

# THE **FIREARMS** INSTRUCTOR

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# INSIGHT TO EYE DOMINANCE

By Matt Seibert and Sherrie Seibert

**T**raditionally the test for eye dominance has been to form a circle with the thumb and forefinger with the arm extended and have the student look through the circle. (Refer to Fig. 1a) Another variation is to have the student take their two hands and form a triangle between the thumb and forefinger and have the student look through the triangle to determine their eye dominance. (Refer to Fig. 1b) Neither of these methods produces an accurate measurement of eye dominance and they fail to explore other variables that can affect which eye is dominant and to what degree. (Refer to Fig. 1c and 1d)

One of the primary objectives in firearms training is to create a straight sighting plane that originates from the center

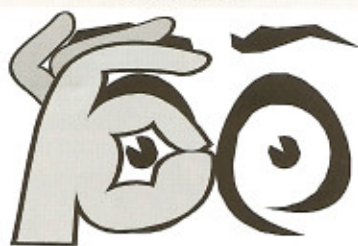
of the dominant eye's pupil to the rear sight, the front sight and to the very center of the target. (Refer to Fig. 1e) To achieve this objective we will investigate various types of eye dominance and how they affect a shooter's performance. We will share with you variables that can cause eye dominance to shift from one eye to the other and techniques that will help guide your student in developing a stable sighting plane.

#### ORIGIN OF THE LINE OF SIGHT

Many shooters prefer one eye over the other, but not everyone's eye dominance is the same under all conditions. The assumption has been that a shooter's eye dominance will be either their right eye or their left eye, but this is far from accurate. When we refer to a shooter's eye dominance we are referring

to the eye that acts as the "origin of the line of sight." The goal is for the origin of the line of sight to lie in the center of the pupil of one eye. (Refer to Figs. 2a and 2b) It is a critical component of the shooting process and plays a vital role in our ability to shoot with precision accuracy. Many students fail to ever achieve peak performance in their shooting abilities because of improper diagnosis, or the lack of the instructors understanding of how the brain, eye and hand systems function. Often students are set up for failure from the very beginning because they were not made aware of the multi-dimensional implications and variations that will cause dominance to become unstable or switch completely to the other eye. The antiquated methods for diagnosing a student's eye dominance only

FIGURE 1A



thumb & forefinger method

FIGURE 1B



2-hand triangle method

FIGURE 1C



2-hand triangle method reveals the student is left eye dominant

FIGURE 1D



testing with a blue gun reveals the student is right eye dominant when shooting with the gun in his right hand using a 2-handed grip

FIGURE 1E



straight sighting plane

work for approximately 40% of the population. Understanding the different variables that influence a student's eye dominance will give you the ability to properly diagnose their dominance. This will assure that every student in your class has an opportunity for success in every aspect of shooting.

### BINOCULAR VISION

7/8's of everything we do is in response to what we see. This concept is critical to understanding the importance of eye dominance in the shooting process. We have binocular vision consisting of two eyes. Each of our eyes sees a different image. The brain uses the differences in these images to interpret distance, size, speed and figure-ground relationships thus creating a three-dimensional picture.

Seeing double is a natural phenomenon although it is not experienced when a shooter's visual system is functioning optimally. By that I mean, a person with normal binocular vision (two eyes working together) can usually suppress or ignore the pseudo image that is caused by converging their focus from the target to the front sight. If a shooter has inadequate suppression when they change their focus from the target to the front sight, the pseudo target may cause a fictitious sighting plane which can result in a miss. There is a psychological suppression skill they can learn or the student can compensate for by closing one eye. There are several variables that we will discuss in this article that can determine what eye is dominant and what conditions have the potential of influencing the degree of dominance. It is important for you as an instructor to know under what conditions your student's dominance may become unstable.

The following exercise will help you to understand when suppression of one eye breaks down or operates at a low level and why a shooter misses or cross fires.

**Exercise:** Hold a pen vertically at arm's-length up to your eye aimed at a distant target of your choice. Use a pen that has lettering on it. The lettering should be facing you. Now put your focus on the target across the room. As you look at the target, you will become aware of two blurred pens in the foreground. (Refer to Fig. 3a) You may need to wiggle the pen aimed at the target to help reduce the suppression.

Now change your fixation to the pen. As you see the pen clearly, you'll notice two blurred targets in the background. (Refer to Fig. 3b)

Now zero in on a single letter on the pen.

The target in the background will disappear if you have good suppressive skills. Many people have a difficult time doing this and will have to close one eye.

