

CHAPTER 1: INTRODUCTION

Opening

Everyday we make a number of decisions that, when placed on a continuum, range from very easy to extremely difficult. Many of these decisions can be considered routine and are made in a manner that does not require a considerable amount of thought or effort. Other decisions, however, require intensive deliberation with their consequences having a profound influence over many lives. Take for example the decision-making associated with the aftermath of September 11th and the lives affected by the decisions that readied this nation for war. It is these types of judgments and decisions that most interest researchers.

Clearly, routine choice decisions that are of little consequence (e.g., what color shoes should I wear?) are not of interest to most decision-making researchers. Instead, researchers are most interested in studying, and ultimately optimizing, those decisions which are complex, dynamic, and difficult and for which the consequences are significant (Cannon-Bowers, Salas, & Pruitt, 1996, p. 195). This study focuses on decision-making at this

level; where decisions impact others and where the decision consequences can be significant. Specifically, this study examined decision-making in the law enforcement profession, where officers are required to make quick and spontaneous decisions under real-world conditions that are often dangerous, ill-defined, and have a high degree of uncertainty.

The decisions police officers make, in many regards affect lives and must be consistent with societal expectations to ensure the bonds of trust go unbroken between police officials and the citizenry. One need only examine the beating of Rodney King by members of the Los Angeles police department to understand the gravity of poor police decisions/actions and observe the immediate collapse of not only respect for, but also trust in the Los Angeles police department by the people. Those well-publicized scenes of violence affected many lives when an amateur videotape showed officers striking King 56 times with batons, while a group of police, including field training officers, stood by idly and did nothing.

Extreme cases such as the King incident, although atypical, should serve as an indicator to police agencies that a thorough review and examination on the preparedness of their officers is warranted. The on-scene decisions

officers made during this and other cases need to be examined and analyzed to reduce such incidences from occurring in the future.

Similarly, the same understanding should be sought when officers make good and reasonable decisions under analogous conditions. This study proactively examined the process that experienced and successful law enforcement officers utilize in their decision-making/judgment techniques and provides a possible first step towards better preparing law enforcement officials.

Background of the Problem

Both researchers and practitioners have recognized the absence of and need for the inclusion of decision-making/judgment theory in law enforcement training curricula.

There are far too many changes taking place in policing, as well as a tremendous accountability that officers are held to by both the courts and the community. The best way to maintain professional police officers who are prepared to handle the complexities of policing is through more and better training (Carpenter, 2000).

Federal statutes and recent court decisions require police departments to provide adequate and relevant training and to encourage the growth of training programs for their personnel. However, the difficulty to agree on the number of training hours, coupled with the failure to establish "what should be taught, how much should be taught, and who is going to teach it" are critical issues that continue to challenge police academies (Dantzker, 1997, p. 137). Various states such as Illinois, Maryland, and Florida have made progress with the implementation of adult education models in an effort to better train police officers, but this is only a partial answer to a complicated issue (Charles, 2000; Weinblatt, 1999).

One area that has been historically neglected in police training is designing curricula based on the empirical understanding of the decision-making/judgment processes of police officials, in the context of the moral, legal, and empirical "ambiguity" of street level work. This neglected area and the need for development of decision-making and problem solving skills has been identified as one of the most critical training requirements for policing (Mastrofski, 1990; Travis, 1995).

Similarly, post-academy training is further complicated and compounded by the fact that there is

little, if any, organized, coordinated, and integrated training for officers throughout their careers (Sharp, 1997).

Certainly, a number of police agencies provide some form of in-service training; however, it is uncommon for police departments to provide coordinated, integrated, and consistent training regimes.

Essentially, training programs differ, they are not integrated with one another, and officers typically are not similarly trained. Further, there generally is no attempt to ensure that officers in the field are practicing their trade in a manner in which they were trained. In reality what typically occurs in police departments is a socially constructed police response to the various situations that police encounter (Charles, 2000, p. 6).

Before law enforcement educators can move beyond socially constructed police responses, a deeper understanding of the strategy that experienced and successful law enforcement officials utilized to make decisions under police conditions is necessary. This study offers this inquiry and analysis of officers rendering decisions under conditions that can be hostile, highly ambiguous, and have a high degree of uncertainty.

Ubiquitous in naturalistic settings, ambiguity and uncertainty constitutes a major obstacle towards effective decision-making (Brunnson, 1985; Corbin, 1980; Lipshitz & Strauss, 1997; McCaskey, 1986; Orasanu & Connolly, 1993; Thompson, 1967). This is mainly due to the varying degree to which decision-makers conceptualize uncertainty and the different methods for coping with such conditions (Huber, Wider, & Huber, 1996; Humphreys & Berkeley, 1985; Lipshitz & Strauss, 1997; Lopes, 1987; March & Shapira, 1987).

Despite the centrality of uncertainty in decision-making literature, only few studies (reference above) addressed (indirectly) this question, (Lipshitz & Strauss, 1997, p. 149).

Strategies for coping with uncertainty in the decision-making process have been offered including collecting additional information before making a decision (Dawes, 1988; Galbraith, 1973; Janis & Mann, 1977) and deferring decisions until additional information becomes available (Hirst & Schweitzer, 1990; Lipshitz & Strauss, 1997). Lipshitz and Strauss (1997) offer five strategies for coping with three different types of uncertainty, which may have some application in policing. These strategies are presented in table 1. Their findings are the result of inquiry into the following questions: 1. How do decision

makers conceptualize uncertainty? 2. How do decision makers cope with uncertainty? 3. Are there systematic relationships between different conceptualizations of uncertainty and different methods of coping?

Table 1

Strategies For Coping With Uncertainty

Three Types of uncertainty	Five Coping strategies
Inadequate understanding	Reducing uncertainty
Incomplete information	Assumption based reasoning
Undifferentiated alternatives	Weighing pros and cons
	Suppressing uncertainty
	Forestalling

Although traditional decision-making researches are interested in various forms of uncertainty (Hammond, McClelland, & Mumpower, 1980) and strategies that tend to reduce it, concentration in this area has focused on single decision events conducted under laboratory conditions (Orasanu & Connolly, 1993). Single decision events are not reflective of complex decision-making that occur under

real-world conditions and as a result, decision-making research in the past fifteen years has departed from laboratory studies of static environments to examining, "real-world complex tasks and systems being operated by individuals in a natural setting" (Randel, Pugh, & Reed, 1996, p. 579).

This new paradigm, labeled naturalistic decision-making (NDM) (Klein, Orasanu, Calderwood, & Zsombok, 1993) provided a description of decision-making as it unfolds in a field setting and "rejects a purely formal approach, whether for describing or for evaluating decisions" (Cohen, 1993, p. 50). The identification of key contextual factors that differentiate naturalistic decision-making from traditional decision research paradigms are outlined in table 2.

This background in traditional and naturalistic decision-making concepts offers a reasonable platform of study for inquiry and analysis of law enforcement officers rendering decisions under conditions of risk, ambiguity, and uncertainty.

Table 2

Differences Between Naturalistic vs. Traditional
Decision-Making Research

Naturalistic decision-making	Traditional decision-making
a. Ill-structured problems	Well-defined problems
b. Uncertain, dynamic environments	Not static, simulated situations
c. Shifting, ill-defined, or competing goals	Stable goals
d. Action/feedback loops	Single decision event
e. Time constraints	Ample time for tasks
f. High stakes	Not situations devoid of true consequences for the decision maker
g. Multiple players	Individual decision-making
h. Organizational goals and norms	Decision-making in a vacuum

Source: Randel, J., Pugh, H., Reed, S. (1996). Differences in expert and novice situation awareness in naturalistic decision-making. International Journal of Human Computer Studies, 45, p. 580.

The Problem

When critiquing the decision-making processes of law-enforcement officers acting under dynamic and fluid conditions, it has been broadly suggested that: police commanders do not set out to make decisions; they set out to command and control an unfolding situation. While

"obtaining this goal requires making many decisions, decision-making is part of a larger activity not an end in itself. Therefore, the commander is making a whole string of decisions, which form a decision-action-feedback loop, where the decision-making process demands flexibility as the environment can change dramatically as events evolve" (Crego & Spinks, 1999).

Police simulation systems have been designed to accommodate this concept of flexibility. Officers emulate naturalistic decision-making by being tasked with managing some component of a critical incident. This is accomplished through video footage and audio material that shows each officer the scene from their own location and perspective (Crego & Spinks, 1999).

While simulation systems offer the law-enforcement profession a unique structure under which to train their officers, these systems are limited and cannot introduce or interpose the emotional or risk-related factors inherent in true, on scene police decision-making. Furthermore, issues such as automatization and the need to operationalize the concept of "command and control" in a police context must be examined before these systems can maximize an officer's performance.

Therefore, it is not known what theory, concepts, constructs, or models may be implicitly driving an officer's actions. Simulated systems are designed to replicate practical problems and offer officers repeated exposure and practice to a critical event, usually resulting in some sort of shooting. These systems, however, are not designed to prepare officers for the routine, unanticipated conditions they often encounter on the street.

Under true conditions, law-enforcement officers often respond to crime scenes that are ambiguous and in a state of chaos and disorder. Consequently, making judgments and decisions under these conditions is difficult because situational clarity is not readily known and takes time to emerge. The decision-making process may therefore be delayed, until an officer reaches an acceptable level certitude or confidence before acting.

While delay may be considered integral to the overall decision-making process, in a law enforcement context it could have negative implications. One such implication is the possibility that the criminal activity will continue and perhaps escalate, thereby increasing the potential for further risk and danger to the officer and others. One

benefit, however, derived from the delay factor is the possibility to improve decision accuracy.

To compensate for delay and advance reaching a suitable level of confidence, officers can assemble decision options based on the existing information or details fixed in the situation, providing the officer is observant to such detail. If an officer is not attentive to this information, decision options will be restricted (delayed) because all detail can be important.

Exploring how this unfolds in specific situations is a central topic of interest to the present study. When and under what conditions sufficient clarity emerges is the obverse side of the decision coin, with precipitous, premature action on the other side. Also important to this study is the recognition of situational detail embedded in the event and the influence this has on the officer's perception in reaching the level of confidence and clarity needed to start in the construction of decision options.

The recognition of detail is accomplished mainly by observation, which gets contextual meaning through the analytical and intuitive processes. For example, when addressing intuition, deBecker (1997), author and researcher coined the phrase "intuitive messengers" and

revealed the impact these messengers play in our decision-making and problem solving abilities (deBecker, 1997).

One such "intuitive messenger" is the ubiquitous hunches or "gut feelings" that are so often associated with effective policing. Research has shown that intuition as a whole, strongly influences one's decision-making/judgment competency and proficiency (Agan, 1987; Brockmann & Anthony, 1998; Morris, 1990; Polanyi, 1966; Sternberg & Horvath, 1999).

deBecker points out, however, that one problem lies in our inability to properly listen to these omnipresent intuitive signals when rendering decisions. The consequence of ignoring the "intuitive messengers" during criminal encounters could prove costly for victims and officers because calm, thoughtful, and rational decision-making can hardly function under situations of violence and uncertainty.

With intuition representing one side of the decision-making/judgment continuum, a more systematic and analytical approach for coping with uncertainty represents the other. Unlike deBecker, Smithson (1989), for example, proposes one such analytical method that is described as:

First, reduce ignorance as much as possible by gaining full information and understanding. Secondly, attain

as much control or predictability as possible by learning and responding appropriately to the environment. Finally, wherever ignorance is irreducible, treat uncertainty statistically (Smithson, 1989, p. 153).

Although this approach or strategy would be difficult to implement under acts of violence, it does offer the more "classical," rational process for dealing with uncertainty in the decision-making process and emphasizes the need to gain full information of the situation.

Research in the field of judgment and decision-making often compares these two approaches, "the rationality of a person's intuitive judgments under uncertainty with analytically derived answers produced by formal models" (Hammond, Hamm, Grassia, & Tamra, 1987, p. 753). The difficulty in assessing the "relative efficacy" of these indirect comparisons, however, lies in the fact that "analytical models are always provided with all the correct (and only the correct) substantive information each model requires, and such models are almost always executed without error - at least in academic journals" (p. 754).

For this reason, indirect comparisons between a law enforcement officer's intuitive and analytical processes will not be sought in this study because both are claimed

to be inherently present in police decision-making.

Decision-makers, acting under dynamic and fluid conditions, are guided by both their intuition as well as their analytical ability.

Additionally, decision-makers under real world conditions realize that there is an appropriate proportion between the time needed to reflect on a condition and the action required to resolve that condition. The appropriate proportion for each, that of reflection and action, will vary from situation to situation, but this requires a decision as well and managing this process needs to be examined and officers need to be sensitive to the process.

Commenting on the notion and meaning of reflection in general, Schon (1985) claims that reflection includes theory-building, problem solving, developing an acute understanding of phenomena, as well as a variety of ways to perceive the situation. Schon (1983) also suggests that expert knowledge is developed through reflection and claims that it is the ability to reflect which distinguishes the expert from the merely competent professional (Maughan, 1996).

A subset of the reflection process is the ability to "reflect-in-action" (while doing something) as well as "on-action" (after it has been done) and both have been

identified as an important feature of professional decision-making training (Schon, 1983; Atherton, 1999). While this differs in some important ways from the conception of reflection, any variation is an issue of concern to the present study and needs to be observed in a specific contextual situation in order to be understood.

Also of concern to this study is when rapid decisions are made during a particular event, an implicit theory of personality or motivation is applied to the specific situation to "understand" the underlying behavior driving the decision process. When a teacher, for example, makes a rapid decision about a child in class, that teacher is using an implicit theory of learning and teaching to the specific situation and expects a specific outcome. In the law enforcement field, however, the underlying theory influencing an officer's decision-making process has not been fully explored and needs further examination.

Purpose of the Study

The goal of this study is to determine the implicit theory of action held by the officer under study. How does it work, what understanding does the officer have of the situation, and what does the officer expect to be the

outcome of his (her) decision to act? This study provides this examination to determine what underlying theory or constructs are implicitly driving an officers' action, particularly under conditions of time constraint and uncertainty.

Decision-making research has undergone a shift from the "classical" to "naturalistic" perspective, given the importance of decision-making to real-world problems and the impact it has on how the field might advance (Cannon-Bowers et al., 1996). Although decision-making in a police context conforms to the naturalistic perspective, no specific studies have been found in either the "classical" or "naturalistic" literature that directly relates to the decision-making processes of police officials. With the naturalistic decision-making model being more applicable to a law-enforcement context than traditional models, the NDM model guides this research undertaking by utilizing the case study methodology to examine and analyze the decision-making process of police officers as they perform their responsibilities in the field.

By examining real-world police decision-making, this study contributes to the existing literature by focusing on the decision-making/judgment processes of experienced and successful law enforcement personnel and understand the

kind of process used to make maximally correct decisions in the minimal amount of time. Correct to the extent that the officer can mitigate any level of risk or threat associated with the case and the final resolution had a positive law enforcement outcome.

The dynamics that influence decision-making under true operational conditions become stressed because the context of the moment is constantly undergoing change. This study concentrates at this phase of the decision-making process, where experienced law-enforcement officials are required to make on scene judgments and decisions under real-time conditions and not that of replicated scenarios through simulation.

The "classical," probabilistic based decision-making theory, and naturalistic model clearly offer different perspectives in understanding the decision-making process. However, "one must recognize that both the analytic and the recognitional modes of decision-making are desirable and indeed may be complementary" (Killion, 2000, p. 66). In the process of discovering merging concepts and categories for this study, both aspects of analytical and intuitive decision-making are viewed as interdependent to the decision-making process.

However, the relationship between these two types of decision-making process, while asserted to be present, has not been examined carefully in a specific ongoing event in the field. How they relate, how they complement or hinder each other, are issues of central interest to the present study. Understanding this process is core to this research undertaking and can only be understood by observing decision-making as it unfolds in a particular situation. This study represents a first step towards this objective.

Significance of the Study

Unfortunately, decision-making for law-enforcement personnel is often examined and critiqued when specific decisions by an officer(s) are brought into question through litigation, generally resulting from some adverse consequence or tragic outcome. A case in point occurred on February 4, 1999 in New York City, where law enforcement officers were indicted for the shooting death of Mr. Amadou Diallo. Officers discharged their weapons 41 times striking unarmed Diallo nineteen times. Decisions made in this case led to the tragic death of an innocent person, police officers being tried for his death, a family in

distress, a community in turmoil, and a nation less trustworthy in their police.

If societal expectations demand that police officers make every attempt to make appropriate decisions while performing their responsibilities, a thorough understanding underlying the process on how successful officers arrive at particular decisions is needed. Only after this understanding is attained, can new strategies be designed and implemented that strive to better prepare officers for their responsibilities. For this reason, this study is guided by the following research questions.

Research Questions

The main research questions under inquiry are:

1. How did three experienced and successful law enforcement officials make judgments and decisions when operating under the stressful moments of law-enforcement?
2. Why did these officers select a particular decision choice(s) and what underlying phenomenon led them to make the decision choice(s) they made?

3. How did they decide when to act, i.e., when is there sufficient clarity to choose a course of action

Definition of Terms

The following section provides for definition of terms as related to this inquiry.

Ambiguity - lacking precise knowledge about the likelihood of events (second-order probability) (Hogarth, 1987).

Control - described by this study's participants as restricting the movement or freedom of others, essentially restraining and inhibiting their actions over the existing conditions.

Decision-maker - a decision-maker is a person, or group of people (e.g., a committee), who makes the final choice among the alternatives (Heylighten & Joslyn, 1999)

Decision-making - generally refers to the process of sampling information/cues analytically and/or

intuitively, generating alternatives, choosing one or more and acting.

Decision theory - a body of knowledge and related analytical and cognitive techniques of different degrees of formality designed to help the decision maker choose among a set of alternatives in light of their possible consequences (Heylighten & Joslyn, 1999).

Intuition - Agan defined "intuitive knowing" as a non-rational process, based on a feeling or sensing level of knowing, an awareness that may come from subconscious data (Agan, 1987). Westcott defined intuition as "the process of reaching accurate conclusions on the basis of consensually inadequate information" (Westcott, 1968, p. 8).

Law enforcement - personnel from local, state, or federal bureaus, departments or agencies that are assigned the responsibilities; and given the authority; to enforce existing laws and have the authority to execute arrest warrants.

"Naturalistic Decision-Making (NDM)" - is concerned with poorly defined procedures because of inadequate information that may be missing, ambiguous, or unreliable (Klein, 1999). "The study of NDM asks how experienced people, working as individuals or groups in dynamic, uncertain, and often fast-paced environments, identify and assess their situation, make decisions and take actions whose consequences are meaningful to them and to the larger organization in which they operate" (Zsombok & Klein, 1997).

Decision risk - refers to situations in which a decision is made whose consequences depend on the outcomes of future events having known probabilities" (Lopes, 1987, p. 681).

Tacit knowledge - Michael Polanyi (Polanyi, 1966), an early pioneer in the concept of tacit knowledge made the simple observation that we "know more than we can tell" and described this maxim as tacit knowledge. Polanyi argued that a large part of human knowledge is occupied by knowledge that cannot be formalized or articulated.

Time constraint - Having a limited amount of time to perform a task. Whenever there is a time deadline, even if the person is able to complete the task in less time. Time pressure indicates that a time constraint induced some feeling of stress and created a need to cope with the limited time. Thus, it is possible to have time constraint but no time pressure (Ordonez, 1997).

Uncertainty - a situation in which one has no knowledge about which of several states of nature has occurred or will occur (Anderson, Deane, Hammond, & McClelland, 1981).

Summary and Organization of Study

This introductory chapter has presented a framework for this study by giving the background of the problem, stating the purpose of the study, and providing information on why this examination is significant. The research question has been outlined and the study is designed with consideration to research conducted by others in related areas.

Chapter 2 includes a review and summary of the relevant literature. Chapter 3 describes the design and methods utilized in the study. In chapter 4, the case study findings are described, presented, and analyzed. Finally, chapter 5 concludes with a summary of the study, conclusions drawn from the findings, application and recommendations where further research is warranted.

This dissertation employs the grounded theory method that discovers concepts and theories empirically grounded in the data from which they arise. It is a systematic generation or induction of every step, from data collection to coding generation, so the process by which the theory or concepts are generated becomes known. Case study examination of participant observation and focused interviews are used to collect data.

It follows Lincoln and Guba's (1985) case study structure by identifying the problem, the context, the issues, analysis of the data and reporting the "lessons learned" (Creswell, 1998). This case study inquiry focuses on real world situations and environments as opposed to laboratory experiments (Merriam, 1998). It investigates, in real-time and actual investigations, the actions and decisions of federal law enforcement agents and police officers.

