

THE DRUG EVALUATION AND CLASSIFICATION PROGRAM (DECP)  
IN THE STATE OF TEXAS: A VALIDATION STUDY

A Dissertation

by

TROY DUANE WALDEN

Submitted to the Office of Graduate Studies of  
Texas A&M University  
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2005

Major Subject: Educational Human Resource Development

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Approved as to style and content by:

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Walter F. Stenning  
(Co-Chair of Committee)

---

Susan A. Lynham  
(Co-Chair of Committee)

---

Kenneth E. Paprock  
(Member)

---

Joseph Morgan  
(Member)

---

Jim Scheurich  
(Head of Department)

May 2005

Major Subject: Educational Human Resource Development

## ABSTRACT

The Drug Evaluation and Classification Program (DECP)

in the State of Texas: A Validation Study. (May 2005)

Troy Duane Walden, B.S., Sam Houston State University;

M.S., Texas A&M University

Co-Chairs of Advisory Committee: Dr. Walter F. Stenning

Dr. Susan A. Lynham

A retrospective research study was conducted to determine the effectiveness of the Drug Evaluation and Classification Program (DECP) procedures in order to identify subjects under the influence of specific drug categories. The investigator wanted to determine if the procedures are reliable and whether a drug recognition expert (DRE) can properly apply the DECP procedures to consistently identify the drug category and have that opinion supported by toxicology.

A total of 324 enforcement drug influence evaluations (DIEs) were obtained from the DRE data tracking system (DRE-DTS) that is maintained through the National Highway Traffic Safety Administration (NHTSA). Toxicology results related to each DIE were compared to the DRE's drug category prediction.

The objectives of the study were to determine if the 12-step DECP process enables DREs to identify drug categories and those most frequently identified and confirmed in Texas.

Using the DECP, the DRE's ability to identify specific drugs according to categories and to have the identification supported by toxicology was moderately accurate at best. Of the 324 evaluations that had toxicology results, the DRE correctly identified drug categories as follows: depressants, 60.5%; stimulants, 32%; hallucinogens, 12%; PCP, 46.6%; narcotic analgesics, 51.6%; inhalants, 14.2%; and cannabis, 64.9%.

To determine which drug categories were called most frequently, the enforcement DREs were analyzed according to each specific category. The investigator found the following drug categories were most frequently called by DREs who evaluated subjects: depressants, 182; cannabis, 142; narcotic analgesics, 83; stimulants, 62; PCP, 18; inhalants, 4; and hallucinogens, 1.

To determine which drug categories were most frequently confirmed through toxicology, the enforcement DREs were analyzed for the number of confirmations for each specific drug category. The investigator found the following drug categories were most frequently confirmed through toxicology: depressants, 176; cannabis, 140; stimulants, 106; narcotic analgesics, 99; PCP, 26; hallucinogens, 8; and inhalants, 4.

The investigator was able to determine, based on the DRE-DTS data, that Texas DREs are only moderately accurate in identifying drug categories when utilizing the DECP procedures in enforcement settings. Furthermore, the DRE's prediction of drug category was not consistently supported by toxicology results obtained from evaluated subjects.

## DEDICATION

This study is dedicated to the memory of my father, Curtis Howard Walden, and to my mother, Alta Joy Walden. I can only hope to be as proud of my children as you have been of yours. I love you both very much.

## ACKNOWLEDGMENTS

I want to first thank the members of my graduate committee, Dr. Walt Stenning, Dr. Sue Lynham, Dr. Ken Paprock, and Dr. Joe Morgan. Without their guidance and support of my academic development, I do not believe it would have been possible to complete this study. All of your expertise, experience, and support were invaluable assets to me finalizing this study. I will never forget any of you.

I also want to thank Mr. Dean Kuznieski of the National Highway Traffic Safety Administration, who allowed me access to all of the drug evaluation and classification program data tracking system resources. Without this access I would not have been able to complete this work.

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I would also like to express my appreciation to Ms. Melissa Noggle, who helped me through the hard times and encouraged me to keep going, especially when things got really tough. Thanks for your support and your friendship.

Finally, and most importantly, is the understanding and compassion of my family. To my son Chase and daughter Aimee, your patience and sacrifice is what allowed me to complete this work. I will never be able to repay the missed time or attention, but by giving me the opportunity to complete this study you both allowed me to grow into the person I want to be. Thank you so much for your support and love

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## CHAPTER I

### INTRODUCTION

Driving while impaired by drugs continued to be a growing problem in America and throughout the world (Substance Abuse and Mental Health Services Administration [SAMSHA], 2003). The economic and societal impacts related to drugged driving significantly affect the safety of the general public on highways and streets across America (Michie, 2000). Impaired driving, whether caused by alcohol or other drugs, is responsible for causing more than 16,000 deaths and over 1 million injuries per year on American roadways (National Highway Traffic Safety Administration [NHTSA], 2003). This epidemic is also responsible for costing society on average an estimated 45 billion dollars yearly.

In the early 1970s, several associated members of the Los Angeles Police Department (LAPD) began to notice trends in persons that they arrested for driving under the influence of alcohol (Burns, Page, & Leikin, 1998; Compton, 1986; Page, 2003). Although the individuals they arrested were highly impaired in their ability to perform simple divided attention tests, they registered low blood alcohol concentrations (BACs) when chemically tested. In short, the level of impairment was not consistent with the level of alcohol in their body based on their BAC. As a result of these findings, the officers realized they were dealing with impairing substances other than alcohol and

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This dissertation follows the style and format of the *American Educational Research Journal*.

recognized that they did not have the necessary skills or training to support their position. In the mid-1970s, two LAPD sergeants, Richard Studdard and Len Leeds, collaborated with numerous medical professionals to develop a simple set of standards and a procedure for evaluating and identifying drug influence and impairment. Out of this effort was born the beginnings of the Drug Evaluation and Classification Program (DECP) (Burns, Page, & Leikin, 1998; NHTSA, 2002a; Page 2003).

In the early 1980s, the National Highway Traffic Safety Administration (NHTSA) took an active interest in the work Studdard and Leeds were conducting and began work with the LAPD to standardize a protocol for a systematic approach to evaluating individuals suspected to be impaired by drugs other than alcohol. With NHTSA playing a leadership role in developing and implementing the scientific validation of the evaluation process, a training program was developed (Kwasnoski, Partridge, & Stephen, 2000; NHTSA, 2002a).

In 1987, NHTSA started the DECP pilot in the states of Colorado, Arizona, New York, and Virginia. In 1988, Utah, California, and Indiana were added. Currently, there are 34 states that participate in the DECP. In addition to these 34 states, Canada and New Zealand also participate in the DECP (NHTSA, 2002a).

The DECP is intended to provide a standardized, systematic approach to evaluating individuals suspected of being impaired by drugs other than alcohol. There are 12 steps that are part of the DECP evaluation protocol (Burns et al., 1998; Kwasnoski et al., 2000; NHTSA, 2002a; Page 2003). Using this consistent process is vital to the validity of the drug recognition expert's (DRE's) evaluation. If the DRE

strays from the 12–step process, the evaluation and the subsequent decision-making process can be compromised (Burns et al., 1998; Kwasnoski et al., 2000; NHTSA, 2002a; Page 2003). The 12 steps that make up the DECP assessment protocol are as follows:

1. Conduct breath alcohol test.
2. Interview of arresting officer.
3. Preliminary examination/interview of subject and first pulse rate check.
4. Eye examinations (horizontal gaze nystagmus [HGN] test, vertical gaze nystagmus [VGN] test, and lack of convergence [LOC] test).
5. Divided attention tests (Romberg balance, walk and turn, one leg stand, and finger to nose).
6. Vital signs (blood pressure, temperature, and second pulse rate).
7. Dark room examination (pupil size check in room light and in near total darkness).
8. Check of muscular rigidity.
9. Check for injection sites and third pulse rate check.
10. Interrogation, statements, and other observations.
11. Opinion of the evaluator.
12. Toxicology examination (urine or blood sample).

In 1984, the DECP was validated by a controlled laboratory study and separate field study (Bigelow, Bickel, Roache, Liebson, & Nowowieski, 1985; Compton, 1986; NHTSA, 2002a). The studies demonstrated that when officers are properly trained they

could successfully identify drug impairment and accurately identify the category of drugs that cause the impairment (Bigelow et al., 1985; NHTSA, 2002a). Along with this study another empirical study was conducted in which more than 500 post-drug use records were analyzed. The major conclusions indicated that the DECP process is a valid method for identifying and classifying drug-impaired drivers, DREs are able to recognize and identify drug impairment by category, and specific drug categories cause observable effects exhibited by the majority of individuals evaluated (Adler & Burns, 1994).

Research conducted in this field has been limited, especially in the State of Texas. Of particular interest, one DECP study was conducted through the Texas Transportation Institute (Davies, 1994), which consisted of a survey distributed to Texas DREs. The data assessment in the research project was focused around the DRE's experience regarding adjudication and prosecution issues rather than evaluating the DRE's use of the 12-step process to select persons under the influence of drugs other than alcohol (Davies, 1994).

No empirical studies have been conducted regarding the DECP in Texas in relation to effectiveness of the DRE's ability to identify persons impaired by drugs other than alcohol. As a result, further study needs to be conducted in this particular area.

## STATEMENT OF THE PROBLEM

In Texas, approximately 1,600 persons die as a result of alcohol and drug related crashes annually (NHTSA, 2003). While alcohol remains the greatest factor in the



majority of these motor vehicle crashes, an estimated one-quarter of those killed also have drugs other than, or in combination with, alcohol in their system (NHTSA, 2003).

There have been a few limited studies conducted that concentrate on the effectiveness of the DRE's ability to accurately predict specific drug categories in individuals they suspect are impaired by drugs other than alcohol. A definitive study should be conducted in Texas that measures the trained DRE's ability to accurately predict which drug category is impairing the individuals on whom they conduct evaluations. Although there have been two substantial studies conducted that provide reliable information concerning proper administration of the DECP steps and accurate selection of drug categories, no empirical data of this magnitude has been collected in Texas to date (Bigelow et al., 1985; Compton, 1986; NHTSA, 2002a). As a result, the percentage of reliability regarding Texas DRE's ability to select specific drug categories based on their training and subsequent evaluation of post-drug users is not known. It is also unknown what impact DECP training has on the ability to make these types of drug category selections.

Previous research has indicated a need for continued research in evaluating the DRE's ability to select specific drug categories. Furthermore, continued research is recommended to link like data in an effort to form an overall picture of the effectiveness of the DECP (Schmitt, Lamers, Ramaekers, & Riedel, 2003).

This study proposes to address whether the training DREs receive plays a role in their ability to accurately select specific drug categories from post-drug users. By examining and assessing DRE evaluations relative to the 12 steps required by the

standardized DECP's training protocol, a positive or negative relationship should be observed.

## PURPOSE OF THE STUDY

The purpose of this study is to evaluate the ability of Texas peace officers who are specially trained as DREs to correctly assess persons who are impaired by drugs other than alcohol. In addition to using the study to recognize a potentially impaired individual, it will also be utilized to determine the reliability of the DRE to identify the specific drug category that is causing the impairment.

## RESEARCH QUESTIONS

1. Is there a significant ability, using the 12 DECP steps, to identify one or more drug categories of use in evaluated post-user individuals in Texas?
2. What are the most frequently called and confirmed drug categories of abuse as indicated by police officers trained in the DECP in Texas?

## DEFINITION OF TERMS

Several operational terms need to be defined before this study can be presented. Table 1 lists the terms and definitions associated with the DECP.

**Table 1**  
**Definition of Terms**

Term	Description
Blood Alcohol Concentration (BAC)	Number of grams of alcohol per 100 ml of blood (Levinthal, 2004; NHTSA, 2002a).
Drug Evaluation & Classification Program (DECP)	Trains law enforcement officers to recognize drug impairment in drivers. The DECP was developed and is currently maintained by the International Association of Chiefs of Police (IACP) and NHTSA (NHTSA, 2002a).
State DECP Coordinator	A designated individual that acts as a statewide coordinator for administration of the DECP (NHTSA, 2002a).
Drug Recognition Expert (DRE)	Individuals trained and certified through the DECP and have completed the required training courses and field certification phases and have passed an extensive knowledge exam as outlined by IACP and NHTSA (NHTSA, 2002a).
DRE Instructor	Individuals trained and certified as DREs and have received further training and experience in instructing the material in the DECP (NHTSA, 2002a).
Law Enforcement Agency	Any organization funded by public monies involved in the apprehension, prosecution, and adjudication of public miscreants, or in the incarceration, detention, supervision, or control of miscreants following apprehension prosecution or adjudication (NHTSA, 2002a).
Drug	Any substance that when taken into the human body can impair the ability to operate a motor vehicle safely (Levinthal, 2004; NHTSA, 2002a).
Drug Evaluation	A process of systematically examining a person suspected of being under the influence of a drug, for the purpose of ascertaining what category of drug or categories of drugs is causing the impairment (NHTSA, 2002a).
Horizontal Gaze Nystagmus	An involuntary jerking of the eyes as they gaze to the side (Citek, Ball, & Rutledge, 2003; NHTSA, 2002a).
Impairment	The degradation of mental and physical abilities necessary for safely operating a motor vehicle (NHTSA, 2002a).
Intoxication	The degradation of mental or physical abilities/faculties due to the ingestion of an impairing substance (NHTSA, 2002a).
Standardized Field Sobriety Tests (SFSTs)	A set of three standardized tests developed and validated through controlled experiments supported by research funds provided by NHTSA. The three tests consist of the HGN, walk and turn, and one leg stand (NHTSA, 2002a).
Divided Attention Tests	Any test that divides the performing person's ability to concentrate on both mental and physical tasks at the same time (NHTSA, 2002a).

## ASSUMPTIONS AND LIMITATIONS

### Assumptions

It is important to note that a number of assumptions were made as part of this study. These assumptions include the following:

- That the DREs who entered evaluations into the DECP tracking system successfully completed the NHTSA DECP's 72 hours of classroom training and passed the associated final examination with at least a minimum score of 80%;
- That the DRE administered and scored the 12-step evaluation process accurately (NHTSA, 2002a);
- That the blood alcohol concentrations and the toxicology results reported in the analysis were accurate;
- That the blood and urine samples were collected using proper and accepted procedures to ensure that no cross contamination occurred;
- That the DRE entered the correct results from the toxicology reports;
- That the drug category prediction was made by the DRE, documented, and entered into the DECP tracking system prior to the toxicology results being returned; and
- That the evaluation entries were not altered after the toxicology results were returned (NHTSA, 2002a).

## Limitations

There are a number of limitations that govern this study:

- All available data used for the study are self-reported by the DRE who completed the evaluation.
- The DRE also enters the findings of the toxicology report associated with the evaluation following the receipt of the results from the laboratory.
- The researcher did not observe the DREs during the evaluation process.
- The experience level of the DRE entering the data as well as their training record is unknown to the researcher.
- The threshold limits of the toxicology testing procedures may vary among the laboratories involved in analyzing the samples.

## CHAPTER II

### REVIEW OF THE LITERATURE

#### INTRODUCTION

Human Resource Development (HRD) has been defined from various perspectives. For the purposes of this study, HRD is defined operationally as “the process of improving learning and performance in individual, group, and organizational contexts through the domains of expertise such as lifelong learning, career development, and organizational development” (Texas A&M University [TAMU], 2001).

Swanson and Holton (2001) contend that “HRD is problem oriented” (p. 15). Since problems are defined as situations that present perplexity and difficulty (Swanson & Holton, 2001), it is logical to conclude that the identification and assessment of an impaired motorist by a law enforcement officer would qualify as an issue that warrants the attention of HRD. In order to properly process a driver under the influence of drugs other than alcohol, the law enforcement officer must receive specialized training and development.

HRD separates training and development, through definition, by referring to training as an activity geared toward individuals in new job roles while the mission of development is to enhance expertise beyond the current requirements of a position (Swanson & Holton, 2001). In the case of drug impairment recognition training, the individual officers could be moving into a new position or expanding their knowledge beyond the basic requirements of their current assignment. For the purposes of this

study, training is used to describe all instructional activities regardless of the individual officer's environment.

The accepted curriculum for training law enforcement to identify and assess the drug-impaired driver is provided by the National Highway Traffic Safety Administration (NHTSA). The Drug Evaluation and Classification Program (DECP) trains officers as Drug Recognition Experts (DRE) through a rigorous, skills-based training curriculum.

The following literature review seeks to frame what is known relative to the training of law enforcement to identify and assess individuals impaired by drugs. This review begins with a discussion of the roots of drug impairment and the United States' perspective of drug use. Next, the relationship between drug use, law enforcement, and society is briefly discussed in an effort to focus the review in the area of police services. The review then proceeds with documentation of available literature related to training police officers to detect and assess the drug-impaired individual along with specific techniques necessary to effectively perform this activity. Since HRD is concerned with training and development as a process of improving learning and performance, this chapter concludes with a discussion of how the training of law enforcement officers to recognize and assess the impaired motorist is directly related to HRD.

