Psychophysiology Training – Mind-Body Connection

Section one in a three-part series of psychophysiology training

by Lindsay Thornton, USOC Sport Psychologist/Psychophysiologist

The Olympic Training Center in Colorado Springs is in the final stages of designing its forthcoming psychophysiology training space in the Ted Stevens Sport Science Center, expected to open in November 2014. The training space will be equipped to monitor athlete brain and body responses at rest and under competitive simulation and provide feedback to the athletes so they can self-regulate. The majority of the work in the training space will be guided by the Psychophysiological Principal, which states:

“Every change in the physiological state is accompanied by an appropriate change in the mental or emotional state, conscious or unconscious, and conversely, every change in the mental or emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state.”

In other words, this means that the mind and the body are connected, or what happens above the neck affects what happens below, and vice versa.

The goal in working with athletes is to help them build awareness of processes in their minds and bodies that impact their performance, and provide opportunities for them to gain greater control over these processes. In closed skill sports like shooting, running, jumping or throwing, where there is a clear beginning and end to skill execution, self-regulation of the mind-body state is crucial. There are sport scientists – and likely many athletes and coaches – who believe that what happens in the mind and body in the time immediately preceding your performance is almost as important, if not as important as, the execution itself. In sports where your competitors’ actions can influence your performance, or your game is more of give and take, like in cycling or team sports, self-regulation of your mind-body state is important and includes an aspect of being ready to respond to your changing environment.

We haven’t been sitting and waiting for the psychophysiology training space to be up and running for us to get to work. Psychophysiology training is available to athletes at the Chula Vista and Colorado Springs OTCs even without a high tech lab. Athletes are working on the mental side of their game and training their awareness and self-regulation skills daily.

You don’t need to be at one of the OTCs to do psychophysiology training. There are a few simple ideas that you can incorporate in your mental training. This segment of the sport psychophysiology article will cover the concept of attention and forthcoming segments in future newsletters will cover muscle activity and breathing.

Attention

You can learn to monitor when you are paying attention, and to eventually control the intensity and duration of your attentional states. One way of doing this is putting brain wave sensors on your head, and getting information about how fast the neurons in certain areas of your cortex are firing.
Another way of doing this is to start paying attention to the way your brain attends to things. One example of this is being mindful, and purposefully paying attention to the present. When doing this, you’ll likely notice your mind wander. If you’d like feedback on just how your mind wanders, you can incorporate a cognitive task, for example you can play a few free brain training games on lumosity.com each day (or pay the equivalent of a couple overpriced cups of coffee each month and play more). By the way, there are a number of online programs out there. Lumosity and Posit Science seem to be two more well-researched options. You should know that no company has published data that indicates that playing computerized cognitive games leads to athletic gains, never mind boosts elite athletic performance. Caveats aside, if you do play these games, you will have immediate feedback regarding your attention. Look for patterns. How does your performance vary? According to time of day, sleep quality the night before, number of cups of coffee, number of things you have on your mind, with your score expectations? Do you notice similar patterns in the way you train and compete in your sport?

Practice using visual and physical cues to anchor your attention prior to the games starting and throughout when you notice your attention wandering. That means that you can focus on how your lungs feel as they fill with air with the objective of slowing your thought processes down or absorbing yourself in a physical sensation. The same can be done with noticing how your fingers feel on the keyboard, or details in the images on the screen. You might draw from a pre-performance routine that you already have established in your sport, or you might find an attention regulation strategy at the computer transfers to the mental side of your sport performance. You’ll likely find that your goal becomes to beat your score, and see how focusing on that goal might benefit or hinder your performance. Does the focus on improving your score increase your motivation? Does it at all interfere with your ability to stay focused during the game? You should use the games to practice noticing what your attentional patterns are and how you can most effectively regulate your attentional states to produce repeatable, optimal, mental performance.

A few minutes of practice each day can build your awareness and self-regulation skills in attention. As your skills develop, you will refine your ability to notice what is happening in your mind and body and will have improved regulation skills to create a consistent pre-performance state.

