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PSYCHOLOGY FOR VCE

UNITS 1 & 2

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UNCORRECTED SAMPLE CHAPTER

This sample is provided for inspection purposes.

To learn more and access a sample of the digital resources and teacher materials that support the series, visit: oup.com.au/vcepsych

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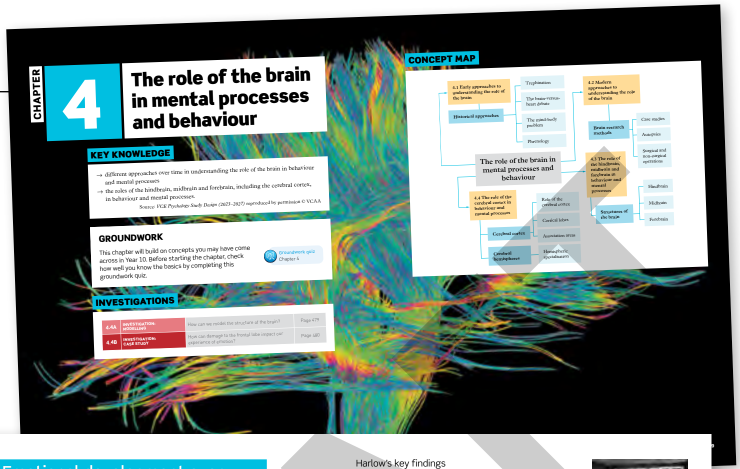
Warning to First Nations Australians
Aboriginal and Torres Strait Islander peoples are advised that this publication may include images or names of people now deceased.

CONTENTS

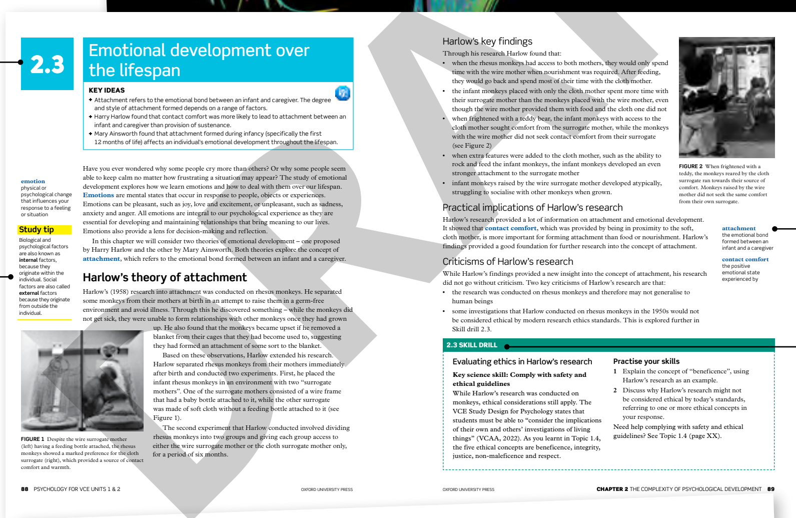
Using Psychology for VCE Units 1 & 2

Key features of the Student Book

- This Student Book combines complete coverage of the VCAA Psychology Study Design 2023–2027 with clear and engaging design.
- Each print Student Book comes with complete access to all the digital resources available on Student obook pro.



Chapter opener
Each chapter begins with a chapter opener that includes:
- Key Knowledge from the Study Design
- a groundwork quiz to test and support students' prior knowledge
- a list of investigations to support key concepts.

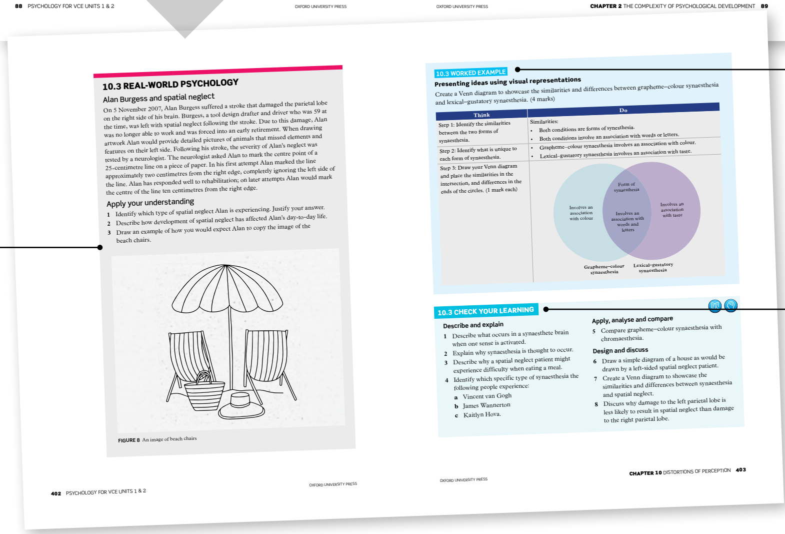


Topic-based approach
Content is structured in clear topics with key ideas signposted at the beginning.

Study tips
Practical tips support student success in internal assessments and exams.

Margin glossary
Literacy support is provided for key terms in the chapter with clear and concise definitions.

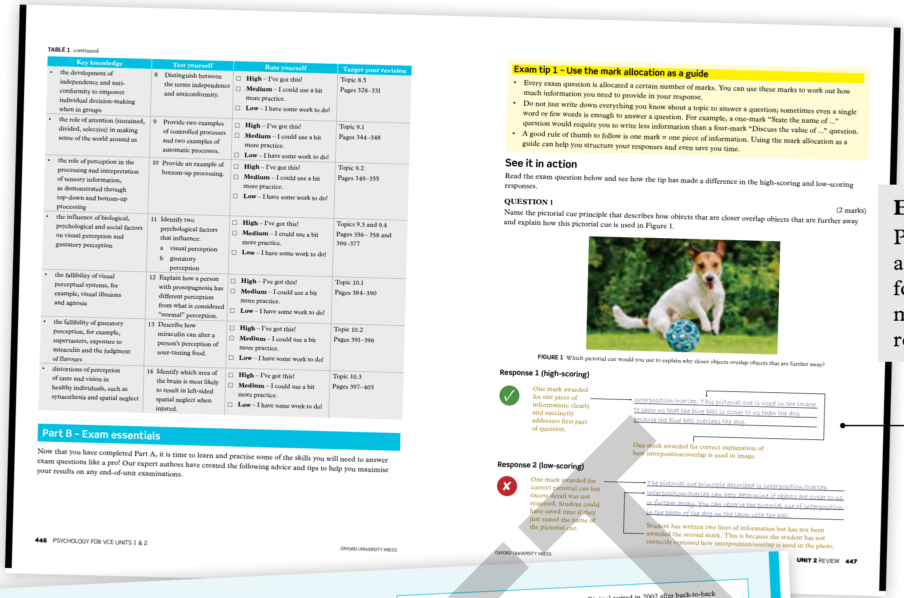
Skill drills
Students can practise their key science skills in context.



Real-world psychology
Real-life engaging examples that provide opportunities to apply key knowledge.

Worked examples
Detailed worked examples take students through how to solve different problems.

Check your learning
Activity boxes with questions and tasks organised using cognitive verbs according to Bloom's taxonomy.

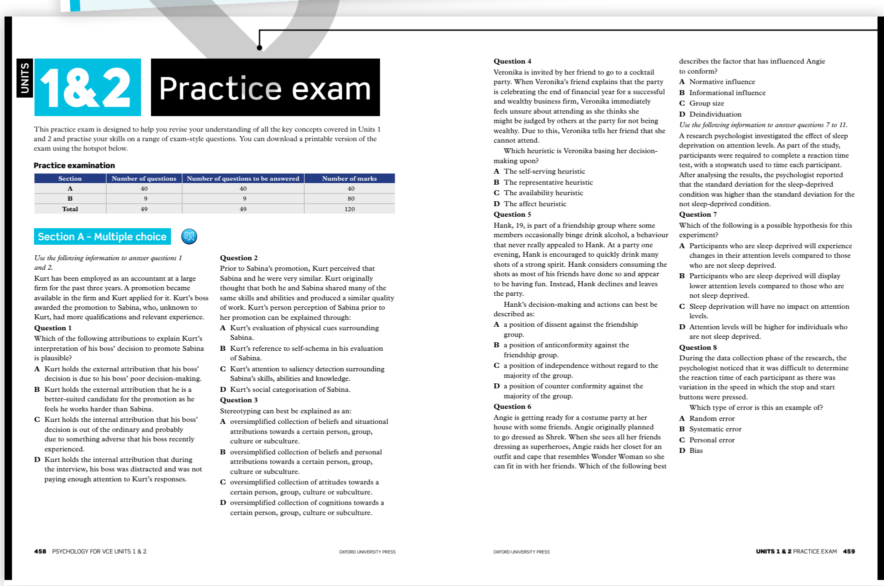


Exam essentials

Provides tips and strategies for maximising marks on exam responses.

Practice assessments

Four practice assessments to familiarise students with the internal assessments.



Practice exam questions

Exam-style questions for students to practise writing responses; includes question sets for Unit 1, Unit 2 and combined Units 1 & 2.

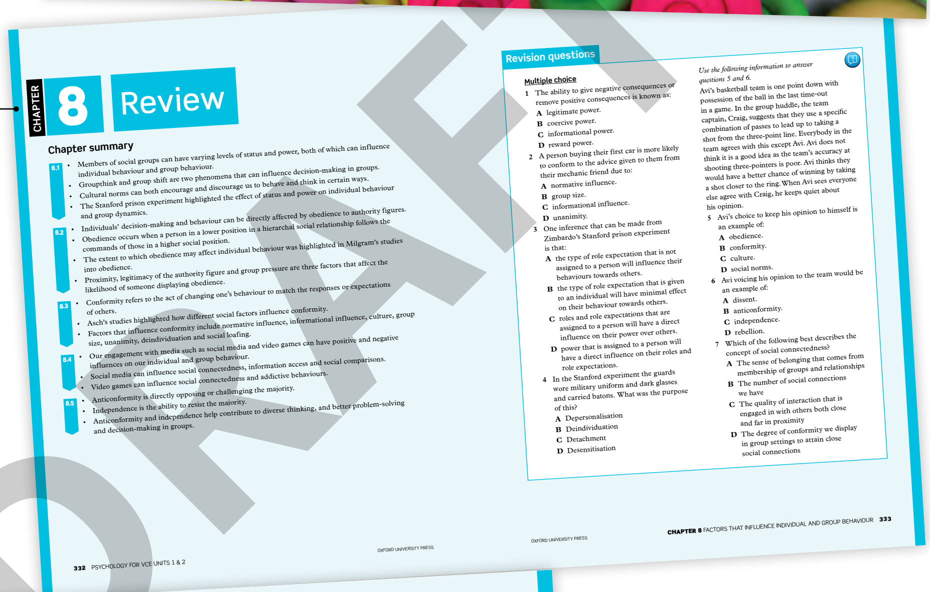
Investigations

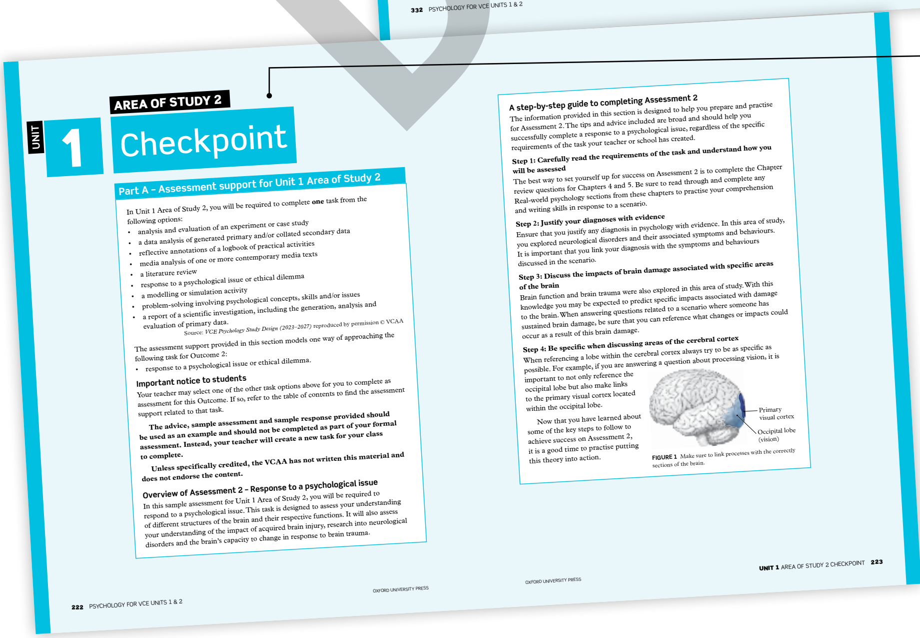
Each chapter contains a range of investigations that cover all eight scientific investigation methodologies. Investigations are available in the Student Book and via your obook pro.

Chapter reviews

Each chapter review includes:

- a summary of key learning in each chapter
- revision questions written to target assessment through multiple choice and short answer questions
- digital links to your obook pro at the point of learning.



