Issues to Consider

Theories of perceptual organisation take either a top-down (meaning higher level cognitive processes are involved) or bottom-up approach (meaning environmental stimuli are sufficient for perception and higher processing is not necessary). We will consider perceptual organisation through Gibson’s bottom-up theory and Gregory’s top-down theory. Next we will examine the development of perception, including depth/distance perception, visual constancies, and the role of nature and nurture. Finally we will consider face recognition and the difficult condition called prosopagnosia, where the person cannot recognise faces.

On completion of this topic you should be familiar with the following.

Use this list of learning objectives as a revision checklist. Cross-reference the objectives with the Specification.

Theories of perceptual organisation

☐ Distinguish between bottom-up (determined by external stimuli) and top-down (determined by knowledge and expectations) perceptual processes.

☐ Outline and evaluate Gibson’s bottom-up/direct theory of perceptual organisation using the optic array, optic flow, perception and action, texture gradients, resonance, and affordances to illustrate the theory.

Development of perception

☐ Critically consider studies of the development of perceptual abilities (e.g. depth/distance, visual constancies), including infant and cross-cultural studies.

☐ Discuss explanations of perceptual development, including the nature–nurture debate in perception.

Face recognition and visual agnosias

☐ Outline and evaluate Bruce and Young’s theory of face recognition.

☐ Consider case studies and explanations of prosopagnosia.
Theories of Perceptual Organisation

For details, see Eysenck’s A2 Level Psychology (pages 73–88).

Our View of the World—Is it Built In or Built Up?

**Fill in the blanks.**

Theories of visual p________ attempt to explain how the two-dimensional images that impinge on our retinas are translated into complex three-di________ images and how, when the images received on the retina are constantly changing, we are able to maintain a stable perceptual world that enables us to perceive depth, sh________, and c__________ with impressive accuracy.

**Bottom-up or top-down processes?**

**Fill in the blanks.**

When we look at any scene, we have two sources of information:

- The actual sensory input that we receive from the scene itself.
- The non-visual information stored in our brain about what we expect the world to look like.

In line with these two sources of information there are two sets of processes that operate during our perception of the w_________

- Bottom-up processes involve inf__________ travelling “up” from the stimulus to the brain via the sense organs. These processes are therefore dependent on input from outside and are also referred to as data-driven processes because the information (raw data) from the s________ organs “drives” perception.
- Top-down processes involve the b________ “sending down” stored information, which then affects the perception of information already in the system, thereby enabling us to make sense of the input received. Top-down processes are driven by a person’s kn_________ and expectations; for this reason they are also referred to as c__________-driven processes.

Some theories of perception assume that perception is indirect in the sense that information has to be processed at a higher level and that we construct our own perceived world. These are known as constructivist theories and emphasise the importance of t____-down processing. Other theories assume that we do not need to use higher-level processes in order to perceive our world because data from the environment provides us with sufficient information to perceive the world in a direct manner and they emphasise the importance of b________-up processes. Such theories are called direct theories.
Gibson’s Theory of Direct Perception—A Bottom-up Approach

**Fill in the blanks.**

The main theme of Gibson’s theory (1950, 1966, 1979; see A2 Level Psychology page 74) is that the sensations received by the visual system are so highly organised and rich in information that we do not need to interpret them to make them meaningful; we can perceive them directly. This means that there are no intermediate stages between light reaching the retina and an animal’s response to it. According to Gibson, all animals use information from the visual system to move around their environment without needing to make use of internal hypotheses or theoretical processes—perception is automatic. Because of the emphasis on environmental stimuli, Gibson’s theory is also known as the theory of ecological optics.

---

**The optic array**

**Fill in the blanks.**

The most important source of information is the optic array, which contains all the visual information available at the retina. Gibson argued that as we move around the environment, we effortlessly detect information from the whole of the optic array. As this optic array provides a great deal of unambiguous information, little or no information processing is required. This information comes in many forms, including optic flow patterns, movement, and texture gradients.

---

**The optic flow**

**Fill in the blanks.**

Gibson was particularly interested in the problems pilots experience when landing. Imagine you are a pilot coming into land. The point you focus on, called the “pole”, is static, while the remainder of your field of vision is moving. The further from the pole an object or scene is, the quicker it appears to move. All of this information is known as the optic flow pattern, and it provides unmistakable information on distance, speed, and altitude.

---

**Perception and action**

**Fill in the blanks.**

In the normal course of our daily lives, we may not be flying aeroplanes, but we are moving around our environment. Gibson consistently argued that there are very close links between perception and action. We do not perceive our world from a static viewpoint but by moving around in it, and interacting in it, and this supports the idea that perception is entirely dependent on action. When an observer moves, the entire optic array is transformed. It is this changing scenery that provides crucial information in the perception of the world. Gibson was critical of other theorists in the field of perception for concentrating on how we perceive a static object (or even glimmer of light) when we stare at it. He pointed out that this is simply not how we perceive in ordinary everyday life.
**Invariants**

*Fill in the blanks.*

As an animal moves around in its natural environment, it identifies those aspects of it that remain the same—that are *invariant*. These invariants provide essential information about the layout of the environment. This makes the layout of objects in space unambiguous, so they can be picked up directly by the perceiver. For a pilot, the “pole” is an invariant.

