



125 ms
Decision to swing

0 ms
Light from ball
reaches eye

50 ms
Brain "sees"
the ball

150 ms
Muscle activated
in spinal cord

200 ms
Arm begins
to move

300 ms
Bat crosses
the plate

What is Vision Training?

How to Improve Your Athletes
Sports Vision

- Vision training has little to do with improving eyesight
- It is a form of perceptual learning intended to improve the ability to process what is seen.
- By repeatedly activating the visual sensory neurons, they increase their ability to send electrical signals from one cell to another across connecting synapses.
- With sensory neurons, just like muscles, it's use it or lose it. The more they are used the better they perform.

- *“Eyesight is simply the ability to see something clearly, the so-called 20/20 eyesight (as measured in a standard eye examination with a Snellen chart). Vision goes beyond eyesight and can best be defined as the understanding of what is seen. Vision involves the ability to take incoming visual information, process that information and obtain meaning from it.”*
- *- Dr. Donald Getz, OD*

- As the eyes are responsible for gathering over 2/3rd's of all information fed to the muscular skeletal system, the athlete who focuses on physical conditioning only is neglecting a key component...VISION! The visual system determines where and when to hit, throw and catch a ball, and enables the body to move precisely through three dimensional space.

Why Vision Training?

- “Vision, like other sensory systems, can be improved with practice,” said Dr. [Bernhard Sabel](#), a neuroscientist at Otto von Guericke University in Magdeburg, Germany, who studies plasticity in the brain. “The improvements occur not in the optics of the eye, but in the central processing centers of the brain.”
- The individual who can process more visual information in a shorter period and make the proper response will have an advantage in competition.
- As athletes tap out their potential in other aspects of their performance, like speed, power or strength, what will they turn to next to increase their performance?

- **The trend seems to be that they will turn to vision training.**

Why Vision Training?

- Vision is learned. This makes vision a trainable skill. Almost anyone can be taught the necessary visual skills necessary to excel in sports and life. Plus, it stands to reason that since 75-90% of all learning comes through the visual pathway first, **any interference in the visual system can interfere with reaching your player's ability to reach their maximum potential.**

Does Vision Training Work?

To support the claims made by these training programs we actually need to demonstrate 3 different things:

First, we need to show that the visual abilities that are being trained (whether its acuity or peripheral vision) improve after training in people with already normal vision or above normal vision.

Does Vision Training Work?

- Second, we need to show that sports performance is improved in some way after the training is done.
- Third, and most importantly, we need to demonstrate transfer of training. In other words, we need to show that the reason people got better at sports by the end of the vision training program was because their vision got better (and not due to some other confounding reason). This will require one or more control conditions.

Performance Studies

- A [study](#) by a team of psychologists and published in February in Current Biology showed that baseball players at the University of California, Riverside, were able to improve by 30 percent their reading of eye charts — as well as their batting averages — after completing more than two dozen 25-minute vision training sessions using a computer program. Players who didn't receive the training did not show similar improvement.

Performance Studies

- A study of the University of Cincinnati baseball team found marked improvement in the batting averages of players following six weeks of various kinds of vision training. The team batting average went up 34 points from the previous season, exceeding improvements of other N.C.A.A. teams. Errors decreased by 15 percent, while fielding assists increased 8 percent. (One author of the study was Johnny Bench, the Hall of Fame catcher.)

Is There Really any Proof?

- Two types of vision training programmes exist, namely, generalized vision training (GVT) and sport-specific vision training (SVT). GVT programmes are designed to improve basic visual function. Whilst there is anecdotal support for the use of GVT programmes, there remains a paucity of empirical evidence to suggest that such training improves sports performance. Conversely, research on SVT has been shown to lead to task-specific improvements in sports performance.

Vision Studies

- Williams et al. (2002) trained anticipation of tennis groundstrokes using film-based sport-specific vision (perceptual) training. They demonstrated that anticipation could be trained through video feedback of key visual stimuli from the opponent's action. Not only did anticipation performance improve above that seen in a matched-ability intervention group, but these improvements transferred to an on-court test of anticipation (the training group's mean responses were 0.187 s quicker than reported for the control and placebo groups)

More Proof...

- Hopwood et al. (2011) demonstrated that highly skilled cricket players who received visual-perceptual training in conjunction with on-field training, demonstrated greater improvements in in situ fielding tests (catching success improved by 21.7 % from pre-to post-test) compared to those who received on-field training alone (catching success improved by 16.2 % from pre- to post-test).

Summarizing

- Without task-specific knowledge about the salient visual information, the benefits of having more effective general visual functioning in individuals with already healthy visual function are unlikely to be realized.
- SVT has been shown to have performance advantages when compared to control and placebo groups across a range of sports. These advantages appear to be task-specific.

