



SAFEMODE

Strengthening synergies between Aviation and Maritime
in the area of Human Factors towards achieving more
efficient and resilient MODES of transportation.



deepblue
consulting & research

Training Package

Human Abilities and Limitations

SAFEMODE-CBHF-M1



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Presentation contents

**1. Human Information
Processing**

2. Perception

3. Attention

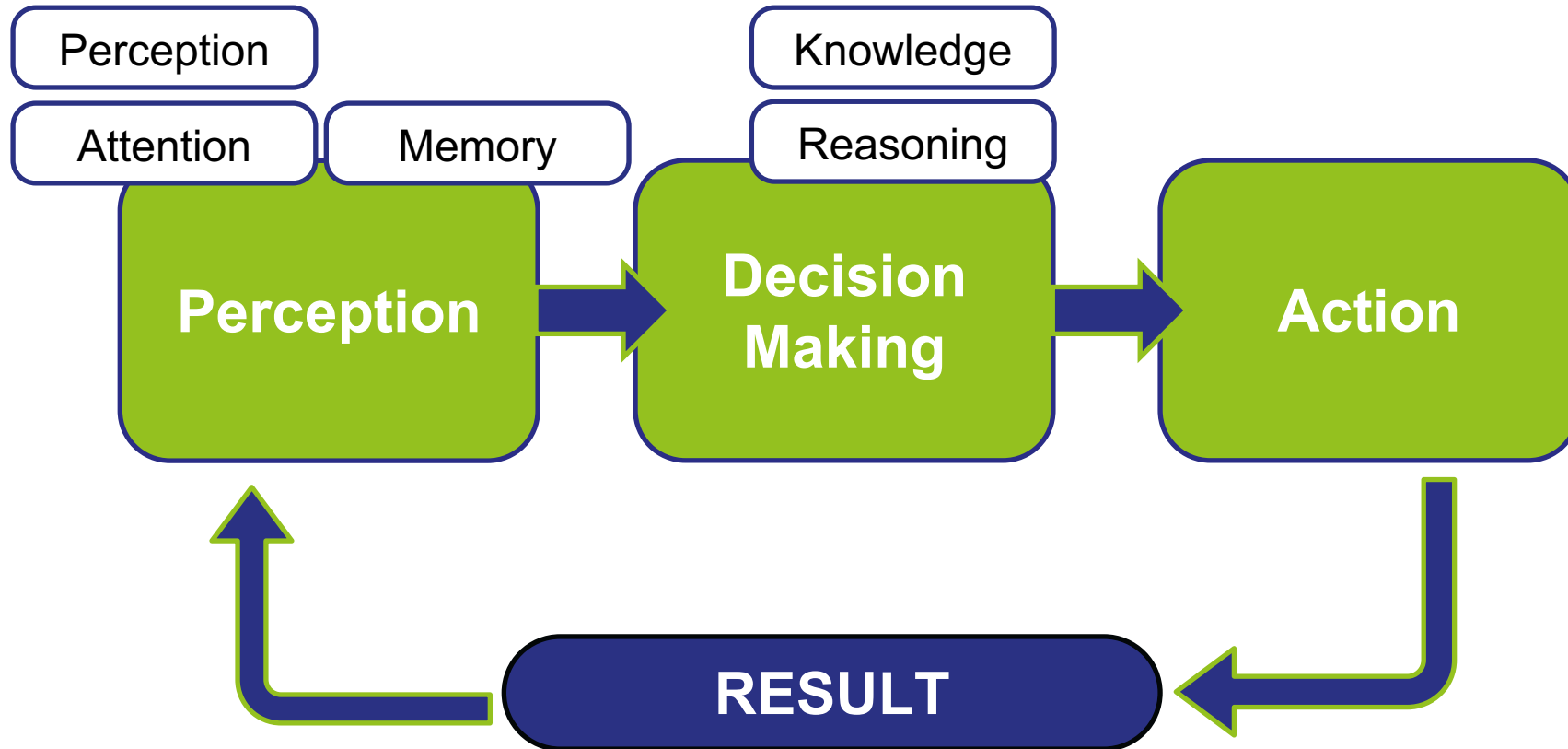
4. Memory

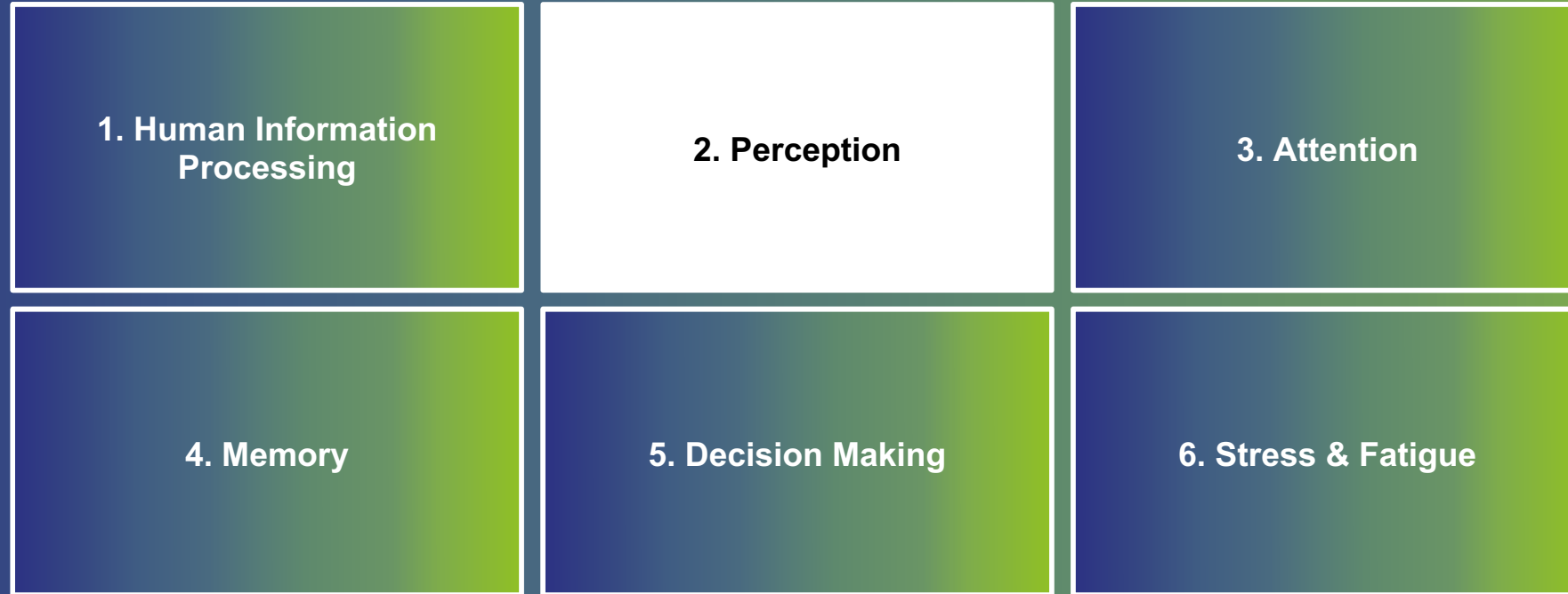
5. Decision Making

6. Stress & Fatigue

You are designing a robot vacuum cleaner.
What capabilities are you implementing?

