

Tactical Flashlights: What We Don't Know Will Hurt Us!

by David Blake, M.Sc, F.S.A., C.C.I.



Will your agency experience a mistake-of-fact shooting based on a lack of training in low-light operations?

Most agencies spend a great deal of time creating policies and procedures to ensure some level of control over every device officers utilize on patrol; except for one – the flashlight. Whether the light is weapons-mounted or hand-held, 100 lumens to 5000 lumens, having a “hotspot” or a wide spill, halogen or multi-function LED – there is little guidance or training for this ever evolving tool. However, due to the advances in lights specifically marketed to law enforcement, there is an identifiable need to address this issue. The misunderstanding, misuse, and lack of training with lighting systems can and have had an effect on officer decision-making in use of force encounters; decisions with both civil and criminal implications.

Law enforcement rarely considers the science of human factors, or the many “human” aspects affecting the confluence of the individual and device in the work environment. As the law enforcement industry searches for ways to mitigate error and enhance decision making, it cannot afford to ignore the science behind human capabilities and limitations. Lighting systems have evolved, are multi-function, and can produce negative outcomes based on individual and environmental factors. The following narrative is intended as a broad brush stroke addressing some of the issues in the hopes that agencies will incorporate lighting systems in policy, procedure, tactics and training to a greater degree than they currently may be.

Human Vision

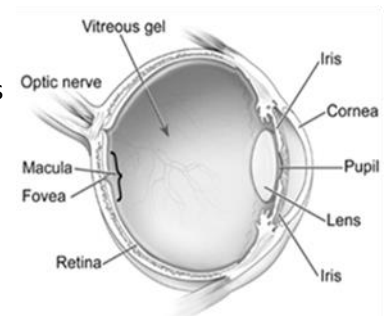
No policy, procedure, tactic or training should be created or manipulated without the appropriate evidence and follow up testing/evaluation. The information provided is the evidence behind the need for further scrutiny, the responsibility for testing and evaluation is the agency's. The initial presentation of said evidence in regards to lighting systems begins with human vision. Perfect vision

is often identified as being “20/20”, or what a normal person sees at 20 feet. When vision is reduced to 20/40, it

indicates the individual must be 20 feet away to see what a person with normal vision would see at 20 feet. A California POST compilation of vision studies states that vision at night, under street lamps, is reduced to 20/60, which means a subject must be at 20 feet to see what a normal person would see at 60 feet during the day¹. This may sound inconsequential on paper, but consider most law enforcement pre-employment screening requires 20/40 uncorrected vision as a hiring condition. In context and based in science, an officer working night shift under street lamps / moonlight likely has visual acuity less than what is required to be considered for employment.

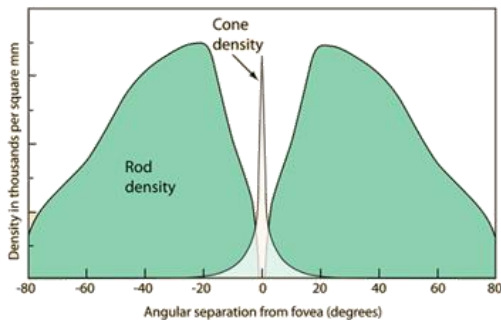
Pre-employment vision requirements are evidence-based recommendations (in part) from studies determining the ability of officers to correctly identify objects held in the hands at a distance. The California POST compilation of vision studies demonstrates officers must have 20/40 vision at 15 yards or 20/63 vision at 7 yards in order to correctly identify handheld objects in low light with 100 percent accuracy.² Within the same document is the presentation of evidence that vision can be reduced to 20/60 under street lamps (at night) and 20/200 in near total darkness. These visual impairments in low light are also propagated in the aviation and military communities based upon scientific study.

While the consideration of clinical visual acuity is important, other aspects of vision may have even greater influence. The biology of the human eye provides the explanation as to why visual acuity decreases during low light so it requires some attention here. Vision is the result of light reflecting from the surface of an object back to the retina



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(back wall) of the eye. The retina is layered with photoreceptors named rods and cones. The cones provide the best high acuity color vision and are associated with daylight “photopic vision”. The cones are centralized in the Macula and provide a small area of high acuity vision at about 3 degrees from center. This small area of high acuity vision is moved both consciously and subconsciously to view the environment (visual saccades). The brain receives the visual information and constructs the perception of a seamless stream of high definition vision. Most of us rarely notice the deficits in peripheral vision (10 degrees or more) unless our attention is overtly directed there while our eyes remain static.



