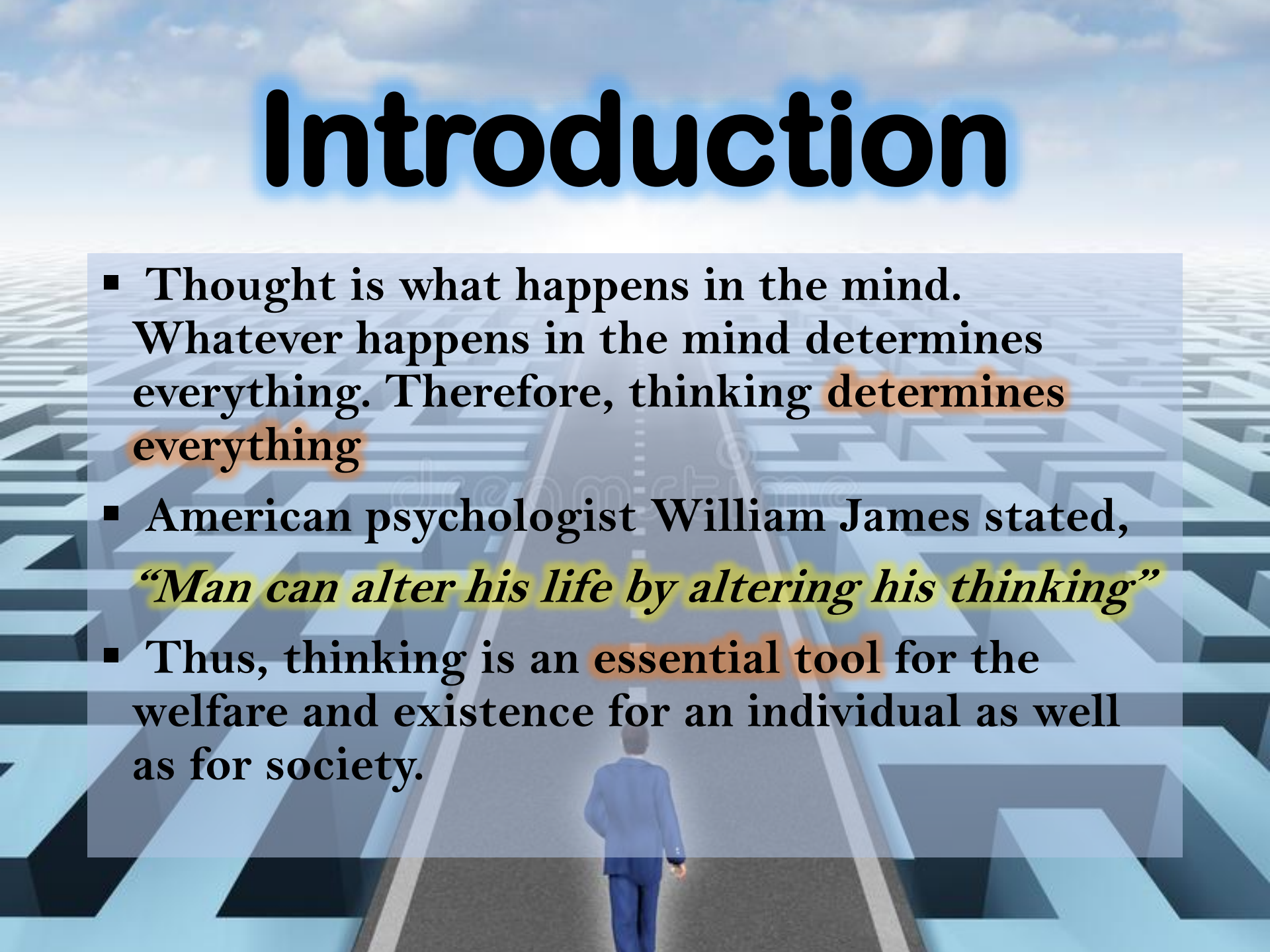

Thinking

Introduction

- Thought is what happens in the mind. Whatever happens in the mind determines everything. Therefore, thinking determines everything
- American psychologist William James stated,

  "Man can alter his life by altering his thinking"
- Thus, thinking is an essential tool for the welfare and existence for an individual as well as for society.



Nature of Thinking

- Thinking is a cognitive activity
- Thinking is directed to achieve some goal or purpose.
- Thinking is an important problem solving behavior.
- During thinking, there is a mental exploration instead of motor exploration
- Thinking is a symbolic activity. It involves signs, symbols, and mental images.
- Thinking can be shifted very rapidly.

❑Hence, it is termed as the language of the brain.

Definitions of Thinking

- Thinking can be defined as a mental activity that is involved in the understanding, processing and communicating of information.
- The word "think" means "to reason" and therefore, it involves hidden tools and techniques in order to organize and manipulate information and knowledge.
- In fact, thinking is a problem-solving process and behavior

Elements of Thought

- Thought depends on memory and requires attention. Information processed from thoughts can be organized into many different manipulations, which form the elements of thought.

- Some of the basic elements of thoughts are as follows:-

➢ **Observations:** - Including present and past observations.

➢ **Memories:** - Of images, words, and sensations.

➢ **Judgments:** - Our judgments include good-bad, right-wrong, pretty-ugly etc. labels.

➢ **Storytelling Thoughts:** - That try to explain why things happen and likely explanations.

➢ **Future Thoughts:** - Including our steps to cope with the future.

Tools of Thinking

- A thinking tool is an instrument that can help us in using our minds systematically and effectively.
- There are *three main tools* of thinking:-

✓Concepts

✓Imagery

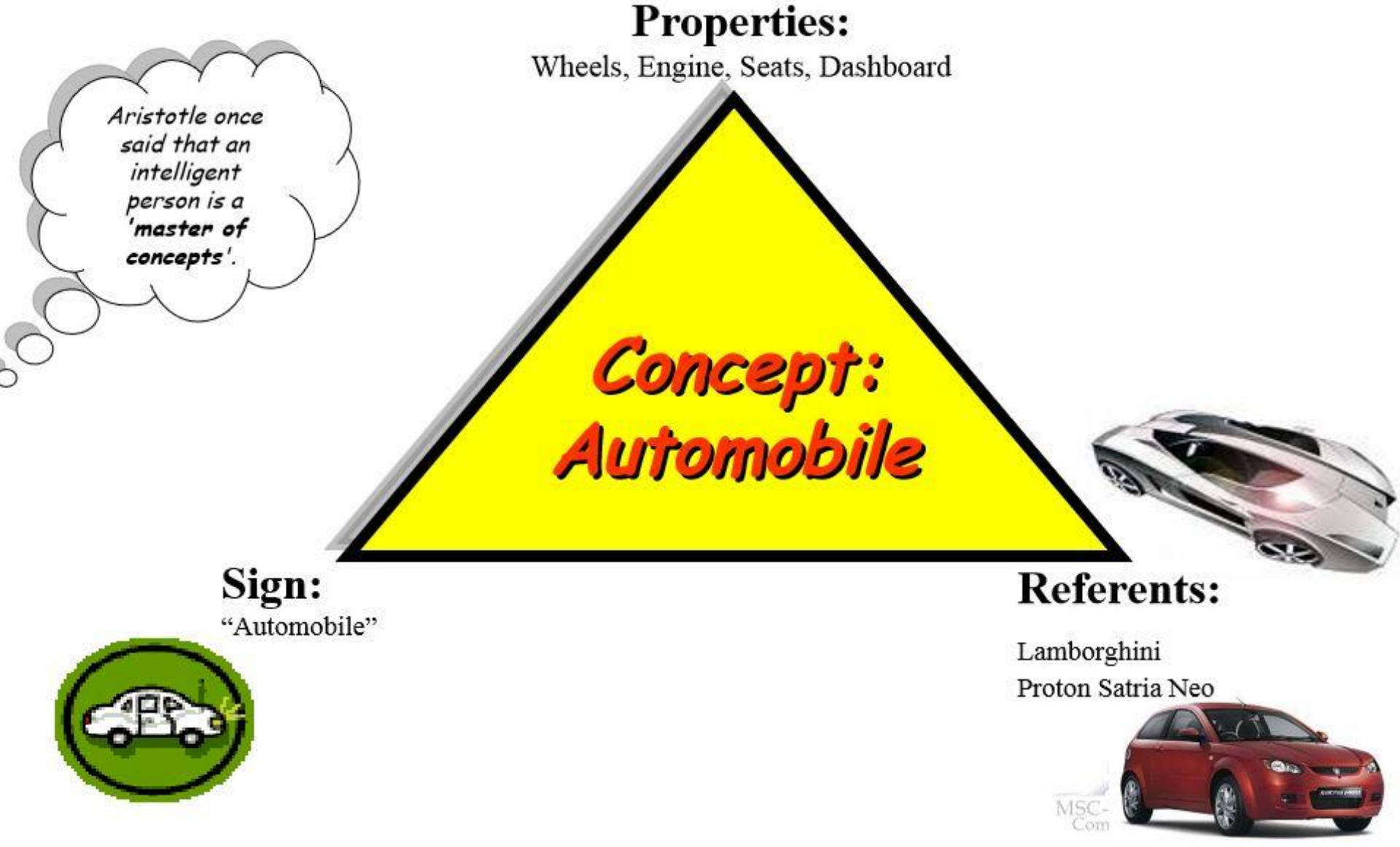
✓Language

Concepts

- General ideas that we use to identify and organize our experience are called concepts.
- Just as words are the vocabulary of language, concepts are the vocabulary of thought. In fact, concepts are the sum total of what we know about an object (how it looks, how it sounds, how it feels etc.), event or idea.