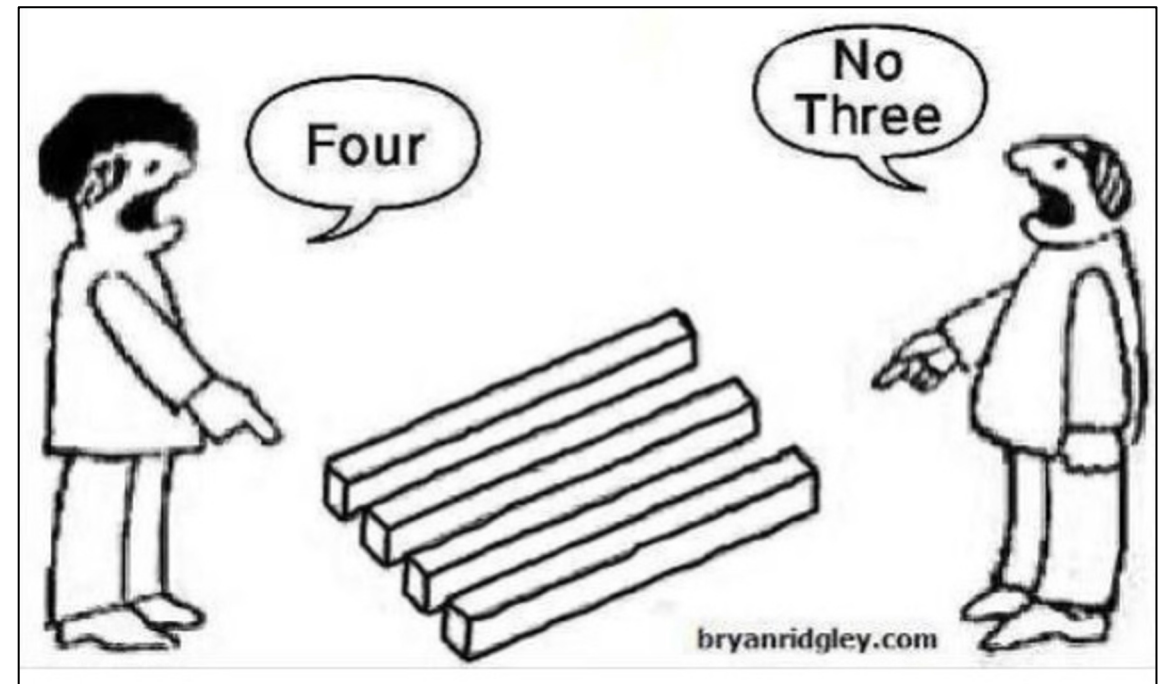






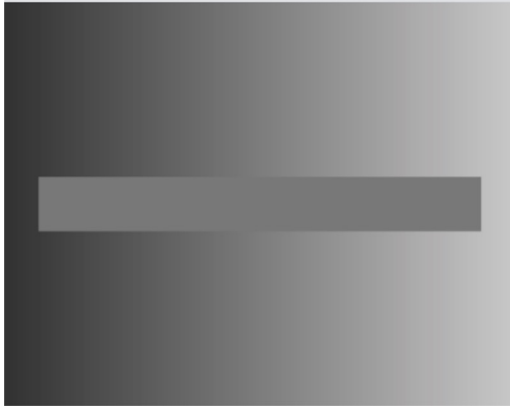
Process by which we select, organize, and interpret sensory information to recognize meaningful objects and events.

The result is awareness of the outside world.



Shades and our expectations influence colour perception

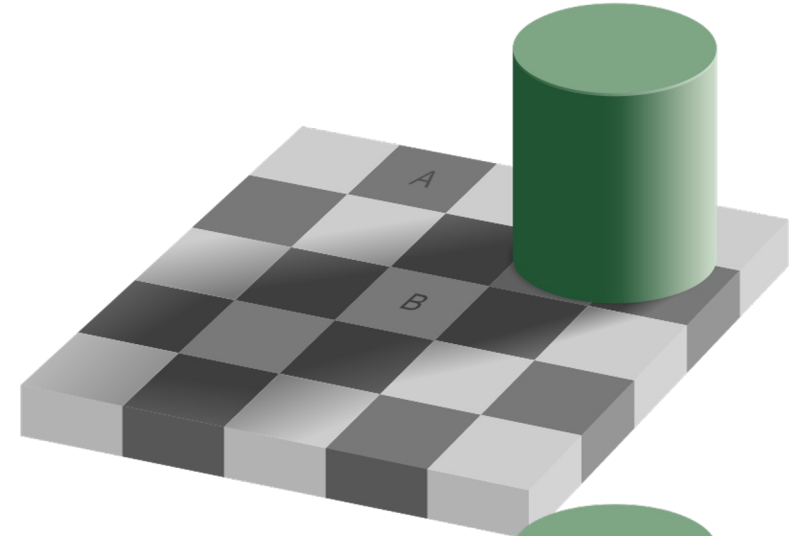
What color do you see looking at the middle bar?



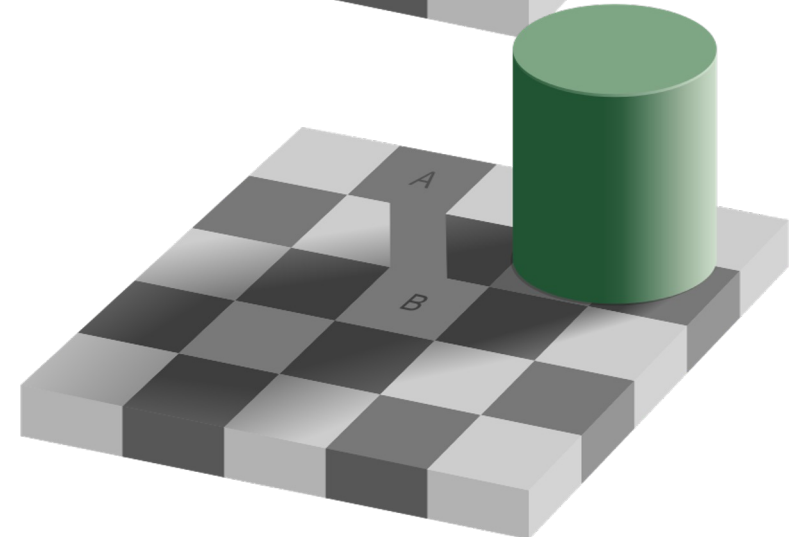
Let's put a black box around it. What do you see now?