A method of experiencing the small degree of high acuity vision is to hold your thumb out at arms length and just in front of this text (1 inch away). Close one eye and focus your central vision on the thumbnail. Without moving your eye, attempt to read the narrative to the right and left of the thumbnail. You will find the words are blurry or unreadable. This represents the 3-degree foveal vision provided by the cones in the macula. This is why a glance at a cell phone, even held up in front of the windshield may cause a driver to miss a change in the environment directly in front of them.

The rods are spread out to the left and right of the retina and are geared toward low light / monochromatic / peripheral vision while providing much less visual acuity. Moving from light to dark areas starts and adaption process from cone related photopic vision (daylight) to rod related scotopic vision (darkness) while passing through a mixed (rod / cone) area of mesopic vision. The complete adaptation of the eye's visual capabilities from photopic to scotopic vision may take up to 45 minutes

which is important considering the work environment of patrol officers. More importantly, both short term (1-2 seconds) and intermediate term (minutes) adaptations can be problematic for law enforcement officers while operating in rapidly evolving situations in a myriad of changing lighting. During these shorter term transitions, the ability to see detail can be greatly diminished and an officer could be essentially blinded in much the same way a driver is blinded by the headlamps of an oncoming vehicle. We've all likely experienced the effects of this example and know that it takes a few moments to recover. In law enforcement applications, these moments can be critical.

The most important point to consider under the umbrella of low light vision is the concept of contrast sensitivity and the ability to see detail in low light. For instance, dark object in front of a dark background can be difficult to identify even under daylight conditions due to the similarities in background and the lack of detail provided by reflected light. When low light conditions exist, the detail found in similar situations (as the example above) will be increased / decreased based on the intensity of light, flashing lights, lighting location, the viewpoint of the officer and movement. Contrast sensitivity, along with visual acuity and light adaption can culminate to create a mistake in perception. Add to this the context of a rapidly evolving, tense and uncertain environment where a weapon may be involved and the potential for a mistake of fact shooting is increased³.

Low Light Mistake of Fact Shootings

Studies concerning low light mistake of fact shootings are rare; however the information provided by various reputable sources is sufficient to create an intriguing picture of fact. The first source is the FBI's Law Enforcement Officers Killed and Assaulted which provides the times officers are killed or assaulted in the line of duty. LEOKA data shows 238 of the 505 officers feloniously killed and 251 of the 533 officers assaulted (2005 - 2014) were attacked during hours of low light (8pm – 6am)^{4 5}

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In addition to LEOKA data and important for intuitive correlation, a few agencies have included low light information in their shooting statistics. A 1996 statistical analysis from the NYPD found that 77% percent of their shootings occurred in “diminished lighting”.⁶ Miami PD also provided details showing that 62% of their outdoor shootings (1998-1994) occurred in other than “daytime” conditions.⁷

The Las Vegas Metropolitan Police Department’s Office of Internal Oversight published a “Deadly Force Statistical Analysis” for the years 2009 to 2013. Within their analysis, they reported 14 mistake of fact shootings. 57 % of the shootings were during low light hours (1800-0600).⁸ The Michigan Commission on Law Enforcement Standards conducted research on their officer involved shootings and found one of the most common problems identified that circumscribed mistake of fact shootings was based on inaccurate threat assessments under low light.⁹ A study conducted on low-light shootings sampled “mistake-of-fact”¹⁰ incidents from Los Angeles County between 1998 and 2002.¹¹ The author found mistake of fact shootings were based in part on, “Misidentification of the threat level due to impaired visual ‘contrast sensitivity’ in low levels of ambient light”.

While there are few studies of this type, law enforcement is intuitively aware that mistake of fact shootings cost agencies millions in civil liability and can result in criminal charges and loss of employment for the officer involved. The evidence suggests that low-light mistake of fact shootings should be something of great interest to law enforcement and there is a need to address this area with policy, procedure, tactics and training.

The Problem & New Evidence

It has been repeated time and again that law enforcement does not train appropriately for low light encounters (generally). Attorney and police practices expert Jack Ryan has written extensively regarding the failure to adequately train officers in shoot / don’t shoot decision-making.¹²

Most importantly, the decision-making training needs to reflect the conditions which the officer is likely to face. Mr. Ryan discusses the court case *Popow v. City of Margate*¹³ in which the court noted the officer involved had no low light shooting training, citing this as potentially “grossly inadequate”. Ultimately, Mr. Ryan states that qualification courses and combat marksmanship are insufficient and decision-making training, inclusive of low light training must be conducted on a regular basis. Compare Mr. Ryan’s statement to a recent national on-line survey conducted by Blake Consulting:

- 95 % of the surveyed officers (318*) stated their agency had no policy or recommendation on lumen levels for flashlights / weapon mounted lights.
- 13% had no low light training (314*), while 47% had low light range qualification training only once a year (314*).
- Only 17% had low light training, both indoors and outdoors multiple times a year.
- 60 % of surveyed officers (314*) did not receive low light decision making (shoot / don’t shoot) training.
- 70 % said they had no training on night vision (318*).