The proposed group of officials participating in the study are assigned to a unit that are making on-scene, real-time decisions and who have been acknowledged as making good decisions in their law enforcement careers based on relatively successful outcomes and the criteria outlined in chapter 3.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

The literature on judgment/decision-making research, when applied specifically to the law enforcement profession is limited and narrow in scope. Much of the literature in this area are studies that were conducted as "after action reviews," which essentially review the actions of an officer after a critical incident (Charles, 2000, p. 3).

This reference has a negative connotation in that this term suggests that the person evaluating the situation is doing so without having been involved in the incident or being responsible for making decisions at the time (p. 3).

Therefore, officers and others view many of these studies critically because it will be immediately noted that those examining the incident were not present, nor were their lives in danger during the incident (Charles, 2000). The present study removes this bias by examining decision-making on-scene in actual tactical operations, rather than as an "after action review." Also, the researcher was exposed to the same operational conditions as the law enforcement official rendering the decisions.

This chapter reviews the literature on decision-making/judgment theory from a historical perspective and the various decision-making paradigms that have been developed. The emphasis is placed on naturalistic decision-making (NDM) because NDM research examines decision-making made under real world and dynamic conditions. Additionally, NDM studies examine experts performing and making decisions in their own respective professions and focuses on acquiring an understanding of how decision-makers are effective under conditions of high stress and time pressure (Milton, 1997).

Participants studied under this model include health-care professionals, battle commanders, and fighter and commercial pilots (Klein, 1999). However, a gap in the judgment/decision-making literature exists that specifically examines the decision-making process of law enforcement officials while in the field. The present study addresses this gap.

The chapter first examines, as background, the plea for law enforcement training that incorporates some form of judgment/decision-making (JDM) theory into existing training curriculums.

When officers are confronted with police situations for which they have not been appropriately trained

and/or in which they infrequently become involved, they will respond from a position of stress, confusion, frustration, and fear. The haphazard nature of their behavior will be directly related to their lack of training, fear, and resulting stress level that they encounter. Such a combination will ensure that officers will make mistakes, act out, and/or resort to any variety of risk-taking behaviors out of frustration and fear. The officers simply do not have the appropriate repertoire to effectively handle life-threatening high stress events (Charles, 2000, p. 7).

The above conclusion was the result of a case study that involved multiple shootings during a felony arrest. It was the intention of the Chief of Police of this particular department to use this tragic event to help in redesigning training programs to better prepare officers.

This department recognized that a need exists calling for better training of their officers and has taken appropriate action towards this objective. This study also acknowledges this need and offers the possible first step of many in meeting this objective.

Background: Law Enforcement Training

Police departments, on occasion, conduct case studies of critical incidences, such as an officer involved in a shooting, to better prepare officers for confrontational encounters.

To begin, it should be understood that there is much yet to be learned by instructors to best prepare police officers properly to engage in life-threatening encounters, let alone basic services and enforcement actions. This is a sad indictment, but unfortunately a highly accurate statement (Charles, 2000, p. 3).

Police instruction is generally lecture oriented, with little time allocated to experiential training, which allows trainees to engage in activities they are required to perform in the field. In essence, officers, upon completion of their training, are required to assume responsibilities for which they received little practical, experiential instruction. Before police academies make attempts to integrate any new design of police curricula into current programs, a fundamental need exists to understand the decision-making processes of law enforcement officials acting under police conditions. Recognizing and understanding this process is important, not only to better

prepare officers, but possibly to reduce various forms of police misconduct that appear to be on the rise.

In 1999, President Clinton, concerned that recent charges of police misconduct might undermine the fight against crime, allocated an additional \$40 million to improve police training nationwide hoping to restore the bonds of trust between the public and law enforcement. "I have been deeply disturbed by recent allegations of serious police misconduct and continued reports of racial profiling that have shaken some communities' faith in the police, who are there to protect them," Clinton said (Anonymous, 1999).

In addition, Congressional lawmakers passed a bill, the National Police Training Commission Act of 1999, which focuses federal scrutiny on police recruitment and training methods in Chicago, Los Angeles, New York and the District of Columbia. The commission is charged with scrutinizing and critiquing departmental training, recruitment and hiring practices, use of force, and arrests and searches in order to curtail the excessive use of force in those areas. The Commissioners empowered by this Act are responsible to Congress for recommending ways to improve police methods and practices.

With renewed concerns and recent examinations of police practices, a concerted effort is justified that

directly focuses on better preparing police officials for their responsibilities. One way to accomplish this objective is to design police instruction that is grounded to the process officers undergo when making actual decisions under operational police conditions. This study provides a starting point towards this initiative.

Decision-Making Literature

To present a review of the origins of decision-making theory, the following section offers an introductory and historically oriented summary on judgment and decision-making theory.

Historical Summary on Judgment/Decision-Making Theory (JDM)

Traditional decision theory favors an analytical approach that is derived from economic theories of rationality and encompasses expected utility theory, multi-attribute utility theory, decision analysis, behavioral decision theory, and similar models of preference driven choice (Smith, 1997).

Decision theory has as its foundation a fundamental aspect of economics in which individuals make rational

choices from a range of alternatives that may be characterized by varying prices. In determining a course of action, an individual must evaluate conditions of uncertainty and risk and develop strategies to make decisions when, at best, the probabilities of events are known in order to maximize the sum of the products of the probabilities and the estimated utilities of the desired eventualities (Bothamley, 1993, p. 138).

Early research on JDM, as presented by Goldstein and Hogarth (1997), can be traced back largely to the events that took place in the 1940s and 1950s. "A complete history of the field would have to stretch back several centuries as least, and be situated relative to several neighboring or more inclusive topics, such as emotion, thinking, and perception" (Goldstein & Hogarth, 1997, p. 3). For earlier reviews see (Becker & McClintock, 1967; Edwards, 1954a; Rapoport & Wallsten, 1972; Slovic, Fischhoff, & Lichtenstein, 1977).

JDM research is not "paradigmatic" where there is a single, universally endorsed, overarching theoretical framework that researchers utilized to guide their efforts. Rather, there are a number of schools of thought that identify different issues as interesting

and deemed different methods as appropriate (Goldstein & Hogarth, 1997, p. 3).

Classical decision-making models have been categorized into various descriptive, normative, and prescriptive frameworks, with the concentration placed on understanding the back end of the decision event or choosing between decision options. (Beach & Lipshitz, 1993; Cohen, 1993).

Normative theories are based on abstract models or principles that serve as theoretical standards for how decision-makers should ideally make judgments. They are derived from certain axioms of 'rational' behavior (von Neumann & Morgenstern, 1944) and describe what decision-makers 'should' do if they are rational and they behave in conformance with specified axioms (McKernan & O'Donnell, 1996). These principles are used as benchmarks to evaluate whether people are accurate or biased in their decision-making and focus on the how people would act if they performed like abstract or theoretical entities.

For decades, traditional research in JDM has examined behavior directed towards rational choice theory. In this framework, "rationality is expressed as a single correct decision shared by experimenters and subjects that satisfies internal coherence within a set of beliefs and preferences" (Mellars, Schwartz, & Cooke, 1998, p. 448).

This notion has received wide criticism because the assumptions associated with this strategy are usually too restrictive (Klein, 1999). Gigerenzer (1991, 1996), notes that good judgment is the main concern and good judgment requires analysis of content, laws, principles, and axioms (Gigerenzer, Hoffrage, & Kleinbolting, 1991). Gigerenzer (1996) and Cosmides & Tooby (1994) propose that good judgment is domain specific and should reflect basic principles of survival and adaptation (Cosmides & Tooby, 1996; Gigerenzer, 1996). Kahneman (1994) argues that logical analysis should be supplemented with substantive evaluations that focus on assessing the quality of decision outcomes (Kahneman, 1994; Mellars et al., 1998). Finally, Lopes (1982) points out that rationality means more than being "right" as often as possible, where a rational strategy should produce the kind of results decision-makers desire (Lopes, 1982; Plous, 1993).

Prescriptive models, in contrast, are concerned with prescribing or assisting decision-makers to improve their performance, allowing for real-world constraints. This assumes the rational choice model is always the preferred method for making "good" decisions and concentrates on the disparity between how actual decision-makers function

(descriptive theory) and how they would ideally function (normative theory) (Mandel, 2000).

Central to the body of prescriptive knowledge about decision-making has been the theory of subjective expected utility (SEU), a sophisticated mathematical model of choice that lies at the foundation of most contemporary economics, theoretical statistics, and operations research. SEU theory defines the conditions of perfect utility-maximizing rationality in the world of certainty or in a world in which the probability distributions of all relevant variables can be provided by the decision-makers (Simon et al., 1986, p. 20).

A notable distinction or variation with SEU is the allowance of subjective, or personal, probabilities of outcomes. Prior to 1954 (Savage, 1954), the probabilities in expected utility theory had been treated as objective probabilities, where SEU generalized the theory to include people's subjective probabilities that an outcome would occur (Plous, 1993).

It assumed that a decision-maker possessed a utility function (an ordering by preference among all the possible outcomes of choice), that all the alternatives among which choice could be made were

known, and that the consequences of choosing each alternative could be ascertained (or, in the version of the theory that treats choice under uncertainty, it assumes that a subjective or objective probability distribution of consequences was associated with each alternative). By admitting subjectively assigned probabilities, SEU theory opened the way to fusing subjective opinions with objective data (Simon et al., 1986, p. 21).

The last of the classical decision-making/judgment approaches concentrates on descriptive paradigms, which are concerned with how people actually make judgments and describe how decision-makers function and perform. These models are based on experimental research findings and concentrate on the process people employ when making judgments and decisions, assuming that all decisions are made by choosing among alternatives. Descriptive models are closely associated with the work of Kahneman and Tversky, (Kahneman & Tversky, 1973, 1979; Tversky & Kahneman, 1974, 1980, 1981, 1986, 1992).

Kahneman and Tversky describes the relationship between subjective/perceived value in terms of the losses and gains in decision-making and whether a person is likely to make risky or riskless choices (Kahneman & Tversky,

1979). They proposed situations differing only in presentation, or the way in which the problem is "framed" and not in mathematical outcomes (Motes, 1999).

This "framing effect" refers to the decision-makers perception of the "acts, outcomes and contingencies associated with the particular choice" (Plous, 1993, p. 69). Kahneman and Tversky found that when situations or problems are presented or framed differently, even though the underlying problem does not change, the selection of alternatives is affected. Other research findings on the topic of "framing" include:

- Individuals exhibit reversals of preferences when presented with the same decision-making situation that have identical outcomes and likelihoods. (Fagley & Miller, 1987; Schneider & Lopes, 1986; Tversky & Kahneman, 1981); (Nygren, 1997). Positive frames produced more risk averse selections of alternatives, negative frames produced more risk seeking selections of alternatives (Tversky & Kahneman, 1981).
- People make more risk averse decisions with narrow decision frames than the same people would make if those decisions were pooled (Kahneman & Lovallo, 1993).

Perhaps no variable is as pervasive in its influence

on decision-making as the framing effect (Fidura, 1998). Framing effects may do more than merely change focus; they can be so disruptive as to be detrimental to the incorporation and adoption of new information into dynamic decision-making strategies. From a practical perspective, the results suggest that applied researchers who are seeking ways to improve decision-making performance in complex environments ought to examine how individuals routinely frame or have their task environment initially framed for them (Nygren, 1997, p. 432).

While decision framing has produced strong effects, several limitations have been offered which include (Shoemaker, 1993):

- Framing effects have been largely studied as demonstrations of the phenomenon rather than as attempts to theoretically explain biases, preference reversals, or changes in quality of decision-making behavior.
- Framing effects have been primarily limited to simple laboratory gambling contexts or hypothetical one time decision scenarios having no meaningful time restriction or having no dynamically changing components.
- The extent to which framing effects are generalizable.

- Framing effects are not designed to assess changes in the quality of decisions or decision-making performance, but rather to provide evidence of preference reversals or inconsistencies of responses. (Nygren, 1997, p. 426).

Within the context of policing, the framing effect is relevant for several reasons. Police training academies routinely devise practical problems, framed around negative expectations that a critical incidence or event could occur while officers are performing their duties. This is the mission and objective of police academies. To instill in officers early and continually, to respond to most situations as though they may be life threatening.

While this study does not directly focus on training initiatives, an important consideration in police practice is the impact and influence negative framing brings to an officer's judgment and decision-making process that transcends beyond training into performance. Research suggests that when imposed with time constraints, as is the case with policing, decision-makers tend to rely most heavily upon negative information (Ordenez, 1997; Wright, 1974).

Other studies have shown that decision-makers have a tendency to speed up execution of their decision strategies

or switch to simple strategies when under time constraints (Edland & Svenson, 1993; Johnson, Payne, & Bettman, 1993; Smith, Mitchell, & Beach, 1982; Svenson & Benson, 1993a; Wright, 1974). Further research showed that decision-makers who are in good nature tend to be more creative in the decision-making process (Isen, Daubman, & Nowicki, 1987). "These findings suggest that conclusions from decision research should be carefully qualified so as to avoid overgeneralization" (Plous, 1993, p. 257).

These findings may or may not apply to the decision-making processes of law enforcement officials. Only until a study is conducted to examine framing effects under actual conditions and as applied to a specific contextual situation, does a better understanding of their impact be known. This study provides this understanding.

From the collective of works by Nygren (1997), Klein (1999), Klein et al. (1993), and Svenson and Maule (1993), a clear need is presented that suggests studies in decision-making processes need to be examined in more naturalistic environments, so concepts such as framing and time constraints are better understood. This study contributes to this understanding and focus on decision-making conditions outside laboratory or classroom conditions and into an operational police setting.

Classical decision-making theories and models, as indicated, focus on understanding the back end of the decision-making process and to some extent have "concentrated on showing the limitations of decision makers" (Klein, 1999, p. 1). As a result, recent trends in decision-making research have moved away from controlled situations to the real-world environment.

Focus: Naturalistic Decision-Making

Naturalistic decision-making has emerged as a research field and is based on observations of individuals acting under dynamic and continually changing conditions, real-time constraints, ill-defined goals and ill-structured tasks, and knowledgeable decision-makers (Klein et al., 1993).

An NDM framework provides a perspective for understanding decision-making in command and control, management, health-care, aviation, manufacturing and other domains. Unlike normative approaches that are based on decision-making theory or other formal models, naturalistic research is in no hurry to replace traditional decision processes with methods that may appear to have theoretical value, but which are qualitatively different from the

methods that proficient decision-makers use (Cohen, Freeman, & Thompson, 1995).

In naturalistic settings with time constraints, changing conditions, and stress related influences; recognition-primed decisions (RPD) are hypothesized to take place that involve an assessment of the situation, recognition of the events as typical, and a resultant course of action based on previous experience (Klein, Calderwood, & MacGregor, 1989). The RPD model (see Figure 1) is distinguished from classical decision models by focusing on the assessment of the situation, rather than assessing different courses of action and judging one option superior to others (Klein et al., 1993; Randel et al., 1996).

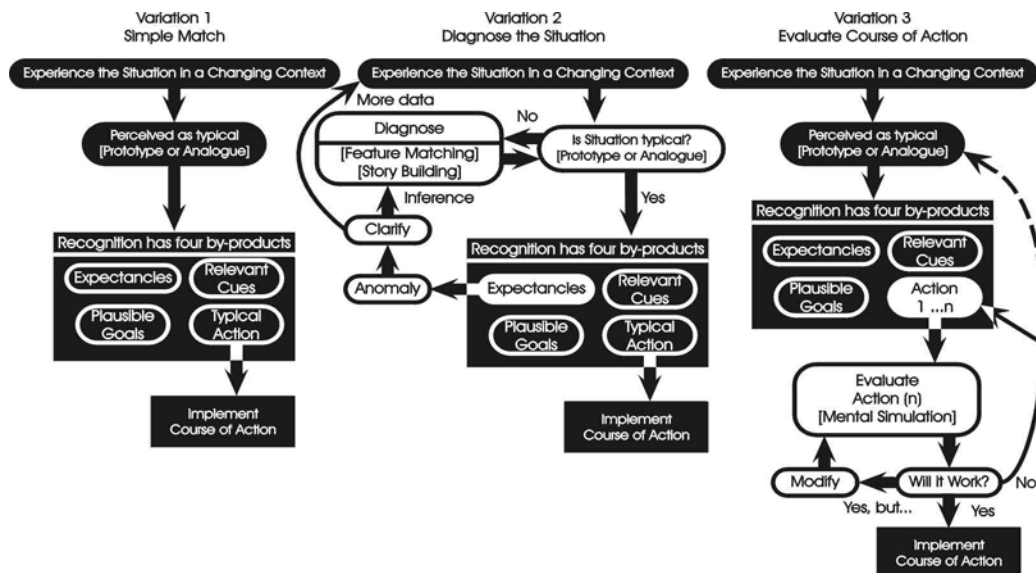


Figure 1. Recognition-Primed Decision Model

Source: Klein, G. A. (1997). The recognition-primed decision (RPD) model. In C. Zsombok & G. A. Klein (Eds.), *Naturalistic decision-making*, p. 286., Re-printed with permission - Klein Associates, Inc (B. Law).

Key features of recognition primed decision-making (RPD) model include:

- First option is usually workable, not random generation and selective retention of options.
- Serial generation/evaluation of options not concurrent evaluation.
- Satisficing (selecting the first option that works), not optimizing (Simon, 1957).
- Evaluation through mental simulation, not MAUA (multi-attribute utility analysis), decision analysis, or Bayesian statistics.

- Focus on elaborating and improving options, not choosing between options.
- Focus on situation assessment, not decision events.
- Decision-maker primed to act, not waiting for complete analysis.

The RPD model emphasizes the recognition of situational dynamics and relies on the experience of the decision-maker to determine what course of action is appropriate. From the studies that have been examined, the RPD model clearly dominates as the general strategy used by naturalistic decision-makers. "Because of the important implications of this claim, other researchers have independently investigated the issue, to determine if they could replicate our findings" (Klein, 1999, p. 100).

Mosier (1991) studied videotapes of twenty-three, three-person commercial airline crews, flying full mission simulations in a Boeing 727 and found that:

Most crews did not wait until they had complete understanding of the situation to make and implement decisions. Rather, they seem to make a recognitional, almost reflective judgment based upon a few, critical items of information; and then spend additional time and effort verifying its correctness through continued situational investigation. If later information

changed situation assessment enough to prompt a change of decision, a second option was generated and implemented. Virtually no time was spent in any comparison of options (Mosier, 1991, p. 269).

In another study examining command and control situations, the United Kingdom Defense Research Agency (DRA) conducted research into various aspects on decision strategies of commissioned and noncommissioned officers from the British army. Individual decision-makers were assessed in controlled simulated environments. Subjects completed three scenarios involving problem solving and decision tasks from the command and control domain (i.e. friendly forces are under continual enemy harassment and a constantly changing battle situation is presented and must be responded to rapidly).

From the analysis of the data, a primary finding across all scenarios "was the dominance of naturalistic strategy utilization (87%) over classical (2%), hybrid (3%), and other (8%) strategies" (Pascual & Henderson, 1997), p. 219). In assessing the form of the naturalistic strategies found, Pascual and Henderson (1997) concluded "that RPD clearly dominated. It is felt that the RPD model provides the most appropriate, accurate, and utilitarian concepts for describing a broad range of command and

control decision-making behavior, particularly for those subjects with considerable military experience" (Pascual & Henderson, 1997, p. 220).

Another study conducted by Randel, Pugh, Reed, Schuler and Wyman (1994), examined electronic warfare technicians as they performed a simulated task, and found that 93% of decisions involve serial (i.e. non-comparative) deliberations that conform with the RPD model (Klein, 1997; Randel, Pugh, Reed, Schuler, & Wyman, 1994). Driskell, Salas, and Hall (1994) found similar results when training experienced Navy officers to follow careful and vigilant procedures, such as systematically scanning all relevant items of evidence and reviewing the information prior to making a decision. This process resulted in the worst performance. Navy officers outperformed others when utilizing "hypervigilant" procedures, compatible with the RPD model (Driskell, Salas, & Hall, 1994).

Collectively, there is a "growing body of empirical support for the RPD model as a descriptive account of the way experienced people make decisions" (Klein, 1997, p. 289). However, most of the cited tasks were examined via simulation. Consequently, little is known on how various constructs, such as emotion, perception, or stress, affect the decision-making process under real-time conditions.

This study attempts to understand the relevance of these constructs, and the importance they play in the decision-making processes for law enforcement officials.

When focusing on stress related consequences as an example, Janis and Mann (1977) claim that people try to avoid making decisions because of the stress involved in carrying out the analysis. They suggest ways in which stress can reduce the effectiveness of decision-making through maladaptive coping strategies such as procrastination, persevering with the favored option, and indecision or hypervigilance (scanning only the information items needed to make a decision, in any sequence, and only reviewing items if necessary) (Johnston, Driskell, & Salas, 1997; Klein, 1999).