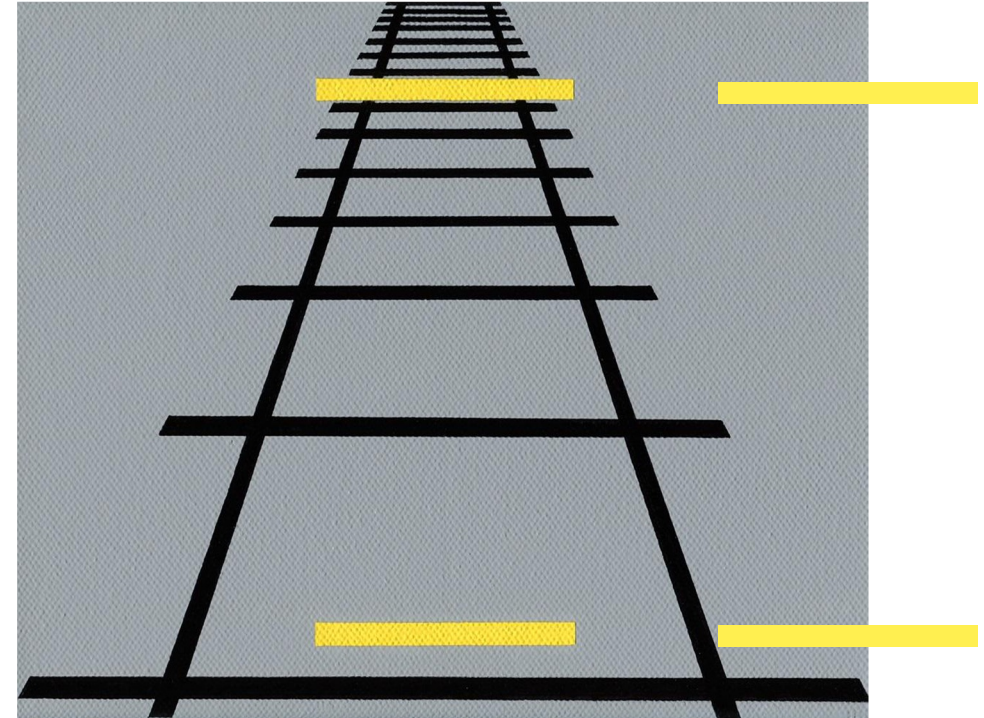
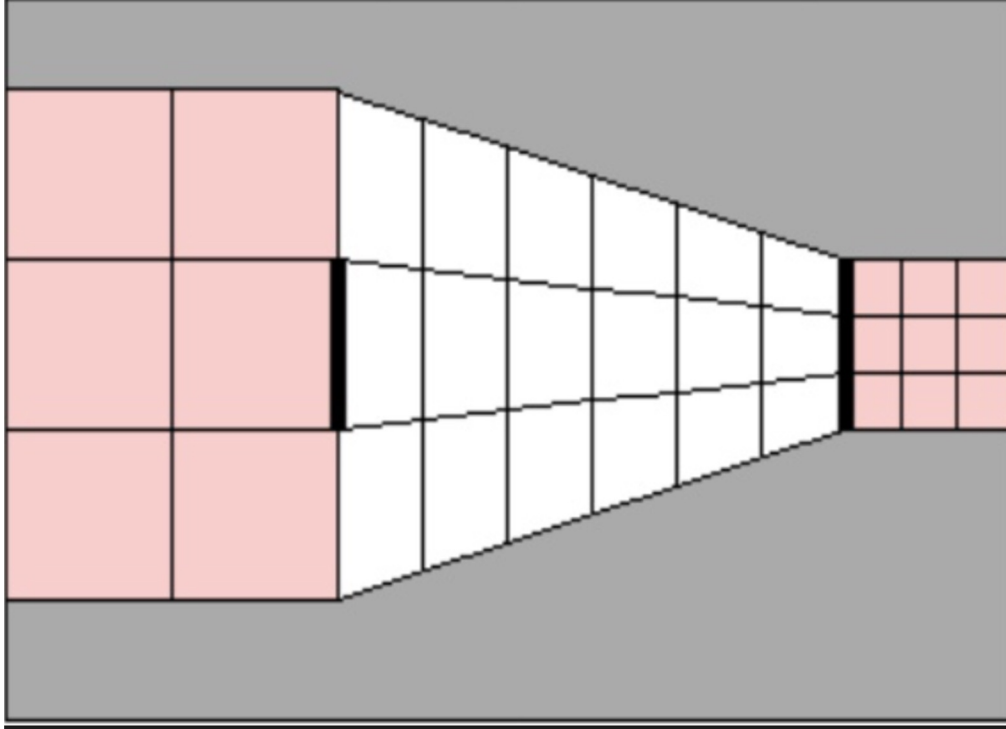
Compare the squares A and B.