### OPTICAL CHIASM

The brain plays tricks with our mind when it receives the two images from two eyes. It

FIGURE 2A



the origin of the line of sight must lie in the center of the pupil of one eye

FIGURE 2B



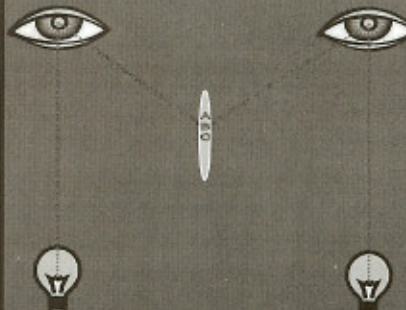
the origin of the line of sight must lie in the center of the pupil of one eye

FIGURE 3A



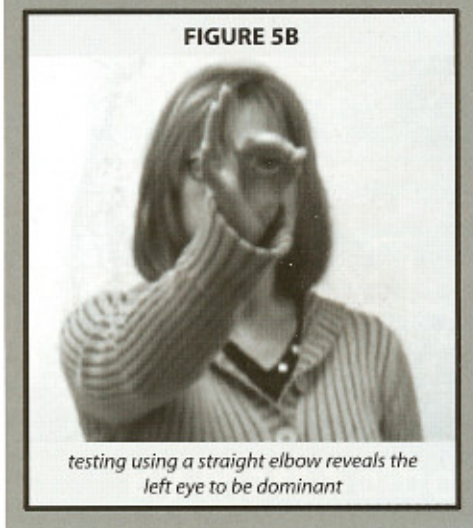
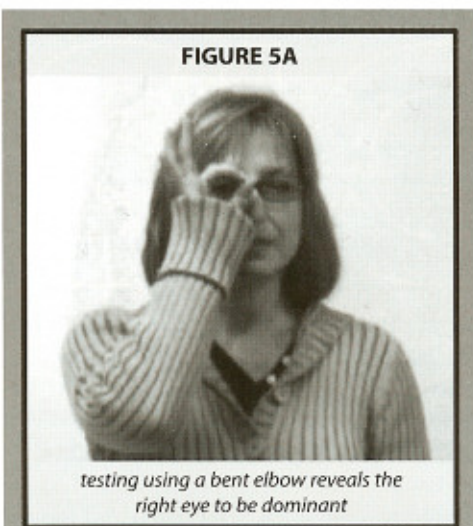
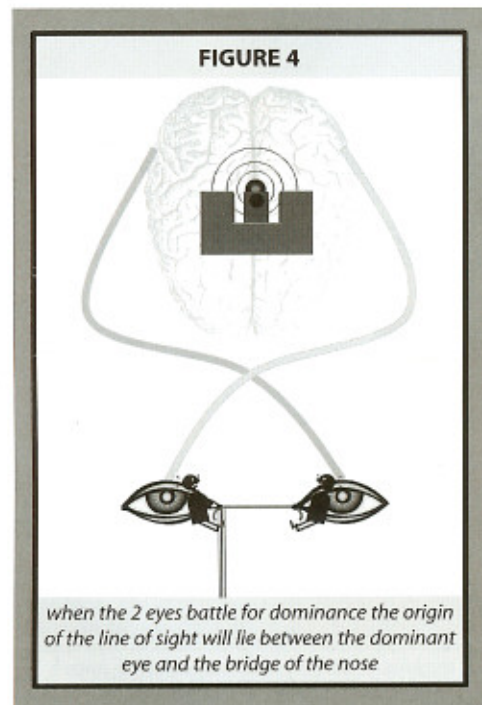
focusing on a distant target will create two pseudo pens in the foreground

FIGURE 3B



focusing on the pen will create 2 pseudo targets

starts when the two images travel from the optic nerve down the left and right eye optic tracks. When the two optical tracks cross before they reach the brain, the two images are transformed into a single image through what is called an optical chiasm. The image then travels down the optical tracks to the left and the right hemispheres of the brain. The brain then sees a combination of the two images which have blended into one image. When two eyes battle for dominance, the origin of the line of sight will not lie in the center of the pupil. (Refer to Fig. 4) Variations in eye dominance will affect the origin of the line of sight in relation to the sighting plane, thus affecting how the shooter sees the sights in relation to the target. The sighting plane will be compromised because the line of sight will originate somewhere between the two eyes. The greater the distance between the dominant eye and the origin of the line of sight, the greater the error will be on the target. When a shooter has problems with their eye dominance, the dominant eye will see the front and rear sight of the gun and the non-dominant eye will see the target. The brain will blend the two images. In the shooter's mind, the sights will appear aligned with the target thus creating a fictitious sighting plane. This phenomena works on the same principle as the Armon O.E.G. sight where the shooter focuses on the red dot in the occluded sight with their dominant eye, the non-dominant eye looks at the target and the brain superimposes the dot onto the target.