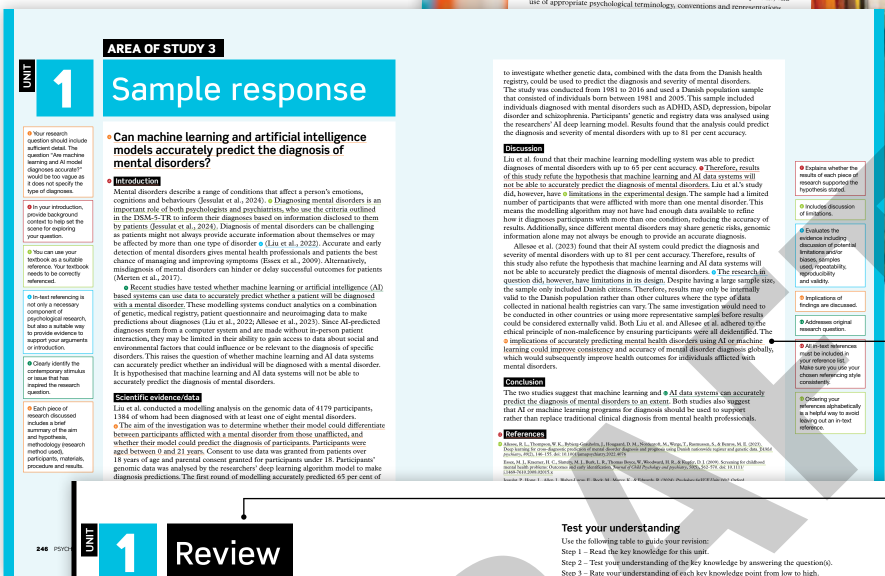


Checkpoints

Practice assessments and exam-style revision questions for each Area of Study, including multiple choice and short answer questions.

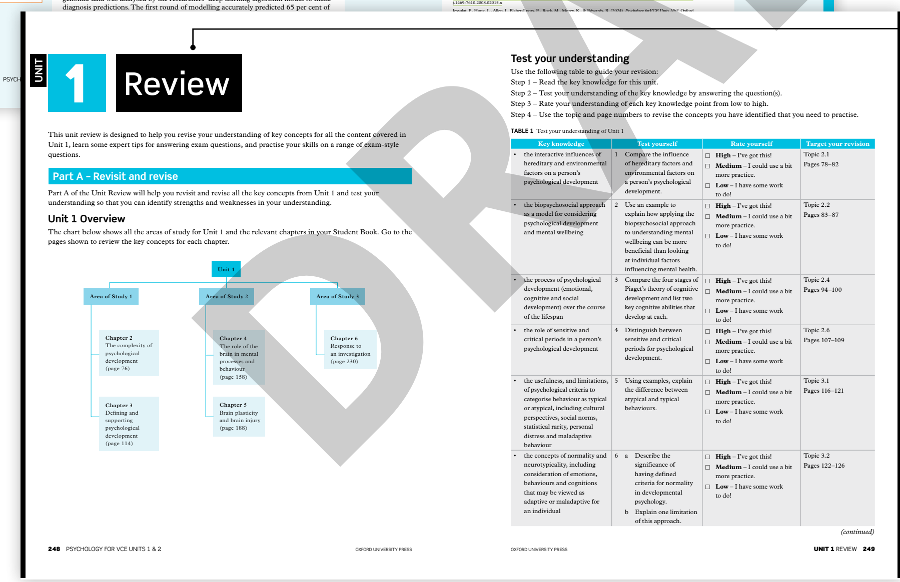
Student investigation chapters

Guidance for Unit 1 AOS 3 Response to an investigation and Unit 2 AOS 3 Student-designed investigation.



Sample investigations

Annotated examples of each AOS 3 investigation to support students create high quality assessments.



Unit reviews

At the end of each unit, students can:

- revisit and revise the content with questions mapped to each key knowledge dot point
- gain tips to succeed in exams and apply their skills in a Think like an examiner activity
- answer practice exam questions.

Digital hotspots

Digital icons or hotspots found throughout the student book link to digital resources accessible via the obook pro.

Video – Watch a video to support understanding of key concepts.

Assessment – Access a digital quiz for the topic or chapter.

Resource – Access a worksheet or additional resource.

Key features of Student obook pro

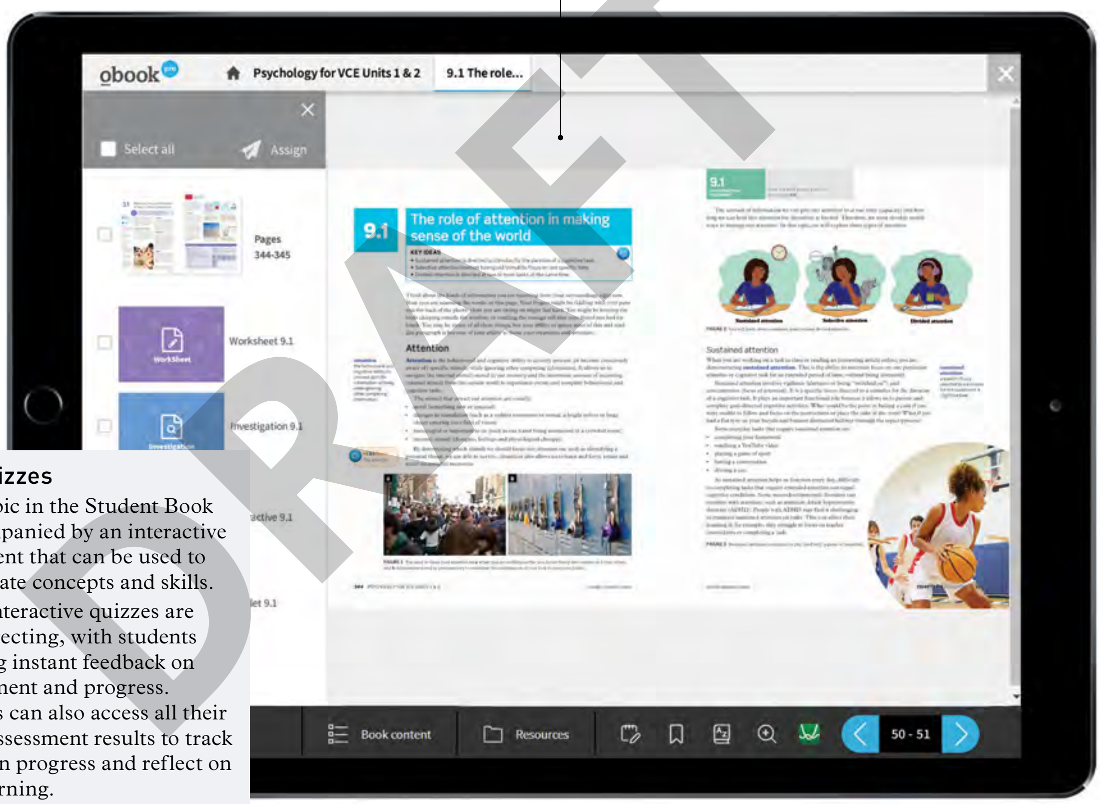
obook pro

- Student obook pro is a completely digital product delivered via Oxford's online learning platform, **Oxford Digital**.
- It offers a complete digital version of the Student Book with interactive note-taking, highlighting and bookmarking functionality, allowing students to revisit points of learning.
- A complete ePDF of the Student Book is also available for download for offline use and read-aloud functionality.

Focus on eLearning

Complete digital version of the Student Book

- This digital version of the Student Book is true to the print version, making it easy to navigate and transition between print and digital.



Interactive quizzes

- Each topic in the Student Book is accompanied by an interactive assessment that can be used to consolidate concepts and skills.
- These interactive quizzes are autocorrecting, with students receiving instant feedback on achievement and progress. Students can also access all their online assessment results to track their own progress and reflect on their learning.
- Each chapter is supported by a multiple choice quiz to give students further practice with exam-style questions.

Benefits for students

- integrated Australian Concise Oxford Dictionary look up feature
- videos to engage and strengthen understanding
- interactive assessments to consolidate understanding
- integrated Quizlet sets, including real-time online quizzes with live leaderboards
- access to their online assessment results to track their own progress

Key features of Teacher obook pro

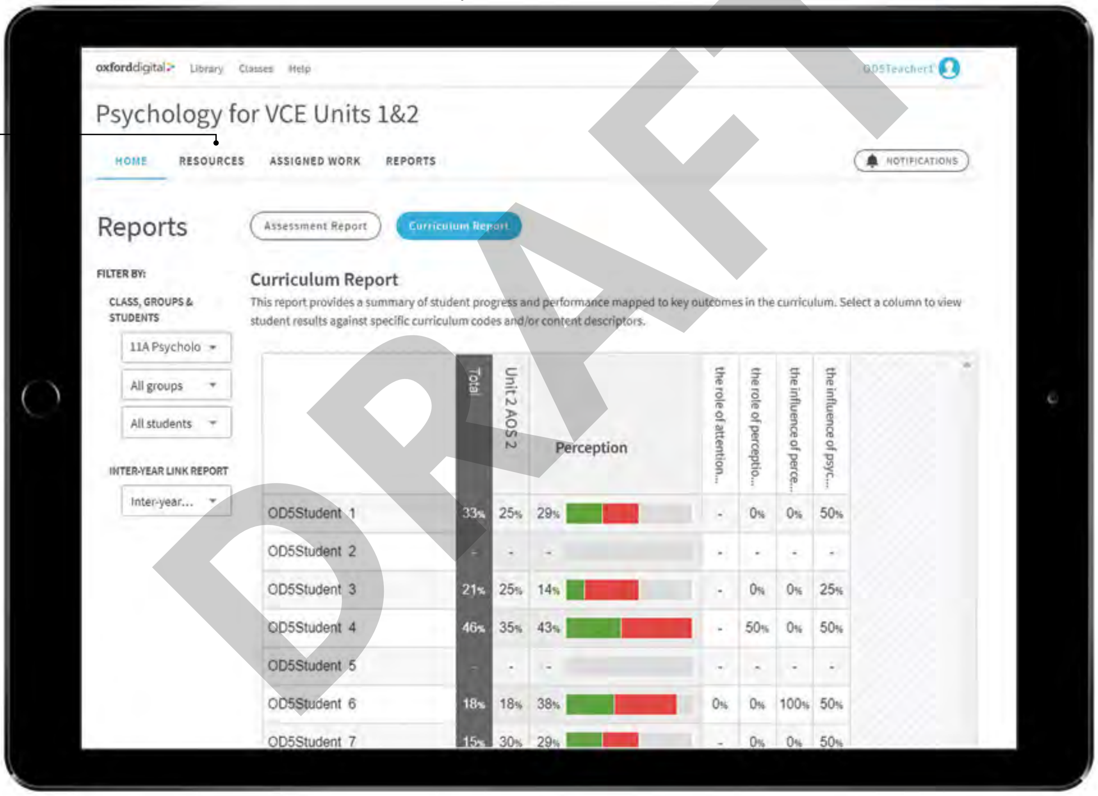
obook pro

> Teacher obook pro is a completely digital product delivered via **Oxford Digital**.
> Each chapter and topic of the Student Book is accompanied by full teaching support. Lesson plans are provided that clearly direct learning pathways throughout each chapter, including ideas for differentiation and practical activities.
> Teachers can use their Teacher obook pro to share notes and easily assign resources or assessments to students, including due dates and email notifications.

Focus on assessment and reporting

Complete teaching support

- Teaching support includes full lesson and assessment planning, ensuring there is more time to focus on students.



Additional resources

- Each chapter of the Student Book is accompanied by additional teaching and learning resources to help students progress.

Benefits for teachers

> In addition to online assessment, teachers have access to an editable practice exam that is provided at the end of Unit 2. This exam is formatted like the VCAA Psychology exam.
> Teachers are provided with practice exams and guidance for internal assessments, detailed planning resources and reporting functionality that tracks student progress and success against assessments or key knowledge in the Study Design.

MEET THE AUTHORS & REVIEWERS

Author: Paige Jessulat

Paige Jessulat has taught VCE Psychology and VCE Legal Studies at Frankston High School since 2017. She is passionate about the field of Psychology and has a special interest in the mental health of adolescents which has underpinned her roles as Year Level Coordinator and Mental Health Week Coordinator. Paige has also been a VCAA Assessor for the Psychology exam since 2020.

Author: Leo Hong

Leo Hong is an experienced Psychology and Legal Studies teacher at Trinity Grammar School, Kew. Having taught in a range of schools over the past 16 years, Leo has a depth of knowledge and pedagogical experience through his involvement and implementation of problem-based learning programs and ICT training programs for teachers. He currently holds a Bachelor of Arts/Music, with a major in Psychology and Honours in Criminology, is an assessment writer for other private educational resource companies and VCAA assessor.

Author: Jodie Allen

Jodie Allen has been teaching VCE Psychology since 2001 and has been a VCAA exam assessor for more than 13 years. She has a Bachelor of Arts and Postgraduate Primary and Secondary Teaching degree and is currently teaching at Wellington Secondary College. Over her career she has held leading teacher and learning specialist roles in areas such as the senior school and student voice & agency. Jodie has worked for OUP in the past writing oBook resources. In her spare time, she likes to spend time with her family, which includes her husband and three daughters and she enjoys playing basketball.

Author: Elizabeth Blaher-Lucas

Elizabeth Blaher-Lucas is a passionate and experienced VCE Psychology teacher, VCE psychology assessor, and examination panel member. In addition to having worked in both government and independent school environments for the past 20 years, Elizabeth has also co-taught 3rd and 4th year preservice psychology teachers at Monash University since 2018.

Author: Matthew Rock

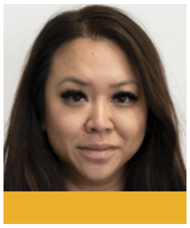
Matthew Rock started his career as a chemist working in energy production and pharmaceuticals whilst finishing studying at Monash University with a double degree in Bachelor of Science/ Bachelor of Secondary Education. His passion in science led to a first teaching job at Trinity Grammar School for five years teaching VCE Chemistry and Psychology gaining skills as a subject coordinator, writer, assessor, and examiner. Matthew's current school, Camberwell Girls Grammar School, allows him to continue his passions in engaging with science, developing student wellbeing projects.

