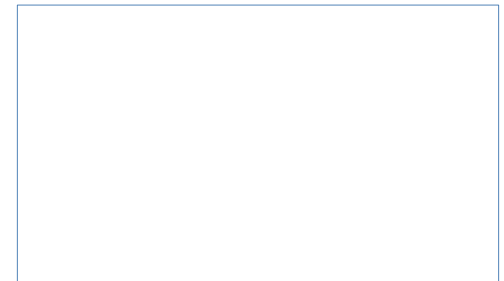
# Attention

Attention is a cognitive process that refers to the ability to selectively concentrate on certain aspects of the environment while ignoring others. It is the mechanism that allows us to focus our mental resources on a specific task or stimulus, and it is essential for many cognitive functions, such as perception, memory, and learning.

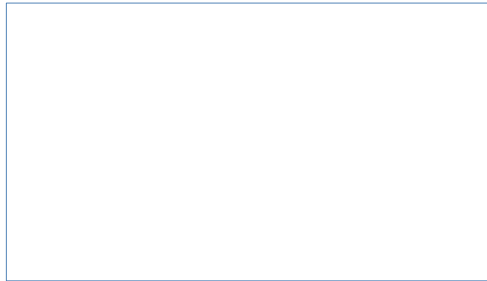


# Presentation of information

Bowling			
Dhruv Pandey	Aditya Chopra	Yuvraj Basoiya	Karan Sharma
O	O	O	O
5.0	5.0	5.0	5.0
M	M	M	M
0	0	0	0
R	R	R	R
36	40	36	36
W	W	W	W
0	2	0	0
Econ	Econ	Econ	Econ
7.20	8.00	7.20	7.20



Bowling	O	M	R	W	Econ
Dhruv Pandey	5.0	0	36	0	7.20
Aditya Chopra	5.0	0	40	2	8.00
Yuvraj Basoiya	5.0	0	43	1	8.60
Karan Sharma	5.0	0	51	0	10.20

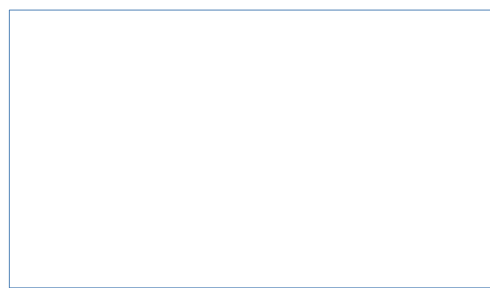


### Bowling

Dhruv Pandey	Aditya Chopra	Yuvraj Basoiya	Karan Sharma
<b>O</b>	<b>O</b>	<b>O</b>	<b>O</b>
5.0	5.0	5.0	5.0
<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>
0	0	0	0
<b>R</b>	<b>R</b>	<b>R</b>	<b>R</b>
36	40	36	36
<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>
0	2	0	0
<b>Econ</b>	<b>Econ</b>	<b>Econ</b>	<b>Econ</b>
7.20	8.00	7.20	7.20

### Bowling

	O	M	R	W	Econ
Dhruv Pandey	5.0	0	36	0	7.20
Aditya Chopra	5.0	0	40	2	8.00
Yuvraj Basoiya	5.0	0	43	1	8.60
Karan Sharma	5.0	0	51	0	10.20
Arnav Aggarwal	3.0	0	27	1	9.00 (2w)
Divyansh Vohra	2.0	0	16	0	8.00



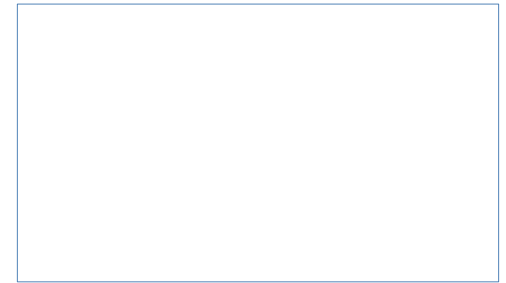


## To do

- Color
- Underlining
- Sequence of information
- Spacing of items

## To avoid

- Cluttering visual interfaces with too much information.

