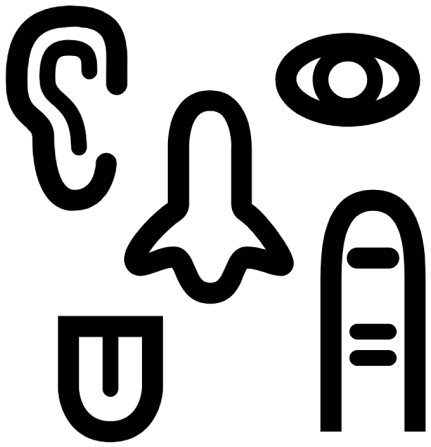
Department of Education

GOVERNMENT OF WESTERN AUSTRALIA

Year 11 ATAR Psychology

Cognition – Sensation and Perception



Requests and enquiries concerning copyright should be addressed to:
Manager Intellectual Property and Copyright
Department of Education
151 Royal Street
EAST PERTH WA 6004
Email: copyright@education.wa.edu.au

Year 11 SELF – Cognition
Sensation and Perception

Instructions to students

This resource package provides you with learning materials for the Psychology ATAR Year 11 course. The package focuses on the topic **Sensation and Perception**

This package is designed to support the program you are completing at your school. If feedback is required when completing this package, you should consult your teacher.

CONTENTS

It is recommended that you further investigate concepts covered in this resource package by conducting your own research using the text/s that you use at school or the internet.

Syllabus Points Covered

- *the role of sensation and perception in cognition*
  - *sensory organs and stimuli*
  - *perception – illusions and distortions of visual perception*

Learning Content and Activities

SENSATION AND PERCEPTION DEFINED

Cognition is the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses. In studying cognition, we are looking at the thinking part of what people do.

Sensation involves our sense organs receiving physical stimuli from the environment. It is the eyes receiving visual stimuli and the ears receiving sound. These stimuli are then processed by the brain.

Perception is when the brain selects, organises and gives meaning to the sensations. Past experiences and motivations influence perception, so people can perceive the same stimuli differently.

FIVE SENSES

Sensation is detected by receptors throughout the body. There are five sense organs, designed to detect stimuli -

- Skin – touch
- Mouth – taste
- Nose – smell
- Eyes - vision
- Ears - sound

ACTIVITY ONE

1. Complete the table below summarizing the five senses.

SENSE ORGAN	SENSE DETECTED	OVERVIEW OF HOW IT WORKS
Skin		
Mouth		
Nose		
Eyes		
Ears		

2. Label the diagrams of the eye and the ear shown below

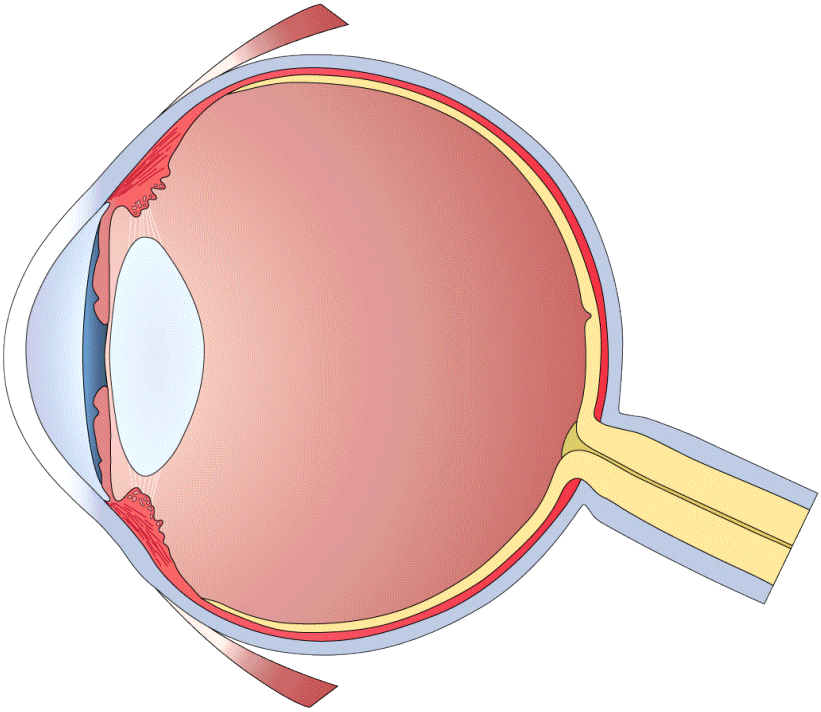


Image by rullgardina https://imgbin.com/ Free for non-commercial use.

