



## Science-Based Solutions to Human Factor Issues

### Why Does My Field of View Narrow under Stress? <sup>1</sup>

#### Tunnel Vision

Under conditions of low to medium stress, the eye is executing 3-4 saccades (movements) per second. The eyes unconsciously move around, locating interesting parts of the scene that capture our attention and builds a mental, three-dimensional 'map' corresponding to the scene.

Saccades help to focus light on the fovea. The fovea is a 2-3 degree area of the eye that is responsible for complete clarity. However, under extreme stress, when the saccades slow down or stop altogether, the fovea can only take in about 1/2 degree of visual clarity – in other words, a 1/2 degree field of view (FOV)!

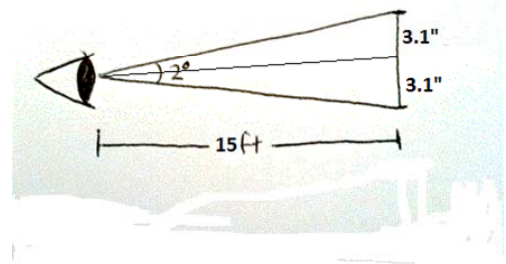
Our normal FOV is 180° horizontal and 135° vertical, but our cone of visual attention is only 55 degrees. As stress increases, it begins to narrow, and under extreme stress can eventually reach 1/2 degree. Look at the two pictures of the cow and you will get the point.

So, the question is: given any certain distance from you to the person or object, what is the field of view that will provide for distinct visual clarity, when that object is projected onto the fovea? To answer that question you are going to have to use some high school trigonometry or **E-mail us for a for a free copy of the CTI Visual Field Calculator in a simple to use Excel spreadsheet.**

Look at the chart for an example on how our field of view narrows.

<sup>1</sup> Force Encounters Analysis: Understanding Human Performance during Critical Incidents, Chapter 4: Stress & Performance: California Training Institute

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Distance	30°	10°	3°	0.5°
5 yards	96"	32"	9"	2"
10 yards	192"	63"	19"	3"
25 yards	482"	158"	47"	8"



# California Training Institute

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### Domestic Violence (DV) Example

Officer enters a room on a DV case. Their first response is to consciously, visually scan for weapons and additional persons. What they are not aware of is that their eyes are also unconsciously scanning through 3 to 4 unconscious eye movements (saccades) per second. This allows the brain to create a mental map of the scene. These short saccades allow visual information to be processed by a part of the eye called the fovea. The fovea is a 2-3 degree area in the back of the eye, with the highest concentration of cones. This area is responsible for fine detail vision.

In this situation, if we are under a moderate level of stress, our effective field of view is approximately 30 degrees. In the average room (5 yards) we see things clearly within 96 inches. Consciously moving our head to scan lets us see the whole room clearly.

During contact, subject male, becomes irritated and begins yelling. As the situation intensifies, you can feel your face flush and your heart beats faster as your level of arousal increases. In addition to the hormones released in the “fight or flight” response, your effective visual field unconsciously begins to narrow. As stress increases, those visual saccades slow down or stop altogether – this allows the visual threat to be clearly focused on the fovea. Under extreme stress, this can narrow to about ½ degree. Depending on the perceived level of stress, our visual acuity/field of view can then narrow from 96 inches to 32 inches, to 9 inches, to 2 inches respectively. You can refer back to the chart for this information.

#### Think about what you could miss:

- If you are looking at the man’s face, you may not be able to see his hands.
- If you are looking at the man, you may fail to see someone else enter the room.
- In the interview, you will only be able to recall what was in your field of attention.

#### Keep these points in mind:

1. Keep stress under control—always have a plan, mentally rehearse it, and breathe slow and deep.
2. When scanning, move your head.

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