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UNIT 5

Q7. Sensory adaptation is the remarkable ability to automatically detect new and important aspects of the environment and adjust bodily functions without being preoccupied with aspects of the environment that are always present. Sensory adaptation occurs when sensory receptors change their sensitivity to stimuli. Important for daily functioning. For example, when we enter a loud bar or party, the sound is loud at first. But after a while, I concentrate on talking with my friends and forget about music. The same thing happens with sight as well as with sound. The pizzeria sign in front of my bedroom turned into a flashing sign one day. At first, it bothered me, but after a while, it didn't bother me anymore!

Q9. There are two types of photoreceptors: cone cells and rod cells. Cone cells can perceive color in bright light conditions. It is very sensitive to acute details and provides tremendous spatial resolution. However, in the dark, its ability is reduced. Conversely, rod cells cannot discriminate colors (monochromatic vision). However, since they can detect even the slightest amount of light, they are mainly active in dark places.

Q13. Meniere's disease is a disease of the inner ear, which is responsible for the body's sense of balance. My mother has had this diagnosis. In Japan, it is known as one of the diseases that

develop from stress. Symptoms of Meniere's disease include dizziness, hearing loss, and others. The basic treatment is drug therapy, but Meniere's disease is often difficult to treat. Patients who do not respond well to hearing aid treatment, such as those with Meniere's disease, may opt for cochlear implant surgery. A cochlear implant can give patients enough hearing to understand the sounds and conversations around them.

Q16. Living things have amazing sensors with several capabilities and functions. Pheromones are one of them. Pheromones are chemicals produced by animals or insects and released into the environment to influence the behavior and physiology of other animals of the same species. Pheromone communication often includes providing information about the reproductive status of potential mates. Various organisms send signals to each other with signaling chemicals collectively known as pheromones, and humans seem to respond to pheromones unconsciously. While researching pheromones, I found an interesting book. In 1971, a paper by Martha McClintock, a female student who had just entered graduate school, was published in *Nature*. The title was "Synchronization and Suppression of Menstruation." Observations of dormitory students at the prestigious women's college she attended showed that when women lived together, their menstrual cycles became synchronized. The phenomenon is thought to be caused by the women sending each other a chemical. (Deborah Blum, "The Scent of Your Thoughts") Although we are usually unaware of it, we seem to communicate through chemical signals just as much as birds and bees do!

Q18. Our ear is divided into three parts; outer (pinna, auditory canal, and tympanic membrane), middle(the three ossicles), and inner (cochlea and basilar membrane). Pinna is the visible part of the ear and protrudes from our heads; Sound waves travel along the auditory canal and strike the tympanic membrane, causing it to vibrate. The vibration results in the movement of the ossicles in the middle part. In this middle part, three tiny bones are known as ossicles (Malleus, Incus, and Stapes). These ossicles move, and the stapes press into a thin membrane of the cochlea called the Oval window in the inner ear. Inside of cochlea is fluid inside, and there is an auditory receptor cell (Hair cells) of the inner ear embedded in the basilar membrane, and it starts to move. This mechanical process (activation of the hair cells) generates neural impulses that travel along the auditory nerve to the brain.

Q22. Subliminal messages are the ability to receive messages below the threshold of conscious awareness. It is possible to receive sub-threshold messages, but we are not consciously aware of it. In Japan, this subliminal effect became famous after the terrorist attack by the cult religion group "Aum Shinrikyo" (currently renamed Aleph) . Many Japanese media reported that Aum Shinrikyo's videos brainwashed people using subliminal effects. But the textbook says, "This doesn't mean we follow these messages like zombies." Research evidence shows that in a laboratory environment, people could process and react to information outside of their consciousness, but it had little effect on behavior outside the lab. However, in 1995, NHK (Japan Broadcasting Corporation)set a program broadcasting standard prohibiting subliminal expression methods in Japan. In 1999, the Japan Commercial Broadcasters Association followed suit. It may not be effective, but they are probably concerned that it will affect people's unconsciousness somehow.

Q23. Photoreceptor cells on the retina receive light, convert it into electrical signals, and transmit the signals to the brain through nerve fibers, the final stage of information processing in the retina. These nerve fibers exit the brain in bundles, and that area lacks light-sensing cells. This area on the retina is the blind spot. However, we live without realizing that information is missing. We have blind spots in our left and right eyes, but each blind spot corresponds to a different space, and each eye gets a slightly different field of view. In other words, the visual information corresponding to the blind spot of the left eye is complemented by the right eye, so we are usually unaware of the blind spot. But when we test with one eye, we can find our blind spot.

Q26. Since children with congenital insensitivity to pain cannot feel pain, parents need to prevent their children from being injured, and I think that parents must observe their children closely. I probably check my child's body often. If an injury occurs, it is important to detect it early and receive appropriate treatment. It may be necessary to devise shoes to prevent injury, and I might consider putting protectors on my child at the park, like a football player. Or I might buy a fence playpen to make limited space for my little child. This fence prevents my child from being close to the fire or a heater. Also, it is necessary to improve the environment that can cause injury at home, such as not leaving anything on the floor. I think it is also important to teach children the importance of caring for themselves.

Q36. Not feeling pain is both good and bad. For example, when I had lower back pain, I couldn't sleep well, and it hurt just by walking. That's bad. But this pain told me that something was wrong with my lower back. This back pain is the reason I started doing yoga exercises every day.

But pain hurts us. Therefore, we may take pain relievers, but we must be careful when taking pain killer. For example, painkillers only block pain and do not solve the problem. We may also become addicted by continuing to take drugs because we fear pain.

As one of the treatments, this video suggests psychotherapy. If we learn how pain occurs, maybe we can control our pain. Relaxation is one idea. We may be able to alleviate pain by focusing on something other than pain. When I am absorbed in an exciting football game, I may forget the pain for a while!

Q39. The advantage of being a super taster is being able to perceive different tastes. The disadvantage is that they tend to dislike the taste of vegetables and alcohol because they feel bitterness strongly. When I was a child, my parents taught me that it was wrong to be picky and instructed me to "clean plate." But researchers tell us that each of us has different tastes. For example, forcing children who are genetically supertasters to eat vegetables may be more painful for them than we expected.

However, our food preferences change. For example, when I was a child, I didn't like bitter and sour foods, but as an adult, I started to enjoy them. Also, when I was a kid, I didn't like crabs and oysters, but now I love them!