Other literature on stress highlight the potential for serious human errors when making decisions under emergency conditions because of the limited understanding of how human decision-making is affected by psychological stress (Kontogiannis, 1996). Many reviews of the stress literature, e.g. (Hartley, Morrison, & Arnold, 1989; Mandler, 1984), gathered data from simulation studies, (Woods, Wise, & Hanes, 1982) from analyses of actual incidences and (Grinker & Spiegel, 1963; Perrow, 1984; Pew, Miller, & Feeher, 1981) underscore the potential for

serious human errors that emergency conditions may engender; where skill performance declines and crucial information is often ignored (Kontogiannis, 1996, p. 75).

While some studies conclude that stress negatively affects the decision-making process, other research refute these findings. Case studies examining decision-making in international crises has provided empirical evidence that shows the quality of decision-making is sometimes improved or remains at acceptable levels when moderate levels of stress exist (Brecher & Geist, 1980; Dawisha, 1985; Dowty, 1984; George, 1986; Holsti, 1975; Shlaim, 1983).

In examining the existing literature on stress-related studies, it has been demonstrated that stress does impact the decision-making process. However, it is not conclusive whether stress adversely or favorably affects the decision-making process. One deduction on stress related factors is that of Klein (1999), who claims that "stress does not cause us to make bad decisions", but affects the way we process information (p. 275).

Many factors, in addition to stress, affect the way one processes information. For this reason, a brief section that reviewed the literature on related topics and concepts is presented.

Related Concepts

Processing information effectively, as related to decision-making and problem solving, is reflective to some degree of the level of experience, expertise, and tacit knowledge of the decision-maker.

The store of expert knowledge, "indexed" by the recognition cues that make it accessible and combined with some basic inferential capabilities, accounts for the ability of experts to find satisfactory solutions for difficult problems, and sometimes to find them almost instantaneously. The expert's "intuition" and "judgment" derive from this capability for rapid recognition linked to a large store of knowledge (Simon et al., 1986, p. 27).

Experience, expertise and tacit knowledge, ubiquitous in naturalistic literature is concerned with decision makers who are expert in the task, those who bring experience to decision-making (Cohen, 1993; Howell, 1997; Klein, 1999; Klein et al., 1989; Lesgold et al., 1988; Polanyi, 1958; Randel et al., 1996; Schon, 1983; Wagner, 1987; Zsombok & Klein, 1997); Randel, 1994).

Rooted in experience is a form of tacit knowledge that has been defined as an unarticulated, unconscious form of

knowledge that is embedded in work-related practice and forms a basis for human judgment and decision-making (Guthrie, 1998; Reber, 1995; Sternberg, 1986). Philosopher Michael Polanyi (1958, 1966) was the first to articulate the concept of tacit knowledge. In his view, individuals can "know more than they can tell" and have knowledge that they cannot easily make explicit. This form of knowing is deep-seated in one's character, parsimoniously declared, and often just acknowledged. Tacit knowledge is also closely coupled to intuition and this linkage serves as the fundamental point that intuition represents "a way of direct knowing that seeps into conscious awareness without the conscious mediation of logic and the rational process. What is claimed here is a way of knowing outside the conscious rationale/logical/analytic process" (Boucouvalas, 1997, p. 7).

Agan (1987), describes "intuitive knowing" as a non-rational process, based on a feeling or sensing level of knowing, an awareness that may come from some conscious data. Rew (1988) confirmed the validity of the defining attributes of intuition as: (a) knowledge as a whole, (b) immediacy of knowledge, (c) knowledge independent of linear reasoning, (d) inner knowing, (e) sensing/feeling/

perceiving, and (f) strength of feeling that affects perception (Rew, 1988b, p. 28). Banner and Tanner (1987) define intuition as "understanding without rationale" (p. 23) and "synthesis, not analysis... a sense of certainty" (Benner & Tanner, 1987, p. 29).

With the predominance of analytical ability and rationality placed on the earlier models of JDM, later models focus on intuitive skills for effective naturalistic decision-making. Many believed that intuitive processes are beyond the scope of scientific study and fall into the realm of the irrational.

However, recent advances in cognitive science suggest that there is nothing mystical about intuition. (Khatri & Ng, 1997; Prietula & Simon, 1989; Simon, 1987). Rather, intuitive processes develop from life experiences and learning and represent a unique way of knowing. (Agor, 1990; Isenberg, 1984; Parikh, Neubauer, & Lank, 1994; Prietula & Simon, 1989; Ray & Myers, 1990; Seebo, 1993; Simon, 1987). Studies examining the characteristics of intuition provided the framework for the construction of various intuitive instruments such as the Miller Intuitiveness Instrument (MII) (Miller, 1993) and Agor's Intuition Quotient (Agor, 1992).

As indicated, intuitive ability presently represents the new focus in the decision-making literature. From an examination of the decision-making literature, a paradigm shift (Kuhn, 1962) has emerged from the classical, rational based models to the naturalistic, intuitive framework when examining decision-making processes (Cannon-Bowers et al., 1996). In many respects, this shift appears to be extreme. Simon (1987) addressed this antinomy of intuitive and analytical processing in relation to "styles of management":

It is a fallacy to contrast "analytic" and "intuitive" styles of management. Intuition and judgment -- at least good judgment -- are simply analyses frozen into habit and into the capacity for rapid response through recognition. Every manager needs to be able to analyze problems systematically (and with the aid of the modern arsenal of analytic tools provided by management science and operations research). Every manager needs also to be able to respond to situations rapidly, a skill that requires the cultivation of intuition and judgment over many years of experience and training. The effective manager does not have the luxury of choosing between "analytic" and "intuitive" approaches to problems. Behaving like a manager means

having command of the whole range of management skills and applying them as they become appropriate (Simon, 1987, p. 63).

As pointed out by Goldstein and Hogarth, the term "appropriate begs the question." Exactly, when is intuition appropriate, but analysis inappropriate? When is the reverse true? (Hammond, Hamm, Grassia, & Tamra, 1987, p. 755).

Research that directly compares intuitive cognition and analytical cognition in the same person under carefully specified conditions is the only way we can adequately determine which mode of cognition should be applied to which conditions and thus discover which mode is "appropriate" for which conditions (p. 146).

Although this examination would be difficult to implement in a police context, Hammond, Hamm, Grassia and Pearson conducted such a study. It involved twenty-one expert highway engineers, and found that the type of task and type of information displayed induced a corresponding understanding that ranged from intuitive to analytical. Their approach, as does this study, rejects the traditional dichotomy between intuition and analysis and suggests that both processes and task conditions can be arranged on a continuum that run from intuition to analysis, where

intuition and analysis represent the bookends on the continuum (Hammond et al., 1987; Hammond & Brehmer, 1973). Environmental tasks were also constructed along a similar parallel continuum because research shows that "decision-making is highly contingent on the demands of the task" (Payne, 1982, p. 382).

For example, the engineers in this study were presented with the task of judging the aesthetics of a highway. This task triggered intuitive understanding or processing, while the task of judging highway capacity triggered a more analytical approach or reasoning. Engineers stated that capacity could be calculated by using an algorithm based on known dimensions; however, there is no known formula for organizing the cues for aesthetics. In these cases, an intuitive approach is generally taken.

One may argue, however, that the very strength of intuition lies in the fact that there are no known formulas or algorithm guiding judgment and performance. Instead, intuition must rely on more powerful attributes that really fall outside the realm of mathematical formulas.

This same study also found that for the same person performing three different types of tasks, intuitive and quasi-analytical cognition could outperform analytical cognition. In addition, analytical reasoning was more

likely than intuition to produce extreme errors. The findings in this study are not without controversy. One such controversy challenges arguments that intuition produced biased, incorrect judgments and should be replaced whenever possible by analytical methods (Regel, 1999).

Juxtaposing intuitive and analytical cognition will continue to foster polemic debate. However, the intuitive -- analytical continuum model (Hammond et al., 1987) provides an equidistant framework from the extreme shifts that have occurred in this field. The applicability of this model, specific to the law enforcement profession, serves as a beginning point in exploring the nature of decision-making by police officers without the need to make comparisons.

Another aspect to decision-making is the concept of cognitive maps, first introduced by Tolman in 1948. Downs and Stea (1978) define cognitive mapping as:

a process composed of a series of psychological transformations by which an individual acquires, codes, stores, recalls, and decodes information about the relative locations and attributes of phenomena in their everyday spatial environment (p.8).

The term "cognitive maps" is broadly used to describe

our inner representations and interaction with the experienced world (Kitchin, 1994a). It provides a means for organizing, assessing, and directing our interaction with our surroundings (Beck & Wood, 1976b).

An individual's cognitive map is an active information seeking structure incorporating spatial imagery as well as memories of objects and kinesthetic, visual and auditory cues. The creation and subsequent use of cognitive maps in decision-making have a fundamental purpose, to set out a strategy that provides direction on how to get there from here (Billinghurst & Weghorst, 1995)?

In law enforcement, here is often indicative of a stress related incident filled with uncertainty; while there represents the officer's objective, the successful resolution of the event without injury. This study examines the factors influencing the construction of cognitive maps and these process officers use for effective navigation.

Framework for this Study

The preceding review of literature on selected studies, theories and models helped frame this study. Researchers are examining alternative frameworks, moving

away from rational choice theory to explore ways in which people find efficient, adaptive, and satisfying decisions (Mellars et al., 1998). There is agreement from many within the field that decision-making needs to be examined under real-world conditions, challenging the influences of earlier models. However, the shift from the classical models to NDM need not be so severe.

This study incorporates concepts from earlier models and considers the applicability of the RPD model to a police context. It examines the "framing effect" as applied to actual events and not by verbal scenarios, as is often the case. The "framing effect" essentially was driven by the decision-maker and not artificially imposed by the researcher.

While this study does not utilize testable hypotheses, it offers in part, an understanding of the underlying phenomenon that "drives the decision" (Hammond, 1993). This research also serves as an important first step in exploring the process that "drives the decision" of law enforcement officials operating under real, operational police conditions and compliments the existing literature in the naturalistic decision-making area.

The following chapter addresses the method section for the collection and analysis of the case study research undertaken for this study.

CHAPTER 3: METHOD

The focus of this inquiry was guided by the following research questions: How do experienced and successful law enforcement officials make judgments and decisions when operating under the stressful moments of law-enforcement? Why did these officers select a particular decision choice(s) and what underlying phenomena led them to make the decision choice(s) they made?

After the data were collected and analyzed, a detailed analysis of decision-making by law enforcement officials was conducted to explore their analytical and intuitive approaches for making decisions under specific contextual situations.

Population and Sample

Purposive sampling was initially used to select the participants. Subsequent to the first round of analysis, theoretical sampling was used to select participants who could contribute to the generation of theory and to the expansion of the developing theory (Bogdan & Bilken, 1992; Glaser & Strauss, 1967; Lincoln & Guba, 1985). Glaser and Strauss (1967) popularized theoretical sampling and

describes it as "the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyzes his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges" (p. 45). Corbin and Strauss subsequently defined this sampling process as "sampling on the basis of concepts that have proven theoretical relevance to the evolving theory" on the basis of the concepts which have emerged from the data (Strauss & Corbin, 1990, p. 176).

The distinction between the former and more recent definition of theoretical sampling is placed on "proven theoretical relevance," which "indicates that concepts are deemed to be significant because they are repeatedly present or notably absent when comparing incident after incident, and are of sufficient importance to be given the status of categories" (p. 176).

"It is an evolving process guided by the emerging theory" (Merriam, 1998, p. 63). Theoretical sampling was used in this study because the researcher "cannot know in advance precisely what to sample for and where it will lead him. It is never clear-cut for what and to where discovery will lead. It is ongoing" (Glaser, 1978, p. 37).

The cases were selected from a population of law enforcement officials with a minimum of 15-years experience in the law enforcement profession. Many of the participants are currently employed with a federal law enforcement agency and at one point in their careers were employed by either a local or state police organization prior to assuming responsibilities on the federal level. Generally, the participants' work experience averages approximately 20-years on the federal level and in some cases, near 25-years experience in law enforcement as a whole. All participants possess a four-year college degree and all hold advanced graduate degrees. Their current positions include responsibilities in a supervisory capacity. Their roles are operationally driven and tactically oriented. Subjects of the case study inquiry have also assisted in investigations on an international level.

The size of the sample was determined by following the procedures set forth by Lincoln and Guba (1985) which state: "the size of the sample is determined by informational considerations. If the purpose is to maximize information, the sampling is terminated when no new information is forthcoming from new sample units; thus redundancy is the prime consideration" (p. 202). While

this strategy applies to "purposeful sampling," the same principle is appropriate to theoretical sampling, where theoretical saturation of data is the identifying characteristic to end sampling.

The general rule in grounded theory research is to sample until theoretical saturation of each category is reached. This means until: (a) no new or relevant data seems to emerge regarding a category; (b) the category development is dense, insofar as all of the paradigm elements are accounted for, along with variation and process; and (c) the relationships between categories are well-established and validated (Strauss & Corbin, 1990, p. 188; Glaser, 1978, pp. 124-126; Glaser & Strauss, 1967, pp. 61-62, 111-112).

Description of Cases

The cases were chosen from an operational unit of a federal law enforcement agency and each participant was selected to provide for maximum variation. Lincoln and Guba (1985) propose that maximum variation is best achieved by selecting each unit only after the previous unit has been interviewed (Leppien, 1995). The intent of theoretical sampling is to "generate the information upon

which the emergent design and grounded theory can be based” (p. 201).

Participants were selected based on Lincoln and Guba’s model. All are required, in many instances, to make quick and spontaneous decisions while operating under time constraint, time pressure and in some cases, dangerous conditions. All participants were selected based on a number of elements. First, their experience level had to meet the requirements as defined above for this study. Second, their current position had to be operationally oriented where participants are required to make decisions under time pressure and restriction. Third, participants have been recognized in the past for making appropriate decisions, judgments, and resolving particular issues that were accomplished in an exemplary manner.

This recognition is in the form of letter(s) of commendation from upper management or in the form of monetary award(s) that recognize the participant’s noteworthy achievements. Lastly, participants were most likely to provide the necessary data to successfully answer the research questions undertaken in this effort. The criteria that was used to determine when to stop the data collection process include: a) exhaustion of resources; b)

emergence of regularities; c) over extension, or going too far beyond the boundaries of the research (Guba, 1978).

The decision to stop sampling must take into account the research goals, the need to achieve depth through triangulation of data sources, and the possibility of greater breadth through examination of a variety of sampling sites (Hoepfl, 1997). The sampling process focused on eliminating redundancy while striving for maximum variation among the participants.

Participant Anonymity

All participants in this study were assured confidentiality and anonymity. Participants were also assured that specificity to any criminal investigation(s) they were assigned would not be disclosed, nor would any sensitive information about the criminal case(s) be cited. Only generic descriptions of the participant's actions/decisions would be reported and details of their assignments would be disguised. To ensure anonymity, each subject was advised that pseudonyms would be used in lieu of true names. All participants were asked to sign an Informed Consent Form before participating in this research effort (see Appendix A).

Theoretical Sensitivity

Glaser and Strauss (1967) and Strauss and Corbin (1990) discuss the "theoretical sensitivity" of the researcher (Hoepfl, 1997). Theoretical sensitivity refers to a personal quality of the researcher. "It indicates an awareness of subtleties of meaning in data, it refers to the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate the pertinent from that which isn't" (Corbin & Strauss, 1990, p. 42).

This approach is based on the developments of "theoretically informed interpretations which is the most powerful way to bring reality to light" (Strauss & Corbin, 1990). Key issues and points are allowed to emerge from the data, rather than forcing the data into preformed categories. This is accomplished by repeated examination of the data to allow the themes to emerge (Berry, 1999).

Strauss and Corbin believe that theoretical sensitivity emanates from a number of sources. One source is literature, which includes readings on theory, research, and documents of various kinds. Professional experience is another source of theoretical sensitivity, where one acquires an understanding of how things work in a

particular field and brings that background into the research. Personal experiences represent the third source of sensitivity and make the analyst sensitive to particular experiences they may have encountered. "As an example, the experience of having gone through a divorce can make one sensitive to what it means to experience loss" (Strauss & Corbin, 1990, p. 42).

Theoretical sensitivity is relevant because the credibility of a qualitative research report relies strongly on the confidence readers have in the researcher's ability to be sensitive to the data and to make appropriate decisions in interpretation (Eisner, 1991; Hoepfl, 1997; Patton, 1990). The researcher undertaking this examination, has over 25-years in the law enforcement field and is sensitive to the decisions law enforcement officers make, particularly while acting under operational conditions. In addition, the researcher has experienced many of the situational and operational factors that often come into play in a police environment. The qualifications and theoretical sensitivity of the researcher helped in the ability to give meaning to data, and the capability to separate the pertinent from the non-pertinent.

Data Collection

Data collection refers to the finding, gathering, and generating of material that was analyzed over a period of time so the researcher can generate grounded theory (Strauss, 1987). To strengthen issues of reliability as well as internal validity, the data were triangulated using multiple methods and sources (Merriam, 1998).

Naturalistic inquiry emphasizes inductive theory development emergent naturally from qualitative research methods (Patton, 1990). While positivist inquiry relies on logical deduction from a priori assumptions, naturalistic inquiry recognizes the process of data collection as influential in the generation of theory (Gorski, 1998).

The prevailing forms of data collection and fundamental techniques and strategies utilized for collecting data in this study consisted of the participants talking aloud and conversing with the researcher on the decisions and actions they were rendering, open-ended and unstructured interviews, and observation. The talking aloud aspect of this examination offers a distinctive method to capture data, via audio recording, as it unfolded. Both the researcher and participants jointly worked on investigations that required decision-making

under operational and tactical conditions. The researcher assumed and maintained a secondary role in all case study examinations. As the participants were fully engaged on a tactical mission, they were allowed to talk aloud into a miniature tape recorder to capture the on-scene rationale and insight concerning the particular decisions that were being made. In addition, the researcher made extemporaneous comments and asked questions during the actual event for later recall during the formal interview process. This gave the participants the ability to hear and reflect on what transpired during the actual case. This subsequently allowed for a thorough and concentrated inquiry into specific topics during the interviewing process.

The second method of triangulating the data was through open-ended, unstructured interviews. Interviews were audio recorded and transcribed, where the participants were asked questions about particular actions and decisions they made as conveyed on the talking aloud-audio recording. Segments of the recording were presented in stages. This permitted each participant to reflect on their comments and consider the cognitive process they employed when selecting one option over others. The audio recording data was

collected while subjects were actively and dynamically participating in an operational police matter.

The third form of data collection was through observation. Observation took the shape of both direct and participant observation. "Participant observation is a special mode of observation in which you are not merely a passive observer. Instead, you may assume a variety of roles within active case study situations and may actually participate in the events being studied" (Yin, 1994, p. 87). The researcher assumed this responsibility by participating and observing decision-making in actual criminal investigations. The participants were assigned a specific responsibility directed towards investigating criminal misconduct and were required to make a number of on-scene decisions.

The researcher is "theoretically sensitive" to the law enforcement culture and can relate to the decision-making process of law-enforcement officers. This is the result of having similar personal and professional experiences encountered in the line of duty. As a result, participant observation was a viable method for triangulation of the data.

Data Coding and Analysis

At the core of grounded theory analysis is the coding process. "Simultaneous data collection and analysis occur both in and out of the field. That is, you can be doing some rudimentary analysis while you are in the process of collecting data, as well as between data collection activities" (Merriam, 1998, p. 162).

Coding and analysis of the data conform to the model initially outlined by Strauss (1987) and later redefined by Corbin and Strauss (1990). The three forms of data coding used in this study that followed the techniques and strategies proposed by Strauss (1987) and later by Strauss and Corbin (1990) include open coding, axial coding, and selective coding.

Open Coding

Corbin and Strauss (1990) describe open coding as the process that involves breaking down or naming of phenomena, analysis, comparison and categorization of data. In open coding, incidents or events were labeled and grouped together via constant comparison to form categories and properties.

Open coding requires application of what is referred to as "the comparative method," specifically, the asking of questions and the making of comparisons. Subsequently, data were compared and similar incidents were grouped together and given the same conceptual label. This process of grouping concepts in a higher, more abstract level is termed categorizing.

Once the categories have been discovered, the next phase of open coding was to refine each category in terms of its properties and dimensions. Strauss and Corbin (1990) describe this as the process of dimensionalizing the properties of a category along a continuum and argue that this is an important process for discovering the relationships between categories and sub categories and between major categories (Corbin & Strauss, 1990, p. 70).

