Ulisse

Soft Skills for Employabiity

Critical Thinking & Problem Solving

Ulisse Soft Skills for Employability

Co-funded by the Erasmus+ Programme of the European Union

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Agenda

1- Critical Thinking

What is Critical Thinking, Obstacles to Critical Thinking, Reasons for Beliefs and Doubts [1 h]

2- Cognitive Biases

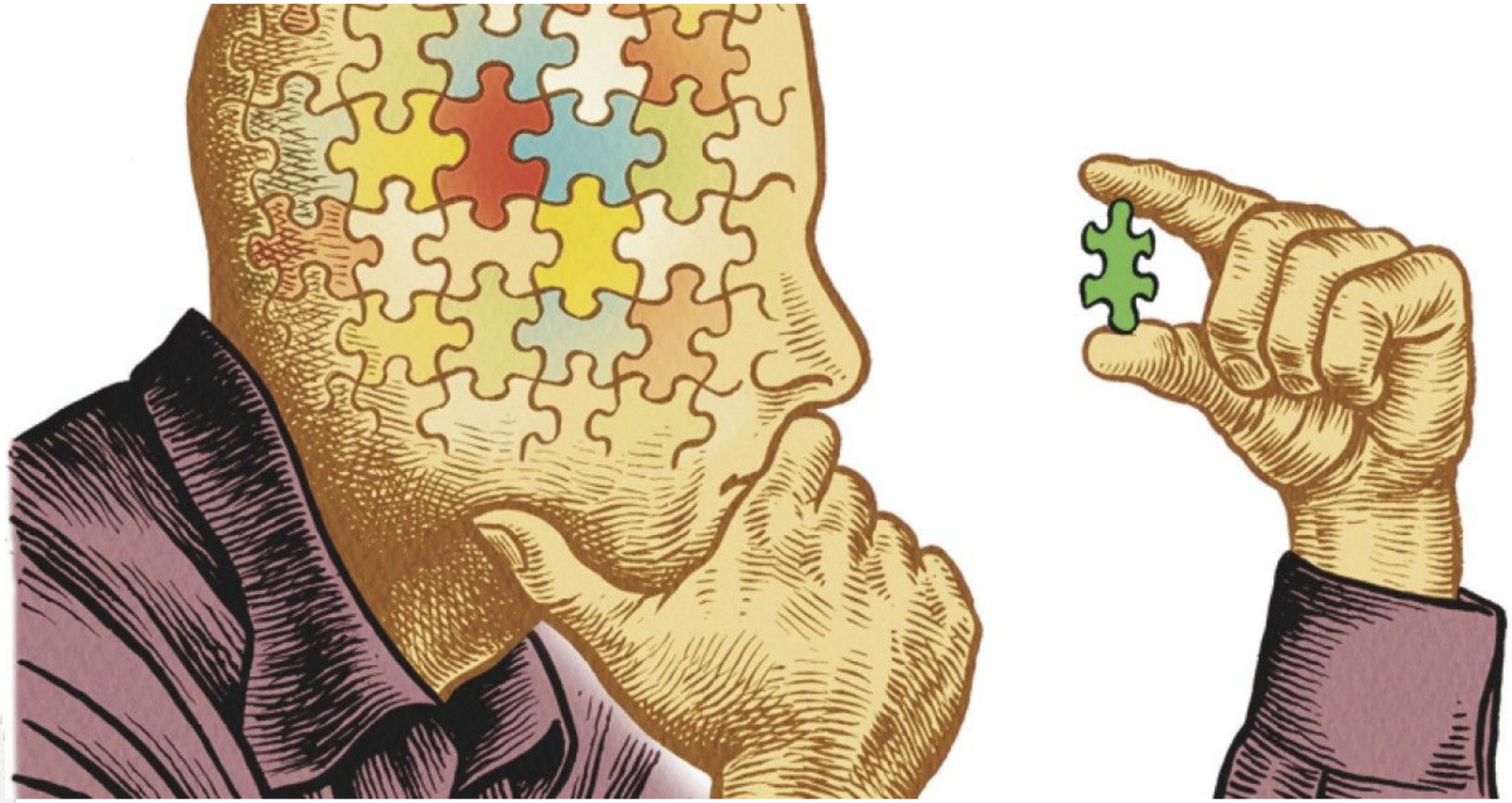
What is a Cognitive Bias, Thinking Fast and Slow, Classification of Cognitive Biases, Cognitive Biases and Experts Opinions [0.5 h]

3- Problem Solving

Linking Critical Thinking and Cognitive Biases, the art of asking questions, problem framing, problem setting, Classification of methods of Problem Solving [1 h]

4- Case Study

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed consectetur nulla [0.5 h]



Critical Thinking

- What is Critical Thinking
- Obstacles to Critical Thinking
- Reasons for Beliefs and Doubts

What is Critical Thinking?



CRITICAL + THINKING

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What is Critical Thinking?

Critical thinking is the process of actively and skillfully analyzing, synthesizing, and evaluating information gathered from, or generated by, observation, reasoning, or communication, as a guide to belief and action.

Ennis, Robert H. (2015), "Critical Thinking", The Palgrave Handbook of Critical Thinking in Higher Education, Palgrave Macmillan

What is Critical Thinking?

Is a mental process, that thus requires energy and self-awareness

Critical thinking is the **process** of actively and skillfully analyzing, synthesizing, and evaluating information gathered from, or generated by, observation, reasoning, or communication, as a guide to belief and action

Ennis, Robert H. (2015), "Critical Thinking", The Palgrave Handbook of Critical Thinking in Higher Education, Palgrave Macmillan, doi:10.1057/9781137378057.0005, ISBN 9781137378057

What is Critical Thinking?

You can develop skills in order to control your ability to thinking critically

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What is Critical Thinking?

These skills will help you process information better

Critical thinking is the process of actively and skillfully **analyzing, synthesizing, and evaluating information** gathered from, or generated by, observation, reasoning, or communication, as a guide to belief and action

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What is Critical Thinking?

Critical thinking is the process of actively and skillfully analyzing, synthesizing, and evaluating information **gathered from, or generated by, observation, reasoning, or communication**, as a guide to belief and action

This information can come from everywhere (inside or outside you brain)

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What is Critical Thinking?

Critical thinking is the process of actively and skillfully analyzing, synthesizing, and evaluating information gathered from, or generated by, observation, reasoning, or communication, as **a guide to belief and action**

Better processing information means having better beliefs (closer to the reality), thus acting better

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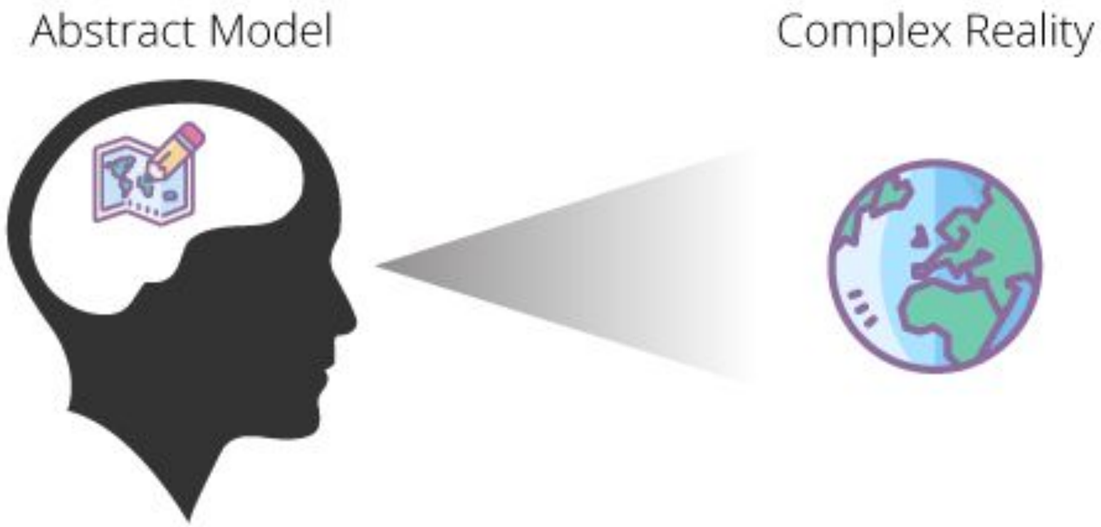
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The one take-away for this lesson: maps of reality

