



GESTÃO CORRENTE

GC 4 – Personal Skills: **Problem Solving**

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LEARNING OBJECTIVES



- Increase proficiency in analytic problem solving
- Recognize personal conceptual blocks
- Enhance creativity by overcoming conceptual blocks
- Foster innovation among others

A MODEL OF PROBLEM SOLVING



Step 1: Define the Problem

- Differentiate fact from opinion
- Specify underlying causes
- Tap everyone involved for information
- State the problem explicitly
- Identify what standard is violated
- Determine whose problem it is
- Avoid stating the problem as a disguised solution



Step 2: Generate Alternative Solutions

- Postpone evaluating alternatives
- Be sure all involved individuals generate alternatives
- Specify alternatives that are consistent with goals
- Specify both short- and long-term solutions
- Build on others' ideas
- Specify alternatives that solve the problem

A MODEL OF PROBLEM SOLVING

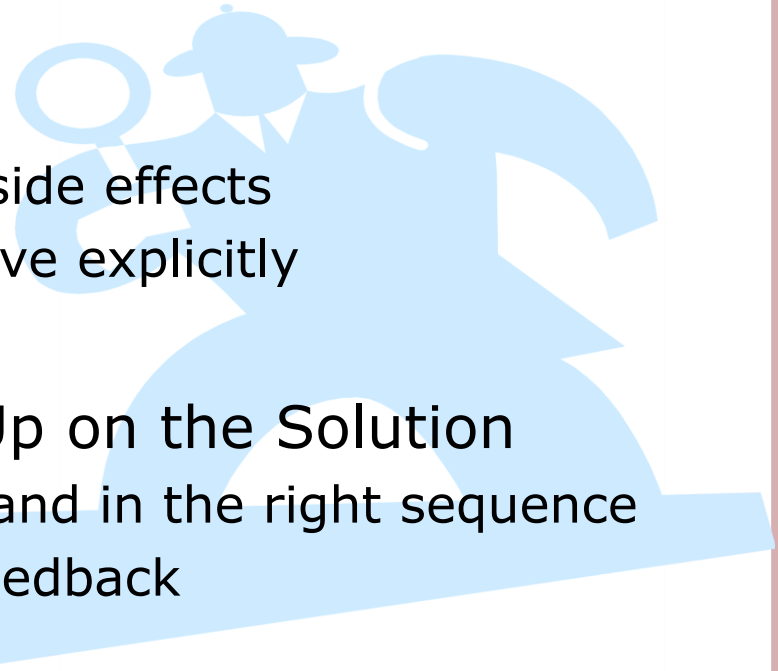


Step 3: Evaluate and Select an Alternative

- Evaluate relative to an optimal standard
- Evaluate systematically
- Evaluate relative to goals
- Evaluate main effects and side effects
- State the selected alternative explicitly

Step 4: Implement and Follow Up on the Solution

- Implement at proper time and in the right sequence
- Provide opportunities for feedback
- Engender acceptance
- Establish ongoing monitoring system
- Evaluate based on problem solution



CONSTRAINTS ON THE ANALYTICAL PROBLEM-SOLVING MODEL



Defining the problems

- Lack of consensus on the problem
- Acceptance of problem definition
- Symptoms are often confused with the real problem
- Confusing information

Generating Alternatives

- Alternatives are evaluated as they are proposed
- Few possible alternatives are usually known
- The first acceptable solution is usually accepted
- Alternatives are based on what was successful in the past

