Chapter 13: Consciousness

Overview

Chapter 13 begins by distinguishing between different levels of consciousness. Tulving suggested that the three systems of memory are tied to different forms of consciousness. For example, procedural memory is associated with **anoetic** ("non-knowing") consciousness, semantic memory with **noetic** ("knowing") consciousness and, lastly, episodic memory is associated with **autonoetic** ("self-knowing") consciousness. Other researchers have taken different approaches. For example, Schooler concurred with Tulving that there were three levels of consciousness, however, he conceptualized those levels as **non-conscious** (unexperienced), **conscious** (experienced) and **meta-conscious** (re-represented).

Although we typically think of perception as a conscious process, research findings support the existence of unconscious or **subliminal perception**. Subliminal perception occurs when a stimulus is too weak to be consciously recognized but still influences behaviour. Wickens suggested that unconscious perception occurs because of the way in which we **encode** information. Encoding of information, such as words, occurs automatically on multiple dimensions including frequency of occurrence, how we feel about it, and physical characteristics such as word length and sound. Although critics of subliminal perception have suggested that a stimulus presented below the threshold of awareness might still be seen, studies using **backward masking,** a dissociation paradigm, have supported the idea that subthreshold information can be processed without awareness and influence the participant's behaviour. Merikle and his colleagues, however, point out the importance of distinguishing between the **objective** and **subjective thresholds.** The objective threshold is the point at which a participant can detect a stimulus above the level of chance, whereas the subjective threshold is the point at which the participant says they did not perceive it. To separate these two different thresholds, Debner and Jacoby developed the **process dissociation procedure**. In this experimental technique, participants are required to ignore stimuli previously consciously observed. In this way, if the participant responds to a stimulus, it suggests the object was perceived at an unconscious level.

The **grand illusion of conscious perception** is the idea that what we see in our visual world is a clear and detailed picture when, in fact, it represents very selective information. **Change blindness** demonstrates that we often fail to detect large changes that occur within a visual scene. O'Regan suggests that visual information is degraded as it moves through multiple layers of cells in the eye. Additionally, although our visual experience is interrupted by **saccadic suppression** and **blink suppression,** our brains compensate for these "blind" intervals by using information it receives from both eyes—a process known as **perceptual completion**.

Mind-wandering, or **"zoning out"** occurs when our thoughts wander away from a particular task without realizing it is occurring. According to Schooler, the moment when you become aware that you have zoned out is a moment of **meta-consciousness**. Mind-wandering can be assessed using several different methods including the **self-caught method**, in which participants monitor their own consciousness, or using the **probe-caught method** where participants are presented with a probe asking them if they are mind-wandering. The latter is an example of **experience sampling**, a technique of asking people to reflect upon and report their conscious experiences at

specific times. **Lucid dreaming**, a dream state in which we are aware we are dreaming, also reflects meta-consciousness. Dreams typically occur during the **rapid eye movement (REM)** stage of sleep and, in the case of lucid dreaming participants are trained to signal to the researcher that they are aware they are dreaming by making a sequence of predetermined eye movements. Such movements are recorded using an **electrooculogram (EOG)** to measure eye movements and an **electromyogram (EMG)** to measure muscle activity.

Although cognitive neuroscience has developed many techniques to examine the relationship between consciousness and the brain, there are still many questions that remain unanswered. Chalmers distinguishes between the **easy problems of consciousness**, which are those that can be answered by cognitive neuroscience, and the **hard problems of consciousness**, which involve understanding the subjective qualities of consciousness. An example of a hard problem of consciousness would be how an individual experiences different hues and textures—not at the neurological level, but from the level of consciousness.

Cognitive psychology relies heavily on case studies of persons with brain injuries to further our understanding of consciousness. The last part of the chapter examines some of these case studies such as **visual hemispatial neglect**, where the patient has no conscious awareness of half of their visual field. Patients who have lost a limb through amputation may experience **phantom limb** in that they continue to experience pain in the limb despite its absence. Phantom limb is suggested to be a consequence of **body schema** and is often treated using a phantom limb mirror box.

