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Table of Contents.

- Introduction.
 - An Interview with Aaron Himmler and Olivia Heltman – NVT for Injury Rehabilitation, Written by Blake Bacevich
 - How To: Vector Balls
 - Announcements
 - Disclaimer
-
-

Introduction.

In this issue we talk about the use of NVT for athletes post injury. We will be interviewing Aaron Himmler; head football athletic trainer at the University of Cincinnati, and Olivia Heltman; a NeuroVisual Trainer at the University of Cincinnati, to gain their perspective on how NVT can play a role in an athlete's injury rehabilitation program.

Our "How To" this week is an introduction to the Vector ball. A novel and fun training aid that can be used for lots of different sports training and for NVT. Keep your eye on the ball when it comes to the vector ball, because it will flash you.

NVT for Injury Rehabilitation

Aaron Himmler, ATC, MS; Head Football Athletic Trainer, University of Cincinnati

Q. When did you first begin including NVT in your athlete's injury rehab programs? What initially sold you on the idea?

I think in some smaller capacity, NVT is a component that has been present in some of my rehabilitation programs since I began practicing as an athletic trainer in 2007. I think where it has altered for me is the recognition and intent. Shortly after starting at UC in 2013, and spending time in and around the already developed vision training program here is where I truly recognized the benefit and intentionally started to utilize NVT with much greater frequency.

Q. Do all your injured athletes have some form of NVT included in their rehab program? Do you see greater benefits for any specific type of injury? Upper body vs lower body injuries?

Absolutely. Whether we are rehabbing an upper extremity injury, or a lower extremity injury, the concept remains the same: We are taking someone with decreased function due to their injury and trying to reintegrate them back into sport (or work, or life) and back into unpredictable environments with a high level of performance. The more efficient someone is at intaking visual information or feedback, processing that information, then acting upon that information, the safer and better their performance will be.

Q. When is the NVT part of an athlete's therapy initiated? Once initiated, how often does it take place?

I think this is an area of our rehabilitation programming that has evolved the most, and the most recently. I think NVT training is something that we initially reserved more for the latter stages of rehabilitation and return to play. However, we are now starting to initiate NVT much earlier in the rehab process as we attempt to speed up their neuroplastic adaptation. We will do this as often as a daily occurrence.

Q. Will an athlete only train the injured side, or will they work on the contralateral side as well? If so, what are the benefits associated with training the healthy side?

It is prudent to train not only the injured side, but also the contralateral side. Whether you are an overhead thrower rehabbing from a shoulder injury or a football player rehabbing from a knee injury, your unaffected side still has to operate in tandem with your injured side.

An example of this is, after an ACL reconstruction there is an increased risk of rupturing the ACL on your other side. There are many theories as to why this occurs, one of them being overcompensation. Not only does the injured side need to be reprogrammed, but the healthy side needs to be reprogrammed how to function properly and normally without overcompensating and taking on too much stress.

Q. Are there any injuries that present risks when incorporating NVT into their therapy?

No, I do not believe so. In fact, I would say NOT incorporating NVT into rehab programming is more risky.

Q. Is it onerous or time consuming for your team to do NVT rehab on athletes?

I do not believe so. We feel so strongly about the necessity of including NVT into our rehab programming that it becomes second nature. Again, this goes back to the recognition of its benefit and the "Why" of its inclusion, and us intentionally including this as a necessary component in all rehabs.

Olivia Heltman – NeuroVisual Trainer – University of Cincinnati

Q. Can you explain what your role was during an athlete's rehab?

Throughout the 2019-2020 sports season, I had the opportunity to serve as a student on the neurovisual team that was very involved in the daily training regimen of many student athletes – specifically those of football. As a student, my role was to assist in the execution of daily neurovisual training protocols developed by Dr. Joseph Clark PhD. After several weeks into August, an alternative position became available; this position was to serve as a primary rehabilitation coordinator for one football student athlete that had undergone a critical injury in the offseason. In assuming this role, it was expected that this player and I meet several times weekly for several weeks. I was responsible for the scheduling, fabrication, and implementation of a training protocol each week. This player and I worked closely for several months, utilizing the Dynavision training system, alternative forms of active neural stimulation activities, and collaborating closely with all available athletic/medical staff to ensure his training remained effective and worthwhile in the long run.

Q. How did you go about creating NVT programs? What did your relationship with the rest of the sports medicine staff look like?

The NVT programs were created in conjunction with Dr. Clark and the athletic trainers that were a part of this athlete's rehabilitation team. As the NVT rehab program continued, it became my sole responsibility to produce rehab programs. This was the first opportunity I had ever had to work directly with one patient and be responsible for their proper care (it is important to note this took place with the supervision of several professionals and medical staff). As a student under Dr. Clark, I reported directly to him. He was the primary liaison between me and the sports medicine staff. With that being said, as I began to create rehab protocols on my own, it was not uncommon that I went directly to the athletic training staff to ask questions and receive feedback.

