

# **Tunnel Vision and Auditory Exclusion**

**By**

**Charles P. Stephenson**

**The Orion Group**

**DbA**

**Crime Scene Plus**

**Crime Scene Reconstruction – Ballistics – Firearms**

**Use of Force – Lethal Less Lethal**



5/11/22

All rights reserved

## **Sympathetic Nervous System – Para Sympathetic Nervous System:**

In the 20's; American Physiologist Walter Cannon, determined; the sole function of the Sympathetic Nervous System (SNS), is to stimulate the body's "fight or flight" reaction; versus the Para-Sympathetic Nervous System, that regulates our day to day body functions, such as breathing, heart rate, digestion, body temperature and libido.

The "fight or flight response", is a psychological/physiological automatic response system, present in all in human beings; it signals our body that danger and/or great bodily harm is imminent.

It stimulates the adrenal gland, to release adrenaline, resulting in an increased heart rate, higher blood pressure and faster breathing. This response prepares the body to deal with stress or danger in our environment. It can be triggered by both real and imaginary threats.

Tunnel vision, auditory exclusion, loss of fine motor skills and cognitive/conceptual disorders can occur during this process. The level of tunnel vision and auditory exclusion is determined by the degree of stress being encountered/ transmitted by the sensory imputes of the body.

An individual's reactions to stimuli is composed of three things; Sensory Perception (seeing); Cognitive processing of sensory input (thinking); and motor skill performance (doing).

We perceive, analyze and evaluate a threat, to formulate a survival response and initiate specific motor response. Each step must be performed in sequence and each stage is dependent on information presented in previous stage.

If any stage lacks sufficient information, reaction time can be expected to increase.

When the SNS activates the "Fight or Flight" (FOF) response, the visual field collapses, sensory perception is disrupted, the brain's ability to analyze and evaluate information is impeded.

Some of the cumulative results of SNS activation and the FOF response are:

Disrupted concentration – failure to develop a logical survival response, irrational Behavior, repetition of actions, freezing in place and submissive behavior.

All individuals' experience "stress", ranging from the individual driving a car in congested traffic; to the professional athlete in competition and/or an individual involved in a life or death confrontation, all experience stress levels and react to SNS activation.

## **Implications:**

When considering the totality of circumstances; in Use of Force incidents and application of the judicial guidelines espoused in *Graham V. Conner*, 490 US 386(1989) , to determine the objectively reasonable use of force; one must consider how activation of the SNS, impacts an individual's perception and decision making skills in high stress situations.

## **Citations and Reference material:**

### **(1) Effects of Stress on Performance:**

**By: Bruce K Siddle and Dave Grossman:**

**Encyclopedia of Violence, Peace, and Conflict (Second Edition)  
2008, Pages 1796-1805**

### **Combat Stress Defined:**

The perception of an imminent threat of serious personal injury or death. Or when tasked with the responsibility to protect another party from imminent serious injury or death.

Combat stress can have a profound effect on what you hear (**auditory exclusion**), what you see (**tunnel vision**) and loss of near vision. How you think (**irrational behavior**) what you do (**loss of motor control**).

When brain becomes focused on an activity or threat the brain will tune in the sensory system that can provide the most relevant information.

Combat Stress activates body's SNS which activates the "Fight or Flight" syndrome, which is common to all mammals.

SNS is an automatic and virtually uncontrollable response to combat stress that dominates all voluntary and involuntary systems until the perceived threat is eliminated.

Once SNS kicks, in the heart drives all subsequent actions. SNS results in an increased heart rate. Normal heart rate between 60 to 115 BPM. SNS will drive the heart beat from 70 to 200 BPM.

Once SNS occurs and increased heart rate begins you may lose all peripheral vision, mind is only processing a minute fraction of all possible information. Loss of near vision occurs, you may have difficulty in focusing on any object within four feet (front sights of a firearm), loss of ability to focus, loss of monocular vision, and loss of depth perception. You will have diminished or total loss of hearing.

Between 115 and 145 BPM, motor skills, visual reaction time and cognitive reaction will be at their highest. When heart rate exceeds 145 BPM, reaction time is diminished, above 175 reaction very poor.

Above 145 BPM motor skills begin to deteriorate at 175 BPM, charging or running away, are the only actions that can be performed well. Auditory exclusion occurs and/or a complete shutdown of hearing. Tunnel vision occurs, near vision and depth perception is affected.

A wide variety of irrational behavior occurs; voiding of bladder/bowels; freezing in place; submissive behavior.

**(2) Dr. Richard Gasaway - Stress - Positive and Negative impacts of hyper vigilance and its impact on Situational Awareness: Understanding Stress –Tunnel Vision, Understanding Stress – Auditory Exclusion**

Stress released hormones increase arousal of the senses, the brain struggles to process all of the information. Trying to process all of the audible/visual imputes may result in sensory overload.

**Tunnel Vision:**

More accurately depicts the results of stress. All of your senses become tunneled when you are stressed. Your visual vision is focused on one small geographic area during high stress situations. You will miss seeing things in your periphery.

**Auditory exclusion:**

For hearing, your attention is focused on one source of sound (text messages on phone, talking face to face, an approaching siren). Once heartbeat reaches over 175 hearing diminishes (blood rushing thru eardrums creates noise cancels out what you might be hearing).

**(3) Steven Yantis, John Hopkins University, Department of Psychological and Brain Centers.**

Research on how the human brain reacted to multiple stimuli and stress. Using a base of adults ranging from 19 to 35 in a lab setting, the individuals were subjected to changing computer displays or multiple numbers and letters and as they listened to three voices simultaneously speaking numbers and letters. The individual's brain activity was captured during the study.

When the individuals focused on visual tasks like tunneling in on a computer screen, the auditory stimuli recorded decrease significantly. When the subject's attention focused the spoken messages the visual image activity diminished; (tunnel vision/auditory exclusion).

“When attention is deployed to one modality, it necessarily extracts a cost on the other modality. The brain cannot can't simultaneously give full attention”.

The stress of attempting to decipher multiple sensory imputes will cause the brain to automatically increase or decrease certain sensory inputs in an attempt to decipher the message being presented to the participant.

**McGurk effect:** What you see overrides what you hear. The brain takes its instructions from the eyes not the ears.

“Both tunnel vision and auditory exclusion result in situational awareness being diminished”.

**(4) FBI Law Enforcement Bulletin**

Oct. 2002, P18 – Research Forum; (IACP Net Document No. 564080); Perceptual Memory Distortion during Officer Involved

Shootings: Alex Artwohl, Ph.D. Police Response to Officer-Involved Shootings.

**(5)** National Criminal Justice Institute; Oct., 16, 2001 Citations: Police Response to Officer Involved Shootings, David Klinger Associate Professor of Criminology and Criminal Justice University of St. Louis, Missouri

**(6)** Law Enforcement Executive Forum: Police Best Practices Oct. 2009: New Developments in understanding the Behavioral Science Factors in Stop Shooting Response.