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**Texture gradients**

*Fill in the blanks.*

Another invariant is *texture gradient* in the natural world. When we look at almost any scene, the texture of things changes as they get further away (think of a sandy beach, or brickwork); in essence, the texture appears finer in the distance than in the foreground. As texture gradient is a characteristic of almost any surface in the natural world around us, this is yet another cue to perception. Again, it is an aspect of the environment that is visible to the observer, not one that needs to be constructed in the brain.

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**Resonance**

*Fill in the blanks.*

Gibson believed that we are able to make use of the rich source of environmental information because our nervous system has been specially attuned by evolution to receive it. He drew an analogy to a radio in the same way that this resonates with the information contained in the electromagnetic radiation so we are equipped to make use of information from the environment without the need for constant judgements and hypothesis testing, as implied by constructivist theories. Like a radio, we operate as a single unit and if one part goes wrong, the system does not work. In a similar way, Gibson argued, the nervous system works as a single unit when perceiving.

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**Affordances**

*Fill in the blanks.*

According to Gibson, we can only understand an animal’s perceptual system in the context within which it has evolved, particularly in terms of the optic arrays to which it has been exposed. Within this context, we attach meaning to the type of visual information we receive. Constructivist theorists believe that these meanings are attached by means of “top-down” processes, as a result of our memory and expectations based on past experience. However, Gibson disagreed. He argued that all the potential uses of an object, called affordances, are perceived directly. We would, for example, “afford” a ladder the properties of being able to assist ascent or descent, by considering the gaps between successive rungs in relation to the length of our legs. The importance of affordances is again of great importance here. They emphasise that our perception of affordances (our perception of the possibilities for action offered by the environment) can only be accurately assessed if we move around. The notion of affordances is therefore important in this theory because it emphasises that all the information needed to make sense of the environment is directly present in the visual input and that perception depends on action.

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### RESEARCH EVIDENCE FOR GIBSON’S THEORY OF DIRECT PERCEPTION

Summarise the research evidence below.

Ψ **Warren and Hannon’s (1988) moving dots study.** How does this support Gibson’s theory?

Ψ **Milner and Goodale’s (1995, 1998) TWO visual perceptual systems.** Which system closely resembles Gibson’s theory?

Ψ **Haart, Carey, and Milne’s (1999) study of the Müller–Lyer illusion and the vision-for-action system.** How do these lend support to Gibson’s theory?

### RESEARCH EVIDENCE AGAINST GIBSON’S THEORY OF DIRECT PERCEPTION

Summarise the research evidence below.

Ψ **Van den Berg and Brenner’s (1994) study of optic flow.** How does this provide evidence that optic flow doesn’t sufficiently account for depth perception?

Ψ **Rushton et al.’s (1998) study of perceived visual direction.** Why is perceived visual direction more important than optic-flow information?
Visual illusions. Why do these challenge Gibson’s theory?

Menzel’s (1978) research of chimpanzees’ abilities to learn food locations without direct movement. What was Gibson’s key omission?

EVALUATION OF GIBSON’S THEORY OF DIRECT PERCEPTION

Summarise the evaluation points below.

It draws attention to the rich source of information available to the perceiver. How did Gibson go beyond previous theories of perception?

It accounts well for everyday perceptions. Why does it account well for our everyday perception?

It takes account of evolution. Why is this a strength?

An underestimation of the difficulties of perceiving the world. Which processes are more complex than Gibson suggests?
ψ Gibson exaggerated the role of optic-flow information. What other factors are involved in perception through movement?

ψ The need for cognitive processes in perception of objects. Why was Gibson wrong about the involvement of cognition?

ψ It ignored the additional meaning attached to objects. Where will this additional meaning come from?

Gregory’s Top-down/Indirect Theory

Fill in the blanks.

Gregory (1970, 1972, 1973, 1978, 1980) is a present-day constructivist theorist who argues that perception is an active and c_____________ process in which top-down processing is an essential element. He believes that the data (information) we derive from the images that impinge on the retinas are insufficient for us to build up an accurate picture of the w_________. He refers to the data obtained as “fragmentary scraps”. Gregory believes that various c___________e processes are involved in perception. Schemas based on ex________________s are amongst the most important of these.