What the Low Light Subject Matter Experts Say:

Ken Good, former Navy SEAL and highly respected low light tactical trainer stated that environmental situations will dictate the necessary intensity of the lighting systems used. He recommends a multifunction LED handheld light be used in conjunction with a weapons mounted light in order to adjust as necessary. In regards to mistake of fact shootings in low light, Mr. Good suggests stress based decision-making scenarios are most important in mitigating error.¹⁴

Aaron Cowan, a federal law enforcement officer / trainer and accomplished low light tactical trainer recommends the highest level lumen lighting possible. Mr. Cowan has seen unskilled / untrained students blind themselves during interior searches, and states’ training is essential in mitigating this effect.¹⁵

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Gordon Gray, a 32 year veteran of LE with 21 years of SWAT experience and owner of a private firearms training business agrees with others in recommending the highest level lumen light possible. He also agrees that officers can blind themselves if untrained, and recommends that officers are trained sufficiently in using both weapons mounted and hand held lighting systems in a tactical environment.¹⁶

Summary & Recommendations

A law enforcement officer's use of a firearm when confronted with the reasonable perception of a deadly force threat is under more scrutiny now than ever before. Law enforcement knows these incidents occur more often in low light, they know that human vision experiences deficits in low light; the confluence of which provides a foundation to review policy, procedure, tactics, and training in regards to the use of flashlights and weapons mounted lights. Suggestions for agencies are as follows:

- Law enforcement agencies should train pertinent aspects of night vision.
- Law Enforcement officers and trainers should make testing / training lighting systems in various environments (indoor / outdoor) a priority.
- Low light training should be conducted indoors and outdoors with shoot / don't shoot decision-making a priority.
- Agency executives should provide evidence-based guidance on lighting systems from human factors science, as well as testing, and evaluation completed by subject matter experts.
- UoF / OIS investigators should be aware of lighting and night vision issues to include them (forensically) during investigations.

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About the Author

David Blake, M.Sc, F.S.A., C.C.I., is a police practices / UoF expert witness and is a contract instructor with the California Training Institute facilitating their CA-POST certified courses entitled; Force Encounters Analysis & Human Factors, Threat and Error Management. He is a

former Adjunct Professor of Criminal Justice, and a current Police Academy and Force Options Simulator Instructor. He is a published author in several periodicals and journals to include a quarterly column with PoliceOne online magazine entitled; "The Science of Training". He holds a Bachelor of Science in Criminal Justice Management and a Master's of Science in Psychology. He is a Certified Criminal Investigator with the American College of Forensic Examiners Institute and a Force Science Certified Analyst with the Force Science Institute ©.

Footnotes

- ¹ <http://lib.post.ca.gov/Publications/Vision.pdf>
- ² <http://lib.post.ca.gov/Publications/Vision.pdf>
- ³ <http://www.visualexpert.com/Resources/policeshooting.html>
- ⁴ LEOKA 2014 Table 20
- ⁵ LEOKA 2014 Table 99
- ⁶ http://www.theppsc.org/Staff_Views/Aveni/OIS.pdf
- ⁷ http://www.theppsc.org/Staff_Views/Aveni/OIS.pdf
- ⁸ http://www.lvmpd.com/Portals/0/OIO/Deadly_Force_Statistical_Analysis_2009-2013.pdf
- ⁹ https://www.michigan.gov/documents/mcoles/MCOLES_Newsletter_April_2007_193299_7.pdf
- ¹⁰ http://www.theppsc.org/Staff_Views/Aveni/OIS.pdf
- ¹¹ http://www.theppsc.org/Staff_Views/Aveni/OIS.pdf
- ¹² <https://www.patc.com/enewsletter/legal-answers/1-may09.shtml>
- ¹³ *Popow v. City of Margate*, 476 F.Supp. 1237 (N.J. 1979)
- ¹⁴ Personal Communication
- ¹⁵ Personal Communication
- ¹⁶ Personal Communication