**DAY 1**

**I. Introduction**

**A. The Problem with Misunderstood Police Shootings**

# B. An overview of Force Science

1. Explanation of the mission
2. Description of the research and how it is conducted
3. How Force Science findings impact investigations

**Learning Objectives:**

* To introduce participants to the type of new research being conducted
* To make clear the importance of the findings
* To explain how applying the findings will enhance the accuracy and thoroughness of investigations.

**II. Enhancing Investigations Through An Understanding of Officer Survival Challenges**

# Action and Reaction

1. Definition of and critical differences between the two terms
2. Findings on time differences between action and reaction
3. Understanding the profound impact an understanding of officer and offender actions and reactions have on investigations: accurate investigations and reconstructions are not possible without a full understanding of the dynamics of action and reaction

# Research Findings on Officer and Offender Behaviors During Shooting Incidents

1. Speed and accuracy with a firearm in pressurized, dynamic and fluid encounters

1. Results of studies on officers involved in shooting situations and explanation of the

20 different officer behaviors identified as common during deadly force encounters

1. Results of studies on offenders who have shot officers and the 15 different behaviors observed in these shooters
2. Shot placement: Where officers are most likely hit and why
3. Behavioral differences between experienced and inexperienced shooters

# Reactionary Shortcuts

1. Identification of the behaviors officers exhibit when trying to gain a time advantage against a threatening subject.

a) Pros and cons of shortcuts

# Interaction and comparison

1. Detail and interpret scenario outcomes based on the variety of officer and offender behaviors identified as possible/probable during deadly force encounters.

**Learning Objectives:**

* Help participants gain a deeper, more thorough understanding of the human dynamics and behavioral characteristics of both officers and offenders during deadly force encounters.
* Explain the critical impact this behavioral understanding has on investigations.
* Explain why accurate reconstructions of officer-involved shootings are not possible without an understanding of the dynamics of action and reaction.

**III. Understanding the Limits of Human Perception Under Stress**

# A. Vision

1. Exploration of the visual anomalies experienced during high stress, life-threatening encounters and their impact on officers’ performance and ability to accurately recall incident details
2. Benefits and liabilities of visual changes under stress

# B. Attention

1. “Selective Attention”
2. Inattentional Blindness”
3. The “Attentional Grid”

3. Impact of attentional phenomenon on situational awareness and recall

# C. “The London Study”

1. Study One: Results of the latest research on perception and memory under stress.
2. Study Two: The impact of high level training on perception, decision-making, performance and memory.

# D. Training and Investigations

1. Explanation of how training can be used to prepare officers to better navigate the perceptual challenges of high stress encounters and position them to better recall event details.

**(Note)** Encounters may include complex and uncertain circumstances often associated with

Terrorism-related and/or extremist activities (e.g. active shooter, suicide bombers, etc).

**Learning Objectives:**

* Help participants understand what kind of human behavior and performance is and is not possible during high stress encounters.
* Explain the physiological realities of the human senses in life threatening encounters and prepare investigators to approach officer-involved shootings with these in mind.
* Help participants to understand what are considered “normal” gaps in memory and to better identify attempts at deception through that understanding.

**DAY 2**

# IV. “Execution” Shots

**A.** Introduction of research findings resulting from studies of highly controversial cases involving situations where officers are often wrongly accused of criminal behavior

1. Offender shot in the back
2. Offender shot while falling down
3. Offender shot after threatening behavior has ceased

# V. “Extra” Shots

1. Exploration of research into the time it takes an officer to recognize that the dynamics of a threatening situation have changed and subsequently alter his or her behavior.

1. Discussion of current research on human reaction times.

1. “The Tempe Study”

1) Presentation of sophisticated research into the speed of mental processing and decision-making and the time it takes an officer to start and stop firing in deadly force encounters

# VI. Applied Analysis To Officer Involved Shootings

**A.** Exploration of several high-profile cases where findings discussed up to this point have been successfully applied in court.