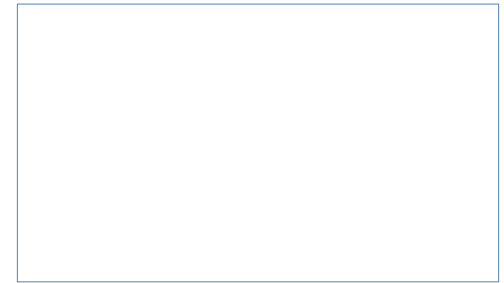


# Perception

Perception is the process by which we interpret and organize sensory information from our environment. It involves taking in sensory input from the world around us through our senses (e.g., vision, hearing, touch, taste, smell), and then using this information to form a mental representation of the world.



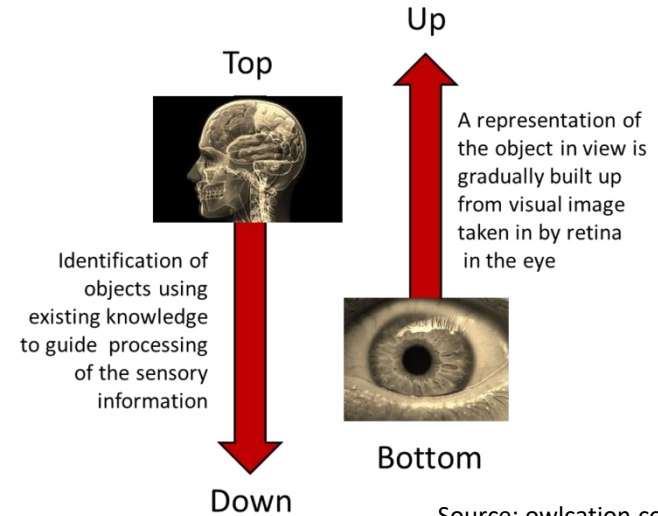
Source: study.com



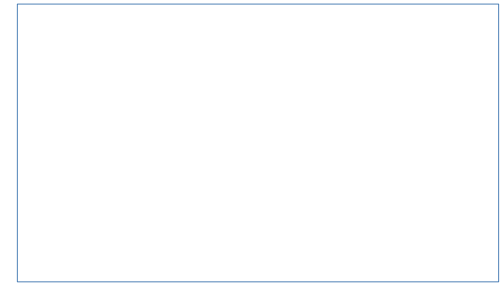


# Perception

Perception is a complex and multi-stage process that involves both **bottom-up processing** (processing sensory information from the environment) and **top-down processing** (using prior knowledge and expectations to interpret and organize sensory information).



Source: owlcation.com



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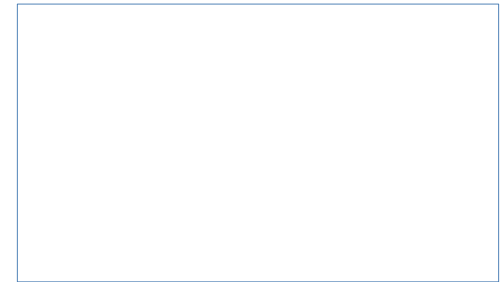
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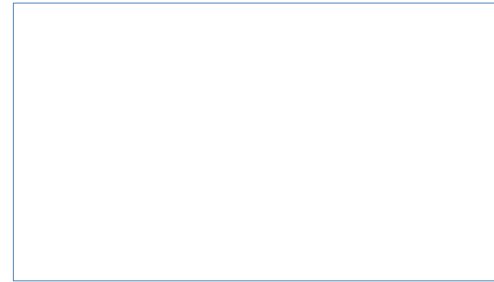
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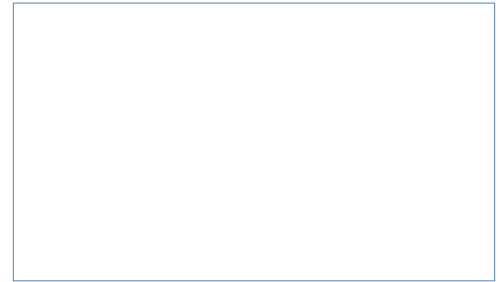
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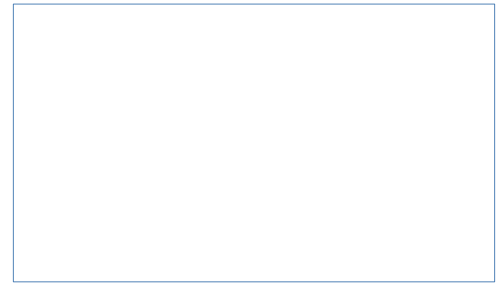
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## To do