## DRUG USE AND DRIVING IN THE UNITED STATES

The phenomenon of drug use and abuse has long been in existence (Burns, 2003a; Poratta, 2003). Humans discovered long ago that a variety of plants had medicinal as well as intoxicating properties (Grilly, 1985; Levinthal, 2004). Prehistoric

man, ancient Celtic societies, American colonists, and American Plains Indians, as well as modern doctors have used a variety of plants to make different types of medicines and anesthetic compounds (Burns, 2003a; Levinthal, 2004; Siegal, 1989). In earlier times these special plants and their impairing effects may not have seriously impeded the user in their daily activities. However, in today's more complex society, their use can have a significant impact within social, individual, and cultural settings (Burns, 2003a; Siegal, 1989). Drug use is further compounded by the boundary that exists between drugs that are used as medicines and those that are used solely as intoxicants. Of particular concern is how to minimize the risks of drug impairment that directly impact public safety and still be able to emphasize a drug's positive effect in improving the quality of life for those who need it medically (Burns, 2003a).

There are multiple explanations why people become physically addicted to or mentally dependent on drugs (Levinthal, 2004). Genetics, anthropology, psychology, socio-economics, and neurochemistry have all provided theoretical foundations as well as described possible first-order triggers for drug use and abuse (McAndrew, 2003). These triggers define possible root causes for drug use and abuse as independent or multi-factor explanations of the problem. While these triggers are important in defining why some people use drugs, they are not within the scope of this investigation. Regardless of cause, it is important to recognize the underlying dichotomies that drive a person to abuse substances in order to deploy effective intervention strategies (Burns, 2003a). This study does not seek to inform the reader about the motivational elements of



drug abuse but instead introduces foundational information relative to the use and effectiveness of the DECP as a professional development training tool (NHTSA, 2002a).

## NATIONAL PERSPECTIVE ON DRUG USE

In the 1980s, the U. S. government scrambled to comprehend and control the drug use and abuse problem which was gripping the nation. In order to galvanize the general public into action, President Ronald Reagan declared that the American people were embattled in a war on drugs (McAndrew, 2003). For the better part of a decade, the federal government's public policy related to drug use and abuse was branded with the slogan *Just say no to drugs* (Anti-Drug Abuse Act, 1988). Having realized no major change in American attitudes toward the use of drugs, the war on drugs was finally proclaimed an unwinnable war. In 1993, senior policy analyst Ross Deck (1993) with the Office of National Drug Control Policy (ONDCP) assessed the affiliation between people and drugs by stating: "First of all we are not fighting a drug war anymore. To have a war you must have enemies. In this situation we are our own enemy and we cannot declare a victory simply because we have killed ourselves" (McAndrew, 2003, p. 353). In the truest sense, Deck figuratively illustrates how we are not at war with a common enemy, drugs, but we are, in fact, in a struggle with ourselves and our own personal desires to wantonly change our own level of consciousness (McAndrew, 2003).

In 1988, the Anti-Drug Abuse Act was signed into law (McAndrew, 2003). It declared that it was the policy of the U. S. Government to create a drug-free America by 1995 (Anti Drug Abuse Act, 1988). Obviously, the target year has passed and people are

still living in a world where individuals continue to use and abuse drugs on a routine basis (McAndrew, 2003; SAMHSA, 2003). Unfortunately, it does not appear that intoxication by drugs will soon subside. In a real sense, there are no new drugs, just new uses for them and new users (Poratta, 2003). The Substance Abuse and Mental Health Services Administration (SAMHSA) conducts a nationwide survey to track drug use among a wide range of demographic groups. According to SAMHSA's National Clearinghouse for Alcohol and Drug's Drug Abuse Warning Network (DAWN) Report, emergency room visits for new rave club drugs such as methylenedioxymethamphetamine (MDMA or Ecstasy) increased by 58% from 1999 to 2000 (SAMSHA, 2001). Similarly, emergency room visits related to heroin/morphine were up by 15% (SAMHSA, 2001). Additionally, the Monitoring the Future survey results from the National Institute on Drug Abuse (NIDA) indicated that 87% of high school seniors reported that marijuana was *fairly easy* if not *very easy* to obtain (NIDA, 2003). These examples illustrate the fact that drug use and abuse is a problem that has not yet been eradicated. In fact, the drug use problem has grown and it appears that there may be no way of abating this issue of pandemic proportion (Drucker, 1998; SAMSHA, 2003).

Drug use and abuse remains one of the greatest threats to the health, safety, and welfare of citizens at the national, state, and community levels (SAMHSA, 2003; U.S. Department of Labor, 2001). It is obvious that the problem of drug use and abuse is not simply going to disappear. The unsuccessful public policy of the Anti-Drug Abuse Act of 1988 drives home the point that enforcement alone cannot solve the drug use and

abuse problem. There must be more effort provided to address the root causes of the drug use and abuse problem through implementation of alternative countermeasures such as education/training, public awareness, and intervention and treatment programs.

## RELATIONSHIP BETWEEN LAW ENFORCEMENT AND SOCIETY

While the human drive to alter levels of consciousness speaks to the nature of substance use and abuse, an individual's quest to change their state of mind often infringes upon public safety (Kwasnoski, Partridge, & Stephen, 2000; Levinthal, 2004; McAndrew, 2003). Law enforcement has the unique and challenging responsibility, charged to them by the public, to protect people from others or from themselves when their actions impose upon public and personal safety (NHTSA, 2002a). While law enforcement is one supporting system upon which public order is achieved, it is not the only organization that can solve the drug use problem. From the viewpoint of a concerned nation, state, and community, law enforcement is often unfairly looked upon as the primary entity for suppression and eradication of the drug use and abuse problem (McAndrew, 2003).

Law enforcement acts as the first line of defense in any community's effort to confront and suppress drug use and abuse problems (Burns, 2003a; Kwasnoski et al., 2000; NHTSA, 2002a). Law enforcement officers regularly deal with the negative outcomes of drug use and abuse, which often manifest in the form of violent crime, spousal abuse, assault, and catastrophic automobile accidents (NHTSA, 2002a; SAMSHA, 2003; ONDCP, 2000). While these events are unfortunate, it is through these

types of interactions with the public that law enforcement has its most direct influence and potential impact on drug use.

The role that law enforcement plays in a community's drug use and abuse problem is often viewed by the public as all inclusive. The public's perceived responsibilities for law enforcement in this endeavor include identifying the source of the drug problem, taking action upon the problems identified, reducing the opportunity for use, eradicating recidivism, implementing strategic plans for to eliminate future use, providing counseling, and punishing those who do not comply with the law. Some of these roles, realistically, are outside the scope of law enforcement's responsibility and are handled more effectively by other groups. Court systems and counseling services provided by individual medical and psychological professionals, as well advertising group activities such as Narcotics Anonymous and other spiritual-based guidance systems, may prove more effective than law enforcement in assisting individuals with drug abuse problems.

Law enforcement cannot effectively act in all capacities and should not be considered a single-source solution to the drug use and abuse problem. Law enforcement, in fact, takes a more reactive role in pursuit of prevention and suppression than it does a proactive capacity aimed at solving the drug problem. This is not to say that there are no measures taken by law enforcement to seek solutions. On the contrary, there are many prevention-based approaches that target selected sources of the problem. Programs such as Crime Stoppers, Drug Abuse Resistance Education (DARE), and the integration of law enforcement into the secondary classroom setting all proactively

address drug use, abuse prevention, and suppression issues (Lynam et al., 1999). Additionally, pro-arrest efforts regarding apprehension of impaired drivers and confrontation of other impairment violations have had an impact in deterring future drug activity (NHTSA, 2002b).

## INDIVIDUAL CHOICE AND PSYCHOACTIVE DRUG EFFECTS

People become strongly attached to their drug of choice, regardless of the type of substance (Levinthal, 2004). To a degree, any activity that transports a person into a different state of consciousness can be compared to the chemical or natural alterations of mental and or physical states (Siegel, 1989). This mental and physical transformation brings about a modification in perception which fosters feelings ranging from euphoria and excitement to sadness and lethargy (Burns, 2003a; Levinthal, 2004).

By definition, psychoactivity is any event, thought, or sense that alters the mind's ability to perform *normal* functions (Levinthal, 2004; NHTSA, 2002a). As children, we all spun around in circles to achieve dizziness, not unlike the feeling achieved through chemical intoxication. Similarly, an individual may hold their breath to achieve lightheadedness, which is not unlike the physical effects experienced during oxygen deprivation associated with inhalant use. The marathon runner's body increases the release of endorphins the longer they run, which creates the *runner's high*. Even participating in sports, competitive and recreational, as well as meditation, work activities, reading, watching movies or television, and listening to music can transport a

person's mental or physical state into another level of consciousness (McAndrew, 2003; Siegel, 1989).

While these activities may alter the way normal people feel mentally and physically, achieving the same level of modification in consciousness for others stems from drug use (McAndrew, 2003; Siegel, 1989). The individual's drive to change the way they feel mentally and physically along with the perceived experience that effects those changes are significant variables that balance the human condition between sobriety and intoxication (Levinthal, 2004).

#### DRUG EVALUATION AND CLASSIFICATION (DEC) PROGRAM

One approach to dealing with the drug use and abuse problem is the DECP.. The DECP provides law enforcement with a valuable tool, that when used properly in the law enforcement setting, helps to assess persons who may be intoxicated by drugs. The DECP is a nationwide training and assessment system geared toward deterring drug-impaired motor vehicle driving. The training program's primary objective is to assist law enforcement officers in the detection, identification, assessment, and removal of individuals from public and private roads who are driving under the influence of drugs. Law enforcement officers who complete the DECP training are commonly referred to as Drug Recognition Experts (Burns, Page, & Leiken, 1998; Kwasnoski, Partridge, & Stephen, 2000; NHTSA, 2002a).

## Exploring the Roots of the DECP

In the early 1970s, members of the Los Angeles Police Department (LAPD) began to notice trends in individuals arrested for driving under the influence of alcohol (Burns et al., 1998; Kwasnoski et al., 2000; NHTSA, 2002a; Sandler, 2003). In many instances, the officers encounter individuals who appeared to be highly intoxicated yet, when chemically tested, they had low blood alcohol concentration (BAC). In short, the individual's level of intoxication was not consistent with the level of detectable alcohol in their blood. The officers recognized that they were dealing with intoxicating substances other than alcohol and did not have the necessary skills or training to support their observations and conclusions. At the time, the officers were unable to link the signs and symptoms of intoxication to other types of impairing drugs. In the early 1980s, Richard Studdard and Len Leeds, two LAPD sergeants, met with various medical professionals to discuss and then later develop an assessment procedure for evaluating and identifying drivers who were potentially drug impaired.

NHTSA took an active interest in the work Studdard and Leeds conducted and began work with them to standardize a protocol for a systematic approach to evaluating individuals suspected of being under the influence of drugs (NHTSA, 2002a). NHTSA led efforts to develop and implement scientific validation of the evaluation process and the subsequent training program (Adler & Burns, 1994; NHTSA, 2002a).

## Early Research in DECP

The DECP underwent scrutiny through validation studies performed in controlled laboratory and field settings (Bigelow, Bickel, Roache, Liebson, & Nowowieski, 1985;

Compton, 1986; Heishman, Singleton, & Crouch, 1995; Preusser, 1992). Several studies conducted showed promising results, demonstrating that DECP practitioners were able to properly classify specific drug categories of abuse on post-drug use individuals who were impaired by a selected substance as well as identify those subjects who had ingested a placebo.

In 1985, NHTSA and NIDA funded research at Johns Hopkins University to determine the feasibility and effectiveness of the LAPD drug recognition procedures (Bigelow et al., 1985; Heishman et al., 1995). The study used four senior DREs to evaluate individuals who had been dosed with cannabis, stimulants (desoxyn), depressants (Secobarbital or Valium), or a placebo. Each evaluator participating in this study had between 3 and 13 years of experience as a DRE.

The altering properties of the depressant and cannabis were controlled at two different levels described as *weak* and *strong* (Bigelow et al., 1985; Heishman et al., 1995). In the experimental design, each volunteer was given either a weak or strong dosage of the drug. None of the volunteers were cross dosed (polydrug use). No combinations of drug categories were administered, and some participants received no drug at all.

Once the volunteers were dosed they were escorted to the evaluators, who performed an assessment according to the LAPD drug recognition program procedure (Bigelow et al., 1985; Heishman et al., 1995). In an effort to control bias, the evaluators involved in the study were not allowed to communicate with each other during the research period. The officers conducting the evaluations had no prior information related



to the volunteer's dosing protocol, drug type, and/or level of intoxication. The evaluators performed their individual assessments in separate rooms to ensure a controlled environment and did not discuss the evaluations during the experiment period.

Analysis of the drug evaluations conducted indicated that the participating officers were successful in identifying post-drug users and non-impaired individuals (Bigelow et al., 1985; Heishman et al., 1995). The evaluators were able to properly classify non-impaired persons 95% of the time. The evaluators were able to correctly classify *strong* dosed individuals as impaired 98% of the time and correctly identified the drug category in those same strong dose users 91% of the time. However, the data also indicated that the evaluators were less likely to identify *weak* dose users. The evaluators were only able to classify 33% of the weak dosed individuals as impaired. The evaluators were able to only properly classify 17% of the volunteers who had taken a weak stimulant.

The study findings concluded that trained officers had a greater level of predictability in identifying persons who were strongly affected by higher dose levels of impairing drugs (Bigelow et al., 1985). However, the trained officers were less accurate in their ability to identify persons who were dosed at weaker levels of the same impairing drugs.

The second phase of the NHTSA Johns Hopkins University research project was conducted as a field study in Los Angeles, California (Compton, 1986). The field study utilized DREs from the LAPD in an attempt to validate the effectiveness of the DECP using suspects who had been arrested for impaired driving. The objective was to

determine whether the field officers could properly identify individuals who were under the influence of drugs as well as identify the specific drug category responsible for the impairment. Blood samples were taken from 173 individuals and analyzed for drug content by toxicologists. The toxicology results were then used to verify the presence of drugs in the individual's system at the time of the DECP evaluation.

The officers completed a full DECP evaluation on the subjects, and the results indicated that in 94% of the cases the officers were able to correctly identify drug impairment in the individuals (Compton, 1986; Kwasnoski et al., 2000; NHTSA, 2002a). The evaluators correctly identified the presence of at least one specific drug category in 87% of the test cases. Lastly, when the evaluator had identified a specific drug category, that drug was detected in the person's blood sample 79% of the time.

In the laboratory phase, the officers were able to recognize, with a high degree of reliability, those individuals who were highly intoxicated on drugs (Bigelow et al., 1985; Heishman et al., 1995). However, while the evaluators involved in the study were able to identify strongly dosed individuals, the weaker dosed individuals were less likely to be properly identified (Compton, 1986; Kwasnoski et al., 2000; NHTSA, 2002a). Table 2 summarizes the success rates by drug category for the laboratory portion of the research project (NHTSA, 2002a).

**Table 2**  
**Confirmation of Evaluations by Drug Category-Laboratory**

Drug Category	Success Rate
PCP	92%
Narcotic Analgesics	85%
Cannabis	78%
CNS Depressants	50%
CNS Stimulants	33%

Note. CNS depressants do not include alcohol.

In contrast, the results of the field study phase of the research project were relatively inconsistent with the success rates observed in the laboratory setting (Compton, 1986; Kwasnoski et al., 2000; NHTSA, 2002a). Of particular concern was that in the field evaluation study the drugs that were more reliably identified in the laboratory (depressants, cannabis, and stimulants) were less likely to be identified by officers who evaluated subjects in the field setting. In fact, the confirmation rate for drug categories in the field study indicated that cannabis was identified properly 78% of the time, depressants were identified properly 50% of the time, and stimulants were correctly identified 33% of the time. The explanations provided for the low percentage of reliability were that blood collection procedures were not properly followed and that laboratory limits, regarding the ability to test under certain threshold limits, impacted specimen test results, thereby affecting information that could have supported the DECP practitioner's drug opinion (Compton, 1986; NHTSA 2002a).

Several elements that were part of the laboratory phase of the research project did not take place in the field evaluation phase and should be taken into consideration regarding their potential for introducing bias into a dual-study correlation. The field

study procedures and data collection protocols did not replicate the study methodology as conducted in the laboratory. In the laboratory phase, the evaluators were informed that there would be no volunteers dosed with phenyl cyclohexyl piperidine (PCP), alcohol, or lysergic acid diethylamide (LSD). Additionally, they were informed that there were no drug combinations and that the volunteers would be single drug category users only. The evaluators were also made aware that some of the volunteers would have no drugs in their system, but that all would smoke a marijuana or placebo cigarette that smelled of marijuana (Bigelow et al., 1985; Compton, 1986; Heishman et al., 1995). The evaluators in the laboratory study clearly had a favorable advantage over those who were subject to administering evaluations in the field simply based on the design differences between the field and laboratory methodologies (Bigelow et al., 1985; Compton, 1986).

