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Hyeyoung Lim

University of Alabama at Birmingham

David W. Webb

University of New Haven, dwebb@newhaven.edu

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The Need for Situational Awareness Assessment Tools to Improve Police Decision-Making Competence (Part One)

Hyeyoung Lim, PhD, Law Enforcement Management Institute of Texas,
Criminal Justice Center, Sam Houston State University
David Webb, PhD, Law Enforcement Management Institute of Texas,
Criminal Justice Center, Sam Houston State University

Introduction

For many professions, instruments of one sort or another are used almost routinely to assess the level of competence of professionals in decision-making relative to their particular occupations. Aircraft pilots, doctors, engineers, and the like are no strangers to such testing. Members of police departments, overall, have little exposure to such forms of assessment, even though they are required from time to time to make critical decisions regarding public safety. At the Law Enforcement Management Institute of Texas (LEMIT), part of the Criminal Justice Center housed at Sam Houston State University, a piece of research has commenced to assess police officers' levels of situational awareness, with the ultimate intention of designing training that enhances decision-making competence. This three-part series addresses the issues involved. The first paper examines the use of applied cognitive psychology in a law enforcement decision-making context; reviews the concept of human error, utilizing a few case studies; examines the concept of situation awareness; and finally addresses the differences between intuition and logical thinking. The second paper describes how simulation-oriented training helps law enforcement officers make better decisions, and the final paper describes how situation awareness assessment tools and simulation training work together.

The Use of Applied Cognitive Psychology in a Law Enforcement Decision-Making Context

Cognitive psychology is the study about "the mental processes involved in acquiring and making use of knowledge and experience gained from our senses. The main processes involved in cognition are perception, learning, memory storage, retrieval and thinking, all of which are terms that are used in everyday speech and therefore already familiar to most people" (Esgate et al., 2005, p. 2). Recently, people became more interested in applying cognitive psychology to real-life situations, asking questions like "Just how do cognitive processes influence individuals' behavior and performance?" This gave birth to the term identified as *applied cognitive psychology*. Since it has focused on measuring human factors, behavior, and performance, the research community's concern had concentrated on *working memory*. Since the term was first used for linking the mind to a computer in the 1960s, now it usually refers to "the system responsible for the temporary storage and concurrent processing of information" (p. 90). Since working memory plays an important role in comprehension, learning, reasoning, problem solving, and reading, it has been applied in various research areas such as aviation, improving teaching methods, artificial intelligence, the medical field, human-computer interaction, and so on.

In 1974, Baddeley and Hitch introduced the concept of working memory, and it was developed by Baddeley (1986). The working memory “is characterized by the assumption that short-term storage of information must be considered as part of a more complex system involved in the execution of a specific task. The information is stored in the working memory as long as necessary, and the structure need not be defined only in terms of the dichotomy between short- and long-term information storage. On the contrary, this system has the ability to store and process information simultaneously” (Cornoldi & Vecchi, 2003, p. 6). Baddeley and Hitch’s (1974) working memory model was originally composed of three main components: (1) *phonological loop*, (2) *visuo-spatial sketchpad*, and (3) *central executive*, and in 2000, Baddeley added the fourth component, *episodic buffer*, which integrates phonological, visual, spatial, and auditory information (Baddeley, 1986; Baddeley & Andrade, 2000).

Working memory capacity is the most important determinant of individual differences in the performance of information-processing tasks, thus, cognitive skills (Baddeley, 1986; Baddeley & Andrade, 2000; Esgate et al., 2005; Turner & Engle, 1989). A number of studies have demonstrated “the relationship between working memory capacity and individual performance in reading comprehension, speech comprehension, spelling, spatial navigation, learning vocabulary, note-taking, writing, reasoning, and complex learning” (Engle, Kane, & Tuholski, 1999, as cited in Esgate et al., 2005, p. 91). Esgate et al. (2005) asserted that “performance in these and related tasks can be predicted by individual differences in the working memory capacities of the participants” (p. 91). Here is our point. Although applied cognitive psychologists focus on finding individual differences in the working memory capacity, this study’s main point is the opposite of it. In other words, the purpose of this study is to develop, improve, and maximize law enforcement officers’ performance in decision-making processes by utilizing individual differences in cognitive skills.