CONSTRAINTS ON THE ANALYTICAL PROBLEM-SOLVING MODEL



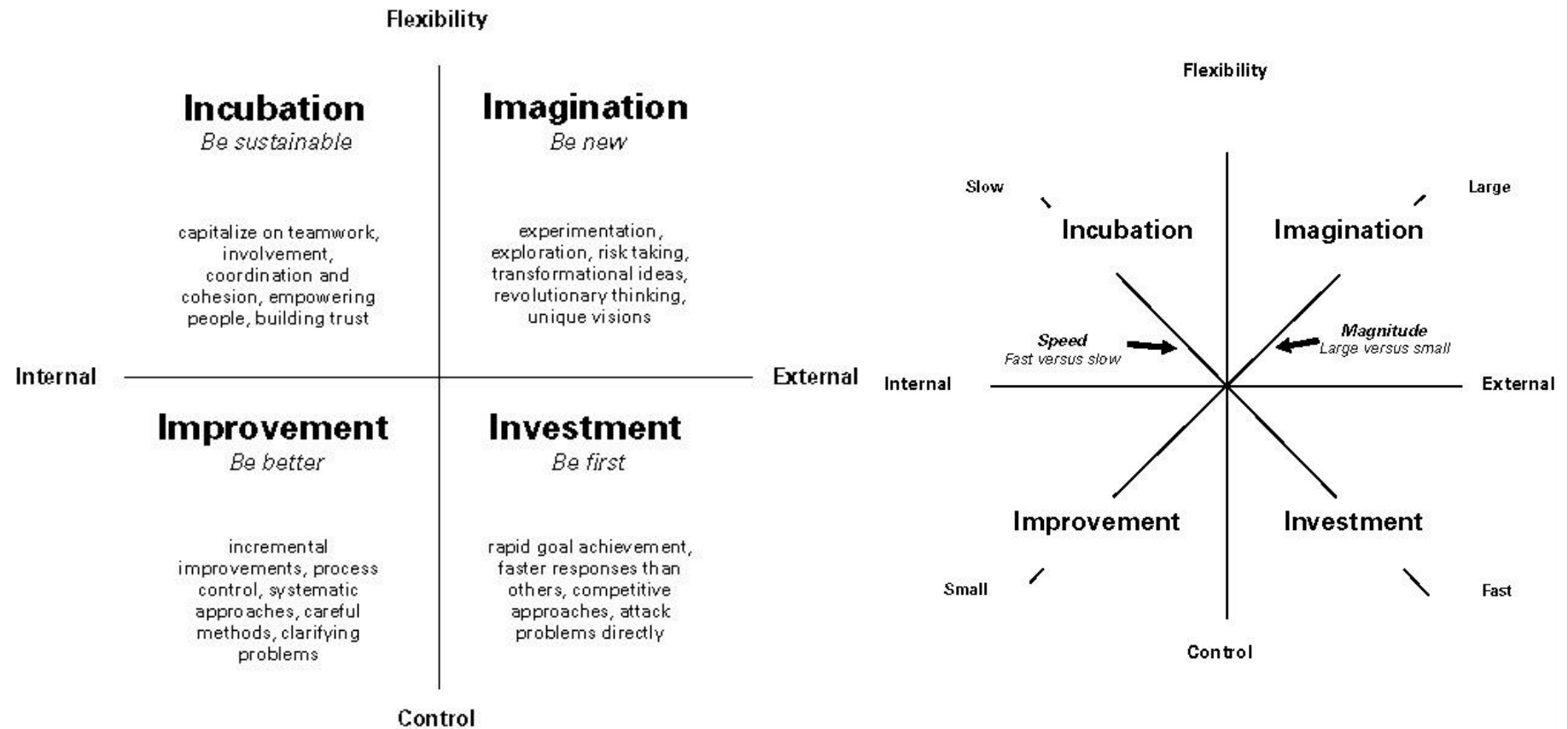
Evaluating and Select an Alternative

- Information on alternatives is limited
- Search for information occurs close to home
- The type of information is constrained by other factors
- Gathering information is costly
- Preferences for the best alternatives are not always known

Implementation and Follow up

- Acceptance is not always forthcoming
- Resistance to change
- Uncertainty about what part of solution to monitor
- Political and organizational processes must be managed
- It may take a long time to implement a solution

FOUR TYPES OF CREATIVITY



WHEN EACH APPROACH IS EFFECTIVE



Incubation

Be sustainable

Existence of a diverse community with strong values; need for collective effort and consensus; empowered workforce

Imagination

Be new

Need for brand-new, breakthrough products or services; emerging markets; resources needed for experimentation

Internal

External

Improvement

Be better

Requirement for quality, safety, and reliability; high technical specialization; effective standardized processes

Investment

Be first

Fast results are a necessity; highly competitive environments; emphasis on bottom-line outcomes

CONCEPTUAL BLOCKS



Mental obstacles that constrain the way problems are defined.

