

**Understanding 1**

**Understanding the Human Physiological and Mental  
Response to Critical Incidents**

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### Understanding the Human Reaction to Critical Incidents

An officer responds to a call of a suspicious vehicle behind a liquor store at around midnight. As he walks up to the driver's side window, he observes a subject sitting in the vehicle. Before he can speak, he sees a bright flash and smells gunpowder. His arm feels wet, and everything seems to be happening in slow motion. He then sees two more bright flashes, and the subject falls over in the seat. He thinks to himself, "Thank God! Someone shot him." The officer looks down and sees his pistol in his hand and realizes that he had fired the two rounds that struck the suspect.

Human beings undergo drastic physiological and mental changes in response to critical incidents. These affects include

- Increased heart rate
- Complex motor skill deterioration
- Auditory exclusion
- Visual impairment
- Increased respiration
- Increased blood pressure
- Loss of bowel and bladder

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- Sympathetic nervous system disruption
- Memory loss
- Loss of cognitive processing
- Critical incident stress

According to Grossman (1995), a study of soldiers who fought months of continual combat in WWII showed that 98% of the soldiers were psychological casualties. Of the remaining soldiers, 1% were categorized as sheepdogs and the other 1% as sociopaths.

This relates to society in that 98% of the population are sheep (citizens), 1% are wolves (criminals) and 1% are sheepdogs (police). The sheep don't like sheepdogs bossing them around until the wolf shows up, and then the whole flock wants to hide behind one dog. The sheep is the only one who moves toward the sound of the fight.

The sociopaths of WWII survived because they thrived on the dangers and killing without conscience or remorse. The sheepdogs survived because they knew that they had a job to do, and they conditioned themselves to do the job.

In society, the criminals are prepared and have the advantage of making the first move. As officers, we must condition ourselves so that we may react with optimum efficiency. If officers understand the following reactions of their body to critical incidents, they can train to move through them and survive the situation.

### **Increased Heart Rate**

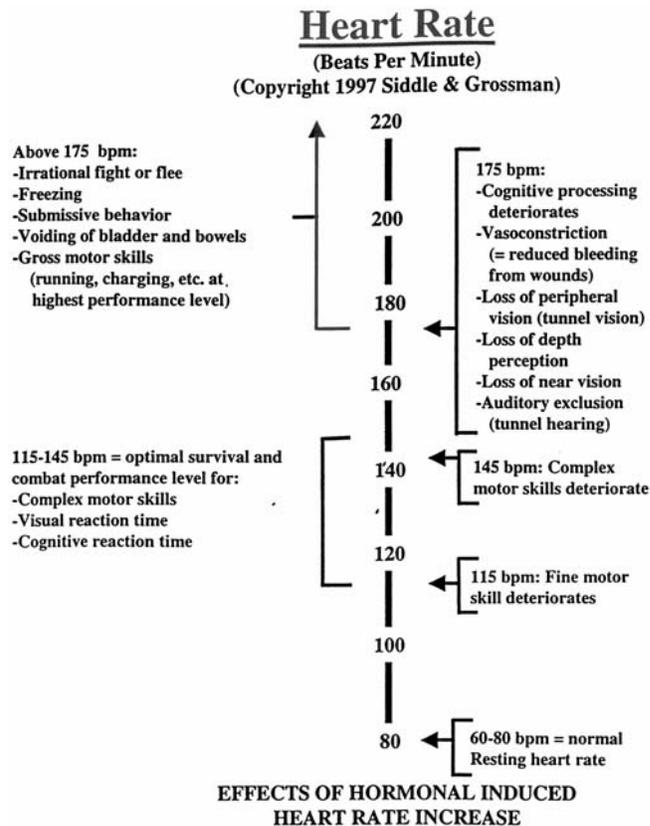
**In a 2001 lecture by Lt. Col. Dave Grossman on Psychology of Combat, he stated that heart rate is hormonally induced as a result of sympathetic nervous system arousal. Heart rate is the most important factor because it directly affects all of the physiological functions.**