Human Error

When some disasters or tragic catastrophes occur, people refer to them as predictable because they believe the disasters are manmade catastrophes, thus, they happened by human error. What is the distinction between errors and mistakes? In psychology, “an error is an appropriate action that has gone awry somewhere in its execution. A mistake, on the other hand, is a completely inappropriate action based upon, for example, faulty understanding of a situation, or faulty inferences and judgments” (Kahneman, Slovic, & Tversky, 1982, cited in Esgate et al., 2005, p. 121). However, in general, the terms *error* and *mistake* are commonly interchangeable and are defined as an act or thought which is considered to be incorrect, wrong, or faulty. As mentioned before, most human error research has been mainly conducted in aviation, medicine, engineering, industrial areas, and so on, but not in the law enforcement field, although errors made by law enforcement officers can bring not only more fatal dangers but also big monetary damages. The following cases are good examples of human errors made by police officers’ misjudgment.

For Diallo’s case, Case 1, the City of New York became the subject of a \$61,000,000 lawsuit claimed by his mother and stepfather in April 2000, and the City had to pay a \$3,000,000 settlement to them in 2004. As a result of his death, the Street Crime Unit in the City of New York was disbanded, and his story was filmed by

director Veronica Keitt in 2007 (see the website www.365daysofmarchingmovie.com). Case 2, the Bell's case, was filed by his fiancée against the officers involved in his death and against the New York Police Department (NYPD) in July 2007.

Case 1. Seven Seconds in the Bronx

The 1100 block of Wheeler Avenue in the Soundview neighborhood of the South Bronx is a narrow street of modest two-story houses and apartments. At one end is the bustle of Westchester Avenue, the neighborhood's main commercial strip, and from there, the block runs about two hundred yards, flanked by trees and twin rows of parked cars. The buildings were built in the early part of the last century. Many have an ornate facade of red brick, with four- or five-step stoops leading to the front door. It is a poor and working-class neighborhood, and in the late 1990s, the drug trade in the area, particularly on Westchester Avenue and one street over on Elder Avenue, was brisk. Soundview is just the kind of place where you would go if you were an immigrant in New York City who was looking to live somewhere cheap and close to a subway, which is why Amadou Diallo made his way to Wheeler Avenue.

Diallo was from Guinea. In 1999, he was twenty-two and working as a peddler in lower Manhattan, selling videotapes and socks and gloves from the sidewalk along Fourteenth Street.

He was short and unassuming, about five foot six and 150 pounds, and he lived at 1157 Wheeler, on the second floor of one of the street's narrow apartment houses. On the night of February 3, 1999, Diallo returned home to his apartment just before midnight, talked to his roommates, and then went downstairs and stood at the top of the steps to his building, taking in the night. A few minutes later, a group of plainclothes police officers turned slowly onto Wheeler Avenue in an unmarked Ford Taurus. There were four of them—all white, all wearing jeans and sweatshirts and baseball caps and bulletproof vests, and all carrying police-issue 9-millimeter semiautomatic handguns. They were part of what is called the Street Crime Unit, a special division of the New York Police Department, dedicated to patrolling crime "hot spots" in the city's poorest neighborhoods. Driving the Taurus was Ken Boss. He was twenty-seven. Next to him was Sean Carroll, thirty-five, and in the backseat were Edward McMellon, twenty-six, and Richard Murphy, twenty-six.

It was Carroll who spotted Diallo first. "Hold up, hold up," he said to the others in the car. "What's that guy doing there?" Carroll claimed later that he had had two thoughts. One, that Diallo might be the lookout for a "push-in" robber—that is, a burglar who pretends to be a visitor and pushes his way into people's apartments. The other was that Diallo fit the description of a serial rapist who had been active in the neighborhood about a year earlier. "He was just standing there," Carroll recalled. "He was just standing on the stoop, looking up and down the block, peeking his head out and then putting his head back against the wall. Within seconds, he does the same thing, looks down, looks right. And it appeared that he stepped backwards into the vestibule as we were approaching, like he didn't want to be seen. And then we passed by, and I am looking at him, and I'm trying to figure out what's going on. What's this guy up to?"

Boss stopped the car and backed up until the Taurus was right in front of 1157 Wheeler. Diallo was still there, which Carroll would later say “amazed” him. “I’m like, all right, definitely something is going on here.” Carroll and McMellon got out of the car. “Police,” McMellon called out, holding up his badge. “Can we have a word?”