Theoretical memoing was utilized during this phase of the coding process. "Memos are the theorizing write-up of ideas about codes and their relationship as they strike the analyst while coding... the analyst has to develop his or her own style and techniques" (Glaser, 1978, 1998; Strauss & Corbin, 1998). Strauss (1987) defines these theoretical memos as "writing in which the researcher puts down the theoretical questions, hypotheses, and summary of codes" (p. 22). Corbin and Strauss (1990) maintain that:

Writing theoretical memos is an integral part of doing grounded theory. Since the analyst cannot readily keep track of all the categories, properties, hypotheses, and generative questions that evolve from the analytical process, there must be a system for doing so. The use of memos constitutes such a system. Memos are not simply "ideas." They are involved in the formation and revision of theory during the research process (p. 10).

The process of memoing was used to monitor emerging categories and stimulate future coding.

Axial Coding

While open coding breaks or splits the data up into concepts and categories, axial coding reassembles the data back together by making connections between a category and the sub-categories (Pandit, 1996). Corbin and Strauss define axial coding as:

a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories. This is done by utilizing a coding paradigm involving conditions, context,

action/interactional strategies and consequences"

(Strauss & Corbin, 1990, p. 96).

The focus in axial coding is on the (a) conditions that precede the phenomenon, (b) the context or its specific set of properties in which it occurred, (c) strategies by which it is managed and (d) the consequences of those strategies. Following axial coding, the process of selective coding is accomplished, whereby emphasis was placed on the main concept of the inquiry.

Selective Coding

Selective coding is described as the process by which categories are related to the core category (the central idea, event or happening) that ultimately becomes the foundation for the grounded theory. Selective coding involves the integration of the categories, including their properties and dimensions and form the initial theoretical framework.

Strauss (1987) indicated that the term grounded theory evolved from an emphasis on the generation of theory and the data in which the theory is grounded. Central to this point "is the selection of a core category and the relating

of all major categories both to it and to each other" (Strauss & Corbin, 1990, p. 142).

The main focus of this qualitative research study is the development of theory that affords an understanding of the decision-making/judgment processes of law enforcement officers. Accordingly, all of the steps in the data collection, coding, and analysis were organized to meet this objective.

The Pilot Study

The pilot study was conducted to determine if any limitations or difficulties exist with the aforementioned data collection methodology and to perform preliminary coding as prescribed by Strauss and Corbin (1990). Further, it helped to refine the data collection process with respect to both the content of the data and the procedures to be followed (Yin, 1994).

The pilot study involved a criminal investigation that culminated with the arrest of a southeastern drug trafficker. The participant was required to make decisions prior to and during this investigation by executing an arrest warrant. During the arrest, unknown individuals arrived on-scene and proceeded to assist the subject of the

investigation, thereby obstructing and complicating the arrest process. What followed were a string of successful decisions made by a federal agent (participant) that managed the situation.

As anticipated, during the actual arrest, both the participant and researcher were focused on the actual event and were unable to capture data as the event unfolded (i.e. unstructured interview). This limitation proved significant. Meaningful information resulting from the event could have been omitted or forgotten when conducting subsequent in-depth interview.

To remedy this deficiency, participants in the actual case study inquiry will talk aloud into a miniature tape recorder (in an unstructured manner), essentially capturing conversation and comments as events unfold. This provided the participant/researcher with a unique ability to properly reflect on the recorded comments and to guide the succeeding open-ended interviews.

Criteria for Judging the Quality of a Research Study

Depending upon the philosophical orientation of a research study, various terms are used to appropriately establish the overall value and trustworthiness of a

research study. Strauss and Corbin (1990) believe that the "usual canons of 'good science'...require redefinition in order to fit the realities of qualitative research" (Strauss & Corbin, 1990, p. 250).

This redefinition is applied to an alternative philosophical approach, interpretivism, which is fundamentally concerned with meaning (verses measurement) and seeks to understand social members' definition of the situation (Schwandt, 1994). Interpretive theory involves building a second order theory or theory of members' theories (Schutz, 1973) in contrast to positivism, which is concerned with object reality and meanings thought to be independent of people (Gephart, 1999).

Interpretivists assume that knowledge and meaning are acts of interpretation and understanding the meaning of the process or experience constitutes the knowledge to be gained from an inductive, hypothesis - or theory-generating (rather than a deductive or testing) mode of inquiry" (Merriam, 1998, p. 4).

The basic issue of trustworthiness in naturalistic or qualitative inquiry is: "How can an inquirer persuade his or her audiences that the findings of the inquiry are worth paying attention to, worth taking account of?" (Lincoln & Guba, 1985, p. 301).

Guba and Lincoln propose four criteria for judging the soundness and quality of qualitative research. Table 3 outlines the criteria typically employed to judge quantitative work and the analogue or corresponding criteria used for qualitative research (Lincoln & Guba, 1985, p. 300).

Table 3

Criteria for Judging Quantitative and Qualitative Inquiry

Conventional Criteria for Judging Quantitative Research	Criteria for Judging Qualitative or Naturalistic Inquiry
Internal validity	Credibility
External validity	Transferability
Reliability	Dependability
Objectivity	Confirmability

Credibility

Researchers suggest the use of credibility as a substitute for internal validity when using qualitative methods (Leppien, 1995). Internal validity in traditional

inquiry refers to the extent to which the findings accurately describe reality. Lincoln and Guba (1985) recommend a variety of strategies for improving the likelihood that findings and interpretations through naturalistic inquiry methods are credible. Two of the strategies are peer debriefing and member checking.

Lincoln and Guba (1985) define peer debriefing as "a process of exposing oneself to a disinterested peer in a manner paralleling an analytic session and for the purpose of exploring aspects of the inquiry that might otherwise remain only implicit within the inquirer's mind" (p.308).

For the purposes of this study, peer debriefing occurred with colleagues from the law enforcement community who did not participate in this study and who hold supervisory positions equal to or higher than those of the participants. Colleagues were asked to comment on the findings as they emerge throughout the study and to determine if the data are accurate and the findings plausible.

Member checking is a process for which respondents verified data and the interpretations thereof (Gorski, 1998; Lincoln & Guba, 1985). Participants received a copy of the interview transcript and tentative interpretations for review, plausibility, and accuracy. If participants

believed the transcript did not reflect the contents or accuracy of the interview, modifications to the transcript were made and resubmitted to the participants for verification of accuracy.

All participants were allowed to listen to the audio recording and validate the accuracy of the transcribed interviews to ascertain if any discrepancies resulted in reporting of the findings. Corrections and modifications were made accordingly.

Transferability

Transferability refers to the degree to which the results of qualitative research can be generalized or transferred to other contexts or settings (Trochim, 1999). Lincoln and Guba (1985) admit that generalizability is "an appealing concept," because it allows a semblance of prediction and control over situations (pp. 110-111). The problem however lies with the existence of local conditions, which "makes it impossible to generalize" (p. 124).

Cronbach (1975) discusses the problem by stating:

The trouble, as I see it, is that we cannot store up generalizations and constructs for ultimate assembly

into a network. It is as if we needed a gross of dry cells to power an engine and could only make one a month. The energy would leak out of the first cell before we had half the battery completed (Cronbach, 1975, February)p. 123).

According to Cronbach, "when we give proper weight to local conditions, any generalization is a working hypothesis, not a conclusion" (Cronbach, 1975, p. 125; (Hoepfl, 1997). Each manifestation in this qualitative study occurs under different contextual conditions, yielding findings that are the result of a process-in-context. Therefore, enough detailed description of the study's context is provided to enable practitioners to compare the "fit" with their situations (Merriam, 1998, p. 211).

Dependability

Kirk and Miller identify three types of reliability when referred to in conventional research: a) the degree to which a measurement, given repeatedly, remain the same; b) the stability of a measurement over time; and c) the similarity of measurements within a given time (Kirk & Miller, 1986, pp. 41-42).

The authors note that "issues of reliability have received little attention" from qualitative researchers, who rather have focused on achieving greater validity in their work (p. 42). Lincoln and Guba propose one measure to enhance the dependability of qualitative research through the use of an "inquiry audit," or a "properly managed" audit (Lincoln & Guba, 1985).

This audit process is the extent to which "other researchers can use the original report as an operating manual by which to replicate the study" (Goetz & LeCompte, 1984, p. 216). True replication for this study, as with most other case studies, is difficult to achieve because the context under which it occurs is endemic to each case.

However, to address dependability issues for this particular study, detailed records of the data collected as well as the analysis procedures were retained and serve as the "operating manual" for this study. A transcript of each interview was created from the audio-tape of the interview. This transcript was then provided to the participants for verification, accuracy, and correction.

Confirmability

Confirmability is the degree to which the researcher can demonstrate the neutrality of the research results and whether the results can be confirmed or corroborated by others. Lincoln and Guba propose a "confirmability audit" to accomplish this, which provides an audit trail consisting of a) raw data; b) analysis notes; c) reconstruction and synthesis products; d) process notes; e) personal notes; and f) preliminary developmental information (Lincoln & Guba, 1985); (Hoepfl, 1997).

Confirmability is "concerned with establishing the fact that the data and interpretations of an inquiry were not merely figments of the inquirer's imagination." Researchers need to link "assertions, findings, and interpretations, and so on to the data themselves in readily discernible ways" (Schwandt, 1997, p. 164).

To enhance the confirmability of this study, the researcher documented the procedures by checking and re-checking the data throughout the study (Trochim, 1999). Records of the inquiry process, recorded interviews, discussions, transcripts and notes were retained for a one-year period (Gorski, 1998). Additionally, sufficient references to the raw data, triangulations, and code

categories are reported to allow the reader to track the study by looking at the specific sources of the researchers' assertions.

Reporting the Findings

Qualitative researchers have a special responsibility to their subjects and their readers. Since there are no statistical tests for significance in qualitative studies, the researcher bears the burden of discovering and interpreting the importance of what is observed, and of establishing a plausible connection between what is observed and the conclusions drawn in the research report.

In the final interpretive phase of this study, the researcher reports the "lessons learned" from the cases (Creswell, 1998; Lincoln & Guba, 1985). Writing the results of qualitative research involves a determination on the right balance of description and interpretation and using a style that integrates them in an interesting and informative narrative (Merriam, 1988).

The results of the case study evaluations are presented generally in a linear - analytic fashion, where the implementation process is presented as it is "unfolded" chronologically, with data drawn from all sources and

integrated into a coherent story (Scanlon, 1998). The final report essentially follows many of the recommendations suggested by Stake (1995) and Corbin and Strauss (1990).

According to Stake (1995), most case study reports follow "a chronological or biographical development of the cases; a researcher's view of coming to know the case"; or "description one by one of several major components of the case" (Stake, 1995, p. 127).

Stake suggests the following progression or outline when reporting a case study. The report starts with an entry vignette giving the reader a vicarious experience of the place, time, and event. This is followed by extensive narrative descriptions that are provided to further define the case in context. The development of issues, descriptive detail, documents, quotations, triangulating data and assertions are also included in this section of the report.

In addition, Corbin and Strauss state that the written case study report should provide:

- (1) A clear analytic story
- (2) Writing on a conceptual level, with description kept secondary

(3) The clear specification of relationships among categories, with levels of conceptualization also kept clear

(4) The specifications of variations and their relevant conditions, consequences, and so forth, including the broader ones (Strauss & Corbin, 1990, p. 229).

This study follows the guidelines prescribed above and concentrates on examining decision-making/problem solving in the context of police oriented assignments. With this objective as the goal, focus is placed on the "general, grounded, most relevant properties of the core [category]" to give the fullest meaning of its nature (Glaser, 1978, p. 131) and to provide for a better understanding of decision-making in law enforcement.

Summary

This study provides an understanding of how experienced law enforcement officials made decisions and judgments while performing in an operational and tactical environment. The case study method was used because of its applicability with real life, contemporary, and naturalistic settings.

"Researchers from many disciplines use the case study method to build upon theory, to produce new theory, to dispute or challenge theory, to explain a situation, to provide a basis to apply solutions to situations, to explore, or to describe an object or phenomenon" (Soy, 1996). This study describes the phenomenon of effective and successful decision-making under tactical police conditions.

CHAPTER 4: CASE STUDIES FINDINGS

This qualitative study investigated how experienced and successful law enforcement officials (LEOs) made judgments and decisions when operating under stressful conditions. Three case studies were examined and analyzed in pursuit of this inquiry (see Appendix B for a brief profile of each LEO and partial text of interview). This chapter contains the findings and analyses from the study as they relate both to the research questions as well as to the literature. The research questions under inquiry were: How did three experienced and successful law enforcement officials make judgments and decisions when operating under the stressful moments of law-enforcement? Why did these officers select a particular decision choice(s) and what underlying phenomenon led them to make the decision choice(s) they made? How did they decide when to act or when was there sufficient clarity to choose a course of action?

Background

As a result of examining this phenomenon and discovering the process these law enforcement officials

used in their decision-making, a theoretical model was generated that represents tactical law enforcement decision-making. The method utilized in this study employed grounded theory (Glaser & Strauss, 1967), a qualitative research method designed to aid in the systematic collection and analysis of data and the building of a theoretical model. The data collection relied on participant observation, audio recordings, journal notes, and transcriptions of open-ended and unstructured interviews. The researcher, also a law enforcement official, was actively involved and participated on-scene in two of the investigations. In the last case, LEO-3 was engaged in an extremely difficult investigation occurring in a foreign territory. As a result, neither the researcher nor LEO-3 were actually on-scene; however, the researcher observed LEO-3's decision-making processes as he coordinated an extremely complex and multifaceted investigation.

Data were also collected while on-scene via a tape recorder that captured extemporaneous dialogue and comments that resulted between the participants and researcher as they performed their duties during an actual tactical event. The researcher often questioned the participants as they selected particular decision options. The researcher

further made frequent comments while on-scene that were also recorded and subsequently used for recall purposes during the formal interview process with the participants.

At the time when the participants were interviewed, which occurred shortly after their involvement in the investigation, the tape recordings were played, reviewed, and discussed at length so the salient points of their decision-making process could emerge. The audio recordings of interviews were converted and saved to computer audio files (wave) for retention purposes.

Furthermore, during the open coding process, the researcher regularly conversed with the participants regarding their individual cases. This continued interaction was facilitated by the fact that the researcher and participants are colleagues and continue to participate in investigations similar to those described herein.

As previously indicated, interviews were conducted with the participants soon after their involvement in an operational criminal investigation, typically within hours of the actual event. Thereafter, each participant reviewed the narratives for accuracy and completeness and was allowed the opportunity to clarify and expand on any relevant issues. Any corrections or modifications made by

the participants have been incorporated in this research as well as quotes from the actual interviews.

While the decisions and the processes involved in decision-making are discussed in detail, certain sensitive and personal identifying information has been removed. For example, to preserve anonymity, the acronym LEO-# (Law Enforcement Official followed by the case number, e.g., LEO-1) is used to identify each officer. The researcher is identified as LEO-R. Additionally, no criminal suspects are identified by name. Specific details as to particular law enforcement agencies involved have also been omitted. Finally, only generic descriptions of the type of criminal investigations are provided to sufficiently give the reader a degree of context and perspective on the operational conditions imposed on the participants.

Given that certain investigative techniques employed in these incidents are considered sensitive (often in terms of sources and methods), only general references are made to the goals and objectives for each of the operations. Furthermore, all of the law enforcement activities discussed in each of the three cases were authorized by a lawfully obtained judicial court order or were conducted under rules and regulations codified in US law. All the activities, authority, and conduct of the participants were

well within the confines of approved agency-specific policies, all subject to Executive, Congressional, and Judicial oversight.

Analysis

Each participant's involvement in a tactical criminal investigation approximated 120 hours, with an additional 100 hours dedicated to the preparation stage of the investigation. Their actual involvement was calculated on the number of days each participant spent on their respective investigation, which generally covered a two-week time period. The preparation phase was calculated exclusively on the participant's approximation on the time they spent in preparing to meet the operational requirements of each investigation. While the participants were actually on-scene, numerous decisions were made that were subsequently coded and analyzed. From that analysis emerged a theoretical model (Figure 2) describing:

- 1.) Causal conditions leading to the development of decision-making strategies
- 2.) Phenomena that emerged from the causal conditions,
- 3.) Context that influenced those strategies

- 4.) Intervening conditions that influenced strategy development
- 5.) Strategies for effective police decision-making
- 6.) Consequences that resulted from the action and interaction (decisions) taken by the participants

The opening coding process generated 41-labeled categories that represented discrete happenings of the phenomena. These codes and categories were constantly grouped, compared, and contrasted until analysis produced no new codes or categories (saturation) and when all of the data were accounted for in the core categories. The grounded theory model for police decision-making, evolving from Strauss and Corbin's (1990) framework and developed from the present inquiry is presented in Figure 2.

Causal Conditions of Phenomena Related to Tactical Police Decision-making - Development of Decision-Making Strategies

Two mutually dependent types of the causal conditions emerged from the data that ultimately led to certain phenomenological experiences as related to effective decision-making in a tactical police environment.

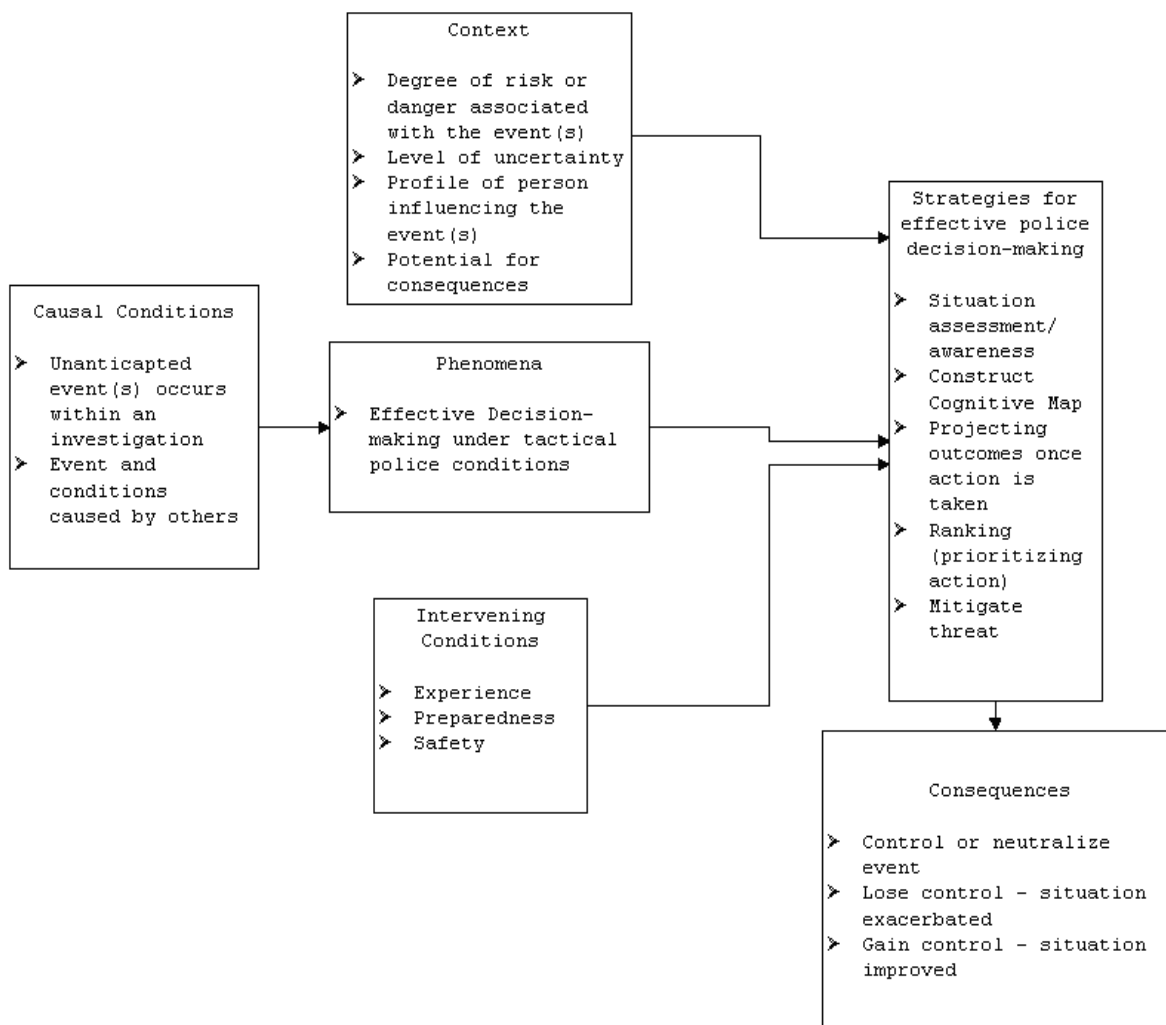


Figure 2. Theoretical Model for Effective Tactical Police Decision-Making.

These causal conditions were: (a) unanticipated event(s) occurring while law enforcement officers were performing their responsibilities and (b) the unanticipated event(s) was caused by someone other than the law enforcement officer.

