RESEARCH IN BRIEF

The IACP Research Advisory Committee is proud to offer monthly the Monthly Research in Brief column. This column features evidence based research summaries that highlight actionable recommendations for *Police Chief* magazine readers to consider within their own agencies. The goal of the column is to feature research that is innovative, credible, and relevant to a diverse law enforcement audience.

Efficacy of Police Body Cameras for Evidentiary Purposes: Fact or Fallacy?

The Police Chief, vol. LXXXII, no. 5, May 2015.

Craig E. Geis, MA, MBA, Lieutenant Colonel (ret.), U.S. Army, and David M. Blake, MSc, California Training Institute

Police body cameras have become a hot topic in both law enforcement and the media. Studies and reviews are already showing some positive results of deploying cameras, but there is a lack of knowledge and education on the differences between the mechanisms involved in

human sight and camera "sight."[1] Human eyes and camera lenses see, process, and recall information differently. It is important to understand the differences before using camera footage in use-of-force (UOF) or officer-involved shooting (OIS) investigations. The ramifications for not understanding the differences include inappropriate or unfair disciplinary actions, increased liability, and potential wrongful incarceration.

Physiology of the Human Visual Experience

Research to shed light on the difference between the visual experience of humans and cameras first looked at the field of view (FOV) of body cameras and compared them to human visual capabilities. The body cameras reviewed in this study provide anywhere from a 95 to a 170 degree FOV. The normal useful field of view in human vision, the area from which information can be extracted at a brief glance without eye or head movements, is 55 to 60 degrees under optimal, normal stress.[2]

Within its FOV, the camera can provide HD quality playback of everything within its viewable angles, but the physiology of the human eye ensures a similar HD version of acuity only within the 1–2 degree angle of the fovea centralis, with vision sharply decreasing toward the periphery.[3] The differences here ensure the camera will "see" and record more of an event in much higher quality than a human is capable of seeing.

The mechanical differences also include the cognitive concept of human "attention." While a camera lens is a stable

mechanism, a person's eye is in constant motion and scans the environment about three times per second. These rapid eye movements are called "visual saccades."[4] Saccades provide near foveal (precise) vision of the environment, but must fixate on an object for a minimum of 160–200 milliseconds in order for the brain to perceive and store the information. This form of sampling is called "visual attention." Because humans visually attend to environmental aspects based only upon need, they may not perceive or attend to other aspects, even if they are within the eye's visual field. Additionally, the subconscious brain rejects significant amounts of incoming bandwidth, sending only a small fraction of its data on to the conscious brain. While the camera has "global attention" and will record all the data from its FOV on film to be viewed later, human physiology is not recording the same level of data to be stored in memory. Hence, human perception and memory of an event can be dramatically different than what is recorded by the camera. This difference increases substantially when the stress and arousal of an UOF or OIS event is a factor.

The Effects of Stress and Arousal on Vision and Memory

The U.S. Supreme Court's *Graham v. Connor* ruling provides that evidence of reasonableness must include the officer's perception of the event during "tense, uncertain, and rapidly evolving events" and not through "20/20 hindsight."[5] When considering the 20/20 hindsight provided by camera evidence, it is imperative to understand the difference between the visual acuity and perception of a human being. Visual acuity is the clarity of vision, the ability to detect and see fine details.

Foveal Vision

For a demonstration of foveal vision, make your left hand into a fist with the thumb extended and hold it at arm's length an inch in front of this text. Close your right eye and focus the left eye's vision on the left thumbnail. With the left eye remaining fixed on your left thumb, you should notice the words immediately to the left and right are significantly blurry.

Perception involves the process of not only detecting an object, but also comprehending the object's significance. A camera may have perfect visual acuity, but has no perception. Only the human brain can perceive and process the significance of the incoming data, which means that only humans can experience the subsequent stress and arousal caused by that data.

UOF and OIS incidents are chaotic and violent, typically causing high levels of stress and activating the limbic system's fight or flight mechanisms, which, in turn, triggers the release of hormones and neurotransmitters throughout the body. Stress and arousal causes an individual's useful field of view to narrow ("peripheral narrowing"). Under extreme stress, a person's field of view can narrow to one half of a degree. Peripheral narrowing and selective attention will cause the individual to not perceive or remember some aspects of the encounter that a camera would capture.

