

Lesson Plan

NEUROHEADWAY

Neuroscience Into Education

Module name: **Our Nervous System**

Lesson objective	Main activity	Reflection	Success criteria
Our nervous system Behaviour, Mental processes			
Perception - Optical illusions	Work in pairs Make a copy of templates attached, present it to students for closer exploration of optical illusions Explain the principle of individual optical illusion, or let students to describe and explain the figures and principles .. Discuss results, make conclusions	Students will become friendly with optical illusions, they will	
Jastrow illusion Make your own Jastrow illusion experiment	Let students work in pairs, print the template of Jastrow segments (A, B) on A4 paper (every student should get one copy). 1. First let students to observe the template, allow them to make comparison of segments - A and B – the upper segment seems to be shorter.... 2. Now cut out the template – both archs A and B and shift their position – now the segment B is above the segment A – and the upper one (previously considered to be longer one) seems to be shorter..... so shift again, again.....the upper segment always seems to be the shorter one..	Students will participate on the experiment with Jastrow segments.	

	3. Finally put them onto each other – compare their size and shape – both segments have the same length – are the same Explanation: The most commonly used explanation of this optic illusion is that the brain is confused by the difference in size between the large and the small radius. The shorter side makes the long side appear longer, and the short side seems to be even shorter https://en.wikipedia.org/wiki/Jastrow_illusion Discuss the explanation of Jastrow visual illusion Have fun!		
Perception Taste illusions	Work in pairs Ask a friend to close his/her eyes and nose (by pressing with fingers) Then put different pieces of food into his/her mouth and ask him/her to identify every single bite. Suggested food: apple, onion, carrot, radish, bread, corn, dark chocolate, cinnamon, etc...	You will find difficult to identify the food since the smell and taste senses are very closely interconnected Taste is without the sense of sight and smell very limited	

Power point Example

NEUROHEADWAY

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Human Mental Processes

The relation of the human mind and the brain have been debated for centuries

- How can immaterial entities may arise from biological material??
- How do we think? How our thoughts look like?
- Do perceptions reflect out most immediate reality? ..or is it only an illusion?
- Why do we have memory?
- How is it possible to understand language?

PERCEPTIONS, THOUGHTS, MEMORIES, ACTIONS, PLANS, UNDERSTANDING JOKES – HOW ALL THESE ASPECTS OF MENTAL LIFE – DEPEND ONLY ON BRAIN TISSUE FUNCTION??

Think and discuss...

Human Mental Processes

- What are mental processes ??

All activities that arise from our mind – like **perceptions, thoughts, memories, volition and emotion**

Mental processes are sometimes called as **cognitive function**

Human Mental Processes Perception

- Our brain – a highly flexible neural machine – is able to discriminate an enormous amount of information from the environment
- Therefore a strong filter protecting our brain from overstimulation have been developed – more than 99% of information is discarded by the brain as irrelevant and unimportant
- 1% of an important sensory information is selected, and than is channeled to proper motor region of the brain

The continuous stream of information from the receptors is organized by the brain as perceptions

Human Mental Processes Perception

Without perception we would not be able to identify the colour of a lavender, the smell of an apple pie, the shape of a pear or murmur of bees.....

Perception enables us to identify and interpret incoming sensory information in order to understand environment

Our sensory systems are part of nervous system responsible for processing sensory information – **vision, hearing, touch, smell, taste and smell**

All senses transduct information from the physical world to the realm of MIND



Human Mental Processes Perception

- Perception is not only a passive receipt of signals from environment, **it is shaped by person's memory, experience, expectations and intelligence**
- For long time have been **senses considered to be a passive receptors** (only receiving signals from exterior), however the study of illusions demonstrated that the brain perceptual system **actively attempts to make sense** of their input..
- Our perception is limited to the **quality of processing information** (sound volume, light conditions) and the general **specifications of our perceptual system** (e.g. we can hear only at certain range of frequencies, or our vision is limited to certain light waves)



Fig.1. The human brain tends to perceive a complete geometrical shapes, despite their incompleteness

Human Mental Processes Visual Perception

The confusing ambiguity of perception can be exploited in animal world

- **Camouflage** – predominantly use of coloration to make animals hard to see (sleeping owl, butterfly, whose drawings on rear wings may birds response to be eyes of a predator)
- **Mimicry** – when an edible, non poisonous animal resembles to be an another species (usually poisonous or non edible) or a part of a natural object (stick, tree bark, leaf)



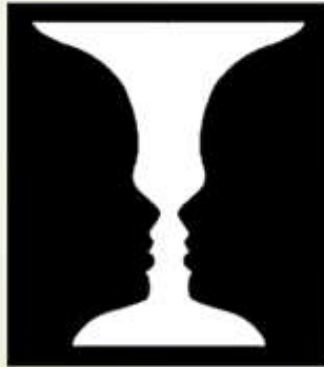
Monarch Butterfly (poisonous)

Viceroy Butterfly (non-poisonous)

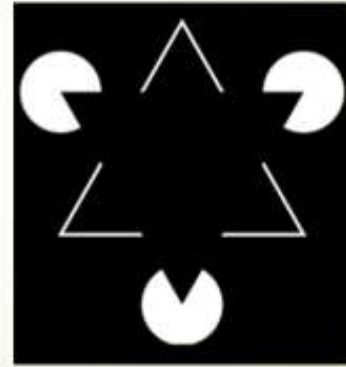


What other examples do you know???....

Human Mental Processes figure-ground perception – optical illusion



Rubin vase: Vase or two faces?? Your perception decides what you see first, neither answer is wrong, it is simply a difference of perspective, or point of view – called personal perspective



Kanizsa's Triangle: One triangle or two triangles? These spatially separate fragments give the impression of a (black) triangle, defined by a sharp illusory contour

Human Mental Processes visual perception – *optional slide*

A Max Velmans model in visual perception:

1. Light rays from a cat impinge on the Subject's eye
2. Impulses travel up via the optic nerve producing a neural representation of the cat within S's central nervous system (CNS)
3. CNS activity, in turn, has a causal influence on S's mind, resulting in a percept of a cat
4. The percept (of a cat) in the mind of S is quite separate both from the neural representation (of a cat) in S's brain and the cat (as-perceived by external observer) out-there-in the world

WE DON'T SEE THINGS AS THEY ARE, WE SEE THINGS AS WE ARE