- Distinguish icons and graphical representations
- Grouping information- separators and white space
- Color contrast techniques
- Distinguish audio sounds
- Distinguish haptic feedback

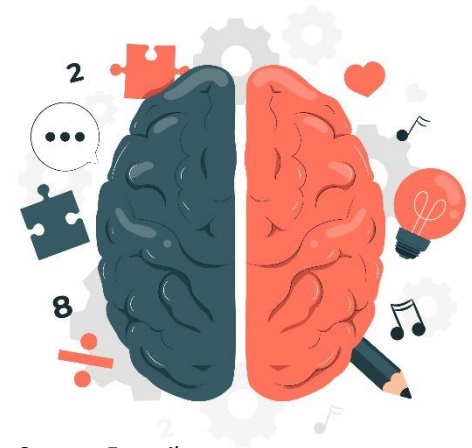


# Memory

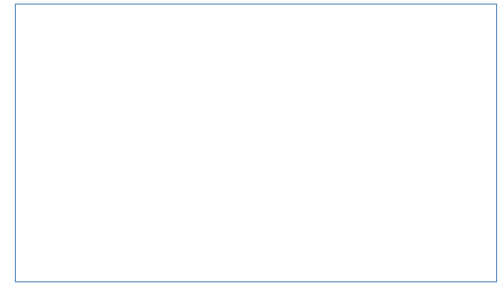
Memory is the ability to encode, store, and retrieve information over time.

*For example,* it allows them to recognize someone's face, remember someone's name, recall when they last met them, and know what they said to them last.

*It is a critical cognitive process that underlies many aspects of human behaviour, including learning, decision-making, and problem-solving.*



Source: Freepik

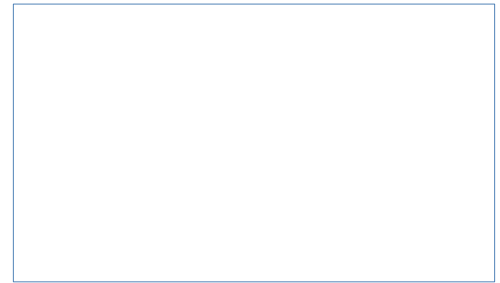


# Memory

There are different types of memory, including

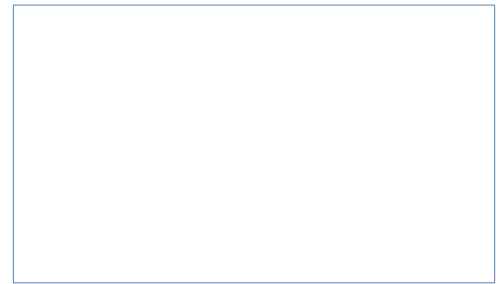
- Sensory memory
- Short-term memory
- Long-term memory

**Sensory memory** refers to the brief retention of sensory information (e.g., visual or auditory stimuli) that occurs immediately after a stimulus is presented.