1. Hollywood Halloween Shooting
2. Stanley Shooting
3. Lovelace Shooting
4. Oklahoma Shooting

# VII. Unintentional Discharges

**A.** Presentation of the latest research on officers who have experienced unintentional discharges

1. Why they occur
2. When they’re most likely to occur
3. Cues investigators should watch for that could indicate a need to challenge an officer’s claim that a discharge was unintentional

# VIII. Synchronous Shootings

**A.** Presentation of research findings that debunk the commonly held myth of “contagious gunfire”

**Learning Objectives:**

* Help participants understand the scientific realities behind some commonly held myths
* Help participants apply these findings to enhance the accuracy and thoroughness of their investigations
* Prevent participants from perpetuating the problem of inaccurate and misdirected investigatory practices.

# IX. The Devaluation of Spent Shell Casing Placement in Investigations

**A.** Presentation of ground-breaking research that reverses the belief that the location of spent shell casings at a shooting scene is indicative of the position and action of officers who fired the rounds

# X. Investigating Cases Involving “Unarmed Victims”

1. Explanation of the role of “contextual cues” in officer decision-making and why officers may perceive an immediate threat even though the person they are facing is unarmed

1. Discussion of how investigators can most effectively work with and interview officers involved in the shooting of unarmed individuals to most accurately determine the facts of the incident.

# XI. Recommendations for Investigative Enhancement

1. Establishing contact and developing rapport with officers involved in shooting incidents.

1. Understanding best practices for most effectively and accurately “mining” officers’ memories after high-stress shooting incidents.

1. Tips for recognizing cues of deception and suspicious claims of lack of recall

1. Suggestions for best practices for working with an officer following a shooting.

1. Direction on how investigators can help facilitate an officer’s emotional recovery following a shooting

# XII. Question and Answer with Class Participants

**DAY 3 – BODY WORN CAMERAS**

# SGT. JAMIE BORDEN (RET.), H.P.D.

VIDEO TAPE REVIEW: What is digital video

* 1. Determining an officer’s focus of attention; is it possible from digital video alone?
  2. Focus of attention
     1. KEY TO SELECTIVE ATTENTION & INATTENTIONAL BLINDNESS (FSI)

# UNDERSTANDING DIGITAL VIDEO

i. The knowledge of digital video;

1. Introduction
   1. Technical aspects and understanding the limitations of video, video analysis
2. Research
   1. What is important?
   2. What is for sale?
      1. Cameras?
      2. Storage?
      3. Service?
   3. Identify the purpose of implementing cameras
      1. Define the purpose
      2. ~How will your department employ BWC~
   4. Transparency
      1. This creates a monumental level of responsibility and understanding regarding the implications
      2. Consider other planned uses of video & potential unplanned uses
   5. Intended uses of BWC footage
      1. On scene review
      2. Spot check (professionalism)
      3. Identification of training
      4. Force Analysis
      5. Video Examinations (forensic)
   6. Un-intended use of BWC footage
      1. Viral social media affect
      2. “Knee jerk” reaction from city government
      3. Un-fair representation of an incident
      4. Damaged investigation; criminal/civil
3. Spot-checking shift video
   1. looking for policy violations
   2. Looking for successes
   3. Automatic activations of MAV or BWC
      1. Speed activations
      2. Code three activations
      3. Accelerometer activations
      4. Remote activations!?!?
4. Budget constraints
   1. Manning work load issues
      1. Additional associated tasks
         1. IT personnel dedicated to the system
         2. Trainers developed to implement the system
         3. Freedom of information act, evidence redaction
         4. Uniform updates
         5. Officer video review
         6. Supervisory video review and spot-checking
         7. Possible need for a dedicated UOF Unit
5. Video in Law Enforcement
   1. Primarily intended for “transparency”
   2. Often if not always used as evidence
   3. Mis-interpreted in most cases
6. Concerns
   1. Training
   2. State laws (privacy issues)
   3. Union issues ~This is not a plug and play endeavor~

# THE NEED TO DEVELOP UOF AND VIDEO SPECIALISTS

* 1. Developing a specialist in
     1. Legal issues
     2. Use of Force
     3. Policy writing and review
     4. Video analysis

# DIGITAL VIDEO (A TECHNICAL PERSPECTIVE)

* 1. Overview Understanding the technical aspects of video
     1. Frame rates (fps) refresh rates
     2. Encoding/Decoding – codec
     3. Transcoding
     4. Pixels
     5. Codec
     6. Artifacts
     7. Compression
     8. Progressive scan and interlacing
     9. Video timing and the use of clocks or timers
  2. Video is prolific evidence
  3. Digital video must be understood
  4. Video content must be interpreted

# FRAMES PER SECOND (FPS)

* 1. Refresh Rate
     1. Frame rate (fps)
     2. Standard is 30 (fps) / 29.97 (fps)
     3. Refresh rates are often variable
  2. Important to understand and identify variable frame rates for UOF and speed analysis, possible missing information, etc.