In another study, a retrospective analysis of 242 DECP evaluations beginning January 1, 1988, until June 30, 2000, in Denver ,Colorado, was conducted to determine if DECP practitioners could correctly identify the impairing drug category as verified by the outcome of urinalysis in drivers suspected of being impaired (Kwasnoski et al., 2000). The results from this study indicated that 74% of the DECP practitioners were able to positively identify at least one drug category in post-drug users that was toxicologically confirmed by a urinalysis.

In 1987, the Arizona Governors Office of Highway Safety commissioned a study to determine the field reliability of the DECP (Adler & Burns, 1994; NHTSA, 2002a). A study of the Phoenix Police Department (PPD) DECP was conducted using records of evaluations that had been completed between January 1989 and May 1993. The

objective of the assessment of the local DECP was to determine the reliability of the DECP evaluation within a specific sample and whether toxicological confirmation supported the officer's identification of a selected drug category. During the study, 500 evaluations were completed by trained DECP practitioners on individuals believed intoxicated by drugs other than alcohol. The men and women, groups of 392 and 108, respectively, were evaluated using the DECP evaluation procedure. Upon completion of the evaluation a biological sample, blood or urine, was obtained from the individual and analyzed using appropriate toxicological methods. Based on the toxicology analysis, 86% of the evaluations confirmed one or more drugs based on the evaluator's selected drug category.

#### Twelve Steps of the Evaluation Process

During evaluation of a motor vehicle driver suspected of drug impairment, the DRE completes a systematic and specific examination of the observable physical and mental manifestations commonly associated with different categories of drugs (NHTSA, 2002a). The DRE is responsible for assessing the observable signs of drug impairment to discern whether an individual is under the influence of drugs as opposed to being impaired as a result of a medical condition. If the impairment is drug related, the DRE determines the category or categories of drugs by which the person is most likely impaired.

In order to complete the assessment, the DRE employs the 12 steps of the DECP evaluation (NHTSA, 2002a). The 12-step evaluation is a standardized, systematic assessment that relates the observable signs and symptoms known to be reliable

indicators of impairment with specific categories of drugs. The DRE is trained to never base their conclusion on a single element of the evaluation process but, instead, rely on all of the available information gleaned from the 12 steps of the evaluation. The 12-step evaluation process is intended to be administered in the same manner each time the DRE conducts an assessment. This ensures that all DREs comply with the same regulations governing administration nationwide. In addition to regulating proper administration of the evaluation, standardization helps avoid errors or omissions of procedural steps, promotes professionalism, and secures acceptance of the evaluation in court.

The DECP evaluation consists of 12 distinct steps that assist the DRE in assessing physiological manifestations present in drug-impaired individuals (NHTSA, 2002a). The following list details the specific sequence of the DECP evaluation:

1. Administering a breath alcohol test.
2. Interviewing the arresting officer.
3. Conducting a preliminary interview and examination of the individual.
4. Examining the eyes.
5. Administering divided attention tests.
6. Evaluating vital signs.
7. Examining pupils in a dark room.
8. Assessing muscular tone.
9. Inspecting for injection sites.
10. Questioning the individual.
11. Formulating an opinion.

## 12. Obtaining toxicology samples.

The 12-step DECP evaluation is not intended to be administered roadside but rather in a controlled environment (NHTSA, 2002a). In most cases, the evaluation is conducted at the police station, jail, or other place where the alleged intoxicated individual is brought post-arrest. This ensures that a controlled testing environment is maintained and the procedural steps needed to make a professional assessment can be addressed in a methodical manner. The following section describes the 12 steps involved in the DECP evaluation.

### *Breath Alcohol Test*

Step one of the DECP evaluation is to obtain an accurate measurement of the alcohol concentration in the evaluated person's blood (Kwasnoski et al., 2000; NHTSA, 2002a). The breath test is conducted to rule out alcohol as the contributing agent responsible for the intoxication. Since the DECP practitioner's job is to identify drugs other than alcohol as the impairing substance, the breath test must be conducted to rule alcohol out as the source of intoxication.

### *Interview with the Arresting Officer*

Step two of the DECP evaluation is to interview the arresting officer (Kwasnoski et al., 2000; NHTSA, 2002a). It is at this point in the evaluation that the DRE uncovers information that occurred prior to his/her involvement with the case. The DRE must take some time to discuss with the arresting officer relevant driving facts, individual reactions to the stop command, the individual's demeanor when contacted, unusual odors or

statements made, poor physical abilities, appearances, and paraphernalia or drugs found at the scene or in the individual's possession (NHTSA, 2002a). It is through this interaction that valuable pre-assessment information is collected and insight into possible drug use or categories of drug use can be considered.

### *Preliminary Examination*

Step three of the DECP evaluation is to conduct a preliminary examination of the arrested individual (Kwasnoski et al., 2000; NHTSA, 2002a). In most cases, this is the first time the DRE comes into contact with the person who is to be evaluated. Prior to making contact, the DRE stands back and monitors the person for a few minutes. Important observational information that may lead the evaluator toward a specific category of drug may be obtained. For instance, agitation and the inability to remain still could indicate stimulant use. Sleepiness and lethargy may lead to a suspicion of depressants or narcotic analgesic use. Hallucinations and panic may lead the DRE to suspect use of hallucinogens or PCP. While these signs in and of themselves are not holistically indicative of a specific category of drug use, they are, when combined with other indicators, possible indices that can be later applied in combination with other factors in articulating the possible influence of a particular drug category.

The DRE conducts a semi-structured interview of the individual. During this interview, the DRE takes the first of three pulse checks (Kwasnoski et al., 2000; NHTSA, 2002a). While doing this, the DRE asks a series of fixed questions. The questions asked are designed to assess whether the suspected impairment may be due to possible medical reasons rather than drug use. Since some medical conditions mimic the



signs and symptoms of drug use, the DRE must qualify the person as a candidate for further analysis through questioning. The DRE questions the individual to assess any health-related issues that could impact the assessment. This inquiry includes questions that assess whether the individual has any physical defects, is diabetic or epileptic, currently taking insulin, sick or injured, under a doctor's or dentist's care, or taking any types of medications. If the individual answers yes to any of these questions the DRE is trained to follow up with appropriate questions. If all of the answers are no, the preliminary examination continues.

Next, the DRE examines the pupils of the eyes (Kwasnoski et al., 2000; NHTSA, 2002a). The DRE assesses the size of the pupils in both the left and right eyes then checks to ensure that the eyes track equally from side to side. The check for equal pupil size and tracking is done to rule out the possibility of medical, neurological, or head injuries. Injuries associated with the head often mimic the signs and symptoms of intoxication.

Lastly, the DRE checks the condition of the eyelids (Kwasnoski et al., 2000; NHTSA, 2002a). Some drugs can cause the eyelids to droop, giving an appearance of sleepiness, while others may cause the eyelids to tremor.

### *Eye Examination*

Step four of the DECP evaluation is to examine the individual's eyes (Anderson, Schweitz, & Snyder, 1983; Dietrich & Frost, 1999; Kwasnoski et al., 2000; NHTSA, 2002a; Tharp, Burns, & Moskowitz, 1981). This includes a check for horizontal gaze nystagmus (HGN), in which is the eyes jerk as they gaze to the side along a lateral plane

(Anderson et al., 1983; NHTSA, 2002b, Tharp et al., 1981). The DRE looks for a lack of smooth pursuit, distinct nystagmus at maximum deviation, and a nystagmus angle of onset prior to 45 degrees. Once this is completed, the DRE assesses the eyes for vertical gaze nystagmus (VGN), in which the eyes jerk as they gaze upward along a vertical plane. Lastly, the DRE assesses the eyes for lack of convergence (LOC). This is a phenomenon where the eyes are purposefully brought inward in an attempt to make them cross.

Certain categories of drugs can cause the eyes to jerk at horizontal and vertical positions as well cause LOC as the eyes gaze inward toward the center (Citek, Ball, & Rutledge, 2003; Kwasnoski et al., 2000; NHTSA, 2002a). Drugs such as depressants, inhalants, and PCP at different levels of blood concentrations cause the eyes to exhibit HGN. These drugs, when taken in high dosage levels by an individual, may also cause VGN. The use of cannabis may cause LOC. Depressants, inhalants, and PCP may also cause LOC. Because depressants, inhalants, PCP, and cannabis cause the eyes to display certain indicators of use (HGN, VGN, and LOC), while hallucinogens, narcotic analgesics, and stimulants do not, the DRE can begin to eliminate or *rule out* some categories of drug use.

#### *Divided Attention Psychophysical Tests*

Step five of the DECP evaluation is to conduct an assessment of the individual's ability to divide attention among simultaneous mental and physical tasks (Anderson et al., 1983; Baselt, 2001; Kwasnoski et al., 2000; NHTSA, 2002a; Tharp et al., 1981). For instance, driving an automobile requires a person to divide their attention between

mental and physical tasks. The driver must mentally assess traffic around the vehicle, recognize and interpret traffic signals, and decide whether to make lane changes or directional corrections. Physically, the driver must be able to activate the vehicle's brakes or accelerator, activate turn signals, scan the driving area by moving the head from right to left, and steer (Baselt, 2001). In order to operate a motor vehicle safely, mental and physical tasks must be performed in unison. Impairment due to drugs often interferes with mental and physical demands and potentially increases the likelihood for severe motor vehicle crashes to occur (Morland, 2000).

The DECP evaluation requires assessment of a person's ability to simultaneously divide attention among the mental and physical tasks required to drive a motor vehicle safely (Kwasnoski et al., 2000; NHTSA, 2002a). This evaluation is achieved through administering a series of sobriety tests known as the Romberg Balance Test, Walk and Turn Test, One Leg Stand Test, and the Finger to Nose Test. Each of these tests requires the individual to concentrate on two or more tasks at the same time. Some of the tasks require recall of information or other mental responsibilities. Additional tasks require exerting physical actions such as standing on one leg for 30 seconds or walking a line in a heel-to-toe manner. Regardless of the tasks given, the tested person must concentrate on two or more things at once (divided attention). Poor performance on this set of tests provides the DRE with examples of loss of mental and physical faculties.

#### Romberg Balance Test

The first divided attention test that is assessed is the Romberg balance test. In this test the DRE tells the person to stand straight with their heels together and their arms at

their sides and to maintain that position while instructions are provided (Kwasnoski et al., 2000; NHTSA, 2002a). The DRE then asks the individual if they understand. The DRE tells the individual to tilt their head slightly back, close their eyes, stand perfectly straight, and estimate the passing of 30 seconds. When the individual believes that 30 seconds has lapsed, they tilt their head forward, open their eyes, and say stop.

The Romberg balance test is intended to assess a person's ability to estimate passing time using what is commonly referred to as the *internal clock* (Kwasnoski et al., 2000; NHTSA, 2002a). The internal clock is simply how a person perceives time in their mind in relation to the actual passage of time. With persons who use different types of drugs, the internal clock may speed up, slow down, or remain normal. The category of drug the person is under the influence of determines how their internal clock will *behave*. For instance if a person is under the influence of a stimulant category of drug (amphetamines), the internal clock in most cases would speed up due to the psychoactive properties of the drug in the system. In comparison, if a person is under the influence of a depressant category of drug (alcohol or Valium), then the internal clock may be slow.

#### Walk and Turn Test

The second divided attention test that is assessed is the walk and turn test (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a; Tharp et al., 1981). This is another test used to assess a person's mental and physical impairment. The walk and turn test requires the tested individual to employ mental processing such as short-term memory, judgment, and decision making. The test also requires physical activity such as balance, muscle control, and coordination of limbs to be evaluated.

The walk and turn test is administered in two stages: the *instructional stage* and the *walking stage* (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a; Tharp et al., 1981). In the instructional stage, the tested person is instructed to imagine a line extending from their left foot straight out in front of them. The individual is told to place their left foot on the imaginary line and then place their right foot in front of the left, touching the heel of the right foot against the toe of the left. The tested individual is told to keep their arms down to their sides and to remain standing in this position until told to start the test. The tested individual is told not to begin the test until instructed to do so then asked if they understand the instructions up to that point. The tested individual is required to stand in this position and the intent is to measure the ability to follow and retain information from the instructions given and to assess physical abilities such as balance.

Once the tested individual understands, the DRE continues with the instructions for the walking stage of the test (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a; Tharp et al., 1981). The DRE informs the tested individual that when instructed to begin, they need to walk a straight line, taking a series of nine heel-to-toe steps on the imaginary line. While taking those steps the tested individual must keep their arms to their sides, look down at their feet, count each step taken aloud, and touch each step in a heel-to-toe manner. Upon reaching the ninth step, they are to turn around by keeping the lead foot on the line and taking a series of short steps around then return back down the line taking nine heel-to-toe steps along the imaginary straight line.

Lastly, the tested individual is told that once they begin the test they are not to stop walking until they complete the test (Anderson, et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a; Tharp et al., 1981). After giving all of these instructions, the administering DRE asks the tested individual if they understand the information provided to them. If the tested individual understands the instructions they are told to begin the test. While walking, the tested individual is assessed for their ability to divide their attention between physical actions such as walking the line and mental abilities such as short-term memory recall and number processing.

The DRE assesses eight clues, two during the instruction stage and six during the walking stage, that indicate possible impairment (Anderson et al., 1983; Kwasnoski et al.; NHTSA, 2002a; Tharp et al., 1981).

- The first clue assessed is the inability to balance during the instruction stage, as observed when the individual cannot maintain a heel-to-toe position while listening to the instructions. The heel and toe must actually break apart before this clue can be assessed to indicate impairment.
- The second clue assessed during the instruction stage is if the individual begins the test before being told to do so.
- The first clue assessed during the walking stage is if the individual stops while walking. This clue is scored to indicate impairment if the individual stops walking by pausing for several seconds before his/her next step forward.
- The second walking stage clue is not touching heel to toe as the individual traverses the imaginary line. In order for this clue to be assessed to indicate

impairment, the individual must miss touching the heel of one foot against the toe of the other by more than one-half inch.

- The third walking stage clue is if the individual steps off the line. In order for this clue to be assessed to indicate impairment, the individual must step completely off the line.
- The fourth walking stage clue is if the individual uses his/her arms to balance while they walk the line. In order for this clue to be assessed to indicate impairment, the individual must raise his/her arms up from his/her side by more than 6 inches.
- The walking stage fifth clue is if the individual loses his/her balance on the turn or turns in an incorrect manner. If the individual staggers when they turn or if they do not turn using a series of small steps, the clue can be assessed to indicate impairment by the administering officer.
- The sixth walking stage clue is if the individual takes the wrong number of heel-to-toe steps instead of the nine heel-to-toe steps required.

### One Leg Stand

The third divided attention sobriety test administered in this portion of the DECP evaluation is the one leg stand test (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a; Tharp et al., 1981). As is with the walk and turn test, the one leg stand test is also administered in two separate stages: the *instructional stage* and the *balance and counting stage*. In the instructional stage, the individual is told to place their feet together side by side, keep their arms down to the side, and remain in that position until

instructed to begin the test. The individual is told not to begin the test until instructed to do so and then asked if they understand the instructions up to that point. The individual is required to stand in this position, and the intent is to measure the ability to follow and retain information from the instructions given and to assess physical abilities such as balance.

Once the tested individual understands, the DRE continues with the instructions for the balance and counting stage of the test (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a, Tharp et al., 1981). The DRE informs the individual that when instructed to begin, they will raise their right leg up into the air approximately 6 inches off the ground while keeping both legs straight and their arms to their sides. The individual is told to point the toe of the elevated foot down and to look at the raised foot while counting in 1000s until told to stop. The test is timed by the administering evaluator for 30 seconds. The intent of the balance and counting stage of the test is to measure the individual's ability to follow and retain information from the instructions given and to assess physical abilities such as balance. Once the individual's ability to balance while holding up his/her right leg is complete, the process is repeated assessing his/her balance holding up the left leg.

The DRE that administers the test assesses four clues that indicate possible drug-induced impairment (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a; Tharp et al., 1981):



- The first clue is if the tested individual sways while balancing. In order for this clue to be assessed to indicate impairment, the DRE must deduce whether there is a noticeable sway.
- The second clue is using the arms to balance. For this clue to be assessed to indicate impairment, the tested individual must raise his/her arms away from their sides by more than 6 inches.
- The third clue is if the individual hops while trying to balance.
- The final clue is if the individual puts their foot down to the ground while balancing.

#### Finger to Nose Test

The fourth divided attention sobriety test administered in this portion of the DECP evaluation is called the finger to nose test (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a). In this assessment the tested individual is required to bring the tip of their index finger up to touch the tip of their nose. The individual performs this test with their eyes closed and their head tilted back slightly. The individual stands with their feet together side by side. Once in this position, the individual attempts to touch the tip of the nose with their index finger six times, three times with each hand. The DRE instructs the individual which hand to use for each attempt. The DRE uses the same sequence when administering this test: left, right, left, right, right, left.

While the finger to nose test has not been validated, experience shows that persons who are impaired by drugs sometimes miss the tip of the nose and sometimes fail to use the proper hand to touch the tip of the nose as requested by the evaluating

DRE (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a). The DRE should be watchful for body sway, body tremors, eyelid tremors, muscle tension, and unusual or interesting statements.

