**8 Perception, sensation, and attention**

Psychophysics: the relationship between stimuli and perception

* Sensing is the process by which we receive energy from the natural world; perception occurs when our brains organize and interpret sensory signals.
* An absolute threshold of stimulus intensity must be reached in order for a stimulus to be detected. The just-noticeable difference is the smallest difference between two stimuli that the appropriate sense organ can detect. Weber’s law is the mathematical expression of the proportion of the standard (the original stimulus) to the JND.
* Signal detection theorists propose that noise and response bias interferes with detection of stimuli. Sensory adaptation also influences stimulus detection. Subliminal perception is the unconscious perception of a stimulus.

Visual perception

* Visible light exists in a narrow spectrum of wavelengths. Eyes allow light to be focused upon the retina where rods and cones begin transducing images into electrical signals to be conveyed to the brain, where they are perceived as visual images. Rods allow us to see at night, while cones are specialized for daylight and colour vision.
* Colour is not a physical property but rather is created by the brain. Two dominant theories of colour are trichromacy theory and opponent process theory.

Aural perception

* Sound is vibration that causes pressure changes known as sound waves. The ear collects, amplifies, and transduces sound waves into electrical signals, which pass to the brain where they are perceived as sound. Both ears are needed to locate sounds.

Touch-related perception

* Touch includes the subdivisions of tactition, thermoception, and nociception. The muscles, tendons, and joints primarily contribute to the kinaesthetic sense. Tactile sensations are converted into neural signals by mechanoreceptors and then carried along trunks of nerves directly to the spinal cord. The signals then travel up the spinal cord to the brain, where they are perceived as touch.
* Pain is a psychological experience as much as a physiological event; there are no specific pain receptors. First pain is the initial sharp sensation at the moment of painful stimulus, whereas second pain is slower to arrive. Gate control theory has been highly influential in pain research.

From visual sensation to perception

* Gestalt theorists propose that human beings have an innate tendency to perceive meaningful visual ‘wholes’ out of inherently meaningless and fragmented sensory impressions. Among the laws of Gestalt perceptual grouping are proximity, similarity, closure, and good continuation.
* Depth perception relies upon binocular and monocular cues. Binocular cues include retinal disparity and convergence. Monocular cues include relative size, linear perspective, interposition, and position on the horizon.
* Perceptual constancy is the ability to perceive an object as ‘itself’ despite changes in angle of view, distance, and illumination. Four primary categories of perceptual constancy are size constancy, shape constancy, brightness constancy, colour constancy.

Evolution, culture, and perception

Experience and perception

* Human beings may have evolved specific visual and cognitive tools and brain regions set aside for the specific task of face recognition—the ability to distinguish faces from other objects and to recognize specific faces. However, this would not rule out the importance of experience in developing and fine-tuning these mechanisms.
* Perception is influenced by experience and expectation. Change blindness and the Rorschach test are two examples of this fact. Expectations, biases, and predispositions that we bring to the viewing of a scene are known as perceptual set. Some researchers suggest that cultural differences exist between Westerners and East Asians in how visual scenes are perceived.

Gibson’s ecological theory of perception

* J.J. Gibson proposed a radical alternative to the orthodox beliefs about perception assumed throughout most of this chapter, emphasizing the ability of the eye to detect rich information in the ambient optic array without the need for cognitive interpretation of visual sensation.
* Gibson has been able to argue convincingly against the traditional evidence for highly cognitive, interpretive perception such as visual illusions.
* Gibson’s idea of affordance is particularly influential; affordance represents the relationship between an organism and an object in terms of what the object appears to offer the organism in the way of interactions.

The intriguing possibility of extrasensory perception

* Most real-life instances of apparent ESP can be neatly explained as logical inference and/or poor probability judgement.
* ESP phenomena of telepathy, clairvoyance, and precognition are, however, studied under tightly controlled laboratory conditions.

Most meta-analyses have supported the existence of small but consistent ESP effects; however, these analyses have been heavily criticized by more sceptical psychologists.