# INTERPOLATION

1. **ENCODING/DECODING**
   1. Codec- encodes and decodes visual data, includes the codec for encoding audio, although audio is a separate stream
   2. An algorithm encodes, compresses and decodes the information
   3. Must use the same codec to decode that which was used to encode
   4. Encoding process
      1. Codec encodes the file when it converts visual information (light) into 0’s and 1’s
      2. Compression
         1. *a process that happens at the source*
   5. Encoding
      1. A representation of information in other form
   6. Compression
      1. To lessen the amount of symbols to represent a given piece of information
      2. This process is not meant to conceal or hide information
      3. Exploits redundancy to reduce file size
      4. May be mathematical or physiological
      5. example; Humans don’t generally hear beyond 20-30kHz, so that may be stripped out of the information stored
   7. Compression Issues
      1. Nearly all compression algorithms are destructive or “lossy”
      2. Detail is lost and unwanted artifacts are introduced
      3. Repeated decoding and encoding results in cumulative generational loss
   8. When to Compress?
      1. When data storage or streaming bandwidth is limited
      2. When long streams of data are recorded, such as surveillance systems
   9. When Not to Compress?
      1. When data storage or streaming bandwidth is not a limitation
      2. When maintaining image quality is important, such as when editing video or using as forensic evidence
      3. Backwards recommendations not suitable for providing the “best” evidence

# CONTAINERS

* 1. Play various codecs
     1. .MPEG (Motion Picture Experts Group)
     2. .AVI (Audio Video Interlace)
     3. .MOV (Apple, Quicktime)
     4. .MP4 (MPEG-4, YouTube recommended format)
     5. .H264 (Video compression codec)
     6. .FLV (Flash Video Format)
     7. .WMV (Windows Media Video)
  2. .EXE files
     1. Downloading the .EXE will leave remnants
     2. The next similar codec may use a remnant from the previous .exe
     3. i.e., possible different directive;

1. 100 frame GOP v. 15 frame GOP
2. the new attempt will skip frames

# ENCODING EXAMPLE

* 1. Rolling shutter (picture example)
  2. The Process
     1. GOP - Group of Pictures
     2. I-Frames / P-Frames / B-Frames
     3. Encoding order
     4. Examples and diagrams
     5. Encoding sequence
     6. decoding in the same order as encoding
     7. Transmission sequence

# THIS MEANS THAT DIGITAL VIDEO IS “CREATED” FROM ENCODED DATA

* 1. Video is prolific evidence
     1. It may or may not affect your analysis
     2. however, it must be understood

# PERSPECTIVE ISSUES

* 1. It may or may not affect your analysis however, it must be understood
     1. Distortions
        1. Broad field of view
        2. Speed distortion
        3. *Distance distortion*
        4. *Poor perspective translation*

# PIXEL OR PICTURE ELEMENTS

* 1. Square shape w/one solid color
     1. The pixel is indivisible
     2. Zooming in merely creates a larger single color square

# AUDIO

* 1. Provides important evidence
  2. Officer commands
  3. Officer / subject interactions
  4. Statements from witnesses
  5. Ambient noise
  6. In some cases, the only evidence is audio evidence
     1. Audio can be useful in deciphering timing issues

# CONSIDERING THE INFORMATION WE KNOW NOW……. WHAT?

* 1. What information are we looking for
  2. Movement/motion
  3. Time/speed
  4. Distance
  5. Force

# VIDEO TIMING AND OTHER POTENTIAL ISSUES

* 1. Is this subject shot in the back?
  2. What issues might be considered in the visual principles
  3. Can these issues be identified in video format

# HUMAN EYE V. THE CAMERA LENS

* 1. The human eye
     1. Perception of information received in the form of light
     2. Emotionally flat until treated by our interpretation
  2. The camera lens
     1. Encodes light captured by the sensor into data.
     2. Turning photons into electrons for digital processing -digital information-
     3. ~We also visually and emotionally interpret digital information captured by the camera~

