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FRIENDS OF NVT

OFFICIAL NEWSLETTER OF INNEURACTIVE

INTRODUCTION

Welcome back to the second Issue of Volume 6 of our continuing Friends of NVT Newsletter! In this second Issue of Volume 6, we dive into the heavily discussed topic of reaction times. Reaction times are routinely discussed in neuro-cognitive performance settings, but unfortunately, they are only discussed at a very surface level without any actual connection to neuroprocessing. Typical reaction time training doesn't dive into the different types of reaction times, nor different drills that challenge individuals to "think" while reacting to the primary task. Read below for more on our thoughts on reaction times and how NVT can be used to improve brain performance!

In our How To this week we will be exploring an interesting assessment and exercise, the Anti-Saccades. Anti-Saccades are a great modality in the gross evaluation of frontal lobe function. The frontal lope of the brain houses the majority of our executive functioning, including the ability to inhibit actions as well, so anti-saccades are a good and quick evaluation for certain neuro-related processes.

We encourage you all to leave questions and/or comments below. Thank you for the continued interest and enjoy!

WHAT'S IN OUR LATEST ISSUE:

@FriendsofNVT

Reaction Times: Not All Reaction Times are Created Equal

The average person will have a fairly clear idea, if not definition, of what a 'reaction time' is. One might say the reaction time is how long it takes to react to something. On the surface that is an adequate definition for most circumstances. If we consider the kids' game, Dodge Ball, such a definition of reaction time would involve the ability to see a ball thrown at you and the speed with which you can dodge that ball. When we apply NVT to reaction time training we will take the reaction time training and testing to a greater depth. Below we will discuss the relevance and significance of some aspects of reaction time and how NVT can improve those reaction time parameters.

Central Vision vs. Peripheral Vision Reaction Time.

Central vision reaction time is where an event in the central visual field occurs where a reaction to that event is required. Consider the above analogy of dodge ball. If you see a person throwing a ball at you, you react to avoid the ball. The faster you can react the more likely you are to avoid getting hit. In general things we see in our central visual field we can react to faster than in our peripheral vision. In the dodge ball example if a ball is thrown at you from the side, in your peripheral vision, many people would react slower to that throw. We have published data that the central to peripheral reaction time slows by 25% in untrained individuals (Clark et al., 2015). With NVT principles it is possible to improve the speed of reaction time in the peripheral visual fields. In FoNVT I6V2 we discuss the utility of the dynavision light board for training eye hand coordination. Within that 2015 paper we also discuss that the dynavision light board can train people to react faster with better eye hand coordination to events in their peripheral visual fields. We have found that following NVT with our football team there is a decrease in the peripheral vision reaction time tested on the dynavision. The peripheral to central reaction time decreases to less than 10%. Plus with the NVT the central reaction time improves by 16 %. Our conclusion is that when testing and training visual reaction time it is important to consider peripheral vision reaction time as this is a skill that has a lot of room for improvement. We believe that being able to see and react quickly to events in your peripheral vision can improve performance and safety while playing numerous sports.

Visual Motor Reaction Time vs. Brain Processing & Reaction Time.

Hick's principle suggests that the more choices an individual has the slower the ability to react to an event. Responses slow down with increasing choices. In short, the brain is slowing down the reaction time. Many people can test and train reaction times where the task is to react on cue. Tests like hit the space bar when the screen flashes. Hit a button when the light lights up, say with the dynavision. These reaction time tests and training activities can improve visual reaction time, but this does not train the brain to process and react quickly.

When considering sports and tactical reaction times and NVT to improve them it is often critical to include the speed of decision making. The brain's decision-making time will impact the reaction time and for NVT this is consistent with the third pillar of NVT (FoNVT I1V1). We've discussed several training modalities in FoNVT that are designed to improve the speed of brain processing when doing sports and tactical activities (I2V2, I6V2, I7V2, I7V3, I7V4, I8V4, I5V5, I7V5). This speed of brain processing based NVT will improve reaction times when a person needs to think. In effect the NVT trains away the slowing one might expect from Hick's principle. Thereby making reaction times when thinking faster.

In conclusion we have discussed the concept of multiple facets of reaction time and what contributes to the reaction time and what constitutes NVT trainable reaction time parameters. The NVT practitioner should consider central vision reaction time, peripheral vision reaction time, decision-based reaction time and the need for their speed concerning performance enhancement and injury prevention for the people being trained.

"HOW TO" – Anti-Saccades (Vertical and Horizontal)

The frontal lobe is the largest of the four major lobes of the brain in humans and contains most of the dopamine neurons in the cerebral cortex. Traditionally, the dopaminergic pathways are associated with reward, motivation, attention, short-term memory, and planning. The ability to measure the frontal lobes functioning is a difficult task, but the scientific literature suggests that anti-saccades offer a faster, simpler, and cheaper alternative to standardized testing. For instance, an alternating task of pro-saccades (regular) and anti-saccades requires task-switching and inhibitory control abilities and can, as a result, measure cognitive control in various healthy and clinical populations.

Regular saccades are thought to be more of an automatic-type of eye-movement, where a stimulus in the visual field attracts eye movement towards that visual stimulus. However, anti-saccades rely on two sub-processes: a) inhibiting an automatic-type of eye-movement towards a visual stimulus, and b) generating a voluntary movement in exactly the opposite direction from the visual stimulus, where nothing in the visual field is attracting the gaze. Thus, switching between a pro-saccade task and an anti-saccade task requires one to have cognitive control over their automatic and voluntary movement.

Below are our methods on how we perform our saccades/anti-saccades exercise:

Methods:

Normal Saccades with Thumbs:

- Hold up two thumbs in front of the patient, about 18 inches apart and 18 inches away from their face, oriented vertically around the height of the bridge of their nose.
- As the "trainer", you are to move one thumb at a time, and when doing so, instruct the participant to navigate their eyes to the thumb that moves and also instruct them to keep their eyes looking at the last thumb that moves.
- Go back and forth and sometimes move the same thumb twice in a row.
- Do this for approximately 15-30 seconds.
- Record the number of saccadic eye movements in the session.

NOTE: It is important as the "trainer" or clinician to observe the saccadic eye movements of the participant.

Anti-Saccades with Thumbs:

- Hold up two thumbs in front of the patient, about 18 inches apart and 18 inches away from their face, oriented vertically around the height of the bridge of their nose.
- For the "trainer", follow the above instructions, move one thumb at a time.
- The participant now is instructed to move their eyes to the OPPOSITE thumb, the thumb that is not being moved.
- Do this for approximately 15-30 seconds.
- Record the number of saccadic eye movements in the session, as well as the number of errors of the participant.

Anti-Saccades with Thumbs and Fixation Target:

- Have the participant fixate on the bridge of nose of the "trainer".
- Repeat anti-saccades with the thumbs using the previous instructions above.
- Once the participant has captured the correct, non-moving thumb, tell them to refocus their gaze back to the bridge of your nose.
- Do this for approximately 15 to 30 seconds.
- Record the number of saccadic eye movements in the session.

Announcements

The team at FoNVT are extremely happy and proud to announce that team member Blake Bacevich has been accepted to Harvard Medical School and will be starting is medical school education in early August. Congratulations to Blake, well done and Harvard is lucky to have you.

Did you notice how well the University of Cincinnati baseball team is doing? The beat in state rival Ohio State. Well done Bearcats baseball. Follow them at @GobearcatsBASE on twitter.

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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.