Diallo didn’t answer. Later, it emerged that Diallo had a stutter, so he may well have tried to say something but simply couldn’t. What’s more, his English wasn’t perfect, and it was rumored as well that someone he knew had recently been robbed by a group of armed men, so he must have been terrified: here he was, outside in a bad neighborhood after midnight with two very large men in baseball caps, their chests inflated by their bulletproof vests, striding toward him. Diallo paused and then ran into the vestibule. Carroll and McMellon gave chase. Diallo reached the inside door and grabbed the doorknob with his left hand while, as the officers would later testify, turning his body sideways and “digging” into his pocket with his other hand. “Show me your hands!” Carroll called out. McMellon was yelling, too: “Get your hands out of your pockets. Don’t make me fucking kill you!” But Diallo was growing more and more agitated, and Carroll was starting to get nervous, too, because it seemed to him that the reason Diallo was turning his body sideways was that he wanted to hide whatever he was doing with his right hand.

“We were probably at the top steps of the vestibule, trying to get to him before he got through that door,” Carroll remembered. “The individual turned, looked at us. His hand was on—still on the doorknob. And he starts removing a black object from his right side. And as he pulled the object, all I could see was a top—it looked like the slide of a black gun. My prior experience and training, my prior arrests, dictated to me that this person was pulling a gun.”

Carroll yelled out, “Gun! He’s got a gun!”

Diallo didn’t stop. He continued pulling on something in his pocket, and now he began to raise the black object in the direction of the officers. Carroll opened fire. McMellon instinctively jumped backward off the step and landed on his backside, firing as he flew through the air. As his bullets ricocheted around the vestibule, Carroll assumed that they came from Diallo’s gun, and when he saw McMellon flying backward, he assumed that McMellon had been shot by Diallo, so he kept shooting, aiming, as police are taught to do, for “center mass.” There were pieces of cement and splinters of wood flying in every direction, and the air was electric with the flash of gun muzzles and the sparks from the bullets.

Boss and Murphy were now out of the car as well, running toward the building. I saw Ed McMellon,” Boss would later testify, when the four officers were brought to trial on charges of first-degree manslaughter and second-degree murder.

“He was on the left side of the vestibule and just came flying off that step all the way down. And at the same time, Sean Carroll is on the right-hand side, and he is coming down the stairs. It was frantic. He was running down the stairs, and it was just—it was intense. He was just doing whatever he could to retreat off those stairs. And Ed was on the ground. Shots are still going off. I’m running. I’m moving. And Ed was shot. That’s all I could see. Ed was firing his weapon. Sean was firing his

weapon into the vestibule. . . . And then I see Mr. Diallo. He is in the rear of the vestibule, in the back, towards the back wall, where that inner door is. He is a little bit off to the side of that door and he is crouched. He is crouched and he has his hand out and I see a gun. And I said, 'My God, I'm going to die.' I fired my weapon. I fired it as I was pushing myself backward and then I jumped off to the left. I was out of the line of fire. . . . His knees were bent. His back was straight up. And what it looked like was somebody trying to make a smaller target. It looked like a combat stance, the same one that I was taught in the police academy."

At that point, the attorney questioning Boss interrupted: "And how was his hand?"

"It was out." "Straight out?" "Straight out."

"And in his hand you saw an object. Is that correct?" "Yeah, I thought I saw a gun in his hand. . . . What I seen was an entire weapon. A square weapon in his hand. It looked to me at that split second, after all the gunshots around me and the gun smoke and Ed McMellon down, that he was holding a gun and that he had just shot Ed and that I was next."

Carroll and McMellon fired sixteen shots each: an entire clip. Boss fired five shots. Murphy fired four shots. There was silence. Guns drawn, they climbed the stairs and approached Diallo. "I seen his right hand," Boss said later. "It was out from his body. His palm was open. And where there should have been a gun, there was a wallet. . . . I said, 'Where's the fucking gun?'"

Boss ran up the street toward Westchester Avenue because he had lost track in the shouting and the shooting of where they were. Later, when the ambulances arrived, he was so distraught, he could not speak.

Carroll sat down on the steps, next to Diallo's bullet-ridden body, and started to cry.

Source: Gladwell (2005), pp. 189-194

Case 2. 50 Bullets

In the early morning hours of November 25, 2006, Sean Bell, a 23-year-old New York City man due to be married later that day, walked out of a Queens strip club, climbed into a gray Nissan Altima with two friends who had been celebrating with him—and died in a hail of 50 bullets fired by a group of five police officers.