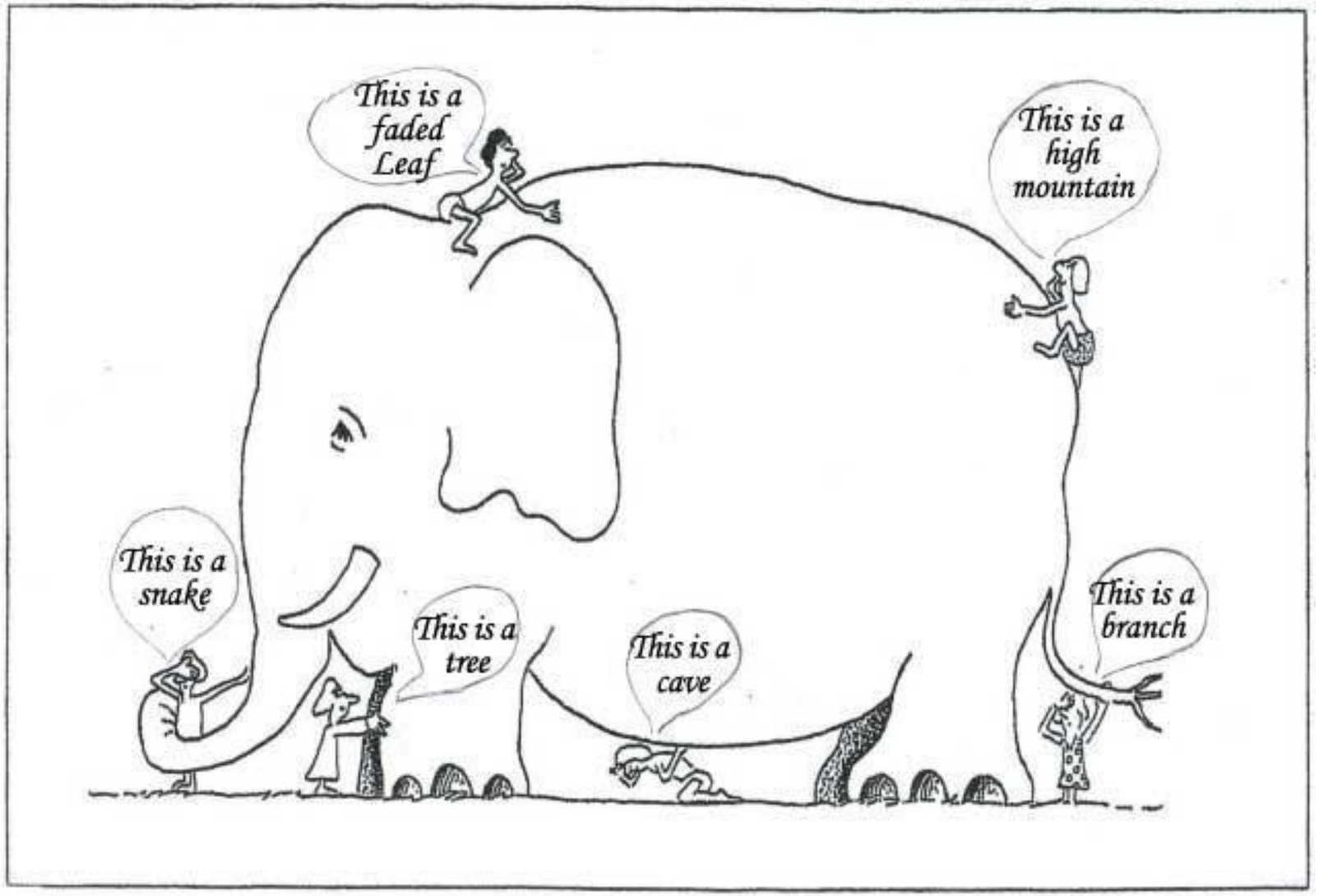


«Skilling me softly» 1/3: your map of the concept of soft skills

- Write down your mental model of Soft Skills trough a concept map
- In the map, each block is a concept, each line a relation between two concepts
- Each block and line need to have a name
- Keep the names as short and simple as possibile

- Time: 15 min!

- Mail to: filippo.chiarello@unipi.it



6 blind men describe an elephant (old indian fable)

4 Standards of Critical Thinking

1. Clarity
2. Relevance (Focus)
3. Logical correctness
4. Fairness



Clarity

- Example: Miss Teen South Carolina

[VIDEO]

Questions:

– Which of the standards of critical thinking does Miss TSC not meet? Why?

– Can you think of other examples of people “not being clear on the concept”?



Relevance, Focus

- Example: Stump the Candidate! [VIDEO]

Questions:

- Is ex-Governor Palin's answer to the question relevant?
- Why?

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Logical Correctness

All mammals are dangerous.
Bobo is dangerous.
Therefore Bobo is a mammal.

I am a man.
Brad Pitt is a man.
Therefore, I am Brad Pitt.

All humans are animals.
Most animals can climb trees.
Therefore, most humans can climb trees.

Next section about logic

Fairness

- Not identifying truth with self-interest
- Not resisting unfamiliar ideas, prejudging issues, stereotyping outsiders



Fairness

- Not identifying truth with self-interest
- Not resisting unfamiliar ideas, prejudging issues, stereotyping outsiders



… but there are important obastcles to CT

Egocentrism

- **Egocentrism**: Seeing reality as centered on oneself
- **Self-interested thinking**: Accepting and defending beliefs that harmonize with one's own self-interest
- **Self-serving bias**: Overrating oneself.

- *Example: 90% of drivers rate themselves as above average*

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Sociocentrism

- **Sociocentrism**: Group-centered thinking
- **Group bias**: Seeing One's own group, tribe, sect, sex as better. Example: "Girls are better than boys."
- **Conformism**: Following the crowd, conforming uncritically to group standards of conduct and belief. Many biases as example.

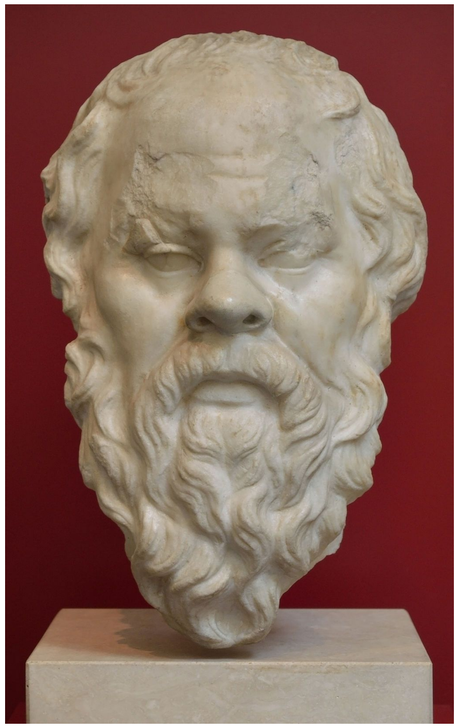
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Relativistic Thinking

- **Relativism**: "There is no objective absolute standard of truth."
- **Subjectivism**: "Truth is a matter of individual opinion." *Exercise*: List areas where truth may be a matter of opinion.
- **Cultural relativism**: "What is true for person A is what person A's culture of society believes is true." *Examples*: drinking wine in France/Iran; polygamy

Logic and Critical Thinking

- The study of logical argumentation is relevant to the study of critical thinking.
- Logic is concerned with the analysis of *arguments*, including the appraisal of their correctness or incorrectness.
- The task of logic is to discover the fundamental principles for distinguishing good arguments from bad ones.
- Task: To distinguish good arguments from bad



Two questions:

Are the premises true?

