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FRIENDS OF NVT

OFFICIAL NEWSLETTER OF INNEURACTIVE

INTRODUCTION

Happy New Year to all our esteemed readers! As we welcome another promising year, it's a perfect time to reflect on our aspirations and set new goals, especially in the realm of athletic performance and cognitive enhancement. This issue of the Friends of NeuroVisual Training Newsletter is particularly exciting, as it delves into a crucial aspect of sports performance: Dynamic Visual Acuity (DVA).

In this edition, we feature an enlightening piece by Dr. Randall Fuerst, OD FAAO, on "Neurovisual Skills: Dynamic Visual Acuity and Strobe Training." Dr. Fuerst brings to light the fascinating world of DVA, a skill that underpins an athlete's ability to accurately perceive, process, and respond to rapidly changing scenarios. Highlighting a conversation between reporter Kyle Posey and San Francisco 49ers head coach, Kyle Shanahan, we gain insights into how quarterback Brock Purdy's exceptional DVA contributes to his remarkable performance on the field. Through Dr. Fuerst's expertise, we explore the complexities of DVA, ranging from peripheral awareness and reaction time to target acquisition and impulsivity control. His work elucidates how these skills are not just vital in sports like football, basketball, and tennis but also crucial in daily tasks such as driving and tracking moving objects.

Our comprehensive training plan, designed to enhance these critical skills, integrates cutting-edge tools like Strobe Glasses, Near/Far Hart Charts, Pitch & Catch Drills, and the Dynavision D2 Light Board. Each tool targets specific aspects of an athlete's visual and cognitive abilities, providing a multifaceted approach to improving performance.

Whether you are an aspiring athlete or a seasoned professional, this training plan offers a unique opportunity to deepen your visual skills profoundly. Our step-by-step guide takes you through various exercises and simulations, ensuring that your training is not only effective but also continuously adapted to your evolving needs.

As we embark on this transformative journey together, we invite you to dive into this issue, engage with our training plan, and unlock your full visual potential. Let's make this year a milestone in achieving athletic excellence and cognitive mastery! Happy New Year, and happy training!

WHAT'S IN OUR LATEST ISSUE:

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Neurovisual Skills: Dynamic Visual Acuity and Strobe Training

Reporter Kyle Posey recently posted a conversation with San Francisco 49ers head coach, Kyle Shanahan regarding quarterback Brock Purdy's 'coolest trait': Posey writes 'He's used his legs and mobility — in most cases by necessity — to help keep the offense on the field. But head coach Kyle Shanahan explained how Purdy's top trait isn't anything physical:

> "I mean, I think that's stuff that he does very naturally. I think that's the talent in Brock that you can't always judge. I think vision and stuff is very important and doesn't just go into like, is he 20/20? There's different types of vision of like looking outside, wide coming in, like just the words I never know. But, it's a big deal how your eyes see things. I think Brock recognizes stuff and the speed of things and levels and he knows the hole and the defenders and what they should defend. But it's always like, there's a progression. It's like, 'yeah, this play's going to go to here,' but that guy might not do his job. So you've got to feel that, make sure if he does his job, we're going to number two. That's what he usually does. Brock went to number one, which hadn't been there on tape, but he wasn't backing up and we had a fast guy in the slot and you better back up. He hesitated a little bit and Brock saw that. So he doesn't memorize and guess, he kind of sees it and reacts and that's the coolest thing about him." (1)

Coach Shanahan mentioned visual acuity –which is what is known as static visual acuity, which measures the clarity of vision when objects are still. Coach Shanahan is mentioning a significantly different neurovisual ability, referred to as dynamic visual acuity. Whereas static visual acuity is usually done at 100% contrast and the smallest possible image size that can be determined, dynamic visual acuity involves peripheral awareness, reaction time, target acquisition, speed of accommodation (focusing), and impulsivity control.

Dynamic visual acuity (DVA) refers to the ability of the visual system to perceive details of objects in motion or during dynamic activities. It's essentially how well someone can see moving objects with clarity, depth perception/localization, and recognition. This skill is crucial in various activities such as sports (like tennis, basketball, car racing or baseball), driving, and tasks that involve tracking moving objects.