Constructivists like Gregory suggest that our perception of the world is strongly affected by our existing schemas. You have come across schemas in several parts of the AS level course (e.g. when studying memory). Schemas are like categories into which we incorporate the in________________ from our experiences. One example of a schema in the world of visual perception is that of faces. Our “face” schema tells us that however different one face is from another, they have certain common features, such as a nose that protrudes, two eyes, a mouth, and so on. One of Gregory’s favourite demonstrations of the role of schemas based on expectation is the “hollow face illusion” (see A2 Level Psychology page 81) in which people view a hollowed mask of a face. Although there is sufficient information to see the mask as hollow, we still perceive a normal face. Our sc________________ of a face overrides the evidence of our own eyes and we accept an incorrect hypothesis.
According to Gregory, perception is a series of hypothesis-testing exercises. As we encounter certain life experiences, we “call up” the most appropriate, the most relevant, or the most recent schema and use these to provide the context in which to interpret our present experience. Most of the time these hypotheses are accurate—they fit our expectations. Sometimes, however, the schema does not fit the occasion and perception is made difficult or inaccurate.

**Gregory’s explanation of visual illusions**

*Fill in the blanks.*

Gregory argued that we treat two-dimensional illusion as if they were threedimensional, even though we know they are only two-dimensional. Gregory suggests the misapplied size–constancy theory explains several illusions.

Gregory suggests that when we look at the Müller–Lyer illusion (see A2 Level Psychology page 78) and the “fins” out of context, there are no cues to help us perceive their length so we draw on existing hypotheses and expectation. These tell us that the figure with the fins diverging represents an inside corner and the one with the fins converging represents an outside corner. Since it is part of our expectation (according to Gregory) that outside corners are usually further away than inside ones, when the vertical line is the same length, the “outside” corner one is perceived as longer since it is perceived as further away.

In a sense, we perceive a two-dimensional figure as if it were a three-dimensional one. This may well be true because if these fins are presented as luminous figures in a dark room, they do appear three-dimensional.

**FIND OUT FOR YOURSELF:** Test the Müller–Lyer, the Ponzo, and the Ebbinghaus illusions on a sample of participants. Find more illusions at the following web-site: http://dragon.uml.edu/psych/illusion.html

**RESEARCH EVIDENCE FOR GREGORY’S TOP-DOWN/INDIRECT THEORY**

*Summarise the research evidence below.*

Ψ Daneman and Stainton’s (1993) study of proofreading. How does this show the role of schemas?

Ψ Bruner and Goodman’s (1947) study of coin size. How does this support Gregory’s theory?
Ashley, Harper, and Runyon’s (1951; see A2 Level Psychology page 82) research on hypnotised adults. How does this support Gregory’s theory?

RESEARCH EVIDENCE AGAINST GREGORY’S TOP-DOWN/INDIRECT THEORY

Summarise the research evidence below.

Bruner and Goodman’s study reinterpreted. How can this study be reinterpreted to challenge Gregory’s theory?

DeLucia and Hochberg’s (1991) three-dimensional, 2-foot-high Müller–Lyer illusion. How does this challenge Gregory’s theory?

EVALUATION OF GREGORY’S TOP-DOWN/INDIRECT THEORY

Summarise the evaluation points below.

Strong evidence that top-down processing influences perception. Which evidence do you think strongly supports Gregory’s theory?

Considers motivational and emotional factors. Why is it important to consider these?
It does not apply to many other variations of the illusion. Which illusion still works in various forms and why should it not if top-down processing explains perception?

Artificiality of research may limit bottom-up processing and exaggerate top-down-processing. Why might such an exaggeration occur?

The information received is not as fragmented and inadequate as Gregory states. Why is the optic array more complex than Gregory gave it credit?

Comparison of theories

*Fill in the theories of perceptual organisation comparison table by inserting the correct concepts into the table according to which theory they relate to.*

<table>
<thead>
<tr>
<th>Built-in</th>
<th>Constructivist theory</th>
<th>Ignore cognition</th>
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Synthesis: Neisser’s Cyclic Theory

*Fill in the blanks.*

Neisser (1967, 1976) has advanced a model that attempts to integrate the c________ and the di________ approaches; visual perception depends on BOTH bottom-up and top-down processes. He considers perception to be a cyclical activity, a continuous process that has no definite starting or fi_________ point.
According to this model, people use their previous experience of the world to build up schemas, as discussed under Gregory’s theory. These schemas lead us to anticipate the information that is likely to be available to us (to take a simple example, we would not expect to encounter a candle that was burning at the bottom).

So what happens in ordinary perception? As we move around in our environment we sample the perceptual world. This is “b-up” processing. If the stimulus is significant we pay attention to it. This sets in motion a search for expected features based on our existing schemas. This search for expected features involves movement and a, just as in Gibson’s direct theory. If the expected features match the schemas (as they usually do) we accept the hypothesis as correct. If not, we use another schema.

Thus, the perceptual cycle described by Neisser includes elements of bottom-up and top-down processing. Bottom-up processing is represented by the sampling of available env information that can modify the current schema. Top-down processing is represented by the notion that schemas influence the course of the in processing involved in perception.

The combination of bottom-up and top-down processing can be seen by the following example of smiling provided by Neisser. When we see someone smile, the light from the smiling face is picked up directly (bottom-up processing). However, the context in which it occurs provides us with non-optical information such as the mood the person is in, perhaps happy or just being polite. In order to ascertain this, we use the top-down processing involved in the perceptual cycles.