Do the premises provide good reasons to accept the conclusion?

Types of Arguments

Deductive arguments:

(try to) PROVE their conclusions

Inductive arguments:

(try to) show that their conclusions are PLAUSIBLE or LIKELY

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Deductive Arguents



- Some pigs have wings.
  All winged things sing.
  Therefore, some pigs sing.

- Everyone has one and only one biological mother.
  Full sisters have the same biological mother.
  No one is her own biological mother.
  Therefore, there is no one whose biological mother is also her sister.

Inductive Arguments

- Every ruby discovered thus far has been red.
  So, probably all rubies are red.

- Polls show that 87% of 5-year-olds believe in the tooth fairy.
  Marta is 5 years old.
  Marta probably believed in the tooth fairy.



- Chemically, potassium chloride is very similar to ordinary table salt (sodium chloride).
- Therefore, potassium chloride tastes like table salt.

Argument terminology

Argument

Argument:

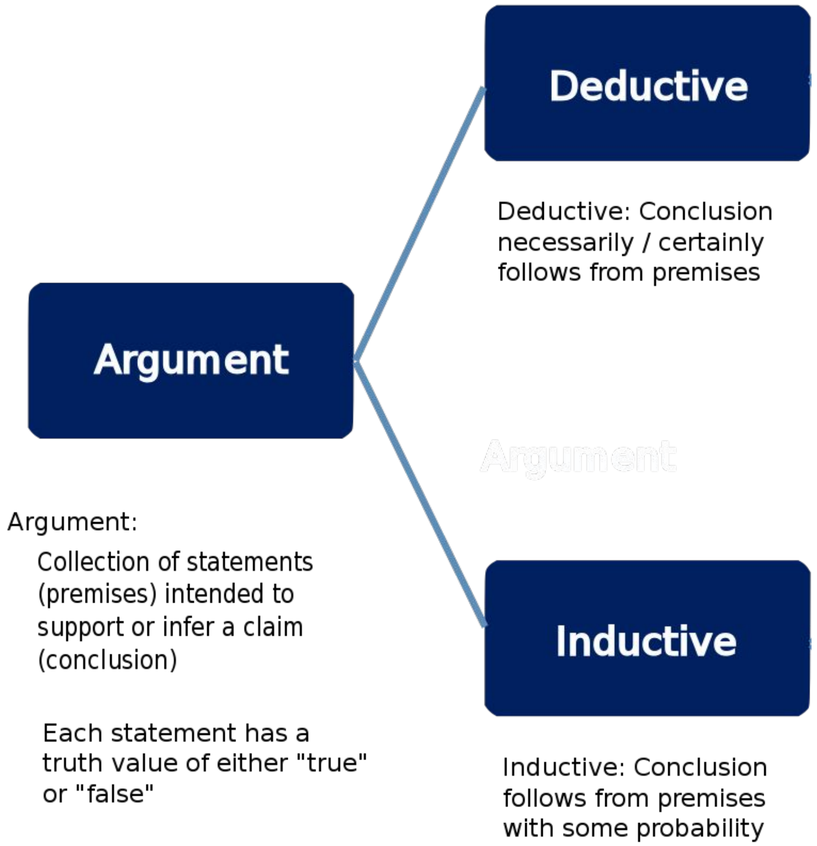
Collection of statements (premises) intended to support or infer a claim (conclusion)

Each statement has a truth value of either "true" or "false"

Source information: Patrick J. Hurley, "A Concise Introduction to Logic, 12th Ed."

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Argument terminology



Deductive: Conclusion necessarily / certainly follows from premises

Argument:

Collection of statements (premises) intended to support or infer a claim (conclusion)

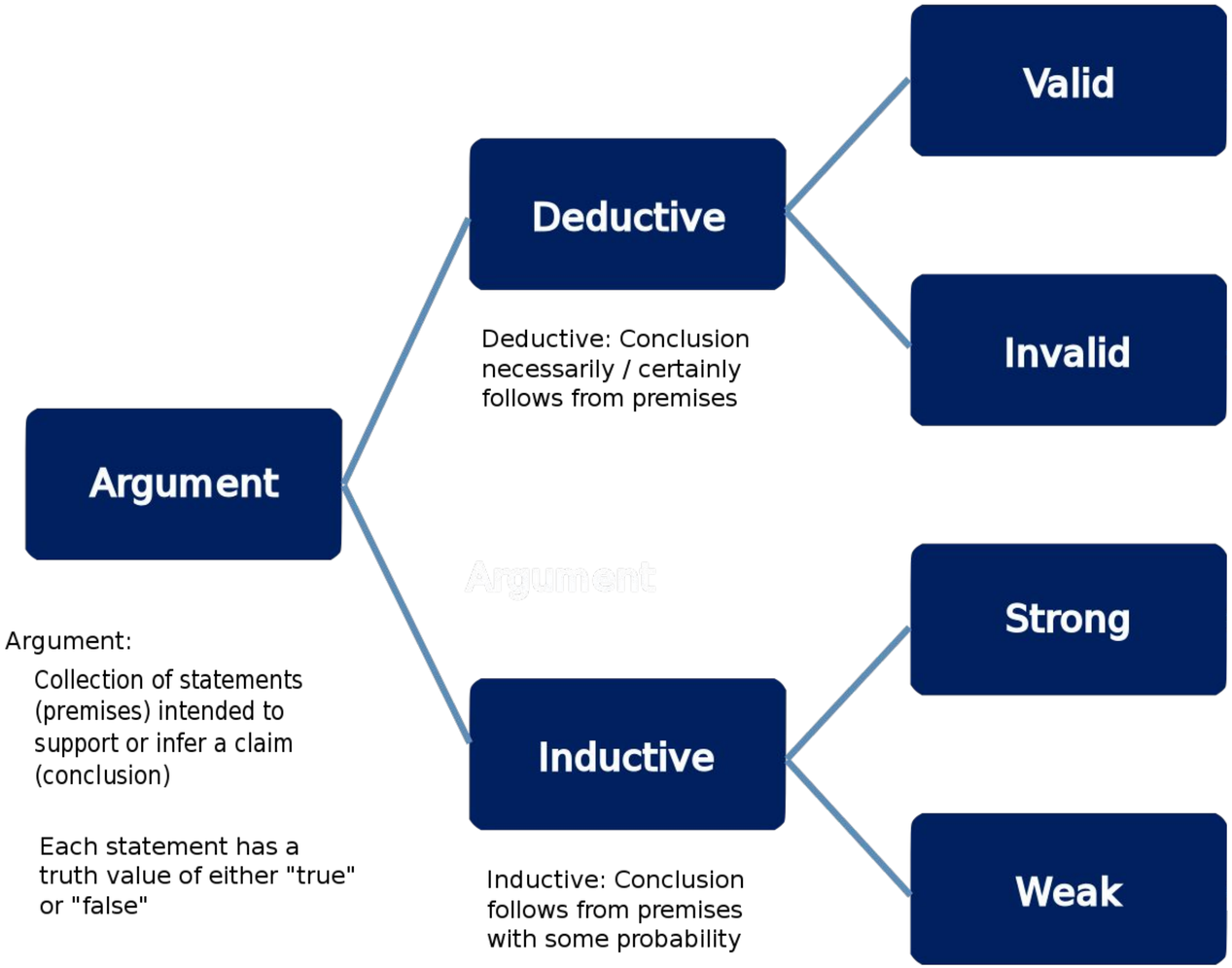
Each statement has a truth value of either "true" or "false"

Inductive: Conclusion follows from premises with some probability

Source information: Patrick J. Hurley, "A Concise Introduction to Logic, 12th Ed."