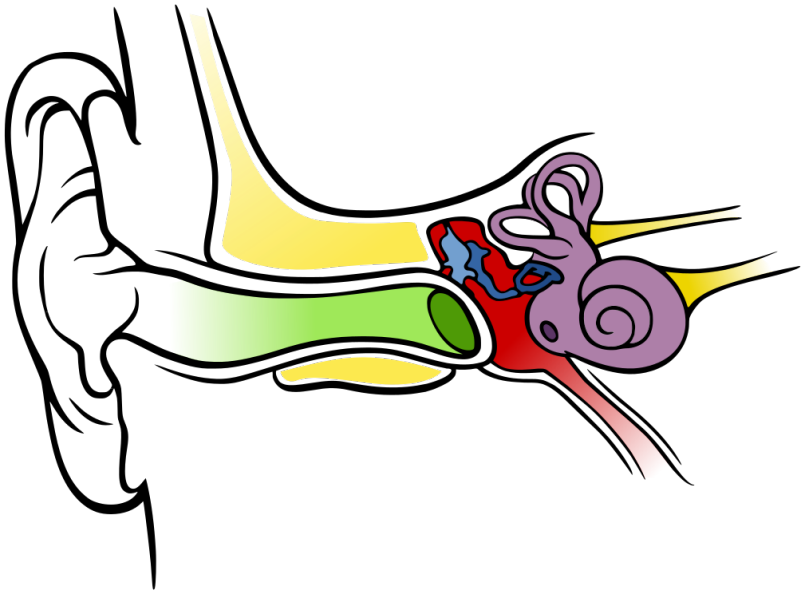


Image by andjar126 https://imgbin.com/ Free for non-commercial use.

3. Go to https://www.sporcle.com/games/g/earanatomy and have a go at labelling the online version of the ear diagram.

4. Go to https://www.sporcle.com/games/smac17/human-eye-anatomy and have a go at labelling the online version of the eye diagram.

5. Go to https://edition.cnn.com/videos/health/2017/10/19/vital-signs-what-makes-a-food-or-drink-taste-great-a.cnn watch the clip "What makes a food or drink taste great" and complete the following questions

    a) What does Givaudan do?

    .

    b) Why do we all taste things differently?

    c) What is the difference between external and internal nares?

    d) How does smell influence taste?

PERCEPTION

How we perceive and respond to stimuli can be viewed in two ways –

- **Top-down theory** - People actively construct perceptions using information based on expectations. Perception is guided by higher-level knowledge, experience, expectations and motivations. In 1970, psychologist Richard Gregory stated that perception is a constructive process. He explained that past experience and prior knowledge related to a stimulus help us make inferences. For Gregory, perception is all about making the best guess or a hypothesis about what we see.
- **Bottom-up theory** - Parts are identified, put together, and then recognition occurs. Perception that consists of recognising and processing information about the individual components of the stimuli. Psychologist E.J Gibson argued that perception is not subject to hypotheses. It is rather that perception is a direct, "What you see is what you get" phenomenon.

Perception Expectancy

Perceptual expectancy is a readiness to respond in a certain way because of previous experience.

Example - A runner in the starting blocks at a track meet is set to respond in a certain way. Likewise, past experience, motives, context, or suggestion may create a perceptual expectancy that sets you to perceive in a certain way. If a car backfires, runners at a track meet may jump the gun. As a matter of fact, we all frequently jump the gun when perceiving. Expectancy is a perceptual hypothesis we are very likely to apply to a stimulus, even if applying it is inappropriate.

Perceptual Set

Allport (1955) defined perceptual set as: 'A perceptual bias or predisposition or readiness to perceive particular features of a stimulus.' **Perceptual set** is a tendency to perceive or notice some aspects of the available sensory data and ignore others. Our own expectation of what an object or event will be like makes us more likely to interpret in that predetermined way.

Bruner & Minturn (1955) illustrated how expectation could influence set by showing participants an ambiguous figure '13' set in the context of letters or numbers. The physical stimulus '13' is the same in each case but is perceived differently because of the influence of the context in which it appears. We EXPECT to see a letter in the context of other letters of the alphabet, whereas we EXPECT to see numbers in the context of other numbers.

Factors that influence perceptual set include motivation, expectation, culture, emotion and attitudes.