Nature and Structure of Concepts

- In order to be easily manipulated and communicated, concepts have a specific structure involving:-
  - **Sign:** - The word or symbol that names the concept.
  - **Referents:** - The examples of the concept.
  - **Properties:** - Qualities that all examples of the concept share in common.



Example of Concept Structure

Concept Formation

- No one is certain how concepts are formed. However, general theories show that *3* main processes are involved.

(1) **Abstraction** is an analytical process which involves the mental analysis of an object.

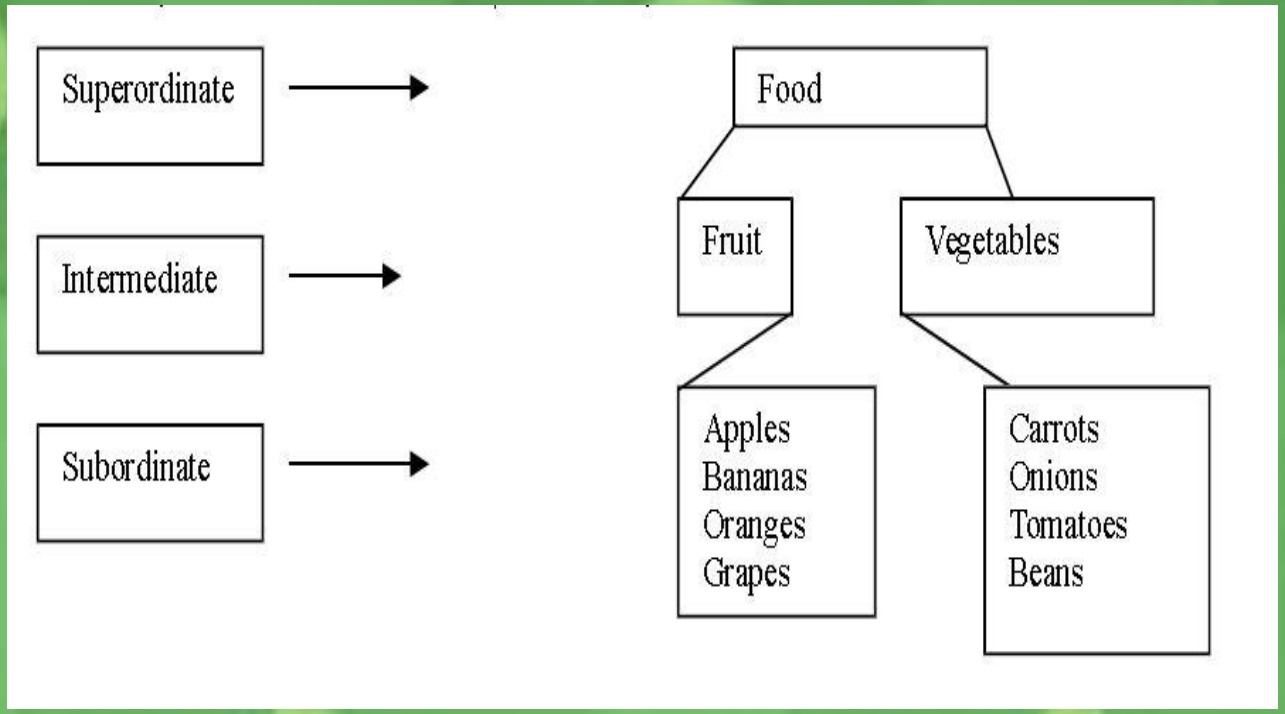
(2) **Generalization** is focusing on the common properties shared by a group of things.

(3) **Interpretation** is involved in the finding of examples of the concept.

TERMS USED TO DESCRIBE CONCEPTS

1- Hierarchies :- Concepts can form networks in which one concept may be part of other concepts.

- **Things that have common attributes fall on same level**



2- Scheme and Scripts:-

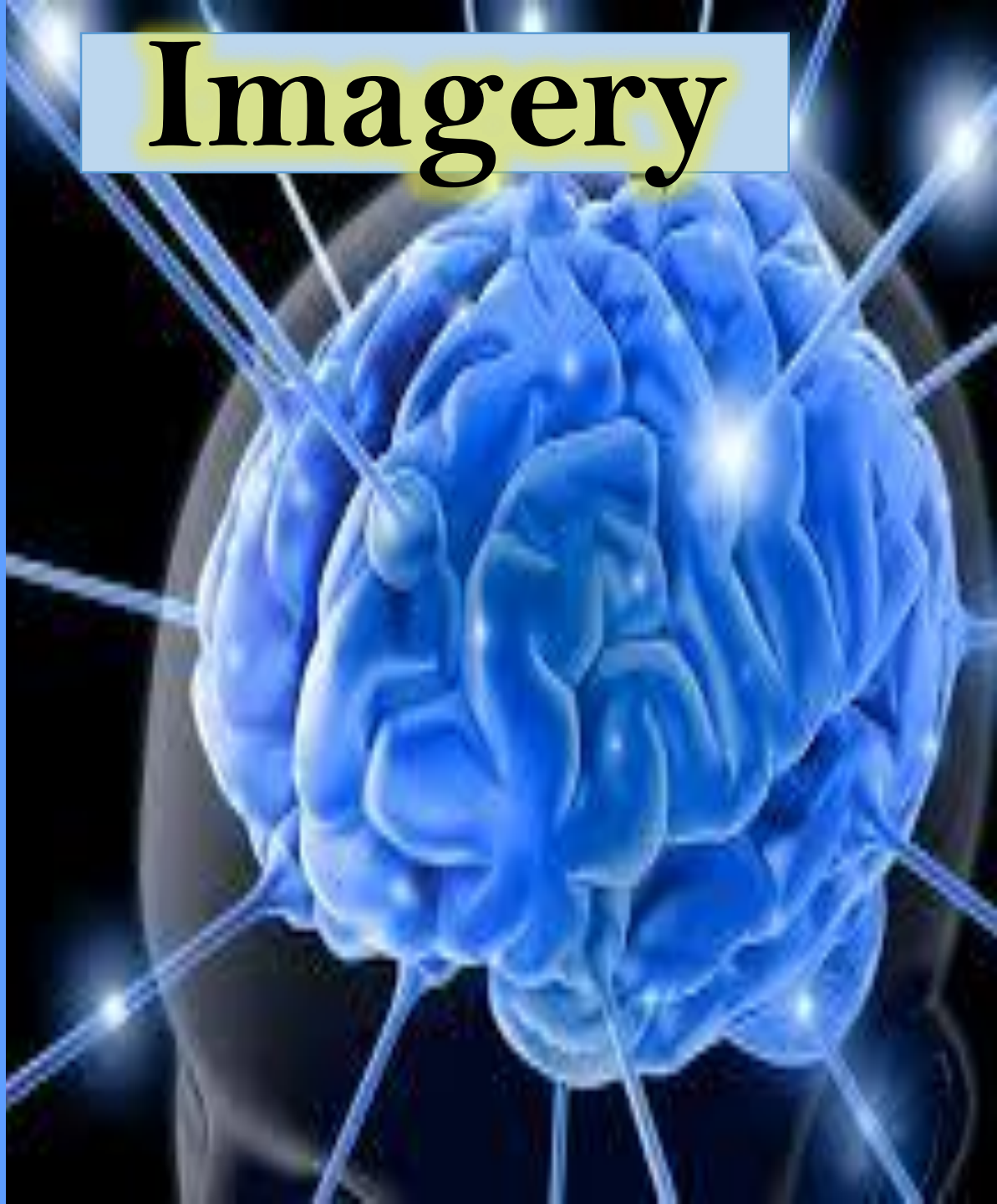
- Schemas are the primary units of meaning in the human information processing system. They are the blue-prints for perception
- Scripts are schemas for routine, familiar activities

3- Propositions and Mental Models:-

- A proposition is the smallest unit of knowledge that can stand as a separate assertion
- Mental models are the clusters of prepositions representing the people's understanding of how things work.

Imagery

- Mental pictures consist of personal experiences of objects, persons, or situations both heard and felt.
- An image is a mental picture formed in the mind in the absence of stimulus. This takes place when we try to remember the experience of stimulus.



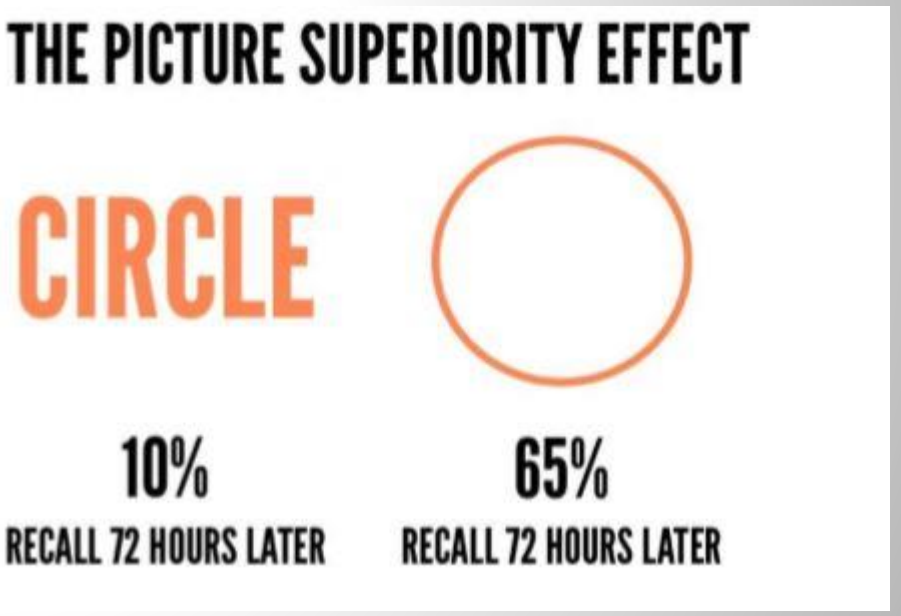
- **Imagery** is the symbolic representation of objects and their characteristics. The mental representations have picture-like qualities.