Argument terminology

Determining validity and strength
If we assume the premises are true, does the conclusion follow?



Deductive: Conclusion necessarily / certainly follows from premises

Inductive: Conclusion follows from premises with some probability

Argument:

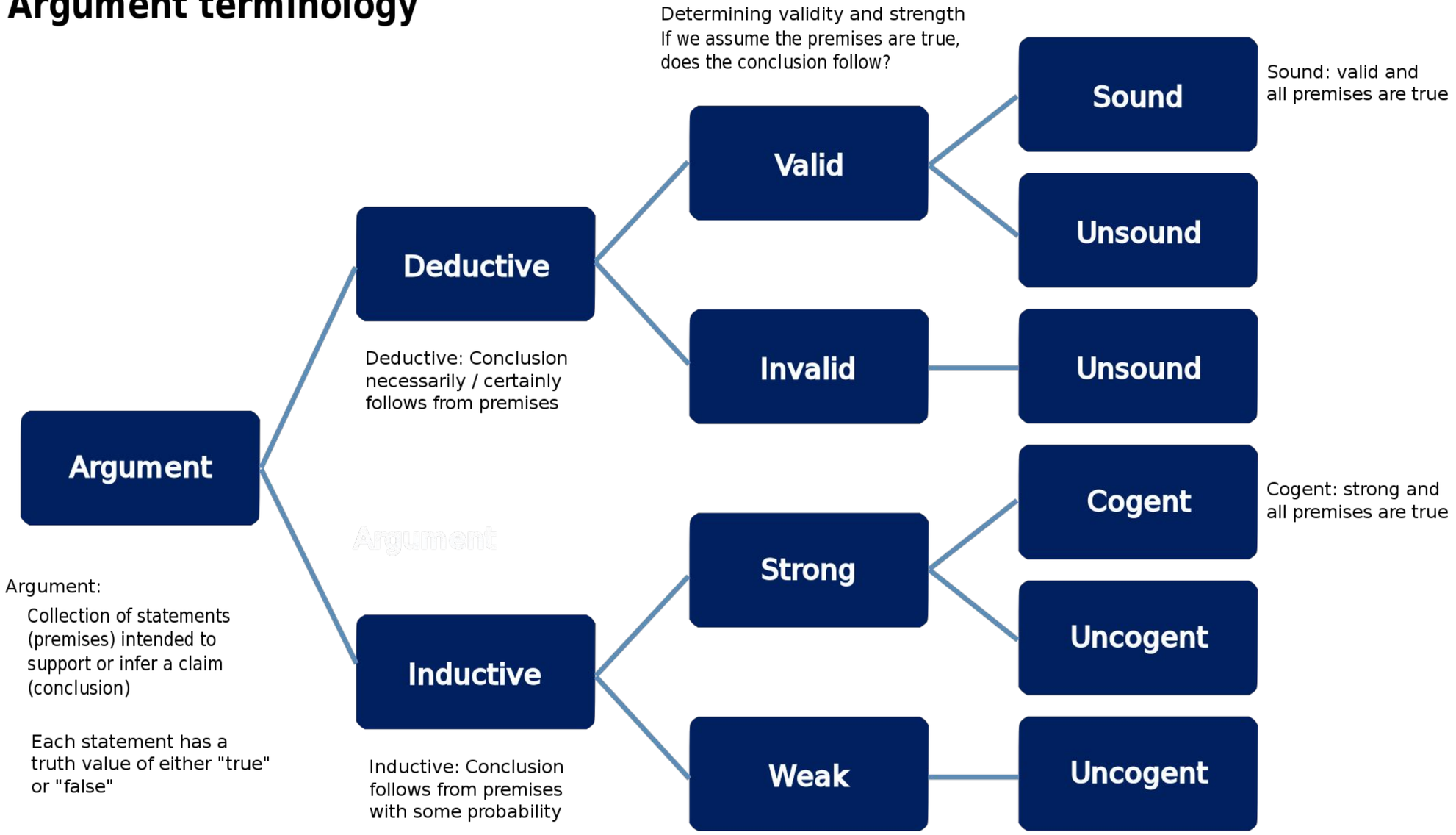
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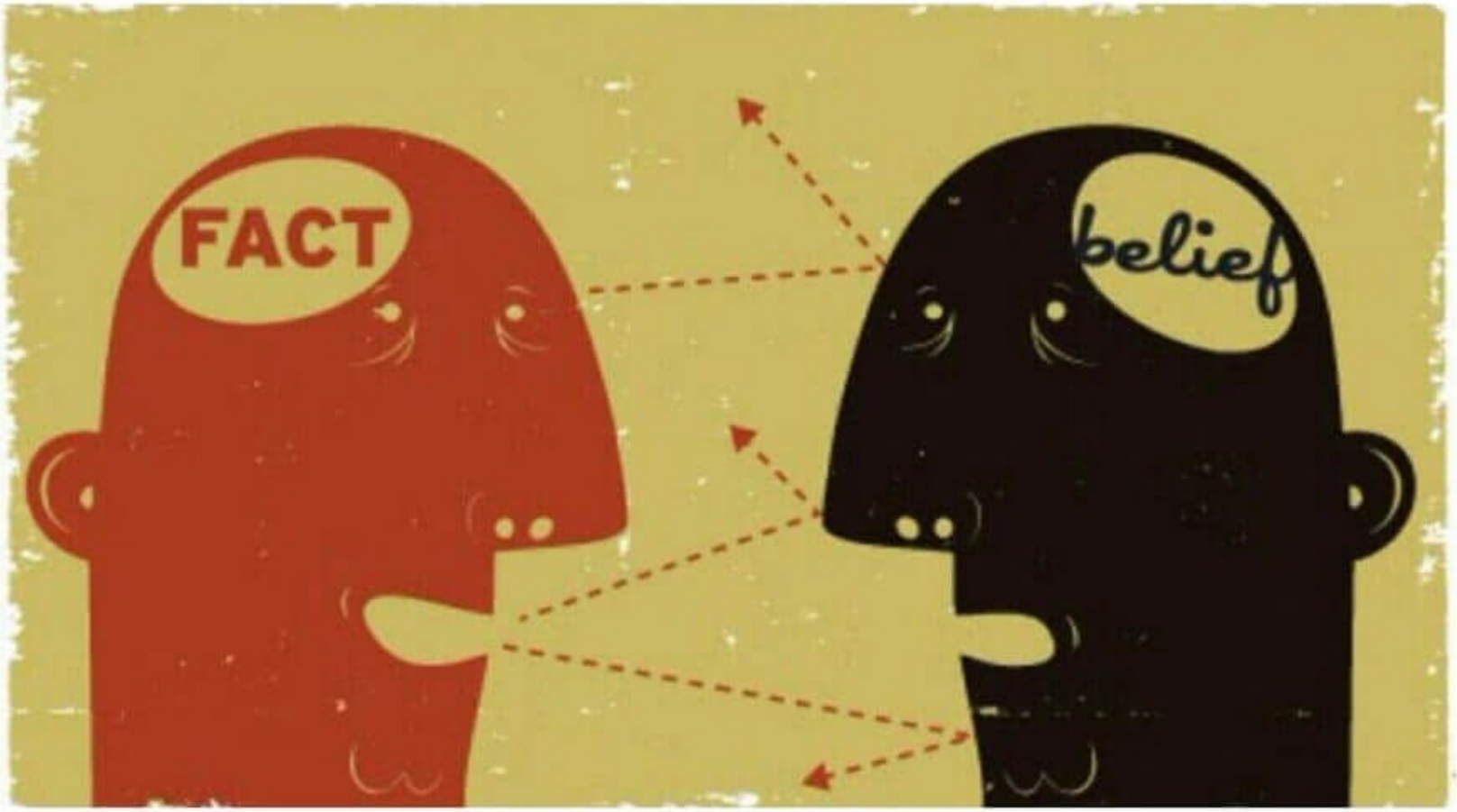
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«Skilling me softly» 2/3: your map of the concept of soft skills