Author: Kerri Morey

Kerri is a passionate teacher of Psychology and Science, having taught at both government and independent schools in Victoria over the past 35 years. She is currently teaching and coordinating Psychology at Brauer College in Warrnambool. She has also enjoyed a variety of roles across different schools in pastoral care, with extensive experience and interest in fostering the wellbeing of students, and in teaching students to understand how to be effective learners through the application of psychology and neuroscience. Kerri has authored for a range of educational resources on the areas of psychology and student development and wellbeing and has been a VCAA exam assessor for Psychology over many years.

Author: Roger Edwards

Roger has been involved with the VCE Psychology course since its inception back in 1991. He taught VCE psychology for fifteen years and is currently the Supervising Psychologist at Monash University's Krongold Clinic – a university-based clinic that provides affordable psychological and counselling services.

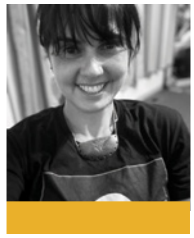


Reviewer: Elise Truong

Elise Truong has taught in the education system since 2009. She worked as an integration aid for four years prior to becoming a teacher in 2013. Elise has taught across the public and private sectors of education including within an alternative setting for disengaged youth. She holds a Bachelor of Psychology (Interpersonal and Organisational), a Graduate Diploma of Education (Secondary) with a major in English and Psychology and a Masters in Instructional Leadership. Elise has taught in the areas of English, Psychology and is a trained and practising IB Psychology (HL) teacher. Elise has taken up various roles in the educational setting including being a year 11 and 12 coordinator, and a lead teacher.

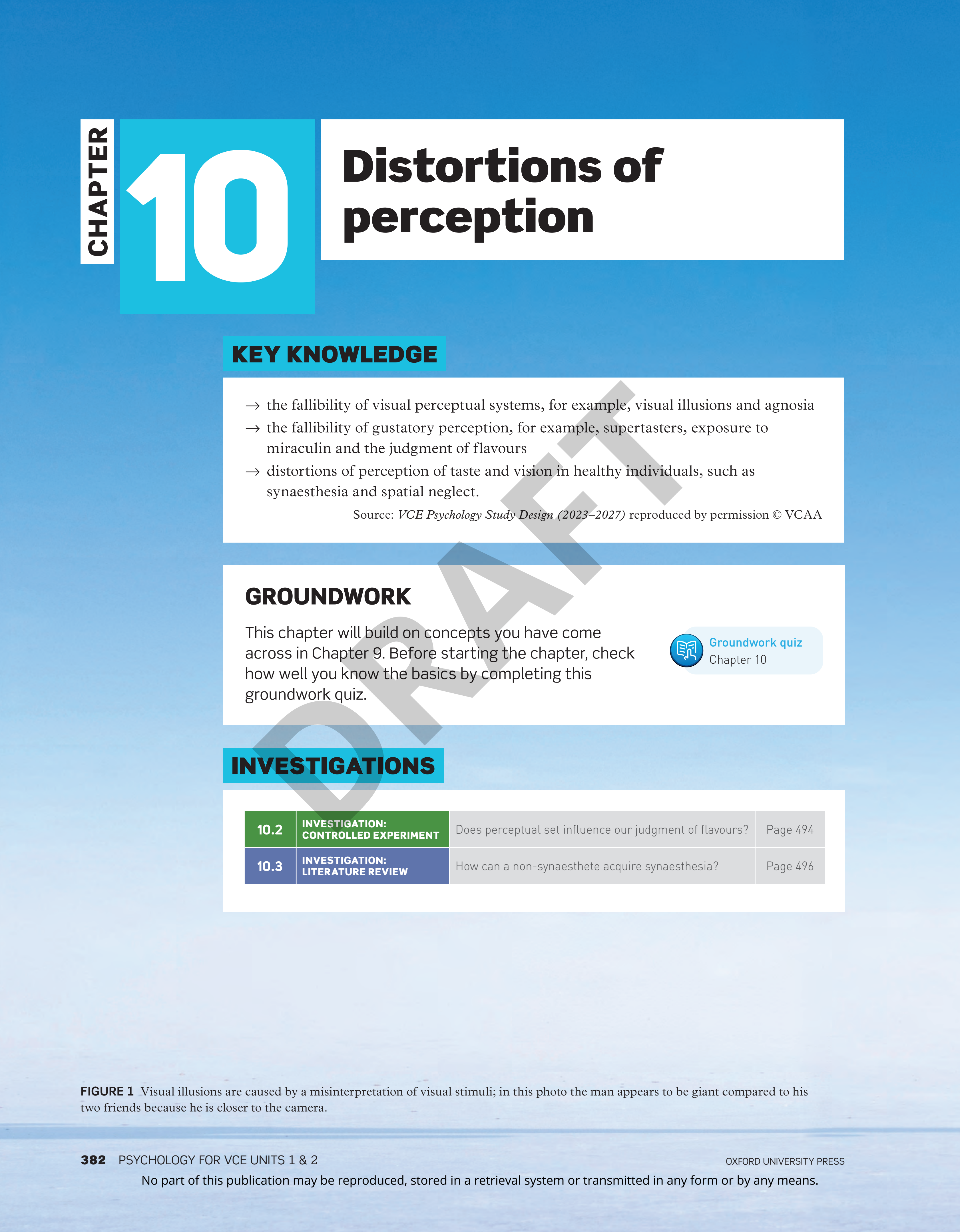
Reviewer: Sayeeda Bawa-Savant

Sayeeda Bawa-Savant is a professionally registered career practitioner and certified life coach with degrees and postgraduate studies in psychology, education, educational psychology, Neuro-Linguistic Programming (NLP), and economics. She began her teaching journey almost two decades ago, in South Africa, with her commitment to her students promoting her to Head of Department roles and Head of a Science Saturday School Program. Sayeeda and her family moved to Australia, where her experience was swiftly recognised by educational institutions. She has held leading teacher roles in psychology and careers coaching, taught business studies, is an exam assessor, and is also a writer of psychology resources. Presently, she teaches in the areas of psychology, business studies, and humanities, while continuing to provide consultancy services in writing, and career and life coaching.



Reviewer: Michelle Maxwell

Michelle Maxwell is a proud Aboriginal woman who brings a self-determined Aboriginal voice and lens to her work, passion and drive for change, focusing on better outcomes for our Aboriginal communities. Michelle currently works as a therapist for Violet Dreaming. She was formerly the Manager of the Aboriginal Social and Emotional Wellbeing team at the Mental Health Reform Victoria, responsible for implementing the Aboriginal Social and Emotional Wellbeing recommendations from the Royal Commission into Victoria's mental health system. Michelle has years of experience working in and alongside Aboriginal Community Controlled organisations developing the delivery of therapeutic services.



CHAPTER 10 Distortions of perception

KEY KNOWLEDGE

- → the fallibility of visual perceptual systems, for example, visual illusions and agnosia
- → the fallibility of gustatory perception, for example, supertasters, exposure to miraculin and the judgment of flavours
- → distortions of perception of taste and vision in healthy individuals, such as synaesthesia and spatial neglect.

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GROUNDWORK

This chapter will build on concepts you have come across in Chapter 9. Before starting the chapter, check how well you know the basics by completing this groundwork quiz.

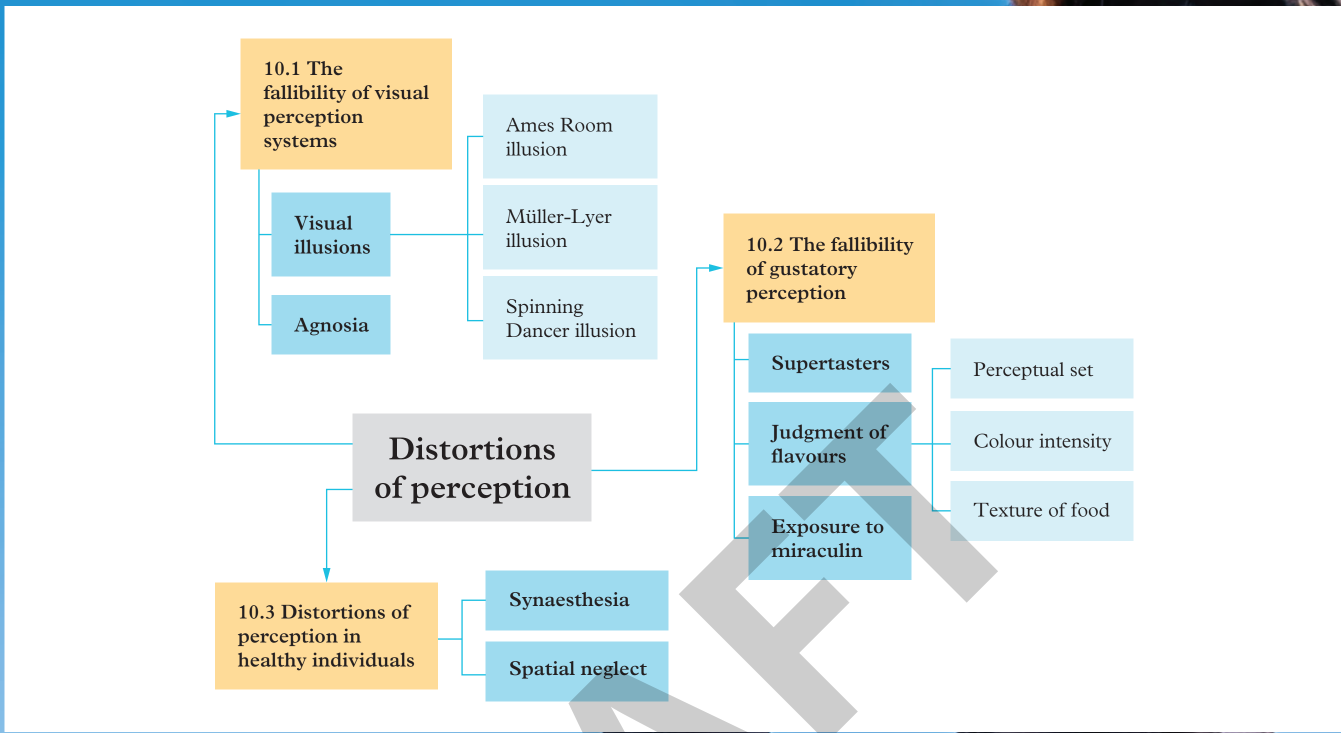
Groundwork quiz
Chapter 10

INVESTIGATIONS

10.2	INVESTIGATION: CONTROLLED EXPERIMENT	Does perceptual set influence our judgment of flavours?	Page 494
10.3	INVESTIGATION: LITERATURE REVIEW	How can a non-synaesthete acquire synaesthesia?	Page 496

FIGURE 1 Visual illusions are caused by a misinterpretation of visual stimuli; in this photo the man appears to be giant compared to his two friends because he is closer to the camera.

CONCEPT MAP



10.1 The fallibility of visual perception systems
Visual illusions
Agnosia
Ames Room illusion
Müller-Lyer illusion
Spinning Dancer illusion
10.2 The fallibility of gustatory perception
Supertasters
Judgment of flavours
Exposure to miraculin
Perceptual set
Colour intensity
Texture of food
Distortions of perception
10.3 Distortions of perception in healthy individuals
Synaesthesia
Spatial neglect

10.1 The fallibility of visual perception systems

KEY IDEAS

- Visual illusions distort real sensory stimuli to create a mismatch between the real-world visual stimulus and the brain's interpretation of that stimulus.
- Damage to the brain's cortex can cause conditions such as visual agnosia, resulting in an inability to recognise objects or familiar faces.

Fallibility of visual perception

fallible
prone to error, which can occur when judging sensory stimuli

ClickView
The science of illusion

Perception is a complex process. To visually perceive something, the brain must be able to interpret sensory stimuli. Visual perception can be **fallible** when sensory stimuli are mistakenly interpreted – this in turn can lead to an altered perception. Misinterpretation of visual stimuli can be due to normal brain function when viewing optical illusions (see Figure 1) or due to abnormal brain function from neurological conditions. Understanding the fallibility of visual perception from illusions and agnosia can help better inform us about how the brain processes visual stimuli.

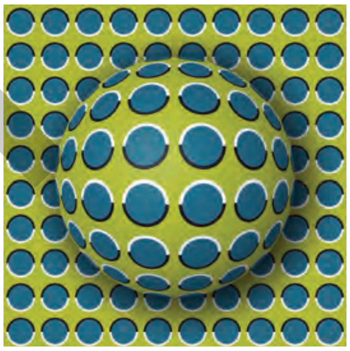


FIGURE 1 This illusion causes our brain to misinterpret the image and think the background is moving.

Visual illusions

visual illusion
when we misinterpret real sensory stimuli to create a mismatch between the real-world stimulus and our perception

A **visual illusion** occurs when we misinterpret real sensory stimuli, creating a mismatch between the real-world visual stimulus and the perception formed in our brain. This phenomenon happens when our perceptions of a stimulus are consistently different to what is really shown. Even if we become aware that what we are perceiving is an illusion, we cannot help but perceive the distorted image. Illusions are created by psychological factors, where the way we interpret stimuli is influenced by the constructs in our brain that usually help us make sense of the world. Three common visual illusions we will explore in this topic are:

- the Ames room illusion
- the Müller-Lyer illusion
- the Spinning Dancer illusion.