- For instance, we can form a mental image of an absent person or object. The information is based on how the person looks i.e. a visual.

- Images help in thinking more effectively. Forming an image can help remember information and help us also remember unrelated things. For example, it is difficult to remember a list of unrelated words but if we attach images to the words, they become easier to remember.

The Picture Superiority Effect

- The "Picture Superiority Effect" is a large body of research which shows that humans more easily learn and recall information that is presented as pictures than when the same information is presented in words.

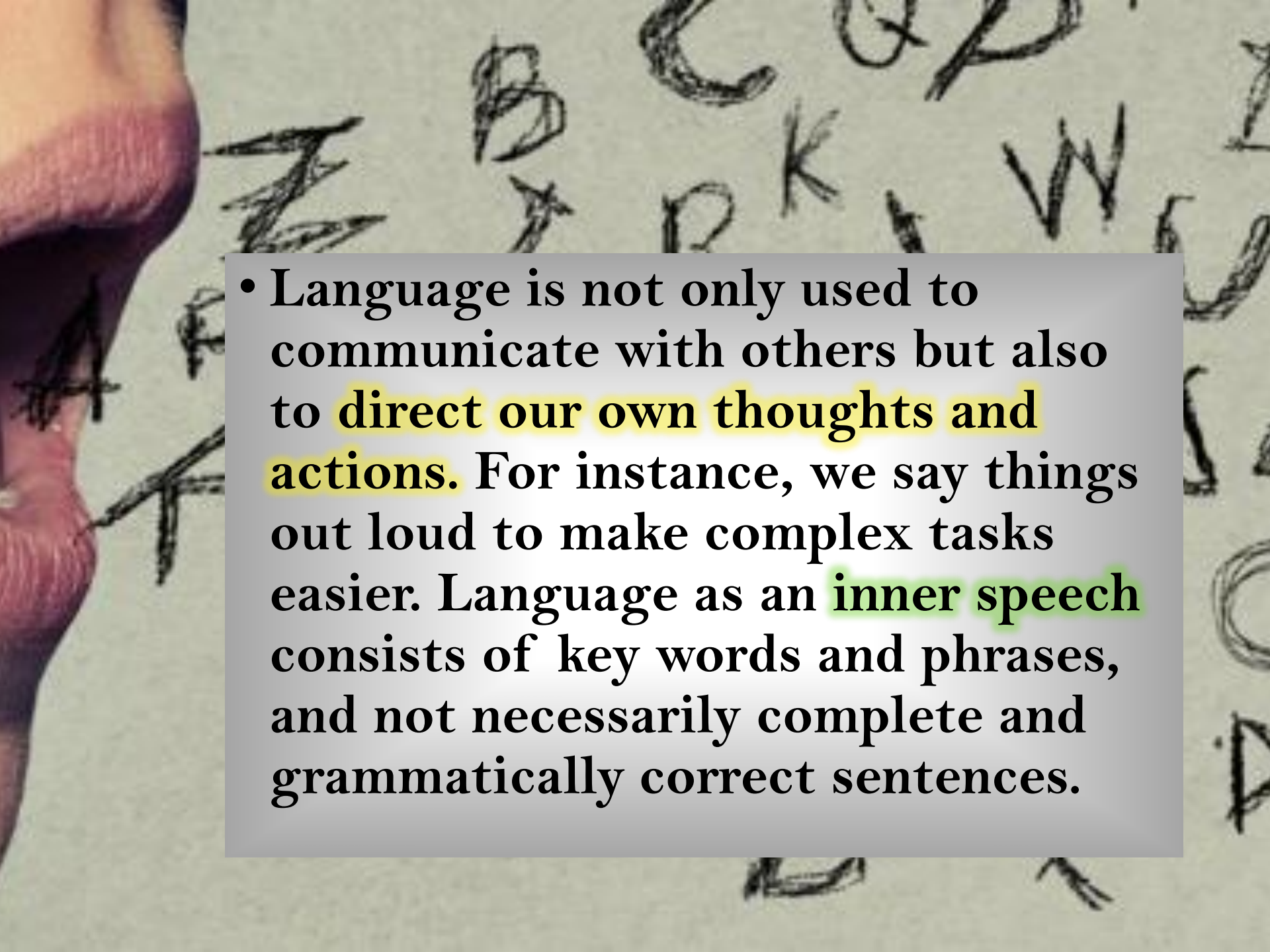


Mental imagery is widely applicable to our daily lives, such as imagining the smile of a friend or colors of your favorite dress. Recent research has tried to **prove that mental imagery is in fact a weaker version of normal imagery – seeing.** Investigations are still going on to understand the cognitive processes involved in imagery.

Language

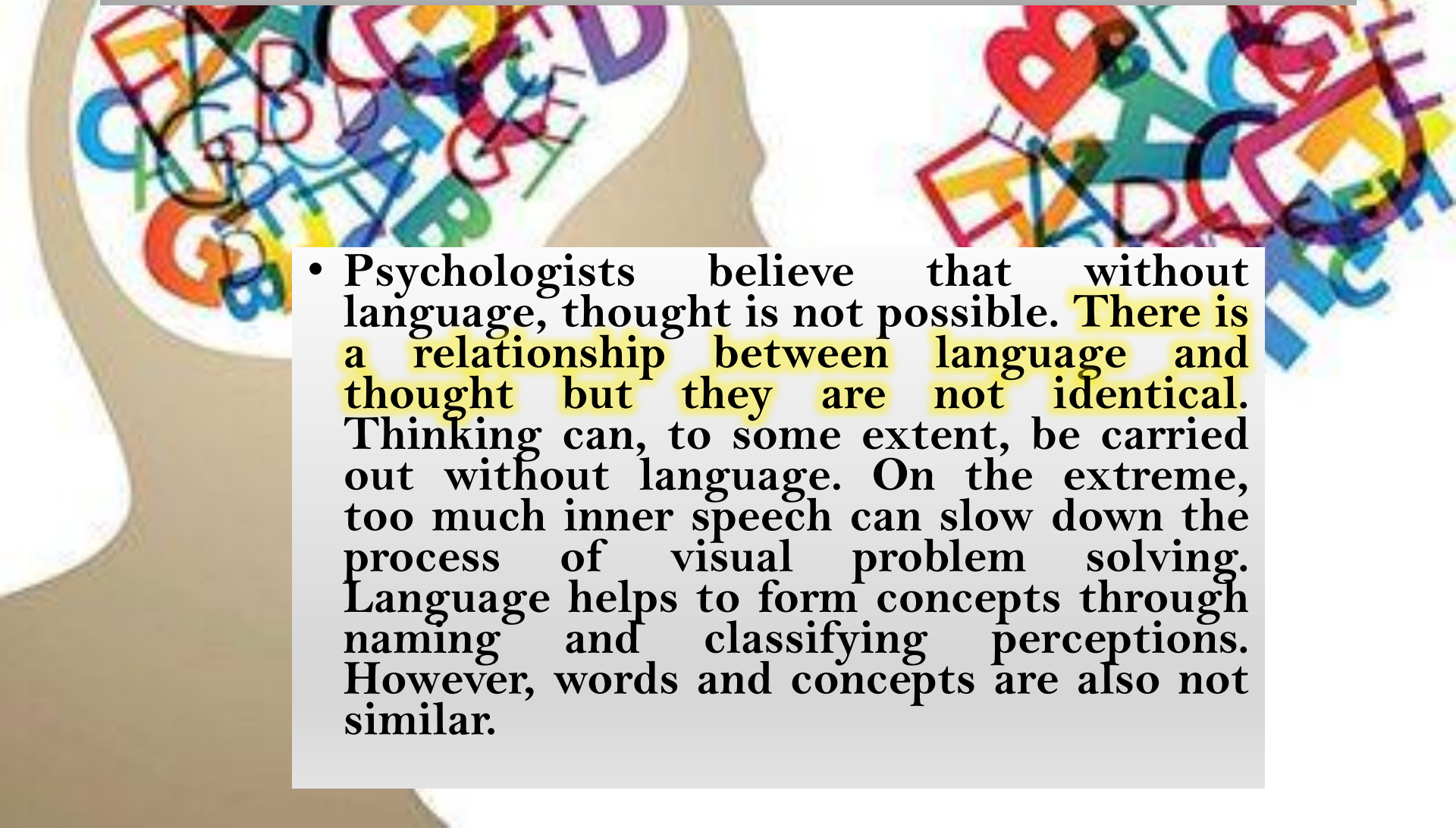
- Language is the means by which we can express our thoughts to others in verbal or written form. If we confine ourselves to conceptual and perceptual thinking, our thinking would remain at low levels. Language, like thoughts, is directed towards some goal. Most thinking relies great deal on language.

- Generally we think in our mother tongue or the language which is very familiar to us. Our thinking will flow like a stream because of language.
- Language is a system of symbols to represent thoughts. It is a way to make sense of things and means of communication with others based on a shared system of meaning.