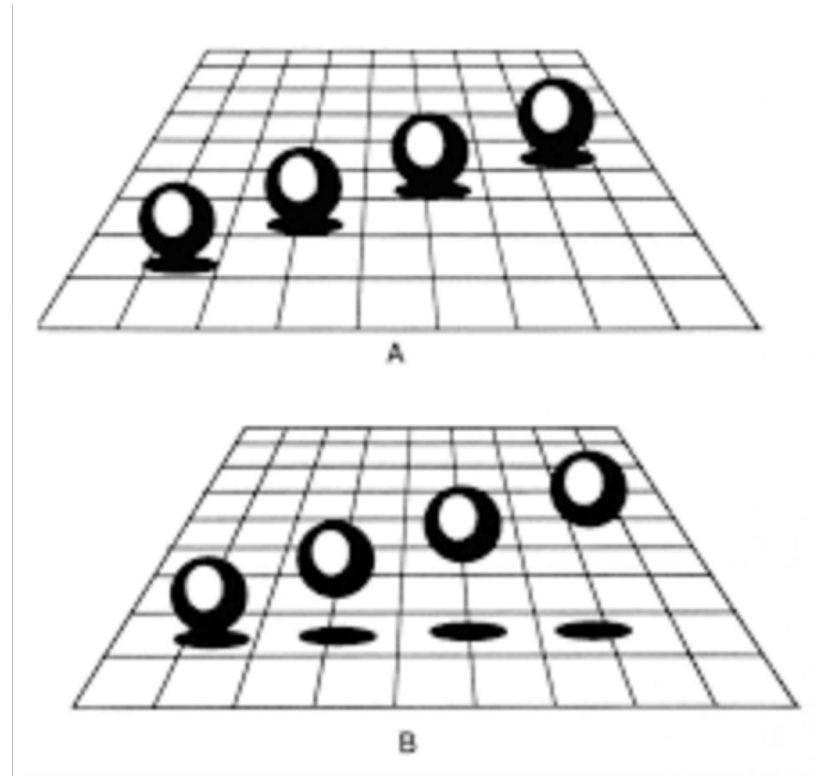


In reality the squares have the same gray tone. You can see that when linking the squares.



Measure the lines to see that they are actually the same size





Perception is more than sensory representation. It is an active process we are mostly unaware of and influenced by different factors:

- Knowledge about the world
- Expectations
- Contextual information



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Attention is the process of concentrating our mental resources on one specific element.

Attention can move quickly from one item to another, but the brain can only deal with one item at the time.



By Financial Times - Patrón cocktail bar, CC BY 2.0,



Follow this link: <https://www.youtube.com/watch?v=14Nb45CS9og>



Follow this link: <https://www.youtube.com/watch?v=cW8UiTQtiwA>

Process of selectively concentrating on a discrete aspect of information while ignoring other perceivable information.
We focus only at one thing at the time.



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It is the process in which **information** is **encoded, stored and retrieved**.

- Short term memory/working memory
- Long term memory



Look at the number for 1 min and try to remember

566733241515

How many numbers can you remember?

How many numbers can you remember?

Try now

566-733-24-1515

How many numbers can you remember?

Try to remember as many words as you can. You have one minute.

Lamp

Fish

Bank

Homework

Clock

Baby

Desk

Ring

Apple

Dog

Fire

Ball

How many words can you remember?

Try to remember as many words as you can. You have one minute.

Kitchen

Table

Bread

Chair

Coffee

Knife

Juice

Avocado

Fridge

Plate

Kettle

Cheese

How many words can you remember?

Try to remember the letters in order. You have one minute.

BB CCN NP DFC EOF BIC IAN DAN FLU SA

Try to recall as many letter as you can in order!

