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FRIENDS OF NVT

OFFICIAL NEWSLETTER OF INNEURACTIVE

INTRODUCTION

Welcome back to the third Issue of Volume 6 of our continuing Friends of NVT Newsletter! In this third Issue of Volume 6, we will be exploring the idea of neurocognitive baselines… not for concussion baselining, but for sports performance baselining! This is a very interesting concept as our NVT philosophy acts as a cycle, starting with an objective neurocognitive baseline that provides objective metrics for many neurological processes and actual insight into the brain's processing abilities. These metrics can be used as an entry concussion baseline as we have discussed in previous issues of FoNVT Newsletter but can also be used to highlight neurological processing weaknesses. Once these weaknesses (not health impairment deficiencies, just weaknesses) are highlighted from our neuro-cognitive baseline, if trained appropriately, we can improve the weaknesses, and translate these improvements to better on field performance. A truly fascinating topic, and at its core is what we at Inneuractive are working hard to establish as the next wave of sports performance enhancement, but more than just sports by branching into employee wellness, everyday neurologic functional improvements, and more!

In our How To this week we will be exploring one our Inneuractive's patent-pending, proprietary training modalities, Spatial Reasoning with Connect the Dots Training Sheets™. These spatial reasoning exercises are a series of tasks that help train spatial reasoning, spatial awareness, and spatial memory. The tasks are made to be fun based on the concept of connect the dots and are completed using paper and pencil. Essentially, this spatial reasoning is encouraged to assess and train one's ability to problem solve.

We are very proud of this issue of our FoNVT Newsletter and hope that you enjoy it. As always, we encourage you all to leave questions and/or comments below. Thank you for your continual readership and support!

WHAT'S IN OUR LATEST ISSUE:

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Sports Performance Baselines: How to Up Your Ability With NVT

Pre-participation health evaluations for athletes have long been a concept with the overall goal of helping maintain the health and safety of the athletes. Most sports require pre-participation evaluations for athletes prior to the beginning of the sport to be eligible to play in that sport. This is not to discourage and exclude athletes from participating in sports, but to promote a safe participation. The Cleveland Clinic in Cleveland, Ohio states that the three primary goals of these required pre-participation health evaluations is to (1) Detect conditions that might predispose the athlete to injury, (2) Detect conditions that might be life-threatening or disabling, and (3) Meet legal and insurance requirements.

The components of these pre-participation health evaluations for athletes follows a similar framework to a routine pediatrician visit or general annual health exam conducted by you're a primary care physician. At the conclusion of this evaluation, the clinician will decide whether or not the athlete is at a significantly increased risk of injury and either classify them as "unrestricted clearance to participate", "clearance after completion of further evaluation or rehabilitation", or "no clearance for certain types of sports or for all sports".

The implementation of these pre-participation health evaluations has been successful in detecting many risk factors, most prominently congenital heart diseases, but until the past two decades that these pre-participation health evaluations included an athlete's concussion history. Moreover, it wasn't until the mid-2000's that computerized neuropsychology baselines were developed for supposedly evaluating an athlete's brain function, and not until the early-2010's until they were required and used mainstream as part of the pre-participation health evaluation for athletes. The most widely used computerized neuropsychology baseline test is the ImPACT test, and over the past decade scientific literature has heavily scrutinized its utility as a concussion baseline for many reasons. Yet, it is still routinely used throughout youth, high school, collegiate, and professional sports teams.

In past issues of our Friends of NVT Newsletter, we have discussed our thoughts and philosophies on neuropsychology baseline testing and have even published in the peer-reviewed scientific literature our own neurocognitive evaluation for concussion baselining (currently pending revisions). This neurocognitive baseline was developed in 2010 by Dr. Joe Clark, PhD in neurophysiology, and was adopted by the University of Cincinnati Department of Athletics. His neurocognitive baseline has been refined and enhanced over the past 10 years to be what it is today and has specifically contributed to the University of Cincinnati's remarkably low concussion rate compared to the NCAA sports-specific averages.