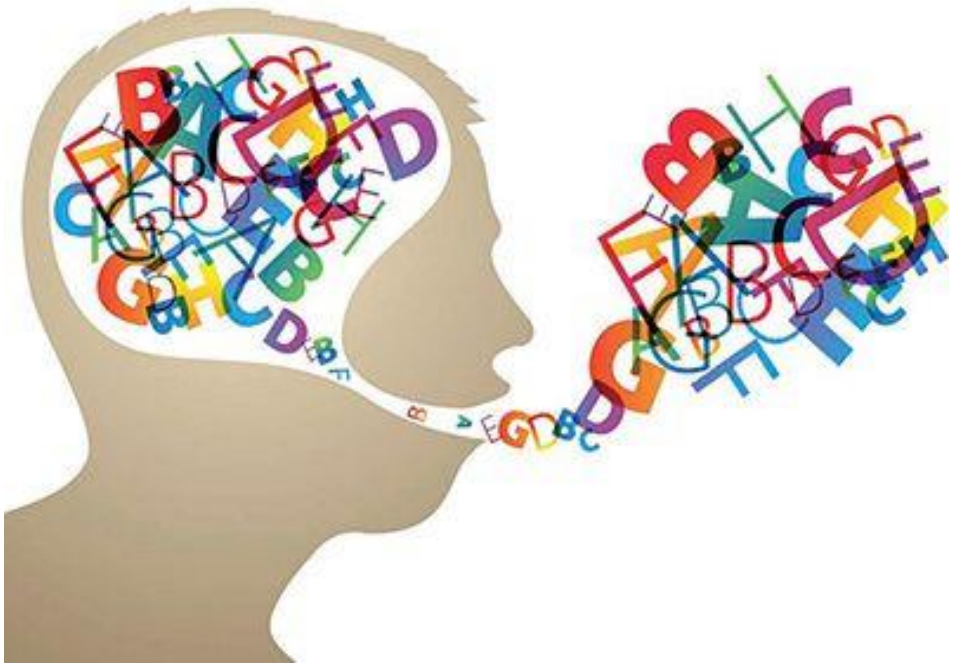
- Language is not only used to communicate with others but also to direct our own thoughts and actions. For instance, we say things out loud to make complex tasks easier. Language as an inner speech consists of key words and phrases, and not necessarily complete and grammatically correct sentences.

Language and Thought



- Psychologists believe that without language, thought is not possible. There is a relationship between language and thought but they are not identical. Thinking can, to some extent, be carried out without language. On the extreme, too much inner speech can slow down the process of visual problem solving. Language helps to form concepts through naming and classifying perceptions. However, words and concepts are also not similar.

- **Aristotle initially held the view that thought determines the structure of language.**
- **On the other hand, Benjamin Whorf argued in his Whorfian hypothesis that languages shape thoughts. In this hypothesis, it was claimed that people who have different languages also have different views of the world.**



Stages of Language Development

There are 3 stages of language development:-

1- **Phoneme Stage:**

Phoneme is the smallest unit of sound that affects the meaning of speech.

2- **Morpheme Stage:**

The smallest meaningful units in language form morphemes.

3- **Syntax Stage:**

The set of grammatical rules which combine words form the syntax stage, which gives an understandable language.

Infancy

- Infants are acutely attuned to the human voice and prefer it to other sounds. In particular they prefer the higher pitch characteristic of female voices.
- Between birth and 3 months of age – infants seem to recognize their mother's voice, turn towards familiar voices and sounds.
- Between 3 and 6 months – infants turn their heads towards a speaker, watch a speaker's mouth movements.
- Between 6 and 12 months – infants search for sources of sound.
- Between 9 and 12 months – Infants recognize words for common objects and names of family members

Toddlerhood

- During the second year of life language development proceeds at very different rates in different children. By the age of 12 months, most children use "mama/dada" appropriately.
- Between 12 and 15 months – Toddlers understand and follow one-step instructions.
- Between 15 and 18 months – Toddlers understand “up” and “down” words and put two short words to form sentences.
- Between 18 and 24 months – Toddlers can point to body parts and enjoy challenge words like “helicopter

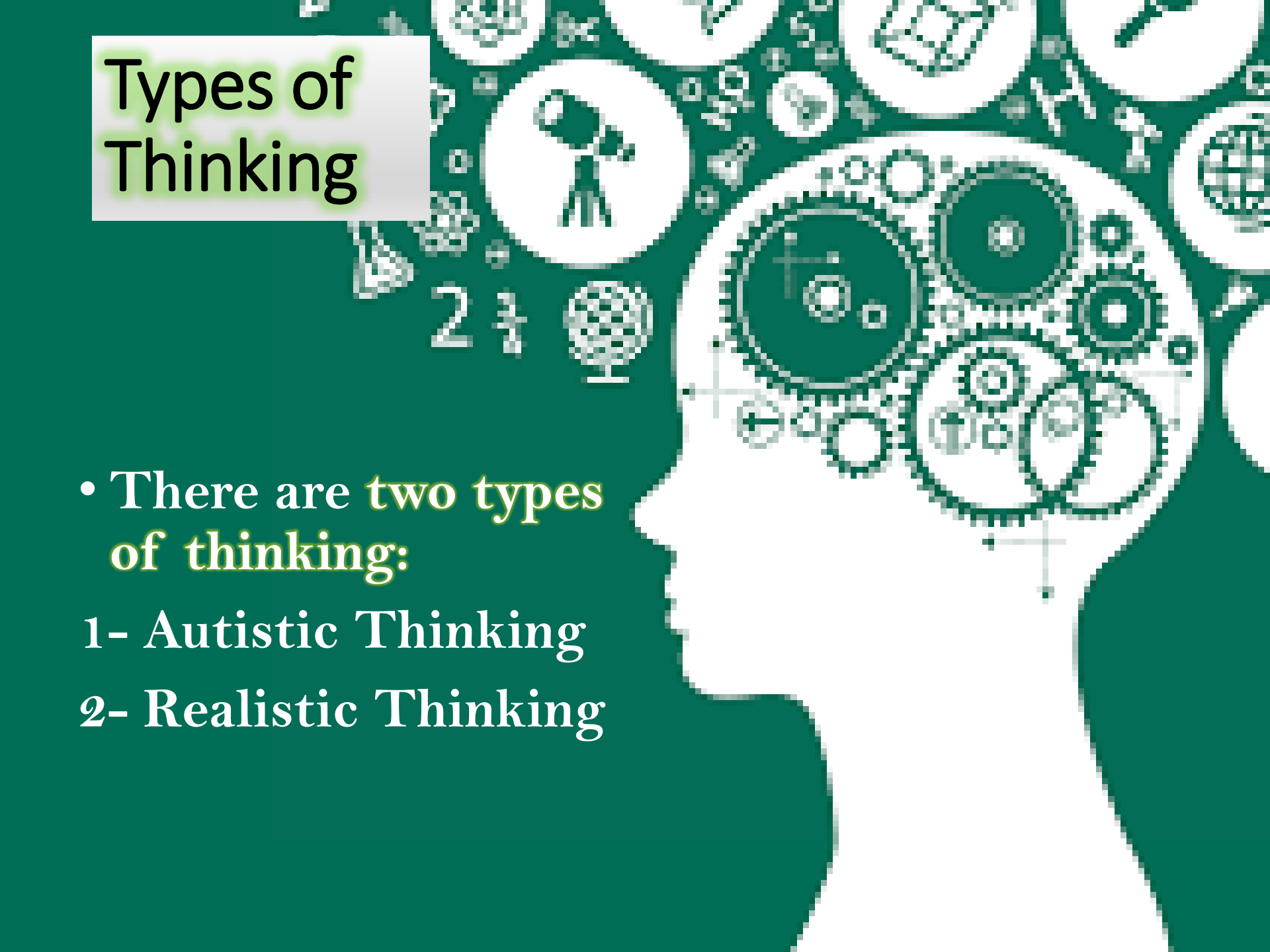
Preschool

- **3 to 4 year old's** – Can usually understand most of what they hear. They use three to six word sentences and ask questions
- **Between 4 to 5 years** – Children communicate easily with other children and adults. They tell stories that stay on topic, and answer questions about stories.

School Age

- **At age 5 – Children talk constantly and ask innumerable questions.**
- **At age 6 – Children can usually correct their own grammar mistakes.**
- **At age 7 - Children begin reading**
- **By age 10 – Children understand figurative word meanings.**

Types of Thinking



- There are **two types of thinking:**

1- Autistic Thinking

2- Realistic Thinking

Autistic Thinking

- Autistic thinking is a type of mental activity in which focus is directed inward and the thinking is subjective. It is comprised of inner thoughts and individual reality. Autistic thinking lacks connection with external reality.
- Autistic thinking is commonly called free-floating thinking. It is not goal or problem orientated.
- Autistic thinking is generally very private.
- Autistic thinking involves day dreaming, free association, and word association.

Day Dreaming

- Day Dreaming constitutes a temporary escape from daily reality by forming mental pictures, usually in spontaneous, brief episodes, of other experiences.
- A daydream may be triggered by a situation, a memory, or a sensory input (sight, taste, smell, sound and touch). It can occur anywhere, at any time.
- When the daydreamer begins to confuse the mental images with reality, the daydream is called a hallucination. Daydreaming is generally not harmful, unless the daydreaming episodes interfere with activities of daily living.