**Short-term memory**, also known as working memory, is the temporary storage and manipulation of information needed for cognitive tasks, such as mental arithmetic or remembering a phone number.

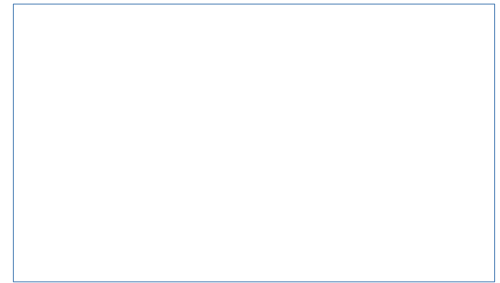
**Long-term memory** refers to the storage of information over an extended period of time, ranging from minutes to years.





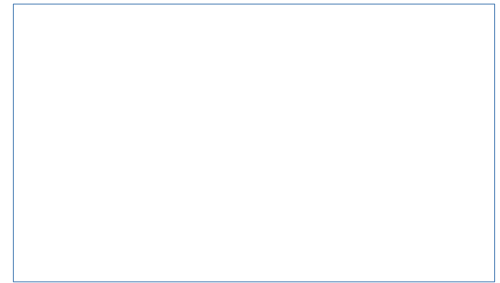
# Personal Information Management

The number of documents written, images created, music files recorded, video clips downloaded, emails with attachments saved, URLs bookmarked, and so on, increases every day. A common practice is for people to store these files on a phone, on a computer, or in the cloud with a view to accessing them later. This is known as *personal information management (PIM)*.



# Memory Load and Passwords

**Multifactor authentication (MFA)** is a security mechanism that requires users to provide two or more different types of authentication factors to verify their identity when accessing a system or application. Authentication factors can be categorized into three types: something you know (e.g., a password or PIN), something you have (e.g., a security token or smart card), and something you are (e.g., biometric data such as fingerprint or facial recognition).



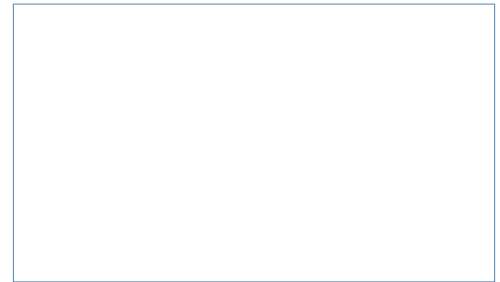
## George Miller's (1956) seven plus or minus two theory

8, 12, 5, 9, 16, 24, 82, , 1, 15, 22, 45, 7

Cat, shoe, milk, hole fly, chocolate, butter, house, string, shirt, key

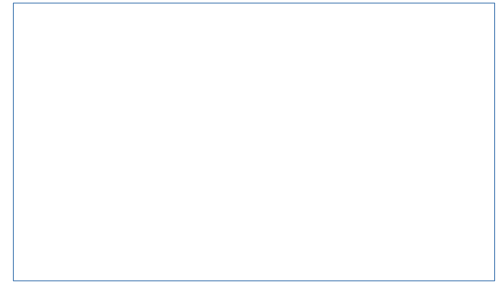
House cat, shoe string, chocolate milk, butter fly, key hole

House milk , cat shoe, butter key, chocolate shoe, fly hole



## Perception of some designers:

- Only seven options on a menu
- Only seven icons on a menu bar
- Seven bullets in a list
- Seven tabs at the top of a website page
- Seven items on a pull-down menu



The screenshot shows the Amazon India homepage. At the top, there is a navigation bar with the text "Hello" and a search bar containing "Amazon.in". To the right of the search bar, there are links for "EN", "Hello, Sonil Account & Lists", "Returns & Orders", and a shopping cart icon. Below the navigation bar, there are several category links: "Gift Cards", "Gift Ideas", "Amazon Business", "Pet Supplies", "AmazonBasics", "Grocery & Gourmet Foods", "Customer Service", and "Home Improvement".

