

Cognition & Attention: A Primer for Mistake of Fact Shootings

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Abstract: *Research regarding bottom-up/top-down attentional processing is rigorous with applications to sport performance, aviation, medicine, and the classroom learning (to name a few). Similar research applications have extended to law enforcement officers in the performance of their duties. However, research on attentional processing as part of an investigatory tool in officer performance during critical incidents (e.g., response to resistance) is lacking. The current research article topically reviews the empirical literature and hypothetically applies it to a police officer involved mistake of fact shooting. Significant evidence supports the application and more research should be done to understand how officers perceive, attend, and decide during tense, uncertain and rapidly evolving situations when presented with a potentially life-threatening situation.*

Keywords: *Police, Use of Force, Law Enforcement, Attention, Cognition*

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A controversial task involved in policing is that of responding to a citizen resisting a legal seizure under the fourth amendment. The violent and occasionally tragic outcomes, such as a mistake of fact shooting¹ result in extensive critiques of an officer's performance. Human error and its root causes are often ignored within the criminal justice field, leading to biased judgments of the involved officer's perception, judgment, and post-incident memory.

Of import, in de-biasing the criminal justice field's investigatory analysis is the empirical evidence concerning attention. Vickers (2007) defines attention as the necessary filtering of information (e.g., visual, auditory, cognitive) to focus on relevant environmental information. Attention is considered the platform from which perception, judgment, and post-incident recall are formed, making it vital to evaluating officer performance (Goldstein, 2011; Ross, 2013).

The foundation for the importance of attention in this context correlates with the narrative in the United States Supreme Court (USSC) case entitled *Graham v. Connor* (1989). The USSC held in *Graham* (1989) that a portion of the evaluative criteria for judging the reasonableness of an officer's force response² is perception. A perception based on objective facts, inclusive of the totality of the circumstances, and known to the officer at the time the force was used (*Graham v. Connor*, (1989)).

As decision making and memory are influenced by attention and perception, this essay endeavors to provide empirical support for consideration of the top-down/bottom-up theory of attention in evaluating a law enforcement officer's performance in the force response context.

¹ A mistake of fact shooting is defined as an officer's reasonable perception of a deadly force threat being presented based upon the totality of the circumstances even though an investigation found no real threat was presented. Replica weapons and furtive movements (a belief the suspect was reaching for or presenting a gun) are often involved (Ross, 2013).

² A force response equates to the reasonable response to suspect resistance.

The empirical research presented includes both neurological and theoretical aspects of attention, to include theories of visual and auditory processing which are rarely considered in post-incident evaluations of police performance. The resulting synthesis of empirical data provides for an evidence-based investigatory process inclusive of recognizing affective states involved in the top-down/bottom-up processing of information during tense, uncertain and rapidly evolving events.

Attention: Top-Down/Bottom-UP

Human beings receive environmental information through several sensory modalities to include; vision, hearing, taste, smell, and balance (Goldstein, 2011). However, the correlation between the presence of an environmental stimulus and a human's ability to receive it is often misunderstood and leads to biased evaluations of performance. Bishop (2008), Goldstein (2011), Ochsner et al. (2011), Staal (2004), Schmidt (2014), Taylor (2007), and Vickers (2007) state that attention is driven both unconsciously (bottom-up) and consciously (top-down). These two constructs, working alone or in parallel, dictate what environmental information is available to; (1) form perception, (2) encode information, (3) make decisions, and (4) recall aspects of an event. Pinto et al., (2013) state both attentional processes have similar end results (preferential processing), but the underlying principles determining the focus of attention are varied and relevant to cognitive processing and performance.

The bottom-up theory of attention is often described as a human survival trait in which aspects of the environment are evaluated automatically based on potential threatening stimuli (Bishop, 2008; Bodenhausen, & Hugenberg, 2009; Staal, 2004). Staal (2004) describes this "orienting reflex" as being "...involuntary, immediate, and nonspecific" (p.31). Corbetta and Shulman (2002) define bottom-up processing as, "Information processing that proceeds in a

single direction from sensory input, through perceptual analysis, towards motor output, without involving feedback information flowing backward from ‘higher’ centers to ‘lower’ centers”

(p.201). Scientific evidence indicates that attention-grabbing stimuli is processed between 100-120ms and can be acted upon without conscious thought (Bishop, 2008; Bodenhausen and Hugenberg, 2009; Pinto et al., 2013; Schmidt, 2014).

Top-down attention is self-directed (selective attention), processed at a higher level of cognitive functioning, and involves sustained attention to an intrinsically salient stimulus (Bishop, 2008; Pinto et al., 2013; Staal, 2004). Selective attention is defined as, “the focusing of attention on one particular location, object, or message (Goldstein, 2011, p. 82). Several internal and external aspects pertain to saliency and sustained attention to include; cognitive resources, cognitive load, color, contrast, size, and movement (Goldstein, 2011; Vickers, 2007). Pinto et al., (2013) provide evidence that bottom-up and top-down attentional processes can be in conflict. For instance, consciously driven attention to object A, occurring simultaneously with an unconscious attraction to object B may result in the eyes focusing somewhere in between (Pinto et al., 2013).