---

**EVALUATION OF NEISSER’S CYCLIC THEORY**

**Summarise the evaluation points below.**

Ψ *It is a plausible theory that provides a balance between top-down and bottom-up processing.* Why is this theory less reductionist?

Ψ *There is empirical evidence in favour of the theory.* How does Biederman, Glass, and Stacy’s (1973) research support the theory?

Ψ *It is very vague.* Which processes has Neisser failed to detail?
It lacks detail. How does this lack of detail influence explanatory power?

CONCLUSIONS—SO WHAT DOES THIS MEAN?

Answer the following questions in your conclusions.

- How does Eysenck (1993) account for both the influence of bottom-up and top-down processing?

- Why are computational models needed to explain perception?

Using this in the exam

Describe and evaluate Gregory’s top-down/indirect theory of visual perception. (25 marks)

Describe and evaluate Gibson’s bottom-up/direct theory of visual perception. (25 marks)
## Development of Perception

*For details, see Eysenck’s A2 Level Psychology (pages 88–101).*

### Development of Perceptual Abilities

#### Depth perception

*Fill in the blanks.*

Gibson and Walk (1960) developed the “visual cliff”, which was a glass-top table, underneath which a check-patterned cloth was positioned. A “shallow” side was created by positioning the cloth close to the glass under one half of the table, and positioning the cloth further away on the other half created a “deep” side. Infants between the ages of 6½ and 12 months were tested for depth perception by placing them on the shallow side and seeing if they could be tempted to cross to the deep side. Most infants could not be tempted by their favourite toy nor their mother’s voice, which suggests that depth perception developed by approximately 6 months, as the babies were reluctant to cross to the “deep” side.

However, Adolph (2000, see *A2 Level Psychology* page 89) argued that the development of depth perception is more complex than assumed by Gibson and Walk (1960; see *A2 Level Psychology* page 89). She argues that infants do not acquire general knowledge (e.g. an association between depth information and falling) that stops them from crossing the visual cliff; instead the infants’ knowledge is highly specific. According to this model, infants learn how to avoid risky gaps when sitting, but subsequently have to learn how to avoid such gaps when they are crawling.

Adolph (2000) provided evidence that learning with the visual cliff is specific to a given posture (e.g. sitting) and new learning is needed when infants become more mobile. This leads to the conclusion that learning to avoid gaps is specific to a given posture (sitting and crawling) in younger infants but becomes more general in older ones, because they are able to transfer depth learning from crawling to walking.

However, research on retinal image size in infants less than 2 weeks old (Bower, Broughton, & Moore, 1970; see *A2 Level Psychology* page 90) does provide evidence of inborn perceptual abilities. The two different size objects had the same retinal size due to being different distances away from the infant, yet the infants were more distressed by the objects that came closer to them, which shows that they were able to perceive depth from a very young age.

#### Visual constancies

*Fill in the blanks.*

Size constancy is when an object is perceived to be the same size regardless of distance, and shape constancy is when an object is perceived to be the same shape regardless of orientation.

**Size constancy**

A size constancy task was developed based on initially presenting infants with a 30cm cube placed 1 metre from them. Infants were then presented with the same cube placed
3 metres away and a 90cm cube placed 3 metres away. Size constancy was shown to some extent as the infants spent longer looking at the cube that had the same size as the initial cube despite the fact it had a much smaller retinal image. But they failed to show complete size constancy as they attended to cubes placed 1 metre away more than cubes of the same size placed 3 metres away.

**Shape constancy**

The habituation method involves presenting a stimulus until the infant no longer attends to it. Once habituation has occurred, a new stimulus is presented and if the infant attends to this then discrimination has occurred. Infants aged 3 months were presented with a square that formed a trapezoidal shape on the retina. This was presented until habituation occurred. They were then presented with a real trapezoid and their interest showed they had habituated to the real shape and not the retinal image. This is evidence that shape constancy has developed in 3-month-olds despite inconsistency with the retinal image, (Caron, Caron, & Carlson, 1979; see A2 Level Psychology page 91). This research shows that the infants habituated to the real shape of the object rather than to the object shape projected onto the retina. This strongly suggests that these infants had developed at least partial shape constancy.

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**EVALUATION**

*Summarise the evaluation points below.*

- **Limitations of the measures.** Why are the measures not true indicators of perceptual processes?

- **Mundane realism and ecological validity.** Why does the research lack mundane realism?

- **Nature or nurture.** Why does research fail to distinguish the role of nature and nurture?
Ethics. Which research raises ethical issues?

Infant and Cross-cultural Studies of the Development of Perceptual Abilities

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<thead>
<tr>
<th><strong>RESEARCH EVIDENCE—INFANT STUDIES</strong></th>
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<tr>
<td><em>Summarise the research evidence below.</em></td>
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<tr>
<td><strong>Visual acuity.</strong> How did Braddick and Atkinson (1983) test visual acuity?</td>
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</table>

| **Newborns lack accommodation.** What does this mean? |

| **Colour vision.** Are infants born with this? |

| **Binocular vision.** What is this and when does it develop? |
Sensitive period for development of binocular disparity. How do Banks, Aslin, and Letson (1975) provide evidence of this?