**The normal resting heart rate for humans is between 60-80 beats per minute. We operate most efficiently in critical incidents with a heart rate between 115-145 beats per minute. At this level, we still have use of our complex motor skills, visual reaction and cognitive reaction. The body shuts down fine motor skills, such as the ability to write neatly, because it is not necessary for survival.**

**At 145 beats per minute, complex motor skills begin to diminish. Between 150-175 beats per minute, we experience loss of near vision, loss of peripheral vision (tunnel vision), loss of depth perception, auditory exclusion (tunnel hearing), vasoconstriction and cognitive processing deterioration. When our heart rate exceeds 175 beats per minute, we may experience irrational fight, flight, posture or submission. Our body's gross motor skills are at their maximum performance level but non-essential functions such as bowel and bladder retention are shut down.**

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The following chart by Siddle & Grossman provides an illustration of these effects on the human body.



**Notes:**

- 1- This data is for hormonal induced heart rate increases resulting from sympathetic nervous system arousal. Exercise induced increases will not have the same effect.
- 2- Hormonal induced performance and strength increases can achieve 100% of potential max within 10 seconds, but drop 55% after 30 seconds, 35% after 60 seconds, and 31% after 90 seconds. It takes a minimum of 3 minutes of rest to "recharge" the system.
- 3- any extended period of relaxation after intense sympathetic nervous system arousal can result in a parasympathetic backlash, with significant drops in energy level, heart rate and blood pressure. This can manifest itself as normal shock symptoms (dizziness, nausea and/or vomiting, paleness, clammy skin) and/or profound exhaustion.

Heart rate and respiration are directly related, and officers can control their heart rate by controlling their breathing. This is achieved by breathing techniques, which will be discussed later.

Another way of controlling heart rate is by controlling stress. Remsburg (1986) states that as your mind interprets a threat, it sends alarming messages throughout

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your nerve network. “Adrenalin (sometimes called epinephrine), cortisol, aldosterone and other hormones pour into your bloodstream, mixing a “chemical cocktail” of alarm that reinforces and prolongs the stress reaction” (Reinsberg, 1986, p.22). Officers can learn to reduce stress before it reaches an uncontrollable level. He cites an instance where eight world-class shooters were injected with enough adrenalin to overload a normal person. As these shooters engaged their targets, a significant reduction in accuracy was only noted in two of the shooters. The other six shooters had developed methods of controlling stress so that it would not have the negative effect on their nervous systems.

One method of learning to control stress is by stress inoculation. This involves subjecting officers to stressful, real life situations. This will build up a tolerance to stress, which will decrease the heart rate during incidents and make the officer less likely to respond in panic. From past experiences in tactical situations, I know that panic is contagious, but so is calmness. In lecture, Grossman stated that the military has adopted this theory. He said that at West Point, they make all of the recruits box each other. They call this putting boxing gloves on bullets. My department achieves this by having officers participate in numerous scenarios involving active gunmen with simunition weapons. Simunitions are powder charged ammunitions, which project a hard plastic cap filled with marking paint. The simunition weapons are identical in appearance to real weapons, and there is a definite consequence to getting hit with a simunition round. There is significant

pain, and bruising and slight contusions will occur. Through these scenarios, officers will have a base of knowledge on how to react to similar situations. The more familiar you are with a threat, the less stress you will encounter.

### Complex Motor Skills Deterioration

Remsberg (1986) suggests that blood is depleted from your small muscle groups during a critical encounter making fine motor skills, that are normally easy, somewhat impossible.

An example of a complex motor skill is the ability to grab a suspect with one hand without pulling the trigger of your weapon with the other hand. Remsberg (1986) refers to this parasympathetic motor reflex as the “Startle Response”. “This refers to the animal instinct to jump or make other involuntary movement in reflex to a sudden frights, such as the sight or sound of a firearm.

Remsberg cites one example where a patrolman who was assigned to inner perimeter at a barricaded subject call accidentally pulled the trigger of his shotgun when the suspect suddenly fired a shot. Not only did this endanger other officers, it gave away his position, and the suspect began to fire at him. Officers can avoid this from happening by training to keep their finger out of the trigger guard until the decision has been made to fire the weapon and keep the weapon pointed in a safe direction.