Where the bullet hits on the target will be influenced by both the dominant eye and the influence of the opposing eye. It is the dominant influence and strength of the opposing eye that will determine the origin of the line of sight.

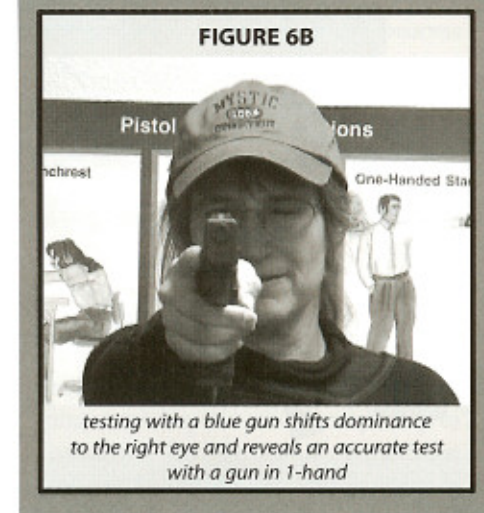
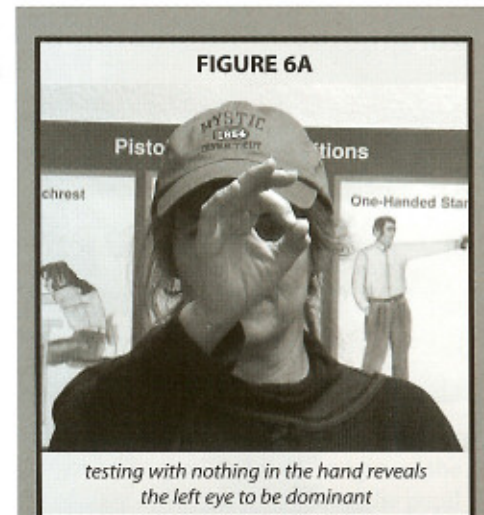
#### FACTORS THAT CAN INFLUENCE EYE DOMINANCE

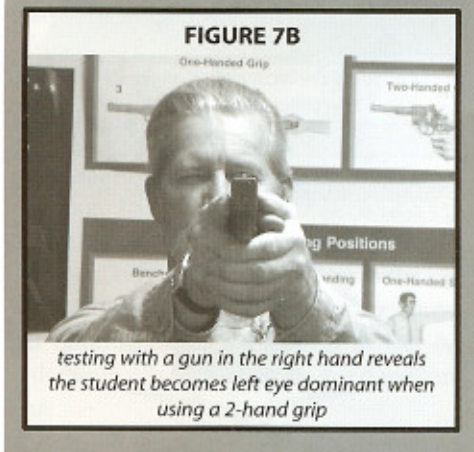
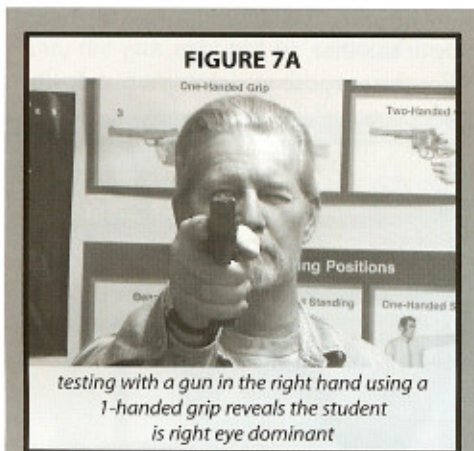
The mind and body follow and react to what the eye sees. Traditionally we have tested to see if the right eye or the left eye was the person's dominant eye. Unfortunately the test stopped there. Our research has determined that eye dominance can shift from one eye to the other through: (1) Interlimbic positioning (position of the arms in relationship to the body), (2) kinesiology (sensation of having something in the palm of your hand; such as a gun), (3) parallel processing through kinesiology (symmetrically affecting both hemispheres of the brain, such as taking a two-handed grip on the gun), (4) change in lighting conditions, and (5) hemispheric processing such as

cognitive processing (thinking and making judgments in shoot-don't-shoot situations), stress (experiencing a sympathetic response; the fight or flight response), and several others variables. These factors influence how the brain establishes what eye will be dominant and/or the degree of dominance. This influences the origin of the line of sight and affects the sighting plane.

