



Sensory Adaptation, Awareness and Attention

SENSORY ADAPTATION

Last week we discussed how and why the nervous system develops learned muscular patterns, and how these learned patterns lead to sensory-motor amnesia. However, the loss of voluntary, conscious control of our muscles is only one piece of the puzzle. Loss of sensation and sensory awareness also play an important role in developing habitual muscular patterns. As a stimulus (in this discussion, a posture or movement) is repeated, most of our sensory systems become less responsive. This process is known as *sensory adaptation*.

In general, activity in sensory systems is highest during and immediately after a new stimulus is presented. Within a short period of time, our sensory receptors return to their normal resting state, even if the stimulus is still present.

Imagine going swimming in cool ocean water. When you first dip your toes into the water, it feels quite chilly. If you stand there for a minute, letting the waves lap over your feet, you get used to the temperature and it begins to feel comfortable. Wading in deeper, you experience this phenomenon each time the water comes into contact with a new part of your body. Soon you are fully submerged, your *thermoreceptors* (sensory receptors which sense temperature) have returned to their resting state, and the water actually feels warm.

We quickly adapt in a similar way to new sensations of touch, sound, smell and taste. Wearing a new bracelet can be bothersome and distracting until you get used to the sensation of the metal touching your wrist. A repetitive sound like a car alarm is at first annoying, but quickly fades into the background. An unpleasant odor can be overwhelming as you enter a room, but within minutes you barely notice it. A sugary drink seems too sweet until you have taken several sips and become used to the taste.

When it comes to posture and movement patterns, we're concerned with the adaptation of our vestibular system and our proprioceptive system. Our vestibular system adapts when we are in motion at the same speed for longer than a few moments; so when we are flying in an airplane at 600 miles per hour, we feel like we're sitting still. Likewise, if we tip our head slightly forward or to the side, after a while the tilted position begins to feel normal. This adaptation is a function of both the vestibular and proprioceptive systems.

Our proprioceptive system senses our body's position in space. *Proprioceptors* are sensory

receptors located in our muscles and joints. The proprioceptors in our joints detect changes in the angle, direction and speed of movement in our joints. These proprioceptors adapt quickly; they are very good at sensing changes in our joint position as we move, but they give us very little information about the resting position of our joints. This adaptability is helpful when we are in motion, but allows us to get comfortable in unnatural resting positions – like slouched forward at a computer.

The proprioceptors located within our muscles also allow us to get comfortable in unnatural positions. These proprioceptors, which sense changes in muscle length, are called *muscle spindles*. When a muscle is chronically contracted, our proprioception adjusts so that we feel that the muscle is not as short or tight as it actually is. So, the increased level of contraction in our muscles actually begins to feel normal.

As we sit at our computer day after day, our brain learns to keep us in a slouched posture by keeping certain muscles contracted, and our proprioceptive and vestibular systems allow us to get more and more comfortable in this unnatural position. Slouching forward begins to feel normal and even good, and sitting up straight takes effort and feels uncomfortable. We typically remain blissfully unaware of this subconscious adaptation until, one day, it finally causes us pain.

AWARENESS AND ATTENTION

The word “awareness” has a New-Agey connotation which may cause people who are grounded in reality to think that it is a fictional concept. The truth is that awareness is an important and entirely real function of human consciousness. Awareness should be practiced and maintained, as it is critical to our personal safety, ability to have healthy interactions with other people, and of course, preventing ourselves from acquiring damaging muscular patterns.

We can improve our awareness by focusing our conscious attention, a concept which is a bit more tangible. We can choose to focus our attention on any portion of the vast amount of sensory information coming into our brain. By focusing our eyes on one object, we are able to observe the tiniest details of the object while ignoring everything else in our visual field. By listening intently, we can hear a conversation happening at the next table in a noisy, crowded restaurant.

Likewise, we can focus our attention on our proprioceptive sensations. As you are reading these words, your head is likely tilted downward. Bring your eyes up and look straight ahead, so that your head sits straight up and down on top of your spine. Notice how this position feels different than tilting your head downward. Also notice how quickly you return to the tilted downward position. Which position feels more comfortable or natural? Can you feel certain muscles that are contracted or released in each position?

Now that you have taken the time to notice the difference between what these two positions feel like, you will likely start to notice your head position more often. In fact, once you have noticed or learned something new it can be difficult to not notice it. This tendency of our brain to notice things we have just learned is referred to as the Baader-Meinhof phenomenon.

You may have had the experience of learning a new word and then suddenly seeing that word everywhere. The Baader-Meinhof phenomenon is also known as the frequency illusion or recency effect, and it is a result of having focused your attention on something new. Once your conscious attention has been brought to this new word, or to an internal sensation such as the position of your head, you have become more aware of this new word or sensation. Each time you read that new word, you will consciously recognize it instead of subconsciously skimming over it. Likewise, now when you hold your head tilted forward, your brain will recognize that proprioceptive sensation rather than ignoring it.

You can think of attention as being focused and active, and awareness as being broad and relaxed. If you begin to pay attention to your proprioceptive sensations, you will become more aware of them; so with practice, you won't need to work so hard at noticing your body position and movement. It's like staying tuned in to a certain radio station so you can always hear it in the background.

As we gradually learn a posture or movement pattern, we get used to the proprioceptive sensations that accompany it, and we begin to notice them less and less. This loss of awareness makes it easy to fall deeper and deeper into our learned patterns, and also makes it difficult to change them. In order to improve our body use and functioning, we need to pay attention to our posture and movement so that we have an accurate sense of our starting point and of changes that we are making. With regular practice of conscious attention (as the practice of Clinical Somatics exercises provides) our awareness improves, allowing us to change damaging muscular patterns and avoid developing new ones.