Human face recognition. Is this due to nature or nurture?

Tracking of human faces. How does this support an innate basis to face perception?

Turati et al.’s (2002) research on infant face recognition. How does this contradict an innate basis to face recognition?

Simion et al.’s (2006) research on face recognition in newborns versus 3-month-old infants. What difference was found?
**EVALUATION OF INFANT STUDIES**

*Summarise the evaluation points below.*

Ψ **Scientific support.** Does evidence support nature or nurture more strongly?

Ψ **Difficult to research infants.** Why is it difficult to research infants?

**RESEARCH EVIDENCE—CROSS-CULTURAL STUDIES**

*Summarise the research evidence below.*

Ψ **Segall, Campbell, and Herskovits' (1963) research on the “carpentered environment”.** How does this support the role of nurture?

Ψ **Annis and Frost’s (1973) comparison of Canadian Cree Indians.** How does this support the role of nurture?

Ψ **Allport and Pettigrew’s (1957) “window” illusion.** What is this and how does it support the role of nurture?
Gregor and McPherson’s (1965) research on the Müller–Lyer illusion and the carpentered environment. How does this challenge the idea this illusion is based on experience of a carpentered environment?

Hudson’s (1960; see A2 Level Psychology page 96) research using two-dimensional drawings. What could Western participants perceive that non-Western participants could not?

Deregowski, Muldrow, and Muldrow’s (1972; see A2 Level Psychology page 96) research of the Me’en in Ethiopia. What did they find out about the ability of the Me’en to recognise drawings?

EVALUATION OF CROSS-CULTURAL STUDIES

Summarise the evaluation points below.

Generalisability. Why does research lack generalisability?

Ethnocentric tasks. Which tasks were culture biased and so ethnocentric?
### Difficult to interpret findings
Why is it difficult to interpret findings?

### Linguistic barriers may decrease validity
How can linguistic difference affect the validity of the research?

### Weaknesses of self-report
What are the biases of self-report?

### Mundane realism and ecological validity
Why does much of the research lack mundane realism?

---

### Nature–Nurture Debate in Relation to Explanations of Perceptual Development

**RESEARCH EVIDENCE**

*Fill in the blanks.*

Evidence for the role of nature in perceptual development is that some aspects, e.g. aspects of f______ perception; aspects of si______ and sh_______ constancy; and dominance of global over local features, seem to be present at birth or very shortly thereafter. This suggests these are in________ visual capacities or evidence of very rapid learning.
Other aspects emerge a few weeks after birth, e.g. visual a_________; c__________ vision, and so seem to involve maturation, which means the behaviours are in__________ (nature) but only emerge at a particular point in development. Other aspects of visual perception seem to develop in a critical or s__________ period, e.g. binocular disparity. This suggests the involvement of genetic factors and so nature.

The substantial improvements in infants’ perceptual abilities in a fairly short time period from birth points to the importance of m__________, i.e. that perceptual abilities are genetically predisposed but require a certain amount of ph_________ development before they are realised. For example, infants’ visual acuity is about one-fortieth that of adults, and typically reaches the adult level around the age of 12 months. It is likely that the large increase in neurons in the visual cortex occurring during the first 6 months of life plays a major role, and so this physical maturation is needed before the pr___________ ability can fully develop.

Other aspects of visual perception take months to develop, e.g. d_________ perception, and so this suggests the role of learning (nurture). The significant c________-c__________ differences also support the role of learning as they suggest that experience (i.e. learning) of the e______________ shapes perceptual development.

Evidence for the role of le______________ is provided by distortion studies. G.M. Stratton (1896; see A2 Level Psychology page 98) tested the effects of wearing a lens on one eye that turned the world upside down (he kept his other eye covered). At first everything looked unreal, but within 5 days he reported he could write and walk around with relative ease. He took the lens off after 8 days and because everything was now a reversal of what he had grown used to it also required some re__________ time. Thus shows the visual system is not completely fixed because it was able to ad_________ to such a changed environment. However, the fact that Stratton’s visual system was fairly intact after 8 days of distortion can be used to support an in__________ basis as clearly any learning did not have a lasting effect.

Further evidence as to whether perception is innate or learned is provided by readjustment studies, which involve individuals born blind because they have cataracts, who then have those c______________ removed. These provide useful insights because their visual system has had no learning experience and so any abilities they have initially must be due to n_____________. To a great extent nurture has been controlled! Gregory and Wallace (1963) documented the case history of SB. SB did not show depth perception, nor could he recognise visual illusions, and in fact continued to use his hands to “see” as touch was the sense he was most accustomed to using.