Perceptual Constancy

Perceptual constancy is our ability to perceive that an object remains the same, even when the object projects different images onto our retinas in our eyes. There are different types of perceptual constancy, for example shape, colour, size, brightness and location constancy.

Despite viewing the door at different angles, we know that the door remains rectangular. In only one of the versions it is an actual rectangle. This is an example of perceptual constancy of shape.

Gestalt Perception

Gestalt is a psychology term which means "unified whole". It refers to theories of **visual perception** developed by German psychologists in the 1920s. These theories attempt to describe how people tend to organize visual elements into groups.

ACTIVITY TWO

Complete the table on Gestalt Perception. Refer to page 31 in your textbook, *Nelson Psychology WA ATAR Unit 1&2*, for explanations and image examples.

Gestalt Principle	Explanation
Proximity	
Similarity	
Continuity	
Closure	
Figure and Ground	

Depth Perception
Depth perception is why we see objects in 3D rather than flat 2D images. Depth perception is made possible by **binocular** and **monocular** cues

Binocular vision is how we see 3D with two eyes. There are two main binocular cues that help us to judge distance and depth –

- **Disparity** – each eye sees a slightly different image because they are about 6 cm apart (on average). Your brain puts the two images it receives together into a single three-dimensional image.
- **Convergence** – when looking at a close-up object, your eyes angle inwards towards each other (you become slightly cross-eyed). The extra effort used by the muscles on the outside of each eye gives a clue to the brain about how far away the object is. If you hold your finger 20 cm in front of your eyes, your muscles need to work a lot harder than when your finger is 50 cm away.

Monocular cues are those that just one eye can do on its own. Some of these monocular cues are -

- **Accommodation** – this is the change of focus when you look at a close-up object. The ciliary muscles inside the eye need to work harder to change the shape of the lens inside your eye. The effort required provides the brain with information about distance.
- **Sharp focus or blurry** – if two objects are at the same distance, they will both appear to be in focus. Objects that are closer or further away will appear blurry.
- **Motion parallax** – if you move your head, objects that are close to you will appear to move more than those objects that are further away.
- **Superposition** – objects that appear to move in front of other objects must be closer (a little obvious perhaps, but very useful).
- **Vividness of colours** – distant objects often appear less bright and colourful. This is due to the scattering of light as it travels from that distant object.
- **Definition and textures** – close objects will have a lot of detail and definition apparent. More distant objects will not appear with as much detail. This is very noticeable when looking at a field of grass. Close up, the blades of grass will be noticeable. Further away, the grass is more of a sea of green.
- **Relative size** – if we already have an idea of the size of two people or objects in a photo, this can give a good clue as to how far apart they are.

ACTIVITY THREE

Go to https://visionaryeyecare.wordpress.com/2008/08/04/eye-test-find-your-blind-spot-in-each-eye/ and do the online blind spot test. Why don't we normally "see" or notice our blind spot?

ILLUSIONS

Illusions occur because our perceptual system is structured to function as though our assumptions and hypotheses about the world around us are true. In situations where our assumptions appear to be true but are actually not, we automatically construct perceptions that bring some sense of meaning and order. These misperceptions are called **illusions**. Then (sometimes) we realize that there are alternative, incompatible, and equally valid perceptions in addition to the one we constructed.

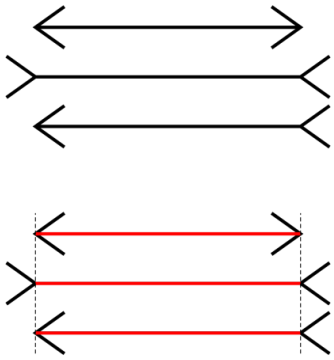
The Ames Room

A specially built room that makes people seem to change size as they move around in it. The room is not a rectangle, as viewers assume it is. It occurs because a single peephole prevents using our binocular depth cues to understand the images.

Click the link below to read more about the Ames room:
https://medium.com/@drlolospsychology/why-you-look-different-in-height-and-size-in-the-same-room-ames-room-illusion-cb35c1a3ead6

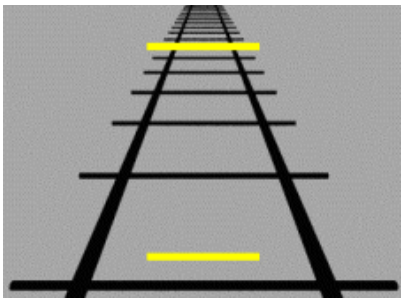
Muller-Lyer Illusion

The Muller-Lyer illusion is a set of lines that end in arrowheads. The orientation of the arrowheads affects one's ability to accurately perceive the length of the lines. We tend to perceive the line with open arrowheads as slightly longer than the one with closed arrowheads. Our perceptual constancy of size and depth cues are the reason why we perceive it as longer.