A camera cannot recreate what a human under acute stress sees, hears, and feels, nor can it incorporate the perspective derived from previous training and experience or provide context to a UOF or OIS event.

Cameras provide a reenactment of events from a mechanical view, unaffected by stress, and produce images on film in a linear fashion for replay. Human memory, however, is a weave of events and experiences, stored in different areas of the brain and tenuously attached to one another. The human body releases cortisol during high-stress situations, which has severe effects upon memory, blocking pathways and ensuring a memory is stored in a fractionated manner or, in some cases, never stored at all. The camera transfers its view into digital media with no cortisol impediment.[6] An officer who does not remember the event clearly or who recounts it differently than what was seen by the camera may fight an uphill battle against those who are uninformed.

Body cameras are the wave of the future in law enforcement and are already showing their many positive contributions. As with all new technologies, there will be growing pains and learning curves. However, in the most severe of cases, when careers are on the line and hefty civil penalties wait on the sidelines, education on these new devices with a sense of urgency that mimics their rapid deployment is critical. The ramifications of not doing so

could be extensive, affecting both individual officers and the entities that employ them.

Recommendations

- Law enforcement (at all levels) should be educated in the science of human behavior and human performance. Education is a proven method to reduce departmental liability and to save officers from criminal prosecution or unwarranted discipline.
- Law enforcement agencies should test body cameras in reality-based training environments and compare officers' memories to after-action reviews of video footage from the training.
- Law enforcement should engage prosecutors, defense attorneys, and the judiciary in conversations regarding the camera versus human issues.
- Law enforcement should engage their communities in similar discussions regarding camera versus human issues. ♦

Notes:

[1]Tony Farrar, *Self-Awareness to Being Watched and Socially-Desirable Behavior: A Field Experiment on the Effect of Body-Worn Cameras on Police Use-of-Force* (Police Foundation, March 2013), http://www.policefoundation.org/sites/g/files/g798246/f/201303/The%20Effect% 20of%20Body-Worn%20Cameras%20on%20Police%20Use-of-Force.pdf (accessed April 1, 2015); Allyson Roy, "On-Officer Video Cameras: Examining the Effects of Police Department Policy and Assignment on Camera Use and Activation" (master's thesis, Arizona State University, 2014), http://repository.asu.edu/attachments/134979/content/Roy_asu_0010N_13803.pdf (accessed April 1, 2015); Michael D. White, *Police Officer Body-Worn Cameras: Assessing the Evidence* (Washington, D.C.: Office of Community Oriented Policing Services, 2014), https://ojpdiagnosticcenter.org/sites/default/files/spotlight/download/Police%20Officer%20Body-Worn%20Cameras.pdf (accessed April 1, 2015).

[2]Karlene K. Ball, Virginia G. Wadley, and Jerri D. Edwards, "Advances in Technology Used to Assess and Retrain Older Drivers," *Gerontechnology* 1, no. 4 (2002), 251 –261.

[3]Melchor J. Antuñano, Pilot Vision, *Medical Facts for Pilots* (FAA Civil Aerospace Medical Institute, 2002), http://www.faa.gov/pilots/safety/pilotsafetybrochures/media/pilot_vision.pdf (accessed April 1, 2015). "Cones" are a type of light-sensitive cells used for day or high-intensity light vision. They are involved with central vision to detect detail, perceive color, and identify far-away objects. The central area of the retina known as the macula is about 4.5 mm in diameter and has a higher percentage of cones, and the exact center of the macula has a very small depression called the fovea centralis that contains only cones.

[4]John M. Henderson, "Human Gaze Control During Real-World Scene Perception," *TRENDS in Cognitive Sciences* 7, no. 11 (November 2003), http://cvcl.mit.edu/SUNSeminar/Henderson_03.pdf (accessed April 1, 2015).

[5]*Graham v. Connor,* 490 U.S. 386 (1989).

[6]Washington University School of Medicine, "High Stress Hormone Levels Impair Memory," *ScienceDaily*, http://www.sciencedaily.com/releases/1999/06/990617072302.htm (accessed April 1, 2015).