Maurer, Lewis, and Mondloch (2005) discussed the findings from people who had cataracts removed when they were only 2 or 3 months old. Many of their visual abilities were normal but there was impairment in the more complex aspects that take the longest to develop. They were poor at recognising faces from different v__________, at discriminating between faces that only differed in terms of the spacing among facial features, and at detecting small differences between shapes. These long-lasting deficits support the importance of l______________ from early visual experience. However, the fact that more simple visual abilities (e.g. distinguishing between simple shapes, discriminating a face from a scrambled image, and discriminating between faces that differed in various ways from each other) were not impaired suggests that visual experience is not necessary for their development.

Blakemore and Cooper’s (1970) research on the visual d______________ of kittens shows the importance of experience on perception. The kittens experienced visual d______________ for the first 5 months, as they were placed in a drum, marked with only vertical or only horizontal lines, as soon as they opened their eyes. The kittens that experienced only vertical lines were unable to perceive horizontal lines and so would
trip over ropes placed in front of them h________________; the opposite was the case for those that experienced the horizontal lines. Blakemore and Cooper investigated cortical activity and found that there was no cell response to the line orientation that had been deprived. This suggests that experience of visual stimuli is needed during the critical period if cells are to function n________________y.

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**EVALUATION**

*Summarise the evaluation points below.*

Ψ **Reductionism.** Why is it reductionist to assume perceptual abilities are due to either nature or nurture?

Ψ **Difficult to interpret adult readjustment studies.** Why is it difficult to interpret adult readjustment studies?

Ψ **Adaptive.** Is there an evolutionary basis to perceptual development?

Ψ **Perception requires understanding.** Why does understanding what is perceived require nurture?

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**FIND OUT FOR YOURSELF:** Conduct an internet search on perceptual milestones to increase your knowledge of when perceptual abilities develop. What conclusions can you draw from the timings of these milestones in terms of nature–nurture?
CONCLUSIONS—SO WHAT DOES THIS MEAN?

Answer the following questions in your conclusions.

• Which research evidence supports the influence of nature?

• Which research shows the role of nurture?

• How does an interactionist approach best account for perceptual development?

Using this in the exam

Describe and evaluate one study of the development of perceptual abilities. \(\text{(10 marks)}\)

Describe and evaluate one explanation of perceptual development. \(\text{(15 marks)}\)

Discuss the nature–nurture debate as it applies to perceptual development. \(\text{(25 marks)}\)
Face Recognition and Visual Agnosias

For details, see Eysenck’s A2 Level Psychology (pages 101–113).

**Prosopagnosia**

*Fill in the blanks.*

This is the inability to recognise f__________, even those that are very familiar such as friends and family. Thus, this condition is also known as “face bli__________” and is usually caused by brain damage. Most prosopagnosics can recognise o__________s reasonably well but do have some problems with object recognition.

Prosopagnosia is difficult to investigate due to a number of problems, including the fact that face and object recognition vary from patient to patient; face recognition may be much harder than object recognition but we cannot be sure if this is the explanation. The origins of the condition may vary depending on whether the prosopagnosia is acquired (due to brain da__________) or developmental. Most research has involved acquired prosopagnosia, and relatively little is known about developmental prosopagnosia. Prosopagnosics may be able to process faces below the conscious level. This is called semantic priming and is when a name is recognised more rapidly when preceded by a related face than by an unrelated one. Some prosopagnosics show semantic priming in spite of not recognising the face (Young, Hallawell, & de Haan, 1988) and this suggests that face processing occurred below the co__________ level.

**RESEARCH EVIDENCE INTO PROSOPAGNOSIA**

*Summarise the research evidence below.*

Ψ **Double dissociation.** What is this?

Ψ **Moscovitch, Winocur, and Behrmann’s (1997) study of CK.** What was he able to do as well as controls?

Ψ **Fusiform face area.** How well is this linked to face recognition?
Fusiform area is not just for processing faces. How do Gauthier and Tarr (2002) provide evidence that the fusiform face area is used to process any objects?

Evidence against this general specialisation of the fusiform area of the brain. How does WJ provide evidence against?

EVALUATION OF EVIDENCE INTO PROSOPAGNOSIA

Summarise the evaluation points below.

Face expertise. Why do we have greater expertise for face recognition over objects?

Lacks understanding of the fusiform brain area. Why is it hard to assess the role of this brain area in face versus object recognition?

Bruce and Young’s (1986) Theory

Fill in the blanks.