Ponzo Illusion

The Ponzo illusion is where a pair of converging lines distorts the perception of two identically sized lines. The side lines seem to converge, while the top line seems farther away but the retinal images of the red lines are equal. The reason the top horizontal line looks longer is because we interpret the scene using linear perspective. Since the vertical parallel lines seem to grow closer as they move further away, we interpret the top line as being further off in the distance. An object in the distance would need to be longer in order for it to appear the same size as a near object, so the top "far" line is seen as being longer than the bottom "near" line, even though they are the same size.



https://commons.wikimedia.org/w/index.php?curid=1211098

ACTIVITY FOUR

1. In recent years great debate raged on social media about a dress which appeared to be either white/gold or blue/black. Click this link to see an image of the dress: https://en.wikipedia.org/wiki/The_dress#/media/File:The_Dress_(viral_phenomenon).png

   What do you see? Is it white/gold or blue/black? What you see depends on what information you are processing.

   Read about it here https://www.iflscience.com/brain/explaining-perceptions-dress/ and explain what perception principles it demonstrates.

2. Go to https://www.verywellmind.com/cool-optical-illusions-2795841 and read about the 10 cool illusions.
   - Pick the two you think are most interesting or like the best.
   - Click on the “more” button to find out how these illusions work.
   - Summarise what you have learnt below, using correct psychological terminology.

Additional Resources

Textbook references and activities:

Nelson Psychology WA ATAR Unit 1&2

- Read textbook pages 29-33
- Complete end of chapter questions on page 50 - MCQ 3 and SAQ 3.

Nelson Psychology WA ATAR Unit 1&2 Student Workbook

- Read and complete pages 39-49.

Additional reading and web links:

Check out the additional reading in the following links to help you clarify your understanding.

Top down and bottom –up theories of perception
https://www.youtube.com/embed/TLHlfPTRekA

TED Talks- Perceptual sets https://www.youtube.com/embed/9VGbwNI6Ssk

McGurk illusion https://www.youtube.com/embed/G-lN8vWm3m0

Summary of perception http://www.simplypsychology.org/perception-theories.html

Optical Illusions show how we see https://www.youtube.com/watch?v=mf5otGNbkuc

Answers

ACTIVITY ONE

1. Complete the table below summarizing the five senses.

SENSE ORGAN	SENSE DETECTED	OVERVIEW OF HOW IT WORKS
Skin	Touch	• The sense of touch is distributed throughout the body. • Nerve endings in the skin and other parts of the body transmit sensations to the brain. • Some parts of the body have a larger number of nerve endings and, therefore, are more sensitive. • Four kinds of touch sensations can be identified: **cold, heat, contact, and pain.** • Hairs on the skin magnify the sensitivity and act as an early warning system for the body.
Mouth	Taste	• The receptors for taste, called **taste buds**, are situated chiefly in the tongue, but they are also located in the roof of the mouth and near the pharynx. • They are able to detect four basic tastes: salty, sweet, bitter, and sour. • At the base of each taste bud there is a nerve that sends the sensations to the brain. The sense of taste functions in coordination with the sense of smell. • The number of taste buds varies substantially from individual to individual, but greater numbers increase sensitivity.
Nose	Smell	• The cavity of the nose is lined with mucous membranes that have smell receptors connected to the **olfactory nerve**. • The smells themselves consist of vapors of various substances. The smell receptors interact with the molecules of these vapors and transmit the sensations to the brain. • The smell receptors are sensitive to seven types of sensations that can be characterized as camphor, musk, flower, mint, ether, acrid, or putrid.
Eyes	Sight	• It has a complex structure consisting of a transparent lens that focuses light on the **retina**. • The retina is covered with two basic types of light-sensitive cells-rods and cones. • The **cone** cells are sensitive to color and are located in the part of the retina called the fovea,

