MUSCLE LAB

1. PROPRIOCEPTION

Even with your eyes closed, we have a sense of body position - where are arms and legs are, for example, and that we are moving them. Muscles, tendons, joints and the inner ear contain proprioceptors, also known as stretch receptors, which relay positional information to our brains. Our brains then analyze this information and provide us with a sense of body orientation and movement.

For these two activities, you & your partner will take turns. Person 1 will read and explain the procedure to person 2 and then you will switch off.

Activity 1: Finding Fingertips

Close your eyes and raise both hands above your head. Keep the fingers of your left hand totally still (no wiggling!). With your right hand, quickly touch your index fingertip to your nose, then quickly bring that fingertip back up and touch your left thumb. Quickly repeat this process (nose, finger, nose, finger, etc.) while attempting to touch each of the fingers on your left hand in succession. After you have touched all five fingers of your left hand with your right index fingertip, switch hands and try again.

** Now that you completed this activity with both hands, repeat the whole process but this time, wiggle the fingers that stay in the air while your other hand goes from your nose to each finger and back to your nose.

Activity 2: X marks the Spot

Mark an “X” on a piece of paper. Keep the paper on the desk in front of you. Pencil in hand, raise your hand above your head, close your eyes and make a dot as near as possible to the “X.” Open you eyes and check your success. Raise your hand above your head, close your eyes, and attempt to make a dot closer to the “X.” Do this several times. Repeat with your eyes open.

What’s Going On?

You are using proprioceptors in your muscles, tendons and joints to judge your body position in all of these activities. Since most of us are highly dependent on visual cues for judging distance, position, etc. proprioception is not enough to give us the fine detail of position, such as needed to complete these activities accurately. Wiggling your fingertips in the first activity provides additional information to your brain which helps us correctly locate our fingers in space. You may notice that with repeated trails one can learn to complete the activities more successfully, and visual cues, such as looking at the position of the “X” between trials, helps us to adjust our movements to complete the task. Most people find that vision is not an important cue in reproducing written words, because we are used to the “feel” of writing provided by proprioceptors in our hands and fingers.
2. OBSERVATIONS OF YOUR MUSCLES

Activity 1: Muscle Action

1. Place your fingers along the angle of your jaw just in front of your ear. Grit your teeth and observe what happens to your muscles when they contract. What do you observe?

2. Wrap a strip of paper around your relaxed upper arm and mark the circumference of your arm on the paper. Clench your fist tightly and mark the new circumference on the paper. What do you observe? What is the difference as measured in centimeters?

Activity 2: Tonus

The muscles of the body are normally in a state of continual and mild contraction. This is known as muscle tone or tonus, and can be detected by feeling a slight rigidity of the muscle. Palpate muscles (feel or massage) in the different regions of your body to detect the presence of tonus. Tonus is concerned with the maintenance of body posture. While sitting erect, relax the abdominal muscles. What is the effect on posture of voluntarily relaxing these muscles?

Activity 3: Fatigue

Fatigue is a state of loss of excitability of a muscle or a group of muscles. Physiologists also recognize psychological fatigue. Holding a heavy object can induce fatigue. Your textbook will be a perfect tool to help illustrate this concept! This is a timed exercise so have your partner get the stopwatch ready. Grasp your textbook between the fingers and thumb (fingers should be above the thumb; thumb should be below the fingers).

Extend the arm laterally (out to your side) (START TIME) and as soon as your arm sinks half way down, STOP the time. How long were you able to keep your arm holding the textbook extended?

Activity 4: Cool!

Stand in the doorjamb and stand straight. Abduct your arms until they hit each side of the doorjamb. Push with both arms as firmly as you can for 1 minute. Immediately after the time has elapsed, step into the classroom and consciously relax. THIS EXPERIMENT WILL NOT WORK IF YOU CONSCIOUSLY OVERRIDE THE EFFECTS OF THE ARM AT COMPLETE REST!