Try to remember the letters in order:

BBC CNN PDF CEO FBI CIA DNA NFL USA

Try to recall as many letter as you can in order!

Even easier when put into a story:

BBC CNN PDF CEO FBI CIA DNA NFL USA

BBC and **CNN** have reported that a **PDF** was shared between the **CEO** of the **FBI** and **CIA** about the **DNA** of an **NFL** player in a murder case in the **USA**.

Working memory has limited capacity.

- 7 (+/-2) elements (Miller, 1956)
- Techniques to expand this:
 - Chunking
 - Link information to stories





It is a cognitive Process resulting in the selection of a course of actions. For this purpose, different alternatives can be evaluated.



Answer the following question:

If you are running a race and you pass the person in second place, what place are you in?

Answer the following question:

You want to buy a birthday card with an envelope. You see that the birthday card with envelope costs a total of 1,50 Euro. The birthday card costs 1 Euro more than the envelope. How much does the envelope cost?

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

Rank the following alternatives in order of probability, use 1 for the most likely, 8 for the least likely.

1. Linda is a teacher in elementary school
2. Linda works in a bookstore and takes yoga classes
3. Linda is active in the feminist movement
4. Linda is a psychiatric social worker
5. Linda is a member of the League of retired aircraft pilots
6. Linda is a bank teller
7. Linda is an insurance salesperson
8. Linda is a bank teller and is active in the feminist movement

System 1

- Automatic and fast
- Uses heuristics to understand complex world.

System 2

- Controlled and slow
- May be busy (or lazy)
- Possibly falls prey to confirmation bias and cognitive ease

Try to say out loud whether the words are written on the left or right side:

LEFT

left

right

RIGHT

RIGHT

left

LEFT

right

Try to say out loud if the words are written in lower or upper case:

upper

lower

LOWER

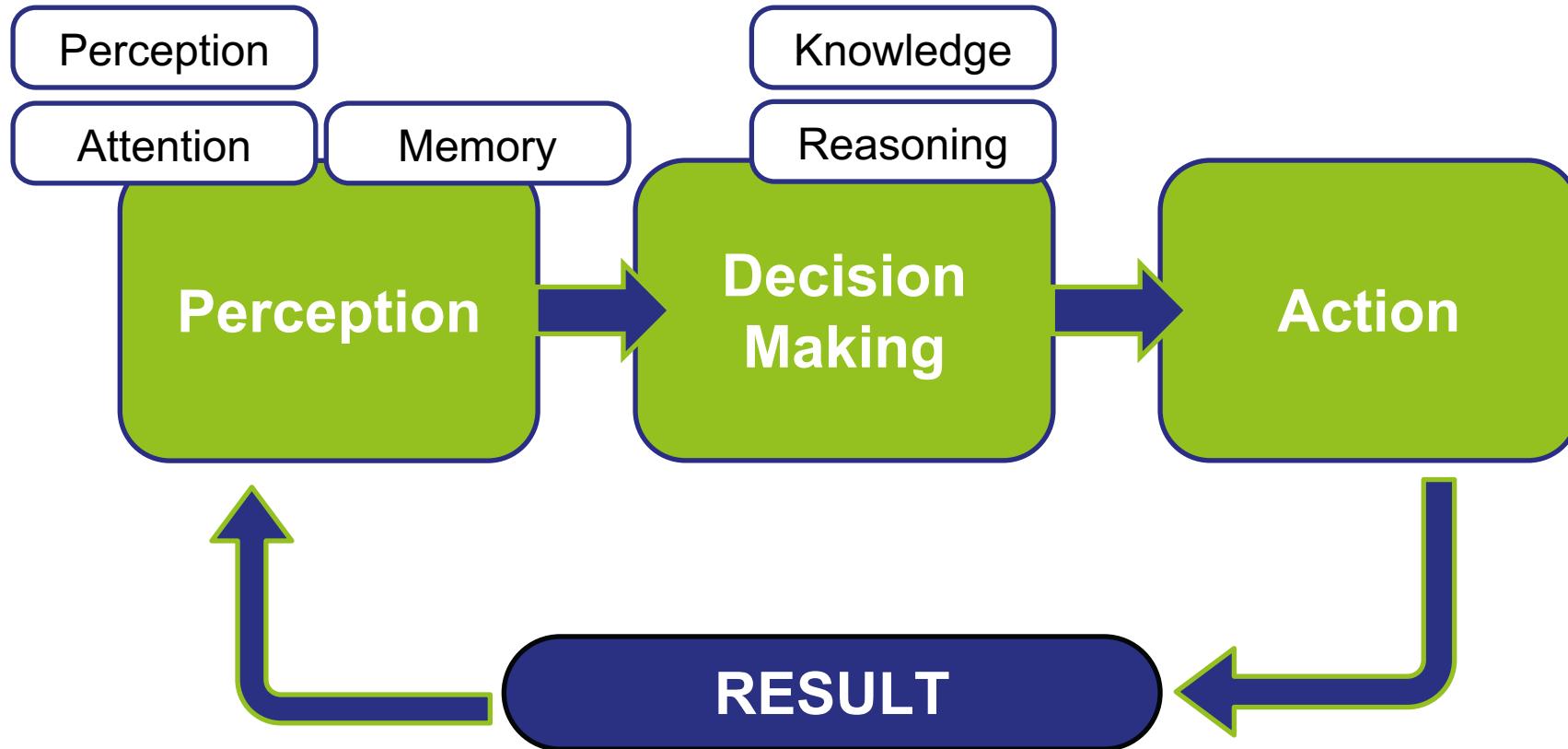
upper

UPPER

lower

LOWER

upper



Perception:

- Active process that is influenced by different factors.

Attention:

- Humans focus at one thing at the time and while focusing on something we might miss other (potentially relevant) information.

Memory:

- The working memory is limited but its capacity can be increased through different techniques.

Decision Making:

- System 1 uses heuristics that is why it is quick but sometimes wrong.

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Perception, Decision and Action can be influenced by our physical condition

- Stress
- Fatigue



Can you recall from your experience cases where stress and fatigue played a role? What happened?