The shooting shocked the city and brought back memories of the deaths in other high-profile police shootings—in particular, the death of Amadou Diallo, an African peddler killed after police fired 41 shots at him in 1999. Both men were black and both were unarmed, although in both cases the officers appeared to have believed the suspect had a gun. While the death of Mr. Bell did not prompt the same levels

of rage and protest as the Diallo case, it prompted unsettling questions about the changes in police procedures adopted in recent years, and about whether black men remained unfairly singled out for aggressive police action.

On March 16, a Queens grand jury voted to indict three detectives in the case, charging the two who had fired the bulk of the shots with first-degree and second-degree manslaughter, and the third with reckless endangerment.

Source: O'Neil (2007)

Situation Awareness

Like the above-cited cases, uncertainty, doubt, and fear are common emotions that are experienced whenever people need to make a decision, but law enforcement officers have to make good decisions in their daily working environment and particularly in critical incident situations, no matter how much irreducible uncertainty, doubt, and fear they have: "Irreducible uncertainty refers to uncertainty that cannot be reduced by any activity at the moment action is required" (Hammon, 1996, p. 13). Hammon explained that irreducible uncertainty takes two main forms: (1) subjective and (2) objective uncertainty. "Subjective uncertainty refers to the state of mind of the person making a judgment, regardless of the state of the objective system about the judgment is to be made" (p. 14), while objective uncertainty can be explained by the opposite condition of subjective uncertainty.

Crichton and Flin (2002) pointed out that "situation assessment is a key feature of most naturalistic decision-making (NDM) models and is considered paramount to effective decision making, where the first step in the decision making task is to evaluate the characteristics of the event correctly" (p. 209). Endsley (1993) argued that "situation awareness is the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future" (p. 157). Moreover, he asserts "in most settings effective decision making largely depends on having a good understanding of the situation at hand" (Endsley, 1997, p. 269). Thus, situation assessment which evaluates the characteristics of the event or situation correctly is an essential part in most NDM processes (Crichton & Flin, 2002). Adams, Tenney, and Pew (1995) defined *situation awareness* (SA) as the product of situation assessment. The SA is divided into three levels: (1) Level I is perception of critical factors in the environment; (2) Level II is understanding those phenomena; and (3) Level III is understanding what can happen within and to the system in the near future (Bedny & Meister, 1999; Endsley, 1995). Crichton and Flin (2002) stated that "situation assessment refers to the acquisition of information, i.e. the integration of cues from the environment, being interpreted on the basis of pre-existing knowledge leading to meaning being given to the cues" (pp. 209-210). A person with good situation awareness "will have a greater likelihood of making appropriate decisions and performing well in dynamic systems" (Endsley, 1995, p. 61). Case 3 is a good example of how situation assessment affects officers' decision-making to handle critical incidents and was provided by Gary Klein (1986) in his book, *The Source of Power: How People Make Decisions*.

Case 3. The Overpass Rescue

A lieutenant is called out to rescue a woman who either fell or jumped off a highway overpass. She is drunk or on drugs and is probably trying to kill herself. Instead of falling to her death, she lands on the metal supports of a highway sign and is dangling there when the rescue team arrives.

The lieutenant recognizes the danger of the situation. The woman is semiconscious and lying bent over one of the metal struts. At any moment, she could fall to her death on the pavement below. If he orders any of his team out to help her, they will be endangered because there is no way to get a good brace against the struts, so he issues an order not to climb out to secure her. Two of his crew ignore his order and climb out anyway. One holds onto her shoulders and the other to her legs. A hook-and-ladder truck arrives. The lieutenant doesn't need their help in making the rescue, so he tells them to drive down to the highway below and block traffic in case the woman does fall. He does not want to chance that the young woman will fall on a moving car.

Now the question is how to pull the woman to safety. First, the lieutenant considers using a rescue harness, the standard way of raising victims. It snaps onto a person's shoulders and thighs. In imagining its use, he realizes that it requires the person to be in a sitting position or face up. He thinks about how they would shift her to sit up and realizes that she might slide off the support. Second, he considers attaching the rescue harness from the back. However, he imagines that by lifting the woman, they would create a large pressure on her back, almost bending her double. He does not want to risk hurting her. Third, the lieutenant considers using a rescue strap—another way to secure victims, but making use of a strap rather than a snap-on harness. However, it creates the same problems as the rescue harness, requiring that she be sitting up or that it be attached from behind. He rejects this, too.