Ames room illusion

Ames room illusion
an illusion created by a deliberately misshapen trapezoidal room where people walking across the room appear to be growing and shrinking in size

The **Ames room illusion** is a visual illusion that deliberately distorts a viewer's perception to give them the impression that someone is growing or shrinking in size as they walk across a room. The illusion was invented by Adelbert Ames Jr in 1946. Ames created a trapezoidal-shaped room that appeared to be rectangular when viewed through a peephole with one eye. This created the perception that the room was a normal right-angled room when it was actually distorted. The actual shape of the room was irregular, with one corner a greater distance away from the viewer than the other (Figure 2). What the viewer does not perceive without access to depth perception is that the floor and ceiling in one corner of the room are closer to each other than in the corner on the other side of the room.

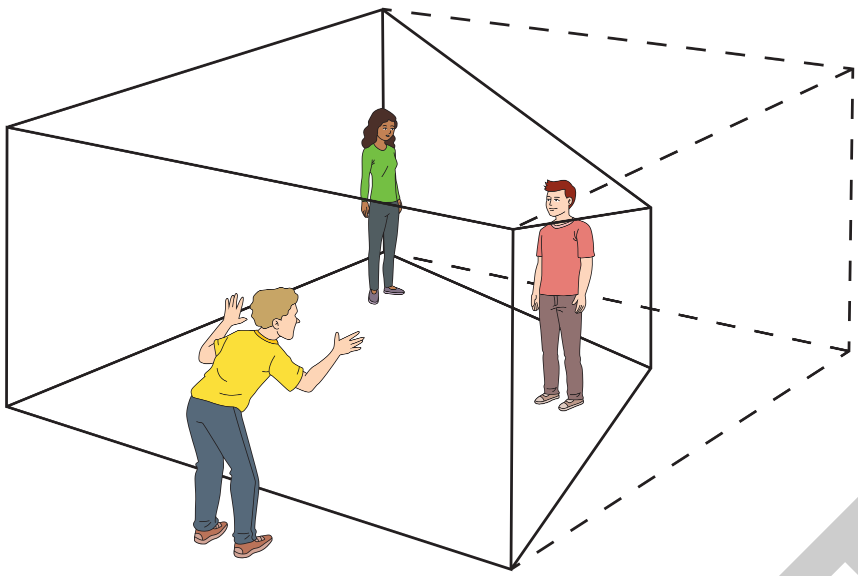


FIGURE 2 From the peephole, the Ames room appeared to be a regular rectangular-shaped room, but it was actually an irregular shape.

ClickView
Ames room illusion

To experience the Ames room illusion, the viewer needs to look through a peephole from a specific location, which makes the room appear to be a regular rectangular shape (Figure 3). The viewer is also required to use only one eye to view through the peephole – this prevents the viewer using binocular depth cues that would normally enable them to perceive depth and judge distance. As the viewer observes a person inside the room through the peephole, the person appears to get bigger as they move across what appears to be a regular-shaped room (Figure 4). Our brain perceives this person as starting on one side of a normal-shaped room with right-angled corners and a normally positioned floor and ceiling, because our experience tells us that rooms are regularly shaped. We are therefore unaware that the person begins in a position further away from us.

The Ames room illusion distorts our perception of depth and distance. In the illusion, a person is placed in an irregularly shaped room that is designed to distort our visual cues. As a person walks from one side of the room to the other, our brain mistakenly perceives them to be staying the same distance from us while they move. Realistically, the room is constructed in such a way that the back wall is not parallel to the viewer, but angled. This creates an optical illusion that makes the room appear perfectly rectangular when viewed from the peephole with one eye closed.

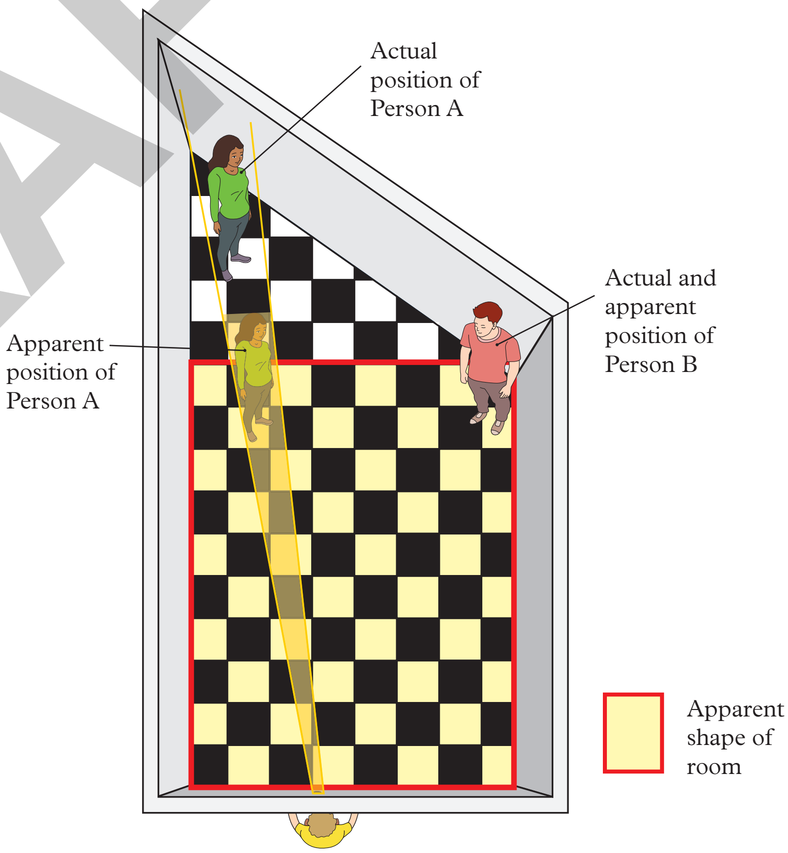


FIGURE 3 How the Ames room illusion is perceived by the viewer

FIGURE 4 The view from the peephole of an Ames room makes the room appear to be a regular shape. In this image, the person in the right corner is positioned further away from the viewer than the person in the left corner, leading to the perception that one person is giant-sized and the other is tiny.

As a person walks from one side of the room to the other, they are really moving closer or further away from us due to the angle of the back wall, despite our perception telling us otherwise. Our brain relies on the assumption that the room is rectangular, and the person is at a constant distance as we interpret what we see. Since our brain expects the person to remain the same distance away, the retinal image of the person on our eyes changes from small to large, leading us to perceive the person walking as growing (if they are moving closer to us) or shrinking (if they are moving further away from us).

If you entered an Ames room, the structure of the room would become obvious because it can be seen for what it is rather than what it appears to be through the peephole. This is due to the outside viewer's inability to use their binocular depth cues when looking through the peephole with one eye. Even if we become fully aware of the room's shape and distortions, the effect is so powerful that if we looked through the peephole to view someone walking again, we would still perceive them to be growing or shrinking in size. Movie set designers use this illusion to their advantage to create special effects. For example, in the *Lord of the Rings* movies this illusion was used to make Gandalf appear larger than the hobbits, as seen in Figure 5.

FIGURE 5 The *Lord of the Rings* trilogy used the illusions of depth and distance to make Gandalf appear larger than the hobbits.

10.1 CHALLENGE

Putting the Ames room into practice

Movie set designers have used the Ames room illusion to their advantage for creating special effects in movies. Imagine you need to direct a scene for a movie where you need to make the Hulk appear large and Antman appear miniature.

1 Draw an Ames room diagram showing where you would place the Hulk and where you would place Antman to achieve the intended effect.
2 Explain how the positioning of your characters in the Ames room set-up affects how they are perceived by the viewer.

FIGURE 6 The Incredible Hulk

Müller-Lyer illusion

The **Müller-Lyer illusion** is an illusion where two lines of the same length are given different ends, leading the viewer to misinterpret their length. The visual illusion was created by German psychologist Franz Carl Müller-Lyer in 1889. The difference between the two lines is the pattern at each end – one line has regular arrowheads while the other has feather tails (inverted arrowheads), as shown in Figure 7. To most people, the line with the arrowheads appears shorter than the line with feathertails, even though they are the same length.

Müller-Lyer illusion
an illusion created by a misinterpretation of two identical length lines that appear to be different due to differently shaped ends

One explanation to help us understand this illusion is based around depth cues that normally help us to judge distance. This idea suggests that we are fooled by the Müller-Lyer illusion due to our experiences with rectangular buildings, where the lines of floors and ceilings extending away from us create a sense of depth (Figure 8). Richard Gregory (1969) proposed the **carpentered world hypothesis** based on this idea. Gregory believed that when we view a two-dimensional image such as the Müller-Lyer illusion, we automatically apply depth cues as if we are viewing the three-dimensional images of buildings.

According to Gregory, when we observe the arrowheads pointing away from the central line in the Müller-Lyer illusion, our perception interprets the line as the vertical edge of a building's external walls (Figure 8a). On the other hand, the line with a feathertail line (inverted arrows) is perceived as representing the edge of two internal walls, in a similar manner to the inner corner of a room (Figure 8b).

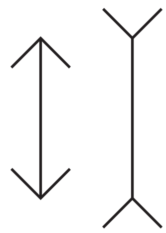


FIGURE 7 The Müller-Lyer illusion; which line appears longer and which appears shorter?

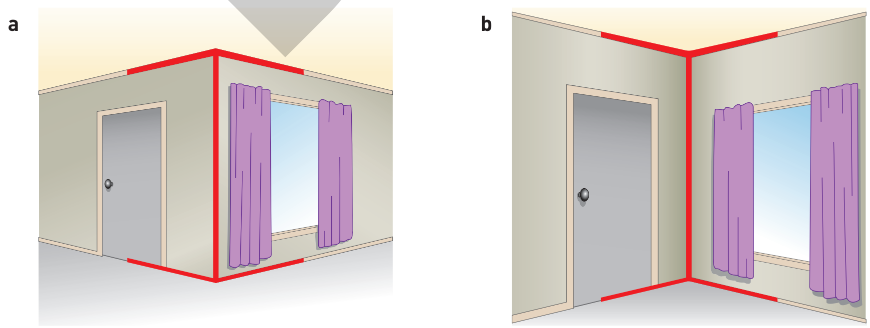


FIGURE 8 Which room (**a** or **b**) has higher walls? The Müller-Lyer illusion is affected by our judgment of depth.

carpentered world hypothesis
a theory applied to the Müller-Lyer illusion that proposes that our familiarity with the straight lines and angles of buildings informs our interpretation of linear perspective in pictorial depth perception

When we apply depth cues and our understanding of spatial arrangement to this two-dimensional image, the arrowhead line appears to be shorter than the feathertail line. Our brain assumes that the arrowhead line is projecting towards us and is therefore closer than the feathertail line, which is projecting away from us.

Since our experience of the world tells us that objects in the distance are expected to be smaller than when closer to us, our perception tricks us into perceiving the feathertail line as longer. This is despite the reality that both lines are the same length.

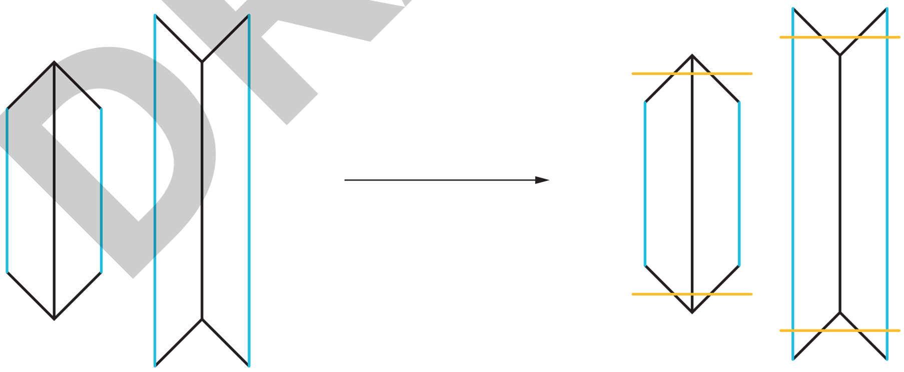
misapplication of size constancy the incorrect use of cues that would normally assist us in accurately perceiving properties such as size

Another explanation to help us understand this previous idea suggests that we perceive the illusion due to the **misapplication of size constancy**. When applying size constancy, we usually perceive three-dimensional objects as actually being the same size when viewed from different distances, despite the retinal image being different. However, when we apply this same principle to a two-dimensional image such as the Müller-Lyer illusion, we inaccurately apply these rules to perceive the two lines at different distances. Because of this, we perceive the lines to be of two different lengths, despite them being the same.

Studies have been conducted in different cultures to determine if this illusion is based upon experience. Some have been conducted on participants in African nations that have a mix of rectangular architecture in urban centres as well as round huts in rural areas. When the illusion was shown to rural Zambians who had no exposure to rectangular buildings, they were not fooled by the illusion and tended to perceive the lines as the same length. However, Zambians living in urban areas did perceive the lines to be different lengths (Ahluwalia, 1978). This supports the idea that experience with buildings can influence our perception of the Müller-Lyer illusion.

perceptual compromise theory an explanation for the Müller-Lyer illusion that proposes that we perceive the line with the feathertail ends as being longer than the arrowhead line due to application of the Gestalt principle of closure

An alternative explanation for the Müller-Lyer illusion is the **perceptual compromise theory** proposed by Australian psychologist R.H. Day (1989). This theory suggests that when we look at the lines of the Müller-Lyer illusion, we are influenced by both the length of the line and the overall length of the figure. The line with the feathertails at each end has a total length longer than the line with arrowheads, so we are influenced by the overall length and therefore perceive the feathertail line as longer. When looking at these figures, Day believed that our perception is conflicted and makes a compromise to judge the longer overall figure as being a longer line.



1. When viewing the open figures in the Müller-Lyer illusion, our mind applies the Gestalt principle of closure (blue lines).
2. Our mind then averages out the blue and black lines and we perceive the length of each figure as the average length (distance between yellow lines).