1. Constancy
 - Vertical thinking (defining problems in only one way)
 - One thinking language (not using more than one language to define and assess the problem)
2. Commitment
 - Stereotyping based on past experience (present problems as a variation of past problems)
 - Ignoring commonalities (failing to perceive them among elements that initially appear to be different)
3. Compression
 - Distinguishing figure from ground (not filtering out irrelevant information)
 - Artificial constraints (defining the boundaries of a problem too narrowly)
4. Complacency
 - Non-inquisitiveness (not asking questions)
 - Non-thinking (a bias toward activity in place of mental work)

CONCEPTUAL BLOCKS: VERTICAL THINKING (DE BONO'S WAYS OF THINKING)



○ Vertical Thinking

- Continuity
- Chooses
- Stability
- Searches for what is right
- Analytic
- Where the idea came from
- Develops an idea

○ Lateral Thinking

- Discontinuity
- Changes
- Instability
- Searches for what is different
- Provocative
- Where the idea is going
- Discovers the idea

CONCEPTUAL BLOCKS: MULTIPLE THINKING LANGUAGES

The more languages available to problem solvers, the more creative the solution will be.

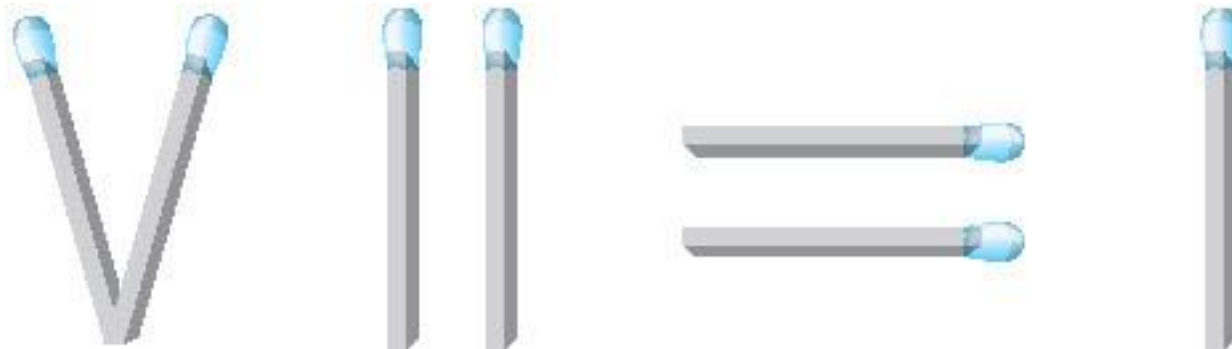
- Words
- Symbols
- Sensory (i.e. smell)
- Feelings and emotions
- Visual imagery