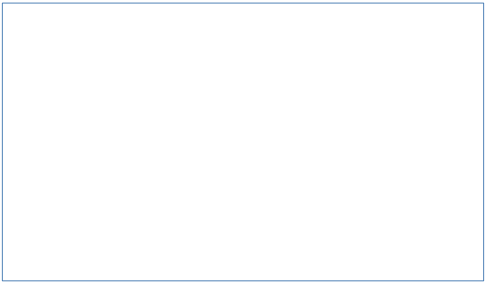
The main content area features a large banner for the "GREAT SUMMER SALE" running from "4<sup>TH</sup> - 8<sup>TH</sup> MAY". The banner includes the text "Ends midnight SHOP NOW" and "10% Savings\* on Credit/Debit Cards & EMI". Below the banner, there are three main promotional sections:

- Latest and upcoming launches:** This section displays two smartphones: the OnePlus Nord CE 3 Lite 5G (Starting ₹19,999) and the Samsung M14 5G (Starting ₹14,990).
- Up to 70% off | Amazon Brands & more:** This section features trending furniture for each room and electronic accessories.
- Become an Amazon seller today:** This section encourages users to register as a seller.

A navigation menu is open on the left side of the screen, showing the following categories:

- Digital Content And Devices**
  - Echo & Alexa
  - Fire TV
  - Kindle E-Readers & eBooks
  - Audible Audiobooks
  - Amazon Prime Video
  - Amazon Prime Music
- Shop By Category**
  - Mobiles, Computers
  - TV, Appliances, Electronics
  - Men's Fashion
  - Women's Fashion
  - See All

The Windows taskbar is visible at the bottom of the screen, showing the search bar with the text "Type here to search" and several application icons. The system tray on the right shows the time as 19:38 and the date as 08/05/2023.



# Digital Forgetting

- To-do lists
- Reminders

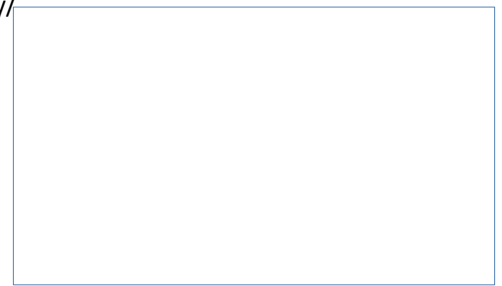
## Designing for memory loss

- Alzheimer's disease



Source:

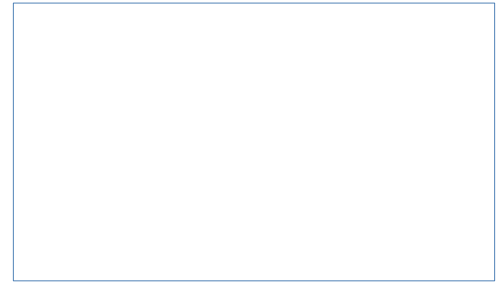
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## To do

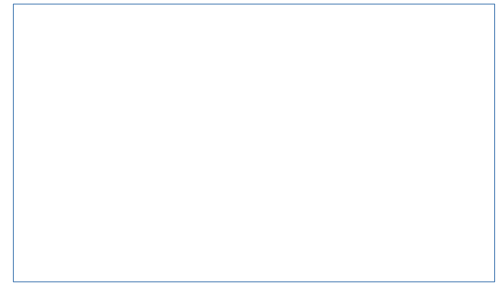
- Avoid long and complicated procedures for carrying out tasks
- Design interfaces that help recognition rather than recall - using familiar interaction patterns, menus, icons, and consistently placed objects
- Provide users with a variety of ways of labeling digital information (for example files, emails, and images) to help them easily identify it again through the use of folders, categories, color, tagging, time stamping, and icons.



# Learning

Learning is closely connected with memory. It is the process by which an individual acquires knowledge or skills through experience, study, or instruction. It is a fundamental aspect of human development and behaviour, and it plays a crucial role in shaping our understanding of the world around us.