### *Vital Signs*

Step six of the DECP evaluation is to conduct an assessment of the individual's vital signs, which includes systematic checks of blood pressure, pulse rate, and temperature (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a). Since certain categories of drugs affect human physiology differently, indicators of possible impairment may be assessed in this stage of the evaluation. For example, drugs that fall into the categories of stimulants, hallucinogens, and PCP may cause an individual's pulse rate, temperature, and blood pressure to be elevated. Other drug categories such as narcotic analgesics may cause an individual's pulse, blood pressure, and body temperature to be lower than normal. Depending on the types of drugs taken and whether they are active in the body, different physiological manifestations could be observed. This is why it is very important for the DRE to assess vital signs in the DECP evaluation.

Assessment of vital signs begins with a check of the individual's pulse rate (Kwasnoski et al., 2000; NHTSA, 2002a). The pulse rate is measured by covering the radial pulse point located on the inside of the wrist closest to the thumb. The DRE covers the pulse point with his or her index and middle fingers then counts the number of beats felt within a 30 second time period. This number is then multiplied by two to get the range of pulse beats per minute. The normal pulse rate range is between 60 and 90 beats

per minute. Readings less than 60 beats per minute are considered *down*, while anything above 90 beats per minute is considered *up*. The check for pulse takes place on three separate occasions at different times during the entire evaluation. The pulse is first checked during the preliminary examination, again during the vital signs examination, and for the last time while checking for injection sites.

Blood pressure is taken during this stage of the evaluation (Kwasnoski et al., 2000; NHTSA, 2002a). Blood pressure is the force that blood exerts on the walls of the arteries as it circulates through the body (NHTSA, 2002a). A special instrument called a sphygmomanometer, often referred to as a blood pressure cuff, and a stethoscope are used to measure blood pressure ranges. Since blood pressure is affected by some drugs, it is important to understand why taking this vital sign is important. Specific drug categories can cause the body's blood pressure to be elevated, depressed, or even remain normal. Knowing how blood pressure levels react provides additional information to the DRE in the identification process of drug categories.

Blood pressure is appraised by wrapping the upper portion of the arm (bicep) with the pressure cuff and inflating the cuff so that no blood moves through the artery (Kwasnoski et al., 2000; NHTSA, 2002a). Slowly, the pressure inside the cuff is released so that some of the blood begins spurting through the artery. When the blood rushing through the artery is clearly audible and a clear tapping sound is heard, the systolic pressure value is recorded. As more pressure inside of cuff is released, a swishing sound should be discernable. The faint tapping at the end of this swishing is the diastolic pressure value.

Blood pressure is assessed by checking for a normal range of systolic and diastolic pressure levels (Kwasnoski et al., 2000; NHTSA, 2002a). The systolic pressure is a measure of heart contraction, which sends blood rushing into the arteries. Normal systolic pressure is between 120 and 140 millimeters of mercury (mmHg). Diastolic pressure is a measure of pressure when the heart is fully expanded. The normal range for diastolic pressure is between 70 and 90 mmHg.

The tested individual's body temperature is the final vital sign assessed in this stage of the DECP evaluation (Kwasnoski et al., 2000; NHTSA, 2002a). To properly measure body temperature, an electronic thermometer is used to obtain an oral reading. A disposable sheath covers the thermometer prior to placing it into the mouth and under the tongue. The normal range of body temperature is  $98.6^{\circ}\text{F} \pm 1^{\circ}\text{F}$ .

As with the pulse rate and blood pressure, different categories of drugs can cause the body to either raise, lower, or maintain body temperature (Anderson et al., 1983; Kwasnoski et al., 2000; NHTSA, 2002a). For instance, depressant category drugs usually do not affect body temperature. On the other hand, narcotic analgesics and some inhalants may cause lowered body temperature, while stimulants, hallucinogens, and PCP usually elevate body core temperature. This is why it is important to measure the tested individual's body temperature. It is through this element of the assessment that the DRE may be able to correlate temperature results with other physical manifestations observed while assessing other vital signs.

### *Dark Room Examinations*

Step seven of the DECP evaluation is the dark room examination (Kwasnoski et al., 2000; NHTSA, 2002a). In this portion of the evaluation, the DRE primarily conducts an assessment of the size of the tested individual's pupils. The pupils are measured using a pupilometer, which is a tool composed of different size dark circles superimposed on a card vertically that mimic pupil sizes in millimeters. The pupilometer is placed to the side of the tested individual's face, and the pupils of the eye are compared to the sizes of the dark circles on the card. While the normal pupillary range is considered to be between 3.0 millimeters (mm) and 6.5 mm, the evaluator may see a wide range of pupil sizes in varying light conditions.

The tested individual's eyes are assessed in three lighting conditions: room light, direct light, and near total darkness (Kwasnoski et al., 2000; NHTSA, 2002a). The DRE begins his assessment of the pupils by first observing them in normal room light. The individual is instructed to fix their vision on a point several feet behind the evaluator. Once this is done, the DRE places the pupilometer beside the left side of the face of the individual and measures the size of the pupil. After checking the left eye, the DRE measures pupil size in the right eye using the same method.

Once the pupils are checked in room light, all ambient sources of light are removed until there is little to no light in the room (Kwasnoski et al., 2000; NHTSA, 2002a). The individual is instructed to close their eyes. After 1 minute and 30 seconds the DRE assesses the tested individual's eyes in near to total darkness. This gives both the individual and the assessing DRE an opportunity for their eyes to become

accustomed to the darkness. Once the 90 seconds pass, the DRE checks the pupils in near total darkness. This is conducted by covering the light source from a pen light with the thumb or index finger, which slightly illuminates the area with a soft orange glow. The pen light is then brought up to just where the eye can be seen, and the pupil is measured using the pupilometer. The left eye is measured first, and upon completion the right eye is measured.

Upon completing the check in near to total darkness, the DRE assesses pupil size in direct light (Kwasnoski et al., 2000; NHTSA, 2002a). The DRE shines the pen light directly into the individual's eyes, completely filling the eye socket with light for 15 seconds. During this time, the DRE measures the size of the pupil as well as looks at the pupil reaction to light. Normally, pupils of the eyes constrict within 1 second of the pen light beam striking the eye. However, there are certain categories of drugs that slow pupil reaction to light or create other manifestations that point to drug use. Examining the pupils under controlled lighting conditions provides important evidence of possible drug influence.

While in the dark room, the DRE also examines the nasal and oral cavities for signs of possible drug ingestion (Kwasnoski et al., 2000; NHTSA, 2002a). Drugs such as cocaine are commonly insufflated through the nose. By having the tested individual tilt their head slightly back and shining the light from the pen light up the nose, important signs of drug use can be discovered. Residue from use is sometimes trapped inside the nostrils, and redness of the septum or inner nasal tissues can also point to possible drug use. After the nasal passages are examined, the DRE checks the oral cavity, looking for

residual drugs, unusual coloring of the inside surfaces of the mouth or tongue, or for possible hidden contraband inside the mouth.

### *Examination of Muscle Tone*

Step eight of the DECP evaluation consists of examining muscle tone (Kwasnoski et al., 2000; NHTSA, 2002a). Upon completing the dark room examination, the DRE has the individual sit down and place their arms on a table. The DRE then places their hands on the arms of the individual, checking for normal, rigid, or flaccid muscle tone. The DRE always begins checking the individual's muscle tone using the left arm. The upper arm is checked first and the hands are worked down the length of the arm to determine the tone of the muscle. This examination is conducted because different categories of drugs may cause the muscles of the body to react in a manner other than normal. Examples of drug categories that might possibly cause the muscles to become rigid are PCP, hallucinogens, and stimulants. The drug categories that would likely produce symptoms of flaccid muscles are narcotic analgesics, inhalants, and depressants. Additionally, cannabis tends to have no effect on muscle tone. While muscle tone is important to note, the DRE is trained to account for an individual's body fat content, which could affect these observations. The evaluator should be diligent in their evaluation of muscular persons, since their muscle tone is normally rigid. The same holds true for individuals who are overweight, since their normal muscle tone is usually flaccid.

### *Examination for Injection Sites*

Step nine of the DECP evaluation consists of examining for injection marks left by hypodermic needles (Kwasnoski et al., 2000; NHTSA, 2002a). Often, drugs are introduced into the system by way of injection through the use of a hypodermic needle. The needle punctures the skin and enters a vein. Once this is accomplished, the user injects the substance into the vein so that it can be distributed through the blood stream to achieve the desired affect. The main area of concentration for injections sites are around the arms, in between the fingers, around the base of the neck, or in other places that have accessible veins. The DRE, in addition to checking for muscle tone, also looks for signs of intravenous drug use. Scarring in and around vein lines or raised bumps or welts may indicate injection of a drug into the system. Whenever an injection site is found by the DRE, a schematic light with magnifier lens is used to assess the mark. Notations of hypodermic needle marks may assist the DRE in determining what categories of drugs may have been used. Drug categories that are most often associated with needle use are narcotic analgesics; however, some stimulants are introduced in this manner as well.

### *Suspect Statements and Other Observations*

Step ten of the DECP evaluation consists of formal questioning of the individual (Kwasnoski et al., 2000; NHTSA, 2002a). Based upon all of the available information gleaned from the evaluation to this point, the DRE should have some idea about what category of drug was used. This hypothesis is based on the physical and observable manifestations exhibited by the evaluated individual during the nine previous steps.



Having made sure that the evaluated individual's constitutional rights have been given and understood, the DRE interviews the individual, asking specific questions concerning drug use and category. The statements given by the evaluated individual are used to support the DRE's prediction of what particular category of drug was used.

#### *Opinion of the Evaluator*

Step eleven of the DECP evaluation is the documented conclusion of the assessment by the DRE (Kwasnoski et al., 2000; NHTSA, 2002a). The DRE documents the category of drugs suspected based on the signs and symptoms the individual presented during their evaluation. The opinion of the DRE should be based on all of the available evidence observed during the 10 previous steps of the DECP evaluation. The conclusion reached by the DRE should indicate whether the individual is under the influence of drugs and the category of drugs, if appropriate.

#### *Toxicological Examination*

The twelfth step in the DECP evaluation is to obtain a blood or urine specimen from the individual being evaluated and forward it to a laboratory for analysis (Kwasnoski et al., 2000; NHTSA, 2002a). The analysis is conducted to determine if a drug is in the system of the individual as well as to identify the drug, if present. The toxicological analysis is then used to verify the category of drugs the DRE indicated based on their evaluation. The result from the laboratory provides corroboration and substantiation of the DRE's conclusions drawn from the previous 11 steps of the procedure conducted prior to submission of the sample. What should be emphasized is

that the role of toxicology in the DECP is corroborative rather than conclusive.

Toxicology provides a scientific measure that supports the fact that a person has at some time ingested a drug. The 11 steps taken prior to toxicological analysis corroborate whether the drug was psychoactive in the system at the time of assessment, thereby causing impairment. The observations of the DRE provide the best proof of a suspect's drug-induced impairment level. It is this combination of all available facts through the entire DECP evaluation process that aids the DRE in their ability to predict drug use and impairment levels.

#### CLASSIFICATION BY DRUG CATEGORY

One of the main purposes of placing drugs into categories is for convenience, understanding, and making sense of vast numbers of chemicals that alter physical and mental states (Page, 2003). The DECP categorizes different drugs based on their similarities in affecting the human condition both physically and mentally (Couper & Logan, 2004; NHTSA, 2000a). The main emphasis on the DECP drug categories is that all seven categories have the potential for abuse. Substances in each of the seven drug categories affect the body and the mind by altering the mood and creating a sense of euphoria in the person taking the substance (Grilly, 1985; Levinthal, 2004). It is the euphoria that is obtained from substance use that drives the user to continue to search for the next high. For instance, cocaine possesses euphoric properties that reinforce the potential for abuse (Levinthal, 2004). Feelings of intense pleasure, super strength, or invincibility are often associated with the drug. Novocain, however, is a drug that is used

in dental procedures to numb the area around a tooth so that no pain is felt. The effect Novocain has on a person will not drive them to abuse the substance because the substance lacks pleasurable effects, unless getting numb is the desire. Cocaine, on the other hand, produces the euphoric effect needed to encourage use due to the pleasure experienced through use. According to Burns (2003a), “The critical premise of the classification system is that drugs of abuse produce detectable, observable effects and can be logically grouped according to similar or shared patterns of effects” (p. 4).

The key component to drug classification is pattern recognition, because association illustrates that drugs have multiple effects on a person as opposed to single effects (Page, 2003). Classification of drugs into categories focuses on the patterns of detectable and observable effects. The seven categories of drugs in the DECP are (Couper & Logan, 2004; NHTSA, 2002a): central nervous system (CNS) depressants; CNS stimulants; hallucinogens; phenyl cyclohexyl piperidine (PCP); narcotic analgesics; inhalants; and cannabis.

#### CNS Depressants

CNS depressant substances depress the activity of the central nervous system (Couper & Logan, 2004; Grilly 1985; Levinthal, 2004; Page, 2003; Ramaekers, 2003). CNS depressants slow down the cognitive functions of the brain beginning first with the voluntary, conscious portions and at higher doses affecting the automatic, non-voluntary functions such as breathing and heartbeat.

There are six separate subcategories of CNS depressant substances (NHTSA, 2002a; Page 2003):

1. Anti-anxiety and tranquilizers, mostly benzodiazepines, are used primarily for treatment of anxiety and insomnia (Couper & Logan, 2004; Grilly 1985; Levinthal, 2004; Page, 2003; Ramaekers, 2003). Specific drugs in this category are Valium, Xanax, Alprazolam, and alcohol.
2. Antipsychotics and other major tranquilizers are used to treat major psychiatric disorders and are rarely, if ever, abused. Some examples of antipsychotic medications are Lithium, Haloperidol, and Thorazine.
3. Antidepressants and mood elevators primarily fall in the category of medications that utilize selective serotonin reuptake inhibitors (SSRIs). Drugs in this subcategory are widely prescribed to persons with mild depression and, like most antipsychotics, they are rarely abused. Drugs that fall in this subcategory are Prozac, Elavil, and Tofanil.
4. Barbiturates were created in the mid-18<sup>th</sup> century and are derived from barbiturate acids. Although still in use, barbiturates are not as commonly used since the advent of anti-anxiety tranquilizers (benzodiazepines). Drugs that fall in this subcategory are Phenobarbital, Pentobarbital, Amobarbital, and Secobarbital.
5. Non-barbiturates have the effects of barbiturates but do not contain barbiturate acids. These drugs, when abused, can cause psychological and physical dependence. Substances such as Methaqualone, Carisaprodo, and gamma hydroxy butyrate are commonly abused due to their intoxicating properties.

6. Combination drugs are pharmaceutically prepared to contain more than one depressant drug in combination with others. The drug Percobarb is an example of a combination drug. This type of drug combines the effects of barbiturates (depressant) and Percodan (narcotic analgesic).

Depressants generally affect people in ways that are similar to alcohol (Couper & Logan, 2004; Levinthal, 2004). Some possible effects of depressant use are reduced inhibitions, inability to divide attention, slowed reflexes, inability to concentrate or divide attention, inability to coordinate muscle movement, and a wide variety of emotional effects ranging from euphoria to depression (Couper & Logan, 2004; Grilly 1985; Levinthal, 2004; Page, 2003; Ramaekers, 2003). In general, a person under the influence of a CNS depressant will look and act like a person who is under the influence of alcohol.

In a DECP evaluation, the DRE would expect to see similar physical and mental manifestations within the CNS depressant category (NHTSA, 2002a; Page, 2003). When assessing the eyes, the DRE should expect to observe HGN, VGN at high doses, LOC, and normal pupil size, except for Soma and Quaaludes, which cause pupil dilation and a slowed reaction to light. When assessing physical manifestations, the DRE should expect to observe normal body temperature, low blood pressure, and a slowed pulse rate, except when Quaaludes and alcohol are used, which usually elevates pulse rate. The DRE should also expect to observe flaccid muscle tone and poor performance on the divided attention tasks such as the Romberg balance, walk and turn, one leg stand, and finger to

nose tests. Disorientation, sluggishness, thick-tongued speech, drowsiness, droopy eyes, and uncoordination are common with the use of CNS depressants

### CNS Stimulants

The second DECP category of drugs is CNS stimulants (Couper & Logan, 2004; NHTSA, 2002a; Page, 2003). Often known as uppers, these drugs stimulate the central nervous system and mimic the body's flight or fight response (Couper & Logan, 2004; Grilly 1985; Levinthal, 2004; Page, 2003). CNS stimulants cause the body to speed up the operation of the brain. Since CNS stimulants increase brain operation, users may exhibit nervousness, irritability, and an inability to think clearly or to concentrate for more than brief periods of time.