The first causal condition consisted of officers experiencing unanticipated event(s) while they were operationally engaged in some segment of a criminal investigation. Officers under study had a specific assignment associated with a criminal investigation and their individual responsibilities were compartmentalized within the overall investigative effort. When unanticipated events occurred while officers were performing their assigned duties, they responded by making spontaneous decisions under difficult, and in some instances, life-threatening conditions.

In one case study, LEO-1 was called upon to assist in the execution of a covert search warrant involving a narcotics trans-shipment. LEO-1 has the mandate to provide support to federal, state, and local law enforcement authorities requesting assistance in the area of covert searches. LEO-1 has an extensive background in this area and is highly experienced in conducting these types of tactical operations. He is often called upon to assist various national and international law enforcement agencies.

In this particular case, as in most other criminal investigations that require the execution of a covert authorized search warrant, law enforcement officers are

enforced to enter a home or office that is unoccupied, search for certain evidence, then leave.

Unlike traditional overt search warrants, if officers find the evidence specified in the affidavit, they will not remove it. Rather, their objective is to simply ascertain whether the evidence is on the premises. As imagined, covert searches entail intense preparation and deliberation on a number of fronts to include: stealth of the team executing the order, ensuring that the location is vacant, and mitigating associated risk factors. These investigations also have an inherently high form of unpredictability that officers must consider when executing this form of warrant.

LEO-1 experienced such extreme volatility in his case. The investigation targeted a multimillion-dollar illicit drug enterprise with a distribution network supplying much of the Southeast region of the United States. The scheduling of this search was arranged for mid-afternoon. LEO-1 and LEO-R both expressed concern about the selected time frame because of the increased possibility of innocent citizens becoming involved in this police matter resulting from heightened neighborhood activity.

During this surreptitious search, an unanticipated event occurred when an unidentified individual, later

determined to be an associate of the drug trafficker, approached LEO-1 and his team at the targeted building and challenged them. The reason why this associate came to the residence was not determined. When this individual penetrated the security perimeter that was guarded by other law enforcement officers, and challenged the team of officers just as they were preparing to covertly enter the building, the security of the operation and safety of the law enforcement personnel involved were placed in immediate jeopardy.

At that moment in time, the tension and concern of the officers pervaded the area. The concern was so pervasive that a few officers drew their weapons, while attempting to remain inconspicuous from the visitor. LEO-R, also on-scene was thinking about the identity of the individual approaching the team and why other officers on the perimeter did not previously stop this vehicle. LEO-R was as equally concerned about the unfolding events and was also preparing to take some form of action.

Before anyone could take action, LEO-1 preempted their intentions and responded by making decisions quickly and affirmatively not only to protect the safety of those involved, but also to maintain the integrity of the

operation. LEO-1 recalled, "all of a sudden, the guy was on us while we were in the front."

This causal condition (an unanticipated event) led to a string of decisions and actions on the part of LEO-1 that eventually convinced the unexpected visitor to leave the scene. This was accomplished mainly through LEO-1's creative dialogue with this individual that basically claimed that they were there for the purpose of examining and possibly purchasing the residence. Prior to the start of this mission, LEO-1 observed a 4-sale sign posted in the front yard of the property. Further details on this particular case are discussed throughout this section.

Similar to the case involving LEO-1, LEO-2 was also presented with an unanticipated event while involved in a covert search of a building, known to be operated by a terrorist network. In spite of significant planning, LEO-2 was forced with making quick decisions when he learned that an innocent third party working as a security guard occupied the building targeted for the search.

It should be pointed out that an important aspect to the success and effectiveness of these types of investigations is directly related to how well the secrecy and covertness of the operation is maintained. As related by LEO-2, "You always want to avoid burning (compromising)

the case and if I can do that at the same time as I keep from getting me or someone else hurt, then great."

LEO-2 recalled that upon arriving on-scene, he, his partner, and LEO-R approached an office door and began entry into target location. Within minutes, a security guard appeared from behind the door where LEO-2 and his partner were working and demanded to know, "What are you doing?"

LEO-R was not fully aware of what was occurring because of positioning, but did hear an unintelligible remark and faintly realized that the premise appeared to be occupied. The guard, completely unassociated with any terrorist activities, had apparently sensed LEO-2 and his partner working in the hallway of this office complex. As a result, the guard tried to open the door suddenly and question LEO-2's motives.

At this point, LEO-R observed LEO-2 apply shoulder pressure to the door while his foot was resting against the bottom of the door. Coincidentally, the right foot of LEO-2 was pre-positioned and resting in this state throughout the entire tactical mission. It was for this reason that the guard was unable to completely open the door.

Reacting to the given situation (an unanticipated event), LEO-2 was able to quickly block the door enough to

shield himself and his partner from the security guard, while intentionally re-engaging the locking mechanism to prevent the guard from forcefully opening the door. This action allowed sufficient time for LEO-2 to leave the area and was successful in diffusing the situation. As commented by LEO-2:

This one was unbelievable, we really screwed up, the guy was right on us and obviously heard some of what we were up to. I reacted right then and I think I surprised him when he had the door pushed in his face and he couldn't get it back open quickly enough.

Although LEO-2 collectively refers to "we" as being responsible for the mishaps of this investigation, he cannot accept any culpability for what transpired in this case. In fact, his task and assignment was totally isolated from ensuring that the facility went unoccupied. Only as a result of LEO-2's quick response to this unanticipated event did a potentially lethal condition become less threatening. This case basically ended with the security guard telephonically notifying the local police department that an attempted burglary was in progress at the specified location. Intervention by other officers associated with the case mitigated the responding police actions.

Unlike the operational conditions and context presented to LEO-1 and LEO-2, LEO-3 was required to react to an unanticipated event when he was charged with providing a possible technical capability to a kidnapping investigation occurring outside the borders of the United States. A foreign national police agency made an official request through diplomatic channels for assistance from the United States on a fast breaking kidnapping matter involving several victims. LEO-3, who holds a senior management position explained:

The ambassador's office advised us of the kidnapping situation and that a ransom note or ransom phone call was placed and received and they were looking for several million dollars for the release of these victims. The request was for our department to provide some type of capability to facilitate the foreign law-enforcement agency in identifying the subjects who initiated this kidnapping.

LEO-R was made aware of this incident by LEO-3 shortly after the above notification. At that time, LEO-R requested that he be present to observe LEO-3's decisions and actions as this investigation developed. LEO-3 agreed. As the case unfolded, it was soon learned that one of several victims had been executed for non-payment of the

initial ransom demand. It was also learned that the captors had been identified and were responsible for similar kidnappings in that region of the world.

The original unanticipated event (the kidnapping) and the subsequent, even more tragic unanticipated event (the execution of the hostage) led LEO-3 to systematically formulate a strategy that concentrated on having the remaining victims released without injury. LEO-3 was successful in accomplishing his objectives and the victims were ultimately released.

Part of LEO-3's successful strategy included the comprehensive compilation of information pertaining to the various segments of the investigation. This information included extensive historical data on the captors, victims, other similarly patterned kidnappings, as well as reviewing the operational conditions under which this offense was occurring.

LEO-3 relied on a unique verification of information that basically triangulated the continuous incoming flow of data by using multiple sources to authenticate the intelligence information. Only after LEO-3's incessant review and scanning of additional information did he decide on a plan that he believed would be in the best interest of having the victims released and justice served.

This plan was essentially a tiered approach that recommended not "instigating" the kidnappers. In the past, when this particular terrorist group's demands were not met, they executed the victims. After the execution, the terrorists would then kidnap other victims and repeat the process.

The second phase of LEO-3's strategy was to recommend that the foreign national police agency handle all negotiations concerning the kidnappers demands. Lastly, LEO-3 recommended focusing on the investigational effort that sought to bring this group to ultimate justice. LEO-3 attained these objectives with the remaining hostages being released unharmed and the kidnappers eventually apprehended and sentenced to long prison terms.

The Second Causal Condition Consisted of Others Causing the Unanticipated Event.

In each of the described cases, a second causal condition emerged from the data. This causal condition is identified as an individual(s) other than the law enforcement officer causing the unanticipated event(s) or condition(s) and this occurrence had an affect on the phenomenon. In each case, the law enforcement officer had a specific role and responsibility in an official police

matter. When others influenced or affected the officer's responsibilities, they were forced to formulate decision-making strategies in response to the unanticipated event(s).

Each of the study participants, when faced with an unanticipated event began a cognitive process whose common goal readily emerged from the interviews of the participants. That goal was recognized and labeled as control and represents a consequence of the phenomena as illustrated in the theoretical model (Figure 2). The participants independently expressed the urgent need to gain, or at least neutralize control of their present situation. In seeking this objective, the participants attempted to limit any influence others had over the eventual outcome of the incident.

The participants frequently referenced control and their need to secure this construct as being a primary goal and objective in their decision-making processes. For this reason, a brief operational definition is provided for conceptualization of control as applied to these particular contextual cases.

The participants claimed that control is described as restricting the movement or freedom of others, essentially restraining and inhibiting their actions over the existing

conditions. LEO-1 explained that he sought to, "confine his (the unknown man's) movement to the front of the house. I didn't want him to walk right up on us and start a confrontation." LEO-2 expressed a similar desire to restrict the security guard's movement and not allow him access to the hallway in which he (LEO-2) and his partner were operating. LEO-2 succinctly said, "I didn't want him to come out. That door was the best thing I could use to slow him down."

As noted, the second causal condition was determined to be that individuals other than law enforcement officers caused the unanticipated event(s) and this particular phenomenon was observed in each of the three investigations. In two of these investigations, individuals approached and confronted law-enforcement officials and questioned them as to their true intent, actions, and the reason for their on-scene presence. In the third case, when the captors executed an innocent person for delay of payment on the ransom demand, LEO-3 was faced with acting on a casual condition that he recognized would be difficult to control, but also understood the need to factor this into his overall decision strategy.

In each case under review, both causal conditions were satisfied with the second causal condition often

acting as the impetus driving the participants decision-making. As commented by LEO-1 when relating his experience in dealing with the potentially armed individual,

Everything typically flows in an operation like this. No problems, no worries. Then all of the sudden, you've got this guy who confronts you and you better be able to handle it or there is going to be a problem. Somebody is going to get hurt.

LEO-1's successful decision-making in this incident, as well as those of the other participants, effectively rendered each event less threatening by reducing any further involvement and influence others had over the situation. When both of the above cited causal conditions were present to the decision maker, the phenomenon under review, namely effective decision-making under tactical police conditions, can then be examined. The following section presents the results of this examination.

Phenomena Emerging from an Unanticipated Event Caused by Others (Causal Conditions)

Causal conditions of an unanticipated event occurring while participants were executing their police duties and where the event was caused by individuals other than police officials resulted in a core category of subjective

phenomena as reported by the participants. As discussed above, each expressed a compelling need to make decisions that were considered effective towards neutralizing or controlling the existing situation. Towards this objective, the security and integrity of the investigation would be preserved, while advancing the cause of the investigation and securing the safety of all those involved.

Participants made several references to their attempt to control the unanticipated event in which they were involved. LEO-1's decision-making objective concentrated on immediately taking control of the situation by not allowing others, particularly the unannounced visitor, to have an influence over, or affect the outcome. LEO-1 plainly admitted that: "I wanted to be somewhat in control."

LEO-2 attempted to control or manage his incident by utilizing the normally passive door as an active means of protection. LEO-2 stated, "that door was a barrier, that door was a barrier and I wanted to keep it between him and me." Initially, LEO-2 maintained control by exerting sufficient pressure on the door to prevent the guard from completely opening it. If LEO-2 allowed the door to be fully opened, permitting the security guard full access to

the hallway, LEO-2 asserts that a whole new set of dynamics would have occurred during this incident.

As a secondary effort to further restrict the security guard's movement, LEO-2 prepared for the precise moment during their encounter when he could take control of the situation by completely closing the door, thereby allowing it to re-lock. LEO-2 recalled the event as:

It was fast breaking and the first thing I was thinking of was, when you see your partner running, you want to run with him. If one guy does a hop, skip and jump as you're walking away from the situation the other one wants to hop, skip, and jump too. One thing that scared me about the situation was that the door was still open. He (the guard) was halfway out the door, and that would have given him more time to take aim at us. So I wanted to make sure that the door was shut and latched so that he would have to go through the extra steps of opening the door again. This would give me enough time to get away from the front door. The danger level would have been greater if we all ran down the steps. If the guy had a weapon, I was thinking, it would have been easier for him to take a couple of shots at us because the door was already open: all he had to do was pull his weapon.

As a result of LEO-2's decisions and actions, the guard would have to undergo a series of steps in order to re-open the door, which LEO-2 believed was sufficient time for him to safely leave the facility. LEO-2 also maintained that as long as he controlled the movement of the door, he felt relatively secure for his safety as well as the security guard's.

In the kidnapping matter, LEO-3 had the authority to transfer any specialized equipment, accompanied by appropriate operational personnel to comply with and more importantly, satisfy the request of the interested parties. The easiest decision that LEO-3 could have made would have been to limit his involvement in the case and provide the requested specialized equipment. Had he chosen that path, his actions would have completely satisfied all parties concerned.

However, LEO-3 chose not to make an easy decision just to satisfy all the participants in this case. When entering this investigation, he believed that his primary task was to lend his operational expertise in order to assist in safely freeing the remaining victims. LEO-3 stated:

We had to establish a strategy here, a technical strategy that would be in line with the investigative

strategy. The bottom line here, make no mistake about it, was first to get the return of the victims. When you look at that as the bottom line, what we're concerned about is: What is the history of this group, (these folks who have been doing these kidnappings?). Are they volatile type folks? Have they in fact harmed any other victims in the past? If they were to find something that we may have supplied, could that have lit the fuse that would have caused them to do additional harm to the victims? We certainly didn't want to be the instigators of that. Based on the questions that we forwarded to the foreign law enforcement group, we learned that one of the victims had already been executed. Now we knew that these folks were very volatile and were prone to violence.

Although LEO-3 opted not to provide a capability to the foreign agency, this decision was arrived at through a systematic process that ultimately proved to be in the best interest of the remaining hostages while maintaining his overall objectives. All the remaining hostages were released safely and without incident. As LEO-3 elaborated, "sure, we could have sent the [reference deleted] down there with the stroke of a pen. If it had been discovered, however, no telling what the reaction would have been. All

I know is that those others [hostages] would have been right in the crosshairs after that.”

Context that Influenced Decision-Making Strategies

Strategies were developed in response to the expressed need to make effective decisions in a tactical police environment that would essentially render the situation less threatening. Particular contextual indicators related to both the causal conditions and the resulting phenomena influenced these strategies. These contextual indicators as discovered by the research include:

- (a) Degree of risk associated with the event
- (b) Level of uncertainty
- (c) Profile of the individual influencing the event
- (d) Potential for consequences

The degree of the risk or element of danger associated with these particular investigations was moderate to high. In LEO-3's case, the danger level involved in the kidnapping matter was considered extremely high due to the demonstrated savagery and volatility of the perpetrators and the threatened position of the victims. In the particular cases involving LEO-1 and LEO-2, the risk or

danger was not only to the lives of others, but also to the participants themselves.

Each participant expressed awareness to and appreciation for the overall risk level associated with their activities and actions. As LEO-1 commented:

During the briefing, a couple of things stood out in my mind. The first thing, I think, was the point that the guy was armed and dangerous and was a "shooter." They also made the point that his associates were also to be considered armed and dangerous. This guy (the principal drug trafficker) had some real problems. He was apprehended for murder and would have no qualms about killing again. The guy was heavily involved in drugs and there's no telling what he or his buddies were capable of doing. So if this guy came back, I figured there were going to be problems, big problems.

Elevated risk levels were attributable in part to poor operational planning and preparation on the part of others, which in turn caused uncertainty for the participants when they were confronted with atypical events. Therefore, the level of uncertainty associated with each of these tactical situations can also be rated at the moderate to high level.

Both LEO-1 and LEO-2 when describing their events chagrined at the lack of adequate preparation on the part

of others involved in their investigations. LEO-1 expressed dismay at the ease at which the unknown person was able to get so close to the target location without being noticed by surveillance personnel. LEO-2 also stated that the presence of the security guard within the building targeted for search should have been detected long before personnel were placed on scene and at risk.

Another contextual marker is the profile of others influencing or affecting the phenomena. This indicator ranged from an innocent party as was the case involving LEO-2 to the inveterate murderers confronting LEO-3. In the kidnapping case, LEO-3 firmly believed that the kidnappers would have executed other victims if they believed there was law enforcement involvement.

The last contextual strategy developed was the potential for consequences. The decisions made by all the participants had consequences, both good and bad. Both LEO-1 and LEO-2 were able to make decisions that effectively took control of the situation, thereby mitigating the threat level and producing positive consequences.

This was not the case for LEO-3 in the kidnapping investigation. LEO-3's late involvement in the investigation caused him to seek to neutralize control of

the events and not exacerbate the already volatile and dangerous situation. While LEO-3 decisions did meet his objectives, earlier decisions made by others involved in this case had negative consequences that impacted LEO-3's decision-making in this matter.

As a result, LEO-3 had to recover from the negative consequences of earlier decisions and develop a strategy that off-set those decisions. LEO-3 best explained this strategy and his final decision not to provide a capability by stating: "I might not have been able to force these guys (kidnappers) to do certain things I wanted, but I sure wasn't about to give them a reason to do (kill) another hostage."

Intervening Conditions that Influenced Strategy Development

In addition to context, there were intervening conditions that influenced the participants' decision-making strategies. These intervening conditions include:

- (a) Experience
- (b) Preparedness
- (c) Safety concerns for all those associated with the investigation

The first intervening condition influencing the participants' decision-making strategies was a reliance on their police experience. All the participants have significant experience in the law enforcement profession, which is complemented by their many years of expertise committed to tactical types of operations. This being the case, none of the participants openly declared experience as being a critical component to their decision-making strategies. Rather, experience was tacitly suggested, but powerfully demonstrated. When LEO-2 was asked about experience, he responded:

I think you rely on your past experiences, I remember the first time I got caught on one of these, it was more or less relying on the senior agents to react properly. There is nothing that they can teach you in training, and there is nothing that they ever did to prepare you for these types of events. I think it is very much like, if you are involved in a shooting, there is nothing really they can prepare you for. That event actually has to take place and you have to learn from that. I think experience engages your natural ability to take over the situation.

LEO-2 attributed much of the positive outcome in his encounter with the security guard to possibly his "many

years of preparing or thinking about what would happen if I got caught, subconsciously, you put yourself through so many scenarios before they happen that hopefully you're ready when they do."

LEO-3 stated that his experience in dealing with violent, volatile individuals over the years taught him valuable lessons that he applied in his handling of the kidnapping matter.

Kidnappers ultimate aim is that ransom. Sometimes you just have to pay up because the safety of the hostages is paramount. You can always catch them later. For cops, that is a hard lesson to learn and unfortunately, at times, comes at a high price.

LEO-1 also demonstrated that experience served as an intervening condition in his decision-making, but further showed the importance of being adequately prepared for the uncertainty that is inherent in police work. Preparation was an important component in all participants' decision-making and was the second intervening condition affecting decision-making strategies. Each participant was thoroughly prepared for their tasking and in some instances, they took on responsibilities that went beyond their own assignments and were often delegated to others officers.

The best illustration that preparation acted as an intervening condition to their decision-making strategies is grounded in several concerns LEO-1 voiced regarding the operational plan for his case that set forth each officer's responsibility. LEO-1 stated, "I had some problems with the way they were planning to execute the search. I thought we had too many guys initially going in. I thought we would have problems with the neighbors, and I wasn't convinced we had enough cover."

While these issues were not explicitly expressed by LEO-1 during pre-operational briefings, they forebode problems that ultimately occurred during the execution of the warrant and were ultimately overcome based in part on LEO-1 preparation. LEO-1's preparation for his role in the search commenced well in advance of the actual operation and continued throughout his involvement in the case. LEO-1 collected a significant amount of information, both on the extraneous details surrounding the location as well as background data on the co-conspirators associated with the main subject of the case.

When first learning of this investigation, LEO-1 implemented a series of procedures that sought to collect intelligence information regarding the case and initiated a comprehensive review of the details surrounding the

investigation. He initially requested that all documentation supporting the investigation be forwarded to him for evaluation. Additionally, he contacted numerous individuals involved in the investigation and identified leads that he believed required attention.

During the operational stage of this case, LEO-1 continued his efforts to gather information. First, he made a concerted effort to become familiar with the surrounding area. He initially approached the rear of the residence and made comments to other team members, noting the style and detail of the fencing surrounding the premises. LEO-1 then discretely moved to the front of the property where he observed a 'For Sale' sign, the make and model of vehicles parked along the street, and the neighborhood activity.