Learning Objectives

In this chapter students will:

- Understand and be able to distinguish different levels of consciousness.
- Look at unconscious perception.
- Explore meta-consciousness, as illustrated by mind-wandering and lucid dreaming, and how it relates to consciousness.
- Discuss the relationship between consciousness and the brain.
- Explain various deficits of consciousness.

Key Concepts with Illustrative Examples

blind spot (see page 418)

> The blind spot is a region in the eye that is unable to process visual stimuli as it does not contain any photoreceptors. Box 13.2 allows students to find their own blind spot. Researchers have recently discovered that, with training, a person is able to decrease the size of their blind spot, resulting in a slight improvement in visual acuity.

blindsight (see page 406)

The term blindsight is somewhat of an oxymoron because, after all, if you are blind, you should not have sight. Blindsight, however, is a condition in which patients who have sustained damage to the primary visual cortex are able to make accurate judgments about objects presented to their blind area even though they report no conscious awareness of the objects. Blindsight is often used as an example of perception without awareness.

body schema (see page 431)

Body schema refers to our mental representation of our own bodies and body parts in space. Your understanding that you are standing up with your arms stretched out in front of you involves body schema. There are several neurological disorders that affect our body schema. Finger agnosia is the inability to detect which finger is being touched in the absence of visual input. It is caused by damage to the left parietal lobe. If a person with finger agnosia closes their eyes and someone touches one of their fingers, they will report being aware of being touched, but cannot identify which finger was touched.

change blindness (see page 416)

We tend to believe in our ability to detect sudden changes to a visual scene. In fact, we are often blind to such change. For a striking example of how much we miss, see the following video: http://www.youtube.com/watch?v=ubNF9QNEQLA

chronesthesia (see page 408)

The ability to perform mental time travel, whether it is to the real past, future, or imagined past is referred to as chronesthesia—our subjective sense of time. First described by Endel Tulving, chronesthesia was believed to exist only in humans. Recent research, however, suggests it exists for other non-human species such as apes and birds.

lucid dreaming (see page 421)

Have you ever been in the middle of a nightmare when suddenly you tell yourself there is no reason to be afraid as you are only dreaming? If so, you have experienced a lucid dream, defined as a dream state in which we are aware that we are dreaming. Some psychotherapists have taught patients how to induce lucid dreams as a therapy for treating depression, anxiety, and chronic nightmares. Despite this, skeptics suggest that lucid dreams are not a "sleep state" at all but occur during brief microperiods of wakefulness.

phantom limb (see page 431)

After having a limb amputated, some patients report still feeling the presence of the missing limb. This condition is referred to as phantom limb. Immediately following the loss of the limb, patients will report the feeling that they are still capable of moving the limb, and will often report pain. In 2012, V. S. Ramachandran reported the case of a woman who was born with only three fingers and partial thumb on one hand. After a motor vehicle accident later in life required her to have the hand amputated, the woman reported phantom pain not only in the missing

hand but in all five fingers of the missing hand—fingers she had never had (for more information see: McGeoch, P., and Ramachandran, V., 2012, The appearance of new phantom fingers post-amputation in a phocomelus, *Neurocase*, 18, 95-97).

subliminal perception (see page 409)

In 1957, James Vicary, owner of a drive-in movie theater, claimed that he had been able to substantially increase sales of Coca Cola and popcorn by hiding messages on single frames of the movie encouraging customers to head to the canteen. As a single frame of a movie passed too quickly for the human eye to be aware of, Vicary suggested he had induced customers to buy Cola and popcorn using subliminal perception. Subliminal perception occurs when the stimulus is too weak to be consciously recognized but still has an impact on behaviour. Although this created a great deal of panic, Vicary later revealed that it had all been an elaborate hoax intended to promote his new advertising company. No subliminal messaging had occurred at all. Although there is certainly evidence to support the idea of perception without awareness, to date there is no evidence that subliminal messaging can induce individuals to engage in any behaviour against their free will.

Discussion and Debate Ideas

1. Based on the concept of panpsychism, have students discuss the following question: "Does a rock have consciousness?"

2. Students often confuse subliminal messaging with product placement in television. Discuss the differences—unconscious vs. conscious awareness between the two concepts.

