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FRIENDS OF NVT

OFFICIAL NEWSLETTER OF INNEURACTIVE

INTRODUCTION

Welcome to Issue 6, Volume 5 of our continuing Friends of NVT Newsletter! The place for all your neuro-visual training insights and information. We are thrilled for you to be joining us yet again and continuing your support for our mission to provide the cutting-edge of NVT methodologies and newsletter.

In this week's issue we are discussing a popular topic regarding stroboscopic training! More specifically, our main content for this issue is a review on two key papers published this year evaluating the stroboscopic training effects on visuomotor performance in elite youth sports. The first paper discusses the effects on reaction and behavior and the second paper posits the brain-behavior mechanisms resulting from the effects of stroboscopic training. Definitely an interesting read, and these papers will be cited at the end of the issue.

Furthermore, our "How To" for this week illustrates palming, which is a key strategy to help relieve eye fatigue. In today's very screen-based world, whether it is cell phones or laptops or TV's, our eyes are under constant strain and I'm sure we've all experienced eye fatigue at the end of the night. Palming is our go to "stretch" for your eyes and actually stretches the muscles that engage eye movements. So make sure to stick around for that and learn how to get more out of your NVT program! Lastly, we have several exciting updates and announcements, so stay tuned and make sure you don't miss those, found at the bottom of this newsletter.

As always, we genuinely appreciate your support, and continue to look forward to bringing you the latest updates, philosophies, and strategies of Inneuractive, and our NVT programs. Make sure to follow us on twitter at @FriendsofNVT.

WHAT'S IN OUR LATEST ISSUE:

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Review of Stroboscopic Training Effects on Visuomotor Performance Papers

Stroboscopic glasses are glasses where the lenses shutter between translucent and opaque states. In the translucent state, the strobe glasses are essentially like any other clear lens glasses or lightly tinted sunglasses, while during the opaque state, very limited visual information is allowed through the lens. Stroboscopic training utilizes this intermittent opaque state by forcing the wearer to make decisions with decreased visual information (FoNVT 16V1). The philosophy behind this training is that if you train someone, let's say an athlete, to make decisions with less visual information than they are used to, once they regain the normal amount of visual information, they can make the same decision or related decisions more quickly. This is also the general idea around improved reaction times post-stroboscopic training. But with that said, let's dive into these two papers.

Given that these papers are companion publications, let's start with a description of the methods used in these studies. These studies were conducted at four national badminton training centers in Germany. Fourty-five young elite badminton athletes participated in this study, with 32 being included in the final data analysis. The 13 subjects that were excluded were due to injury or illness, missing data, or insufficient training time. The average age of the 32 athletes included in this study was 13.7 years old. Participants in these studies were assigned to either the intervention (stroboscopic training) group, or the control group (no stroboscopic training). The totality of the study occurred across 19 weeks, and performance tests were performed before and after a 10-week training intervention, and after a 6-week period without training intervention, termed the "retention period". The laboratory tests consisted of a reaction time assessment and an EEG. The Field-Test included a reaction time measurement, ball-racquet contact metric, and a net drop parameter.

The Training protocol was designed to improve the players' visuomotor reaction speed by addressing the visual system. Because stroboscopic vision sets high demands on the visual system especially in a realistic training task, the researchers limited the stroboscopic interventions to 2.5 min with a 2.5-min break that were repeated up to six times during a training drill. Throughout the course of the training intervention, the strobe glasses' settings were progressed from week 1 at 15 Hz, and 50% translucent to opaque states, to week 10 at 8 Hz, 70% translucent to opaque states. Overall, the training intervention included five different drills, with three of the drills being on-court tasks and the other two exercises with the ball machine.

The first publication, "Part 1", seeks to investigate both the short- and long-term effects of stroboscopic training on visuomotor reaction speed in elite athletes, specifically evaluating behavior parameters derived from a laboratory and field test. The results described in Part 1 of this two-part study demonstrated a significant acceleration of visuomotor reaction speed attributable to the premotor rather than the motor time both immediately after training and after the retention period. This means that the effects of the stroboscopic training related to decreased visuomotor reaction time persisted even after a 6-week period without training. This supports long-term benefits of the stroboscopic training. Furthermore, no changes were observed in the control group. In addition to the laboratory test, performance improvements in the posttest and retention test were further observed in the field test. Despite improvements in field testing measures, training effects did not differ between groups.

The second publication, "Part 2", seeks to elucidate the brain-behavior interaction resulting in the stroboscopic training effects of accelerated visuomotor reaction time that were discussed in Part 1 of the studies and above. The results from Part 2 highlight that the stroboscopic training-induced improvements in visuomotor reaction time were "accompanied by a decrease in the stimulus-locked N2 latency and an increase in the response-locked N2-r latency that, linearly combined to the Vlc latency, explained >60% of the variance in training effects on reaction time between participants. In contrast, no relation was observed between reaction speed and the BA6 negativity potential. The results provide first evidence that performance improvements in reaction speed after stroboscopic training are mediated by accelerations in visual function."