FIGURE 9 How we view the Müller-Lyer illusion according to perceptual compromise theory.

Spinning Dancer illusion

In 2003, Japanese web designer Nobuyuki Kayahara created the **Spinning Dancer illusion**. The illusion shows a spinning silhouette of a dancer that is perceived by some viewers to be spinning clockwise, and by others to be spinning counterclockwise. It is also possible to see the dancer spinning one way and then the other. A change in direction can be activated by blinking, tilting your head or focusing on a specific part of the image.

This illusion is believed to happen because the dancer is an ambiguous two-dimensional figure that can be seen from two different perspectives. This ambiguity presents our visual perception with different interpretations (Figure 10). The image of the dancer also lacks visual depth cues, which prevents our brain from interpreting it as a three-dimensional image where some parts of the body are seen as closer to the viewer than others. If the image included depth cues, our brain would be able to process and interpret it as a dancer spinning in one specific direction.

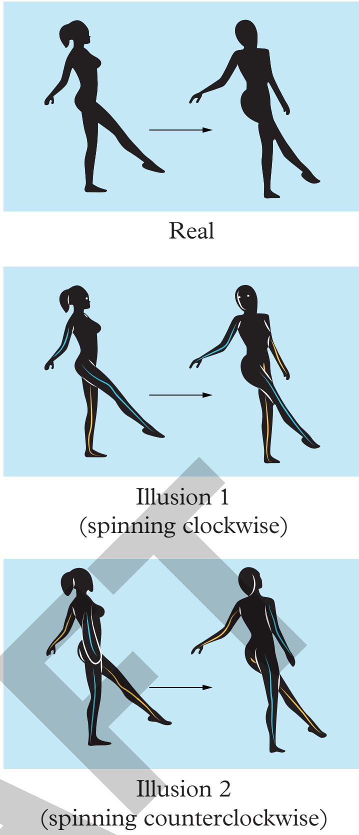


FIGURE 10 Diagram showing the clockwise and counterclockwise perspectives of the spinning dancer – the ambiguity and lack of depth cues in the real image show how our brain can perceive the dancer spinning in one direction or the other.

Spinning Dancer illusion
a spinning dancer silhouette that appears to spin both clockwise and counterclockwise

Agnosia

Agnosia is a rare neurological condition that disrupts the brain's ability to process sensory information. This results in difficulty recognising objects, faces, voices or places. Agnosia usually only affects a single sensory pathway, which means most affected individuals are still able to interact with the world using their other senses. The name "agnosia" is derived from the Greek "gnosis", or "not knowing".

Agnosia usually occurs from damage to the brain caused by conditions including stroke, dementia or traumatic brain injury (TBI). Neuroimaging tests such as CT and MRI scans can be used to help diagnose agnosia. While there is no specific treatment for agnosia itself, the underlying cause of agnosia can sometimes be treated. For example, if a brain tumour has caused agnosia, then radiation therapy or surgery on the tumour may reduce the effects of agnosia. Living with agnosia can be challenging, but familiar routines, predictable environments and labelling items may assist with managing the disorder on a daily basis.

agnosia
neurological disorder resulting in difficulty recognising objects, faces, voices or places

Visual agnosia

Visual agnosia is the inability to name, recognise or describe the use for an object when looking at it. It occurs when the brain is damaged along neural pathways that connect the occipital lobe (which processes visual stimuli) to the parietal or temporal lobes (which allow us to understand the visual stimuli).

Typically, if we were to look at a flower, the visual stimulus of the flower would be sent to the occipital lobe at the rear of our brain. To understand what this stimulus is, information would then be sent to our parietal and temporal lobes. We could then recognise the flower and give it a name. For those who have visual agnosia, this pathway to the parietal and

visual agnosia
a condition that results in the inability to describe, recognise or name an object seen

temporal lobes is damaged and results in the inability to recognise an object, such as a flower, from visual sensory information alone. As agnosia typically only affects one sensory pathway, a person with visual agnosia who is asked to touch the flower and feel its texture would likely be able to recognise it as a flower. This is because the neural pathways that allow us to process sensory information from touch are not damaged or affected.

prosopagnosia
a condition that results in the inability to recognise faces

Prosopagnosia is a specific form of visual agnosia that results in a person being unable to recognise the faces of people they know very well, or even of themselves. It occurs when the neural pathway leading from the occipital lobe to the specific region in the temporal lobe responsible for recognising faces is damaged. Perception of this visual stimuli (a person's face) is therefore unable to be processed regularly. People with prosopagnosia can also mistake a person's face with an object and vice versa. Prosopagnosia often occurs with neurological conditions that interfere with neural pathways, such as Alzheimer's disease.

FIGURE 11 Prosopagnosia is a form of visual agnosia where a person is unable to recognise people from looking at their faces.

10.1 CHECK YOUR LEARNING

Describe and explain

1 Define the term "visual illusion".
2 Describe the Ames room illusion.
3 Explain why a figure appears to shrink and grow as it moves across an Ames room.
4 Identify the distortion we perceive when looking at the Müller-Lyer illusion.
5 Explain how the lack of visual depth cues leads to the Spinning Dancer illusion.
6 Outline what causes a person to experience visual agnosia.

Apply, analyse and compare

7 Apply your understanding of depth cues to explain the Müller-Lyer illusion.

Design and discuss

8 Discuss how a person with prosopagnosia might respond when asked to identify a person from an image of their face.
9 Create a Venn diagram to map out the similarities and differences between the Ames room illusion and the Müller-Lyer illusion.
10 Create an Ames room by printing out the template linked in the hotspot and assembling it according to the instructions. Place two identical objects in the two distant corners of the room. Observe any difference and discuss why this occurs.
11 Predict the effect of a larger peephole on the Ames room illusion. Justify your prediction.

10.2 The fallibility of gustatory perception

KEY IDEAS

- Taste perception involves the integration of stimuli from the senses of vision, taste, smell and touch.
- Gustatory perception can be fallible due to supertasters, exposure to miraculin, past experiences, colour intensity and texture.

Fallibility of gustatory perception

Taste is one of life's greatest pleasures. To perceive food flavours we rely on the complex integration of stimuli from our senses of vision, taste (gustation), smell and touch. When eating a ripe strawberry, the juicy texture of the fruit as we bite on it, the bright red colour, the sweet smell and sweet flavour all combine to create the intensity of flavour that we recognise as the taste of a fresh strawberry (Figure 1). Our **gustatory cortex** is a specialised area in the cerebral cortex that processes sensory stimuli to create our perception of taste or gustatory perception. In this topic we will look at how our gustatory perception is influenced by several factors, many of which can lead us to form fallible perceptions of taste.

gustatory cortex the region of the brain where taste information is processed

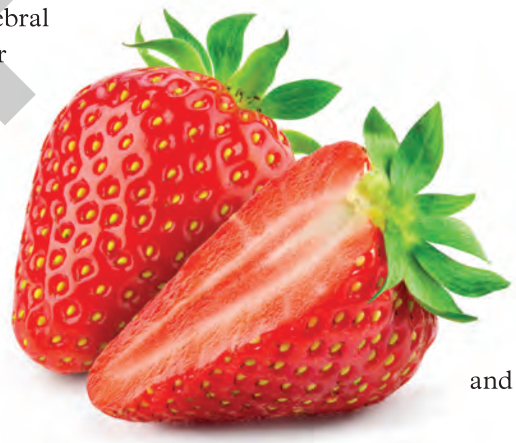


FIGURE 1 Our perception of what a strawberry tastes like comes from the combination of its colour, texture, smell and flavour.

Supertasters

Papillae are small, raised structures on the surface of the tongue that play a role in detecting and perceiving information from the food and drinks we consume. There are many different types of papillae that have specific roles in detecting information. These include:

papillae small round bumps located on the surface of the tongue that play a role in taste and gripping food

- filiform papillae – detect texture and provide friction on the tongue
- fungiform papillae – involved in perceiving sweet, sour, bitter, and umami tastes, and are dispersed across the tongue (generally more concentrated at the tip of the tongue)
- foliate papillae – located along the sides of the tongue that are involved in detecting sour and salty tastes
- circumvallate papillae – large papillae located along the back of the tongue (often in a v-shaped row) primarily responsible for detecting bitter tastes.

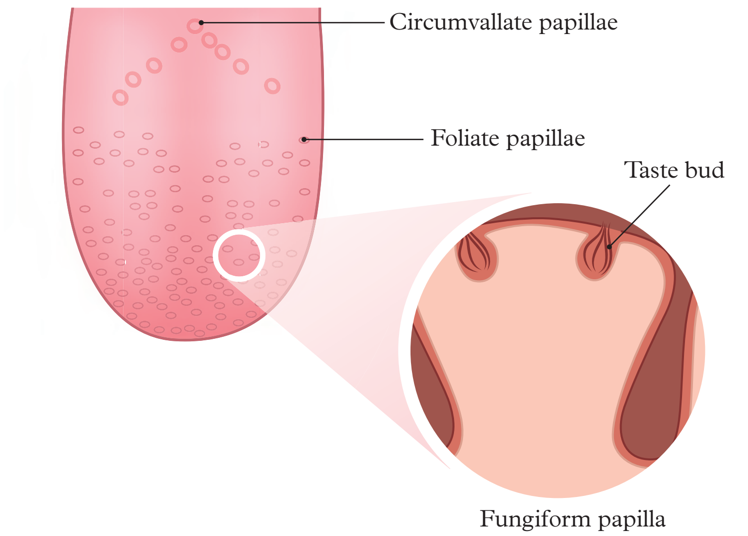


FIGURE 2 Foliate, fungiform and circumvallate papillae all contain taste buds.

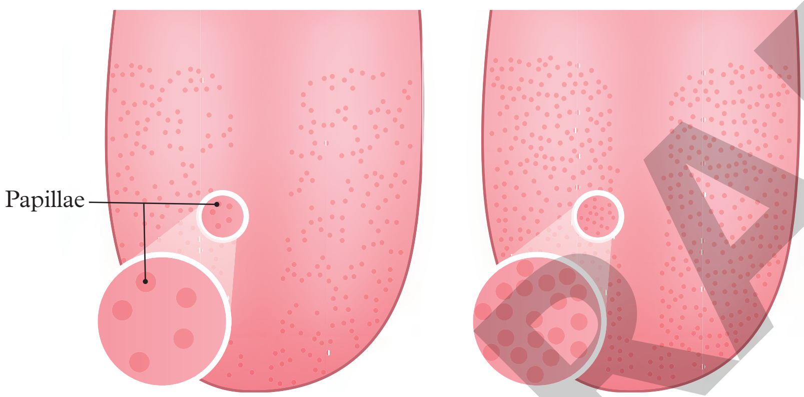


FIGURE 3 A supertaster has more papillae on the surface of their tongue than a non-taster.

Fungiform, foliate and circumvallate papillae all contain specialised sensory receptors called taste buds (see Figure 2). Taste buds contain gustatory cells, which detect sensory information and transmit signals to the brain. Taste buds respond differently to different tastes such as sweet, bitter, salty, sour and umami.

A supertaster is a person who experiences a heightened sense of taste for certain flavours compared to what is experienced by most people. Supertasters commonly have an increased sensitivity to bitter flavours, leading to strong food preferences and dislikes of specific foods. Supertasters can experience a heightened sense of taste due to the large number of taste buds on their tongue (Figure 3). Most adults have between 2000 and 10,000 taste buds on their tongue, and those who have closer to 10,000 are considered supertasters. Most supertasters have the TAS2R38 gene, which predisposes them to a greater number of papillae and therefore taste buds on their tongue. The large number of taste buds leads to supertasters having extreme sensitivity to the taste of bitter and sweet foods. Because of their sensitivity to certain tastes, it is common for supertasters to dislike bitter foods such as broccoli, spinach, rocket, kale, brussels sprouts, coffee, beer and dark chocolate. A person who strongly dislikes eating bitter green leafy vegetables, such as kale and rocket, may in fact be a supertaster. Supertasters often tend to add more salt and sugar to bitter-tasting foods to mask their bitterness.

Of the general population, approximately 25 per cent are supertasters, 50 per cent considered **medium tasters**, and 25 per cent are **non-tasters**. Medium tasters can perceive bitter-tasting foods but are not highly sensitive to their taste. Non-tasters have a lessened ability to perceive flavours. Non-tasters often think food tastes bland and will add condiments to their food, such as hot sauce, to increase the intensity of flavour (Figure 5). Non-tasters also prefer fatty foods, seasonings and sweet-tasting foods.

medium taster
a person who falls within the average range of taste sensitivity (without extreme sensitivity or insensitivity to certain flavours)

non-taster
an individual who has a decreased sensitivity to tastes

FIGURE 4 Rocket is a leafy green that has a sharp, peppery flavour. Many people love it, but to a supertaster, it could taste extremely bitter – a totally different experience.

FIGURE 5 Do you know someone who is always adding sriracha or hot sauce onto their food? They may be a non-taster!

10.2
INVESTIGATION: CONTROLLED EXPERIMENT

Does perceptual set influence our judgment of flavours?
Go to page **494**.

Exposure to miraculin

Synsepalum dulcificum or "miracle fruit" is a shrub native to West and Central Africa known for its taste-modifying berries. The berries of the shrub contain a chemical called **miraculin**, which can alter taste to make sour foods taste sweet (see Figure 6). While the miracle fruit berry is not sweet-tasting itself, once eaten, the miraculin chemical binds to sweetness receptors on the taste buds of papillae that detect sweetness. This action temporarily sweetens our taste so that sour foods, such as apple cider vinegar or lemons, lose their typical acidic flavours and are instead perceived as sweet. The effect of miraculin is only activated when sour food is introduced; other food flavours (for example, bitter or salty) are unaffected by the chemical. The effects of miraculin typically last for around half an hour, or until the chemical is diluted by our saliva. Miraculin can turn sour worms into sweet lollies and cause sour lemons and limes to taste like sweet oranges. Exposure to miraculin therefore alters our perception of taste.