Attention: Biological and Neurological Basis

According to Staal (2004), the hypothalamic-pituitary-adrenal (fight or flight) response has been rigorously supported in its effects on cognition and attention. Low arousal states can lead to inattention and lack of focus, while increased arousal leads to selective and fixated attention. Associated with the HPA response are both state (environmental) and trait (individual) aspects which modulate attention (Staal, 2004). State effects include task load, emotion, and stress (Goldstein, 2011; Vickers, 2007; Schmidt, 2014) while individual traits related to high and low anxiety, as well as the resources available effect attention (Bishop, 2008).

Wright (2017) provides evidence from neuroscience supporting the dual attention theory in which information is bifurcated to both the limbic system (bottom-up) and the frontal cortex (top-down). For example, an unattended but salient peripheral stimulus is directed through the Thalamus to the limbic system (Amygdala) where threat memories (schema) are processed unconsciously. If the threat is recognized, an orienting reflex will occur, and the Hypothalamic-Pituitary-Adrenal Axis will increase physiological arousal. The information flows simultaneously, albeit slower, from the Thalamus to executive regions of the brain (occipital lobe, frontal cortex) for conscious processing. Conscious attention, depending on continued saliency, threat discrimination, and arousal modulation can be sustained, divided, or become fixated and narrowed (tunnel vision).

Top-down/bottom-up in Action

Consider the example of a police officer responding to a man with a gun call in a crowded park. Upon arrival, the officer scans the crowd using a top-down approach. Limitations in attention provide the officer's visual scan is like the beam of a spotlight. Central objects are processed more intently while peripheral information reception is reduced or ignored (Goldstein, 2011). The suspect (man with a gun) may be located through conscious scanning or he may 'pop-out' (e.g., orienting reflex) based upon bottom-up processing (e.g.: salient verbal or visual cue).

Once attention is focused, aspects of saliency, cognitive load, trait anxiety, and individual resources will determine what the officer's experience may be. For instance, if the suspect reaches toward his waistband and begins to pull out a dark square object, the officer may experience an immediate bottom-up response resulting in fixation and attentional narrowing toward the object. (Easterbrook, 1959; Godnig, 2003). Narrowed attention can cause a failure to

notice other peripheral stimuli which will not be processed in the moment or available for later recall (Ross, 2013).

As stated, bottom-up processing subconsciously compares the visual cue (e.g., reaching to waistband & dark square object) to previous learning and experience. Other aspects of the event, such as threat related dispatch information (priming/framing) and overall context may influence perception of threatening cues. Ultimately, if priming/framing effects, visual cue and threat memory (e.g.: schemata developed through training) are strongly associated, research suggests an automatic skill-based response can result (Goldstein, 2011; Page, n.d.; Schmidt, 2014). The response is both autonomic and somatic, meaning the sympathetic nervous system will excite while automatic motor behaviors associated with the highly-relevant cue may occur (Page, n.d.; Schmidt, 2014; Wright, 2017). Cognitive, visual, and auditory resources will be narrowly focused on the perceived threat (Easterbrook, 1959; Godnig, 2003) causing peripheral data to be un-experienced and unavailable for later recall (Ross, 2013).

Cognitive neuroscientist Johnathan Page (n.d.) describes a similar scenario in which the dark square object is a cell phone misperceived by the officer as a handgun. The officer's response of shooting the suspect is described as an automated survival reaction to a misperceived threat. Payne (n.d.) describes an intricate association between bottom-up and top-down processing in which each influences each other. He provides evidence concerning misperceptions caused by "faulty signals" associated with bottom-up processing may not have time to be corrected by top-down processes before a survival reaction.

Conclusion

Research concerning the performance of elite athletes discusses the impact of top-down/bottom-up attentional processes and their impact on performance (Schmidt, 2014; Vickers,

2007). Specifically, well-learned cue/memory associations allow elite performance to predict their opponent's moves in an unconscious and automated way (Schmidt, 2007). Police officers have been described as having comparable elite performance in threat recognition and firearms skills (Vickers, 2007; Vickers & Lewinski, 2012). The difference is that an error in sports performance such as the misperception of a "juke" move on the football field has considerably fewer consequences to misperceptions of threat-related cues by police. Automated behaviors caused by bottom-up processing in the discussed scenario could save the officer's life, or it could result in a mistake of fact shooting (Page, n.d.; Schmidt, 2014).

Criminal or administrative judgments of officer performance, based solely on the outcome of an event, is not an adequate measure of a mistake of fact shooting. The top-down/bottom-up theory of cognition and perception provides a sound hypothesis for human error in this context and challenges findings of criminal intent or negligence. The inclusion of the bottom-up/top-down construct is suggested for consideration when investigating error due to reasonable misperception. Page (n.d.) wrote in this regard, "...it is recommended that investigators looking into police use of lethal force involving mistake-of-fact shootings start from the premise that a misperception is simply a misperception, and not seek out more complicated explanations unless they have solid reasons for doing so" (p.12).

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