### **Auditory Exclusion**

**Just as the officer in the opening story smelled gunpowder, saw a flash, but did not hear the first gunshot, this phenomena may happen to other officers when confronted with a threat. “Where sounds are concerned, nearly 65% of officers under peak stress experience distortions (“I did not hear any of the five shots fired by myself and my partner”)-is most common (Remsberg, 1986, p.25).**

**If an officer is not prepared for auditory sensory distortion and does not hear his rounds going off, he may think that his gun has malfunctioned and stop shooting or he may continue to fire an empty gun instead of reloading when needed.**

**I have observed officers in swat training who are yelling directions to nearby officers who never hear them. Recognizing this problem, our swat team has devised a system of communication which incorporates both verbal and hand signal communication. It is also important to realize that the suspect may be experiencing auditory exclusion as well. Because of this, we train to give loud repetitive verbal commands to insure that they hear what we want them to do.**

### **Visual Impairment**

**Human beings naturally tend to focus solely on an object perceived as a threat. All other objects in our surroundings are deemed to be insignificant and are blurred**

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out. This is described as tunnel vision, a loss of peripheral vision. Remsburg (1986) states that like a television camera's zoom lens, your eyes may block out everything above, below and to the sides of the perceived threat. He cites an instance where an officer and a suspect were wrestling, and the officer's partner drew his weapon. The officer fired three shots, and admitted later that he saw nothing but where he was aiming on the suspects back. Because he did not see his partner, the danger he subjected his partner to did not register until after the incident. Luckily for the struggling officer, the suspect's backbone stopped all of the rounds.

We also lose depth perception and our near vision. During an interview with an unnamed officer at my department, he advised me that he had been involved in three shooting situations. He stated that he never took aim with his weapon, but instinctively pointed and shot, striking his target each time. The traditional method of firearms training was to close your non-dominant eye, and focus on your front sight picture before you shot. This works great in training, but when your heart rate reaches 160 beats per minute, it is impossible to focus on your front sight picture. Also when you experience tunnel vision, and one eye is closed, you lose even more peripheral vision. To counter these effects, our department has adapted our firearms training to correspond with the body's natural instincts. We have instructed officers to shoot with both eyes open and on how to present their weapons so that they will be on target by point shooting alone. This is done by resting the thumb of your off hand under the slide pointed toward the muzzle and the trigger

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finger of your primary hand under the slide on the other side toward the muzzle. When an officer points these two fingers at an intended target, the front sight will be inline with the target.

The following is a copy of a course designed by my department for this purpose.

### B. P. D. "No-sight Course"

This course is designed to train the officer to shoot without the aid of sights. Therefore, students should be carefully indoctrinated so that the student does not rely on previous training that may stress such things as target acquisition, sight picture etc. **Note:** Since some of the course will require a up to a 180 degree stance to the target and other less familiar positions, special attention must be given to safety requirements.

<u>ROUNDS AND DISTANCE</u>	<u>POSITION AND STANCE</u>	<u>TIME</u>
<u>15 rounds @ the one (1) yard line</u>		
2 rounds	facing target/standing	2 sec./Holster
3 rounds	facing target/standing	2 sec./Holster
5 rounds	90 degrees/standing	3 sec./DO NOT
<b>HOLSTER WEAPON ! (instruct student to relax weapon at side with muzzle down)</b>		
5 rounds	180 degrees/standing	3 sec./Holster
<u>25 rounds @ the three (3) yard line</u>		
5 rounds	facing target/standing	3 sec./Holster
5 rounds	90 degrees/standing	3 sec./Holster
5 rounds	90 degrees/kneeling	3 sec./Holster
5 rounds	90 degrees/hands and knees	5 sec./Holster
5 rounds	Supine pos./head to target	5 sec./Holster
<u>10 rounds @ the 7 yard line</u>		
5 rounds	facing target/standing	4 sec./Holster
5 rounds weapon	90 degrees/standing	4 sec./Holster
CLEAR		

Another tactic used to defeat tunnel vision is training scenarios with multiple suspects. An officer enters a room and is engaged by a suspect. When he directs his attention to the suspect, another attacks him from the opposite side of the room. This training forces the officer to scan the entire scene for other possible threats.