The utility of Dr. Clark's neurocognitive baseline goes beyond that of just another concussion baseline. It objectively measures neurological processes including eye-hand coordination, peripheral visual awareness, central & peripheral visual reaction times, retinal scans, electrophysiological measurements reporting visual information processing speeds providing insights into the functioning of the optic tract, visual acuity, neurological reflexes that can't be "sandbagged" by the athletes, and much, much more. The beauty of this neurocognitive baseline is that it documents objective neurologic parameters that we've found to be significantly reduced in our athletes who unfortunately incur a concussion and repeat the neurocognitive baseline.

There are many aspects of this neurocognitive baseline that propel it above traditional computerized neuropsychological baselines such as the ImPACT test. However, what we'll discuss in the remainder of this article is that since it provides metrics into an athlete's neurophysiological functioning, rather than their neuropsychological functioning, we can detect weaknesses, or areas for improvement, that don't at all necessitate withhold from play, but simply areas that an athlete can work on and train at to improve their neurological functioning.

Another way to think about these metrics for neurological performance enhancement training is similar to ways we've discussed neuro-visual training in previous issues of the Friends of NVT Newsletter when we compare it to neurologically focused strength and condition training. For example, during an athlete's first lift, a seasoned strength coach will usually start out by performing a strength and conditioning baseline to assess an athlete's baseline strength and conditioning fitness levels. If an athlete shows weakness in their chest muscle development, they will emphasize strength and conditioning exercises relating to pressing lifts, such as bench press, triceps extensions, chest fly exercises, and shoulder work as well. Even though shoulders are completely separate muscles from the chest muscles, the pectoralis major and minor, it is beneficial to strengthen the shoulders to work on strengthening the chest.

This concept is nearly identical to our neuro-visual training philosophies when enrolling one of the University of Cincinnati athletes into our neurocognitive strength and conditioning programs. Moreover, as developing strength and muscular endurance through strength and conditioning relatively translates to better on-field performance, training an athlete's brain to better process and act on sensory information, most notably visual sensory information, hypothetically translates to better on-field performance.

Think about it… for example, in American football each player on the field, both offensive and defensive players, must line up on the football and wait to start the play until signaled to move by the center hiking the football to the quarterback. The visual information of the football moving must be processed by each player and they must act/react accordingly. This reaction time off of the snap of the football is directly related to how quickly a player is able to signal the visual information of the football moving from the eyes, along the optic tract, and to the occipital lobe (where visual information is processed), how quickly the neurons in the occipital lobe are able to process this visual information, how quickly other areas of the brain use this information to make a decision, and finally how quickly it takes the brain to send out the decision to the muscles on where to move. This all happens roughly within 0.20 seconds, but what if an athlete was able to react to the snap of the ball at 0.18 seconds? On paper, a 0.02 difference is a very minimal difference, but when competing on the football field where most of the players are all around the 95th percentile of athletic ability, that 0.02 difference can help separate the good players from the great players, or even the great players from the hall of fame players.

Obviously there is much more that goes into becoming a hall of fame football player, but that is exactly the point we are making… an athlete's neurological functioning is one part of many that may contribute to the overall player's individual athletic ability, just like their strength, their height, their weight, their speed, etc. In addition, the nervous system controls the body, and if an athlete's strength and speed plateau with strength and conditioning training, there may be other opportunities with neuro-visual training to speed up the "conduction" of information throughout the body and to the muscles.

As athletes are consistently training to become stronger and faster with each generation, it is important that we emphasize the brain's role in sports performance. That is why Dr. Clark's neurocognitive baseline is so valuable, because with the proper analysis, the appropriate neuro-visual training program can be developed and used to target an athlete's neurological areas for improvement, and further enhance an athlete's on-field performance.