There are three separate subcategories that further divide the CNS stimulant category (NHTSA, 2002a):

1. Cocaine is a CNS stimulant that is derived from the coca plant, indigenous to countries located in South America (Levinthal, 2004; Schmitt, Lamers, Ramaekers, & Riedel, 2003). Cocaine is made by processing coca leaves, extracting the impairing substance, and processing it into a fine whitish colored powder. The substance is usually a fast acting, short duration drug. Depending on how the drug is ingested, the body experiences different durations of effect. When cocaine is smoked, the effects are almost instantaneously felt. However, the duration of these effects rapidly diminish, usually within 5 to 10 minutes (Levinthal, 2004; NHTSA, 2002a). If the substance is ingested by insufflation, the onset of effects takes approximately

30 seconds and the duration of the euphoric effects last between 30 and 90 minutes. In most cases, cocaine is a fast-acting drug that usually has a short duration of effects.

2. Amphetamines (NHTSA, 2002a) are synthetic drugs that have legitimate medical applications. Some noted applications include control of epilepsy, attention deficit disorders, and hyperactivity disorders along with fatigue relief and appetite suppression (Levinthal, 2004; Schmitt et al., 2003). Amphetamines are fast-acting drugs that, when entering the body's system, often mimic the effects of cocaine. However, the duration of effects for amphetamines versus cocaine are measurable. Amphetamine effects last much longer those of cocaine. Instead of a short 30 to 90 minute high, the amphetamine user's high lasts between 4 and 8 hours, depending on the drug used.
3. Other kinds of CNS stimulants (NHTSA, 2002a) are similar to the combination CNS depressant subcategory of drugs, which combine two category drug groups together in one application. For instance, the drug Dexamyl combines dextroamphetamine sulfate, a stimulant, with Amobarbital, a depressant.

Some possible effects of CNS stimulant use are restlessness, euphoria, talkativeness, irritability, bruxism or grinding of teeth, eyelid and leg tremors, and rigid muscle tone (Grilly 1985; Levinthal, 2004; Page, 2003; Schmitt et al., 2003). In general,

a person under the influence of a CNS stimulant looks and acts like a person in a very excited state.

In a DECP evaluation, the DRE would expect to see specific physical and mental manifestations with CNS stimulant use (NHTSA, 2002a). In assessing the eyes, the DRE should not expect to observe HGN, VGN, or LOC. The pupil size will be dilated and a slow reaction to light will be present. In assessing physical manifestations, the DRE should expect to observe elevated body temperature, blood pressure, and pulse rate. The DRE should also expect to observe rigid muscle tone and poor performance on the divided attention tasks such as the Romberg balance, walk and turn, one leg stand, and finger to nose tests.

### Hallucinogens

The third category of drugs in the DECP is hallucinogens (Couper & Logan, 2004; NHTSA, 2002a; Page 2003). The types of drugs that fall within this category are those that transpose the senses, creating synesthesia (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a; Schmitt et al., 2003). This phenomenon causes the user to transpose visual stimuli, such as colors, to sounds and audible stimuli, like sounds such as music, to sight (Page, 2003). In a real sense, these drugs cause the user to experience hallucinations. These distorted sensory perceptions are changed so that objects, sounds, smells, and tastes are experienced differently than normal (Couper & Logan, 2004; Levinthal, 2004; Schmitt et al., 2003).

Hallucinogens are usually composed of two subcategories (NHTSA, 2002a):



1. The first subcategory of hallucinogens is those that are naturally occurring substances. Examples of these include peyote, psilocybin, and others (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a; Schmitt et al., 2003). Peyote is a natural hallucinogen derived from a natural substance called mescaline found in the peyote cactus. The substance is found in the small buttons that adorn the outer skin of the cactus and are cultivated to be brewed into a tea or dried and then eaten. Psilocybin is a substance that is found in different species of mushrooms. This fungal substance is often brewed to make tea or can be dried and eaten like peyote. Other substances such as nutmeg, morning glory seeds, and jimson weed, while all very toxic, can be used to derive a natural hallucinogenic high.
2. The second subcategory of hallucinogens is those that are manufactured synthetically (NHTSA, 2002a). These manmade hallucinogens are more commonly used by individuals than are the naturally occurring types. The most common hallucinogen of choice is lysergic acid diethylamide (LSD). Most commonly ingested orally, LSD is often placed on bits of paper or on sugar cubes for ingestion into the body's system (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a; Schmitt et al., 2003). LSD may also be ingested by smoking cigarettes or marijuana that has been dipped into the substance. Another common synthetic hallucinogen that is very popular among youth is methylenedioxymethamphetamine (MDMA), or ecstasy. It is normally produced in either a liquid or powdered form that can be pressed into pills. Found primarily

at all-night rave parties or at the underground club scene, MDMA is fast becoming the hallucinogen of choice due to the pleasurable effects it possesses as a sensory transposition drug along with its stimulant qualities (Porrata, 2003).

Some possible effects of hallucinogen use are dazed appearance, body tremors, perspiration, uncoordination, rigid muscle tone, difficulty with speech, hallucinations, distorted perceptions and senses, and paranoia (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a; Schmitt et al., 2003). In general, a person under the influence of a hallucinogen looks and acts like a person in a very confused state.

In a DECP evaluation the DRE would expect to see specific physical and mental manifestations of hallucinogen use (NHTSA, 2002a). When assessing the eyes, the DRE should not expect to observe HGN, VGN, or LOC. The pupil size will be dilated, and a normal reaction to light will be present. When assessing physical manifestations, the DRE should expect to observe elevated body temperature, blood pressure, and pulse rate. The DRE should also expect to observe rigid muscle tone and poor performance on the divided attention tasks such as the Romberg balance, walk and turn, one leg stand, and finger to nose tests.

#### Phenyl Cyclohexyl Piperidine (PCP)

The fourth category of drugs in the DECP is PCP (Couper & Logan, 2004; NHTSA, 2002a; Page, 2003). PCP is a member of the arylhexylamine class of designer drugs (Buchanan & Brown, 1988; Schmitt et al., 2003) and is a disassociate anesthetic, meaning that its use cuts off the brain's ability to recognize and perceive sensory

reception (Buchanan & Brown, 1988; Couper & Logan, 2004; Levinthal, 2004; Schmitt et al., 2003). PCP was first developed in the 1950s as an intravenous anesthetic. Patented in 1963 under the name Sernyl, PCP was used to disassociate pain during surgery in human patients. Due to unpleasant side effects for surgical use, PCP was repatented as a veterinarian anesthetic under the name Sernylan in 1968. What is particular about PCP versus any of other drug category is that PCP takes on several effects found within other drug categories. Individuals who use PCP may exhibit manifestations that mirror those of hallucinogens, stimulants, and depressants. It is specifically for this reason that PCP is given its own category within the DECP.

The main method of ingestion into the body's system is through smoking a substance laced with the drug (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a; Schmitt et al., 2003). Since PCP is usually manufactured in liquid or powder form, it can be dipped or spread into smokeable materials such as tobacco, mint leaves, or marijuana. When the substance is smoked the effects of the drug are felt almost immediately, with the duration of effect lasting between 4 and 6 hours. While smoking the substance is the most common way of ingesting PCP, some persons choose to insufflate the substance or take it orally. When PCP is insufflated, the effects of the drug are felt usually within 2 to 3 minutes with duration of effect lasting about the same as if smoked. If the substance is taken orally, the duration of effects lasts between 30 and 60 minutes. Some possible effects of PCP use are acute intoxication, blank stare, numbness, lightheadedness, vertigo, ataxia, perspiration, warm to the touch, delayed reactions, non-responsiveness,

confusion, agitation, possible violence and combativeness, and cyclical behavior (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a; Schmitt et al., 2003).

In a DECP evaluation the DRE would expect to see specific physical and mental manifestations of PCP (NHTSA, 2002a; Page, 2003). When assessing the eyes, the DRE should expect to observe HGN, VGN, and LOC. Pupil size and reaction to light will be normal. When assessing physical manifestations, the DRE should expect to observe elevated body temperature, blood pressure, and pulse rate. The DRE should also expect to observe rigid muscle tone and poor performance on the divided attention tasks such as the Romberg balance, walk and turn, one leg stand, and finger to nose tests.

#### Narcotic Analgesics

The fifth category of drug in the DECP is narcotic analgesics (Couper & Logan, 2004; NHTSA, 2002a; Page, 2003). These drugs all exhibit analgesic properties, meaning they relieve pain. There are three main distinguishing characteristics that separate narcotic analgesics from the other categories of drugs. First, they are all pain relievers (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a; Schmitt, et al., 2003). Second, this category of drug will produce withdrawal symptoms if use is discontinued after prolonged usage. Withdrawal symptoms that may be associated with discontinued use are chills, muscle ache, nausea, insomnia, diarrhea, depression, hot/cold flashes, muscular and abdominal cramping, and twitching. Third, this category of drug allows substitution of other drugs within the category for relief of withdrawal symptoms. For instance, heroin users may be given methadone to combat the withdrawal symptoms associated with non-use.

Narcotic analgesics are usually composed of two subcategories (NHTSA, 2002a):

1. The first is those that are naturally occurring substances, or opiates. Examples of these include morphine, codeine, and thebaine, which are natural narcotic analgesics derived opium, harvested from the poppy plant (Levinthal, 2004; NHTSA, 2002a). The substance is collected by making cuts in the pod of the poppy plant and collecting the fluid that permeates the cut. The collected substance is then processed into the natural forms of the drug. Heroin is the most common of the abused natural opium-based narcotic analgesics.
2. The second subcategory of narcotic analgesics is those that are manufactured synthetically from nonopiate substances (NHTSA, 2002a). These manmade narcotic analgesics are more commonly used by individuals than are the naturally occurring types. One of the most commonly used synthetic narcotic analgesics is methadone, which is used in the treatment of heroin addiction. Although these types of substances are not opiate derivatives, they have the same pharmaceutical characteristics as the natural narcotic analgesics.

Narcotic analgesics can be ingested in many different ways, including but not limited to injection, oral, insufflation, smoking, or taken via suppository (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a). The most common method of ingestion is via oral and intravenous methods. Narcotic analgesics vary in their duration of effect, with most substances lasting between 4 and 6 hours. The exception to this, however, is methadone, the effects of which can last for up to 24 hours.

Some possible noticeable effects of narcotic analgesic use are droopy eyelids, drowsiness, depressed reflexes, low raspy speech, dry mouth, facial itching, euphoria, fresh puncture marks from needle use, and nausea (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a). In general, a person under the influence of a narcotic analgesic looks and acts like a person who is very sleepy.

In a DECP evaluation the DRE would expect to see specific physical and mental manifestations (NHTSA, 2002a). When assessing the eyes, the DRE should not expect to observe HGN, VGN, or LOC. The pupil size will be constricted, and no reaction to light will be present. When assessing physical manifestations, the DRE should expect to observe depressed body temperature, blood pressure, and pulse rate. The DRE should also expect to observe flaccid muscle tone and poor performance on the divided attention tasks such as the Romberg balance, walk and turn, one leg stand, and finger to nose tests.

### Inhalants

The sixth category of drug in the DECP is inhalants (NHTSA, 2002a). Inhalants include a large assortment of breathable vapors and gasses that produce mind-altering effects (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a) and delirium as the mind becomes incoherent, excited, and confused.

There are three separate subcategories that further divide the inhalant category (NHTSA, 2002a):

1. The first is volatile solvents, which are liquids and other chemicals that vaporize at room temperature (Couper & Logan, 2004; Schmitt et al., 2003). These substances, such as toluene, acetone, and aliphatic acetates, are often found in

many household and industrial products such as cleaners, spray paint, gasoline, paint thinners, dry cleaner fluids, and fingernail polish removers (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2004; Schmitt et al., 2003). Inhaling these vapors produces a state of mind similar to that from a CNS depressant category drug. The user may experience euphoria, disorientation, lightheadedness, sleeplessness, muscle weakness, and possible hallucinations (Dinwiddie, 1994; Sharp & Rosenberg, 1997). Out of all three subcategories of inhalants, the volatile solvents have the most prolonged duration of effect which, depending on the substance, can last between 6 and 8 hours.

2. The second subcategory of inhalants is aerosols (NHTSA, 2002a), which are compressed chemicals that are discharged from pressurized containers. While these chemicals are used primarily as propellants for the products contained inside the canister, their gaseous contents become an intoxicant if inhaled (Levinthal, 2004; NHTSA, 2004; Schmitt et al., 2003). Substances that are commonly abused in this subcategory include hairsprays, deodorants, Freon, glass chillers, and frying pan lubricants. It is the hydrocarbon gasses in these aerosol substances that produce the impairing effects. The effect of aerosols is almost immediately felt upon inhalation of the chemical. Subsequently, the intense feelings of euphoria that are experienced are just as quick to diminish, consequently requiring the user to continually inhale the substance to maintain peak effects of the drug.

3. The third subcategory of inhalants is anesthetic gases (NHTSA, 2002a), which are inhalant drugs used to suppress pain during medical surgeries (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2004; Schmitt et al., 2003). Examples of such drugs are nitrous oxide, chloroform, ether, amyl nitrate, and butyl nitrate. Users of these drugs often report short-term effects such as nausea, disorientation, confusion, euphoria similar to alcohol intoxication, dizziness, floating sensation, lightheadedness, and spinning sensations. As with all three subcategories of inhalants, the primary method of ingestion into the body is through inhalation. The vapors of the drug are inhaled into the lungs and absorbed into the blood. The chemical is then distributed throughout the body via the blood stream, which carries it to the brain for the effects to be felt. Inhalant effects are felt almost immediately after inhalation. However, how long the effects last depends on the substance that was inhaled. The duration of effects of anesthetic gasses are short lived, ranging from between just a few seconds to as long as 20 minutes.

In a DECP evaluation the DRE would expect to see specific physical and mental manifestations of inhalant use (NHTSA, 2002a). When assessing the eyes, the DRE should expect to observe HGN, VGN at high doses, and LOC. Although the pupil size will usually be normal, it may become dilated. Reaction to light will be slow. When assessing physical manifestations, the DRE should expect to observe increased blood pressure with volatile solvents and aerosols but depressed blood pressure with anesthetic gasses. Pulse rate will be elevated, and body temperature may be elevated, depressed, or



normal. The DRE should also expect to observe flaccid muscle tone and poor performance on the divided attention tasks such as the Romberg balance, walk and turn, one leg stand, and finger to nose tests.

### Cannabis

The seventh and final category of drug in the DECP is cannabis (Couper & Logan, 2004; NHTSA, 2002a). Cannabis is derived primarily from various species of cannabis plants. These species of plants contain more than 400 chemical compounds, of which 60 are termed cannabinoids (Schmitt et al., 2003). The cannabinoid that is responsible for the drug's physiological and psychological effects is delta-nine tetrahydrocannabinol (THC) (Burns, 2003b; Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2004; Schmitt et al., 2003). Highest THC concentrations are found in the leaves and flowering buds of the plant rather than the stems. While cannabis is most often used illegally, there are some medical uses for the drug. One such use is for relieving inner ocular pressure in the eyes of those persons who suffer from glaucoma. Another medical use is to suppress nausea and vomiting sometimes brought about by chemotherapy treatments in persons who have cancer.

There are four principal forms of cannabis in the DECP, including marijuana, hashish, hash oil, and synthetics (Couper & Logan, 2004; NHTSA, 2002a). The first principal form is marijuana, which consists of the dried leaves of the cannabis plant (Burns, 2003b; Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2004; Schmitt et al., 2003). The leaves are dried then crumbled into pieces that resemble processed tobacco. The substance is then either rolled into a cigarette or smoked in a pipe. The second form

of cannabis is hashish, a compressed resin from the non-fertilized female marijuana plant. Since the tops of the female marijuana plants contain higher concentrations of THC, the plants are cultivated, boiled, and then compressed to make a semisolid mass. This mass contains high concentrations of THC, ranging between 15% and 25% THC (Burns, 2003b; Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002). The third form of cannabis is hashish oil, which is produced from compression of hashish to a point where liquid is generated. The liquid that is produced is hashish oil. When in this oil form, the THC concentration can be boosted to as high as 70% (Burns, 2003b; Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002). The final form of cannabis is synthetic, manmade substances that mimic the characteristics of the plant form cannabis.

The main method of cannabis ingestion into the body's system is through smoking (Burns, 2003b; Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a). When the substance is smoked, the effects of the drug are felt generally within 8-9 seconds after inhaling the smoke (Burns, 2003b; Couper & Logan, 2004; NHTSA, 2002a; Page, 2003). The effects usually reach their peak about 10 to 30 minutes after smoking and last between 2 and 3 hours (Burns, 2003b; Couper & Logan, 2004; NHTSA, 2003).

Some possible effects of cannabis use are body tremors, eyelid tremors, relaxed inhibitions, increased appetite, impaired perception of time and distance, disorientation, and possible paranoia (Couper & Logan, 2004; Levinthal, 2004; NHTSA, 2002a; Schmitt et al., 2003).

In a DECP evaluation, the DRE would expect to see specific physical and mental manifestations of cannabis use (NHTSA, 2002a). When assessing the eyes, the DRE should not expect to observe HGN or VGN but would expect to observe LOC. The pupil size will be dilated but could be normal. Reaction to light will be normal. When assessing physical manifestations, the DRE should expect to observe normal body temperature and elevated blood pressure and pulse rate. The DRE should also expect to observe normal muscle tone and poor performance on the divided attention tasks such as the Romberg balance, walk and turn, one leg stand, and finger to nose tests.

