Special senses lab answers

Perform the following simple experiments to stimulate your sensory system. Some of these experiments work best with a partner. Write a short report describing your experiences and answering the questions below. As you'll learn, there are many more senses than the traditional five, and there's also a lot of interaction between them. The Human Eye 1. Vision: A. Sticks and cone: The retina is a thin layer of neural tissue that feeds the back inside of the eyeball; this tissue contains the receptors for vision called sticks and cone. Cone is color sensitive and works best in bright light. Rods are more light sensitive and work better in dim light, but are not sensitive to color, so they are important for the night vision. Cone is the most densely concentrated in the middle of the retina, while vines are more concentrated around the periphery of the retina. Experiment 1: Sit in the dark for a few minutes to make your eyes adjust. In close darkness, stare directly at an object and try to make out the details. Now look at it with your peripheral vision (from the side). Can you make it clearer? How does this relate to sticks and beans? Try this trick while stargading and you'll see more! Experiment 2: Lay several colored objects in front of you, and very slowly bring the lights out of full darkness. Why can you see, but not easily identify colors in dim light? How does this relate to sticks and beans? B. The Blind Spot: The retina is like a projection screen on which the image is focused through the lens of your eye. Within the retina, however, there is a small area where the optic nerve connects to the eye; this area is called the papilla. There are no light sensitive cells in this area, which is called the blind spot. No visual information is sent to the brain from the part of your field of vision projected onto the papilla. One interesting bit of trivia is that the cephalopod eye (found in the invertebrate molluscs such as octopus and ink ink inklod) independently develops from the vertebrate eye and due to another internal design, lacks a blind spot. Blind spot tests Experiment 1: Hold your left hand over your left eye as you stare directly at the upper X with your right eye, and slowly approach the screen until the black spot disappears (about a foot away from the screen). You found your blind spot. With both eyes open, why can't you find your blind spot? Experiment 2: Now repeat this procedure while looking at the X in the lower panel. When the mouse disappears, what happens to the cages of the cage? How can you see something in what you know is your blind spot? Why do you see the bars, but not the mouse? If you're having trouble finding your blind spot, remember to move your head to the screen very slowly with your left eye covered. C. Reflections: A Change in Sensitivity up to a limited region of the retina is called locally This can lead to the production of reflection. Naimage test With one eye covered, recovered on the white spots in the middle of the peace symbol on the left for about 30 seconds. Then fasten to the black spots in the middle of the circle to the right. Describes what you see in the white circle. How did the sensitivity of your retina change after going to the dark geometric shape? How long do you keep seeing the afterfire? D. Compensation: Is a blind person's sense of hearing or smell improving, or does a blind person just do more with the same information as a seen person does? E. Optical Illusions: In some cases, as with the blind spot experiment, the brain fills in missing information to compensate for the missing data coming from the blind spot region, but it can only fill in a regular pattern by sampling the area around the missing data. In other cases, perception (which occurs in the brain) may be fooled by what the eye sees accurately. In each of these examples, try to identify why your perception is fooled. Notice in the figure of the eye above that the image that comes to view is projected upside down on the retina. How is it then that we see things on the right? F. Color blindness: Due to a mutation on the X chromosome, men are more likely to express color blindness than women since women (who XX) have a backup X and men (who XY) don't. About 5% of men have some red-green color blindness. Do you know any colorblind men? Do you know any colorblind women? On the next test chart, everyone can easily distinguish the orange circle, but people with red-green color blindness will struggle to identify the red star. How did you do? Colorblindness test G. Vision Test: 20:20 vision means that at a distance of 20 feet, you can distinguish the letters on a chart as well as the average person can at 20 feet. A person with 20:100 vision is much closer because what they can only see at 20 feet, an average person can see at 100 feet. A person with 30:20 vision has better than average visual acuity because they can see at 30 feet what the average person can only see at 20. Sometimes these sharpness ratios are divided to give a single number. In that case, a number greater than 1 above average visual acutity means, while a 1 average and a number less than 1 indicates under average visual acutity. Download this vision graph or this one to test your vision. Print it and run the test with one eye covered, and then the other. If the graph is pressed correctly, the large E should be 3.5 inches long. It should be read from 20 feet away. If you can accurately read the line marked 20 feet. If you wear glasses, take the test with and without them and compare results. 2. Taste (Gustation) and Smell (Olfaction) Receptors for taste and smell called chemoreceptors. The taste buds, which are spread throughout the tongue, can detect five very distinct taste sensations: sweet, sour, salty, umami (sad), and bitter. However, the flavour of food is also strongly influenced by the sense of smell. The oral cavity is open to the nasal cavity, allowing molecules to spread from the mouth to the smell receptors in the nose. The Tastebud A. Effect of smell on taste: Have you noticed that when you have a head cold, things often don't quite taste right? That's because your nose sinuses are blocked. Conduct the following experiment to determine how your taste's taste is affected by smell: Unburbe two hard candles with very different flavors (butternut and mint, for example) and place them in front of you. Pinch your nose and close your eyes, so you can't tell which delicacy you'll taste. Place a sweets on your tongue. Let it stay there for a few seconds. Take those tasty parts off your tongue and guess what flavour it is. Rinse with water between taste. Try again with the second tasty toy. Repeat with your eyes still