CONCEPTUAL BLOCKS: MULTIPLE THINKING LANGUAGES, EXAMPLE: THE MATCHSTICK CONFIGURATION



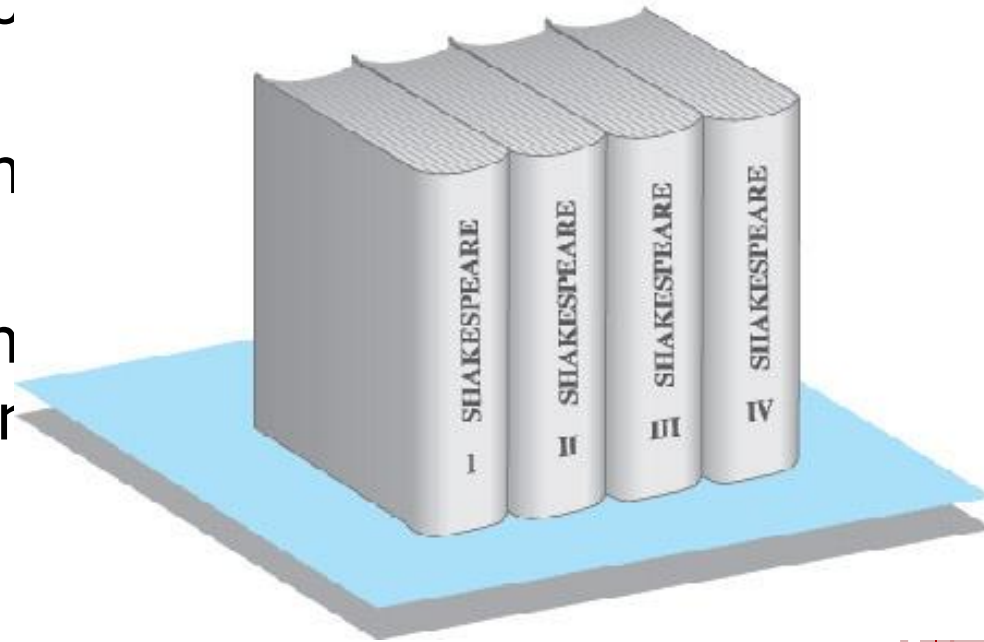
Below are 7 matchsticks. By moving only one matchstick make the figure into a true equality (the value on one side equals the value on the other side).



CONCEPTUAL BLOCKS: STEREOTYPING BASED ON PAST EXPERIENCES, EXAMPLE: THE SHAKESPEARE RIDDLE

DESDE 1911

- Assume that there are 4 volumes of Shakespeare on the shelf.
- Assume that the pages of each volume are exactly 2 inches thick.
- The covers of each volume are 1/2 inch thick.
- Assume that a bookworm ate straight through from the first page of volume 1 to the last page of volume 4.



What distance did the worm cover (inches)?

CONCEPTUAL BLOCKS: IGNORING COMMONALITIES

EXAMPLE: NAME THAT SHIP!



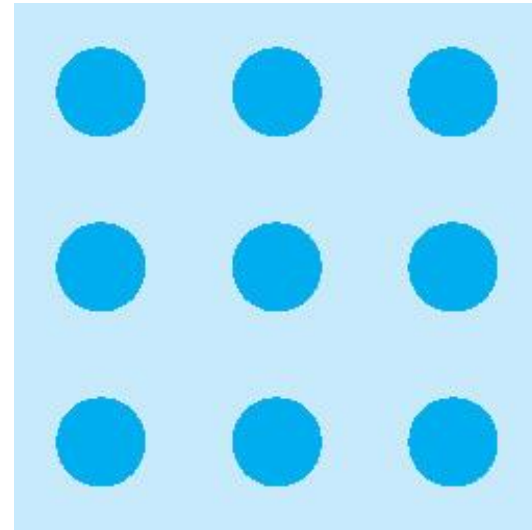
- Using the code letters for the smaller ships as a guide, what is the name of the larger ship?