Low Light Capabilities

1. In low-light situations, the processor applies noise reduction algorithms to reduce graininess caused by amplification
2. Can reduce sharpness
3. affects the color values as received by the digital sensor

* 1. The human eye is not equipped with low light capabilities

# ASPECT RATIO

* 1. Non-Standard Video
     1. Any video that uses an uncommon aspect ratio or resolution is non-standard
     2. On-line videos
     3. Surveillance cameras
     4. Early generation cell phones

# ~VIDEO REVIEW AND ANALYSIS~

* 1. CAUTIONS
     1. Unlike what you see in the movies, what we can do with video enhancement is limited
     2. Typical enhancements include enlargement, contrast enhancement, noise and artifact reduction, deblurring and frame comparison/averaging
  2. Timing issues
  3. understanding and applying
  4. human factors
  5. and human performance

# “THIS VIDEO SPEAKS FOR ITSELF “I DON’T NEED AN EXPERT TO TELL ME WHAT I CAN SEE WITH MY OWN EYES”

* 1. These statements can be damaging

# INTERLEAVING;

* 1. Insert, place between the mixing of two or more digital signals
  2. What information is reality and what is
  3. a creation of the recording process

# EYE-BALLING VIDEO

* 1. Video shows you what
  2. you want to see
  3. Viewer bias

# VIDEO REVIEW IS AN EMOTIONAL CONDUCTOR

* 1. In most cases the decision makers will believe the video evidence over the officers statement
  2. Emotional instigators
     1. Ethnicity
     2. Verbals
     3. Unfiltered uploads/Narration
     4. Media Hype / Framing / Bias
  3. Verbal content will override the reality of action what you hear can override what you see.
     1. Important for Officers on the street
     2. as well as investigators

# WHAT IS THE REALITY OF “FOCUS OF ATTENTION” WHEN YOU’RE IN THE ACTION V. REVIEWING OR ANALYZING THE VIDEO

* 1. Why do we need to consider “Limitations?”
     1. In digital video analysis
     2. In Human Factors & Human Performance
     3. Our own expectations!
  2. Investigations & Limitations considerations
     1. Keep in mind the limitations of video, this is an exacting science and should be performed by experts in the field

# CONSEQUENTIALISM VIEWER BIAS

* 1. Who is susceptible to Consequentialism & Viewer Bias

# REVIEWING TECHNIQUES TO CONSIDER

* 1. Watch video globally  
     1. Let the emotional instigators have an affect
     2. Watch without sound
     3. Move on to interrogate the video evidence
     4. Focus on the 4 corners (separate viewings)
     5. Pick areas of interest and stay focused on that thing.
  2. The most experienced investigators must be aware of their own bias.
     1. how is it defeated
        1. Remove advocacy
        2. Find and report facts
        3. backed with a knowledge of limitations
     2. What is the viewer’s expertise
        1. Use of Force
        2. Police Practice
        3. Human Performance
        4. Video examination
  3. Video analysis
     1. Developing a working knowledge of digital video and the associated terms and processes What level of knowledge regarding digital video is necessary to review and analyze video content?
     2. Developing a working knowledge of digital video and the associated terms and processes
  4. Interrogate the video
     1. As investigators and force analysts, we need more than the ability to identify surface-oriented issues directly related to an officer’s actions
     2. We don’t automatically and intrinsically believe a witness’s account of an incident
     3. We cannot intrinsically believe the data contained in a video
     4. Video is a witness
     5. Video evidence must be challenged
     6. The facts may not be as readily available without a deeper analysis of the digital video process
  5. Investigators must be able to:
     1. Accurately and reliably examine video for the purpose of movement analysis and to further force analysis and force investigations.
     2. Develop proficiency in conducting basic digital image capture.
     3. Accurately produce sub-clips of relevant video data from larger files.
     4. Test, define and articulate the technical limitations of proprietary digital video players.
     5. Discover techniques to determine accurate image refresh rates for the purpose of determining timing and other issues related to motion and force, and for speed
     6. estimation.
     7. discover effective free-ware and specialized COS software for the purpose of producing reliable images and to write accurate reports, defining processes, and
     8. displaying video and still images
     9. Discover expedited techniques to quickly and accurately produce reliable sources of video evidence that will be easily played in industry standard players for court purposes.