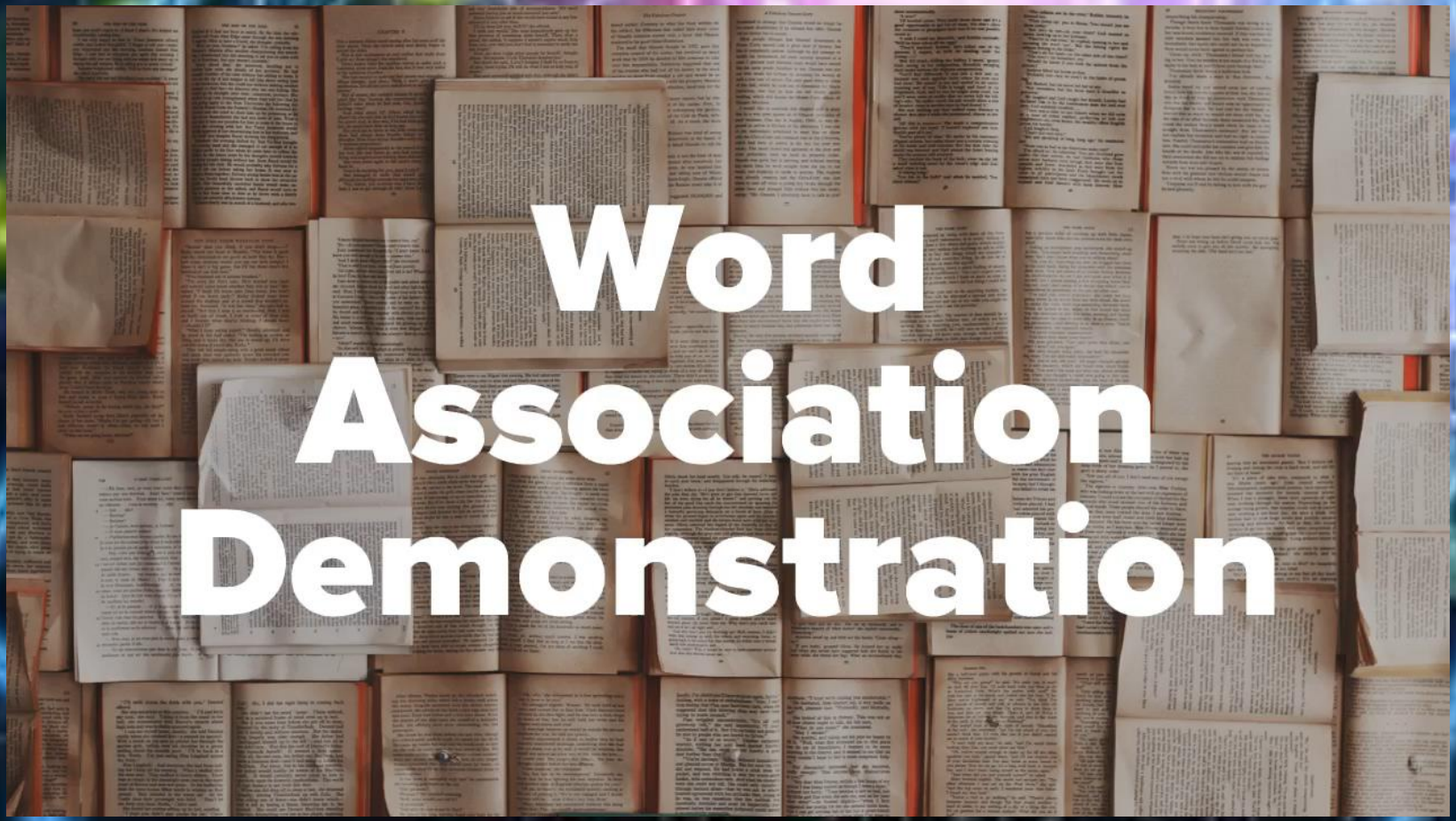
Free Association

- Free association is a practice in psychoanalytic therapy is which a client is asked to freely share thoughts, random words, and anything else that comes to mind, regardless of how coherent or appropriate the thoughts are.
- The process was originally developed by Sigmund Freud, who claimed that it gave clients complete freedom to examine their thoughts without interruption by the therapist.

Word Association

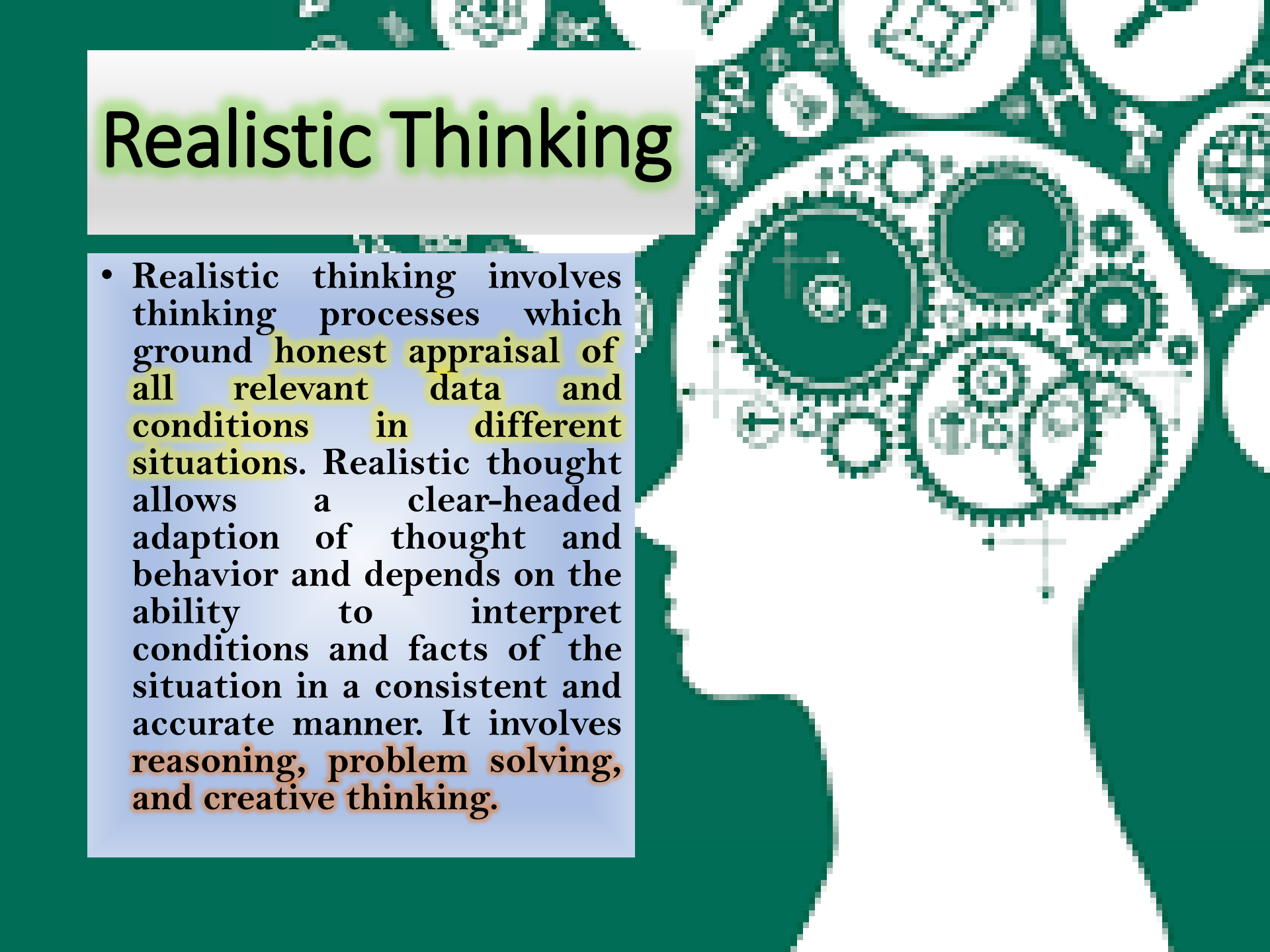
- Carl Jung was director of research on the Word Association Test (WAT). This test usually consisted of a hundred stimulus words that were read out singly to a subject who was to answer as quickly as possible with the first word that occurred to him or her. The reaction time, verbal response, and test behavior were recorded and analyzed.
- Carl Jung later speculated that how somebody responds to a word association exercise might reveal something about their character
- For example, if the word "cat" gives different associations like "companion" and even "claw", this highlights that different associations are related to different perceptions or experiences with cats or the word to be associated with.

Demonstration



Realistic Thinking

- Realistic thinking involves thinking processes which ground honest appraisal of all relevant data and conditions in different situations. Realistic thought allows a clear-headed adaption of thought and behavior and depends on the ability to interpret conditions and facts of the situation in a consistent and accurate manner. It involves reasoning, problem solving, and creative thinking.



Reasoning

- Reasoning is an essential cognitive ability and it resembles thinking. According to Garrett, "Reasoning is step-wise thinking with a purpose or goal in mind". It combines past experiences in order to solve a problem which cannot be solved by mere reproduction of earlier solutions.
- Reasoning has a definite purpose or goal. It involves problem solving behavior. Like thinking, reasoning makes use of one's previous knowledge and experience. It is also a mental exploration as we try to explore mentally the reason or cause for an event happening.
- Reasoning is of two main types – inductive or deductive reasoning.

Inductive Reasoning

- Inductive reasoning, or induction, is reasoning from a specific case or cases and deriving a general rule. It draws inferences from observations to make generalizations. In doing so, it recognizes that conclusions may not be certain. Inference can be done in four stages:

(i) **Observation:** collect facts, without bias.