Now he comes up with a novel idea: using a ladder belt—a strong belt that firefighters buckle on over their coats when they climb up ladders to rescue people. When they get to the top, they can snap an attachment on the belt to the top rung of the ladder. If they lose their footing during the rescue, they are still attached to the ladder, so they won't plunge to their death.

The lieutenant's idea is to get a ladder belt, slide it under the woman, buckle it from behind (it needs only one buckle), tie a rope to the snap, and lift her up to the overpass. He thinks it through again and likes the idea, so he orders one of his crew to fetch the ladder belt and rope, and they tie it onto her.

In the meantime, the hook-and-ladder truck has moved to the highway below the overpass, and the truck's crew members raise the ladder. The firefighter on the platform at the top of the ladder is directly under the woman shouting, "I've got her. I've got her." The lieutenant ignores him and orders his men to lift her up.

At this time, he makes an unwanted discovery: ladder belts are built for sturdy firefighters, to be worn over their coats. This is a slender woman wearing a thin sweater. In addition, she is essentially unconscious. When they lift her up, they

realize the problem. As the lieutenant put it, "She slithered through the belt like a slippery strand of spaghetti."

Fortunately, the hook-and-ladder man is right below her. He catches her and makes the rescue. There is a happy ending. Now the lieutenant and his crew go back to their station to figure out what had gone wrong. They try the rescue harness and find that the lieutenant's instincts were right: neither is usable.

Eventually they discover how they should have made the rescue. They should have used the rope they had tied to the ladder belt. They could have tied it to the woman and lifted her up. With all the technology available to them, they had forgotten that you can use a rope to pull someone up.

Source: Klein, 1998, pp. 18-19

Intuition Versus Logical Thinking

One of the decision-making strategies which Crichton and Flin (2002) promoted is the Recognition-Primed (intuition/gut feeling) Decision-making (RPD) Model. Klein (1997a) stated that "the purpose of RPD model is to explain how people could generate and adopt a single course of action, without having to consider other options and how people could evaluate a course of action without comparing it to others . . . [thus] how mental simulation is used to build stories for evaluating different interpretations of the situation" (pp. 15-16).

Buchanan and O'Connell (2006) argued that "gut decisions are made in moments of crisis when there is no time to weigh arguments and calculate the probability of every outcome. They are made in situations where there is no precedent and consequently little evidence. Sometimes, they are made in defiance of the evidence" (p. 40). There is a part called an adaptive unconscious in our brain which leaps to conclusions without utilizing the thinking process. Gladwell (2005) stated that the adaptive unconscious is like "a kind of giant computer that quickly and quietly processes a lot of the data we need in order to keep functioning as human beings" (p. 11). Moreover, he asserted that "decisions made very quickly can be every bit as good as decisions made cautiously and deliberately" (p. 14). On the other hand, LeGault (2006) stated that "critical scientific reasoning almost always involves a component of intuition, and intuition is almost always informed by experience and hard knowledge won by reasoning things out" (p. 12). Additionally, the technique by which we make good decisions and produce good work is a nuanced and interwoven mental process involving bits of emotion, observation, intuition, and critical reasoning. The emotion and intuition are the easy, "automatic" parts, and the observation and critical reasoning skills are the more difficult, acquired parts. The essential background to all this is a solid base of knowledge (LeGault, 2006, p. 12).

Overall, both arguments on making good decisions by utilizing an individual's snap judgment or logical thinking process are right. As Endsley and Bostad's (1994) tests with pilots proved, there existed individual differences in the abilities to acquire and maintain situation awareness, each individual having different

abilities. Some have higher intuition which makes the probability of the person's snap judgment more correct than others, while others are good at logical reasoning or thinking based on their knowledge, factors that LeGault emphasized. However, in a case of critical incident situations, people may use both, even though they are not able to recognize it consciously. Thus, even though most of those who have good situation awareness ability refer to it as their gut feeling or intuition, that ability might be based on prior experience and knowledge (Crichton & Flin, 2002; Flin, 1996; Klein, 1998a, 1998b, 2000, 2003; LeGault, 2006).

On the other hand, there are always errors existing in decision-making processes. Mostly those errors are referred to as human errors. Lipshitz (1997) defined *decision error* distinguishing it from common human error: "decision errors are deviations from some standard decision process that increases the likelihood of bad outcomes" (p. 152). He indicated that "decision errors are likely to produce bad outcomes, but some bad outcomes are produced by perfectly sound decisions" (p. 152).