Vision Definitions

- **DYNAMIC VISUAL ACUITY**

This is the visual skill that allows you to see objects clearly while the object is in motion. In virtually every sport this means that you need to have exceptionally good vision at distances ranging from a few inches to 300 feet.

- **FOCUSING SKILLS**

The ability to see clearly both up close and in the distance, and to shift focus quickly, accurately and efficiently from near to far

- **SACCADIC EYE MOVEMENT**

The ability to scan quickly from player to player, or ball to target

Vision Definitions

- **TRACKING**

The ability to follow a moving object smoothly and accurately with both eyes, such as a ball in flight

- **FIXATION**

The ability to quickly and accurately locate and inspect an object with both eyes

- **BINOCULARITY**

The ability to use both eyes together, smoothly, equally, simultaneously and accurately

Vision Definitions

- **DEPTH PERCEPTION**

The ability to judge relative distances of objects and to see and move precisely in three-dimensional space

- **VISUAL RECOGNITION AND REACTION TIME**

The speed with which your brain interprets and reacts to your opponent's action

- **VISUAL CONCENTRATION**

The ability to screen out distraction and stay focused on the ball or target

Vision Definitions

- **PERIPHERAL AWARENESS**
The ability to use visual information perceived from over a large area
- **CENTRAL-PERIPHERAL INTEGRATION**
The ability to monitor and interpret what is happening around you while attending to a central, specific task
- **EYE-HAND-BODY-COORDINATION**
These crucial interactions are the ultimate basis of athletic skill. The ability to take in correct and appropriate visual information and translate it into necessary body movements is the essence of this skill set.

Vision Definitions

- **VISUAL MEMORY**

The ability to process and remember a fast moving, complex picture of people and things

- **VISUALIZATION**

The skill which enables you to see yourself performing well in your "mind's eye" while your eyes are seeing and concentrating on something else

- **DECISION MAKING SKILLS**

The cognitive thought of reaching a decision between alternative courses of action

Questions for Your Players?

- Do you use any visual aid? For competing? For training?
- Do you have difficulty keeping your eye on a moving object?
- Do you notice variations during your performance?
- Does your performance fall off early or late?
- Is your performance the same for night as for day competition?
- Do you have other visual difficulties when performing?
- Do you experience loss of concentration when performing?

Does The Coach Recognize Any Of The Following Signs?

- Inconsistent performance
- Performance not up to potential
- Performance deteriorates over time
- Performance deteriorates under mental or physical stress?

Vision Training Tools

- Charts
 - Hart Charts
 - Saccadic Charts
 - Wall Charts
 - Peripheral Vision Charts
 - Rings

Vision Training Tools

- Brock String
- Eye Patch
- Vision Goggles
- Cognitive Vision Program

Vision Training Tools

- Vision Rings
- Juggle Stick
- Flat Bat
- Small target balls and bats
 - Wiffle Golf
 - PowerNet Bat & Small Training balls
 - Koosh Balls

Additional Training Tools

- Overload/Underload Training
 - Weighted Balls
 - Heavy/light Bats

In Conclusion

- Vision is the process of reacting to what one sees
- Vision is one of the basic sports ingredients for winning
- The eyes manage the body. They orchestrate the motor muscular movements of the body
- The visual system is the trigger mechanism which determines the right time
- The eyes look where we tell them to look – they are teachable

Three Layers

- **Layer one: trajectory extrapolation**
- **Layer two: snap judgment**
- **Layer three: pattern recognition**

- Pitches traveling at 100(70) mph take just 400 ms to travel from the pitcher to the hitter. Since the typical reaction time is 200 ms, and it takes 100 ms to swing the bat, this leaves just 100 ms of observation time on which the hitter can base his swing. If reacting that fast sounds superhuman, it is; if reaction time were all there was to it, batters would never get a hit. To work around their slow reactions, humans have developed a **three-layer mental strategy**.

- Although baseball players' reactions aren't superhuman, as they are sometimes portrayed, the reality sounds just as fictional. Their brains are simply employing a three-layer mental strategy to travel forward in time, determine when and where the ball will cross the plate, and provide precious extra milliseconds to compensate for slow reactions. The truly amazing thing is that each person's brain is naturally equipped with this ability.
- Of course, most of us can't hit a 100 mph fastball. The best hitters spend hours watching thousands of pitches. With each pitch, the different layers in their brains get just a bit better. Maybe the reaction times of these hitters aren't superhuman, but the focus and dedication required to train their brains enough to hit a fastball might be.