Now that may be a lot of jargon, so to help break this down, the "N2" is an event-related potential (ERP), and is commonly evaluated using a non-invasive electroencephalography (EEG) cap. The N2 is a wave that peaks around 200-350 milliseconds after a stimulus and is primarily found over the front of the head. The N2 has been used as an objective measure to reflect executive cognitive control functions. N2 latency then is the delayed time it takes to evoke a response after a stimulus is presented. So, in Part 2 of this study, the researchers demonstrated that by keeping a constant stimulus, the stroboscopic training group showed decreased N2 latency. The Vlc measure is an assessment from an EEG that signals the quality of the EEG reading. "BA6" is Brodmann area #6 in the cortex, which is classified as the medial premotor cortex, right above the cingulate gyrus. Thus, since there was no relationship between improved reaction time and BA6 measurements gathered using the EEG, this suggests the improvements were mediated by visual function. All in all this is a rather significant and exciting finding!

The researchers concluded that the "improvements in reaction speed and its applicability to sport-specific training settings make stroboscopic training a promising approach for visuomotor-demanding sports and athletes exhibiting slow visuomotor reactions." As we've discussed throughout our Friends of NVT Newsletter, we routinely use Strobe glasses as a progression for our sports performance enhancement NVT program. Its encouraging to see more research coming out about these training modalities, and these papers build off of the mounting evidence suggesting both short and long-term performance enhancement benefits from stroboscopic training.

Again, the citations for both Part 1 and Part 2 of these papers are below, after the "Announcements" section, and we HIGHLY encourage you all to read them for more in-depth information about the testing and training methodologies. All in all, these were fantastic publications and an exciting contribution to the field of NeuroVisual Training for sports performance enhancement!

"HOW TO" – Palming

Palming can be used as a means to reduce eye strain. It is a simple method originating in the 1930s. While the methods and protocols for doing palming can be varied greatly, we have a simple two-minute exercise we use with our NVT program for our athletes as well as patients undergoing NVT following brain injury.

To begin, make sure there are no contact lenses in the eyes and no pre-existing conditions contraindicating palming. Place both elbows on a firm surface and place the palms of both hands gently on closed eyes. Gentle pressure should NOT produce pain, only the sensation of pressure. The pressure is approximately 1 pound of pressure in each eye (≈0.5 kg). Think of it more as resting your eyes in the inside portion of your palm.

Recommended Palming Cycles:
Palming can be done in 1 to 2-minute cycles. For one minute, rest the eyes in the palms and keep the eyes straight ahead with eyes closed. Do not try to open your eyes while palming. For the second minute, Palming can be done where the subject looks left, right, straight, down, up and straight for 10 seconds in each position, still maintaining your eyes closed. This would be performed during the second minute of palming.

A palming cycle is typically 1 minute of palming with eyes straight and a second minute with the eyes in different gaze positions for 10 seconds each. Subjects can do the palming if the eyes become fatigued up to 20 times per day. Pain with movement can be an indication of extraocular muscle fatigue, injury, or dysfunction. See your eye care professional.

When palming is done remove palms, but still keep eyes closed for a few seconds. Sit up straight and start blinking the eyes rapidly. Look around and give the eyes a few moments to re-adjust. Sometimes blurry vision can remain for a few moments. If discomfort or unusual blurry vision persists, see your doctor and or an eye care professional.

Some individuals see images with the eyes closed. This is not uncommon. Tell your health care provider if you see residual images during palming.

Announcements

Congratulations to our UC Bearcats football team with beating Tulane and maintaining their rank at #2 in the nation! The Bearcats are slated to play Tulsa at 3:30 PM EST on Saturday, November 6 and will be hosting ESPN's College Gameday so make sure to turn in if able!

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.

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.

CITATIONS:
1. Hülsdünker T, Gunasekara N, and Mierau A. Short- and Long-Term Stroboscopic Training Effects on Visuomotor Performance in Elite Youth Sports. Part 1: Reaction and Behavior. *Med. Sci. Sports Exerc.*, Vol. 53, No. 5, pp. 960–972, 2021.
2. Hülsdünker T, Gunasekara N, and Mierau A. Short- and Long-Term Stroboscopic Training Effects on Visuomotor Performance in Elite Youth Sports. Part 2: Brain–Behavior Mechanisms. *Med. Sci. Sports Exerc.*, Vol. 53, No. 5, pp. 973–985, 2021.