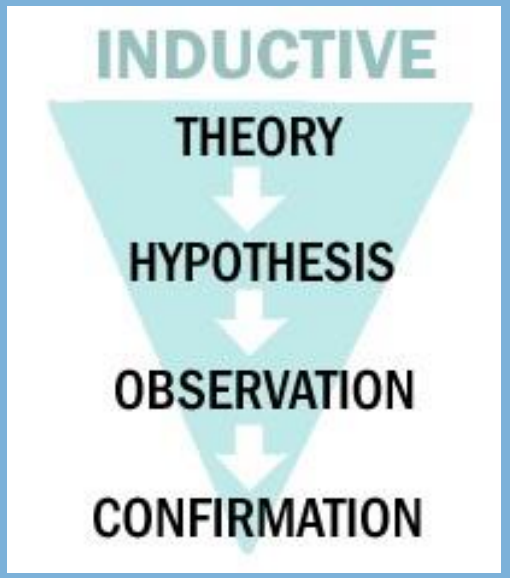
(ii) **Analysis:** classify the facts, identifying patterns of regularity.

(iii) **Inference:** From the patterns, infer generalizations about the relations between the facts.

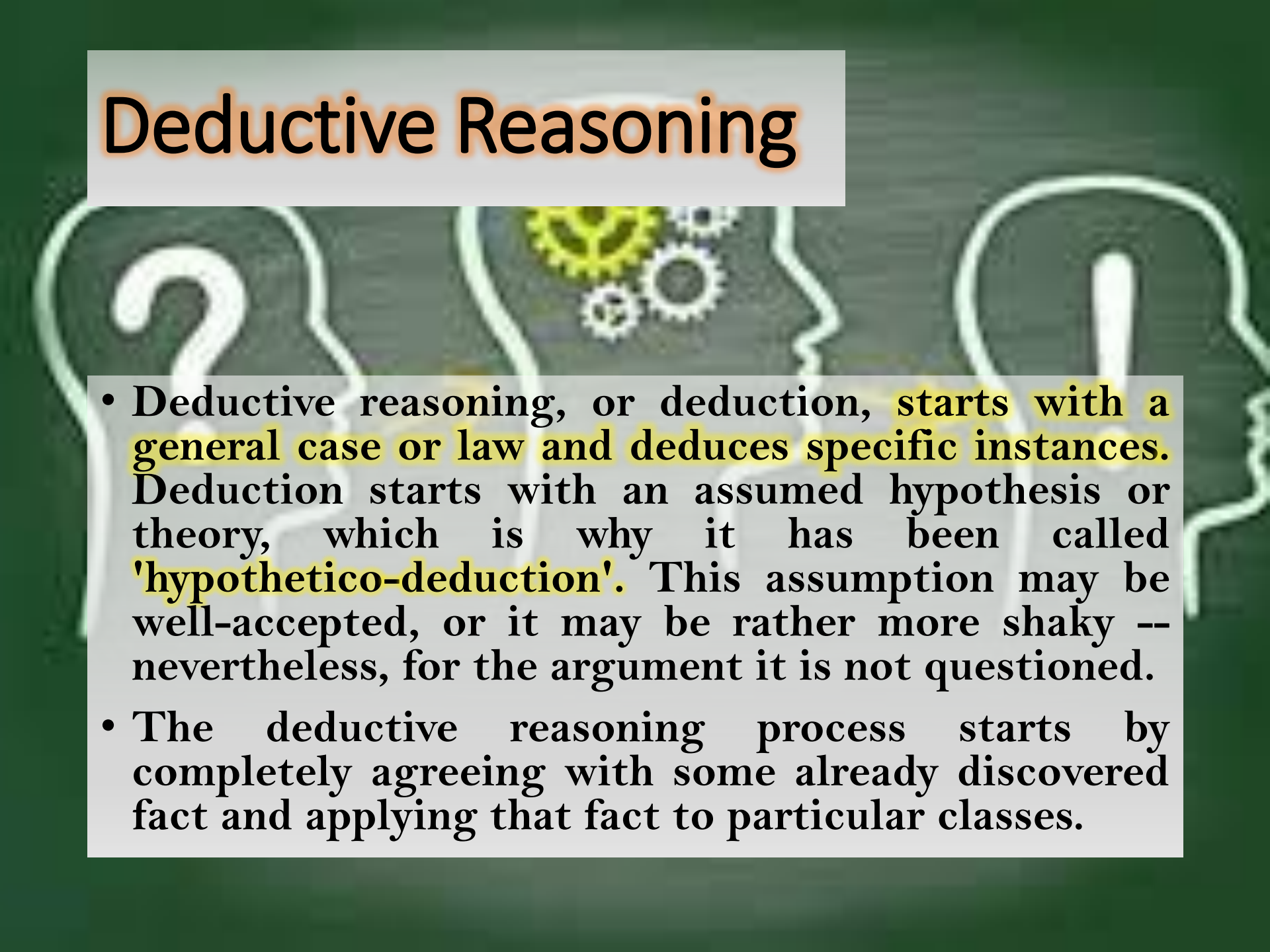
(iv) **Confirmation:** Testing the inference through further observation.

Examples of Inductive Reasoning

- Jenny is a dancer. Dancers are thin and tall. Jenny is thin and tall.
- All of your friends are good. You can be good, too.



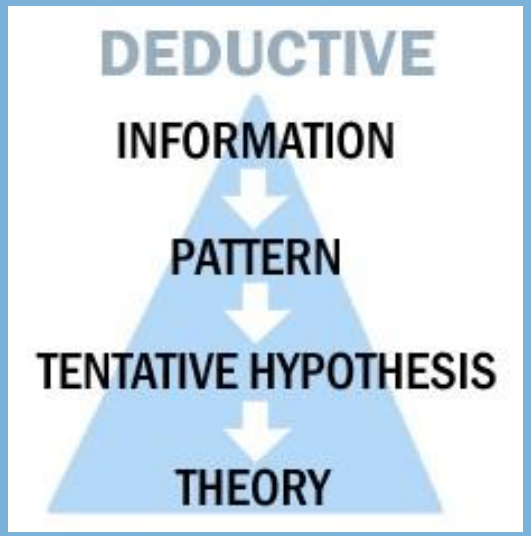
Deductive Reasoning



- Deductive reasoning, or deduction, starts with a general case or law and deduces specific instances. Deduction starts with an assumed hypothesis or theory, which is why it has been called 'hypothetico-deduction'. This assumption may be well-accepted, or it may be rather more shaky -- nevertheless, for the argument it is not questioned.
- The deductive reasoning process starts by completely agreeing with some already discovered fact and applying that fact to particular classes.

Examples of Deductive Reasoning

- To earn a master's degree, a student must have 32 credits. Hafsa has 40 credits, so she will earn a master's degree.
- Gravity makes things fall. The apple that hit my head was due to gravity.



Problem Solving

- Everybody in this world is faced with problems. These involve obstacles during our path of trying to attain our needs and motives that are to be satisfied. For this purpose, we set definite goals or aims.
- Problem solving is a mental process that involves discovery, analyzing and solving problems. The ultimate goal of problem solving is to overcome obstacles and find a solution that best resolved the issue.
- Problem solving is thus, any goal directed activity that must overcome some type of barrier to accomplish a task
- There are four main stages of creative problem solving as proposed by Donald M. Johnson and other psychologists. These involve preparation, production, incubation, and judgement.

1- Preparation

- In the first stage, the thinker formulates the problem and collects the facts and materials considered necessary for finding new solutions. The process involves attention, reasoning, and planning to gather information.
- During the preparation stage of problem solving, a 'problem space' is created. A problem has three main parts:

(i) An Initial Stage – Where incomplete information is spaced out.

(ii) A Goal Stage – Where goals hoped to be achieved are defined.

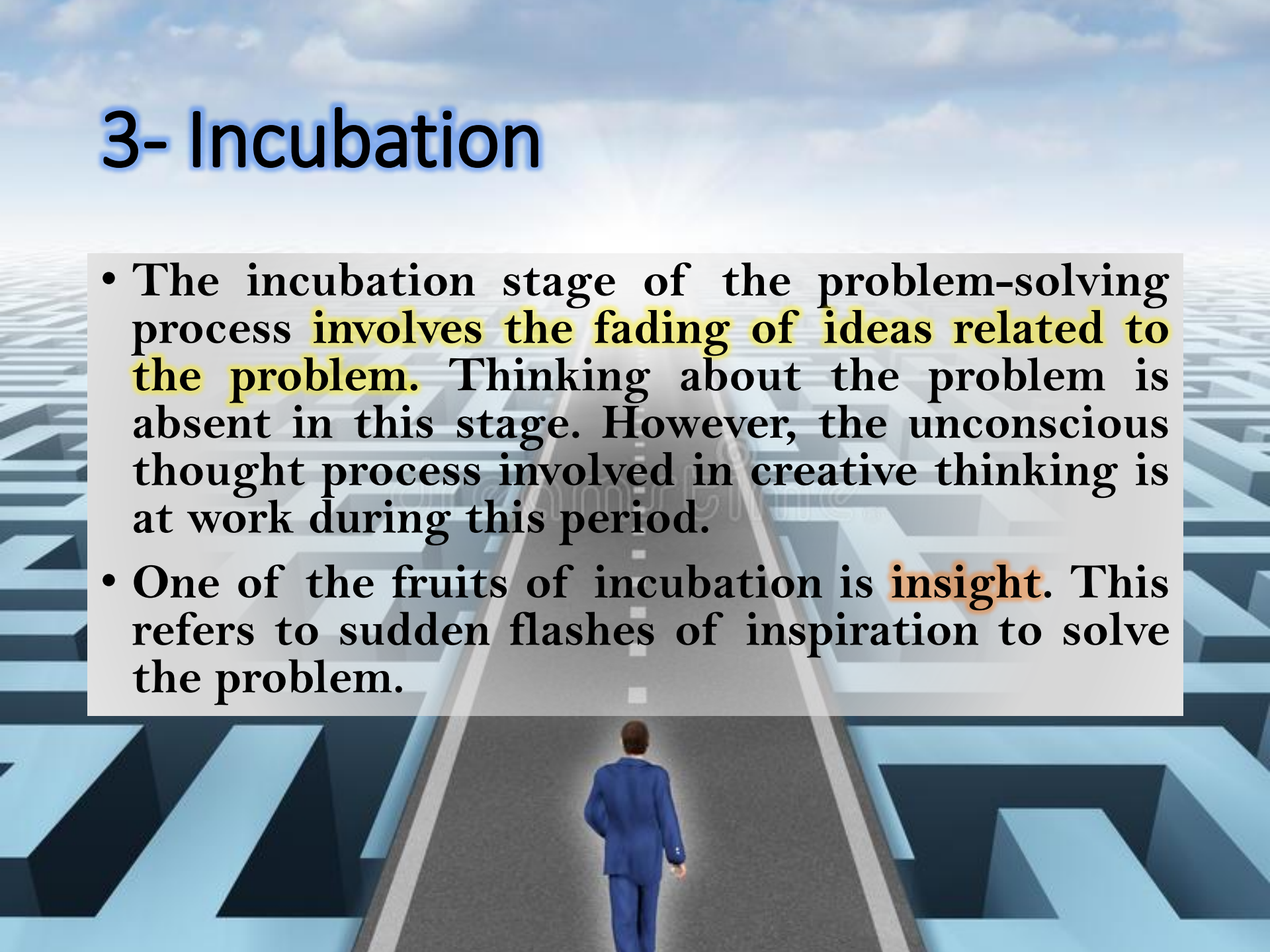
(iii) A Set of Operation – Operation includes all steps used to move from initial to goal stages.