It should be noted that LEO-1 had a limited, albeit critical role in the investigation in which he was involved. His role in the search was technically oriented with minimum responsibility directed towards investigating the allegations contained in the warrant. Consequently, many involved in the case believed that LEO-1's inquiries regarding suspects and associates went beyond the scope of his responsibilities and served a limited purpose. However, he persisted in his inquiries and was provided

with significant details regarding the entire criminal enterprise.

Although many believed LEO-1 to be acting beyond his assigned scope of responsibility, it became apparent that his preparation method was more than justified when confronted by an associate of the narcotics trafficker. The on-scene law enforcement personnel relied on the judgments, decisions, and subsequent actions taken by LEO-1 without comment or hesitation.

At the decisive moment, LEO-1 took action and alone challenged the unintended visitor. LEO-1 commented later that armed with all the information he had gathered up to that critical moment, "I came up with a reasonable answer to every question he (the associate) had. If you don't act like you have anything to hide and have some answers, people are less likely to suspect anything. To him, I posed no threat."

His decisions and actions rendered the situation non-threatening, with other law enforcement officers depending on LEO-1 to control this unanticipated event. LEO-1's initial decisions were both credible and plausible to the visitor and subsequent decisions followed a logical and coherent flow that ultimately produced a successful outcome: Successful in that the investigative strategy

undertaken was not compromised and more important, the safety of all involved was protected.

The last intervening condition that influenced the participants' decision-making strategies was safety concerns for both the participants as well as others involved in the investigation. The participants' goal and objective in these cases was to mitigate at a minimum, and possibly eliminate any threat or danger associated with their respective incidents. In the investigation involving LEO-3, a different perspective and somewhat different context was present, particularly when compared to the other cases under review. This case revealed the importance safety played as an intervening condition that influenced the participants' decision-making strategies.

LEO-3 was required to render judgments and decisions while he was physically removed from the actual criminal incident. As a result, he had to rely on others to provide him with timely intelligence and information in order to make effective decisions in a life and death situation. Being physically removed from the scene, presented LEO-3 with a new set of unique dynamics. Three key elements stand out in this case.

First, LEO-3 was unable to sense first hand the conditions and circumstances under which this investigation

was taking place. Second, all incoming information was provided to LEO-3 through a number of idiosyncratic sources. As a consequence, data gathering and collection became problematic because each of the varying sources had their own assessment and interpretation of the situation, effectively portraying an incomplete and inconsistent picture to LEO-3.

Lastly, because this case was occurring outside United States borders and legal jurisdiction, LEO-3 had to be cognizant of the political ramifications associated with this investigation. These three key elements had to be integrated into the more important strategy of having all the hostages safely released and returned to their families.

With safety as the primary concern, LEO-3 was not going to jeopardize the hostages' lives by making decisions that allowed for the deployment of equipment that may have revealed a police presence in the matter. As stated by LEO-3, the priority "was first to get the return of the victims back safely."

LEO-3's inquiries into determining the merits of deploying a sophisticated capability concluded that such an option was a viable investigative technique. When asked about the basis of his decision, however, he emphasized:

"in my mind, a very high risk of this equipment being found by the bad guys, causing them to be more violent" outweighed the benefits this would bring to the investigation. "I did not want to impose any further danger than these people were already facing." Coincidentally, it was later learned through LEO-3's inquiry that the captors had sufficient capability to detect various investigative technologies that were considered for deployment in this situation.

While others opposed LEO-3's decision, he presented a fully supported justification explaining why this decision was appropriate under these intensely difficult circumstances. The final resolution of this investigation concluded with the remaining hostages being released and returned to governmental officials. The captors were subsequently arrested and are presently serving long prison sentences.

Strategies for Effective Police Decision-Making

This study was undertaken to describe and explore the process in which experienced law enforcement officials engage when making actual decisions and judgments under tactical police conditions. While studies of decision-

making in naturalistic setting are rich in the literature, few describe the process undertaken by officers when operating under the stressful moments of policing (Crego & Spinks, 1999). Therefore, to complement the existing literature and to explore the process officers used when making real police decisions in the field, these three case studies were conducted to reflect actual decision-making by successful and experienced law enforcement officials in operational police environments.

In the presence of both context and intervening conditions, the phenomena led to the development of five strategies that contributed towards effective police decision-making. These strategies are identified as: (a) situation assessment/awareness, (b) constructing cognitive map, (c) ranking or prioritizing information, (d) projecting outcomes, (e) mitigating threat level (see Figure 3).

The first strategy for effective tactical police decision-making relates to the theoretical constructs of situation assessment and situation awareness. Within these two constructs, a distinction is present that defines situation assessment as a cognitive process of "achieving, acquiring, and maintaining situation awareness" (Endsley, 1995, p. 36).

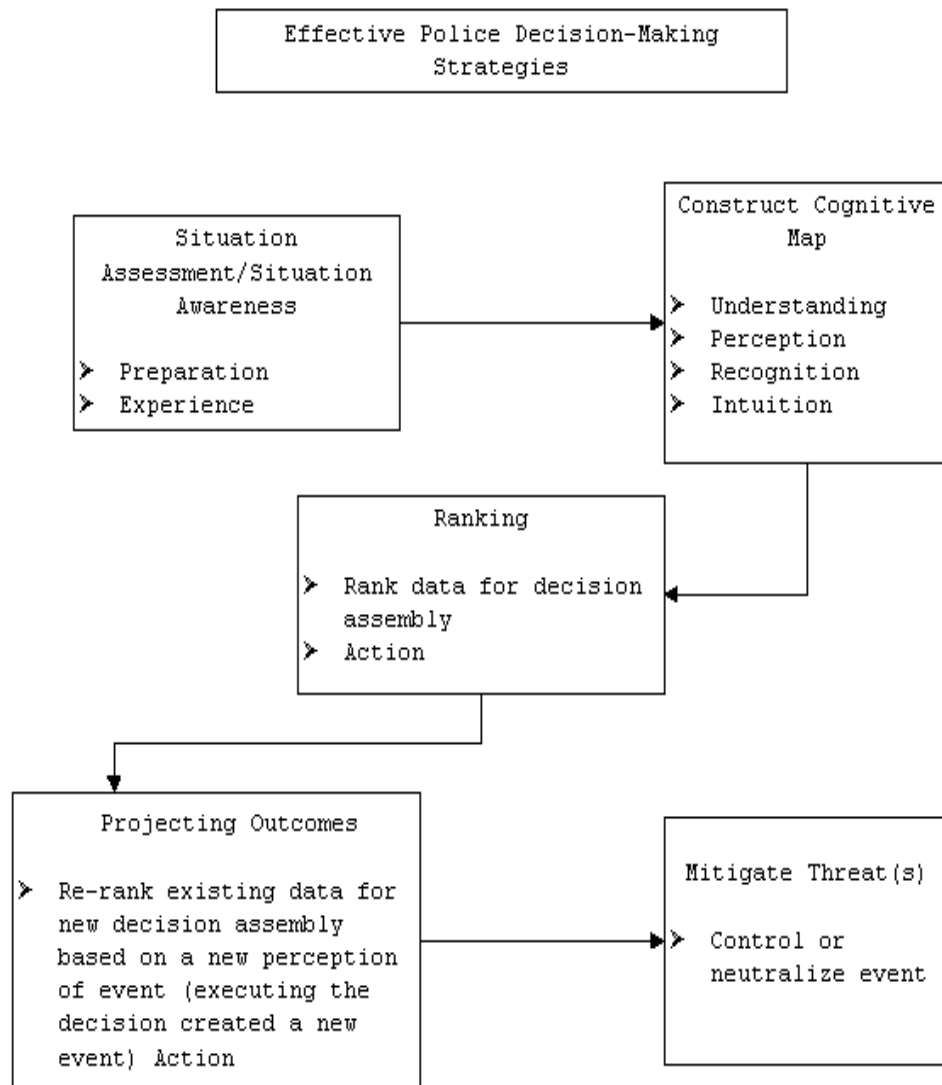


Figure 3. Effective Police Decision-Making Strategies

Adams, Tenney, and Pew (1995) similarly defined it as the "process referring to the various perceptual and cognitive activities involving constructing, updating, and revising the state of awareness" (p. 88).

Conversely, situation awareness is defined by Endsley (1988) "as 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" (Randel et al., 1996). A natural taxonomy of situation awareness is therefore classified as:

1. Perceiving critical factors in the environment
2. Understanding what those factors mean, particularly when integrated together in relation to the person's goals
3. Understanding of what will happen with the systems in the near future (Endsley, 1988, p. 269).

Situation awareness has received increased attention over the last decade; however, some debate remains about the precise details of this concept (Bass & Baxter, 1998, p.81). In schema-driven decision-making such as policing, an emphasis is placed on the indispensability of (a) situation assessment in naturalistic settings and (b) knowledge base, past experience, event sequence, and similarity recognition as cognitive components of situation assessment (Beach & Lipshitz, 1993; Federico, 1995).

While these concepts were inherent in the participants' decision-making processes, particularly in

the area of knowledge base, similarity recognition, and past experience resulting from their expansive careers in law enforcement, what was not so clear and missing in existing literature was the method and techniques the participants initially utilized to acquire, and subsequently sustain situation awareness. In these cases, this was accomplished through a scanning process, which held that everything in a situation is relevant and formed the basis on which a coherent cognitive map was developed.

Another characteristic influencing situation awareness that was observed in all the participants was their thorough preparation for their impending assignment and responsibility. This preparation phase included, but was not limited to collecting, analyzing, and storing information on the investigation that in many respects went beyond what was considered within the scope of their delegated task.

Also included in the preparation was the participants' past experience that yields a broad range of contingencies and worst-case scenarios and a general plan on how to deal with these scenarios. At a minimum, having worst-case scenarios in mind before hand acts as an alerting technique to the officer. Preparation for situation awareness includes knowledge that everything in the surroundings may

be important and nothing is irrelevant (a newly established cognitive set). Preparation for ranking options incorporates rehearsal of consequences of worst-case scenarios. All preparations are designed to reduce the time required for a response. At the moment decision-making was required by the participants, they were able to effectively assemble decision options based on this preparation, along with knowledge, experience, similarity recognition, and intuition.

Essentially, the participants were able to construct a cognitive map that guided them towards their projected goal(s) and objective(s). On the assumption that the path led the participants to their programmed objective, no digression was required. If, however, the route that was selected deviated off course from the intended goal because of circumstances caused by others within the unanticipated event, the participants were able to promptly change course by selecting the right piece of information and reconstruct their cognitive map along "other routes and paths" until their final goal(s) were attained (Tolman, 1948).

If re-direction was necessary, the participants did not blindly travel down roads with unrealistic expectations. Instead, they relied on the information they

gathered or scanned prior to and during the event, along with their experience that guided them in determining the best course to travel under the particular contextual circumstances with which they were involved.

By way of illustration, LEO-1 recalled at his pre-operational planning briefing that the subject of the investigation and his known associates were considered "armed and dangerous." During this meeting, LEO-1 had several concerns and was the only officer to request additional information or clarification on the daily activities of the criminal subject as well as his known associates.

He also requested further detail on the routine activities of individuals in the surrounding neighborhood, particularly during the time the search would be executed, along with the descriptions of vehicles used by the subject of the investigation and his acquaintances. Other officers during this briefing remained quiet and inattentive to these discussions and some suggested that the execution of the warrant was a relatively perfunctory assignment. At the conclusion of this briefing, each officer reported to their designated positions and commenced with providing logistical support to the operational team executing the warrant.

Approximately halfway into the tactical segment of this investigation, the unexpected occurred when the potentially "armed and dangerous" individual approached and challenged the operational team. At that precise moment, LEO-1 was the only officer who responded and took action. This unfortunate event commenced when the assumed "armed" visitor jumped from his vehicle and shouted: "what the hell are you doing here?" LEO-1 took charge, un-hesitantly and decisively and approached this individual and stated: "we're here to look at the property: our realtor was supposed to meet us here at 2:00, but is apparently running late." LEO-1, at this point in time established a path he followed, directed by the cognitive map he constructed, aimed exclusively at convincing this person that his intent was the purchase of the property.

An obvious piece of information needed before one could plausibly and effectively start down this road was the awareness that a sign was posted in front of the residence, which few realized. LEO-1 could accomplish this because he had included everything in the situation in his cognitive map and considered nothing as irrelevant. Others neglected the details of the surrounding and as a consequence, were limited in deriving an effective response. Also, it was imperative that the information

available to the decision-maker be ranked in order of relevancy to enhance the construction of a cognitive map and to augment the credibility of the actions taken by the participant.

Decision-making and actions by LEO-1 continued along the same path even when additional questions were raised. When asked by the intruder: "who are all these other guys (with you)?" LEO-1 responded, "they're building and termite inspectors here to check the foundation for termites and to make sure the foundation is okay."

Other questions persisted and LEO-1 remained both persuasive and convincing in his dialogue. At the conclusion of this event, LEO-1 achieved his objective and maintained control of the situation where no injuries resulted, and where the integrity of the investigation was maintained.

In this particular case as with the other cases under review, it was observed that both LEO-1 and the other officers displayed a behavioral pattern that was consistent throughout their involvement in these investigations. As was cited, LEO-1 was the only law enforcement officer who took the initiative during the pre-operational briefing to request additional information on topics that were either omitted or required clarification. Other officers remained

relatively quiet and believed their assignments and responsibilities were clearly articulated and that no further details were needed.

This behavioral pattern continued when officers were confronted with the "armed and dangerous" individual. LEO-1 was the only on-scene law enforcement officer who effectively took control of the situation, while other officers remained quiet and displayed an obvious form of vicarious trial and error (VTE) by looking around at one another, either waiting for the other "one" to take action or deciding on what course of action they would take. A "looking before you leap" sort of affair" (Tolman, 1938).

Tolman describes VTE as the conscious pondering of behavioral choices, which are influenced by expectations, knowledge of what leads to what in a given situation, goals, and other internal processes or states (Hunt, 1993). LEO-1's actions in his case were decisive and his decisions both expeditious and effective. LEO-1 followed the route that he believed would lead him to his destination, that being to neutralize and ultimately control the event. "I wanted to be in control." LEO-1 continued by saying:

The bottom line -- the guy was going to walk right up to us and see six agents squatting down. If that happens, he was the one in control. Before that could

happen, I wanted him to know that I was ready for him to approach me and that I had visual contact on him. None of us could see what he was doing, where he was, or his movements. If I was going to get shot, at least I wanted to see what he was doing instead of hiding behind a car. I wanted to control this thing and not him.

All the decisions made by the participants were directed towards removing or mitigating any threat imposed by others, together with having a successful resolution in the case. Mitigating the threat (by either controlling or neutralizing the event) accounts for the last strategy towards effective police decision-making.

Whether in the case of LEO-1's concern that a verbal confrontation could have escalated to a shooting incident, or in the case of LEO-3 where his primary concern was the safe release of all hostages, all decisions were made to control or neutralize the imminent danger associated with the incident. As a result of strategies employed by the participants for effective police decision-making, consequences resulted from these strategies are presented in the following section.

Consequences of Strategies for Police Decision-Making Decisions

The strategies used by the participants had both positive and negative consequences. In every case, those strategies employed by the participant succeeded in neutralizing or controlling the event and where the safety of all involved was protected. When LEO-1 was presented with an atypical situation that permeated with uncertainty, risk, and ambiguity; his immediate inclination was to seize control of the incident. His decision-making process was driven by this theoretical construct and his actions were directed towards acquiring, maintaining, or at least neutralizing control of the event.

The frequently discussed concept of control, and its relevance to dynamic decision-making, support and extend Brehmer's (1990) and Edward's (1962) description on achieving control over a system in order to produce desired outcomes.

- It requires that people make a series of decisions rather than a single decision. Decisions are interdependent, that is decisions made at one point in time constrain the possible choices in the next. Early decisions influence and affect later decisions.

- The environment changes both autonomously and as a result of the earlier decision makers' actions.
 - Decisions are goal directed and made under time pressure, thereby reducing the decision maker's opportunities to consider and explore options.
- (Brehmer, 1990; Edwards, 1962).

While these conditions theoretically applied to each of cases under study, they became transparent to the overall decision-making processes because of the pre-constructed cognitive map the participants followed. In these particular cases, the cognitive map did direct each participant towards a successful outcome.

In the case with LEO-1, the outcome was successful and is directly attributable to his decision-making and subsequent actions. Therefore, the consequences produced positive results. Similarly, the same applied in the case with LEO-2. Unfortunately, in this case an innocent security guard life was placed in danger, due mainly to poor coordination and planning on the part of law enforcement. However, a successful resolution to this investigation did occur.

The last investigation entailed significant coordination and exemplifies how LEO-3 was confronted with having to make difficult choices, judgments, and decisions.

Obviously, improper decisions rendered in this investigation could have had devastating consequences. In this case, it appeared that the best decision was to send no equipment or specialized capability. In his final assessment, LEO-3 determined that if the perpetrators detected any U.S. provided technology, execution of the victims was highly probable. LEO-3 recommended alternative techniques that would assist in the safe release of the hostages. LEO-3 was also successful in accomplishing his goal when the victims were later released unharmed.

Summary

While the literature on decision-making is rich with descriptions on naturalistic decision-making, this study is distinctive in its systematic examination of effective police decision-making strategies. A theoretical model of police decision-making was constructed through qualitative data analysis, which included engaging the participants in the analytic process to ensure the data reflected their personal concepts and constructs. Additionally, this study was conducted under operational police conditions, where the participants were required to make on scene decisions under varying degrees of uncertainty and risk.

The emergent theoretical model for effective police decision-making was essentially the researcher's interpretation of three participants' constructions of their decision-making strategies. While it is frequently the case in qualitative research that the results of the analysis are endemic to the particular researcher, participants, and context, transferability of this theoretical model for effective police decision-making takes place as the reader examines these results in the context of specific circumstances of interest (Creswell, 1998). The present findings contribute to the existing literature on naturalistic decision-making and offer a conceptual framework for understanding the process police officers undertake when making decisions in the field.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Regularly, law enforcement officers are called upon to make tough decisions under difficult and sometimes life threatening conditions. When those situations arise and they must decide on a course of action, what recommendations can be suggested concerning how they should proceed? What decisions should they make, knowing that the conditions under which they operate are demanding and their options limited?

One option typically available to an officer is to select a method that concentrates solely on the management of each isolated incident as it occurs, essentially reacting to the actions of others. This reactionary stance requires the officer to act only to counter the actions of others and therefore arguably places the situation and its ultimate outcome in the hands of others. This course may, in some instances, produce a desirable outcome either by chance, well-considered reactions on the part of the officer, or through favorable decision-making and actions of others. It is still heavily influenced, however, by the control others have over events preceding the outcome.

An alternative option is to select a method that relies less on the actions of others and more on the

officer striving to seize control of the situation. In seeking control of the situation, an officer can strive towards a predetermined goal favorable to the objectives of the officer.

Both of these options produce outcomes. The difference between the two strategies is that the latter, striving to control the situation, inhibits the actions of others and as a consequence, produces a greater likelihood of a positive influence over the outcome.

Although the choice may seem apparent on which method an officer should select, in practice the difficulty lies with implementing an effective decision strategy that guides an officer towards the predetermined goal of controlling the situation. In part, this is due to the contextual factors affecting real world decision-making, particularly those associated with police work. Law enforcement officials, when engaged, try to compensate for some of the contextual factors (i.e. risk, uncertainty, and time pressure) by focusing on the immediacy and urgency of the pending event, rather than strategizing on a course of action aimed at reaching predefined objectives.

As a result, an officer's emphasis and concern concentrates on the now and present. So it is both reasonable and practical to expect law enforcement training

programs to pursue analogous agendas that focus on preparing their officers to react to situations, rather than to respond to them. Reaction, to some degree, underlies the immediate, where response requires a cognitive process that transcends the present and steps through a time continuum with a beginning point to a final outcome.

Whether performing under the time domain of the immediate or progressing through a cognitive process aimed at a goal, the participants in this study effectively and successfully *responded* to their respective events by making decisions with a clear objective in mind. Each journeyed from a start point, when others caused the event to occur and concluded with the participants seizing control of the situation.

As they traveled through this process from beginning to end, many decisions were made and numerous threats were mitigated. The participants responded to these situations by having a goal in mind and were guided by a cognitive map that gave precise directions, along with alternate methodologies on reaching their final destination or goal.

In terms of the cognitive map, striving for control represents the goal for the officer. The route to this goal may have been different in each case, but control was

always the goal of the map. The officers searched for and collected clues by scanning as much detail about the features and relationship fixed in the event. When the officers were required to make decisions, they replayed the scanned, stored material and assembled an internal map that directed them towards the best alternative on controlling the event at hand. The strategy and factors leading each officer to the attainment of this objective was through preparation and their ability to take notice of details embedded in the situation.