#### 1. INTER-LIMBIC POSITIONING

Raising your arm above 45° can influence how the eyes and brain interact. Just by bringing your arm up to eye level can cause the origin of the line of sight to move toward the non-dominant eye or even shift your eye dominance from one eye to the other. A shooter with their hands down at their sides may test differently when they bring their hand or hands up to eye level. We'll talk more about how this impacts a shooter's performance in the section on "Basil Dominance." Dominance can also be influenced by bending the elbow. If a shooter shoots with a bent elbow their dominance may be affected. This has major implications





influence which eye is dominant and to what degree. When the gun is held using a two-handed grip, both hemispheres of the brain are symmetrically affected, and the shooter's eye dominance may become more or less stable. The dominance can shift from one eye to the other. In other words, when a student has a gun in their right hand only, their right eye may be dominant, but when they shoot right handed using a two hand grip (directly affecting both hemispheres of the brain), their eye dominance may become unstable and the origin of the line of sight may lie somewhere between the two eyes or may shift to their left eye. (Refer to Figs. 7a and 7b)

#### 4. LOW LIGHT CAN AFFECT DOMINANCE

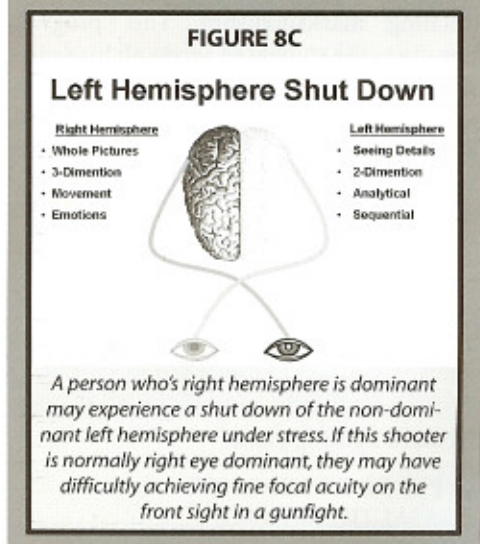
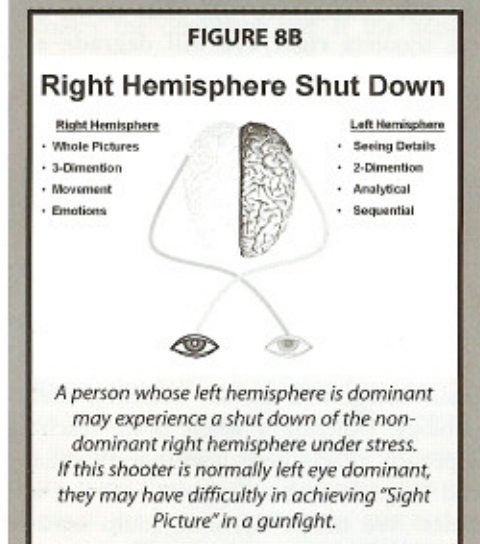
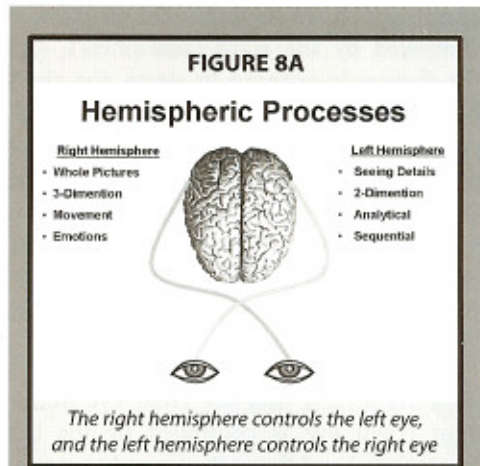
Shooting in low light can cause dominance to shift from one eye to the other. If you see a student whose shots are hitting dead center on the target with the lights on, and then in a low light setting their group is off to the right or left, ask the student to close one eye. By closing one eye their eye dominance will stabilize and six times out of ten their shots will center. It helps to conduct a low light eye dominance test on your students before taking them into a low light environment. This is especially important for Law Enforcement and Military