"HOW TO" – Spatial Reasoning

Spatial reasoning is the ability to recall and process visual spatial information. This ability is routinely used for important tasks such as driving, parking, walking, and following directions. Spatial reasoning has also been thought to help enhance memorizing information by organizing information within a representational "spatial framework map" in the mind – very cool! Spatial reasoning is a neuro-cognitive ability like any other that we have previously discussed and can be improved upon if appropriately trained.

In principle, spatial reasoning with connect the dots is done to train a person's ability to problem solve. Spatial reasoning tasks are great for people who want to improve their spatial memory or spatial awareness, and even for people post brain injury. If you have a problem parking your car, or reading a map, or packing your bags, spatial reasoning sheets are a way to improve these behaviors. People post brain injury often complain of bumping into doors or walls while walking or scrape the side of the car while parking because of the brain injury. Some patients we have worked with in the past also report having difficulty remembering where they placed their keys, their wallets, and have significant trouble following simple instructions. Therefore, training spatial reasoning processes can help improve these deficiencies that prior to injury were simpler and more "automatic".

Below we provide the instructions for how to use Inneuractive's Spatial Reasoning Training Sheets with Connect The Dots™ (Figure 1):

Terminology: The key that has just the shape, is called the shape key. The key that has all the shapes in one image is called the image key.

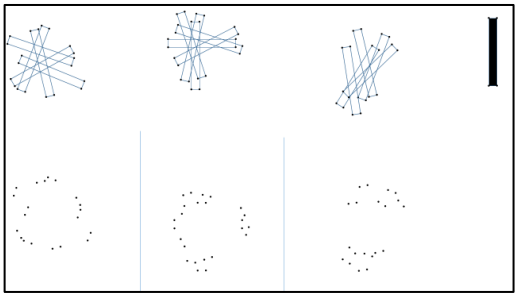
Goal: Use one or more known shapes provided by the shape key to connect the dots of in such a way that matches it to the image key.

Instructions:

1. The participant is instructed to look at only the image key for 30 seconds to 1 minute.
2. After looking at the image key for 30 seconds to 1 minute, instruct the participant to now look only at the shape key for 30 seconds to 1 minute.
3. Now have the participant only look at the connect the dots template for 30 seconds to 1 minute.
4. After the participant has observed the image key, the shape key, and the connect the dot templates, fold the sheet along the horizontal axis, while in the landscape orientation, so that the image key & shape key are completely hidden during the trial.
5. Once folded, instruct the participant to attempt the connect the dot exercises.
    a. The participant is allowed to "peek" at only the shape key when stuck on a section of the connect the dot template.
6. Record the time it takes the participant to complete each connect the dot template, how many mistakes were made during the trial, and how many "peeks" were taken during the trial.
    a. We often note or ask what "strategy" the participant uses to solve the connect the dots exercises as a way to reinforce their personal cognitive processing strategies. There is no "correct" way to do this, but it is beneficial to get the participant thinking about the strategy they used, as well as how they could have approached the task differently using other strategies.
7. ***PROGRESSION:*** An advanced person could be asked to solve the spatial reasoning by just looking at the shape key, and not be provided the opportunity to look at the image key.

NOTE We strongly recommend that a subject uses paper and pencil to do this task. Also, scoring is somewhat achieved by timing how long it takes to finish a set. Although the sets are heterogeneous and have graded difficulties, so the time it takes to finish a set is variable. Subjective measures concerning how hard or easy the task feels can also be reported.

Figure 1. Inneuractive's Spatial Reasoning with Connect the Dots Training Sheets. The vertical rectangle top right is the "shape key". The three clusters of transparent rectangles are the "image keys". The connect the dot templates are the exercise and to be solved.



Announcements

As always, if you're interested in learning more about Inneuractive, our mission, our products and service offerings, or just Neuro-Visual Training in general, please click the following link: www.inneuractive.com. If interested in learning more or purchasing Tricerapro, please visit www.tricerapro.com.

Have suggestions for a future issue? Please reach out to clarkjf@gmail.com or info@inneuractive.com and we will do our best to include your request in the future.