Before delving into the manner in which the officers prepared, it should be noted that the law enforcement officials selected for this inquiry have extensive experience in the law enforcement profession. For this reason, a brief discussion on the benefit experience brings to the decision-making process is explored and presented following the section on preparation. This chapter concludes with recommendations for future research.

Preparation

One factor that contributed greatly towards the effectiveness of the decision-making process was through extensive preparation. Preparation is considered a

fundamental task, essential in producing positive results, but is often overlooked or at least neglected. Preparation is the filling in of the details, the development of possible routes, the recognition of potential barriers, and the construction of options.

Without preparation, an officer is left to draw only on his experience, must react many times in an information vacuum, and limits his options to only those he has immediately at hand. There are several stages for preparation, including activities undertaken prior to going in the field and those associated with actual performance while in the field.

Preparation: Before going into the field

One important aspect of preparation before going in the field is having knowledge and awareness of as much of the detail concerning the impending situation as possible. This is critical because anything can be important (useful). The smallest detail could prove most beneficial when barriers are encountered and detours need to be explored.

One way this can be accomplished is to create as many worst-case scenarios as possible and understanding the

consequences associated with each of these scenarios. This also serves as a preventive mechanism to guard against possible bad decisions being rendered when action is eventually required.

The concept of experience facilitates this process and assists in the formulation and construction of worst-case scenarios. Experience can greatly assist in the development of 'What if's,' but can never adequately substitute in the heat of the moment for the methodical vetting of response options derived from preparation.

These worst-case scenarios effectively represent the barriers that can be imposed into a tactical situation and provide the grounding to change course during a dynamic event. Ancillary to the formulation of worst-case scenarios is the requirement to plan tactics for an appropriate resolution of each scenario and rank order the discovered options.

In order to accomplish this, an officer must rely on the information preset in the case prior to and during their entire involvement in the matter. All data have the potential to be important. Officers scanned the surroundings for details and when required, were able to construct options based on that information.

The participants' astuteness to observation and scanning for detail prepared them for the unanticipated scenarios they encountered on the street. Through a replaying of the scan information, pieces of the puzzle could be assembled that represented successful and effective decision-making under tactical conditions.

This implication, the ability to perform a scanning function for details and consider everything as relevant, does promote the current state of police training programs. While this topic does require further research, a brief discussion will be presented towards the end of this chapter to address this specific topic.

Preparation: While in the field

The moment of truth for a law enforcement official is "on the street," when the elements of uncertainty, risk, danger, and emotion all collide. A prerequisite to decision-making under these operational conditions is to note everything in the surroundings because this affords the potential routes that may need to be traveled. This level of detail provides the input for the construction of the internal cognitive map.

Officers must be alert to the possibility that an

instant reaction to a situation may not be the optimum action. Instantaneous reaction does not always contribute or further the process needed to reach a predetermined goal. A deliberate, planned, and targeted response is the superior method towards reaching identified objectives.

For example, every law enforcement officer is trained early in his or her career that the use of deadly force may at some point be required in response to a life-threatening situation. They are trained in the response to such situations and typically tested to be sure that the officer will choose deadly force when a life threatening condition exists. Thereafter, their response and all its associate actions are mentally stored as an always possible, always available detour in their cognitive map.

The training they received to that point regarding the use of deadly force is in actuality a form of pre-event preparation. If an event or situation in which the officer is involved requires the use of deadly force, the officer calls upon prior preparation and responds to the situation. If an officer never anticipated the possible use of deadly force and had never prepared for its eventuality, then the officer would be forced to react to the instant event and the actions taken may be less certain and predictable.

To adequately prepare for a planned response and to reduce the possibility of instant reaction, various scenarios should be developed so the related consequences can be exposed and explored in advance of the event. In creating the potential outcomes or consequences associated with these different scenarios, the officer is essentially using a new set of processes, a new cognitive set to resolve any conflict within the situation. This set includes: (a) a visual process that incorporates a scanning function, (b) an intellectual process that maintains nothing as irrelevant and, (c) a cognitive process that integrate the information into a broad map with expectancies on the outcome(s) and a map that is adaptable to the evolving situation.

Prior preparation can therefore be established before the officer goes into the field by having a cognitive set that strives to scan and store every detail of the situation for potential use afterwards. When something happens within an event, an officer can make instantaneous use of a detail. In the case of a total "surprise" or essentially an unanticipated scenario, a different form of preparation is necessary.

Unanticipated or unpredicted scenarios in the field do occur. The readiness to respond to these events is gained

through preparation that constantly reviews and evaluates the ongoing and unfolding "situation." By providing this incessant inspection and assembling suitable details of the scanned and stored data, barriers will be quickly observed and corresponding routes will soon emerge.

During these totally unforeseen events an officer may select a method that requires some form of adaptation or detour. In these situations, necessary guidance and direction will be afforded to an officer from the information input during the construction of the cognitive map that will prove essential to successfully reaching the final outcome.

Experience has an influence over this process. Experience, or more appropriately a lack of experience, limits the skill set needed to conceive and forecast a total "surprise" and as a consequence, the failure to devise a strategic tactic to offset against it. Segregating the concept of experience out of the overall decision-making process is a difficult undertaking, but one that is necessary in order to recognize some of the benefits experience brings to a law enforcement officers decision-making process.

Experience

The participants selected for this study were purposively chosen for two main reasons. The first is their extensive experience in law enforcement and second, their recognized and successful job performance. This integration was necessary due to the idiosyncratic nature of experience and the incapacity to transfer or teach one's own experience to others.

Furthermore, in a police environment actual events seldom repeat themselves. They are individually distinctive from incident to incident. Experience is not able to tell you what specifically to do in the present based on what you did in the past. Nevertheless, several benefits can be identified.

One such benefit was previously discussed in the section on preparation. The competency to create worst-case scenarios and the subsequent planning of preemptive tactics to successfully remedy these scenarios is interrelated to the level of experience of the officer.

The more exposure and participation to actual police incidents, the more an officer can gain insight into the fundamental construction of a cognitive map driving his/her

decisions and actions towards a goal. Conversely, limited exposure or insufficient information inputted into the cognitive map that results from inexperience has the potential of getting an officer lost and off course when detours are required. This is a hypothesis for future research.

Also, the idea to consolidate experience with success adds a new dimension in examining this topic. Experience alone may offer little in preparing others to effectively respond to situations. When experience, however, is combined with successful outcomes, a different perspective is gained. When officers accomplished their goals and objectives in a successful and consistent method, together with being recognized for exemplary performance in the line of duty, then decision-making becomes a phenomenon worth exploring.

In exploring this topic of experience and naturalistic decision-making in a police context, the present analysis is congruent with Klein's (1997) findings as reflected in the recognition-primed decision model (RPD). However, the emergent theoretical model for effective tactical police decision-making splits from the RPD and contributes to the existing decision making literature in the following areas:

- Strive to control the event - a preset goal

- Construct a cognitive map, with detours and alternate routes, that provide directions on how to travel towards the final destination (goal). Accomplished by knowing to scan for details and assembling proper pieces of the details when required
- Preparation - create worst-case scenarios, (limited by experience)
- Plan tactics to effectively respond to worst-case scenarios and constantly update tactics when new detail is provided
- Avoid quick reaction, instead respond by following well-grounded cognitive map
- Perform constant checking and updating as scenario unfolds

These initiatives provide a beginning step for a re-examination on how law enforcement officers are prepared to execute their duties. It is through these techniques that the participants under this study have proven both effective and successful in their decision-making.

The emergent concepts and constructs are also applicable to an aggressive police training agenda that

instills in officers a pragmatic approach in responding to various types of situations. It is a starting point in providing the law enforcement officer with the necessary tools to operate under extremely difficult and tenuous conditions.

Review of Research Questions

The purpose of this dissertation was to answer the following research questions:

1. How do experienced and successful law-enforcement officials make judgments under the stressful moments of law enforcement?

The modeling of three case studies demonstrated that this was accomplished through the following techniques.

- Preparation - these law enforcement officials created worst-case scenarios and prepared tactics to offset these scenarios should they arise. They considered all detail in the situation as relevant and constantly scanned the environment for new and additional information. When required, this information served as the conduit for the construction of various decision options.

- Cognitive map - officers also anticipated the causal conditions of unanticipated events and those events being caused by others. These officers prepared for barriers by creating contingency plans. This was accomplished through the construction of a cognitive map of the situation with detours and alternative routes providing directions on how to continue to travel towards the final destination (goal).
 - Awareness - these successful officers perform constant scanning to check and update their knowledge as the scenario unfolds. They then used this new knowledge to constantly update their available options.
 - Ranking of alternatives - the officers rank ordered alternatives in order to prioritize actions.
 - Generating expectations - officers generated expectations about the effectiveness of the outcome of their decisions and modified decision options based on attaining their overall goals and objectives.
2. Why did these officers select a particular decision choice(s) and what underlying phenomenon led them to make the choice(s) they made?
- Control - the three case studies examined showed conclusively that these officers strived to control

the events as they unfolded. These officers believed (based on the intervening conditions) that the likelihood of complicating factors occurring during the event were increased if they failed to control the situation.

- Threat mitigation - these effective officers weighed their alternatives by examining the possible benefits of a change in tactics while concurrently seeking to reduce the threat.

3. When did the officers decide to act; i.e., when is their sufficient clarity to choose a course of action?

- These officers made decisions when the construct of control was moving away from the officer and towards the individual causing the unanticipated event. Furthermore, these officers acted when the "how" and "why" questions cited above were met.

Summary and Implications

The tools developed under the research domain of decision-making have found extensive application, particularly in the area of naturalistic decision-making. To give direction to the development of new theory, a

substantially enlarged program of empirical studies that include direct observation in both laboratory and field experiments will be essential to guide future research (Simon et al., 1986).

Much of the information presented in this work focuses on the participants strategies that ultimately produced successful and effective decisions under a tactical police situation. Extrapolating the benefits derived from these strategies and subsequently applying them to a training environment is an important topic, but one that goes beyond the boundaries of this research.

To further examine this area, however, the findings resulting from this study, in part, concluded that the participants had a skill to scan and store details on their respective cases for subsequent use during an unanticipated event. Although transforming the scanned and stored details or data into practical decision options could be considered an idiosyncratic characteristic, the important and trainable component rests on the vital need to perform a scanning function. How the assembly of the material is converted into decision choices can remain distinctive, providing sufficient detail is scanned, gathered, and the information is subsequently converted into viable decision options. Equally as important is the recognition of this

new perspective that essentially organizes the environment in a new way.

The importance of this recognition and being observant through a scanning process cannot be underestimated. During initial police training, officers are typically tested in their ability to observe their surroundings and thereafter recall to some degree the details embedded in the situation. This exercise for the most part is designed to impress upon the recruits the importance of observation diligence; however, skills that can help them capture and store information regarding their surroundings are not usually integrated into the training.

The context in which trainees are exposed to the importance of observation primarily centers on their future need to recount facts for court proceedings. They are not trained in the importance and value of observation as it relates to and affects their ability to respond to situations, or more appropriately unanticipated events. Therefore, the cognitive set that new recruits operate under is driven more by evidentiary purposes and less on the preparation required to respond to these frequent unanticipated events.

Therefore, in order to enhance current police training for the new recruit, a transformation to a new cognitive

set is needed that emphasizes a decision-making response to unanticipated events. Specifically, in a police academy environment, the general issues for the new recruits include:

- Practice being observant to the ultimate degree without knowing in advance what is useful and what is not
- Practice being observant of the motives of any of unanticipated person who might possibly enter the situation
- Practice expecting the goal (person or situation) to shift so that repositioning one's self will be necessary

The establishment of this cognitive set will associate particular details of events, through observation, and translate those details into decision options. Operating under this newly acquired set would help to ingrain in an officer's mindset the commonality associated with unanticipated events and the need to be observant in possibly resolving the situation.

This would of course require them to be ever vigilant to a changing situation, always being observant to details even if they at the time seem unimportant, and always updating their cognitive map leading them to their goal. An unanticipated event is by definition unanticipated and a detail that minutes ago seem insignificant, may in the present provide the crucial key towards a successful

outcome. The early lessons taught to new officers on the awareness of observation will transcend into practice, offering a new approach to decision-making. This claim, however, will require further examination and research.

Another area requiring additional inquiry is the manner in which officers are trained to be observant. Present protocols designed to train officers in this new approach can be augmented with processes designed that inculcate in trainees the ability to scan their surroundings for not only evidentiary type information, but also information that may prove value in resolving unanticipated events should they arise. Demonstrating the usefulness of environment awareness in training scenarios would first convince students of the importance of scanning their environment. The importance of environmental awareness could then be reinforced by exposing students to situations where scanning their surroundings and preparing prior to an event will greatly assist them in resolution.

Integral to this scanning function is for the officer to process information about persons who initiate or become involved in an unanticipated event. Key is for the officer to try to determine the motives of the person(s) and use the information scanned as an advantage. If the central goal of the officers is to gain control of the situation as

determined by this study, all information embedded in the situation is important towards meeting this objective. The skill lies in discerning what information should be applied during the immediate decision-making event and what information should be held in abeyance for subsequent development. This key factor relies, in part on the officer's rationality, tacit knowledge and intuition. These areas, particularly those associated with tacit knowledge and intuition require further research to explore the influence each contributes towards the effectiveness of tactical police decision-making.

Although "control" was determined to be essential in the law enforcement domain, future research in this particular area as well as naturalistic decision-making overall must go beyond descriptive accounts of dynamic decision-making and ascertain the goals associated with the particular practice under study. Once goals and objectives are discovered, new methods with testable hypotheses can be developed which produce more robust findings than verbal protocols describing cognitive processes. This echoes the position of Howell, who calls for a functional taxonomy of tasks, more theory building, and long-term evaluation of applications (Howell, 1997).

In conclusion, the final comments will be those of C. Zsombok and G. Klein as expressed in Naturalistic Decision-Making (1997):

We look forward to the by-products of this development: ease of access by those new to the NDM endeavor; identification of research topics; development of dissertation topics (a crucial step for assuring continuing growth in NDM research); more timely communication among NDM researchers; and the evolution of an organized body to shape the lessons learned (Zsombok & Klein, 1997).

This research provides a small step in that direction.

References

- Adams, M., Tenney, Y., & Pew, R. (1995). Situation awareness and the cognitive management of complex systems. Human Factors, 37(1), 85-104.
- Agan, R. D. (1987). Intuitive knowing as a dimension of nursing. Advances in Nursing Science, 10(1), 63-70.
- Agor, W. H. (1990). The logic of intuition: an agenda for future research. In W. H. Agor (Ed.), Intuition in organizations. (pp. 263-264). Newbury Park, CA: Sage Publications.
- Agor, W. H. (1992). Intuition in decision-making: how to assess, use, and develop your intuitive powers for increased productivity. University of Texas at El Paso. Available: Global Intuition Network.
- Anderson, B. F., Deane, D. H., Hammond, K. R., & McClelland, G. H. (1981). Concepts in judgment and decision research. New York: Praeger.
- Anonymous. (1999, Nov). Clinton proposes more police training. Associated Press (AP) available://abcnews.com.
- Atherton, J. (1999). Reflective Practice. Available: <http://website.ntl.com>.
- Bass, E. J., & Baxter, G. D. (1998). Human error revisited: Some lessons from situational awareness. Paper presented at the Fourth Symposium on Human Interaction with Complex Systems, Los Alamitos, CA.
- Beach, L. R., & Lipshitz, R. (1993). Why classical theory is an inappropriate standard for evaluating and aiding most human decision-making., Decision-making in action: Models and methods (pp. 21-35). Norwood NJ: Ablex.
- Beck, R., & Wood, D. (1976b). Comparative developmental analysis of individual and aggregated cognitive maps of London. In G. T. Moore & R. G. Golledge (Eds.), Environmental knowing. Stroudsburg, PA: Dowden, Hutchinson and Ross.

- Becker, G. M., & McClintock, C. G. (1967). Value: Behavioral decision theory. Annual Review of Psychology, 18, 239-286.
- Benner, P., & Tanner, C. (1987). How expert nurses use intuition. American Journal of Nursing, 87(1), 23-31.
- Berry, J. (1999). Apart or a part? Information Technology and Disabilities. Available: <http://www.rit.edu> [August 7, 2000].
- Bogdan, R., & Bilken, S. K. (1992). Educational research. An introduction. New York, N.Y.: Longman.
- Bothamley, J. (1993). Dictionary of theories. London: Gale Research International.
- Boucouvalas, M. (1997). Intuition: The Concept and the Experience. In R. Davis-Floyd & P. S. Arvidson (Eds.), Intuition: The inside story - interdisciplinary perspectives (pp. 3-18). New York: Routledge.
- Billinghurst, M., & Weghorst, S. (1995). The use of sketch maps to measure cognitive maps of virtual environments., Proceedings of IEEE 1995 Virtual Reality Annual International Symposium, IEEE Computer Society. Los Alamitos, CA, 1995, 40-47.
- Brecher, M., & Geist, B. (1980). Decisions in crisis: Israel, 1967 and 1973. Berkeley, CA: University of California Press.
- Brehmer, B. (1990). Strategies in real-time dynamic decision-making. In R. M. Hogarth (Ed.), Insights from decision-making. (pp. 262-279). Chicago: University of Chicago Press.
- Brockmann, E., N., & Anthony, W., P. (1998). The influence of tacit knowledge and collective mind on strategic planning. Journal of Managerial Issues, 10(2), 204-222.
- Brunnson, N. (1985). The irrational organization. Chichester: Wiley.

- Cannon-Bowers, J. A., Salas, E., & Pruitt, J. S. (1996). Establishing the boundaries of a paradigm for decision-making research. (decision-making in complex environments). Human Factors, 38, 193-203.
- Carpenter, M. J. (2000). A cop's education: It takes a lifetime. APB Multimedia Inc. Available: www.apbnews.com/cjprofessionals [2000, January 20].
- Charles, M. T. (2000). A strategic, tactical, and social psychological analysis of police officer shootings: a case study. Champaign-Urbana: University of Illinois - Police Training Institute.
- Charles, M. T. (2000). Police training: breaking all the rules. Charles C Thomas Publisher, Springfield, IL.
- Cohen, M. S. (1993). The naturalistic basis of decision biases. In G. A. Klein & J. Orasanu & R. Calderwood & C. Zsombok (Eds.), Decision making in action: Models and methods. (pp. 50-99). Norwood NJ: Ablex.
- Cohen, M. S., Freeman, J. T., & Thompson, B. B. (1995). Training the naturalistic decision maker (MDA903-92-C-0053 funded by Army Research Institute). Arlington VA: Cognitive Technologies.
- Corbin, J., & Strauss, A. L. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. Qualitative Inquiry, 13(1), 3-21.
- Corbin, R. M. (1980). Decisions that might not get made. In T. Wallsten (Ed.), Cognitive processes in choice and decision behavior. Hillsdale, NJ: Erlbaum.
- Cosmides, L., & Tooby, J. (1996). Are humans good intuitive statisticians after all? Rethinking some conclusions from the literature on judgment under uncertainty. Cognition, 58, 1-73.
- Crego, J., & Spinks, T. (1999). Critical incident management: Engendering experience through simulation. Metropolitan Police, New Scotland Yard, London. Available: <http://www.essenet.demon.co.uk> [1999, May, 12].

- Creswell, J. (1998). Qualitative inquiry and research design. Thousand Oaks, CA: Sage Publications.
- Cronbach, L. J. (1975, February). Beyond the two disciplines of scientific psychology. American Psychologist, 30(2), 116-127.
- Dantzker, M. L. (1997). Contemporary policing: Personnel, issues, and trends. Newton, MA.: Butterfield-Heinemann.
- Dawes, R. M. (1988). Rational choice in an uncertain world. New York: Harcourt Brace Jovanovich.
- Dawisha, K. (1985). The Kremlin and the Prague Spring. Berkeley, CA: University of California Press.
- deBecker, G. (1997). The gift of fear. New York: Dell Publishing.
- Downs, R., & Stea, D. (1973). Cognitive maps and spatial behavior: Process and products. In R. Downs & D. Stea (Eds.), Image and environment (pp. 8-26). Chicago: Aldine Publishing Co.
- Dowty, A. (1984). Middle East crisis: U.S. decision-making in 1958, 1970, and 1973. Berkeley: University of California Press.
- Driskell, J. E., Salas, E., & Hall, J. K. (1994). The effect of vigilant and hyper-vigilant decision training on performance.: Paper presented at the 1994 Annual Meeting of the Society of Industrial and Organization Psychology.
- Edland, A., & Svenson, O. (1993). Judgment and decision-making under time pressure: studies and findings. New York: Plenum.
- Edwards, W. (1954a). The theory of decision-making. Psychological Bulletin, 51, 380-417.
- Edwards, W. (1962). Dynamic decision theory and probabilistic information processing. Human Factors, 4, 59-73.