- Incidental learning
- Intentional learning

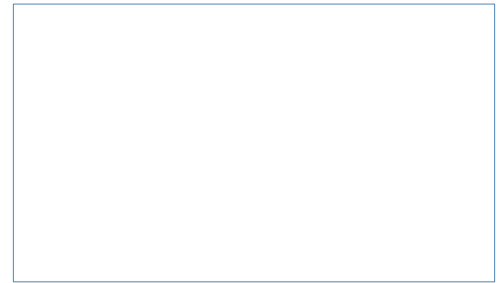






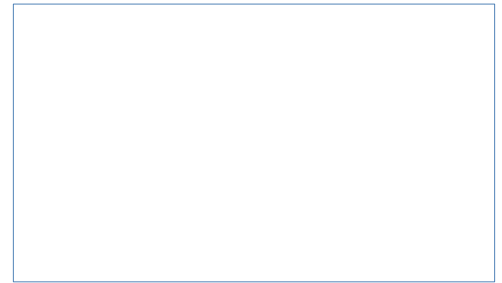
## To do

- Interfaces that encourage exploration
- Interfaces that constrain and guide users to select appropriate actions when initially learning



# Reading, speaking, and listening

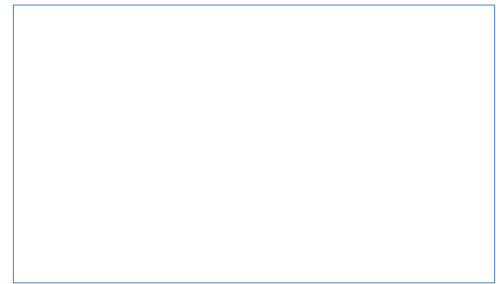
Reading, speaking, and listening are three forms of language processing that have some similar and some different properties. One similarity is that the meaning of sentences or phrases is the same regardless of the mode in which it is conveyed.





## To do

- Short length of speech-based menus and instructions
- Clear audio in artificial speech voices
- Making text large on a screen



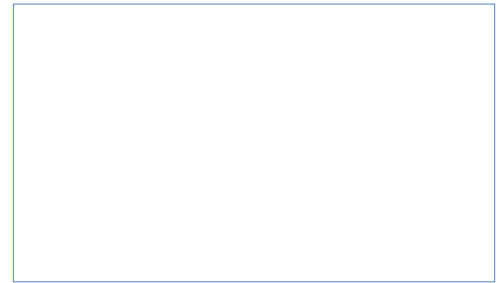
# Problem-solving, planning, reasoning, and decision-making

These are processes involving reflective cognition.

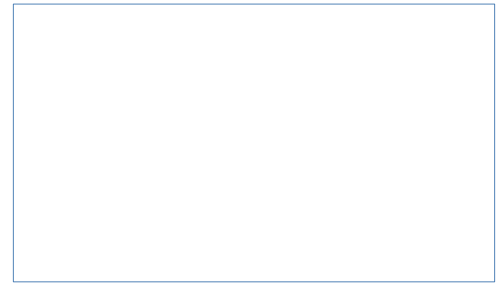
They include thinking about what to do,

What the available options are, and

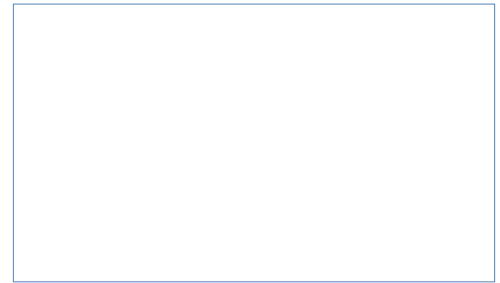
What the consequences might be of carrying out a given action.