CONCEPTUAL BLOCKS: ARTIFICIAL CONSTRAINTS, EXAMPLE: THE NINE-DOT PROBLEM

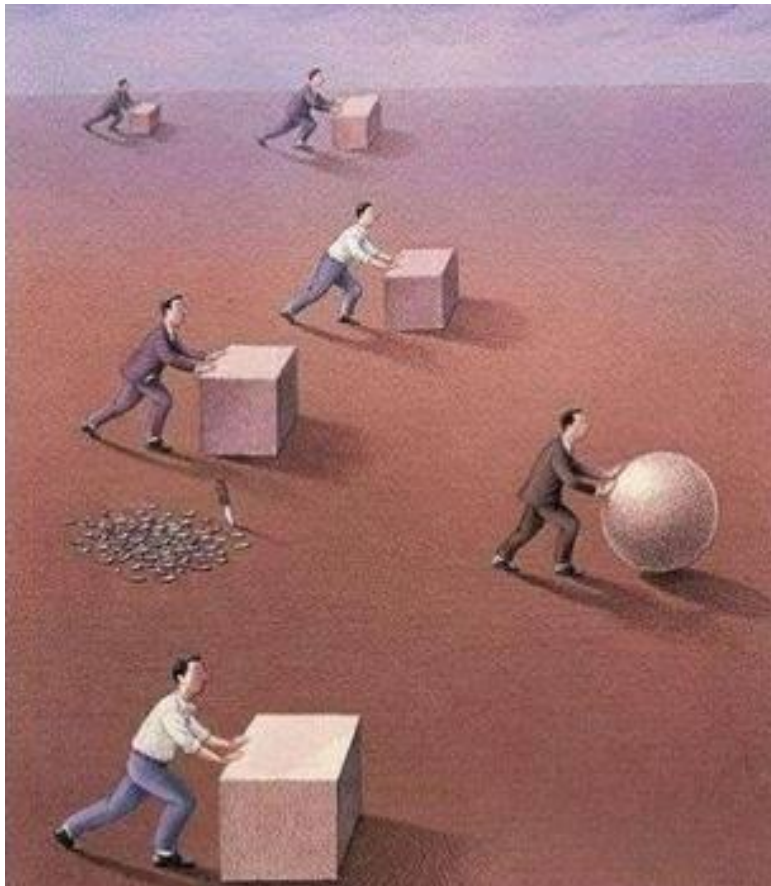


- Without lifting your pencil from paper, draw four straight lines that pass through all nine dots.



CONCEPTUAL BLOCKS: ARTIFICIAL CONSTRAINTS, EXAMPLE: DIGGING IN THE SAND

“There is only one way to do it ...”

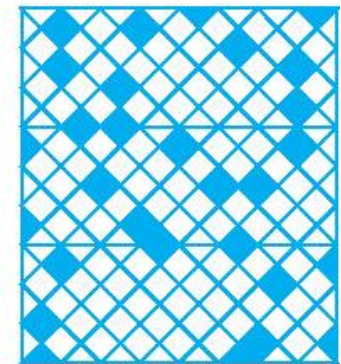
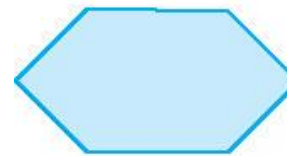
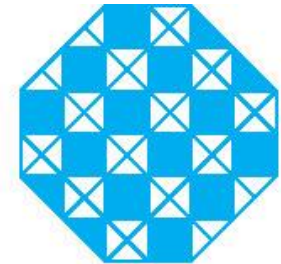
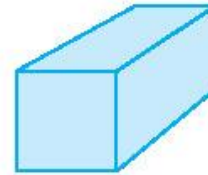


CONCEPTUAL BLOCKS: SEPARATING THE FIGURE FROM GROUND, EXAMPLE: EMBEDDED PATTERN



- For each pair, find the pattern on the left that is embedded in the more complex pattern on the right.

- Now try to find at least two figures in each pattern.



CONCEPTUAL BLOCKS: SEPARATING THE FIGURE FROM GROUND, EXAMPLE: EMBEDDED PATTERN



○ How many babies?