- Eisner, E. W. (1991). The enlightened eye: Qualitative inquiry and enhancement of educational practice. New York, NY: Macmillan Publishing.
- Endsley, M. R. (1988). Design and evaluation for situational awareness enhancement. Paper presented at the Human Factors Society 32nd Annual Meeting, Santa Monica, CA.
- Endsley, M. (1995). Toward a theory of situation awareness in dynamic systems. Human Factors, 37(32-64).
- Fagley, N., & Miller, P. (1987). The effects of decision framing on choice of risky vs. certain options. Organizational Behavior and Human Decision Processes, 56, 399-429.
- Federico, P. A. (1995). Expert and novice recognition of similar situations. Human Factors, 37, 105-122.
- Fidura, F. G. (1998). Thinking & decision making. Geneseo [1999, November].
- Galbraith, J. (1973). Designing complex organizations. Reading, MA: Addison Wesley.
- George, A. (1986). The impact of crisis-induced stress on decision-making. Washington D.C.
- Gephart, R. (1999). Paradigms and research methods. Academy of Management, Research Methods, 4(Summer), 1-9.
- Gigerenzer, G. (1996). Rationality: Why social context matters. In P. Baltes (Ed.), Interactive minds: Perspectives on the social foundation of cognition (pp. 319-46). Cambridge: Cambridge University Press.
- Gigerenzer, G., Hoffrage, U., & Kleinbolting, H. (1991). Probabilistic mental models: A Brunswikian theory of confidence. Psychology Review, 98, 506-528.
- Glaser, B. G. (1978). Theoretical sensitivity. Mills Valley, CA: Sociology Press.
- Glaser, B. G. (1998). Doing grounded theory: Issues and discussions. Mills Valley, CA: Sociology Press.

- Glaser, B. G., & Strauss, A. L. (1967). The discovery of grounded theory. Chicago: Aldine.
- Goetz, J. P., & LeCompte, M. D. (1984). Ethnography and qualitative design in educational research. Orlando, FL: Academic Press.
- Goldstein, W. M., & Hogarth, R. M. (1997). Judgment and decision research: Some historically context. In W. M. Goldstein & R. M. Hogarth (Eds.), Research on judgment and decision making: Currents, connections and controversies. (pp. 3-65). Cambridge, UK: Cambridge University Press.
- Gorski, P. (1998). Racial and gender identity development in white male multicultural educators and facilitators: Toward individual processes of self-development., Dissertation, University of Virginia, Charlottesville, VA.
- Grinker, R. R., & Spiegel, J. P. (1963). Man under stress. New York, NY: McGraw-Hill.
- Guba, E. (1978). Toward a methodology of naturalistic inquiry in educational evaluation. (Vol. Monograph 8). Los Angeles: UCLA Center for the Study of Evaluation.
- Guthrie, S. (1998). The role of tacit knowledge in judgment and decision theory. Winstar Telebase - Iquest [1998, February 20].
- Hammond, K., Hamm, R., M., Grassia, J., & Tamra, P. (1987). Direct comparison of the efficacy of intuitive and analytical cognition in expert judgment. IEEE Transactions on Systems, Man, and Cybernetics, 17, 753-770.
- Hammond, K. R. (1993). Naturalistic decision-making from a Brunswikian viewpoint: its past, present, future. In G. A. Klein & J. Orasanu & R. Calderwood & C. Zsombok (Eds.), Decision-making in action: models and methods. (pp. 205-227). Norwood, NJ: Ablex.

- Hammond, K. R., & Brehmer, B. (1973). Quasi-rationality and distrust: Implications for intentional conflict. In L. Rappoport & D. Summers (Eds.), Human judgment and social interaction (pp. 338-391). New York: Holt, Rinehart, Winston.
- Hammond, K. R., McClelland, G. H., & Mumpower, J. (1980). Human judgment and decision-making. New York: Praeger.
- Hartley, L., Morrison, D., & Arnold, P. (1989). Stress and skill. In A. M. Colley & J. R. Beech (Eds.), Acquisition and performance of cognitive skills. Chichester: Wiley.
- Heylighten, F., & Joslyn, C. (1999). Decision Theory. Principia Cybernetica Web [1999, Sept. 19,1999].
- Hirst, E., & Schweitzer, M. (1990). Electric-utility resource planning and decision-making: The importance of uncertainty. Risk Analysis, 10, 137-146.
- Hoepfl, M. C. (1997). Choosing qualitative research: A primer for technology education researchers. Journal of Technology Education, 9(1), 1-17.
- Hogarth, R. M. (1987). The psychology of judgment and choice. San Francisco, CA: Jossey Bass.
- Holsti, O. (1975). The effects of stress on the performance of foreign policy-makers. Paper presented at the Political Science Annual: An International Review, Indianapolis.
- Howell, W. C. (1997). Progress, prospects, and problems in NDM: A global view. In C. E. Zsombok & G. Klein (Eds.), Naturalistic Decision Making (pp. 37-48). Mahwah, NJ: Lawrence Erlbaum Associates American Psychological Association.
- Huber, O., Wider, R., & Huber, O. W. (1996). Active information search and complete information presentation in naturalistic risky decision tasks. Acta Psychologica, 95, 15-29.

- Humphreys, P., & Berkeley, D. (1985). Handling uncertainty: Levels of analysis of decision problems. In G. Wright (Ed.), Behavioral decision-making. New York: Plenum Press.
- Hunt, M. (1993). The story of psychology. New York: Anchor Books.
- Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. Journal of Personality and Social Psychology, 52, 1122-1131.
- Isenberg, D. (1984) How senior managers think? Harvard Business Review, Nov/Dec, 80-90.
- Janis, I. L., & Mann, L. (1977). Decision-making: A psychological analysis of conflict, choice and commitment. New York: Free Press.
- Johnson, E. J., Payne, J. W., & Bettman, J. R. (1993). Adapting to time constraints. In O. Svenson & A. J. Maule (Eds.), Time pressure and stress in human judgment and decision-making. New York: Plenum.
- Johnston, J. H., Driskell, J. E., & Salas, E. (1997). Vigilant and hypervigilant decision-making. Journal of Applied Psychology, 82(4), 614-622.
- Kahneman, D. (1994). New challenges to the rationality assumption. Journal of Institutional and Theoretical Economics, 150, 18-36.
- Kahneman, D., & Lovallo, D. (1993). Timid choices and bold forecasts: a cognitive perspective on risk-taking. Management Science, 39(1), 17-31.
- Kahneman, D., & Tversky, A. (1973). Subjective probability: A judgment of representativeness. Cognitive Psychology, 3, 430-454.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. Econometrica, 47, 263-291.

- Khatri, N., & Ng, H. A. (1997). Role of intuition in strategic decision-making., Nanyang Technological University, Singapore.
- Killion, T. (2000, November). Decision-making and the levels of war. Military Review, 80, 6.
- Kirk, J., & Miller, M. L. (1986). Reliability and validity in qualitative research. Beverly Hills: Sage Publications.
- Kitchin, R. M. (1994a). Cognitive maps what are they and why study them? Journal of Environmental Psychology, 14, 1 - 19.
- Klein, G. (1999). Sources of power: How people make decisions. Cambridge, MA: The MIT Press.
- Klein, G. A. (1997). The recognition-primed decision (RPD) model: Looking back, looking forward. In C. Zsombok & G. A. Klein (Eds.), Naturalistic decision-making. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Klein, G. A., Calderwood, R., & MacGregor, D. (1989). Critical decision method of eliciting knowledge. IEEE transactions on systems, man and cybernetics, 19, 462-472.
- Klein, G. A., Orasanu, J., Calderwood, R., & Zsombok, C. E. (Eds.). (1993). Decision making in action: Models and methods. Norwood, NJ: Ablex Publishing.
- Kontogiannis, T. (1996). Stress and operator decision-making in coping with emergencies. International Journal of Human Computer Studies, 45, 75-104.
- Kuhn, T. (1962). The structure of scientific revolutions. Chicago: University of Chicago Press.
- Leppien, J. H. (1995). The paradox of academic in high ability, African American, female students in an urban elementary school. Unpublished Doctoral Dissertation, University of Connecticut, Storrs, CT.

- Lesgold, A., Robinson, H., Feltovich, P., Glaser, R., Klopfer, D., & Wang, Y. (1988). Expertise in a complex skill: Diagnosing x-ray pictures. In M. Chi & R. Glaser & M. Farr (Eds.), The nature of expertise (pp. 312-342). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Lincoln, Y., & Guba, E. (1985). Naturalistic inquiry. Newbury Park, CA: Sage Publications.
- Lincoln, Y., & Guba, E. (1994). Competing paradigms in qualitative research. Newbury Park, CA.
- Lipshitz, R., & Strauss, O. (1997). Coping with uncertainty: A naturalistic decision-making analysis. Organizational Behavior and Human Decision Processes, 69(2), 149-163.
- Lopes, L. L. (1982). Doing the impossible: a note on induction and the experience of randomness. Journal of Experimental Psychology: Learning, Memory, and Cognition, 8, 626-636.
- Lopes, L. L. (1987). Between hope and fear: The psychology of risk. In W. M. Goldstein & R. M. Hogarth (Eds.), Research on judgment and decision-making: Currents, connections, and controversies (Vol. 20, pp. 255-295).
- Mandel, D. R. (2000, February 2000). Judgment and decision making. University of Hertfordshire. Available: <http://phoenix.herts.ac.uk> [2000, March12].
- Mandler, G. (1984). Mind and body: Psychology of motion and stress. New York, NY: Norton & Company.
- March, J. G., & Shapira, Z. (1987). Managerial perspectives on risk and risk taking. Management Science, 33, 1404-1418.
- Mastrofski, S. (1990). Prospect of change in police patrol: A decade in review. American Journal of Police, 3(1).
- Maughan, C. (1996). Problem-solving through reflective practice: The oxygen of expertise or just swamp gas? Web Journal of Current Legal Issues.
- McCaskey, M. B. (1986). The executive challenge: Managing change and ambiguity. Harper Business.

- McKernan, J. F., & O'Donnell, P. (1996). Creative accounting and the creation of value. University of Glasgow. Retrieved May, 1999, from the World Wide Web: <http://panoptic.csustan.edu>
- Mellars, B. A., Schwartz, A., & Cooke, D. J. (1998). Judgment and decision-making. Annual Review of Psychology, 49, 447-477.
- Merriam, S. B. (1988). Case study research in education: A qualitative approach. San Francisco, CA: Jossey-Bass Publishers.
- Merriam, S. B. (1998). Qualitative research and case study applications in education. San Francisco: Jossey-Bass Publishers.
- Miller, V. G. (1993). Measurement of self-perception of intuitiveness. Western Journal of Nursing Research, 15(5), 595-606.
- Milton, N. (1997). Decision theory and social psychology. University of Nottingham. Retrieved November, 1999, from the World Wide Web: <http://www.psychology.nottingham.ac.uk/>
- Morris, L. E. (1990). Strategies and tactics to access intuition: A look at the moment of solution. Unpublished Doctoral Dissertation, Virginia Polytechnic Institute and State University, Blacksburg.
- Mosier, K. L. (1991). Expert decision-making strategies. In P. Jersen (Ed.), Proceedings of the Sixth International Symposium on Aviation Psychology. (pp. 266-271). Columbus, OH.
- Motes, M. (1999). The framing of outcomes and risk-averse vs. risk-seeking decision making. University of North Florida. Available: <http://www.unf.edu> [2000, March 7].
- Nygren, T. (1997). Framing of task performance strategies: effects on performance in a multi- attribute dynamic decision-making environment. Human Factors, 39, 425-434.

- Orasanu, J., & Connolly, T. (1993). The reinvention of decision-making. In G. A. Klein & J. Orasanu & R. Calderwood & C. Zsombok (Eds.), Decision-making and action: Models and methods (pp. 3-20). Norwood, NJ: Ablex publishing.
- Ordonez, L. (1997). Decisions under time pressure: How time constraint affects risky decision making. Organizational Behavior and Human Decision Processes, 71(2), 121-140.
- Pandit, N. R. (1996). The creation of theory: A recent application of the grounded theory method. The Qualitative Report, 2(4), 15.
- Parikh, J., Neubauer, F. F., & Lank, A. G. (1994). Intuition: The new frontier of management. Cambridge, MA: Blackwell.
- Pascual, R., & Henderson, S. (1997). Evidence of naturalistic decision-making in C². In C. Zsombok & G. A. Klein (Eds.), Naturalistic decision making. Mahwah, NJ: Erlbaum.
- Patton, M. Q. (1990). Qualitative evaluation and research methods. (2nd ed.). Newbury Park, CA.: Sage Publications.
- Payne, J. (1982). Contingent decision behavior. Psychology Bulletin, 92, (2,) 382-402.
- Perrow, C. (1984). Normal accidents: Living with high-risk technologies. New York, NY: Basic Books.
- Pew, R. W., Miller, D. C., & Feeher, C. E. (1981). Evaluation of proposed control room improvements through analysis of critical operator decisions. (EPRI-1982). Palo Alto, CA: Electric Power Research Institute.
- Plous, S. (1993). The psychology of judgment and decision making. New York: McGraw-Hill.
- Polanyi, M. (1958). Personal knowledge. Chicago: The University of Chicago Press.

- Polanyi, M. (1966). The tacit dimension. Gloucester, MA: Peter Smith.
- Prietula, M. J., & Simon, H. A. (1989). The experts in your midst. Harvard Business Review, 67(1), 120-124.
- Randel, J. M., Pugh, L. H., & Reed, S. K. (1996). Differences in expert and novice situation awareness in naturalistic decision making. International Journal of Human Computer Studies, 45, 579-597.
- Randel, J. M., Pugh, L. H., Reed, S. K., Schuler, J. W., & Wyman, B. (1994). Methods for analyzing cognitive skills for a technical task. San Diego, CA.: Navy Personnel Research and Development Center.
- Rapoport, A., & Wallsten, T. (1972). Individual decision behavior. Annual Review of Psychology, 23, 131-176.
- Ray, M., & Myers, R. (1990). Practical intuition. In W. H. Agor (Ed.), Intuition in organizations (pp. 247-262). Newbury Park, CA: Sage Publications.
- Reber, A. S. (1995). Implicit learning and tacit knowledge (Vol. Oxford Psychology NO. 19). New York: Oxford University Press.
- Regel, R. W. (1999). How common sense and intuition contribute to good operations control. University of Montana. Available: <http://sbaer.uca.edu> [2000, March 7].
- Rew, L. (1988b). Nurses' intuition. Applied Nursing Research, 1(1), 27-31.
- Savage, L. J. (1954). The foundations of statistics. New York: Wiley.
- Scanlon, E. (1998). Protocol for conducting a case study design. GWB. Available: <http://gwbweb.wustl.edu> [2000, July 24].
- Schneider, S. L., & Lopes, L. L. (1986). Reflection in preference under risk: Who and when may suggest why. Journal of Experimental Psychology: Human Perception and Performance., 12, 535-548.

- Schon, D. (1985). The design studio. London: RIBA Publications Limited.
- Schon, D. A. (1983). The reflective practitioner: How professionals think in action: Basic Books - Harper Collins.
- Schutz, A. (1973). Collected papers I: The problem of social reality. The Hague: Martinus Nijhoff.
- Schwandt, T. A. (1994). Constructivist, interpretivist approaches to human inquiry. In Y. Lincoln & N. K. Denzin (Eds.), Handbook of Qualitative Research (pp. 118-137). Newbury Park, CA.
- Schwandt, T. A. (1997). Qualitative inquiry: A dictionary of terms. Thousand Oaks: Sage.
- Seebo, T. C. (1993). The value of experience and intuition. Financial Management, 22(1), 27.
- Sharp, A. G. (1997, December). Does training keep up with the times? Law and Order, 12, 43-48.
- Shlaim, A. (1983). The United States and the Berlin blockade, 1948-1949. Berkeley, CA: University of California Press.
- Shoemaker, P. J. H. (1993). Determinants of risk-taking: Behavioral and economic views. Journal of Risk and Uncertainty, 6, 49-73.
- Simon, H. A. (1957). Models of man: Social and rational. New York: Wiley.
- Simon, H. A. (1987). Making management decisions: The role of intuition and emotions. Academy Management Executive, 1, 57-64.
- Simon, H. A., Dantzig, G. B., Hogarth, R. O., Piott, C. R., Raiffa, H., Schelling, T. C., Shepsle, K. A., Thaler, R., Tversky, A., & Winter, S. (1986). Report of the research briefing panel on decision making and problem solving. Washington, D.C.: National Academy of Sciences - National Academy Press.

- Slovic, P., Fischhoff, B., & Lichtenstein, S. (1977). Behavioral decision theory. Annual Review of Psychology, 28, 1-39.
- Smith, G., F. (1997). Managerial problem solving: A problem-centered approach. In C. E. Zsombok & G. Klein (Eds.), Naturalistic decision making (pp. 371-382). Mahwah, NJ: Lawrence Erlbaum Associates.
- Smith, J. F., Mitchell, T. R., & Beach, L. R. (1982). A cost benefit mechanism for selecting problem solving strategies: some extensions and empirical tests. Organizational Behavior and Human Performance, 29, 370-396.
- Smithson, M. (1989). Ignorance and uncertainty: Emerging paradigms. New York: Springer Verlag.
- Soy, S. K. (1996). The case study as a research method. University of Texas. Available: <http://www.gslis.utexas.edu> [2000].
- Stake, R. E. (1995). The art of case study research. Thousand Oaks, CA: Sage.
- Sternberg, R. J., & Horvath, J. A. (1999). Tacit knowledge in professional practice. Mahwah, NJ: Lawrence Erlbaum Associates, Inc. Publishers.
- Sternberg, R. J., Wagner, R. K. (1986). Practical intelligence in real-world pursuits: The role of tacit knowledge. Journal of Personality and Social Psychology, 49, 436-458.
- Strauss, A. L. (1987). Qualitative analysis for social scientists. New York: Cambridge University Press.
- Strauss, A. L., & Corbin, J. (1990). Basics of qualitative research: Grounded theory procedures and techniques. Newbury Park, CA: Sage Publications.
- Strauss, A. L., & Corbin, J. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory. London: Sage.

- Svenson, O., & Benson, L. I. (1993a). Framing and time pressure in decision-making. In O. Svenson & A. J. Maule (Eds.), Time pressure and stress in human judgment and decision-making. New York: Plenum.
- Thompson, J. (1967). Organizations in action. New York: McGraw Hill.
- Tolman, E. C. (1938). The determiners of behavior at a choice point. Psychological Review, 45(1), 1-35.
- Tolman, E. C. (1948). Cognitive maps in rats and man. Psychological Review, 55, 189-208.
- Travis, J. (1995). Education in law enforcement: Beyond the college degree. Chicago: National Institute of Justice - U.S. Department of Justice.
- Trochim, W. M. K. (1999). Qualitative methods, qualitative validity. Research methods knowledge base. Available: trochim.human.cornell.edu [2000, May 4,].
- Tversky, A., & Kahneman, D. (1974). Judgments under uncertainty: Heuristics and biases. Science, 185, 1124-1131.
- Tversky, A., & Kahneman, D. (1980). The belief in the "law of small numbers." Psychological Bulletin, 76, 105-110.
- Tversky, A., & Kahneman, D. (1981). The framing of decision and the psychology of choice. Science, 211, 453-458.
- Tversky, A., & Kahneman, D. (1986). Rational choice and the framing of decisions. Journal of Business, 59, S251-S278.
- Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. Journal of Risk and Uncertainty, 5, 297-323.
- von Neumann, J., & Morgenstern, O. (1944). Theory of games and economic behavior. Princeton: Princeton University Press.

- Wagner, R. K. (1987). Tacit knowledge in everyday intelligent behavior. Journal of Personality and Social Psychology, 52(6), 1236-1247.
- Weinblatt, R. B. (1999, August). New police training philosophy: Adult learning model on verge of nationwide rollout. Law and Order, 8, 84-90.
- Westcott, M. R. (1968). Antecedents and consequences of intuitive thinking. (Bur. No. BR-5-0735 Contract No. OEC-3-10-072). Washington D. C.: U. S. Department of Health, Education, and Welfare, Office of Education.
- Woods, D. D., Wise, J. A., & Hanes, L. F. (1982). Evaluation of safety parameter display concepts. (EPRI-NP 2239). Palo Alto, CA: Electric Power Research Institute.
- Wright, P. (1974). The harassed decision maker: time pressure, distraction and the use of evidence. Journal of Applied Psychology, 59, 555-561.
- Yin, R. K. (1994). Case study research: Designs and methods. Thousand Oaks: Sage Publications.
- Zsombok, C. E., & Klein, G. A. (1997). Naturalistic decision making. Mahwah, NJ: Lawrence Erlbaum Associates.