FIGURE 6 *Synsepalum dulcificum*, or "miracle fruit", produces berries that contain the taste-modifying chemical miraculin.

miraculin
a chemical extracted from the "miracle fruit" that causes sour foods to taste sweet

Judgment of flavours

Our ability to judge the flavour of food relies on our senses and memory of past experiences with food. Our judgment of flavour can also be fooled by a range of factors which lead us to believe the taste of something differs to what it actually is. Factors such as perceptual set, colour intensity and the texture of our food can all interfere with our judgment of food flavours.

Perceptual set

As discussed in Chapter 9, our perceptual set is our tendency to perceive specific aspects of available sensory information based on our set expectations. Our perceptual set and expectations of what food will taste like can influence our perception and experience of food flavours. For example, consider the traditional cheese from Sardinia, Italy, called casu marzu that contains live maggots (see Figure 7). To those who grew up with the cheese, it is often considered a delicacy and extremely tasty.

However, to people that associate maggots with fly-blown food not fit to eat, just the idea of eating a maggot could trigger a response of disgust and interfere with that person's gustatory perception of the cheese. If the cheese was served up as a sample in a blind food test, a person disgusted by maggots would be better able to evaluate the true taste of the cheese and may even enjoy it. This is because they would not have their pre-existing ideas about maggots interfering with their perception of the taste of the cheese.

FIGURE 7 Casu marzu is now illegal to eat in Italy and Europe due to health concerns; however, it is sold illegally on the Sardinian black market, showing the lengths people will go to eat the cheese.

FIGURE 8 An Asian palm civet consuming coffee beans that will later be collected from its faeces to produce Kopi Luwak coffee.

Another example of how perceptual set can influence taste is Indonesia's Kopi Luwak coffee. This coffee is brewed from beans that have been passed through the faeces of an Asian palm civet (Figure 8). Some coffee drinkers expect that the coffee must taste amazing because it is expensive to purchase and therefore must be of high quality. To others, the coffee is completely unpalatable because it has been sourced from animal faeces. Different sets of expectations can lead to different gustatory perceptions of the Kopi Luwak coffee.

The appearance of food and food packaging can also influence our perceptual set and therefore our gustatory perception. If given the choice of a plainly packaged supermarket house-brand chocolate biscuit or a well-known quality brand chocolate biscuit, many people will choose the more expensive brand because the quality of packaging or brand associations are tied to an expectation that the product will taste better.

Colour intensity

colour intensity depth of colour

Colour intensity refers to how bright or dull the colour of an object or item is. The colour intensity of foods can lead us to taste flavours that are simply not there. As children, we learn to associate intensely coloured foods, such as red icy poles and red cordial, with an intensely sweet taste. The stronger or more vivid the colour, the sweeter the foods are usually perceived to taste. This past experience teaches us that intensely coloured food will have an intense flavour and leads us to expect this in future experiences with food.

FIGURE 9 Consider the white cherries and the red cherries shown. Which do you think has the more intense cherry flavour? Most people would say the red cherries due to their colour intensity.

Our gustatory perception of a sweet or intense flavour can differ to how much flavour is truly present. This is because the brain can perceive intensity because it has learned to expect it. This association has led to some food brands adding an intensely coloured dye to their food products, a common practice in the production of coloured confectionery and soft drinks. Food manufacturers do this in the hope that the consumer will perceive the product to be full of flavour or sweetness.

Colour can also confuse our flavour perception. For example, it is common to expect intensely coloured red cordial and red icy poles to have a strawberry or raspberry flavour. If we were asked to identify the flavour of different coloured solutions that are simply water and food dye, we are likely to perceive the flavour that corresponds with the colour. For example, a green solution of water and food dye is likely to be perceived as lime flavoured while a red solution of water and food dye is likely to be perceived as strawberry.

FIGURE 10 Food and drink manufacturers often add intense dyes to their products so that consumers associate their products with intense flavours.

FIGURE 11 Did you know that the rainbow and caramel PaddlePops™ are the same flavour? The only difference between the two is the coloured dye used.

Food texture

Texture describes the way food feels in our mouth – it is often described using words such as juicy, crunchy, creamy, tough, grainy, crisp or tender. The texture of foods can also influence our judgment of the flavour of foods. As a marketing tool, companies like to use texture-specific words to describe food products because the sensation described can produce a desirable eating experience. Throughout childhood we learn to associate certain textures with foods – potato chips are crunchy, apples are juicy, ice cream is creamy. When the foods we consume have the texture we expect them to have, we perceive them to taste their best. For example, most people would consider a soggy potato chip less tasty than a crunchy potato chip, or flat soft drink less tasty than fizzy soft drink. We can also change the texture of food to alter flavour perception. For example, grated apple can be thought to taste different to crunching on a whole apple, and pureed apple tastes different to apple juice.

texture
the way food feels in our mouth

FIGURE 12 Most people expect potato chips to be crispy and would be disappointed with the taste of a soggy potato chip!

10.2 SKILL DRILL

Making predictions about perception investigations

Key science skill: Develop aims and questions, formulate hypotheses and make predictions

Mr Smith decided to test the influence of colour intensity on the judgment of food flavours with his VCE Psychology class. He asked 10 volunteers to taste from each of four glasses of water – each glass was half filled with water and either one, two, three or four drops of red food dye. This food dye influenced the colour intensity but not the flavour. Mr Smith asked each volunteer to rate the sweetness of each glass as they were presented in random order.

Practise your skills

1. Identify the IV and DV for this experiment.
2. Identify the type of experiment conducted by Mr Smith – is it a within-subjects or between-subjects design? Justify your answer.
3. Predict the likely results of Mr Smith's experiments. Justify your prediction.

Need help identifying variables and making predictions? See Topic 1.2 (page 9).

10.2 CHALLENGE

Applying population statistics to other samples

Mrs Cook decided to give her 20 students coriander to taste test. She gave each student a small sample of fresh coriander and asked them to taste it, then report its flavour as either pleasant or unpleasant.

What percentage of Mrs Cook's class is likely to report the coriander taste as being unpleasant? What would this group of students be called – non-tasters, medium tasters or supertasters?

FIGURE 13 This investigation involves taste testing coriander.

10.2 CHECK YOUR LEARNING

Describe and explain

1 Describe the sensory stimuli that combine to create our perception of food.

2 Define a supertaster.

3 Describe the effect of miraculin on taste buds.

4 Explain how our judgment of flavours can be influenced by colour intensity. Give an example.

5 Explain why coriander tastes different for a supertaster as compared to a medium-taster or non-taster.

Apply, analyse and compare

6 Compare the taste of a lemon before and after miraculin.

Design and discuss

7 Discuss how perceptual set could influence our perception of the flavour of kangaroo meat.

8 a Design a simple experiment to investigate the influence of the texture of corn chips on perception of flavour. You should include the following:
- an aim
- a hypothesis
- the IV and DV
- your method (including information on the sample, materials used, set-up and how you will collect data).

b Discuss your expected results and explain why, with reference to your understanding of the influence of food texture on the judgment of flavour.

10.3 Distortions of perception in healthy individuals

KEY IDEAS

- Synaesthesia creates an enhanced sensory experience because of increased neural connectivity between sensory areas of the cortex.
- Spatial neglect patients lack the ability to perceive and respond to stimuli on one side of their body due to brain injury.

Perceptual distortions create unique experiences

Neuroscientists learn a great deal about the human brain through studying the brains of healthy individuals. They are also able to add to our understanding of brain function by studying individuals who have unique experiences of processing and perceiving information. In this topic, we will look at two conditions that lead to distortions of perception in healthy individuals: synaesthesia and spatial neglect.

ClickView Dorothy Latham's synaesthesia

FIGURE 1 Some individuals perceive life differently to most. Artist Vincent van Gogh perceived sounds to have certain colours due to a neurological condition called synaesthesia.

Synaesthesia

synaesthesia
a phenomenon where individuals experience an integration of senses when one sense is stimulated

Synaesthesia is a neurological condition where stimulation of one sensory pathway leads to the involuntary stimulation of another sensory pathway. The term "synaesthesia" means "to perceive together" and describes the experience of two or more senses being experienced at the same time. Stimulating one sense will involuntarily stimulate the perception of another sense so that the brain thinks they are intricately connected. For example, Kaitlyn Hova, a professional violinist, composer and neuroscientist, grew up assuming it was normal to see flashes of colour as she played the violin. She now recognises that her experience of music is not shared by everyone, and is instead caused by synaesthesia. Kaitlyn's senses of sound and vision are blended, so that when she plays the C note on her violin, she perceives flashes of red, the D note creates flashes of blue, E a super-yellow, F a light green and G a deep green.

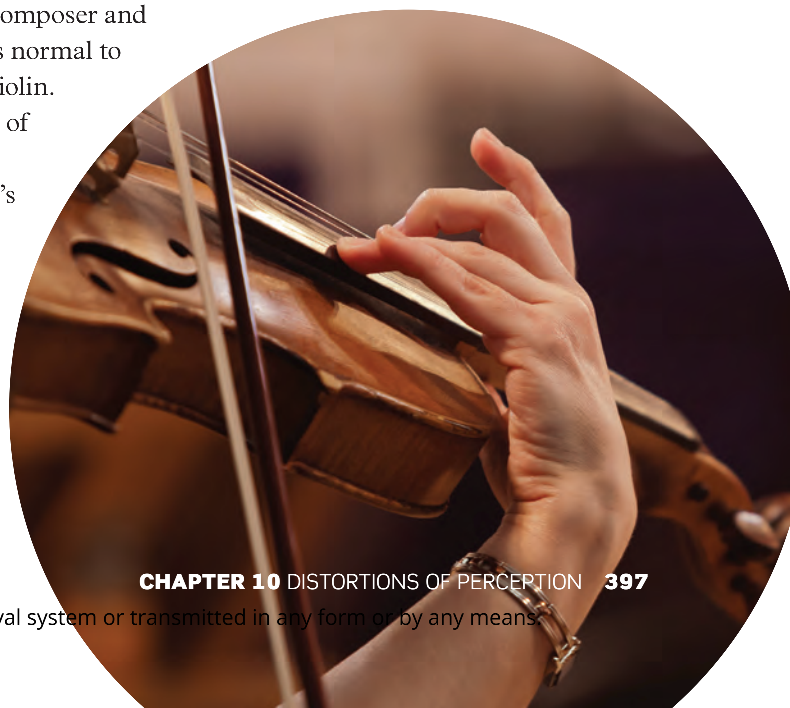


FIGURE 2 When Kaitlyn Hova plays the violin, each note triggers the flash of a distinct colour.

For Kaitlyn, music is an immersive experience where she cannot separate the visual experience from the musical notes – the notes and colours always occur together and in the same way. She believes this experience has enhanced her ability to perceive music as a complete sensory experience. Kaitlyn's blended sensory experience of sound and colour is unique. The colours she associates with specific notes can differ from other **synaesthetes** who experience a similar type of synaesthesia.

synaesthete
an individual with synaesthesia

Some synaesthetes "taste" sound, while others might "hear" colours or "taste" shapes. James Wannerton, a synaesthete who learned languages at school, describes French as tasting of "runny egg" while German tastes like "marmalade" (Figure 3).

FIGURE 3 James Wannerton perceives French language as tasting like runny eggs and German as tasting of marmalade.

Synaesthetes also consistently experience the same unique sensory associations. For example, when Kaitlyn hears the C note, she always sees a red flash and not another colour. Since synaesthetes grow up accustomed to their integrated senses, it can often be a surprise when a synaesthete realises that not all people have the same sensory experiences. Some synaesthetes can even experience multiple forms of synaesthesia; these individuals are known as **poly-synaesthetes**.

poly-synaesthete
an individual who experiences more than one type of synaesthesia

Varieties of synaesthesia include:

- **grapheme–colour synaesthesia** – when letters, words or numbers are associated with specific colours (Figure 4)
- **chromaesthesia** – when sounds are associated with seeing colours
- **lexical–gustatory synaesthesia** – when letters or words are associated with a particular taste
- **auditory tactile synaesthesia** – when sounds trigger physical sensations, such as tingling, pressure or change in temperature.

grapheme–colour synaesthesia
a form of synaesthesia where letters, digits or words are perceived as having colours

chromaesthesia
a form of synaesthesia where sounds are perceived to have colours

lexical–gustatory synaesthesia
a form of synaesthesia where letters or words are perceived to have a particular taste

auditory tactile synaesthesia
a form of synaesthesia where sounds are perceived to have a physical sensation, such as pressure, heat or pain

Approximately 3 to 5 per cent of the population experience synaesthesia. The condition is considered neurotypical because the brain can function normally when creating each enhanced perceptual experience. Synaesthesia tends to run in families and is thought to be determined by a genetic trait carried on the X-chromosome. However, the specific type of synaesthesia is not believed to be genetically inherited because sensory associations can vary between family members. For example, a mother might associate words with different tastes, while her son sees shapes when hearing sounds. The condition is more common in women and occurs more frequently in artistic people. Famous synaesthetes include Billie Eilish, Vincent van Gogh, Billy Joel and Pharrell Williams. Artists and musicians with synaesthesia will often describe their experience as being a significant part of their creativity. Synaesthesia is also thought to improve memory recall for some individuals because they can more easily recall things they associate with a specific sense.

10.3 INVESTIGATION: LITERATURE REVIEW
How can a non-synaesthete acquire synaesthesia? Go to page **496**.

Synaesthesia

FIGURE 4 Letters of the alphabet can trigger vivid colours in some synaesthetes.