### Increased Respiration

As mentioned earlier, respiration and heart rate are directly related. In lecture, Grossman stated that officers can prevent their heart rate from climbing by controlling their breathing. Breathing is controlled by the autonomic nervous system. This means that it happens without conscious thought. When we choose to control our breathing, we make it somatic and in effect hold the throttle to the autonomic nervous system. Remsfeld (1986) suggests to “belly breathe”. The breathing technique completely fills and flushes out your lungs to expel carbon dioxide waste and replace it with essential oxygen at a certain rhythmic rate. “The effect is to reverse the alarm response, restore your psychological sense of self-control and return your body to a naturally balanced state” (Remsfeld, 1986, p.30).

This technique consists of taking in a deep breath for four seconds first letting it fill your stomach, the low portions of your lungs and finally your chest. Next, you hold in the breath for four seconds while you try to relax your mind. Then you exhale the breath for four seconds pushing all of it out. These steps are then repeated

several times until the heart rate falls. Our swat team practices this technique on the way to an entry to insure that everyone is calm and in control of their facilities.

Short sessions of this technique can even be beneficial. An example of this is when an officer encounters fire and ducks behind cover. While forming a plan, he can use this technique to remain calm and his ability to effectively return fire will increase.

### Increased Blood Pressure

In lecture, Grossman explained that during a critical incident, the body insures that the muscles are working at maximum performance to support the primal instincts. It achieves this by flooding all of the major muscles groups with blood that contains vital oxygen.

Remsfeld (1986) states that these muscles, needed for strength and speed, are engorged with nutrients in blood to clear away waste and improve efficiency. Your spleen increases the release of red blood cells into your bloodstream to promote maximum oxygen supply. As the blood is channeled into your muscles, the blood vessels tighten down, which is defined as vasoconstriction.

A positive effect of vasoconstriction is that if you receive a wound, there will be less bleeding due to the constricted blood vessels. The down side to this is that your brain is deprived of oxygen, which is characterized by a whitening of the face. This results in a loss of cognitive processing, which will be discussed later.

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After the threat subsides, you will experience vasodilatation, which is the returning of blood to the rest of the body. A red face due to blood rushing back to the brain characterizes this. Officers may experience nausea and dizziness at this time.

### Loss of Bowel and Bladder Control

The human body places a priority on bodily functions during critical incidents that we have no way of controlling. When the heart rate goes above 175 beats per minute, the body essentially goes on autopilot. Although it may seem pretty important to us, when faced with a severe threat, the body does not care about bowel or bladder control. Priorities are simply shifted elsewhere, and the bowels and bladder release themselves. The fact that this often occurs is not widely known because it is not a glamorous part of the incident that people want to share with their buddies. It is important however to educate officers on this so that they are prepared when it happens to them. In lecture, Grossman stated that  $\frac{1}{4}$  of soldiers in WWII admitted to urinating and defecating on themselves in battle.

### Sympathetic Nervous System Disruption

Not having an understanding of the sympathetic nervous system and how it affects the body is probably the most dangerous threat to officers. When an officer

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is on patrol, his body is at rest and his parasympathetic nervous system is in control. He receives a call of a domestic disturbance, and his sympathetic nervous system kicks in causing a large release of adrenaline and a spike in his blood pressure, respiration and heart rate. He arrives on the scene at the peak of his performance with all of his senses alert. The officer discovers that the violence is over, and there is no immediate threat. His body begins to come down from the high of the spike and experiences a parasympathetic backlash, which creates fatigue in the body. This can be compared to how a man feels after a sexual encounter.

According to Grossman's lecture, the level of the crash rises or falls due to the severity of the threat. While the officer is coming down, the suspect is experiencing more anxiety, and when he is advised that he is going to jail, he has a sympathetic nervous system spike. Now he is at his most dangerous level, and the officer is experiencing fatigue from his backlash. The suspect attacks the officer, and the officer's body has to counter the backlash and try to achieve another spike to survive.

The officer could avoid this problem by remaining calm on the way to the scene. He could practice the breathing techniques and rehearse possible scenarios in his head while he responds. When he arrives at the scene calm, his body is primed to respond to any threat that he might encounter.