#### 5. HEMISPHERIC PROCESSING

There is a relationship between the two hemispheres of the brain and the two eyes. Each hemisphere processes information in a specific way. The left hemisphere is usually the dominant hemisphere, unless the person is left handed and their mother was also left handed. The left hemisphere is responsible for seeing details (Example: Making a pursuit movement of the eye to achieve primary focus on the front sight.), symmetry, two dimensions and linear sequential analysis, and is language orientated. The right hemisphere sees whole pictures (such as sight picture: *sights in relation to the target*), patterns, three-dimensions, and senses movement and emotions, and is the creative side of the brain. Each controls a different side of the body. The brain has a crossover process so that each side of the body communicates with the opposite hemisphere of the brain. All sensory motor functions on the right side of the body are controlled by the left hemisphere. All sensory motor functions on the left side of the body are controlled by the right hemisphere. In other words, the left hemisphere communicates with the right

eye, and the right hemisphere communicates with the left eye. (Refer to Fig. 8a) The right hand sends and receives information from the left hemisphere, and the left hand sends and receives information from the right hemisphere.

We've discovered that when a student's dominant eye is on the opposite side of the



for a shooter who shoots with a bent elbow when using a Weaver Stance. (Refer to Figs. 5a and 5b)

#### 2. DOMINANCE IS AFFECTED BY KINESIOLOGY

Holding a gun or an object in the palm of your hand will stimulate the nerve receptors in the palm of that hand. This can influence the degree of eye dominance or change which eye is dominant. This is why traditional testing with empty hands often provides inaccurate assumptions of a person's dominance. If you test a student who is making a circle with their thumb and forefinger or using the two handed triangle method and then re-test with a blue gun in their hand, you may find the results to be the opposite from testing with nothing in their hands. (Refer to Figs. 6a and 6b) Some instructors use a washer (metal disk with a hole in the center) to test dominance. If there is no contact of an object with the palm of the hands the neurological response that can affect eye dominance and the test can be inaccurate.

#### 3. SYMMETRIC KINESIOLOGY AFFECTS DOMINANCE

Shooting with a two handed grip as opposed to shooting with one hand, can

body from the dominant hemisphere; the communication between that hemisphere and eye will continue to function effectively under stress. Generally, under stress the non-dominant hemisphere tends to shut-down and leaves the majority of the processing up to the dominant hemisphere.

Here's one of the problems; If the person's **dominant hemisphere is their left**, and their **left eye is dominant** (left eye is controlled by the right hemisphere), and the shooter is **exposed to stress**, the **right hemisphere will shut down** and the shooter's **left eye will degrade** and they will have **difficulty conceptualizing whole pictures such as "sight picture."** (Refer to Fig. 8b) Under stress the degree of dominance may be affected and the origin of the line of sight may shift the dominance to or towards the opposite eye.

If the person's **dominant hemisphere is their right**, and they are **right eye dominant** (right eye is controlled by the left hemisphere) and they are **exposed to stress**, the **left hemisphere will shut down** and the shooter's **right eye will degrade** and they will have **difficulty seeing fine details such as the front sight.** (Refer to Fig. 8c) Sometimes under stress the degree of dominance may be affected and the origin of the line of sight may shift the dominance to or towards the opposite eye.

One of the ways Insight Firearms Training Development has been able to work around some of these hemispheric issues is to optimize the learning state by utilizing whole brain integration in our teaching methodology. Utilizing a whole brain teaching approach affects both hemispheres equally and keeps both hemispheres active at all-times. We use a dynamic multi-sensory enriched PowerPoint presentation when teaching marksmanship. This program stimulates the student to access all his senses and both hemispheres. If you create a multi-sensory learning environment, you will improve whole brain integration that will train both hemispheres to keep functioning under stress.

There are several other variables that can affect dominance which cannot be discussed in this short article. We are sharing the ones that we believe will be most beneficial in assisting the instructor's ability to diagnose the origin of the line of sight and stabilize the shooter's sighting plane.

#### TYPES OF DOMINANCE

##### BASAL DOMINANCE

It is very important to know the basal

dominance of a person's lead eye when they are at rest and their hands are down at their side. When the shooter's hands are down at their side, one eye will generally act as the preferred dominant eye and will be the primary visual lead. Everything they see will lie at a right angle to that eye.

It is also important to realize that under certain conditions this lead eye may shift to a different eye, and the origin of the line of sight may lie between the newly established dominant eye and the original lead eye. A person's right eye may be dominant when they have their hands down at their side, and through inter-limbic positioning, by bringing the gun up to eye level, their dominance can shift from the right eye to the left eye, or somewhere in between.

When a shooter makes the decision to draw their gun with their hands-down at their side, their eye dominance can shift to the opposite eye when the gun is brought into the sighting plane. This has major implications:

The shooter will hesitate, waiting for his dominance to stabilize while trying to obtain a straight sighting plane. This translates into a very slow first shot.