3. Well-known British musicologist and conductor Clive Wearing suffered devastating impairment in consciousness after contracting encephalitis. In his diary, he records every moment as "having just woke up." He describes, "I'm conscious for the first time, having just woke up." Have students imagine what it would be like if we did not have consciousness. Share the story of Clive Wearing using the following BBC video clip:
https://www.youtube.com/watch?v=Vwigmktix2Y

4. William James believed that for consciousness to be part of our current process it must have an adaptive function. Have students suggest what adaptive purpose consciousness serves.

5. Discuss the relationship between mind wandering and other cognitive processes such as attention. Does it occur more in persons with ADHD?

6. Does blindsight occur in persons without brain injury? Have students generate situations whereby we may perceive something in our environment without being aware that we are doing so. For example, sometimes we might drive down a familiar road and not be aware of other people or cars that we pass.

Further Reading, Media Suggestions, and Teaching Aids

1. **Capgras delusion patient:**
   http://www.youtube.com/watch?v=dqBGzkz1oDU&feature=related

   This 10-minute video offers a fascinating demonstration of and explanation for the Capgras delusion. It seems that, for these individuals, the conscious ability to recognize faces is intact but they may have damage to the system in the brain that produces the automatic emotional response to familiar faces. A familiar face, then, seems "not quite right." More specifically, information about a face is sent to parts of the temporal lobe, which has a role in face recognition (and things work fine here). Then the information is sent to the amygdala, which is important for emotional processing. Normally, a familiar face elicits a certain emotional response, but an individual with the Capgras delusion has some disconnect on the way to the amygdala. Therefore, they don't feel the typical emotion and warmth for this person whom they know very well and, from that lack of emotion, they assume that this must be an imposter.

2. **Hemispatial neglect: https://www.youtube.com/watch?v=d4FhZs-m7hA**

   This video allows students to see what a person with hemispatial neglect would see. It also presents two stroke patients who have sustained damage to the right parietal lobe resulting in hemispatial neglect. The patients describe how this disorder affects their everyday functioning and lives.

3. **Simons Lab, University of Illinois: http://www.simonslab.com/videos.html**

   The Visual Cognition Lab at the University of Illinois has a website that includes fascinating demonstrations of change blindness.

4. **Part 2: Phantoms in the Brain – Blindsight:**
   https://www.youtube.com/watch?v=PpEpj-JgGDI

   Dr. V. S. Ramachandran describes the case of Graham, a man who is considered to be blind due to an injury to the primary visual cortex, but is still able to accurately detect the motion of a stimulus. Graham has a condition known as blindsight. Despite the accuracy of his motion detection, Graham insists he is not aware of actually seeing anything. Dr. Ramachandran explains blindsight in terms of dual pathways for the processing of visual stimuli.

5. **Subliminal Messages:**
   https://www.youtube.com/watch?v=h3F-Vku9U1M

   This interesting video discusses the existence of subliminal messages and their effect on behaviour. Discussion on the history of subliminal messaging includes Vicary's original study as well as attempts to use subliminal messaging.

Homework or Study Questions

1. **Distinguish between Tulving's three types of consciousness.**

   Noetic means "knowing." Semantic memory is noetic in that we are aware of using it. If asked when Canada Day is, we are aware of accessing the knowledge stored in semantic memory to come up with "July 1st." Procedural memory is anoetic in that we are mostly unaware of its workings. We may be aware that we are engaged in the act of tying our shoe, but we are not aware of accessing memory to do so. Episodic memory is autonoetic, meaning "self-knowing." Episodic memories are, by nature, self-reflective memories that involve mentally travelling through our personal past.

2. **How might you explain change blindness with reference to depth of processing?**

   Consider the example (from Chapter 3) of a stranger asking for directions and switching places with a door-carrier. One way to think about this is that the person who is asked for directions doesn't deeply process the details of the asker's appearance. Since it is not deemed to be important to the task at hand, there is little elaboration and distinction in assessing the asker's appearance. Since the asker's appearance was only shallowly processed, the participant is unlikely to notice the switch. They fail in the memory task of noticing the switch because the information relevant to that test was not deeply processed.