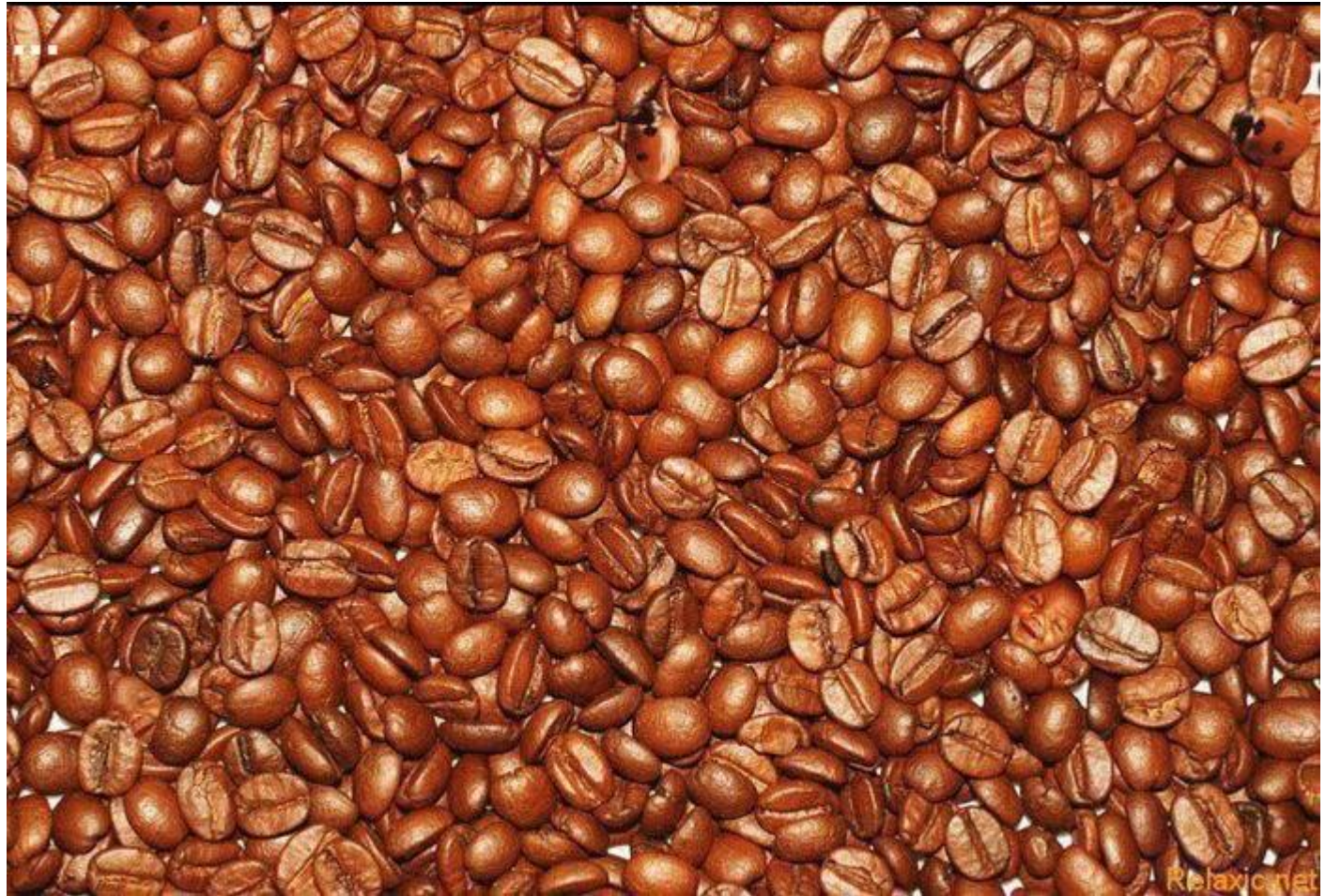
0?

1?

2?

3?

4?



Relaxionet

CONCEPTUAL BLOCKS: SEPARATING THE FIGURE FROM GROUND, EXAMPLE: EMBEDDED PATTERN



- Where is the 2?

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CONCEPTUAL BLOCKS: BIAS AGAINST THINKING, EXAMPLE: AMBIDEXTROUS THINKING TEST



There are two lists of words:

- Take about 1 minutes to memorize the first list. Then, on a piece of paper write down as many words as you can remember.
- Now take about 1 minutes and memorize the words on the second list. Repeat the process of writing down as many words as you can remember.

LIST 1	LIST 2
Sunset	Decline
Perfume	Very
Brick	Ambiguous
Monkey	Resources
Castle	Term
Guitar	Conceptual
Pencil	About
Computer	Appendix
Umbrella	Determine
Radar	Forget
Blister	Quantity
Chessboard	Survey

STAGES IN CREATIVE THOUGHT



1. Preparation

- Gathering data, defining the problem, generating alternatives, consciously examining all available information