- One person present her mental model (~3 minutes)
- The rest of the class writes the mental model down
- The class compare their starting mental models with the one presented (~7 minutes)
- Let’s discuss on differences/similarities between the models (~5 minutes)



Cognitive Biases

- What is a Cognitive Bias
- Thinking Fast and Slow
- Classification of Cognitive Biases
- Cognitive Biases and Experts Opinions
- Reasons for Beliefs and Doubts

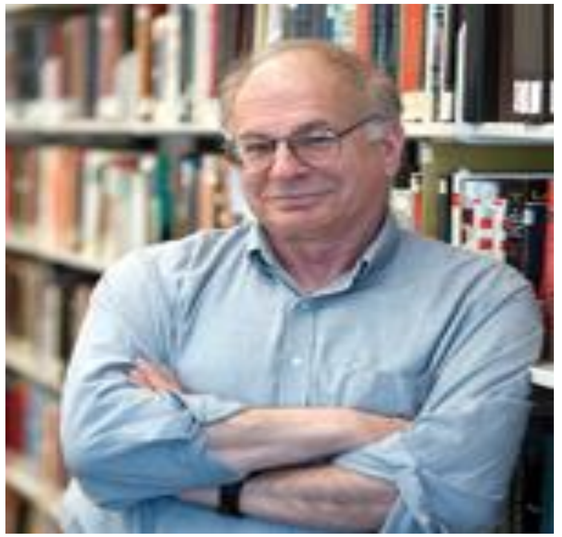
Cognitive Biases

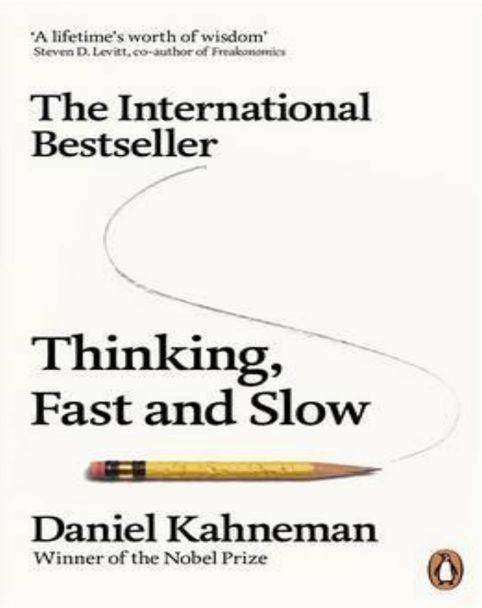
- A cognitive bias is a pattern of poor judgment, often triggered by a particular situation.
- The existence of most of the



Why they exists?

- We think using 2 systems:
  - System 1: intuitive, fast, easy
  - System 2: analytic, slow, takes effort