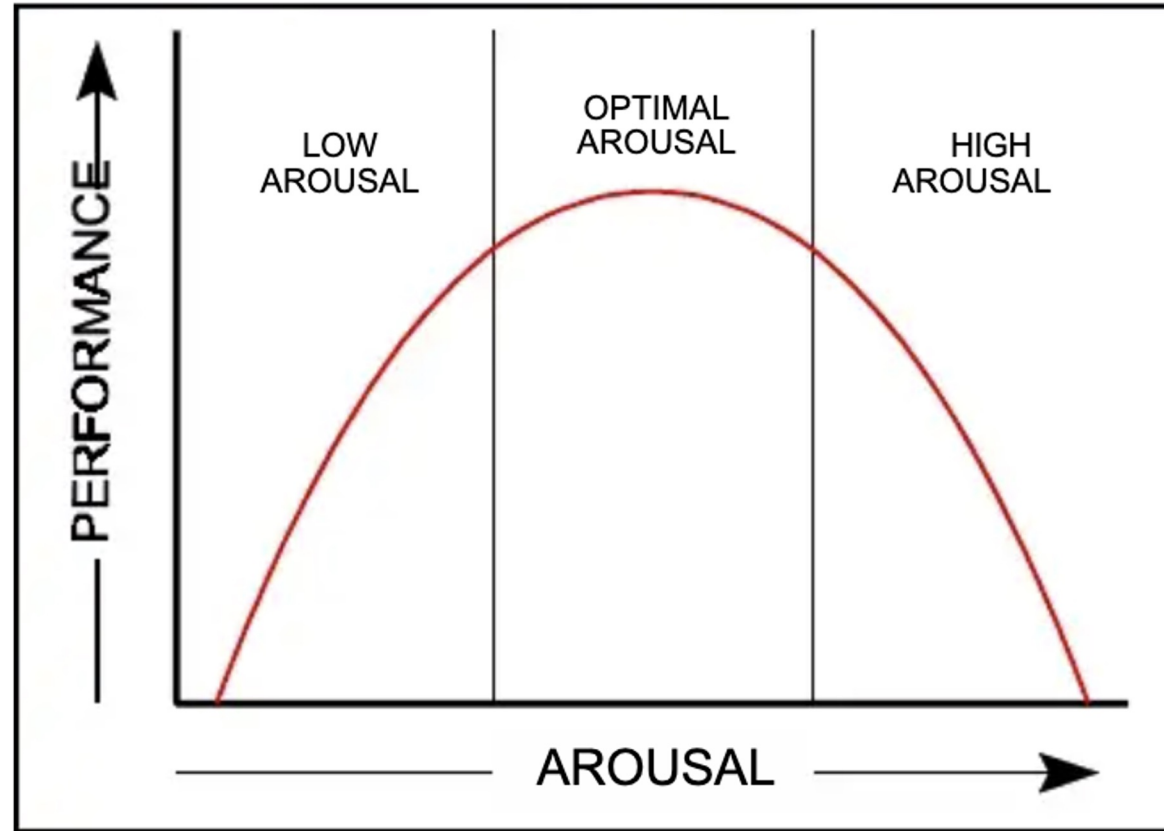


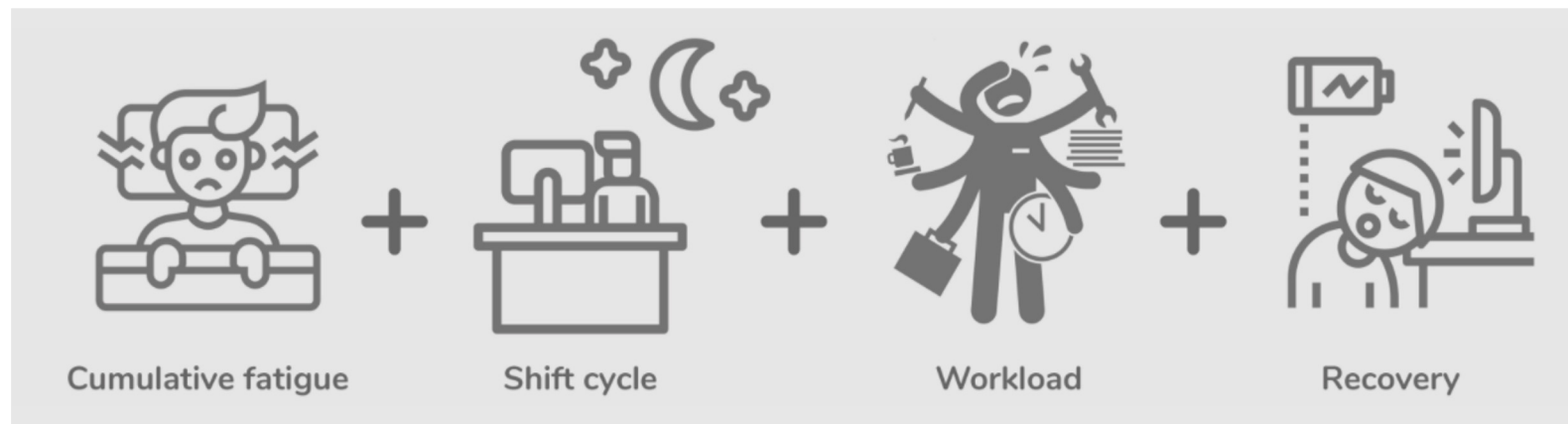
Figure 7.2. The Relationship Between Arousal and Performance (Yerkes Dodson)

Mental fatigue:

- rather manifests in sleepiness or slowness. A person with mental fatigue may fall asleep, may react very slowly, or may be inattentive

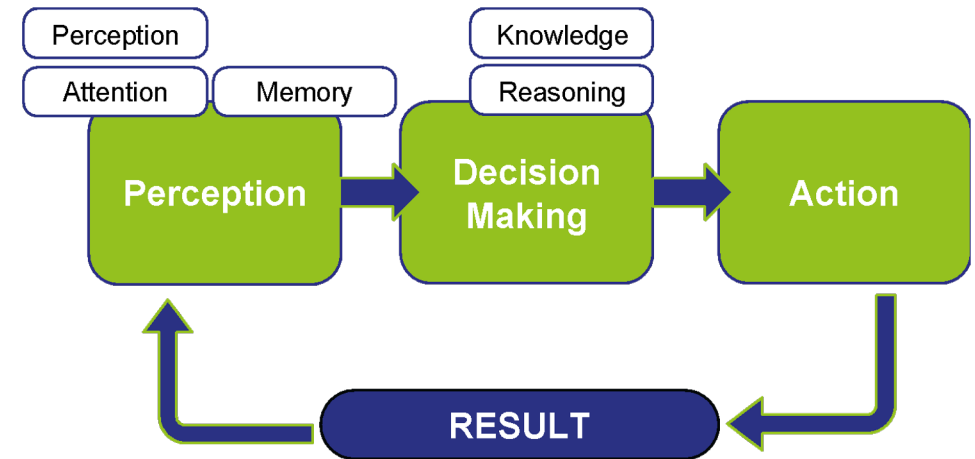
Physical fatigue:

- inability to continue functioning at the level of one's normal abilities; a person with physical fatigue cannot lift as heavy a box or walk as far as he could if not fatigued





What messages will you take home from this presentation?



Thank you for your attention

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