Synaesthesia is thought to occur because of increased neural connectivity between areas of the brain that link the senses. In a non-synaesthete, a visual stimulus is sent to the visual cortex, but in a synaesthete there are additional connections that will send this message to other sensory areas of the cerebral cortex. As a result, sounds can be seen, and words can be tasted. When Kaitlyn Hova hears a musical note, her auditory cortex processes the sound and at the same time activates her visual cortex, so that she perceives the flashes of colour as being fully integrated into the same experience. It is believed that this experience is created when excess neural pathways are not "pruned back" during brain development as a child grows (Figure 5). A synaesthete brain is therefore a healthy brain with additional connections that create a unique sensory experience.

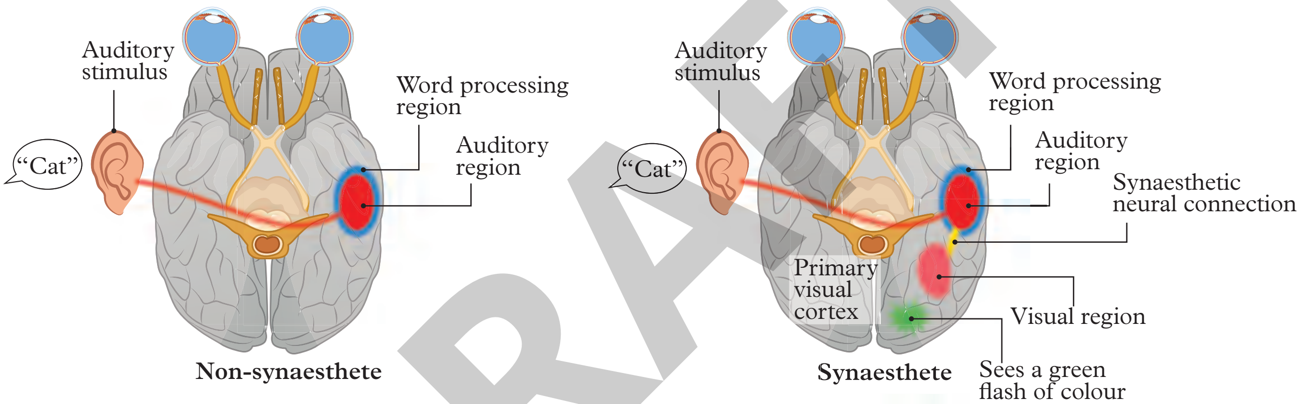


FIGURE 5 How a synaesthete sees a green flash of colour when they hear the word "cat", compared to a non-synaesthete

In rare cases, synaesthesia can occur in response to head injury. There have been cases of people who developed the condition following traumatic brain injury. It is thought that the development of synaesthesia occurred due to neural connections forming in response to the brain trying to compensate for injury.

Study tip

Remember to make links between key terminology used in chapters. For example, if you know gustatory perception is taste perception – you can infer that lexical–gustatory synaesthesia has something to do with taste perception.

10.3 CHALLENGE

Investigating other forms of synaesthesia

There are more forms of synaesthesia than those mentioned in this topic. Research a form of synaesthesia not mentioned in this topic (such as spatial sequence synaesthesia or mirror–touch synaesthesia) and answer the questions.

1 Identify the senses that are blended in this type of synaesthesia.
2 Describe how this type of synaesthesia can influence an affected person's interactions with the world (does it make some tasks difficult or some tasks easier?).
3 Use your understanding of the brain to suggest which areas of the brain are activated or connected to create this form of synaesthesia.

Spatial neglect

spatial neglect
a disorder created by a damaged parietal lobe where a patient ignores the one side of their world

left-sided neglect
spatial neglect characterised by the inability to perceive and interact with stimuli appearing on the left side of the body due to damage in the right hemisphere

right-sided neglect
spatial neglect characterised by the inability to perceive and interact with stimuli appearing on the right side of the body due to damage in the left hemisphere

Spatial neglect is a neurological condition where someone is unable to perceive or respond to stimuli on one side of their body. Spatial neglect is typically caused by injury to the right parietal lobe. To understand the effects of spatial neglect, consider Peggy, who experienced a stroke in her early sixties. Peggy recovered from the stroke but afterwards was unable to perceive the left side of her world (left-sided neglect). Peggy's stroke damaged an area at the rear of her right parietal lobe normally involved in processing spatial tasks. Peggy now systematically ignores the left side of her world – her visual sensory system is unaffected, but she does not pay attention to her left field of view. Peggy does not notice food on the left side of her plate, or untidy hair on the left side of her head when she brushes her hair. Peggy also only applies make-up to the right side of her face. When asked to copy a drawing of a flower, Peggy carefully draws petals of the right side of a daisy, and then sits back believing the drawing is finished. When asked to read the word NETBALL, Peggy only sees the word BALL.

Left-sided neglect is more common than **right-sided neglect**. This is because the right hemisphere is largely in control of distributing spatial attention and regulates more attention than the left hemisphere (Figure 6). When the left parietal lobe is injured, the right hemisphere can usually compensate for loss of function, but when the right parietal lobe is injured, the left hemisphere is limited in its ability to compensate for loss of function.

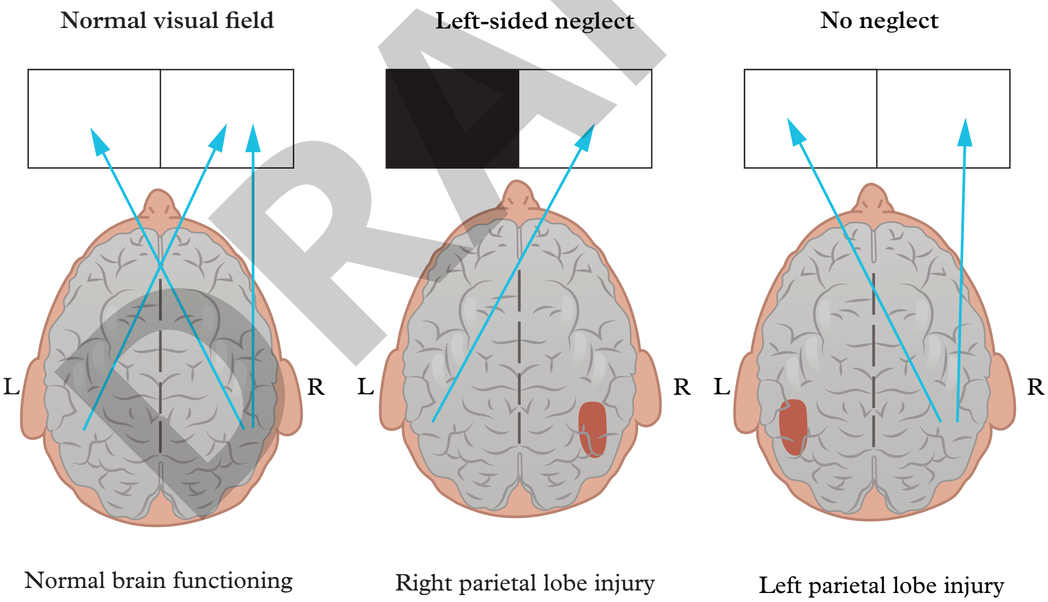


FIGURE 6 Left-sided neglect is more common than right-sided neglect because damage to the right hemisphere is harder to compensate for.

Curiously, most patients with spatial neglect are unaware of their condition; it is usually first noticed by a caregiver. Spatial neglect can make daily activities difficult for the individual because they are unaware of objects on their left as they navigate their environment. Spatial neglect can also affect memory, as patients with spatial neglect might only describe the right side of a scene they recall and not pay attention to the left side (see Figure 7). With the help of caregivers, patients with spatial neglect can develop strategies to help them manage the challenges presented to them in their daily lives.

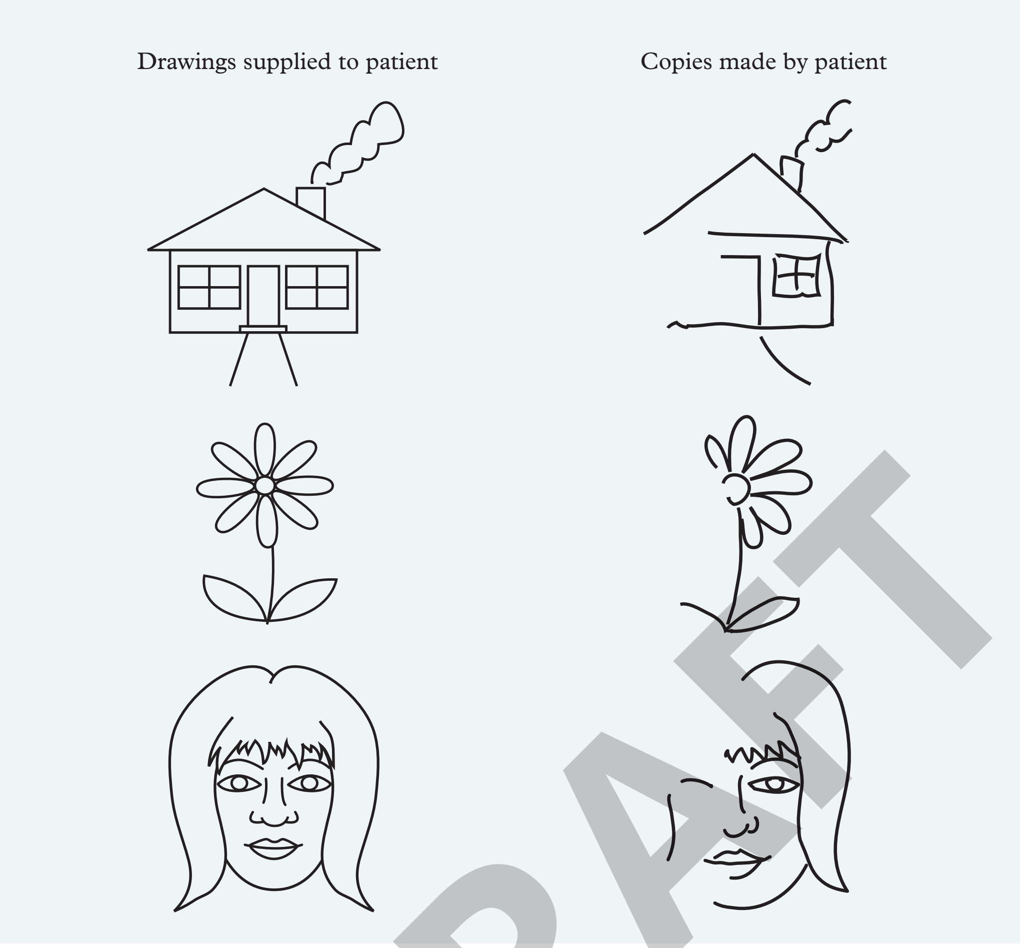


FIGURE 7 Drawings copied by a spatial neglect patient

Spatial neglect can be better understood through documented case studies. Oliver Sacks, a well-respected neurologist, wrote extensively about some of his intriguing spatial neglect patients. One such patient was identified as "Mrs S". "Mrs S" was described as an intelligent woman who had suffered a stroke that had damaged her right hemisphere. The passage below is an extract from Sacks' observations.

> *"She sometimes complains to her nurses that they have not put dessert or coffee on her tray. When they say, "But Mrs S, it is right there, on the left," she seems not to understand what they say, and does not look to the left. If her head is gently turned, so that the dessert comes into sight, in the preserved right half of her visual field, she says, "Oh, there it is – it wasn't there before." She has totally lost the idea of "left", both with regard to her world and her own body. Sometimes she complains that her portions are too small, but this is because she only eats from the right half of the plate – it does not occur to her that it has a left side as well. Sometimes, she will put on lipstick, and make up the right half of her face, leaving the left half completely neglected: it is almost impossible to treat these things, because her attention cannot be drawn to them and she has no conception that they are wrong. She knows it intellectually, and can understand, and laugh: but it is impossible for her to know it directly."*
>
> Oliver Sacks (1985)

10.3 REAL-WORLD PSYCHOLOGY

Alan Burgess and spatial neglect

On 5 November 2007, Alan Burgess suffered a stroke that damaged the parietal lobe on the right side of his brain. Burgess, a tool design drafter and driver who was 59 at the time, was left with spatial neglect following the stroke. Due to this damage, Alan was no longer able to work and was forced into an early retirement. When drawing artwork Alan would provide detailed pictures of animals that missed elements and features on their left side. Following his stroke, the severity of Alan's neglect was tested by a neurologist. The neurologist asked Alan to mark the centre point of a 25-centimetre line on a piece of paper. In his first attempt Alan marked the line approximately 2 centimetres from the right edge, completely ignoring the left side of the line. Alan has responded well to rehabilitation; on later attempts Alan would mark the centre of the line 10 centimetres from the right edge.

Apply your understanding

1 Identify which type of spatial neglect Alan is experiencing. Justify your answer.
2 Describe how development of spatial neglect has affected Alan's day-to-day life.
3 Draw an example of how you would expect Alan to copy the image of the beach chairs.