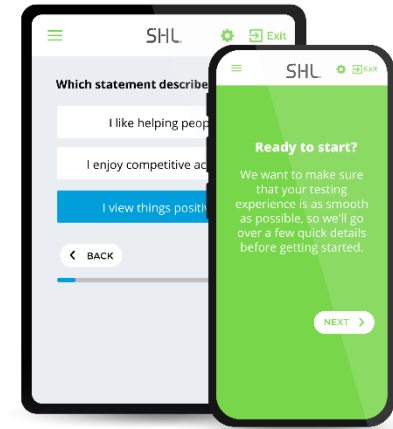
**Problem-solving** is the process of identifying, analyzing, and resolving problems or obstacles in order to achieve a specific goal. It involves using various cognitive strategies and approaches to break down complex problems into smaller, more manageable components and to identify potential solutions.



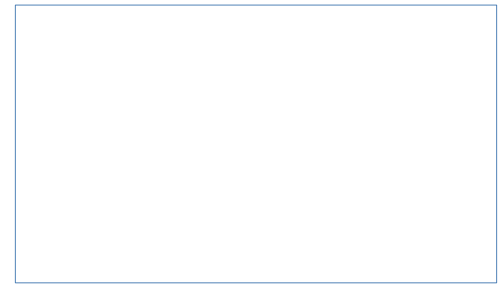
**Planning** is the process of developing a course of action to achieve a specific goal. It involves setting objectives, identifying resources, and determining the steps needed to reach a desired outcome.



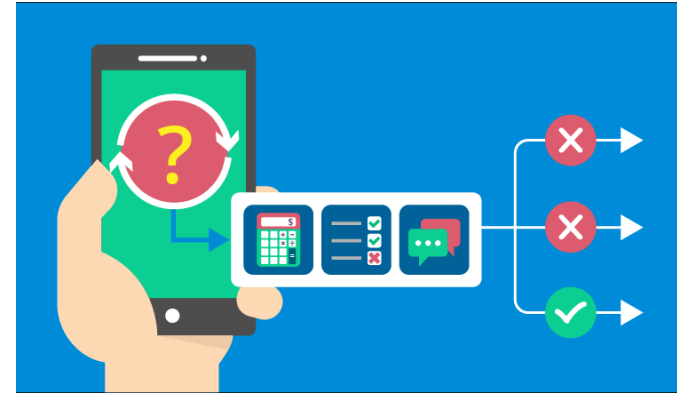
**Reasoning** is the process of using logical and critical thinking to make sense of information and to draw conclusions based on evidence and facts. It involves analysing data, evaluating arguments, and making informed judgments.



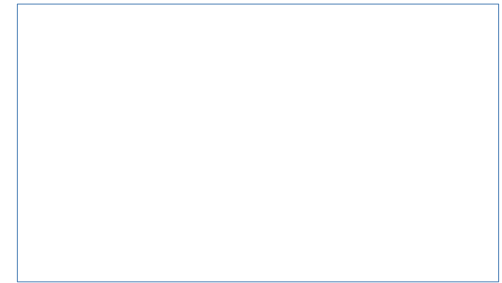
Source: SHL.com



**Decision-making** is the process of choosing a course of action from among several alternatives. It involves assessing the available options, considering the potential risks and benefits of each option, and making a choice based on the best available information.



Source: Sciencesoft

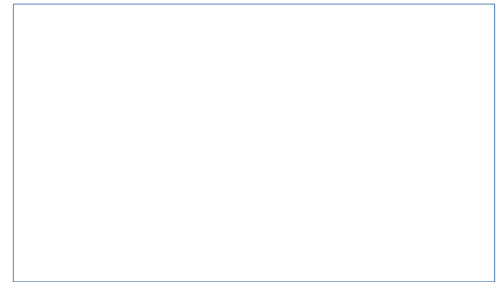






## To do

- Information and help pages- for easy access for people who want to understand more about how to carry out an activity more effectively (for example, web searching).
- Simple and memorable functions for quick decision-making and planning.



**Thank You**