## Memory Loss

A misconception that often occurs is that when several people involved in an incident give slightly different versions of the occurrence, is that some of them are lying. As I discussed earlier, the body often goes into autopilot and cognitive processes shut down. “On rare occasions, you may mentally block out part of the stressful episode, not just after it’s over but while the event is actually taking place” (Remsberg, 1986, p.26).

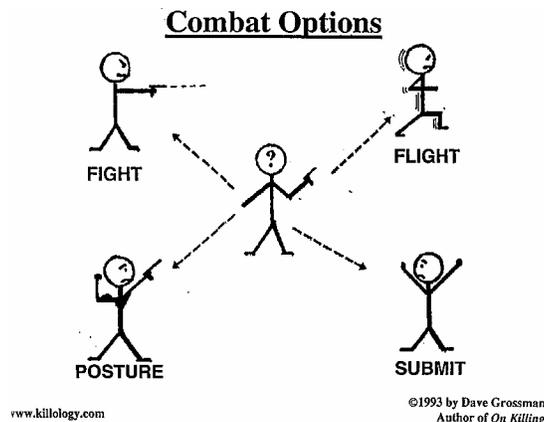
Remsberg then cites an instance where two officers encountered a mentally distressed suspect as he attempted to chop down a telephone pole with an axe. The suspect knocked one officer down and raised the axe to strike the officer. The next thing that his partner was aware of was someone patting him on the shoulder and saying, “Good shot!”

In Grossman’s lecture, he cited Dr. Alexis Artwohl and Loren Christian from the book *From Deadly Force Encounters* in a survey of 141 officers involved in a critical incident. Of the officers, 51% experienced memory loss for parts of the event, 47% experienced memory loss for some of their actions, 22% experienced memory distortions, 26% experienced intrusive and distracting thoughts, and 40% experienced disassociation or detachment from the incident.

### Loss of Cognitive Processing

According to Grossman's lecture, cognitive processing occurs in the forebrain. This is where rational thought occurs and is what distinguishes us as human beings. When a critical incident reaches a certain point, the body says that there is no longer a need for rational thought. The body resorts to its primal instincts, which are controlled by the midbrain. The midbrain controls your decisions to fight or flight when confronted with dangers posed by another species.

Grossman (1995) suggests that these options expand to include posturing and submission when confronted with dangers posed by members of our own species. Below is an illustration by Grossman demonstrating these reactions.



Remsburg (1986) suggests that while you are in this mode, you are unable to concentrate, your judgment suffers and your judgments may be wildly

inappropriate. Your ability to reason clearly, improvise strategies and tactics and elicit options from your memory are severely hampered. To counter this, officers must train in tactics with great repetition so that the body will resort back to how it was taught to function.

### Critical Incident Stress

Grossman states that when the midbrain takes over, there is a path burned from the forebrain to the midbrain that can open later for no apparent reason causing a panic attack or reliving of the incident. Because of this, officers must be educated on natural feelings they will encounter when they see a human tragedy. The first response is, "Thank God it was not me". Officers may then have a feeling that the tragedy was their fault or they may experience survivor's guilt.

" In a sample of 86 officers, 18 reactions were expressly experienced, including heightened sense of danger, anger, nightmares, isolation/withdrawal, fear and anxiety about future situations, sleep difficulties, flashbacks/intruding thoughts, emotional numbing, depression, alienation, guilt/sorrow/remorse, the "Mark of Cain" (an assumption that others blame or shame them), problems with authority figures/rules/regulations, family problems, feelings of insecurity/loss of control, sexual difficulties, alcohol/drug abuse, and suicidal thoughts (Ayers, 1990, p. 8).

To help cope with these emotions, it is important to defuse with other members after a critical incident. By talking about the incident, you can de-link it from the

**sympathetic nervous system and prevent panic attacks. After all, pain shared is pain divided.**

### **Conclusion**

**Officers responding to critical incident situations will experience a dramatic change in their physiological and mental processes. Taking time to understand these changes combined with training the body to cope with them will help the officer deal with the situation and could possibly save the officer's life.**

References

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