Bad outcomes can be traced to faulty cognitive processes in complex causal chains that consist of (1) a bad outcome, (2) an inappropriate action or substandard performance of an appropriate action, (3) a fault in one of the elements of the decision-making process (situation analysis, action selection, action planning, and implementation), (4) a breakdown in the cognitive mechanisms that control action, and (5) situational factors such as time stress or a task structure that overload or mislead the cognitive system (Rasmussen, 1993, cited in Lipshitz, 1997, p. 152).

Klein (1997a) also indicated some of the limitations of the RPD model such as (1) not addressing cognitive processes, (2) not explaining how the pattern matching or judgment of typicality occurs, (3) not explaining what happens when people do have to compare courses of action, (4) not accounting for the generation of new courses of action, and (5) not offering direct prescriptive guidance for training and for distinguishing between good and poor decisions, or for identifying errors. Despite these limitations, the RPD model has its strengths: (1) it explains how people can make decisions without analyzing strengths and weaknesses of alternative courses of action; (2) it explains how people can use their experience to adopt the first action they consider workable; (3) it shows how expertise can affect decision-making; (4) it shows the positive contributions of the availability and representativeness heuristic (permitting recognition of situations as typical) and the simulation heuristic (for explaining events and evaluating courses of action); (5) it spotlights the process of mental simulations; (6) it generates some empirical findings; and (7) it has been supported by several replications (Klein, 1997a, p. 16).

Consequently, whatever it has been called, gut feeling, intuition, or logical reasoning, it can be developed and improved through education or training (Crichton & Flin, 2002; Flin, 1996; Gladwell, 2005; Klein, 1997a, 1997b, 1998a, 1998b, 2000, 2003; LeGault, 2006).

Our Future Research and Development

Our intention is to build on this wealth of knowledge to actually develop and improve the decision-making capabilities of the members of our police community. At this time, one of our solutions is the creation and development of a *situational awareness test* software program. We will leverage existing technologies being used

in the field of cognitive psychology and apply them in the development of such a tool. The next paper will describe how simulation-oriented training helps law enforcement officers to make better decisions.

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Dr. Hyeyoung Lim has served as a research specialist for the Law Enforcement Management Institute of Texas (LEMIT) since May 2007. She holds a PhD in Criminal Justice from Sam Houston State University, a Master of Law (Criminology) degree from Dongguk University, and a Bachelor of Science (Computer Science major; Educational Psychology minor) degree from Sookmyung Women's University in Seoul, Republic of Korea. Prior to accepting her doctoral admission, Lim was a counselor in nonprofit organizations and counseled juvenile offenders as a member of the special crime prevention committee of the Seoul Probation Office. During her graduate study, Lim was a research assistant at the Korean Institute of Criminology (KIC), Ministry of Justice, Korea. During her doctoral studies, Lim received a graduate scholarship and assistantship for four years and was twice awarded the College of Criminal Justice Dean's award, the George J. Beto Memorial Scholarship. Additionally, Lim was selected as a visiting scholar for the

2008 Interuniversity Consortium for Political and Social Research (ICPSR) Summer Program course on Quantitative Analysis of Crime and Criminal Justice sponsored by the Bureau of Justice Statistics. Lim's current research interests involve predicting recidivism using data mining, analyzing crime and imprisonment trends, developing a software program to test situation awareness for law enforcement officers, law enforcement management and education, critical decision-making, and program evaluation.

Dr. David Webb is the Associate Executive Director of LEMIT; he has worked there since November 2001. Webb holds a Bachelor of Arts in Political Science and is a graduate of Bramshill Police Command College in England. He completed his PhD at Sam Houston State University, and he also holds a Management Diploma from the National Examination Board (UK). Webb relocated to the United States after spending over 30 years in policing in the United Kingdom, the last 12 years of which were at the rank of Chief Superintendent of Police. He is also an adjunct faculty member of the Criminal Justice Center at Sam Houston State University. His policing interests include decision-making, human trafficking, political violence, and organizational issues. His latest book, *Competence and Policing: A Research Study*, was published in July 2008.

Contact Information

Hyeyoung Lim
Law Enforcement Management Institute of Texas
Criminal Justice Center
Sam Houston State University
Huntsville, TX 77341-2417