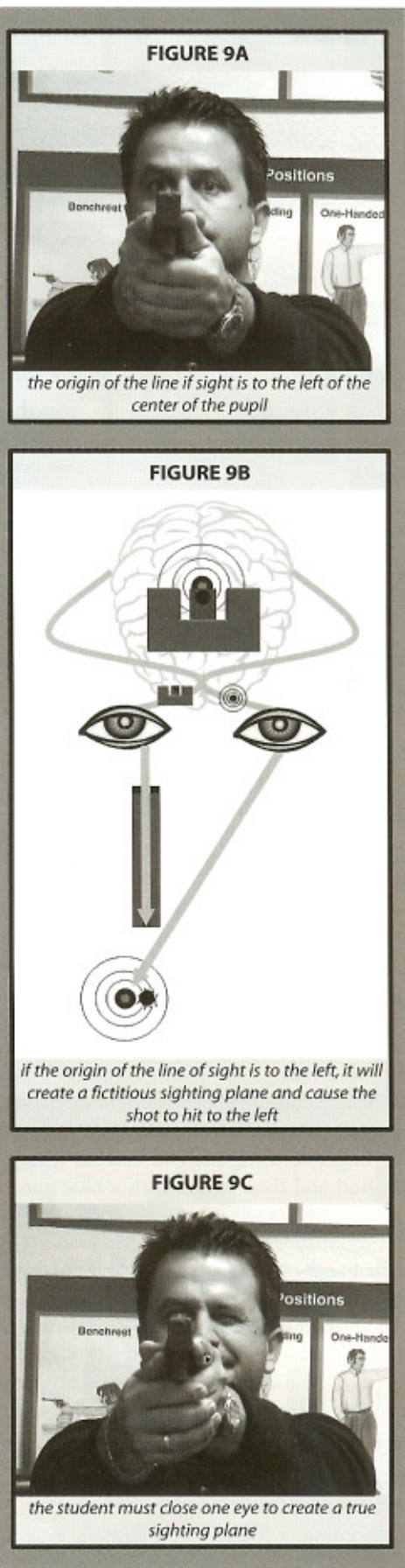
If the shooter is not able to establish a sighting plane in a stressful situation, or there is a delay in obtaining a stable sighting plane, the shooter's emotional arousal will increase, creating a sense of urgency to release the shot. This will cause the shooter to fire without establishing a true sight picture or seeing their front sight. This generally translates into a missed shot or utilization of the "spray and pray method" of firing.

**MASTER EYE:** For the purpose of sighting a pistol, when the firearm is brought into view, the master eye will immediately take over as the primary lead eye creating a condition of monocularity as opposed to binocularity. The non-dominant eye will be psychologically suppressed during the act of shooting. The shooter will be able to sustain acuity (focus) on the front sight without the other eye trying to take over which could create an unstable condition. The origin of the line of sight will always lie in the center of the pupil of that eye.

**DOMINANT EYE:** A dominant eye assumes the visual lead but with degrees of hesitation, strain and/or correction. The origin of the line of sight of a "dominant eye" may lie between the dominant eye and the bridge of the nose to that respective eye. The degree of dominance will influence the relationship between the eye, gun and target,

thus affecting the sighting plane and accuracy of the shot.