Maintaining dynamic visual acuity (DVA) involves the coordination of the eyes, brain, and nervous system to process and interpret visual information rapidly and accurately while the athlete is still or moving, in balance or out of balance, and typically under stress—concurrently while objects are in motion. The neurovisual components noted include:

- **Peripheral Awareness**: The greater the stress level, the more your peripheral visual field contracts. As an example, when you are bench pressing or lifting weights, the heavier it gets, the more your focus constricts to 2-5 feet in front of you. Further, the faster the object is moving, the more energy and concentration is needed to pick it out from the background. Thus the balance between peripheral vision and central vision tilts quickly to your central vision and your peripheral awareness tends to diminish.
- **Reaction Time**: This subskill details the speed from when the target is presented – for example, the wide receiver starts his route and is picked up (or delayed in being picked up) by the defensive player. OR, the basketball player who gets into position on the court where he could take a shot. How quickly he can assess the defending player(s), and pick up the rim for shot judgment, is a form of reaction time. Steph Curry is an amazing example of rection time – getting the shot off before he can be defended.
- **Target Acquisition**: Examples of target acquisition include the scrambling quarterback stepping into the pocket with defensive players barreling down on him, then scanning the field and making a judgment as to who he is throwing to—the target acquisition begins as he assesses the trajectory, distance, speed, and loft for an accurate pass. Or the tennis player racing to run down the ball hit to her backhand—and getting her body in position to hit it accurately. The more accurate your target acquisition skills, the quicker you can judge position, speed, loft, spin, and your opponent's court positioning. The slower you are, the more the goal is reduced to simply getting your racquet on the ball.
- **Speed of Accommodation** (focusing): This subskill of DVA can be exemplified by a basketball player being closely guarded. The offensive player (with the ball) must rapidly shift focus from distance (the rim and other teammates) to near (his defender(s)) and back and forth.
- **Impulsivity Control** – This neurovisual subskill of DVA, while difficult to assess, is critically important. It involves concentrating 'long enough' to gather the requisite information so that the pass, the swing, or the shot is as accurate as possible.

Improving these subskills in aggregate defines dynamic visual acuity (DVA). The better ones' DVA, the better their performance -batting average, shot percentages, completed passing rates. As athlete's move from one level to the next – high school to club to college to professional-the game speeds up tremendously. Couple this with the fight against fatigue, mild injury affecting rotation, jumping height, and defensive pressure of pushing pulling, bumping – the game becomes infinitely harder. That said, we can marvel at the quarterbacks who make the game seem effortless with their quick reads and ability to get the ball off quickly, as well as the Steph Curry's who, in one motion catch and release a long distance three point shot that barely ripples the net.
Improving dynamic visual acuity can involve specific exercises and activities that challenge the visual system to process information quickly and accurately in dynamic situations. These exercises often focus on enhancing eye tracking, visual processing speed, binocular vision in order to afford optimal depth perception, and overall coordination between the eyes and brain.

I had the wonderful opportunity to work with the Sacramento Kings for nearly 20 years. When I first started working with the Sacramento Kings, I was asked to work with a player who was a first round draft pick, but his transition to the pro game was challenging. He really needed work on DVA. At the time, the best available training tool was a theatrical strobe light(s). We would go into a dark room, start the strobe light at a high flash rate (easier), and work with tennis balls, basketballs, bean bags- and have him catch them. The rate I would throw the ball varied, with some being bounce passes and others lobs over his shoulder. Then the strobe flash rate would be slowed, and then varied. Later, I was able to take him into the Kings' Arena, setting up multiple strobes, and work on passing, shooting, catch and shoot – and he was able to make rapid progress. At first, there were a number of times I hit him in the face with the basketball – but quickly he improved and, despite the increasing degree of difficulty, his DVA improved markedly. He went on to a long and productive NBA career.

The problem, however, is the difficulty setting up training sessions. I began to think about how this could be done with a pair of glasses, where one could be outdoors, or on a fully lit basketball court. Where the ease of use would be simply turning the 'strobe' glasses on, setting the speed, and going about normal practice routines. Quickly, the athlete could use them hitting off a tee, soft toss, then batting practice; catching and quick release basketball; reading the receiver, DB, and route and then throwing accurately—all 'sped up' while using DVA-training strobe glasses.

I received a patent in 1994 for StrobeSpex, which was later licensed to Nike for their Vapor Strobes. When Nike discontinued their sports vision enhancement training division, the business was bought by Senaptec – who are still producing Senaptec Strobe Glasses, which have excellent functionality. One of the side benefits is that in using high speed liquid crystal, there is not a flashing light that can bleach the retinal photoreceptors. Thus, the issues of strobe light induced seizures are dramatically reduced.