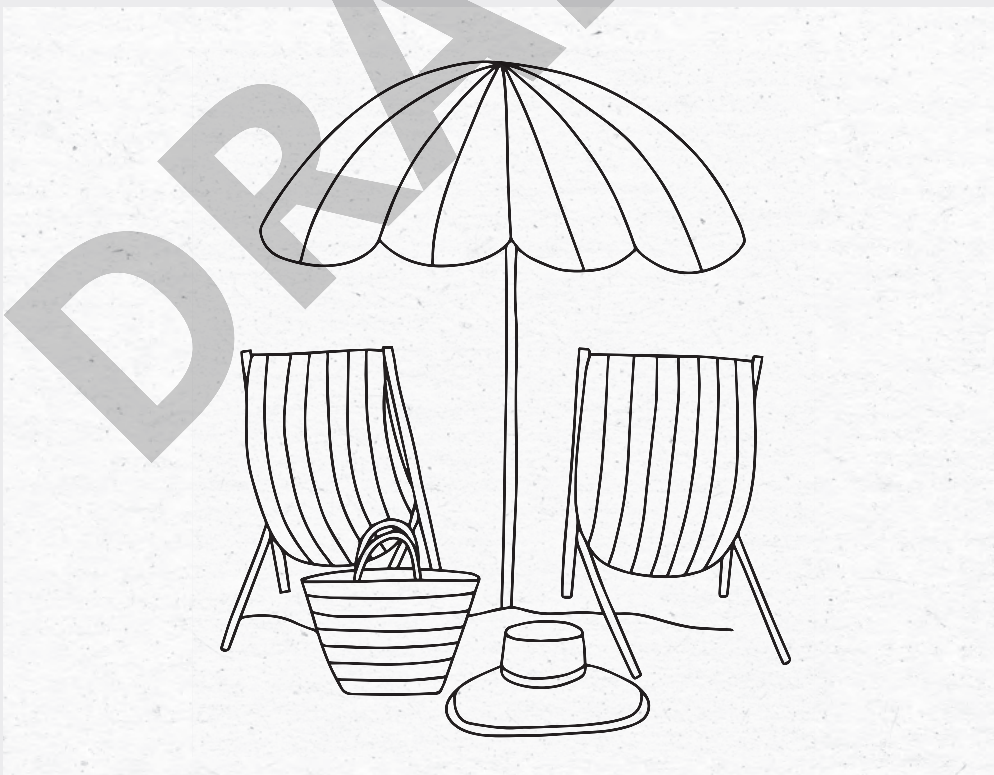
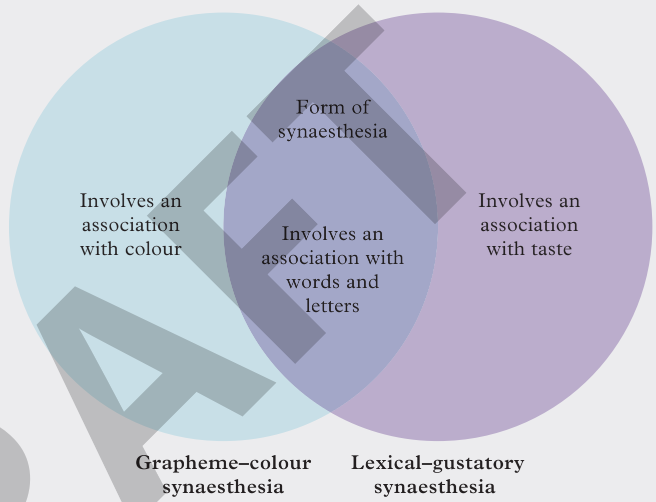


FIGURE 8 An image of beach chairs

10.3 WORKED EXAMPLE

Presenting ideas using visual representations

Create a Venn diagram to showcase the similarities and differences between grapheme–colour synaesthesia and lexical–gustatory synaesthesia. (4 marks)

Think	Do
Step 1: Identify the similarities between the two forms of synaesthesia.	Similarities: • Both conditions are forms of synesthesia. • Both conditions involve an association with words or letters.
Step 2: Identify what is unique to each form of synaesthesia.	• Grapheme–colour synaesthesia involves an association with colour. • Lexical–gustatory synaesthesia involves an association with taste.
Step 3: Draw your Venn diagram and place the similarities in the intersection, and differences in the ends of the circles. (1 mark each)	

10.3 CHECK YOUR LEARNING

Describe and explain

1 Describe what occurs in a synaesthete brain when one sense is activated.

2 Explain why synaesthesia is thought to occur.

3 Describe why a spatial neglect patient might experience difficulty when eating a meal.

4 Identify which specific type of synaesthesia the following people experience:

- a Vincent van Gogh
- b James Wannerton
- c Kaitlyn Hova.

Apply, analyse and compare

5 Compare grapheme–colour synaesthesia with chromaesthesia.

Design and discuss

6 Draw a simple diagram of a house as would be drawn by a left-sided spatial neglect patient.

7 Create a Venn diagram to showcase the similarities and differences between synaesthesia and spatial neglect.

8 Discuss why damage to the left parietal lobe is less likely to result in spatial neglect than damage to the right parietal lobe.

CHAPTER 10 Review

Chapter summary

10.1

- A visual illusion occurs when we misinterpret real sensory stimuli, creating a mismatch between the real-world stimulus and the perception formed in our brain.
- The Ames room illusion demonstrates how we can ignore depth cues and use our past experience to perceive a trapezoidal-shaped room as rectangular, and therefore perceive a person walking across the room as shrinking or growing in size.
- The Müller-Lyer illusion leads us to view two lines of the same length as different lengths due to the arrowhead and feathertail ends. We consistently view the line with arrowheads as being shorter than the line with feathertails.
- The Spinning Dancer illusion is an ambiguous figure that lacks depth, presenting a figure that can be perceived as spinning in two directions.
- Visual agnosia is an inability to name or describe the use of an object, or to recognise a familiar face.

10.2

- A supertaster experiences the sense of taste for certain flavours with a greater intensity than most people in the population.
- Miraculin is a chemical extracted from the berry of the miracle fruit *Synsepalum dulcificum*, which can stimulate taste buds to cause sour foods to taste sweet.
- Judgment of food flavours is influenced by factors such as perceptual set, colour intensity and food texture.

10.3

- Synaesthesia is an intriguing phenomenon where the stimulation of one sense will involuntarily stimulate another sense in response to a stimulus.
- Spatial neglect is a disorder most often caused by damage to the right parietal lobe. The condition leaves individuals unable to acknowledge, orient or perceive things that sit within a particular field of view.

Revision questions

Multiple choice

1 Visual illusions occur when we incorrectly apply ______________ factors that usually help us to understand our world.

A biological

B psychological

C physiological

D fallibility

2 The Müller-Lyer illusion leads us to misinterpret two lines of the same length as being different lengths. One explanation to help us understand this illusion is the carpentered world hypothesis. This suggests that we perceive the illusion as a result of:

A our experience with rectangular buildings, and therefore our application of depth cues to perceive the feathertails line as being closer and shorter in length.

B the misapplication of size constancy where we perceive lines the same size at different distances as being different lengths.

C a perceptual compromise where we judge the overall length of the figure to perceive the line with feathertails as the longer line.

D our experience with rectangular buildings, and therefore our application of depth cues to perceive the arrowheads line as being closer and shorter in length.

3 The Ames room illusion:

A occurs when we look through a peephole to perceive a rectangular room as trapezoidal.

B enables the viewer to use binocular depth cues when using a peephole to view inside a room.

C occurs when we are unable to use normal depth cues to perceive figures as growing or shrinking in size as they walk across a trapezoidal-shaped room.

D occurs because a trapezoidal-shaped room uses depth cues to create the illusion of figures changing in size as they walk across the room.

4 The inability to name or describe an object or to recognise faces is the result of a disorder known as:

A synaesthesia.

B prosopagnosia.

C visual agnosia.

D spatial neglect.

5 A supertaster is someone who:

A perceives sour foods as tasting sweet.

B has an increased sensitivity to the flavours of foods.

C combines the senses of vision, taste, smell, and touch to increase the experience of food flavours.

D readily identifies intensely coloured foods as having a stronger flavour.

6 Our perception of food flavours can be strongly influenced by past experiences. This influence is known as:

A perceptual set.

B a visual illusion.

C spatial neglect.

D gustatory perception.

7 The texture of foods can influence our perception of flavour. An example of this is when a subject identifies that:

A crunchy potato chips taste better than soggy potato chips.

B a more intensely coloured red drink tastes sweeter than a diluted red drink.

C creamy camembert cheese tastes better than shredded tasty cheese.

D crunching on a fresh apple reminds them of happy childhood experiences.

8 Synaesthesia is best described as:
   A an abnormal condition that identifies damage to a specific area of the cerebral cortex.
   B the integration of two or more senses that are perceived as belonging together.
   C increased connectivity between sensory areas of the cerebral cortex that create an integrated sensory experience when one sense is stimulated.
   D a unique sensory experience that is experienced as different every time a sense is stimulated.

9 Vern has recently had a stroke where his right parietal lobe was damaged. He is unable to notice that he has not eaten the food on the left side of his dinner plate. Vern has a condition known as:
   A visual agnosia.
   B synaesthesia.
   C spatial neglect.
   D blindness.

10 Distortions in the perception of visual stimuli and judging the flavours of food can be attributed to all the following factors except:
   A the biological composition of our visual and taste sense organs.
   B misapplication of psychological factors that we normally use to make sense of sensory stimuli.
   C past experiences that build our understanding of the world.
   D an inability to use all information normally available to us for an accurate perception of the world.

Short answer

Describe and explain

11 Describe the Müller-Lyer illusion.

12 Explain how the carpentered world hypothesis can offer an explanation for our inaccurate perception of the two lines in the Müller-Lyer illusion.

13 Explain how the Ames room illusion prevents us from using binocular depth cues to perceive the realistic structure of the room.

14 Describe how a person with visual agnosia might respond to being asked to name a series of objects.

15 Amani dislikes brussels sprouts because they taste extremely bitter. Explain what this could indicate about Amani's perception of taste.

16 Identify the food chemical that can temporarily change our perception of a sour taste into a sweet taste.

17 Identify which senses are being activated when Isaac perceives the colour blue when he hears the word "tripod". Identify and describe the condition Isaac is experiencing.

18 Explain what is occurring in the brain of a synaesthete when they "taste" colours.

19 Explain why a person with visual agnosia might be able to identify a pencil if they can touch it, but not when looking at it.

20 Describe how a left-sided spatial neglect patient might respond when asked to count the number of meerkats while observing the scene shown. Explain why they would respond this way.

Apply, analyse and compare

21 Provide evidence for the carpentered world hypothesis explanation for the Müller-Lyer illusion using a cultural example.

22 Create a Venn diagram to display the similarities and differences between the Ames room illusion and the Spinning Dancer illusion.

23 Propose why a foreign visitor to Australia may find the flavour of Vegemite disgusting, whereas a person growing up in Australia may enjoy it thickly spread on their toast for breakfast each day.

24 Provide two examples not discussed in this chapter to illustrate how both colour intensity and texture can influence our perception of taste.

25 Compare how a spatial neglect patient and a patient with visual agnosia might respond when asked to identify the king from a photo and then complete a simple drawing of his face. Justify your responses with reference to characteristics of each disorder.

Design and discuss

26 Discuss the statement, "Perception is fallible." In your response, refer to the fallibility of both visual and gustatory perceptual systems and use examples to show your understanding.

27 The Müller-Lyer, Ames room and Spinning Dancer illusions are all examples of visual illusions. Construct a concept map to compare these illusions as examples of the fallibility of our visual perception.

28 Design a simple experiment that could be used to test the idea that miraculin can alter the flavour of sour foods. Identify the IV, DV and expected results of your experiment.

29 Evie wanted to test the effect of visual cues on the accuracy of taste perception. She conducted an experiment on a group of 20 volunteer Year 7 students from her school. She used a between-subjects: the control group tasted five coloured macarons that visually matched their flavours (such as yellow = banana, blue = blueberry), while the experimental group tasted the same five macarons while blindfolded. Subjects were asked to identify the flavour of each macaron tasted.

Discuss the advantages and disadvantages of using between-subjects design in this experiment, and the predicted results. Justify your prediction with reference to factors influencing taste perception.

30 With reference to the experiment in question 29, discuss the ethical guidelines that Evie should have incorporated into her experimental design.

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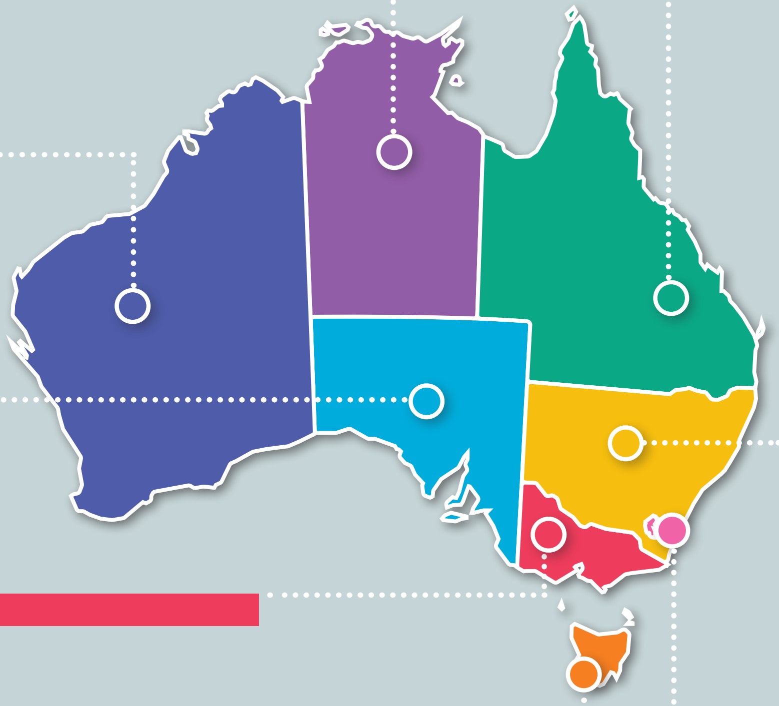

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