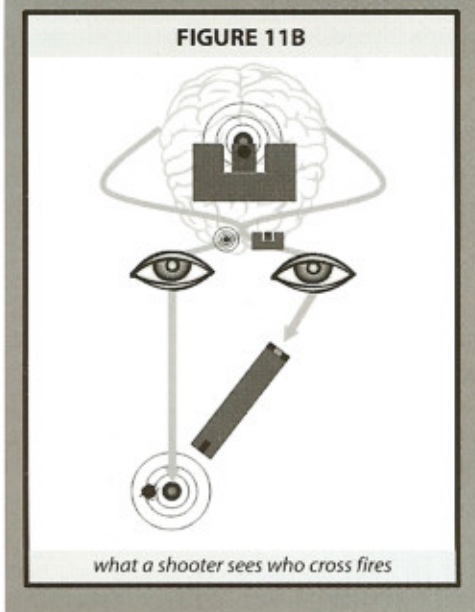
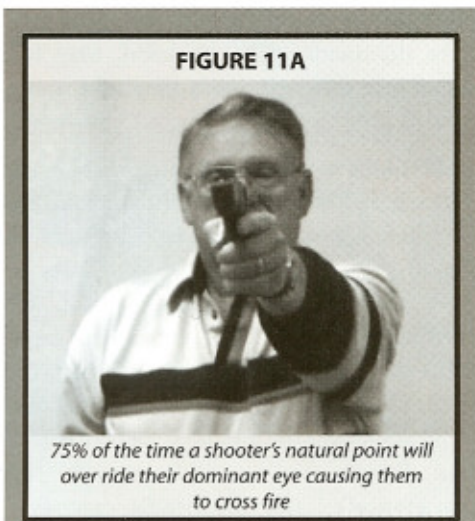
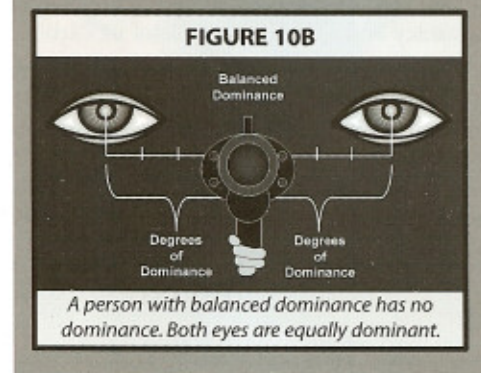
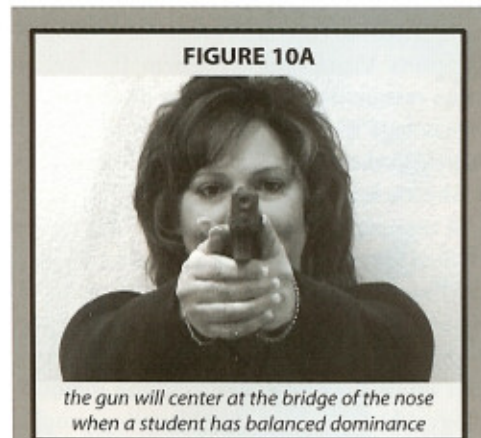
For the purpose of sighting a pistol, when



the firearm is brought into the sighting plane, the gun may not be centered in the pupil if a dominant condition exists. The position of the gun may lie somewhere between the center of the pupil and the bridge of the shooter's nose. This translates into the shot hitting to the left or right of the target, depending on which eye is dominant and the degree of variation in the origin of the line of sight from the center of the pupil. If the shooter is right handed and their right eye is dominant, they may have the tendency to shoot to the left, if the strength of the opposing non-dominant eye is pulling the sighting plane off to the left. (Refer to Figs. 9a and 9b) The shooter will have to use corrective measures to get the origin of the line of sight centered in the pupil. To do this they may have to partially or fully close the non-dominant eye to create a stable dominant condition. (Refer to Fig. 9c)

Traditionally it has been assumed that if a right handed student is shooting to the right of the desired point of impact, the student was milking the trigger, when in fact 60% of the time it is caused by an eye dominance issue.

Some shooters try to force dominance by positioning the non-dominant eye completely out of the visual field. Having a student turn his head to obtain a dominant condition can create a delay in the shooter's



ability to pick up the front sight quickly if the gun and the head are both moving at the same time. If the student is under stress, this can also translate into forcing the shot before the student has had time to achieve sight picture, or sight alignment and gain focal acuity on the front sight. The easiest way to eliminate this delay is to have the student close one eye as they bring the gun up to eye level. If this process is taught as part of the student's presentation (the draw) it will eliminate the hesitation or delay.

**BALANCED VISION:** When a balanced dominant condition exists the dominant strength of the two eyes are equal. Both eyes assume the visual lead. The origin of the line of sight lies between the two eyes at the bridge of the nose. When bringing the pistol into the sighting plane, the gun will center itself directly between the two eyes. (Refer to Figs. 10a and 10b) When the two eyes are of equal dominance, the person

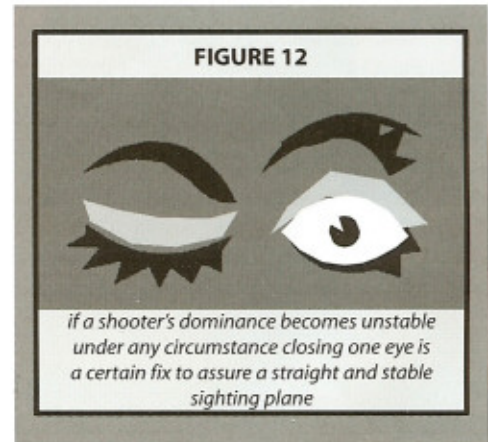
doesn't really have a dominant eye. We have found that even with balanced dominance, the person will still have a preferred eye. A balanced dominant condition will create a more extreme angle in the sighting plane than a dominant condition thus creating an even greater error as to where the bullets impact on the target. The shooter will have to partially or fully close the non-preferred eye to create a straight sighting plane so the origin of the line of sight will lie directly in the center of the preferred eye's pupil.