SYSTEM 1

Intuition & instinct

95%

Unconscious
Fast
Associative
Automatic pilot



SYSTEM 2

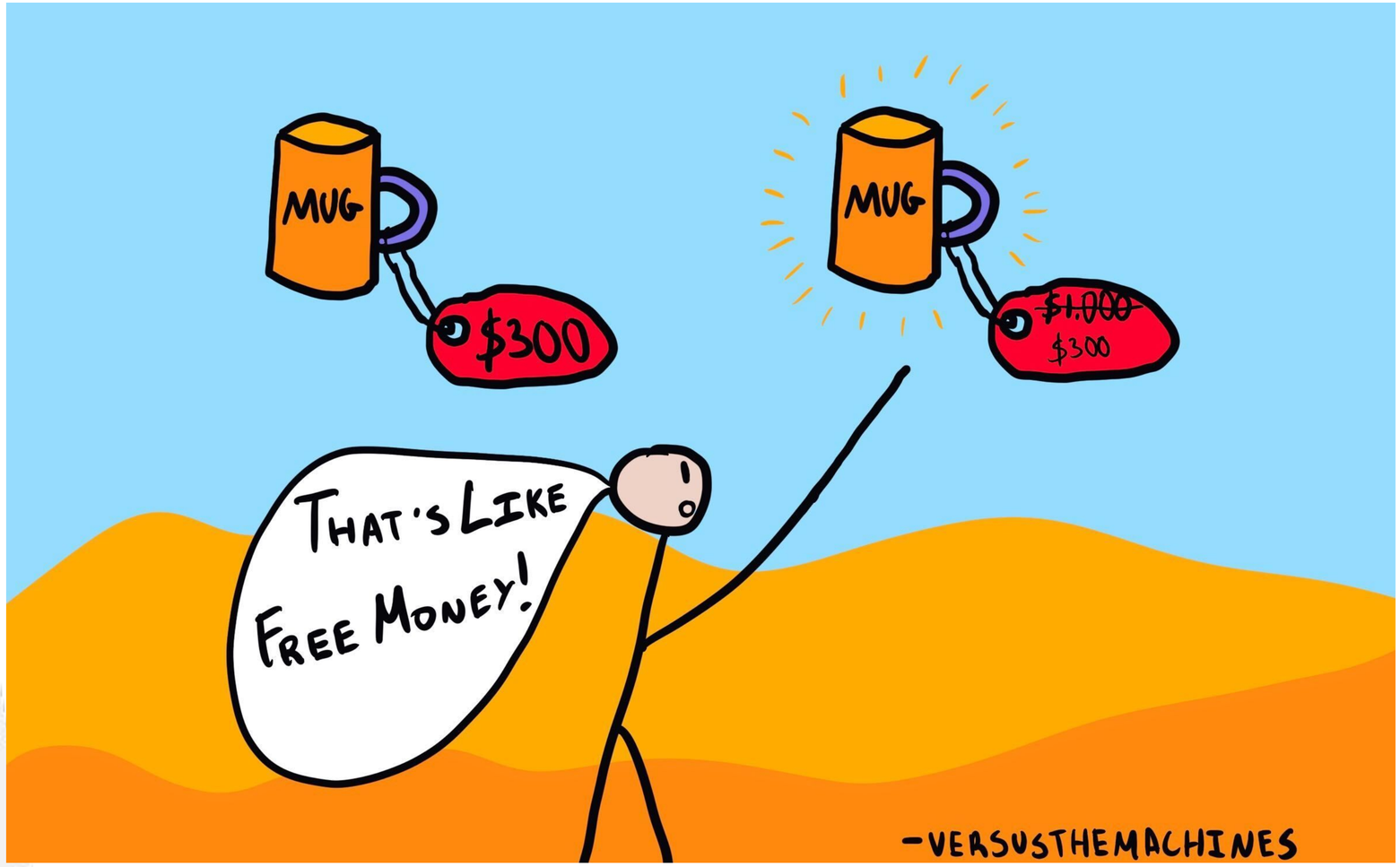
Rational thinking

5%

Takes effort
Slow
Logical
Lazy
Indecisive

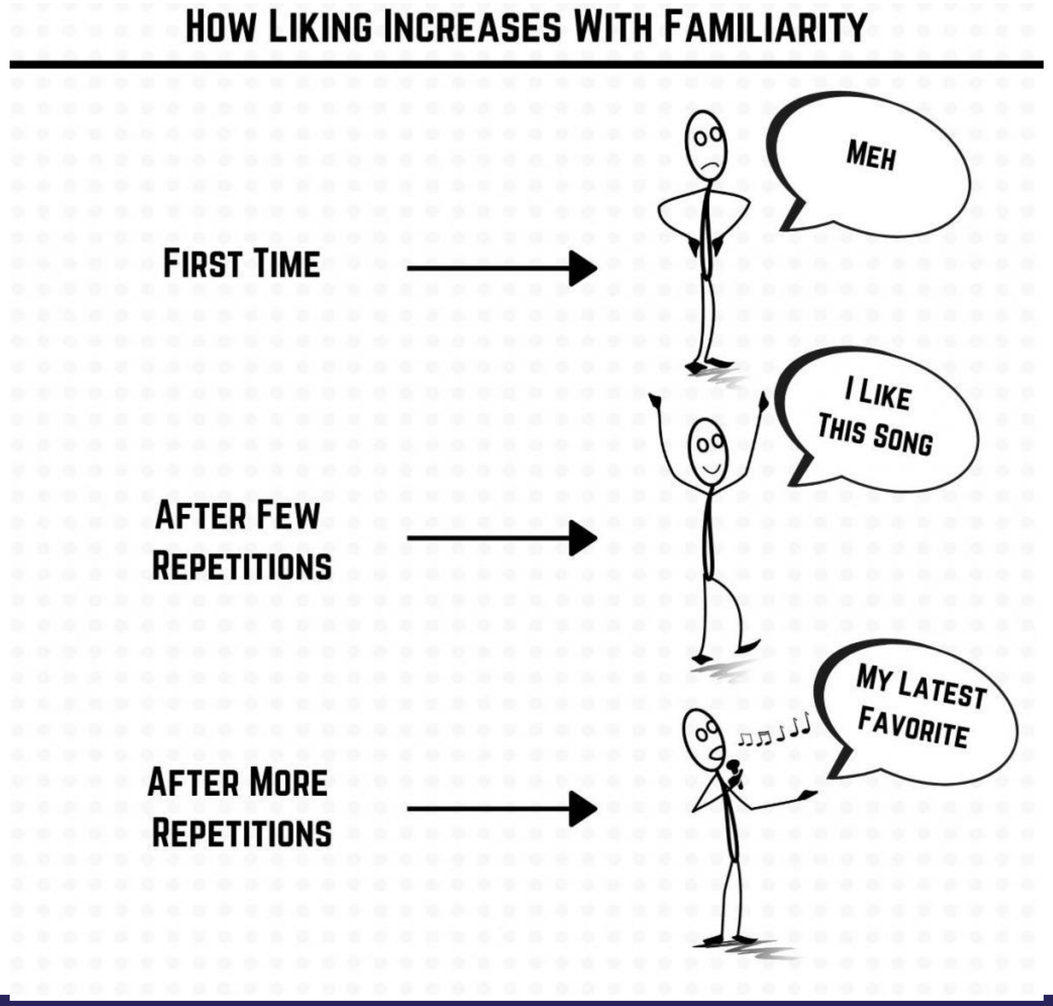
Data from a variety of environments demonstrates that human beings prefer to use System 1 processing whenever possible

Anchoring Effect



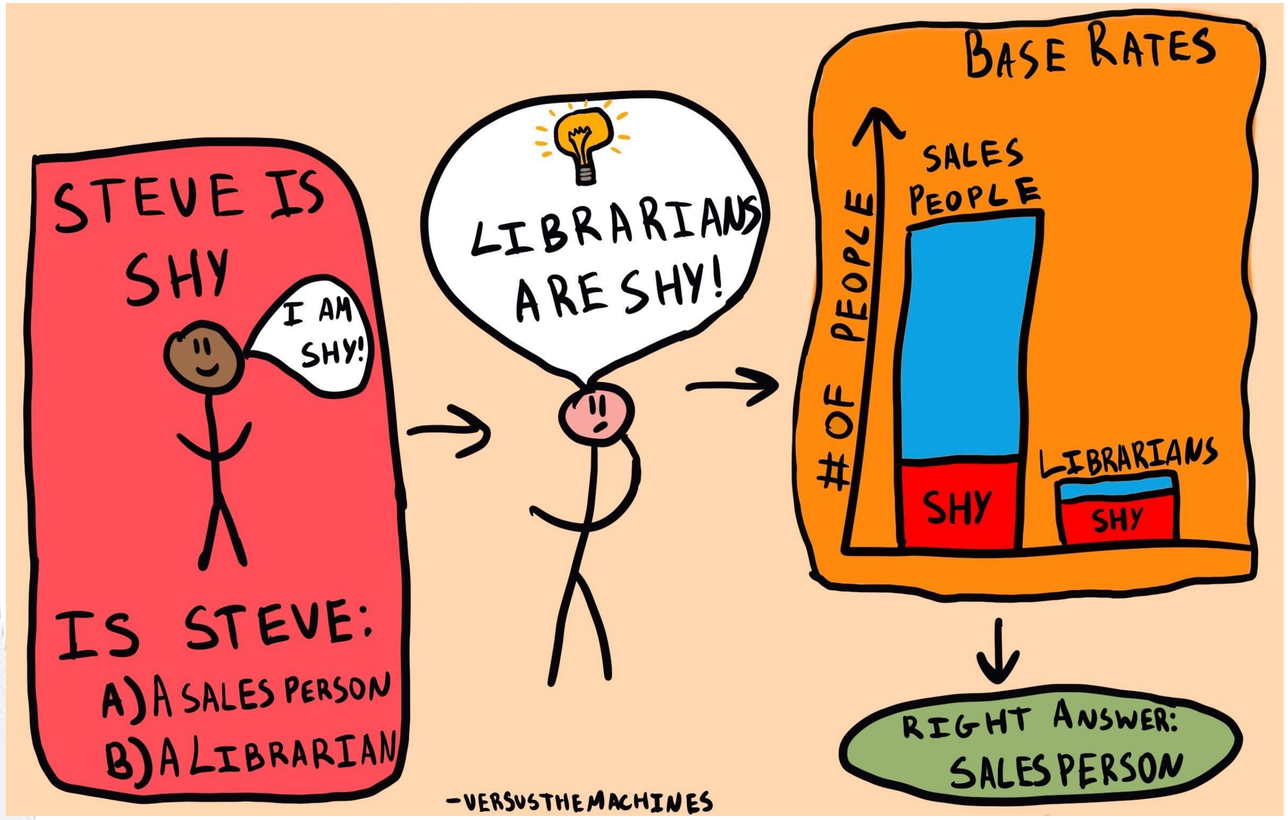
The common human tendency to rely too heavily, or "anchor," on one trait or piece of information when making decisions.

Mere Exposure Effect



The tendency to express undue liking for things merely because of familiarity with them.