closed, but this time, don't pinch your nose. B: Saturation: Have you noticed that when you first enter a room, you might smell something strong, but after a few minutes in the room you no longer see the smell or find it much less intense? It's called saturation. It's not that the smell has faded, but that your receptors are all blocked by the smell molecules and no longer send the signal to your brain. If someone new enters the room, they can comment on the smell you've detected before but no longer notice. Soak a tissue with perfume and have the subject take a good sniff and stay near the soaked tissue for 5-10 minutes of exposure. Again, the topic described the smell after the exposure. Is it less intense? Send the subject out of the room for a few minutes for some fresh air. When they come back, ask them to re-describe the smell and compare it to their first exposure. Does it look stronger again? It's not that the smell dissipated, but that the receptors cleaned while the subject got fresh air. 3. Touch Receptors in the skin You have numerous specialized sensors in your skin, know as mechanoreceptors. Some respond to pressure, touch (tactile sense), pain, hot and cold. However, these receptors are on different densities in different places on your body. The distance between two tactile stimuli at which the two are only distinguished from being separate is known as the simultaneous spatial threshold. A. Simultaneous Spatial Threshold: Unbend a paper clip and bend it again so that the two tips are close together. Measure the distance. While your partner closes his or her eyes, place the two tips of the paper cuts simultaneously on the back of his/her arm. Ask your partner if he or she feels tips or one. Change the distance between the two tips. Every Now Now Then, touch them with just one tip to be sure they don't just guess two all the time. By doing this procedure repeatedly, you should be able to get a good estimate of the simultaneous spatial threshold of the back of the arm. Measure this distance with a ruler. Repeat using the back of the hand and the palm of the hand and compare results. Which of the three areas is most sensitive? What's the least? What distances did you measure for each area? Why do you think these distances vary so much? Which parts of the body can have the smallest spatial threshold? Which parts have the largest spatial threshold? Temperature Perception: Have you ever noticed that when you first get into a tub of hot water you can barely tolerate it and, just a few minutes later, it looks good? The sensation of temperature is not absolute - the sensation is ultimately reduced. To demonstrate this phenomenon, prepare three sinks of water; one with warm water, one with lukewarm water, and one with ice water. Has the subject spot one hand in hot water and the other hand in ice water. After at least 1 minute of immersion, your partner place has one hand in the lukewarm water and describes the temperature. Then they placed the other hand in the same sink and again described the temperature. Why is it that although both hands experience the same temperature, the sensation differs? 4. Hearing and balance The ear involves both hearing and balance The sense of hearing depends on the vibration of sound waves on the thin membrane called the tympanum or eardrum, which in turn each of the 3 legs of the middle ear, the malleus, incus and staple food, commonly known as hammer, amble and stir. The last leg activates small hair that sends a nerve impulse to the brain. A. Orientation to Sound: First, a blindfolded subject tried to point to a ticking object like a watch or a kitchen timer while their head is in a fixed position. Then allow them to wrap their head while trying to identify the source of the sound. What's more effective - turn the head or stay silent? Why? Why is it harder with an earplug in one ear? How can animals that can wrap their ears have a further advantage? B. Balance: Balance or equilibrium is controlled by the semicultural channels of the inner ear. Each of the three channels is oriented along one of the 3 dimensions of the body (the x, y and z axes), so movement in either direction is felt when the liquid in the channels triggers small hairs on the inside. The brain integrates this information into a sense of balance. i. Balance and Vision: Have a person standing on both feet without moving while their eyes are closed. Then they locked balance on one foot with their eyes. Finally, their walk closed a straight line with their eyes. How does vision work in with the sense of balance? Can you see why people are asked to a straight line to test sobriety? ii. Proprioception: How is it that, even with your eyes closed, you know if your arms are extended directly in front of you, over your head or down on your side, bent at the elbow or straight, with palms facing up or down? Do you think it's affected by gravity or not? Would an astronaut in zero know gravity and in pitch darkness? Can you touch your nose with your eyes closed? Iii. Motion sickness: Motion sickness is generally caused when the inner ear and the eye do not agree on the status of the body. For example, when you're in a smooth driving car and you look out the window, tell your eye that you're moving quickly while your inner ear says you're sitting still. In a way, both are true, but the brain cannot rationalize these two different experiences and this leads to nausea for some people. Why stare at a fixed point on the horizon rather than the fast-moving terrain sometimes helping to reduce movement sickness? Why is zero gravity causing nausea for most people? C. The Doppler Effect: Near a busy street or highway where cars move at a steady speed, close your eyes and listen as cars approach, past you, and then move away. The sound of the car will have a higher pitch as it approaches and, as it passes and moves away, the pitch should drop. This happens because the sound waves are closer together on approach because the car is chasing its own sound waves. The faster the vehicle moves, the more pronounced this effect will be. After the car passes, the sound waves are further apart because the car retreats from its sound waves. When a vehicle moves fast enough (the speed of sound is 768 mph) to overcase its own sound waves, a sonic boom occurs because the sound waves produced earlier are added to those now produced. 5. Other animals: Describe a feeling that we have that is more sharply developed in another animal. For example, the bloodhound's smell or the cat's night vision. Describe a sense that another animal has what we don't quite have. For example, the lateral line of fish, the echo of bats or the sonar of dolphins and whales. whales.