2- Production

- The second stage of the problem-solving process is production. The production stage involves a search for possible alternative solutions. A person may also recall previous examples or similar examples to help look for possible solutions.
- Sub-goals allow the main problem to be broken down.
- An algorithm is a step-by-step procedure that will always produce a correct solution. A mathematical formula is a good example of a problem-solving algorithm
- A heuristic is a mental rule-of-thumb strategy that may or may not work in certain situations

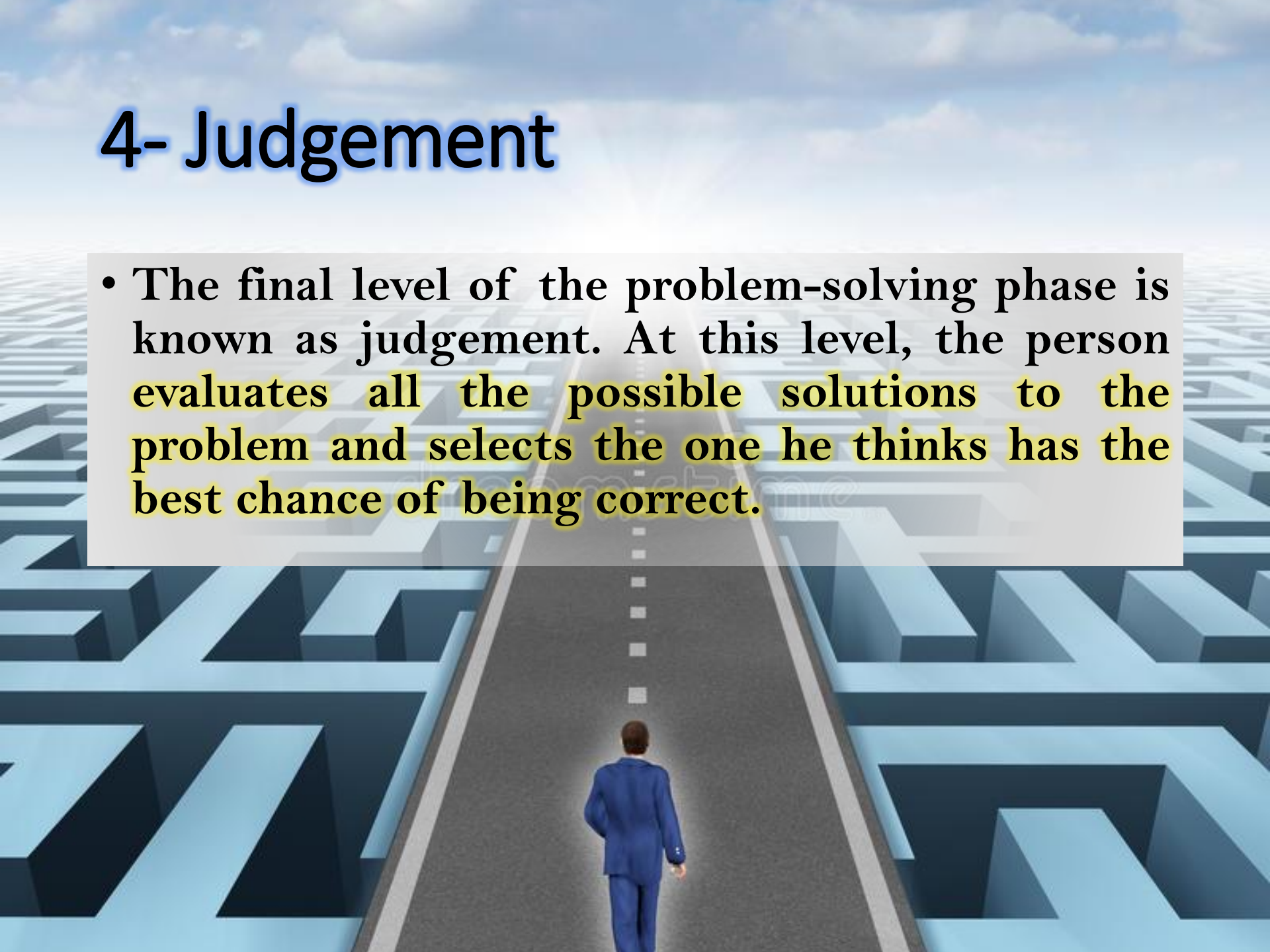
3- Incubation

- The incubation stage of the problem-solving process involves the fading of ideas related to the problem. Thinking about the problem is absent in this stage. However, the unconscious thought process involved in creative thinking is at work during this period.
- One of the fruits of incubation is insight. This refers to sudden flashes of inspiration to solve the problem.



4- Judgement

- The final level of the problem-solving phase is known as judgement. At this level, the person evaluates all the possible solutions to the problem and selects the one he thinks has the best chance of being correct.



Demonstration of Problem Solving

Obstacles to Problem Solving

- There are a number of different obstacles that can interfere with our ability to solve a problem quickly and efficiently. Researchers have described a number of these mental obstacles, which include the following:

1- Confirmation Bias

2- Mental Set

3- Functional Fixedness

4- Representativeness Heuristic

5- Availability Heuristic

1- Confirmation Bias

- It is a tendency to search for information that confirms one's preconceptions. Basically, you would have found the solution before you found the problem.
- For example, if you believe that during a full moon there is an increase in admissions to the emergency room where you work, you will take notice of admissions during a full moon; but be inattentive to the moon when admissions occur during other nights of the month.

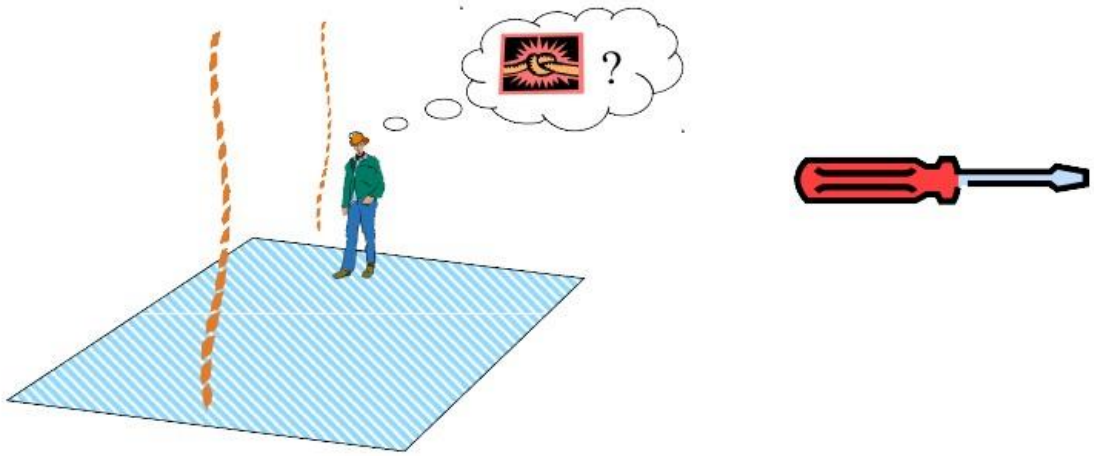
2- Mental Set

- Another common problem-solving obstacle is known as a mental set, which is the tendency people have to only use solutions that have worked in the past rather than looking for alternative ideas.
- A mental set can often work as a heuristic, making it a useful problem-solving tool. However, mental sets can also lead to inflexibility, making it more difficult to find effective solutions.

3- Functional Fixedness

- **Functional fixedness is the tendency to think only of the familiar functions of an object.**

Use the screwdriver as a weight, and tie it to the end of one rope. Swing it toward the other rope to tie the knot.



The inability to think of the screwdriver as a weight is functional fixedness.