It is important to remember that the same person who tested balanced dominant with nothing in their hands may test completely different with a gun in their hand. It must also be noted that a person who tests balanced dominant with one hand, may test completely different when they take a two handed grip.

**PARALLEL DOMINANCE:** The dominant eye will be determined by which hand the shooter is using. When a person shoots with their right hand, their right eye becomes the dominant eye. If the person shoots with their left hand, then the left eye becomes dominant. The kinesiology of having the gun in their hand(s) is determining the dominance of their eyes. There can be varying degrees of dominance with this condition.

The major implication is that if a right handed person tested right eye dominant and then switches the gun to the left hand, there is the possibility their dominance may shift to the left eye. Depending on the strength of the dominant condition of the left eye, the gun may not line up to the center of the pupil thus creating an angle from the origin of the line of sight to the gun and to the target. This could cause an inaccurate shot.

It is important to remember that the same person who tested parallel dominant



with nothing in their hands may test completely different with a gun in their hand. It must also be noted that a person who tests parallel dominant with one hand, may test completely different when they take a two handed grip.

**CROSS DOMINANCE:** The dominant eye will be determined by which hand the shooter is using. When a person shoots with a gun in their right hand, their left eye becomes dominant. If the person shoots with a gun in their left hand the right eye becomes dominant. This becomes a real problem because of the phenomena of the optical chiasm that creates a cross fire condition. There can be varying degrees of cross dominance.

If the shooter is left handed and their right eye is dominant, they have a 75% chance that they may cross fire and shoot to the right. The shooter's natural point may override the dominant eye. (Refer to Figs. 11a and 11b) Vice versa for a right handed, left eyed shooter.

It is important to remember that the same person who tested cross dominant with nothing in their hands may test completely different with a gun in their hand. It

must also be noted that a person who tests cross dominant with one hand, may test completely different when they take a two handed grip.

#### SUMMARY

Teaching your students how their eye dominance works, is just as important as teaching your students the principles of sight alignment and trigger control. We need to evaluate each student's visual capabilities based on the individual and the visual requirements needed for the shooting application by using a Blue or Red Simulated Gun. (Never use a real firearm to test dominance!) Using the proper diagnostic procedure in evaluating your student's eye dominance will be reflected in the success of the student's performance.

There are eye exercises that can aid in developing dominance and non-dominant suppression, but this can take months to develop. It is easier to identify how your student's eyes are wired and teach them to develop the habit of closing one eye to stabilize their dominance in order to assure the origin of the line of sight originates from the center of the eye's pupil. (Refer to Fig. 12) We

must train the eyes in a similar manner we train any other motor skill. If a shooter has to close one eye in any of the circumstances mentioned to achieve a stable dominant condition, the closing of one eye has to be reinforced and programmed to the unconscious until the skill is automatic under all conditions. This process must be integrated into every application of shooting for a shooter will never remember to close on eye in one situation and keep both eyes open in another. The process must be the same for every shot. **TFI**

#### ACKNOWLEDGEMENT

I would like to thank Jim Gregg for his tutelage in the art of instinct shooting and introducing me to the variations in eye dominance. He inspired me to further explore the visual requirements for the "sighted shot" and the eye - brain - body relationships for using sights and sighting systems to achieve peak performance and precision accuracy.

#### ABOUT THE AUTHORS

Matt Seibert is a former law enforcement officer and has been training law enforcement in the use of firearms since 1976. He is currently the President of Insight Firearms Training Development and a former Instructor and General Manager for Gunsite Training Academy. He has been a member of the International Academy of Sports Vision and has spent the last 15 years researching the visual skills and neuro psychology required to achieve peak performance in the use of the pistol and carbine.

Sherrie Seibert is also a firearms instructor and training specialist. Matt and Sherrie are trained Hypnologists and specialize in conducting advanced firearms instructor development programs for Law Enforcement and Military Special Op's. They have developed and utilize an accelerated training methodology which programs the shooting process to the unconscious and actually "enhances" accuracy and speed with a pistol or carbine under extreme conditions.

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**IALEFI® would like to continue to offer our sincerest thanks to the brave men and women in our military who are working day and night to protect us.**

*Thank You.*

