Perception and Sensory Systems

Name

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The Relationship among the Sensory Systems

The sensory system is a vital component of the nervous system that is responsible for sensing and processing sensory information (Møller, 2002). As such, the sensory systems help to detect and render vital information regarding our surroundings. Specifically, types of sensory systems include vision, audition, olfaction, gustation, somatosensation, vestibular, proprioception, kinesthesia, thermoception, and nociception (Spielman et al., 2014). The sensory systems involve two core functions including sensation and perception, whereby sensation is a physical process while perception is a psychological process. Every sensory system has specialized sensory receptors that respond to particular stimuli. Sensation occurs when sensory receptors in any sensory system detect sensory information. For instance, sensation in the vision system occurs when light entering an eye induces chemical changes in cells at the back of an eye. Then, these cells convey messages to the central nervous system in the form of action potentials.

Sensory information collected by sensory receptors from the surroundings cannot influence how people respond to the world unless there is an accurate perception. According to Spielman et al. (2014), perception describes the process by which sensory information is organized and interpreted. In particular, perception involves top-down and bottom-up processing. Top-down processing is a process by which people interpret sensations based on their available knowledge, thoughts, and experiences while bottom-up processing involves building perceptions from sensory inputs (Spielman et al., 2014).

Various sensory systems may influence each other leading to bottom-up processing. Suppose a young child puts a finger on some water just before it boils and continues to play with the water as it catches heat. In such a case, somatosensorial system will receive and process sensory information when the child touches some water that is about to boil. As the water begins

to gain heat, thermoception system will detect the rise in temperature and relay that sensory information to the central nervous system. As the water begins to boil, nociception system will detect pain inflicted into the finger and convey the sensory information to the brain. Subsequently, the brain will relay some messages telling the child to move the finger from the boiling water. The proprioception system will detect movement of the finger and change in the position of the child's body.

Top-down processing can be illustrated in cases where people process sensations based on their experiences, thoughts, and available knowledge. Suppose a loud bang is produced in an area where terrorism is so rampant. After the audition system takes the sensory information about the loud bang to the brain, the probable perception would be that a bomb has exploded. In another perspective, when the vision system of people collect sensory information about the sight of smoke, the perception of fire is imminent because the sensations have been influenced by the available knowledge and experiences. The perception initiated at the brain will relay messages to the senses like olfaction and then kinesthesia causing people to run away from the danger.

Additionally, the relationship among sensory systems is evidenced by sensory compensation where the attenuation or cessation of sensory input in one sensory system leads to the reinvigoration of signals in another sensory system. Sensory compensation implies that losing one sense improves at least one sense. Human senses are controlled by six major areas of the brain including temporal, frontal, insular cortex, occipital, parietal, and limbic lobes (Møller, 2002). The occipital lobe controls the sight while the temporal lobe controls the senses of sound and smell (Staughton, 2019). The parietal lobe detects and processes the sense of touch. The Olfactory nerves affect the senses of smell and taste, which are closely related. When one sense ceases, the part of the brain that controls it becomes a bit idle. More processing power and

energy shift from the idle portion to the active parts of the brain, making other sensory systems to become stronger (Calvert, Spence & Stein, 2004). For instance, blind people gain a stronger sense of hearing. Indeed, blind people often make clicking sounds and consequently process the resulting echo to determine the surroundings around them. However, most people improve the remaining sensory systems because due to prolonged use of the remaining senses to interact with the world. For instance, blind individuals who use the sense of touch to identify objects are likely to perfect their sense of touch in the future.

Finally, synesthesia portrays the relationship among sensory systems, especially between the vision and auditory systems. Synesthesia refers to a phenomenon whereby the stimulation or activation of the sensory system results in involuntary experiences in another sensory system (Cytowic, 2002). However, synesthesia can link all senses but not just two senses. Safran and Sanda (2015) argue that the most common synesthesia links sound to colors. For instance, common sounds including car honking, wind whirring, and people shouting may provoke seeing colors. In such a case, synesthesia has linked the auditory system to the vision system in the cognitive pathways. Moreover, synesthesia may affect spatial sequence causing someone to perceive number 2 to be closer while number 1 is farther away. Additionally, synesthesia can be auditory-tactile, implying that the stimulation of the auditory system induces tactile experiences. For instance, someone suffering from this type of synesthesia may experience the touch of a specific body part after hearing a certain word. Likewise, certain sounds may produce an involuntary sensation in the skin even without being touched.

References

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