2. Incubation

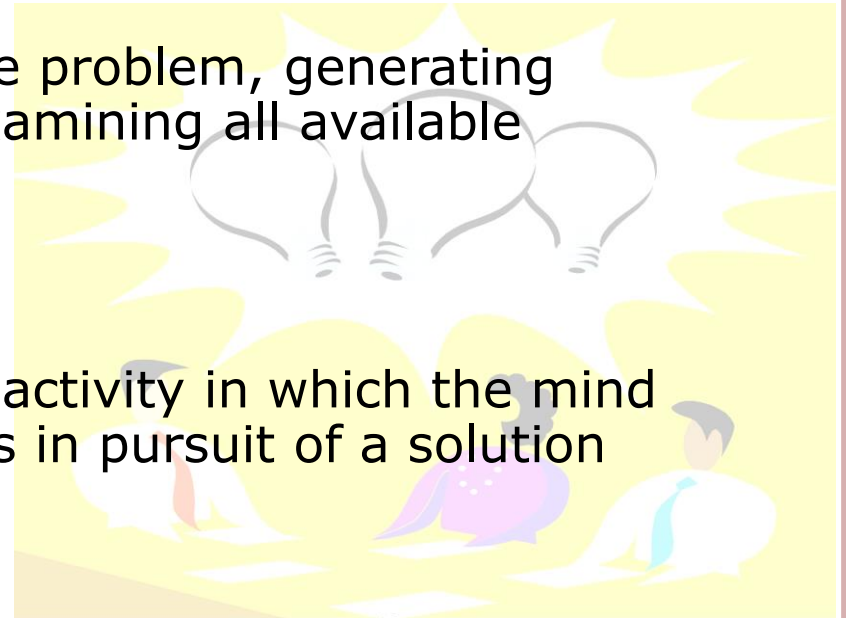
- Mostly unconscious mental activity in which the mind combine unrelated thoughts in pursuit of a solution

3. Illumination

- Occurs when an insight is recognized and a creative solution is articulated

4. Verification

- Involves evaluating the creative solution relative to some standard of acceptability



WAYS TO IMPROVE PROBLEM DEFINITION



Tabela 3.5, p. 221

1. Make the strange familiar and the familiar strange –
Synectics
 - Put something you don't know in terms of something you do know, then reverse the process back again.
 - What does this remind me?
 - What is this similar to?
 - What is this opposite to?

2. Elaborate the definition
 - Force two alternatives hypotheses for each problem
 - Use a questions check list
 - Is there anything else?
 - Is the reverse true?
 - Is this the symptom of a more general problem?
 - Who sees it differently)?

3. Reverse the definition
 - Turn de problem upside down or back to front
 - Janusian Thinking (Roman God, with two faces looking in opposite directions)

WAYS TO GENERATE MORE ALTERNATIVES



1. Defer judgment
 - Brainstorming helps generating more alternatives for problem solving without prematurely evaluating, and hence discarding, them.
 - No evaluation of ideas is permitted
 - Wild ideas are encouraged
 - Quantity before quality
 - Build on ideas of others

2. Expand current alternatives
 - Subdivision of problems in smaller parts

3. Combine unrelated attributes
 - Forcing integration of seemingly unrelated elements
 - See common relationships among disparate factors
 - Morphological synthesis (four step procedure)
 - Relational algorithm (applying connecting word that force a relationship – Relational words
 - Example: “Customers are dissatisfied with our service”
 - Ling underlined word with relational words.

HINTS TO FACILITATE CREATIVE PROBLEM SOLVING



1. Give yourself relaxation time
2. Find a place (physical) where you can think
3. Talk to other people about ideas
4. Ask other people for their suggestions about your problems
5. Read a lot
6. Protect yourself from idea-killers (black holes who absorb all your energy)

THREE PRINCIPLES FOR FOSTERING CREATIVITY



1. Pull people apart; put people together
 - Let individuals work alone as well as with teams and task forces
 - Encourage minority reports and legitimize “devil’s advocate” roles
 - Encourage heterogeneous membership in teams
 - Separate competing groups in subgroups
2. Monitor and stimulus
 - Accountability
 - Verbalization that encourages to attempt something (eliminate ...)
3. Reward multiple roles
 - Idea champion
 - Sponsor
 - Orchestrator
 - Rule breaker