Psychophysiology Training – Mind-Body Connection

Section two in a three-part series of psychophysiology training

As covered in the last month’s issue, the Psychophysiological Principal states:

“every change in the physiological state is accompanied by an appropriate change in the mental or emotional state, conscious or unconscious, and conversely, every change in the mental or emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state.”

There are a few simple ideas that can be incorporated in your mental training to make sure that your mind and your body can work cooperatively. Paying attention is one idea that was covered last month.
and this segment of the sport psychophysiology article will cover **muscle activity** – we will take a look at **breathing** in next month’s issue.

**Muscle Activity**

Assuming you will take a few minutes each day to engage in the mental practice of being aware of your attention and increasing your attentional control skills, you can easily incorporate noticing what is going on in your muscle system as you become competitive.

When you are intensely focusing, what happens from your head to your toes? Are you leaning forward, clenching your jaw, tensing your shoulders/forearms/wrists/fingers? See if you can exert mental effort while using only the physical effort that is necessary for the task. Overworking your muscles without microbreaks is one way to end up with a repetitive strain injury. With psychophysiology equipment, we can monitor the resting tension and activation levels of muscle groups in athletes to determine if they have consistent activation patterns across their performances, and if they have brief and effective periods when their physical tasks are complete when they reduce the resting tension to almost zero. You can do this fairly well without equipment by scanning your muscle groups in your mind’s eye to assess resting tension. You can use stretching, tensing/relaxing, or pressing your fingers into the muscle to try to minimize tension.

Create a routine of resetting your posture before you begin and at regular intervals if you are doing cognitive training. Note that this can be for anything you do—driving, answering emails, talking on the phone—see if you can make it a habit to maintain an efficient posture. Sort out how to take on a cognitively challenging task without overusing your muscle system. One way to address this is to create a habit of relaxing your forehead, eye muscles, jaw, neck, shoulders and down to your fingers before starting.

See how this might relate to sport performance, specifically are you using excess muscle effort to in an attempt to create mental effort (we call this misapplied effort, where the goal of increasing mental effort or attempting to ‘do something better’ is incorrectly translated to excess tension in the muscles). As you notice your patterns, consider the short term and long term effects. Take some time to build your awareness and self-regulation skills in your muscular system in order to maintain muscle health and potentially avoid developing unnecessary repetitive strain injuries.

Muscle awareness is not just about your health, there are performance implications as well. In research studies with sprinters, tensing the shoulders is associated with losing speed. You might have heard your coach say to relax your shoulders or move your arms faster when you are trying to speed up (in any sport that involves running). The reason they tell you this is that there is neural coupling between the arms and the legs (neurons that are associated with arm and leg control are synchronized in the pre/motor cortex) when we are walking and running. If the arms are going slower - due to the restricted range of motion in a runner’s tense shoulders - then according to the way the brain works, the legs could slow down. An effective intervention is to give athletes information about what their tension is like along their upper trapezius. This could be done with a muscle sensor on the shoulder that provides audio feedback, or the coach/teammate monitoring the muscle tension recording. When you are told
your muscle is tight, it is pretty easy to relax it, so all the runner would need to do is relax more effectively while under the physical strain of running fast. You might think your shoulders are relaxed are running, but it’s easy to shift your attention to running fast and have your shoulder tension creep up. There is no guarantee that a runner will run faster with this, but the potential barrier of slower arms leading to slower legs would be removed (and if that is something that is inhibiting performance, well, then they might go faster).

A few minutes of practice each day can build your awareness and self-regulation skills in your muscular system. As your skills develop, you will refine your ability to notice what type of effort you are using and if that type of effort is most appropriate for the physical demands. An easy example of noticing this might be paying attention to how tightly you grip your phone when texting normally, then when rushing or emotionally charged. When you catch yourself overworking your muscles or holding excess tension outside of sport training, work to regulate to a more appropriate muscle activation level. If you come up with something related to your sport, talk with your coach about your muscle activation patterns and see if there is a more efficient way to execute your skills.