## CONCLUSIONS

The DECP is built on a foundation that requires effective human resource development. It is critical to the success of the program that the DECP evaluation process be conducted according to the prescribed training. Courts across the United States have found the DECP process to be reliable in identifying specific drug categories in impaired individuals, provided that the 12-step evaluation has been completed properly. The courts accept, as a reliable measure, testimony regarding specific drug categories that have been opined and provided by officers who have been specially trained in the DECP.

As a result of the DRE's extensive training, evidence found in the evaluation will, in most cases, be allowed into the court record under the states' rules of evidence. Based on the need for the DRE to demonstrate optimal performance, the effectiveness of the training associated with the DECP is a primary HRD concern. This is because the

DRE must be able to properly process a driver who is under the influence of drugs, and their evaluation must be tied specifically to training and development. This literature review provided an overview of the drug abuse problem in the United States and the history of the DECP. It also identified the DECP's systematic process of evaluation and the drugs that are known to impair individuals. This literature review serves as a foundation for the design, data collection, and analysis portions of this study.

## CHAPTER III

### METHODOLOGY

#### INTRODUCTION

The National Highway Traffic Safety Administration (NHTSA) currently maintains a database of Drug Evaluation and Classification Program (DECP) practitioners (Drug Recognition Experts or DREs) and instructors who have been successfully trained to detect impairment in individuals by drugs other than alcohol. A second database contains information collected that relates these DREs to their record of DRE evaluations from the field. An open record request was sent to NHTSA to obtain an electronic copy of the officers who have been trained and the information obtained on individuals evaluated through the DECP procedure who were suspected of post-use drug impairment.

There is limited research available in this area; therefore, it was important to obtain a broad understanding of the program's effectiveness. This was accomplished through analysis of the available DRE's drug influence evaluation (DIE) data as a whole. Based on the lack of comprehensive research, this approach to analyzing data associated with the problem and subsequent need is both practical and informative.

To understand the investigator's methodology, it is important to be aware of the DECP's standard for determining an accurate opinion on the part of the DRE. The DECP determines the accuracy rate for an individual DRE and, in turn, the entire DECP, based

on standards set forth by the International Association of Chiefs of Police (IACP). IACP serves as the certification body for the DECP on behalf of NHTSA. These standards stipulate that a DRE's opinion is supported if the toxicology analysis returned discloses the presence of at least one drug category named by the DRE. In the event that the DRE concluded that three or more categories of drugs are involved, at least two categories must be supported by toxicology results. To comprehend the effectiveness of the DECP, the investigator felt compelled to analyze the accuracy rate of DREs by looking strictly at single-category drug use. Without completing an investigation at this level, the DRE's true level of accuracy would have been ignored, and as such, the DECP as a whole would not have been properly represented for its proper standing.

#### INSTRUMENT(S)

The Texas data set of the national DRE tracking system (DRE-DTS) was the primary information collection instrument for this study. The DECP utilizes a standardized format to gather the DRE's drug evaluation information for input into the DRE-DTS as is illustrated in appendix B. The DRE-DTS serves as a collection system for the DECP for the DREs after information is gathered from formal drug influence evaluations (DIEs). The instrument is a combined assessment and evaluation tool used by DREs to report post-drug use as required by the national DECP protocol.

## PROCEDURE

The investigator retrieved the set of pre-existing data, self-reported data, and analyzed the information in terms of the proposed research questions. Data was assessed by identifying information listed within the seven drug classification categories, which were classified as single drug use choices. The drug category choices made by the DREs were reviewed and compared against toxicology results reported. Correct and incorrect drug category choices made by the DREs, according to single drug categories, were analyzed and compared against the toxicology results. Subsequent information obtained from the data identified popular drugs of abuse as indicated by police officers trained in the DECP in Texas.

## POPULATION

The population for this study was composed of all of the available enforcement evaluation data collected during the 2000 calendar year and entered by DREs that have been trained in the DECP in Texas. The available data was requested and obtained through an open records request submitted to NHTSA. It was anticipated that the 2000-year population would be approximately 500 evaluations.

## DESIGN AND STATISTICS

Statistical evaluation of data in this study relied primarily on descriptive, comparative, and predictive statistics. The researcher analyzed the Texas data set to

determine the accuracy rates for each of the seven individual drug categories. The DECP currently restricts its analysis to calculation of an accuracy rate based on standards created for the program through IACP. A DRE evaluation is considered to be correct or supported by toxicology if the DRE recognizes at least one drug category disclosed in the toxicology report or at least two when three or more categories of drugs are involved. This approach to supporting the DRE's assessment does not provide a complete or accurate picture of the effectiveness of the DECP and, therefore, warranted a more detailed analysis.

A chi-square analysis on the data for each of the seven drug categories was conducted to uncover if there was a relationship between the DRE's drug category choice and corresponding toxicology results. Upon completion of the chi-square analysis, a phi test was conducted to determine the level of relationship the two variables had upon one another. The relationship between drug category choices made based on the DRE's evaluation and the corresponding toxicology results provided an association that supports the results obtained.



## CHAPTER IV

### RESULTS OF THE STUDY

#### TIME PERIOD AND STUDY RECORDS

This study consists of an analysis of self-reported data that was collectively reported from law enforcement personnel trained and certified by the National Highway Traffic Safety Administration (NHTSA) and the International Association of Chiefs of Police (IACP) as Drug Recognition Experts (DREs). Data collected by the DRE through the drug influence evaluation (DIE) is entered into a Drug Evaluation and Classification Program (DECP) tracking system database. The DRE Data Tracking System (DRE-DTS) is designed to warehouse information obtained by DREs through the DIE to report post-drug use in individuals evaluated in actual field arrest situations and in pre-certification evaluations conducted during DECP field training.

The data analyzed for this study was obtained from the DRE-DTS. The data set included all entries in the DRE-DTS during the 12 month period between January 1, 2000, and December 31, 2000. The DREs who completed the DIEs were responsible for collecting and submitting the information into the DRE-DTS. Depending on the procedures set forth by the local law enforcement agency, the DIE was entered manually into the DRE-DTS by the DRE or a designated department representative known as an agency coordinator. The DRE-DTS requires that data be entered individually according to each separate evaluation conducted. The data maintained in the DRE-DTS is a summary of the information recorded on the written documentation form completed by

the DRE during the DIE. The specific fields required in the DRE-DTS are detailed in Appendix A of this study.

The electronic fields on the DRE-DTS are divided into specific sections of informative data requested by NHTSA. The first data entry section is specific to the location of the evaluation. State, region, agency, evaluator information, and case number are contained in this section. The second data entry section is reserved for identifying the subject being evaluated. The subject's first and last name, date of birth, gender, and race are collected in this section. The third data entry section contains the arresting officer's first and last name. The fourth data entry section collects specifics on the evaluation itself. Type of evaluation, enforcement or training, and the date and time of the evaluation are also captured. Breath alcohol concentration (BrAC), availability of toxicology results, and specimen type retrieved round out the information collected in this section. The fifth data entry section is designated for the DRE's opinion. In this section, the DRE selects the appropriate category of drug(s) they believe is responsible for the subject's impairment (depressants, stimulants, hallucinogens, PCP, narcotic analgesics, inhalants, and/or cannabis). In addition to the seven drug categories, the DRE may indicate no impairment, alcohol rule-out, or medical rule-out as choices when no observable indicators of drug impairment exist or there is a reason other than drug impairment for the observed signs and symptoms. The final data entry field is the type of offense. The DRE lists the offense charged to the subject being evaluated as a felony or misdemeanor. In addition, drop-down boxes provide a list of charge-related statutes and/or traffic offenses to provide more detailed information.

## DRUG INFLUENCE EVALUATION RECORDS

Specific criteria were set forth to assess the DIE records for appropriateness prior to including each in this analysis. First, the DRE must have evaluated the subject in an enforcement setting. Second, the DRE must have successfully completed all phases of DECP training. Third, a complete 12-step evaluation, using the DECP training protocol, must have been administered. Lastly, a toxicological sample, blood or urine, must have been secured by the DRE after the evaluation had taken place. The sample must have been analyzed by a state-approved laboratory and the results entered into the DRE-DTS in order to compare the toxicology results against the DRE's drug category opinion.

There were a total of 736 DIEs reported by DREs from January 1, 2000, to December 31, 2000. These DIEs represented 36 different reporting law enforcement agencies from the State of Texas. Of the 736 DIEs reported, 529 were designated as enforcement evaluations and 207 were categorized as training evaluations.

An individual assessment of each electronic record was conducted to determine whether there were duplicate entries of the same evaluation. From that assessment it was discovered that of the 529 enforcement evaluations conducted, 14 were duplicate evaluations. The same procedure was conducted for the training evaluations that were reported, and of the 207 listed training evaluations, 8 had been duplicated during the entry process. Based on this data assessment, the 14 duplicate enforcement evaluations and the 8 duplicate training evaluations were removed from the population, making the baseline number of evaluations 515 enforcement evaluations and 199 training evaluations.

For the purposes of this study, the investigator's goal was to determine whether the DRE was able to correctly identify specific categories of drugs using the skills developed from their classroom training and jail instruction/evaluation certifications. To determine this, all of the training evaluations were removed from the population of DREs.

The rationale behind removal of the training evaluations was to minimize bias in the study. Since training evaluations are conducted while the DRE is still a candidate for certification, they often receive help from instructors who are more familiar with the DECP evaluation process and are more experienced in identifying post-drug users. Their assistance and technical expertise is often called upon by the trainees to confirm drug use and selection of drug categories while in this field certification training phase. Additionally, field toxicology kits are used in pre-certification training to immediately analyze and confirm the category drug(s) in the system of an evaluated subject so that the trainee can receive credit for a confirmed drug call. Confirmation of a minimum five of the seven drug categories must be accomplished in order for the DRE candidate to complete their training. The result of the field toxicology screening may be known to the instructor prior to prediction of drug category by the trainee. As a result, the fact that the instructor could potentially know the category of drug prior to a DRE candidate making a prediction could influence the instructor's interaction with the DRE candidate during the evaluation and, therefore, may positively skew the study's findings.

Another limitation regarding the training data was that many of the recorded evaluations were entered as single subjects but in reality were entered as multiple evaluations conducted on the same subject under the names of multiple student

evaluators. This was a direct result of placing students together in groups while they evaluated subjects believed to be impaired by drugs in the training phase. For instance, four students may work together in a training pod to evaluate Subject A. Each student receives credit for being part of the evaluation of Subject A as either the evaluator or an observer. As such, there may be a record in the DRE-DTS for each trainee who participated in the evaluation and four separate correct evaluations of the same evaluated subject logged into the database, one under each student's name. This process of data entry skews the end result percentage by a ratio of four to one.

In an attempt to keep the data for this analysis as unbiased as possible, no training evaluations were included in this study. This represented a decrease in the population of DIEs being analyzed from 718 to 515.

A total of 515 DIEs were identified in the DRE-DTS database as enforcement evaluations. Of the 515 evaluations conducted, 191 did not have toxicological samples provided to confirm the DRE's prediction of drug use. Since toxicology confirmation is required to correlate the DRE's evaluation to a specific drug category, these 191 evaluations were stratified and not used in this study. This represented a decrease in the population of DIEs analyzed from 515 to 324. The final population used in this investigation that met the study criteria is 324 DIEs.

The mean number of DIEs that qualified for this study that were performed and entered per month between January 1, 2000, and December 31, 2000, was calculated to be 27. A summary of enforcement DIEs entered into the DRE-DTS during the 2000 calendar year is provided in Figure 1.

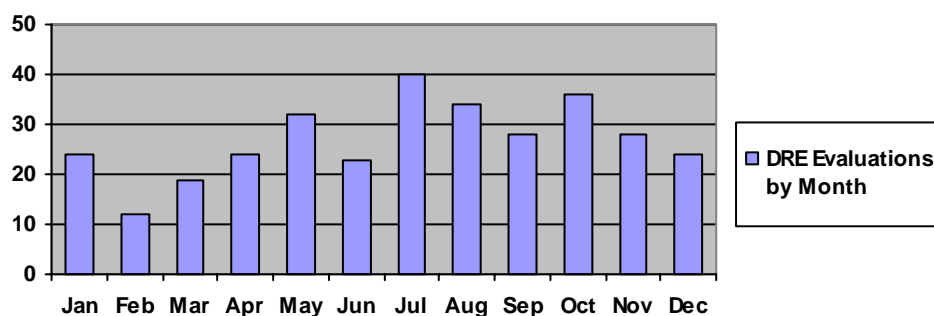


Figure 1. Summary of enforcement DREs for 2000.

## RESEARCH QUESTIONS

### Question One

The first research question asked if using the 12-step DECP process significantly enhanced the DRE's ability to identify of one or more drug categories of use in evaluated post-drug users in Texas. To determine this, the investigator analyzed the drug category predictions made by DREs in the 324 enforcement DREs used in this study. The DIE, the DRE's drug category prediction, and the known toxicology results were analyzed, and the accuracy rate of the DRE's drug prediction with the toxicological results for individual records was compared. This comparison was necessary to confirm the DRE's prediction regarding drug(s) found in the toxicological sample provided by the evaluated subject. The DRE's opinion is recorded according to the seven drug categories. The associated toxicology results were compared with the DRE's prediction for confirmatory findings of drug(s) within the specific drug category.

For the purpose of this study, a four-quadrant matrix illustrates the positive or negative predictions made by the DRE and positive or negative findings of the drug in the evaluated person's toxicology sample. An example of this four-quadrant matrix is shown in Table 3.

**Table 3**  
**Example of Prediction Matrix**

		Drug Recognition Expert Opinion	
		Positive	Negative
Toxicology Results	Positive	Quadrant I	Quadrant II
	Negative	Quadrant III	Quadrant IV

### *Depressants*

The first drug group analyzed was the depressant category. Of the 324 evaluations analyzed, 135 DREs indicated that the subject was under the influence of a depressant category drug and toxicology results from samples submitted by the evaluated subjects subsequently confirmed the presence of a depressant category drug in their system. The DRE correctly determined depressant category drug(s) use in evaluated subjects at a rate of 42%.

The DRE failed to predict a depressant category drug in 41 of the DREs where toxicology results were positive for a depressant category drug in the evaluated subject's

sample. The DRE was incorrect in identifying depressant category drug use in the evaluated subject at a rate of 13%.

Additionally, 47 of the 324 DREs indicated that the evaluated subject was under the influence of a depressant category drug although toxicology results from the sample submitted by the evaluated subject did not confirm the presence of a depressant category drug. Therefore, the DRE incorrectly indicated the subject's impairment related to a depressant category drug in 14% of the DREs.

Lastly, 101 DREs indicated the subject was not under the influence of a depressant and no depressant was confirmed by the toxicology results. The DREs accurately indicated no depressant category drug(s) in the evaluated subjects at a rate of 31%. A summary of the analysis results is illustrated in Table 4.

Of particular concern with this segment of the four-quadrant matrix is that the DRE did not have to make a prediction in this portion of the assessment to be deemed correct. While this segment of the matrix represents 31% of the findings, it is the opinion of this investigator that the number does not represent any selective criterion based on the DRE's training. Many of the signs and symptoms associated with depressant category drug use are not characteristic of the other six drug categories and the physiological and physical manifestations observed with depressant category drugs are frequently different from those observed in other drug categories. Since these drug characteristics were not observed, the DRE is credited for something he or she did not purposefully identify and likely did not observe. If this is taken into consideration and



the DRE's non-prediction of depressants is confirmed by a negative finding in the toxicology, then the percentage of reliability changes considerably.

**Table 4**  
**DRE Opinion vs. Toxicology Results Matrix: Depressants**

		Drug Recognition Expert Opinion	
		Positive	Negative
Toxicology Results	Positive	N = 135	N = 41
	Negative	N = 47	N = 101

To understand the relationship between the DRE's opinion and toxicology results, the chi-square test for independence was utilized. The total number of observations for the depressant category is 324. There is 1 degree of freedom and the confidence level is 0.95. The observed chi square for depressants is 65.97. This calculated, observed chi square exceeds the critical chi square value of 3.84; therefore, the null hypothesis was rejected. By rejecting the null hypothesis, this indicates that there is a relationship between the DRE's opinion and the toxicology results within the depressant category. Additionally, the effect size index (phi) was calculated to determine the degree of relationship between the DRE's opinion and the toxicology result. For the depressant category,  $\phi = 0.45$ , which indicates a medium-sized relationship between the DRE's opinion and the toxicology results.

### *Stimulants*

The second drug group that was analyzed was the stimulant category. Of the 324 evaluations that were analyzed, 45 DREs indicated that the subject being assessed was under the influence of a stimulant category drug and toxicology results from the sample submitted by the evaluated subject subsequently confirmed the presence of a stimulant category drug. The DRE correctly determined stimulant category drug(s) in the evaluated subject at a rate of 13%.

The DRE failed to identify a stimulant drug in 65 of the 324 DREs where toxicology results indicated the presence of a stimulant drug(s) in the evaluated subject's sample. The DRE failed to correctly identify stimulant category drug(s) in the evaluated subject at a rate of 20%.