I was able to introduce the StrobeSpex to the NBA trainers and coaches in 1996, women's professional tennis, and we shot the training video with 49ers all pro Tight End Brent Jones at the 49ers facilities in Santa Clara.
There has been a number of peer reviewed journal articles researching the value in training DVA, reaction time, and academic visual concentration. Improved visual cognition through stroboscopic training, by L. Gregory Appelbaum is but one of the research papers Dr. Appelbaum has published on strobe glasses training, during his time at Duke, and now UCLA. (2)

When one thinks about the components of dynamic visual acuity - peripheral awareness, reaction time, target acquisition, speed of accommodation (focusing), and impulsivity control- you can hopefully readily envision how the strobe flashing decreases the visual 'data' the athlete/ subject sees—in effect speeding up the speed and giving him/her less time to process information needed to make a judgment. This also increases what is referred to as neural noise, which increases the burden on impulse control, reaction time, speed of accommodation, and target acquisition. Also of importance is that this increased demand upon the visual system leads to the athlete greatly increasing his/her central vision focus, to the detriment of their peripheral awareness. Having the subject have to move, maintain balance on a Bosu Ball, while working to pick out peripheral visual targets (such as when using the DynaVision) works well.

Hopefully this article has led to a greater appreciation of the value of dynamic visual acuity. Given this, let me once again post Coach Shanahan's discussion of Brock Purdy and his vision:

Head coach Kyle Shanahan explained how Purdy's top trait isn't anything physical:

> "I mean, I think that's stuff that he does very naturally. I think that's the talent in Brock that you can't always judge. I think vision and stuff is very important and doesn't just go into like, is he 20/20? There's different types of vision of like looking outside, wide coming in, like just the words I never know. But, it's a big deal how your eyes see things. I think Brock recognizes stuff and the speed of things and levels and he knows the hole and the defenders and what they should defend. But it's always like, there's a progression. It's like, 'yeah, this play's going to go to here,' but that guy might not do his job. So you've got to feel that, make sure if he does his job, we're going to number two…"

One of the intriguing memories I have in regards to having had the opportunity back in the late 1980's and into the 1990's working with some of the 49er players was having an opportunity to sit with then offensive coordinator, Mike Shanahan, and discuss our Strobespex and DVA there at the 49ers offices –and now read comments by his son, the current 49ers head coach, as he is describing neurovisual skills, of which DVA is of major significance.

References:

1. Niners Nation December 14, 2023 by Kyle Posey
2. Appelbaum, LG et al, Improved visual cognition through stroboscopic training, Frontiers in Psychology; 10/2011; Vol. 2, article 276

How To: The Comprehensive Dynamic Visual Acuity Training Plan

In the competitive arena of sports, the ability to quickly and accurately process visual information can be the difference between victory and defeat. Dr. Fuerst's insightful piece lays the foundation for understanding how crucial dynamic visual acuity (DVA) is for athletes in high-speed and high-stakes environments. Embracing this concept, our training plan is meticulously crafted to refine and elevate these essential skills. This multifaceted program harmoniously integrates innovative tools such as Strobe Glasses, Near/Far Hart Charts, Pitch & Catch Drills, and the Dynavision D2 Light Board. These elements work in concert to sharpen not only an athlete's visual acuity but also their cognitive processing, reaction time, and coordination.

Whether you're an emerging talent in the athletic world or a seasoned professional striving for excellence, this program offers a transformative pathway to profoundly hone your visual capabilities. Our approach is not just about enhancing your performance in the arena but also about enriching your cognitive functionality in daily life. Get ready to embark on an exhilarating journey that will unlock your full potential, both in your sport and beyond.

Step 1: Introduction to Strobe Glasses and Baseline Assessment

- Introduce Strobe Glasses: Explain the concept, benefits, and operation of strobe glasses.
- Baseline Performance Assessment: Perform initial visual acuity and coordination tests without strobe glasses, including basic catch drills and a session on the Dynavision D2 Light Board.

Step 2: Initial Training with Near/Far Saccade Exercises

- Simple Near/Far Tasks: Conduct near/far saccade exercises using the Near/Far Hart Chart set.
- Emphasis on Eye Movements: Train the athlete to make quick, accurate saccades between near and far targets.

Step 3: Introduce Basic Tasks with Strobe Glasses

- Initial Strobe Training: Start with low strobe intervals and basic activities like ball catch drills or static chart reading.
- Adaptation Phase: Allow the athlete time to adjust to the visual interruptions caused by the strobe glasses.