Neglect of Probability



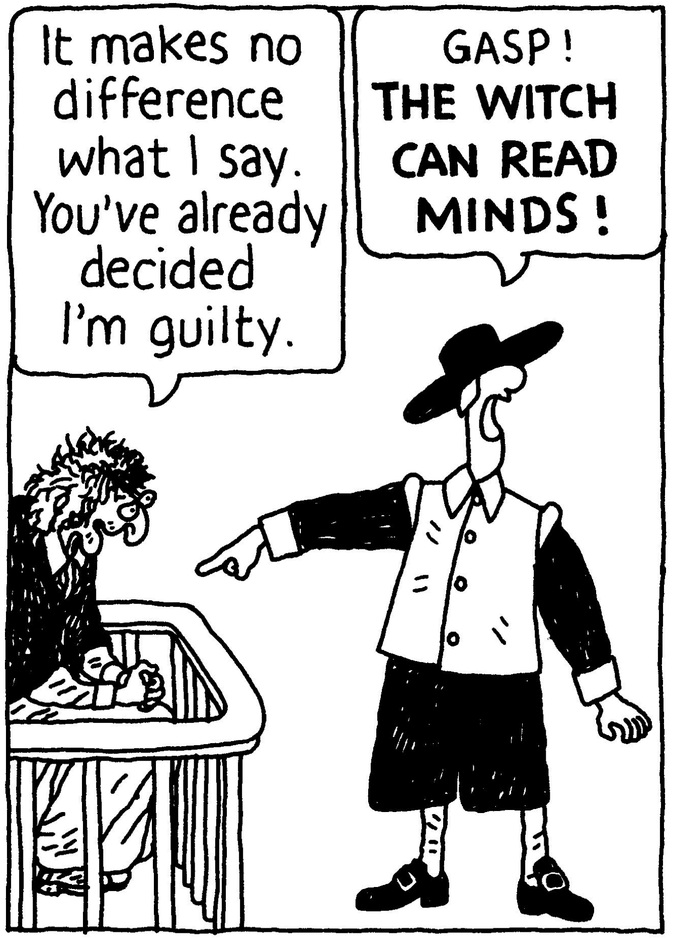
The tendency to completely disregard probability when making a decision under uncertainty. Also called Stereotyping.

Clustering Illusion

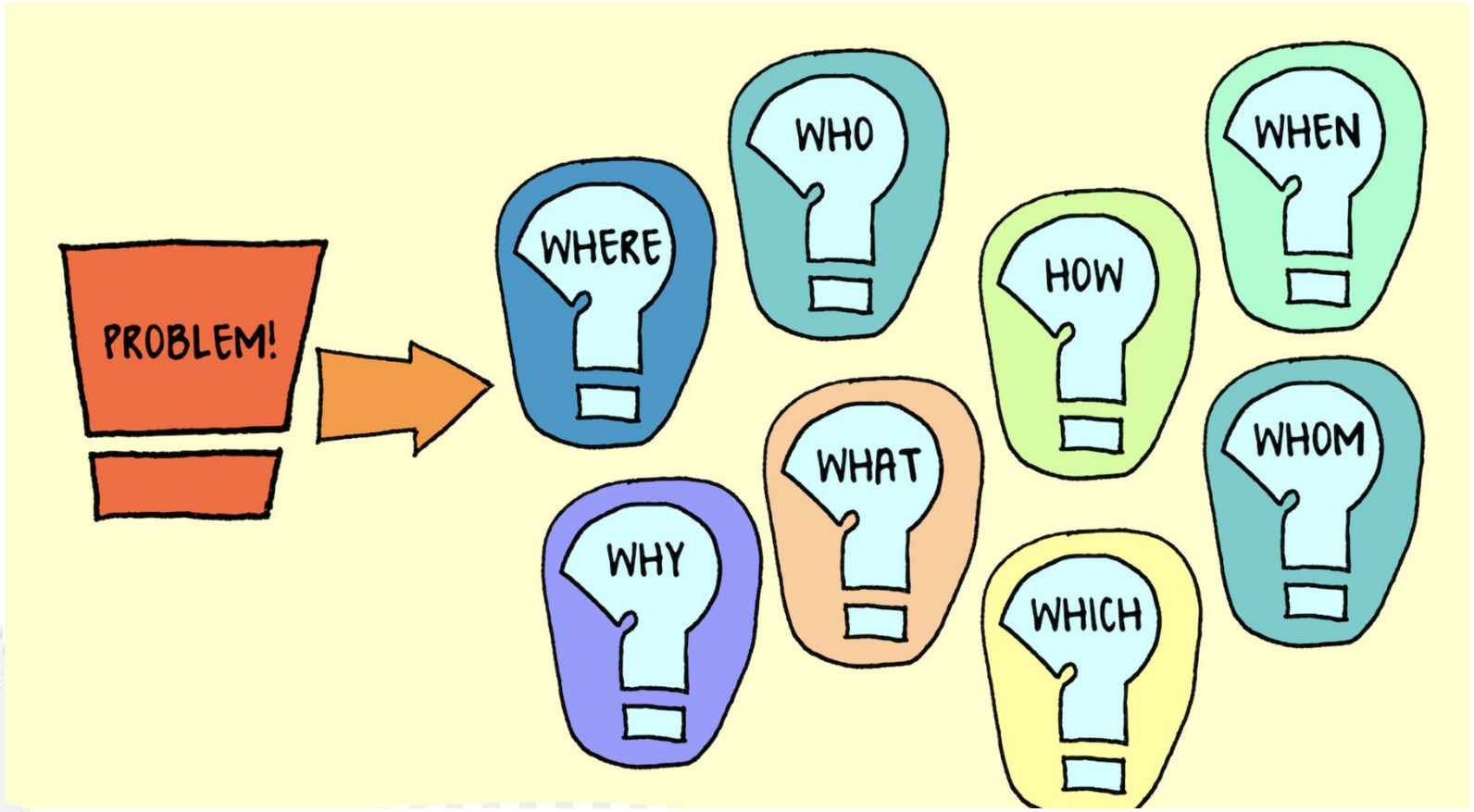


The tendency to see patterns where actually none exist. Also referred to as "patternicity“.

Confirmation Bias



The tendency to search for or interpret information in a way that confirms one's preconceptions.



Problem Solving

- Linking Critical Thinking and Cognitive Biases
- The art of asking questions
- Problem framing
- Problem setting
- Classification of methods of Problem Solving

Let’s Clarify…



- Problem-Solving
- Critical Thinking
- Creative Thinking
- Strategic Thinking
- Decision-Making





Problem-Solving

- Involves using higher-order thinking skills to effectively handle and critically work out realistic solutions to problems.

  - Is a basic skill or tool that is needed by employees for workplace demands
  - Includes a complex set of cognitive, behavioral, and attitudinal components
  - Can be a multiple-step process



Critical Thinking

- Involves examining the meaning and significance of what is observed or expressed.

  - Is a useful skill in making careful considerations during problem-solving
  - Involves objectively and thoughtfully examining evidence before making judgments
  - Requires logic, reasoning, clarity, credibility, accuracy, relevance, depth, significance, and fairness.

Creative Thinking

- Involves exploring ideas, generating possibilities, and looking for many right answers rather than just one.

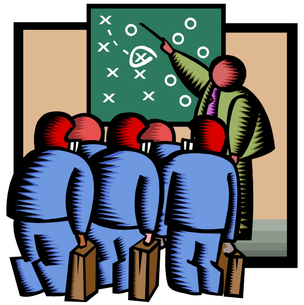
  - Thinking creatively allows individuals to have the ability to accept change and newness, a willingness to play with ideas, and a flexibility in their outlooks
  - Is an important mode of thinking when trying to solve problems



Strategic Thinking

- Involves assessing a program in relation to its mission, its future goals, and the external environment.

  - requires examining whether a program is "doing the right things" in order to achieve its mission
  - means having an end goal or vision in mind and developing plans to reach them







Decision-Making

- Involves identifying & choosing alternatives based on the values and preferences of the decision maker.

When making choices among alternatives, we want the decision that:



1) Has the highest chance of being successful or effective
2) Best fits with our needs, goals, desires, and values

Types of Questions Involved in Problem-Solving

There are three basic types of questions:

1.) Open-ended
2.) Closed-ended
3.) Leading



Open-Ended Questions

Open-ended: is designed to encourage a full, meaningful answer using the subjects own knowledge and feelings

- Allows for a free response and can be perceived as a less threatening type of question.