Of the 324 evaluations analyzed, 21 DREs predicted that the subject being assessed was under the influence of a stimulant category drug; however, toxicology results from the sample submitted by the evaluated subject did not confirm the presence of a stimulant category drug in their system at or shortly after the evaluation was performed. This ratio highlights that the DRE falsely identified the stimulant category in 6% of the DREs.

Lastly, 101 of the 324 evaluations showed that the DRE indicated no signs of impairment that could be attributed to a stimulant category drug, and this opinion was supported by a negative toxicology result. This translates into a success rate of 61%. The four-quadrant matrix associated with the stimulant category is summarized in Table 5.

As with the depressant category, quadrant IV is of particular concern to the overall success rates that could be claimed by the DECP. While this segment of the matrix represents 61% of the findings, it is the opinion of this investigator that the number is not representative of any selective criterion based on the DRE's training. Many of the signs and symptoms associated with stimulant category drugs are different from those observed in other drug categories. The DRE is being given credit for a correct prediction even though they do not identify a category. If this is taken into consideration and the DRE's non-prediction of stimulants is confirmed by a negative toxicology finding, then the percentage of reliability changes considerably.

**Table 5**  
**DRE Opinion vs. Toxicology Results Matrix: Stimulants**

		Drug Recognition Expert Opinion	
		Positive	Negative
Toxicology Results	Positive	N = 41	N = 65
	Negative	N = 21	N = 197

To understand the relationship between the DRE's opinion and toxicology results, the chi-square test for independence was utilized. The total number of observations for the stimulant category is 324. The degrees of freedom are 1 and the confidence level is 0.95. The observed chi square for stimulants is 38.87. This

calculated, observed chi square exceeds the critical chi square value of 3.84; therefore, the null hypothesis was rejected. This rejected null hypothesis indicates that there is a relationship between the DRE's opinion and the toxicology results within the stimulant category. Additionally, the effect size index (phi) was calculated to determine degree of relationship between the DRE's opinion and the toxicology result. For the stimulant category  $\phi = 0.35$ , which indicates a medium-sized relationship between the DRE's opinion and the toxicology results.

### *Hallucinogens*

There were fewer records related to the hallucinogen category than the first two categories, and only 1 DIE indicated that the DRE predicted that the subject being assessed was under the influence of a hallucinogen category drug and toxicology results from the sample submitted by the evaluated subject subsequently confirmed the presence of a hallucinogen category drug. The DRE correctly determined hallucinogen category drug(s) within the evaluated subjects at a rate of less than 1%.

Of the 324 evaluations analyzed, toxicology results from the sample submitted by the evaluated subject confirmed the presence of a hallucinogen category drug in their system in seven cases where the DRE did not identify the category on the DIE. This ratio represents 2% of the 324 records. None of the records indicated that a DRE predicted the hallucinogen category in a case where the toxicology results were negative.

Lastly, 316 of the 324 DIEs analyzed predicted that the subject being assessed was not under the influence of a hallucinogen category drug and toxicology results from the sample submitted by the evaluated subject confirmed no presence of a hallucinogen

category drug. This quadrant of the matrix represented 97% of the records in the hallucinogen category. The information related to the hallucinogen category is presented in Table 6.

Of particular concern with this segment of DREs is that the DRE did not make a prediction in this portion of the assessment. While this segment of the matrix represents 97% of the findings, it is the opinion of this investigator that the number is not representative of any selective criterion based on the DRE's training. An example of this is that many of the signs and symptoms associated with hallucinogen category drug use are not seen in the remaining six categories and the physiological and physical manifestations observed with hallucinogen category drugs are frequently different from those observed in other drug categories. However, many characteristics of other drug categories are observed with hallucinogen use. In this case, the DRE is given credit for a correct prediction that was never purposefully identified and should not have been observable. If this is taken into consideration, this quadrant of the matrix impacts the calculation of the overall success rate.

**Table 6**  
**DRE Opinion vs. Toxicology Results Matrix: Hallucinogens**

		Drug Recognition Expert Opinion	
		Positive	Negative
Toxicology Results	Positive	N = 1	N = 7
	Negative	N = 0	N = 316

In order to understand the relationship between the DRE's opinion and toxicology results, the chi-square test for independence was utilized. The total number of observations for the hallucinogen category is 324. The degrees of freedom are 1 and the confidence level is 0.95. The observed chi square for hallucinogens is 36.62. This calculated, observed chi square exceeds the critical chi square value of 3.84; therefore, the null hypothesis was rejected. This rejected null hypothesis indicates that there is a relationship between the DRE's opinion and the toxicology results within the hallucinogen category. Additionally, the effect size index ( $\phi$ ) was calculated to determine degree of relationship between the DRE's opinion and the toxicology result. For the hallucinogen drug category,  $\phi = 0.35$ , which indicates a medium-sized relationship between the DRE's opinion and the toxicology results.

#### *Phencyclidine (PCP)*

The fourth drug group that was analyzed was the phencyclidine (PCP) category. Of the 324 evaluations that were analyzed, 14 DREs indicated that the subject being assessed was under the influence of PCP and toxicology results from the sample submitted by the evaluated subject subsequently confirmed the presence of PCP in their system at or shortly after the evaluation was performed. The DRE correctly determined PCP in the evaluated subject at a rate of 4%.

The DRE failed to predict PCP in 12 DREs where toxicology results came back positive for the drug in the evaluated subject's sample. Based on the total population of 324, this ratio represents a rate of 4% for this segment of the quadrant. Conversely, the DRE indicated that the subject was impaired by PCP on 4 of the 324 records when the

toxicology results did not confirm the prediction. The DRE incorrectly identified PCP in the evaluated subject at a rate of 1%.

Lastly, the data analysis indicated that 294 of the 324 DREs predicted that the subject being assessed was not under the influence of PCP and toxicology results from the sample submitted by the evaluated subject subsequently confirmed no presence of PCP in their system at or shortly after the evaluation was performed. The DRE correctly determined no PCP in the evaluated subject at a rate of 91%. The data associated with PCP is summarized in Table 7.

As with the previously categories, the 91% success rate for this category does not provide a clear indication as to the application of the DRE's training. PCP is a unique category related to observable signs and symptoms. The DRE-DTS accepts these category IV results to be successful predictions, giving the DRE credit for accuracy in something that was never purposefully identified since there were no signs and symptoms. If this is taken into consideration, and the DRE's non-prediction of PCP and a negative finding in the toxicology is present, then the percentage of reliability changes considerably.

**Table 7**  
**DRE Opinion vs. Toxicology Results Matrix: PCP**

		Drug Recognition Expert Opinion	
		Positive	Negative
Toxicology Results	Positive	N = 14	N = 12
	Negative	N = 4	N = 294

In order to understand the relationship between the DRE's opinion and toxicology results, the chi-square test for independence was utilized. The total number of observations for PCP is 324. The degrees of freedom are 1 and the confidence level is 0.95. The observed chi square for PCP is 125.64. This calculated, observed chi square exceeds the critical chi square value of 3.84; therefore, the null hypothesis was rejected. This rejected null hypothesis indicates that there is a relationship between the DRE's opinion and the toxicology results for PCP. Additionally, the effect size index (phi) was calculated to determine degree of relationship between the DRE's opinion and the toxicology result. For PCP  $\phi = 0.62$ , which indicates a large-sized relationship between the DRE's opinion and the toxicology results.

#### *Narcotic Analgesics*

The fifth drug group analyzed was the Narcotic Analgesics (NA) category. Of the 324 evaluations analyzed, 62 DREs indicated that the subject being assessed was under the influence of an NA category drug and toxicology results from the sample submitted



by the evaluated subject subsequently confirmed the presence of an NA category drug in their system at or shortly after the evaluation was performed. The DRE correctly determined NA category drug(s) in the evaluated subject at a rate of 19%.

Additionally, 37 of the 324 DIES evaluated indicate that the DRE failed to identify NA as a possible impairment category when the toxicology results showed positive levels for the drugs. This represents 11% of the predictions in the NA category.

Of the 324 evaluations analyzed, 21 DREs predicted that the subject being assessed was under the influence of an NA category drug when the toxicology results did not confirm the presence of an NA category drug in their system at or shortly after the evaluation was performed. This accounts for 6% of the records in the NA category.

The narcotic analgesics category had 63% (204 records) of DIES that had negative toxicology results and no indication impairment attributed to the category by the DREs. The data associated with the NA category is presented in Table 8.

Again, this situation poses particular concern related to the published success rates within the DRE-DTS. While this segment of the matrix represents 63% of the findings, it is the opinion of this investigator that the number is not a true representation of the ability of the DRE to correctly predict impairment due to NA and inclusion of this quadrant significantly impacts success rates.

**Table 8**  
**DRE Opinion vs. Toxicology Results Matrix: Narcotic Analgesics**

		Drug Recognition Expert Opinion	
		Positive	Negative
Toxicology Results	Positive	N = 62	N = 37
	Negative	N = 21	N = 204

To understand the relationship between the DRE's opinion and toxicology results, the chi-square test for independence was utilized. The total number of observations for the narcotic analgesic category is 324. The degrees of freedom are 1 and the confidence level is 0.95. The observed chi square for narcotic analgesics is 102.47. This calculated, observed chi square exceeds the critical chi square value of 3.84; therefore, the null hypothesis was rejected. This rejected null hypothesis indicates that there is a relationship between the DRE's opinion and the toxicology results within the narcotic analgesic category. Additionally, the effect size index (phi) was calculated to determine degree of relationship between the DRE's opinion and the toxicology result. For the narcotic analgesic category  $\phi = 0.56$ , which indicates a large-sized relationship between the DRE's opinion and the toxicology results.

### *Inhalants*

The sixth drug group analyzed was the inhalant category. Of the 324 evaluations analyzed, 1 DIE indicated that the subject being assessed was under the influence of an

inhalant category drug and toxicology results from the sample submitted by the evaluated subject subsequently confirmed the presence of an inhalant category drug in their system at or shortly after the evaluation was performed. The DRE correctly determined inhalant category drug(s) in the evaluated subject at a rate of less than 1%.

Only 3, or less than 1% of the inhalant records, indicated that the DRE did not predict impairment when the toxicology results reported a positive result. Additionally, analysis indicated that the DRE predicted inhalants on 3 of the 324 DREs, but the toxicology results did not confirm their opinion. This quadrant represents less than 1% of the reports attributed to the inhalant category.

Lastly, an analysis of the data was conducted to determine how often the DRE did not predict the inhalant category of drug and the toxicology results confirmed that no inhalant category drug was found in the evaluated subject's sample. Of the 324 total evaluations, 317 DREs indicated that the subject being assessed was not under the influence of an inhalant category drug and toxicology results from the sample submitted by the evaluated subject confirmed no presence of an inhalant category drug. The DRE correctly determined no inhalant category drug(s) within the evaluated subject at a rate of 98%. All of the information related to the inhalant category is summarized in Table 9.

Of particular concern with this segment of the four-quadrant matrix is that the DRE does not have to predict anything in this portion of the assessment. While this segment of the matrix represents 98% of the findings, it is the opinion of this investigator that the number is not representative of any selective criterion based on the DRE's training. Inhalant use typically produces signs and symptoms that are very short

in duration and therefore are often no longer present when the DRE observes the subject. This phenomenon is one of the reasons for the high percentage of successful no-calls and cannot be represented as a valid success rate. Additionally, there are not enough opportunities in this drug category for the DRE to apply their skills. Including these results as part of the analysis skews the perceived success rate.

**Table 9**  
**DRE Opinion vs. Toxicology Results Matrix: Inhalants**

		Drug Recognition Expert Opinion	
		Positive	Negative
Toxicology Results	Positive	N = 1	N = 3
	Negative	N = 3	N = 317

To understand the relationship between the DRE's opinion and toxicology results, the chi-square test for independence was utilized. The total number of observations for the inhalant category is 324. The degrees of freedom are 1 and the confidence level is 0.95. The observed chi square for inhalants is 18.76. This calculated, observed chi square exceeds the critical chi square value of 3.84; therefore, the null hypothesis was rejected. This rejected null hypothesis indicates that there is a relationship between the DRE's opinion and the toxicology results within the inhalant category. Additionally, the effect size index (phi) was calculated to determine degree of

relationship between the DRE's opinion and the toxicology result. For the inhalant category  $\phi = 0.24$ , which indicates a small-sized relationship between the DRE's opinion and toxicology results.

### *Cannabis*

The seventh drug category is cannabis. Of the 324 evaluations analyzed, 111 DREs predicted that the subject being assessed was under the influence of a cannabis category drug and toxicology results from the sample submitted by the evaluated subject subsequently confirmed the presence of a cannabis category drug in their system at or shortly after the evaluation was performed. The DRE correctly determined cannabis category drug(s) in the evaluated subject at a rate of 34%.

Of the 324 evaluations analyzed, 29 DREs failed to predict that the subject being assessed was under the influence of a cannabis category drug while toxicology results confirmed the presence of a cannabis category drug in their system. This ratio represents 9% of the records in the cannabis category.

Additionally, 31 of the 324 DREs indicate that the DRE incorrectly selected cannabis as a category of influence when the toxicology results from the sample submitted by the evaluated subject did not confirm the presence of cannabis. This translated into a 10% failure rate for the DRE in this quadrant of the cannabis category.

Finally, 153 DREs, or 47% of the cannabis records, indicate the DRE did not predict cannabis and that selection was confirmed through a negative toxicology result. The information for the cannabis category is illustrated in the matrix in Table 10.

As with the other drug categories, the use of the statistics in this quadrant of the matrix is of concern to the investigator. Cannabis shares some of the same signs and symptoms with other drug categories, while it also has distinct indicators that are exclusive to the cannabis category. As has been discussed for previous categories, inclusion of this quadrant in the cannabis success rate presents problems in the area of reliability.

**Table 10**  
**DRE Opinion vs. Toxicology Results Matrix: Cannabis**

		Drug Recognition Expert Opinion	
		Positive	Negative
Toxicology Results	Positive	N = 111	N = 29
	Negative	N = 31	N = 153

In order to understand the relationship between the DRE's opinion and toxicology results, the chi-square test for independence was utilized. The total number of observations for the cannabis category is 324. The degrees of freedom are 1 and the confidence level is 0.95. The observed chi square for cannabis is 125.90. This calculated, observed chi square exceeds the critical chi square value of 3.84; therefore, the null hypothesis was rejected. This rejected null hypothesis indicates that there is a relationship between the DRE's opinion and the toxicology results in the cannabis

category. Additionally, the effect size index ( $\phi$ ) was calculated to determine degree of relationship between the DRE's opinion and the toxicology result. For the cannabis category  $\phi = 0.62$ , which indicates a large-sized relationship between the DRE's opinion and the toxicology results.

### *Summary*

An independent analysis of each DIE submitted for each of the seven drug categories was undertaken to determine the rate of reliability at which the DRE could predict drug(s) use categories in the subject being assessed. The investigator wanted to identify whether the DRE's methods used in the DIE accomplished their purpose, which is to correctly identify impairment by certain categories of drug(s) by confirming the DRE's predicted drug(s) category choices with toxicological results of biological specimens provided for analysis. The percentage of accuracy in the DRE's identification of certain categories of drug(s) represents the success rate in relation to the DRE's ability to perform this function.

The drug categories were broken down into DRE predictions based on the DIE that reported for the subject being evaluated. The DRE could make one of four choices:

1. They believed the person was under the influence of a drug category and this belief was confirmed by toxicology analysis (Quadrant I).
2. They believed the person was not under the influence of a drug category; however, toxicology confirmed the presence of the substance in the subject being evaluated (Quadrant II).

3. They believed the person was under the influence of a drug category; however, toxicology failed to confirm the presence of the substance in the subject being evaluated (Quadrant III).
4. They believed the person was not under the influence of a drug category and toxicology confirmed no presence of the substance in the subject being evaluated (Quadrant IV).

Table 11 summarizes each drug category according to quadrant.

**Table 11**  
**Results by Drug Category: DECP Success Rate**

	Quadrant I		Quadrant II		Quadrant III		Quadrant IV	
	DRE	Tox	DRE	Tox	DRE	Tox	DRE	Tox
	+	+	-	+	+	-	-	-
Depressants	42%		13%		14%		31%	
Stimulants	13%		20%		6%		61%	
Hallucinogens	<1%		2%		0%		97%	
PCP	4%		4%		1%		91%	
Narcotic Analgesics	19%		11%		6%		63%	
Inhalants	<1%		<1%		<1%		98%	
Cannabis	34%		9%		10%		47%	

The DECP considers their success rate to be a combination of quadrants I and IV. Conversely, quadrants II and III are considered to be unsuccessful predictions. Based on



these criteria, the success rate for enforcement data collected in the DRE-DTS for the calendar year 2000 were as follows: depressants, 73%; stimulants, 74%; hallucinogens, 98%; PCP, 95%; narcotic analgesics, 82%; inhalants, 99%; and cannabis, 81%.