3. **How does the existence of a "body schema" help to explain the phenomenon of phantom limbs?**

   An individual who has had a limb amputated may feel as though the missing limb is still there. They may feel as though they should be able to reach out and touch it and there is often a great deal of pain associated with the missing limb. These feelings may last for years. A body schema refers to our inner representation of body parts and their relationships. Adjusting to an amputation requires a major revision of the body schema and can therefore take time.

4. **With reference to an example, what is the purpose of the process dissociation procedure?**

   The purpose of the process dissociation procedure is to assess the relative contributions of conscious and unconscious processes. In the experiment described in the textbook, words (e.g., "table") were masked and presented for short (50 ms) or long (500 ms) durations. Later, participants were told to complete a word fragment (e.g., "tab—") with a word *not* presented previously. Participants had no trouble excluding the long duration items. They were likely to mistakenly use a short duration item to complete the fragment. It seems the short presentation duration was enough to make the word later come to mind but without conscious awareness of having seen the word before.

5. **Name and describe the three levels of consciousness according to Schooler.**

   The first of Schooler's three levels of consciousness was the non-conscious (unexperienced), which monitors and changes the contents of thought. It also changes behaviour to address immediate goals. The second level or conscious (experienced) level includes everything being experienced at the time. Finally, the third level, the meta-conscious level, describes those times when we reflect on our own state of mind.

6. **How does Wickens's perspective on encoding of information relate to subliminal perception?**

   Wickens suggested that encoding is an unconscious process that occurs automatically and quickly. He also suggested that a stimulus can be encoded on multiple dimensions including frequency of occurrence, how we feel about it, and physical characteristics (appearance and sound). Subliminal perception occurs without awareness and, even though the person may not be aware they have perceived a stimulus, it can still have an effect on behaviour. Therefore, it could be suggested that subliminal perception occurs because of multidimensional encoding as Wickens suggested.

7. **Explain the grand illusion of conscious perception. Provide an example that supports this illusion.**

   The grand illusion of conscious perception is the idea that our visual perception of our world is complete, clear, and detailed, when actually Rensink and colleagues suggest that we are likely to only process one or two objects in detail at any moment. Change blindness provides an example of the grand illusion of conscious perception in that a person can be presented with two pictures, one with a large change from the first one, and a person will often not be able to point out the change.

8. **Why is our visual experience not an accurate reflection of the stimuli in the environment? How does our system compensate for this?**

   O'Regan suggested two reasons: first, the visual information is degraded because of the many layers of cells the light must pass through as the visual information travels from the eyes to the brain. Second, O'Regan suggests that viewed information from our visual fields is not given equal representation in the brain. While information in the central visual field is given priority all the way through the process, information in the periphery is given less priority. Additionally, saccadic suppression and blink suppression interrupt our visual processing, creating "blind" intervals. Our brains compensate for these interruptions by filling-in with information it receives from both retinas—a process known as perceptual completion.

9. **Differentiate between the easy problems and the hard problems of consciousness**.

   The easy problems of consciousness are those that can be answered using objective measurements of cognitive neuroscience (e.g., ERP, fMRI). The hard problems of consciousness, however, are questions involving the understanding of subjective qualities of an individual's consciousness (e.g., the individual's experience of colour, auditory tone, etc.).

Suggestions for Research Paper Topics

1. Tulving believes that autonoetic consciousness is uniquely human. With reference to research on animal cognition, prove him wrong.

2. O'Regan suggests that the grand illusion of conscious perception occurs because of the design of the visual system. Design a visual system that would allow us to process all information in our environment equally so phenomenon like change blindness would not occur. What other processes would this affect?

3. Critics of subliminal perception suggest that it is not possible to rule out the possibility that a stimulus presented at subthreshold levels is not actually seen. Review both sides of the debate and the experimental paradigms used to examine them.

4. Explore individual differences in mind-wandering. Are there specific personality variables that increase "zoning out"?

5. Eye-tracking technology allows us to determine where someone looks in a particular scene. How might we use eye-tracking technology to find evidence of perception without awareness? Design an eye tracking experiment that might suit this purpose.

6. What would the world be like for a person with visual hemispatial neglect? What challenges would they face in their everyday lives? How do they compensate for this impairment?