Step 4: Incorporate Dynavision D2 Light Board

- Introduce Dynavision Training: With the strobe glasses on, have the athlete engage in sessions on the Dynavision D2 Light Board.
- Focus on Eye-Hand Coordination: The dynamic and unpredictable light patterns on the board will challenge the athlete's visual tracking and reaction skills.

Step 5: Advanced Near/Far Saccade Training with Strobe Glasses

- Combined Strobe and Near/Far Exercises: While wearing strobe glasses, the athlete performs the Near/Far Hart Chart exercises.
- Dynamic Chart Movement: Introduce movement in the charts to enhance the challenge, especially for the "FAR" chart.

Step 6: Complex Eye-Hand Coordination Drills

- Advanced Catch Drills: Execute more complex catch drills, like catching balls of different sizes or weights, with strobe glasses on.
- Challenging Dynavision Sessions: Increase the difficulty level on the Dynavision D2 Light Board, demanding faster and more precise reactions.

Step 7: Increase Strobe Intensity and Task Complexity

- Enhance Strobe Difficulty: Gradually increase strobe intervals and incorporate these settings into both the catch drills and Dynavision exercises.
- Complex Dynamic Visual Tasks: Introduce more complex coordination tasks, demanding higher levels of concentration and agility.

Step 8: Sport-Specific Training and Simulation

- Sports Context Application: Apply strobe glasses training in sport-specific scenarios, simulating game-like conditions.
- Realistic Drills: Use drills that mimic the specific demands of the athlete's sport, focusing on dynamic visual tracking and quick decision-making.

Step 9: Regular Monitoring and Progress Adjustments

- Assess Progress: Regularly evaluate performance in dynamic visual tasks, catch drills, and Dynavision exercises with strobe glasses.
- Training Intensity Modification: Alter the difficulty based on the athlete's progress, either by adjusting strobe intervals or task complexity.

Step 10: Gradual Reduction of Strobe Glasses Use

- Reduce Strobe Dependency: As proficiency improves, gradually decrease the use of strobe glasses.
- Final Assessment Without Strobe Glasses: Conduct a comprehensive evaluation of dynamic visual acuity, reaction time, and coordination without strobe glasses.

As we conclude this detailed exploration of our Dynamic Visual Acuity Training Plan, it's clear that the journey to visual mastery is both challenging and rewarding. Each step of this program, from the foundational introduction of Strobe Glasses to the intricate eye-hand coordination drills on the Dynavision D2 Light Board, is designed to methodically enhance your visual and cognitive agility. The journey through sport-specific simulations and regular progress assessments ensures that your training is relevant, effective, and continually adapted to your evolving capabilities.

This comprehensive training regimen is more than just a series of exercises; it's a commitment to excellence, a dedication to harnessing the full capacity of your visual and cognitive abilities. As you advance through each phase, you will notice significant improvements not just in your sports performance but in your overall sensory processing and decision-making speed.

If there are any questions, requests for additional information, or improved clarity, please reach out to us at anytime!

Related FoNVT Readings:
Strobe: I6V1, I2V8
Dynamic Visual Acuity: I6V9
Eye Discipline: I3V2, I5V8

Announcements

We are thrilled to welcome both Kevin Kohmescher and Franky West Jr. to the Inneuractive team! Kevin is a chemical engineer, graduating from the University of Cincinnati and a dedicated NVT researcher/practitioner. Franky is a highly ranked defensive back from Eastern Kentucky University and a promising draft prospect for the 2024 NFL Draft. Both of these men have exceptional skills and dedication that make them valuable new members of our team.

In other news, Inneuractive is happy to present Neurobiks™! Neurobiks™ is a community-based program developed to approach physical fitness and mental wellness in a rather new and unique way! Our primary focus being what we call our Three Pillars: Cognitive, Balance, and Mobility. Classes started January 2, 2024 with our partner Crossfit Cincinnati. Please follow Neurobiks™ on Instagram and twitter @neurobiks_nvt.

Thank you for accompanying us on this remarkable journey. Your enthusiasm and support are crucial in shaping a brighter future in neurotrauma care. We encourage our Friends of NeuroVisual Training community to engage with these enriching resources. Your commitment to staying updated fuels the advancement of our field, and for that, we are sincerely appreciative.

As always, check out our store, http://www.inneuractive.com/shop! We regularly add new products and are excited for the upcoming launch of our NVT warmup panels.