Closed-Ended Questions

Closed-ended: is designed to encourage a short or one word answer, such as “yes” or “no.”

- These questions require short responses, and thus save time. However, responses may then be more incomplete.

- Example: Do you get along well with your boss?

Leading Questions

Leading: designed to subtly prompt the responder to answer in a particular way.

- These questions can be problematic as they can result in false or slanted information.

- Example: Tell me, what is the problem with your boss? (this assumes that there is a problem)

The Structure of Problems

A problem consists of three components:

1. **Givens:** are information available as part of the problem.
2. **Goals:** are defined as the desired termination state of a solution to the problem.
3. **Operations:** are potential actions that can be executed to achieve the goals of a solution.

The Problem Space

For any given problem there is an associated problem space which is all the possible goals and paths potentially related to the problem known by a problem solver.

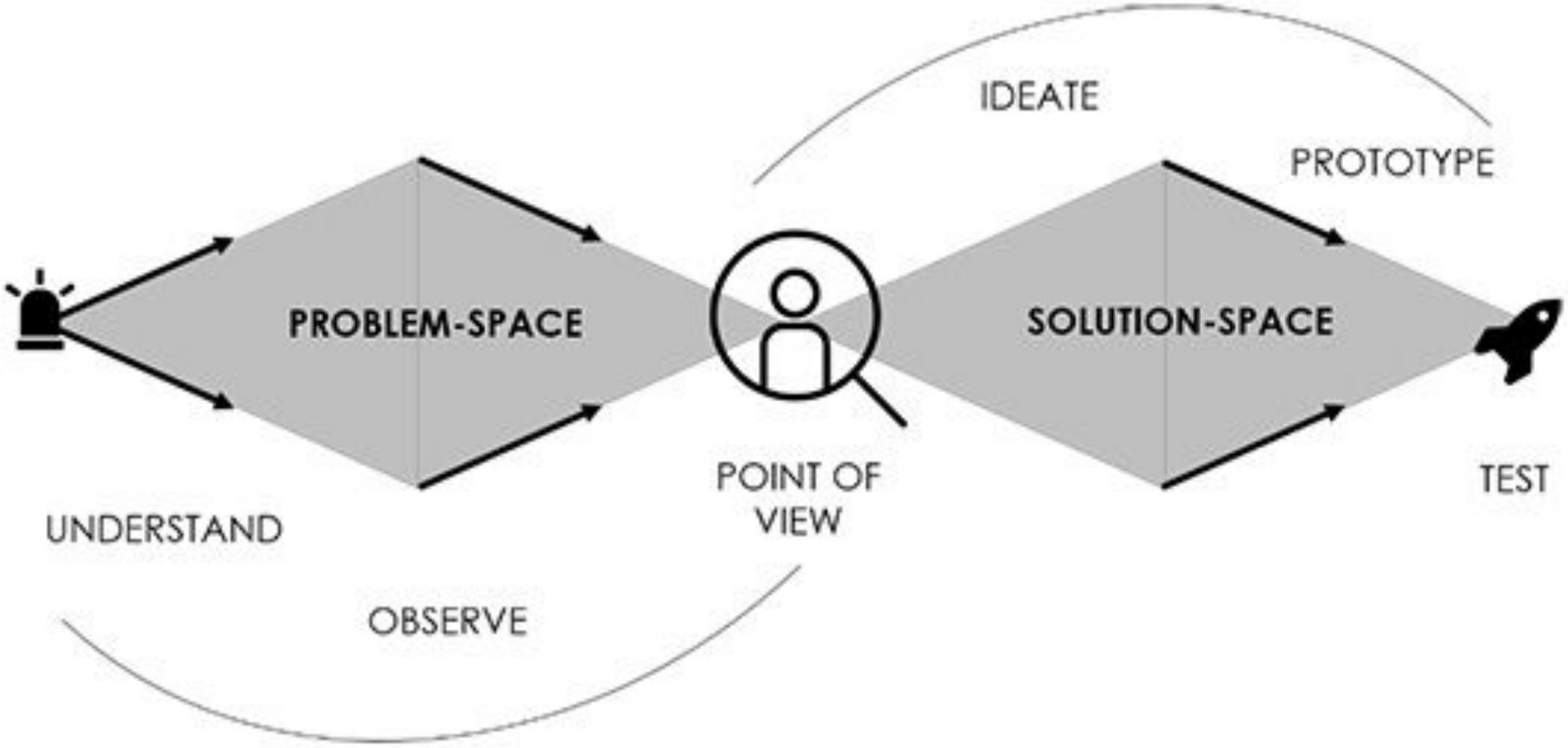
A solution to a certain problem might not exist within the solver's current solution space.

This could be caused by many factors, such as that the problem could be ill-defined, expected goals are ambiguous, and/or no method (path) is available that links the give problem object to the goal(s).



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Problem-Solution



Is There no Solution?

- A solution to a certain problem might not exist within the solver's current solution space.

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  - expected goals are ambiguous;
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The solution always exist. We need to find the right tool to explore the problem and the solution spaces

Approaches to Problem Solving

- **Heuristic**: adopting rule of thumb or the most possible solutions.
- **Analogy**: reducing a new problem to an existing or similar one for which solutions have already been known.
- **Algorithmic deduction**: applying a known and well defined solution for a problem.
- **Exhaustive search**: using a systematic search for all possible solutions.
- **Divide-and-conquer**: solving a whole problem via decomposing it into a set of subproblems.
- **Analysis and synthesis**: reducing a given problem to a known category and then finding particular solutions.

Factors Limiting Problem Solving

A. **Mental set,** in which a fixed or improper method is adopted for a new problem while eas- ier solutions could have been utilized
B. **Meta-cognition,** in which a problem solving process may require the support of other metacognitive processes to achieve the solution goal
C. **Lack of knowledge,** in which either the problem or the goal could not be well represented or modeled, and no method or solution could be applied to the problem.

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Can limit these using Critical Thinking and avoiding Cognitive Biases

The Drivers of Problem Solving

- A problem is an obstacle that makes it difficult to reach a certain goal or satisfy a certain need, placing itself between the individual's will and objective reality.
- In a more specific sense, this term refers to any situation or condition that is unresolved and which presents difficulties for its solution.

DRIVERS

- Time
- Type
- Level of abstraction
- N. Of Solutions
- N. Of known solutions
- …

N	Description	Metrics
1	Problem Identification	The problem can be identified from the beginning: (1) Exactly (5) No
2	Multidisciplinarity	Single domain team (1) in general formed by one or few people Multidisciplinary team (5) in general formed by many people
3	Robustness of the background	A robust discipline for problem definition exists (problem definition ∃!) (1) yes - (5) no
4	Level of Constraints	(1) High - (5) Low
5	Level of breakthrough	(1) Low - (5) High
6	Theoretical-Empirical	Theoretical (1) - Empirical (5)
7	Typology of solution	(1) Only one well defined solution exists; (2) More than only one solution exists; (3) More than one concept can be explored; (4) Solution depends on the point of view (e.g.: lawyers); (5) No solution has been found yet.
8	Replicability of the output with different teams	(1) Total replicability; (2) Similar solutions; (3) Different solutions; (4) Absolutely improbable; (5) Impossible.

«Skilling me softly» 3/3: Your map of the concept of soft skills

- Let’s divide in three groups
- Create a shared concept map of the concept of soft-skill
- Let’s discuss:
    - Which are problems/limitations of soft-skills?
    - How to overcome these problems?
- Create a concept map of your shared solution



Thank you for your attention!

Filippo Chiarello: filippo.chiarello@unipi.it

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