4-Representativeness Heuristic

- **Representativeness heuristics involve a rule of thumb for judging the likelihood of things in terms of how well they match our prototype.**
- **Below is Linda. She loves books and hates loud noises. Is Linda a librarian or a beautician?**
- **Chances are, she is a beautician!**

5- Availability Heuristic

- **Availability heuristic involves estimating the likelihood of events based on their availability in our memory.**
- **If it comes to mind easily (maybe a vivid event) we presume it is common.**

Although diseases kill many more people than accidents, it has been shown that people will judge accidents and diseases to be equally fatal. This is because accidents are more dramatic and are often written up in the paper or seen on the news on T.V., and are more available in memory than diseases.

Creative Thinking

- Creative thinking is the **ability to find or build alternative solutions for a given problem.** Creativity involves cognitive ability. It is a way of looking at a problem and solve problems from a different perceptive. Creative thinking is a process by which individual comes up with **new ideas or new approaches.**
- According to Edward de Bono, creative thinking is not a talent, **it is a skill that can be learnt.** It empowers people by adding strength to their natural abilities which improve teamwork and productivity and where appropriate profits.

Forms of Creativity

- Creativity can come in different forms;

(i) **Scientific Form** – Involving inventions or medical cures

(ii) **Artistic\ Musical Form** – Involving beautiful paintings or songs

(iii) **Writing Form** – Involving novels, short stories and poems

Nature and Characteristics of Creativity

(i) Creativity is the **ability to synthesis ideas**. It is the ability to develop something original.

(ii) Creativity has **several natures**, it is a process as well as product.

(iii) It is a **complex dynamic and serious process**. It is a capacity to accept challenges.

(iv) It is the **freedom to exercise choice**.

(v) Creativity knows **no special medium place person or time.**

(vi) It is the resultant of **some interactions**.

Characteristics of a Creative Personality

- **A creative personality: -**

✓ **Curious**

✓ **Seeks problems**

✓ **Enjoy challenges**

✓ **Optimistic**

✓ **Imaginative**

✓ **Sees problems as opportunity, does not give up easily.**

Steps To Creativity

- **Creative approaches are fulfilled through some basic steps: -**

(i) To increase creativity, it is recommended that a stimulating environment must be provided.

(ii) Freedom is also seen to enhance creativity as a pressure-free time helps focus on the problem to be solved.

(iii) Moreover, time must be given in order to ensure the creative thinking process to begin during problem solving.

Decision Making

- Decision making involves weighing alternatives and choosing between them. Because it is difficult to simultaneously evaluate all possible options, people tend to focus on only a few aspects of the available options. This results in less than optimal decisions.
- There are two main types of decisions: -

(i) **Decisions about Preferences** – These are decisions to problems in which people make choices about what they would prefer.

(ii) **Risky Decisions** – These involves selecting between known features of alternatives. Such selection of unknown outcomes is risky in nature

Additive Strategies in Decision Making

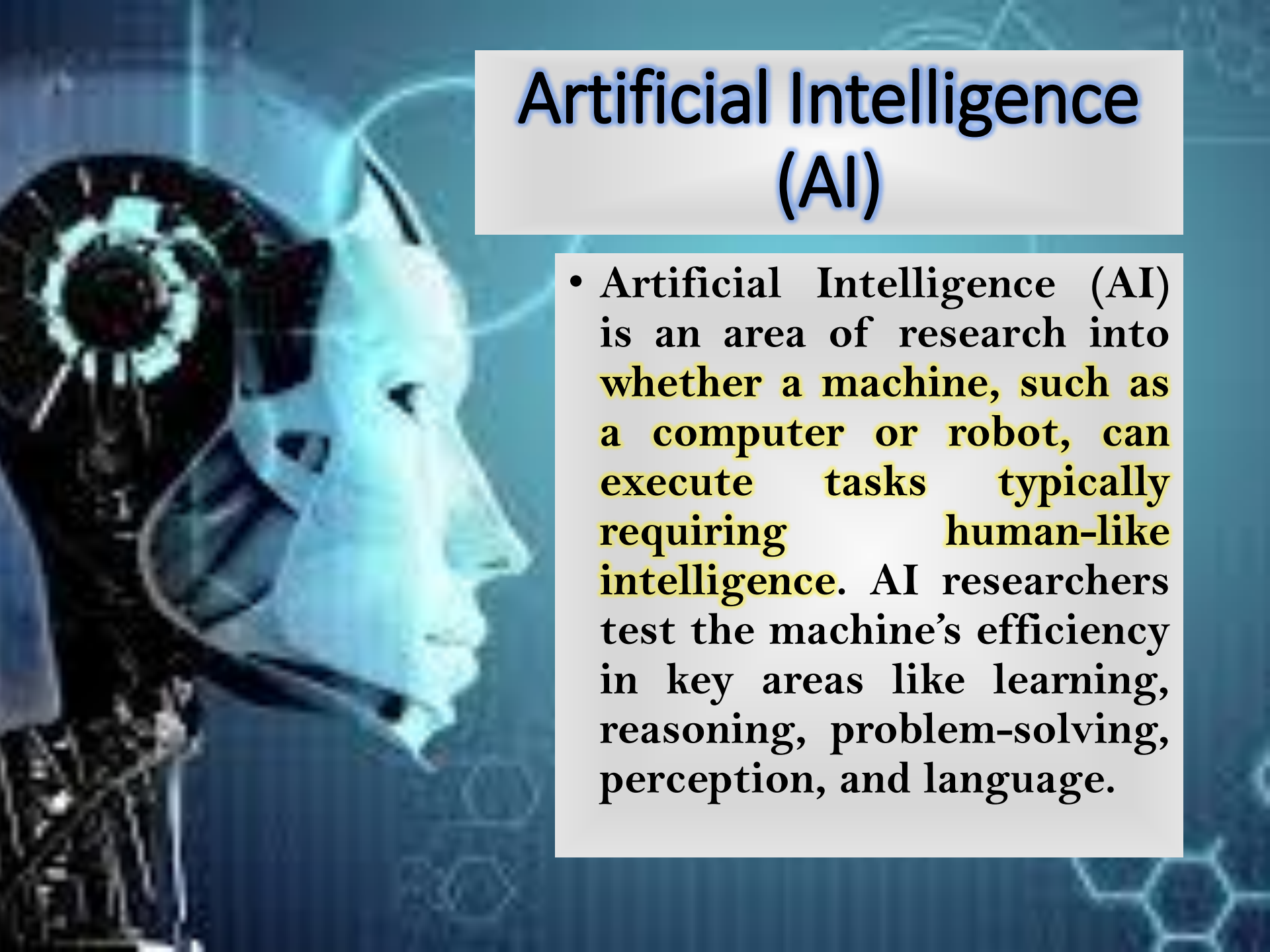
- When using an additive strategy during decision making, a person lists the attributes of each element of the decision, weights them according to importance, adds them up, and determines which one is more appealing based on the result.
- Example: - To decide which armchair to buy, Josh may list the features he considers important in an armchair. For example, he might list attractiveness, comfort, and price. Then, for each armchair, he rates each feature on a scale from +5 to –5. He also weights each feature according to its importance. For instance, if he considers comfort to be twice as important as price, he multiplies the ranking for comfort by 2. Josh then adds up the ratings for each armchair. The chair with the highest-ranking wins.

Elimination Strategies in Decision Making

- Another strategy for making decision involves elimination strategies which are also called elimination by aspects. This involves eliminating alternatives based on whether they do or do not possess aspects or attributes the decision maker has deemed necessary or desirable. People often use this type of strategy when a large number of options and features have to be evaluated.
- Example: - When using this strategy to choose his armchair, Josh sets a minimum criterion for each feature he thinks is important. For example, minimum criteria for attractiveness, comfort, and price of an armchair might be blue color, soft fabric, and under $300, respectively. He then compares the two armchairs according to these minimum criteria, starting with the most important criterion. An armchair that doesn't meet a criterion gets eliminated, and the remaining one wins.

The Overconfidence Effect on Decisions

- The overconfidence effect is the tendency for people to be too certain that their beliefs, decisions, and estimates are correct. People can minimize the effects of overconfidence by collecting a lot of information and evaluating it carefully before making a decision.
- For example, at the outset of the Civil War, young Southern men eagerly enlisted in the Confederate Army, believing their superior gallantry would help them make speedy work of the Union soldiers.



Artificial Intelligence (AI)

- **Artificial Intelligence (AI) is an area of research into whether a machine, such as a computer or robot, can execute tasks typically requiring human-like intelligence. AI researchers test the machine's efficiency in key areas like learning, reasoning, problem-solving, perception, and language.**

The Risks of AI

(i) **The AI can be programmed to do something devastating** – Autonomous weapons are artificial intelligence systems that are programmed to kill. In the hands of the wrong person, these weapons could easily cause mass casualties.

(ii) **The AI is programmed to do something beneficial, but it develops a destructive method for achieving its goal** – This can occur if the AI goals do no match ours. For example, if you tell your self-driving car to take you to the airport as fast as possible, it can take that task seriously and lead to you being sick or posed to accidents.

Psychology in the face of AI

- In a future where AI is unavoidable, the question arises that how psychology is essential in the face of artificial intelligence. When artificial intelligence will take over the world, psychology will remain a resource for helping people cope with uncertainty and change. As the world becomes more complex and technological, so does the need for human-based counselling and connection.
- As AI is bound to cause unemployment, this will cause a significant increase in anxiety and stress. Modern technology is bound to cause isolation and sleep disorders. This is when psychology comes to assist those people affected.

Demonstration – AI in Health Care

Thank you.