Of particular concern is that the fourth quadrant of the matrix does not require a prediction from the DRE. While this segment of the matrix represents in some cases a high percentage of the findings, it is the opinion of this investigator that the number is not representative of any selective criterion based on the DRE's training. As with all of the drug categories, inclusion of the statistics in this quadrant of the matrix is of concern. Several drugs share similar signs and symptoms with other drug categories, while others have distinct indicators that are exclusive of the other categories. If this is taken into consideration and the DRE's non-prediction of a drug category coupled with a negative finding in the toxicology is present for that particular drug category, then the success rate percentage changes considerably.

This phenomenon is one of the reasons why no-calls should not be included as a part of the valid success rate. Additionally, there are not enough opportunities for the DRE to apply their skills by including these results as part of the analysis; as such, it skews the calculated success rate. Taking this into consideration, a more accurate success rate would not consider quadrant IV as part of the evaluation. A summary of the drug categories, along with the adapted success rate (omitting quadrant IV) is presented in Table 12.

**Table 12**  
**Results by Drug Category: Adapted Success Rate**

	Quadrant I		Quadrant II		Quadrant III		Adapted Success Rate
	DRE	Tox	DRE	Tox	DRE	Tox	
	+	+	-	+	+	-	
Depressants	135		41		47		60.5%
Stimulants	41		65		21		32.2%
Hallucinogens	1		7		0		12.5%
PCP	14		12		4		46.6%
Narcotic Analgesics	62		37		21		51.6%
Inhalants	1		3		2		16.6%
Cannabis	111		29		31		64.9%

It is evident that when quadrant IV is eliminated from the success rate calculation, there is a significant difference between the percentages. For example, the success rate in the depressant category when quadrant IV is included is 73%. However, when quadrant IV is eliminated from the calculation, the success rate drops to 60.5%. This represents a 12.5% decrease in the DRE's success rate for identification of this category of drug.

#### Research Question Two

The second research question asked was: What is the most frequently called and confirmed drug categories of abuse indicated by police officers trained in the DECP in Texas?

To determine this, the investigator analyzed the drug category predictions made by DREs in the 324 enforcement DIEs selected for this study. The DIE, the DREs drug category prediction, and the confirmed toxicology results were analyzed. The findings were then compared, assessing the frequency of the DRE's drug category prediction. The DRE's drug category prediction was then compared to the known toxicological results. This comparison was necessary to confirm the DRE's prediction regarding drug(s) found in the toxicological sample provided by the evaluated subject.

#### *Frequency of Called Drug Categories*

In order to determine which drug categories were called most frequently, the enforcement DIEs were analyzed for the number of calls for each specific category. Quadrants I and III represent positive predictions made by the DRE for specific drug categories called. In 182 of the DIEs conducted, the DRE indicated the subject to be under the influence of a drug in the depressant category. The second most cited category was cannabis, with 142 DIEs referencing this category. The next most frequently called category was narcotic analgesics, which were cited in 83 separate DIEs. Stimulants were the fourth most frequently called drug category, with 62 DIEs reported. The remaining categories chosen by DREs represent a low number of calls due to a lack of DIEs conducted on impaired individuals using these categories of drugs. PCP, inhalants, and hallucinogens accounted for 18, 4, and 1 DIE records, respectively. Table 13 summarizes the called information according to drug categories.

**Table 13**  
**Summary of Called Drug Category**

	Quadrant I		Quadrant II		Quadrant III		Adapted Success Rate
	DRE	Tox	DRE	Tox	DRE	Tox	
	+	+	-	+	+	-	
Depressants	135		41		47		60.5%
Stimulants	41		65		21		32.2%
Hallucinogens	1		7		0		12.5%
PCP	14		12		4		46.6%
Narcotic Analgesics	62		37		21		51.6%
Inhalants	1		3		2		16.6%
Cannabis	111		29		31		64.9%

#### *Frequency of Drug Category Confirmation*

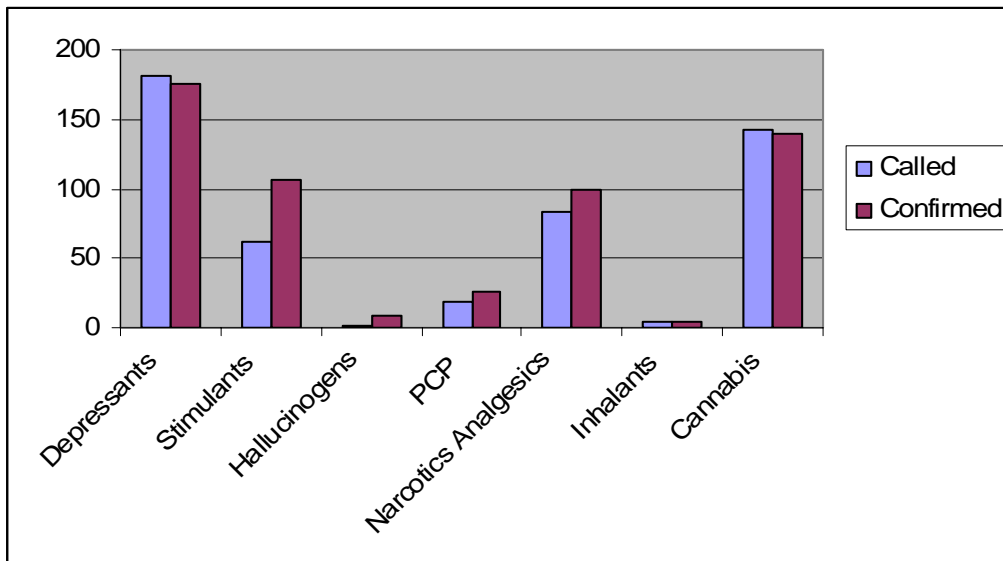
To determine which drug categories were confirmed through toxicology most frequently, the enforcement DIEs were analyzed for the number of confirmations for each specific drug category. Quadrants I and II represent positive confirmations from toxicology analysis for specific drug categories. In 176 of the DIEs conducted, toxicology results indicated the subject was under the influence of a drug in the depressant category. The second most confirmed drug category was cannabis, with 140 DIE toxicology results. The next most frequently confirmed category was stimulants, which were confirmed in 106 separate DIEs. Narcotic analgesics were the fourth most frequently confirmed drug category, with 99 DIE toxicology analyses confirmed. The remaining categories confirmed by toxicology represent a low number due to a lack of

DIEs conducted on impaired individuals using these categories of drugs. PCP, hallucinogens, and inhalants accounted for 26, 8, and 4 DIE toxicology confirmations, respectively. Table 14 summarizes the confirmed information according to drug categories.

**Table 14**  
**Summary of Confirmed Drug Category**

	Quadrant I		Quadrant II		Quadrant III		Adapted Success Rate
	DRE	Tox	DRE	Tox	DRE	Tox	
	+	+	-	+	-	+	
Depressants	135		41		47		60.5%
Stimulants	41		65		21		32.2%
Hallucinogens	1		7		0		12.5%
PCP	14		12		4		46.6%
Narcotic Analgesics	62		37		21		51.6%
Inhalants	1		3		2		16.6%
Cannabis	111		29		31		64.9%

To highlight potential opportunities for improvements in DECP training, Figure 2 presents the frequency of called and confirmed records according to drug category.



*Figure 2. Comparison of called vs. confirmed according to drug category.*

The data presented in this chapter provides appropriate information to answer the proposed research question within the specific limitations. The results prompt additional questions which warrant further research. The conclusions, limitations, and recommendations for further research will be discussed in the next chapter of this study.

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### SUMMARY

A retrospective research study was conducted to determine if the Drug Evaluation and Classification Program (DECP) procedures were effective in their mission to identify subjects who are believed to be under the influence of specific drug categories. The investigator wanted to determine if the DECP procedures were reliable so that drug recognition experts (DREs) could properly apply DECP procedures and consistently identify the category of drugs used and have that opinion supported through toxicology analysis.

The study data analyzed was obtained from the DRE data tracking system (DRE-DTS) maintained through the National Highway Traffic Safety Administration (NHTSA). A total of 324 enforcement drug influence evaluations (DIEs) that met the study criteria for inclusion were analyzed. In addition, the toxicology sample results from the evaluated subjects were analyzed and compared to determine if the DRE's drug category prediction was supported through toxicology analysis results. The study objectives were to determine if the 12-step DECP process significantly increases the DRE's ability to identify drug categories of use and to identify what the most frequently called and confirmed drug categories of use are in post-drug users in Texas.

DREs' ability to predict specific drugs of use according to categories and to have the prediction supported by toxicology was moderately accurate at best. Of the 324

evaluations that included toxicology results, the DRE was able to correctly identify drug categories as follows: depressants, 60.5%; stimulants, 32%; hallucinogens, 12%; PCP, 46.6%; narcotic analgesics, 51.6%; inhalants, 14.2%; and cannabis, 64.9%.

To determine which drug categories were called most frequently, the enforcement DREs were analyzed to determine the number of calls for each specific category. The investigator found the following drug categories to be the most frequently called by the DREs who evaluated subjects: depressants, 182; cannabis, 142; narcotic analgesics, 83; stimulants, 62; PCP, 18; inhalants, 4; and hallucinogens, 1.

To determine which drug categories were most frequently confirmed through toxicology, the enforcement DREs were analyzed to determine the number of confirmations for each specific drug category. The investigator found the following drug categories to be the most frequently confirmed through toxicology: depressants, 176; cannabis, 140; stimulants, 106; narcotic analgesics, 99; PCP, 26; hallucinogens, 8; and inhalants, 4.

## CONCLUSIONS

The investigator was able to determine, based on DRE-DTS data, that Texas DREs are only moderately able to identify drug categories of use when utilizing DECP procedures in enforcement settings. The DRE's prediction of drug category was not consistently supported when the DREs were compared to actual toxicology results in samples obtained from evaluated subjects. While the DRE-DTS reports an overall



success rate of 85.5% (median) across all drug categories, this analysis respectfully submits a more representative percentage of success at 53.2% (median).

What should be emphasized is that the DRE-DTS success rate includes all negative DRE predictions accompanied by negative toxicology results (quadrant IV). As stated previously in chapter IV of this study, the physiological and physical manifestations observed with certain category drugs are frequently different from those observed within other drug categories. Since drug characteristics display different manifestations, not all of those represented across all drug categories will be observed. As a result, the DRE is given credit for a correct prediction which was neither purposefully selected nor were observable signs displayed within that category. When this is taken into consideration, the percentage of reliability changes considerably.

The DRE-DTS does not make this assumption and includes this quadrant, which in some cases represents 97% of the population, skewing the DRE's prediction rate of success. The calculated difference between the DRE-DTS and this study's adapted rate of success when quadrant IV has been removed from the equation is summarized in Figure 3.

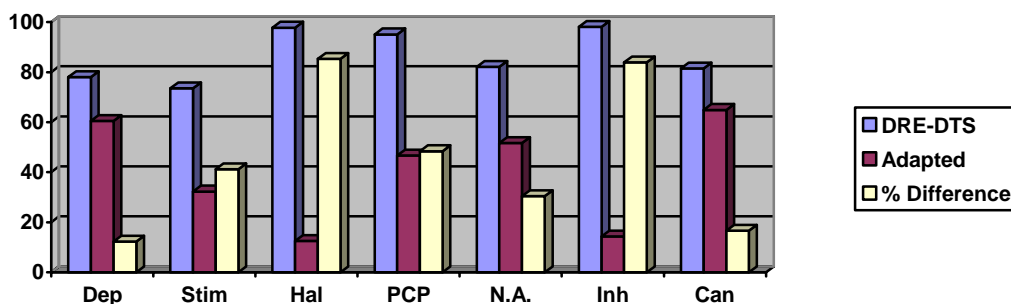


Figure 3. Comparison of the DRE-DTS and adapted success rate.

It is not the intent of the investigator to present this adapted rate in order to place the DECP in a negative light but rather to highlight more clearly the opportunity for effective program evaluation and subsequent training improvements. Based on the data analyzed, there was a significant difference between the drug categories predicted and the rate of confirmation through toxicology.

In order to accurately calculate success rates for the DECP program, only enforcement evaluations should be included in the equation. Training evaluations should not be used because of inherent problems with multiple assessors and instructor influence. Additionally, the training evaluation process and enforcement processes are not homogeneous and therefore cannot be included within the same population.

#### RECOMMENDATIONS/IMPROVING THE STUDY

If the DRE-DTS is expected to be used as a means of effectively evaluating the DECP, then it is critical to ensure that all data evaluations conducted are input into the system. Currently, not all of the DIEs are entered into the DRE-DTS. The system relies

on self-reported data entered at the discretion of the individual DRE. This practice must be changed so that the system more accurately reflects the actions of the DECP community. It also serves to ensure the integrity of the data collected.

Additionally, all of the DREs should be entered into the DRE-DTS in order to track whether the signs and symptoms of drug use within categories are consistent with DECP training protocol. This provides a more holistic picture of the DRE's evaluation results compared to what should be observed in the DIE process.

## FUTURE RESEARCH

In order for DECP training and field deployment to be effective, future studies should be conducted in the area of assessing specific physical and physiological manifestations that occur when subjects use particular categories of drug(s). These signs and symptoms should be analyzed to better understand the effects that certain categories of drugs play in identifying impaired behavior or measurable physiological manifestations.

The DECP trains officers to utilize a decision-making process to identify a specific category of drug(s). Future research should seek to understand whether the DREs use of the prescribed process of evaluation and selection criteria are appropriate for each drug category sought. Additionally, research should be conducted to analyze the information that is documented as part of the detailed DIE, such as blood pressure, pulse rate, and specific signs and symptoms, as well as horizontal gaze nystagmus (HGN), to better understand the decision-making process of the DRE related to those DIEs that

were deemed incorrect. These incorrect DIEs include those that were assigned to quadrants II and III and were previously discussed in this study.

Based on the results of this research, it is important to assess the link between the combination of the training content and the learning activities and the application of desired skills in enforcement settings. This research informs the training element of the DECP at both the initial certification and recertification levels.

Finally, a detailed evaluation study should be conducted that follows the DECP process from arrest, through the 12-step DIE process, through toxicology, and adjudication through the court system. By conducting this type of study, it is hoped to be able to achieve a level of validity that supports the process in its purpose to correctly identify and classify post-drug users.

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## APPENDIX A

## DRUG EVALUATION AND CLASSIFICATION (DEC) PROGRAM

## DRUG INFLUENCE EVALUATION

<b>DRUG INFLUENCE EVALUATION</b>		
<b>LOG NO.</b>	<b>DRE:</b>	<b>ARRESTEE:</b>
<b><u>1. LOCATION:</u></b>		
<b><u>2. WITNESSES:</u></b>		
<b><u>3. BREATH TEST:</u></b>		
<b><u>4. NOTIFICATION/INTERVIEW OF ARRESTING OFFICER:</u></b>		
<b><u>5. INITIAL OBSERVATIONS:</u></b>		
<b><u>6. MEDICAL PROBLEMS:</u></b>		
<b><u>7. PSYCHOPHYSICAL:</u></b> Romberg test; Walk and turn test; One leg stand test; Finger to nose test		
<b><u>8. CLINICAL INDICATORS:</u></b> Pulse rate x 3; Body temperature; Blood pressure; Eye examinations: HGN & LOC		
<b><u>9. SIGNS OF INGESTION:</u></b>		
<b><u>10. SUSPECTS STATEMENTS:</u></b>		
<b><u>11. OPINION:</u></b>		
<b><u>12. TOXICOLOGICAL:</u></b> Urine sample obtained (yes or no)		
<b><u>13. MISC:</u></b>		

## APPENDIX B

## DRUG EVALUATION AND CLASSIFICATION (DEC) PROGRAM

## DATA TRACKING EVALUATION FORM

State:	Agency:	
Evaluator:	Case Number:	
Subjects Last Name:	Type of evaluation:	
Subjects First Name:	Date of evaluation:	
Subjects DOB:	Time of evaluation:	
Subjects Gender:	Subjects BrAC: Refused (yes or no)	
Subjects Race:	Will Tox results be available?	
Arresting officer:	Specimen type taken:	
_____		
Last name	first name	
<b><u>Opinion of the Evaluator</u></b>		
CNS Depressants	CNS Stimulant	Hallucinogens
PCP	Narcotic Analgesic	Inhalant
Cannabis	Alcohol	Alcohol rule out
Medical rule out	No Impairment	
Felony Offense:	Misdemeanor Offense:	

## VITA

Troy Duane Walden  
2813 Muirwood Court  
Bryan, Texas 77807

## Education

- Ph.D. Educational Human Resource Development  
Texas A&M University, College Station, Texas. May 2005
- M.S. Educational Human Resource Development  
Texas A&M University, College Station, Texas. August 1999
- B.S. Criminal Justice: Law Enforcement and Police Science  
Sam Houston State University, Huntsville, Texas. August, 1987

## Professional Experience

President and Managing Partner: Walden, Platt & Associates, Bryan,  
Texas. 2002-present

Program Coordinator: Texas Engineering Extension Service Law  
Enforcement Security Training Division/ The Texas A&M University  
System, College Station, Texas, 1999-2002

Sergeant: City of College Station (Texas) Police Department, College  
Station, Texas, 1988-1999.