A close study of br_____-damaged individuals has told us much about the processes involved in face recognition. Bruce and Young’s (1986) theory of face recognition suggests that we extract several kinds of information from faces. They identified eight components of face re____________.
### Bruce and Young’s components of face recognition

**Match the component to its correct description.**

<table>
<thead>
<tr>
<th>Name generation</th>
<th>Directed visual processing</th>
<th>Person identity nodes</th>
<th>Structural encoding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive system</td>
<td>Face recognition nodes</td>
<td>Facial speech analysis</td>
<td>Expression analysis</td>
</tr>
</tbody>
</table>

1. _____________________________: This produces various representations or descriptions of faces.
2. _____________________________: People's emotional states are inferred from their facial features.
3. _____________________________: Speech perception is helped by observing a speaker’s lip movements. This was shown clearly by McGurk and MacDonald (1976; see A2 Level Psychology page 105), who prepared a tape in synchronisation with lip movements indicating “ba”. Participants heard “da”, which is a blending of the visual and auditory information.
4. _____________________________: Specific facial information is processed selectively.
5. _____________________________: These contain structural information about known faces.
6. _____________________________: These contain structural information about known faces.
7. _____________________________: A person's name is stored separately.
8. _____________________________: This contains additional information (e.g. most actors and actresses have attractive faces), and influences which other components receive attention.

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**Fill in the blanks.**

A more simplified theory is provided by Duchaine and Nakayama (2006) who included an additional face de-____________ stage and then a further three more components and so about half the number proposed by Bruce and Young (1986).

Bruce and Young (1986) suggest that fa_________ and unfamiliar faces are recognised in different ways. Recognising familiar faces depends mainly on str____________ encoding, face recognition units, person i__________ nodes, and name generation. In contrast, the processing of unfamiliar faces involves structural encoding, ex____________ analysis, facial speech analysis, and directed visual processing. If different processes are involved then some patients should have much better face recognition for familiar than for unfamiliar faces, whereas other patients should have the opposite pattern (i.e. a d____________ dissociation).

Similarly, the model predicts that separate processing should be used for the processing of facial i__________ (who is the person?) and the processing of facial e____________ (e.g. what is he/she feeling?). Again a double dissociation would provide evidence that the two tasks involve different processes. The processes involved in facial speech analysis (using lip movement to facilitate speech perception) according to the model differ from those used in other aspects of face processing. The model also predicts that when we look at a familiar face, familiarity information from the face re____________ unit should be accessed first, followed by information about that person (e.g. occupation) from the person id____________ node, followed by that person’s n________ from the name generation component. Therefore, the face should be re____________ before other information about the individual is accessed.
## RESEARCH EVIDENCE INTO BRUCE AND YOUNG’S THEORY

*Summarise the research evidence below.*

1. **Double dissociation of familiar and unfamiliar faces.** Why is there only weak evidence for this?

2. **Face recognition versus face expression.** What evidence is there that these involve separate processes?

3. **Campbell, Landis, and Regard’s (1986) research on facial speech analysis and facial identity.** What did they find?

4. **The order of recognition: face recognition should precede occupation identification, which should precede naming.** What evidence is there of this?

5. **Putting a name to a face.** What did Young, Hay, and Ellis (1985) find?

6. **Contradictory evidence.** How does Brédart et al.’s (2005) research contradict the order of recognition suggested by Bruce and Young?
### EVALUATION OF THE EVIDENCE INTO BRUCE AND YOUNG’S THEORY

**Summarise the evaluation points below.**

- **Improved our understanding.** What insights does Bruce and Young’s theory provide?

- **Empirical support.** What evidence is there for the theory?

- **Oversimplified.** What is ignored by the theory?

- **Processes are unlikely to be completely separate.** Which processes are unlikely to be separate and why not?

- **Inflexible.** Why is the order of recognition too inflexible?

- **Case studies.** What is the key weakness of such studies?

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**FIND OUT FOR YOURSELF:** Test the order of recognition by showing participants the same famous people. The model also predicts that face recognition should be first followed by information about that person (e.g. occupation) followed by that person's name. Remember to use famous people from a range of fields, e.g. TV presenter, actor/actress, singer, politician, news reader, radio presenter, etc.
**Visual Agnosias**

**Fill in the blanks.**

The term “visual agnosias” is used to refer to various conditions in which brain-damaged patients have difficulty in recognising or identifying objects. Patients with a visual agnosia generally have much stored information about objects. As a result, they can identify objects by touching them, and they can provide detailed verbal descriptions of objects when asked to do so.

Lissauer (1890; see A2 Level Psychology page 109) has identified two main types of visual agnosia:

1. **Apperceptive agnosia**: Object recognition is impaired mainly because the patient has problems with complex perceptual processing.

2. **Associative agnosia**: Perceptual processes are more or less intact. However, object recognition is impaired because the patients can’t access their relevant stored information about visually presented objects, i.e. they cannot access the information in their long-term memory.

One way to assess the type of agnosia the patient has is to test the patient’s ability to copy objects that can’t be reproduced (Humphreys, 1999). Patients who can copy objects are said to have associative agnosia, and those who can’t have apperceptive agnosia.

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**Apperceptive agnosia**

**Fill in the blanks.**

Patients with apperceptive agnosia do possess some perceptual abilities. For example, they typically have normal visual acuity and can reach for moving targets. However, they have deficient visual processes because they are very poor at recognising or identifying objects.

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**RESEARCH EVIDENCE FOR APPERCEPTIVE AGNOSIA**

**Summarise the research evidence below.**

Ψ Grossman, Galetta, and D’Esposito’s (1997) research. What could their patients not recognise?