		where the light is focused by the lens. The **rod** cells are not sensitive to color but have greater sensitivity to light than the cone cells. These cells are located around the fovea and are responsible for peripheral vision and night vision. • The eye is connected to the brain through the **optic nerve**. The point of this connection is called the "blind spot" because it is insensitive to light.
Ears	Sound	• The outer ear protrudes away from the head and is shaped like a cup to direct sounds toward the **tympanic membrane**, which transmits vibrations to the inner ear through a series of small bones in the middle ear called the **malleus, incus and stapes**. • The inner ear, or **cochlea**, is a spiral-shaped chamber covered internally by nerve fibers that react to the vibrations and transmit impulses to the brain via the **auditory nerve**. • The brain combines the input of our two ears to determine the direction and distance of sounds. • The ear, eye and muscles (mechanoreceptors) detects the stimuli for with balance. • Structures in the inner ear are the most important in balance. Movement of fluid inside the **semicircular canals** and the bending of hair like projections in the **utricle and saccule** detect the position of the head. • The eyes and the muscles also provide information about the body position in relation to the rest of the body and the environment. • The **cerebellum** receives the information from all the senses about the position of the body.

2. Label the diagrams of the eye and the ear shown below.
   Check your labelling of the diagrams against the online versions at questions 3 and 4 below.

3. Go to https://www.sporcle.com/games/g/earanatomy and have a go at labelling the online version of the ear diagram.
4. Go to https://www.sporcle.com/games/smac17/human-eye-anatomy and have a go at labelling the online version of the eye diagram.

5. Go to https://edition.cnn.com/videos/health/2017/10/19/vital-signs-what-makes-a-food-or-drink-taste-great-a.cnn watch the clip "What makes a food or drink taste great" and complete the following questions

   e) What does Givaudan do?
      Flavour house, creates ¼ of the all the natural and artificial flavours put in food.

   f) Why do we all taste things differently?
      From all the experiences we have had in life our taste has evolved to be sensitive to different things.

   g) What is the difference between external and internal nares?
      The location of each in the nose. External are for smelling outside smells, internal nares smell from within the nasal cavity when we eat.

   h) How does smell influence taste?
      The aroma brings together all the taste sensations. Believed that 75% of what we taste comes from the smell.

ACTIVITY TWO

Complete the table on Gestalt Perception

Gestalt Principle	Explanation
Proximity	Proximity occurs when elements are placed close together. They tend to be perceived as a group. The nine circles above are placed in close proximity so they are viewed as a group. The bottom eight circles are without proximity and are perceived as separate shapes.
Similarity	Similarity occurs when objects look similar to one another. People often perceive them as a group or pattern. The example in the picture (containing 11 distinct objects) appears as single unit because all of the shapes have similarity. Unity occurs because the triangular shapes at the bottom of the eagle symbol look similar to the shapes that form the sunburst.
Continuity	Continuation occurs when the eye is compelled to move through one object and continue to another object. Continuation occurs in the example shown, because the viewer's eye will naturally follow a line or curve. The smooth flowing crossbar of the "H" leads the eye directly to the maple leaf.
Closure	Closure occurs when an object is incomplete or a space is not completely enclosed. If enough of the shape is indicated, people perceive the whole by filling in the missing information. Although the panda above is not complete, enough is present for the eye to complete the shape. When the viewer's perception completes a shape, closure occurs.
Figure and Ground	Figure and ground - The eye differentiates an object form its surrounding area. a form, silhouette, or shape is naturally perceived as figure (object), while the surrounding area is perceived as ground (background).

ACTIVITY THREE

Go to https://visionaryeyecare.wordpress.com/2008/08/04/eye-test-find-your-blind-spot-in-each-eye/ and do the online blind spot test. Why don't we normally "see" or notice our blind spot?

Both eyes have a blind spot and they are indifferent positions. The overlap of the left and right eye means that our brain still sees that information where the blind spots are from the other eye. Our brain can then ignore the blind spot.

ACTIVITY FOUR

1. The white/gold or blue/black dress social media debate.

   What do you see? Are they all white/gold, all blue/black or maybe a mix of both? What you see depends on what information you are processing. Read about it here https://www.iflscience.com/brain/explaining-perceptions-dress/ and explain what perception principles it demonstrates.
   Demonstrates perceptual constancy, where some people see the dress in shadow and some are seeing it in bright light. Also demonstrates top down processing as there is not enough information in the tightly zoomed photo to make a clear judgement. So our brains have hypothesised about what we see. This is why we get different guesses happening, where one person can see white/gold in all of the images and another can see white/gold sometimes and blue/black other times.

2. Go to https://www.verywellmind.com/cool-optical-illusions-2795841 and read about the 10 cool illusions. Pick the two you think are most interesting or like the best. Click on the "more" button to find out how these illusions work. Summarize what you have learnt below, using correct psychological terminology.
   Various answers