Q. How often and for how long did you see the players you were responsible for (times per week, duration per session, and start/end dates)?

The individualized NVT rehab program began on September 5th, 2019 and the last session was conducted on March 5th, 2020. Training did not take place between the weeks of December 9th, 2019 and January 13th, 2020 as these dates were the beginning and end of a university mandated holiday break. The training sessions that took place in the fall season occurred 2-3 times a week and lasted no longer than 30 minutes. The training sessions that took place in the spring season occurred one time per week and lasted roughly 45 minutes.

Q. Was it hard to keep the athletes engaged in the rehab for that time? What did you do to keep them interested in what you were doing?

In terms of keeping this athlete engaged during rehab, I found no difficulty in doing so. I was fortunate enough to work with an individual that was highly motivated and was looking to improve his craft. Even on days when this athlete was experiencing fatigue or was experiencing environmental stressors, they remained very focused and engaged. Often times it was helpful to take longer breaks between sets and creating a competitive atmosphere proved effective as well.

Q. How did you manage tracking the athletes progress? How did you go about progressing their exercises?

During each training day, the athlete's results were taken down manually. Following this, they were uploaded to an excel sheet in order to visual whether or not there was any improvement. After the fall season, my assistant Ryan Divine did several analyses of the data we compiled in order to draw conclusions on how our athlete had performed thus far. Exercise progression was based upon the capability of the athlete. In the beginning months, much of the protocol was remedial; designed to acclimate the athlete to NVT and participating in NVT with an injury. As the athlete's condition improved, many of the foundational exercises were built upon as to make them more challenging.

Q. Concerning NVT, what feedback did you typically get from the athlete(s) you have worked with? Did they express that it was worth their time?

After completion of this year, it appeared that this particular athlete had deemed the NVT valuable. I appreciated this athlete's patience in working with me throughout the duration of the year and I feel that it was an interesting and advantageous experience for the both of us. This particular athlete did not express directly that NVT was worth their time, but it was evident throughout training that NVT was something they were benefitting from. If given the opportunity to take part in another rehabilitation program utilizing NVT I would not hesitate to do so. I feel NVT benefits athletes tremendously.

How To: Vector Balls

There are several pitch and catch training devices available that can train a person to see, think and catch. One of these devices is a three-pronged boomerang, with different colors on each prong. Another, more recent, device is the vector ball. The vector ball (<https://eyeonballinc.com/>) is a translucent baseball sized ball that flashes



red, blue or green when bounced or hit. It can be used to train baseball batting; eye on the ball to the bat, bounce response; catch the ball based on the color of the flash and others. It can also be used as a random signal generator. Have a person run towards you and cut left, cut right or stop based on the color flashed when bounced or hit. The limitations to the NVT possibilities are restricted only by your imagination. The company website also discusses various other drills for batting, bouncing against a wall, etc.

In today's "How To" segment we are going to give you the instructions for one of the drills we commonly do. There are lots of different possibilities, so be creative.

Our default protocol is to have two athletes stand about 20 feet apart on a firm surface. Each person has one

vector ball. The two people throw their vector balls at the same time to their partner, with a bounce pass about 8 feet in front of their partner. They are to track the incoming ball and observe the flash when it bounces. Based on the flash they catch the ball. If it flashes red, they catch with their right hand, blue with both hands, and green with their left hand. (Red=Right, Blue=Both, Green=Left). If it does not flash, they catch it with both hands. They must ignore the flashed color of the other ball and concentrate on the ball coming to them.

This is our foundational drill. We can progress it with the addition of strobe glasses, pinhole glasses, eye patch, rhythmic stabilization, half bosu, aerex, multiple people in a circle, etc.

There are two styles of vector balls available. One has a 3 second delay between flashes, while the other has a 0.5 second delay. The 0.5 second delay ball is available on Amazon.com.

This is generally considered a fun drill that allows for a high volume of reps. A pair of people can typically do about 35 throws in less than a minute. This makes it an easy drill to incorporate into interval training as one of the stations. Sometimes we use it to keep athletes occupied while waiting for other stations. If people are standing in line, do this drill until a station opens up.

Announcements.

Announcing a new society and journal; The Journal of the Society of NeuroSports. The society is calling for members, as well as papers to publish. According to their website they are an academic society dedicated to the interdisciplinary collaboration in the fields of exercise science and neuroscience. Please check them out at <https://nsuworks.nova.edu/neurosports/>.

In this paper <https://onlinelibrary.wiley.com/doi/epdf/10.1002/ana.25820> they do a retrospective analysis of vision training (VT) papers post traumatic brain injury (TBI). They conclude that the sum of the evidence for VT post TBI does not support recommending it. They claim that the papers out there are small and insubstantial and that more research needs to be done. More research is needed and there is a lot we do not know.

Disclaimer. Nothing in this communication should be construed as a practice of medicine, an endorsement or political action. The opinions are the opinions of the authors.