Ψ Humphreys and Riddoch’s (1987) study of integrative agnosia. What is this type of agnosia?
### Associative agnosia

*Fill in the blanks.*

Patients with associative agnosia have reasonably good basic ____________ processes but are poor at accessing their stored _________ knowledge about objects because it is hard for them to access in _______-term memory.

### RESEARCH EVIDENCE FOR ASSOCIATIVE AGNOSIA

*Summarise the research evidence below.*

- Anaki et al.'s (2007) research. How did they establish their patient had associative agnosia?

### EVALUATION

*Summarise the evaluation points below.*

Ψ **Empirical evidence supports variations.** What variations are supported by research?

Ψ **Individual differences.** How well are these accounted for?

Ψ **Lacks a clear understanding of the cause.** Why is this unclear?

Ψ **The distinction lacks relevance to specific deficits.** Which distinction is this and why does it lack relevance?
Conclusions—So what does this mean?

Answer the following questions in your conclusions.

- What evidence is there that face recognition and object recognition rely on different processes?

- How have Bruce and Young contributed to our understanding of face recognition?

- What are the issues with categorising visual agnosia into apperceptive and associative agnosia?

Using this in the exam

Outline and evaluate Bruce and Young’s theory of face recognition.  

(25 marks)
Example Essay Plan

1(a) Describe and evaluate one study of the development of perceptual abilities.
   (10 marks; 4 AO1 and 6 AO2/AO3)

1(b) Discuss the role of nature–nurture in relation to perceptual development.
   (15 marks; 5 AO1 and 10 AO1/AO2)

The marking is broken down into three sets of criteria, AO1, AO2 and AO3, but this is not how
you should write your essay. The essay should include all these criteria in a holistic way—e.g. as
you write about each theory you will then write about the research studies supporting and
challenging the theory, and therefore be able to comment on the strengths and weaknesses of
the theory from various points of view such as methodological (e.g. participant sample size),
ethical, reductionist/biological approach, etc.

AO1 (9 marks)
A detailed description of one study of perceptual abilities is needed in part (a) and given that
there are only 5 marks of AO1 available in (b) then this will come from an introduction and
explanation of the nature–nurture debate. You need to choose a study that will provide enough
AO1 in (a) for 4 marks and so you need to be selective so that whichever study you choose will
give you enough to write about.

AO2 (12 marks)
An evaluation of the one study in (a) should include contradictory evidence to the study such as
the evidence that depth perception may be learned.

AO3 (4 marks)
Evaluation and/or interpretation of the research could include the methodological and ethical
criticisms of the study.

So the essay could be structured in the following way.

1(a) Describe and evaluate one study of the development of perceptual abilities.
   (10 marks; 4 AO1 and 6 AO2/AO3)

Describe the “visual cliff” research on depth perception by Gibson and Walk (1960). Explain in
detail the procedure and how this tested infants’ depth perception.

Provide contradictory evidence to depth perception being innate, such as Campos et al.’s
(1978) evidence of learning in depth perception Then use research on retinal image to
counter the argument that depth perception is learned as this also provides evidence of innate
abilities.

Evaluate the weaknesses of the visual cliff study; for example, as a measure it is limited
because the method shows that the deep side disturbs infants but this does not reveal how
they perceive depth. Consider the implications of this in terms of internal validity and why it is
difficult to investigate cognitive processes. Then consider external validity by discussing
mundane realism and ecological validity. You can also evaluate the ethical issues with the
research.
1(b) Discuss the role of nature–nurture in relation to perceptual development.
(15 marks; 5 AO1 and 10 AO1/AO2)

With this part of the question the research evidence needs to be used effectively so make sure you use link phrases.

Introduce the nature–nurture debate. Provide evidence for the role of nature in perceptual development—the perceptual abilities that seem to be present at birth or very shortly thereafter, e.g. aspects of face perception; aspects of size and shape constancy; and dominance of global over local features. This suggests these are innate visual capacities or due to very rapid learning. Also consider maturation as evidence for. Explain how this means that although the abilities are genetically determined they require a certain amount of physical development before they are realized; examples being visual acuity, colour vision, and the fact that binocular disparity develops within a critical or sensitive period. This suggests the involvement of genetic factors and so nature.

Explain how other aspects of visual perception take months to develop, e.g. depth perception, and so this suggests the role of learning (nurture). Use other research evidence to support learning such as cross-cultural research and the distortion and readjustment studies.

Consider the threats to validity that limit the research evidence. For example, it is difficult to interpret the adult readjustment studies and the distortion study.

Consider the evolutionary basis of cultural differences in perceptual abilities. This sounds strange as of course evolution predicts universal behaviour but it also favours those who can adapt to the environment.

Discuss the reductionism of taking either the nature or nurture approach and consider how they must interact. Perception, for example, requires understanding of the environment to process what has been perceived. Therefore most perceptual abilities depend on both nature and nurture.