DETECTION OF DRINKING: A NEGLECTED ELEMENT IN DUI ENFORCEMENT

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SECTION I: DETECTION OF DRINKING IN THE ARREST PROCESS

INTRODUCTION

A strong emphasis is being placed on general deterrence to drunken driving by the National Highway Traffic Safety Administration, the federal government, through the President's Commission on Drunk Driving and by the states, through new legislation strengthening drunk driving laws, and appropriations providing for increased enforcement effort. While considerable emphasis is being given to enforcement and to producing general deterrence, relatively little has been done to study the nature of the general deterrent effect or to produce improved enforcement technology.

There are, however, three notable exceptions to this general statement: 1) breath test development companies have produced small, portable preliminary test devices which are highly accurate; 2) under a NHTSA contract (Harris, et al., 1980), the driving behaviors which are most likely to indicate that the vehicle operator is impaired have been studied and compiled in a manual for traffic enforcement officers; and, 3) with NHTSA support (NHTSA, 1982), a new sobriety testing technique making use of a Nystagmus (small involuntary movements of the eye) has been developed and embodied in a training program for application to officers on DUI assignment.

Detection of Drinking

One area, however, which has received little or no attention is the initial detection of individuals who have been drinking. This is one of the four major steps in the enforcement process. The process begins with the officer observing unsafe or illegal driving behavior. On the basis of such behavior, the officer brings the driver to a stop and an interview begins. The second step involves the detection of drinking in the course of that interview. Once evidence of drinking has been collected, the combination of unsafe driving and evidence of drinking provides the basis for the third step, conducting a more detailed investigation, making use of roadside sobriety tests and/or a preliminary breath test. If these provide evidence of impairment, the officer then has "probable cause" for the fourth step--

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arrest of the driver and initiation of formal processing which normally will include an evidential breath test.

As noted above, recent studies have provided new tools for the traffic police in carrying out step 1, (the detection of erratic driving behavior and the carrying out of step 3, (the determination of impairment), either through the use of a preliminary breath test or through sobriety testing. The second step, which involves the detection of drinking on the part of the driver in the initial interview following the stopping of the car, has received little attention, however.

DETECTION OF DRINKING AT CHECKPOINTS

This neglect is becoming more significant as police departments experiment with sobriety checkpoints. In this enforcement procedure, step 1 is eliminated. All vehicles are stopped or at least subject to being stopped and no unsafe driving behavior is normally observed. In the sobriety checkpoint, the first contact with the driver comes in the interview once the vehicle has stopped and the full weight of the checkpoint procedure falls upon the initial detection of drinking.

Requirements for Individualized Suspicion

The Fourth Amendment to the Constitution states that, "The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures shall not be violated, and no warrant shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized." This has placed a constitutional limit on the nature of the searches and seizures which can be conducted by police in the course of law enforcement. The basic requirement for reasonableness is met by demonstration of probable cause.

With the exception of a few well-defined situations, officers must obtain a warrant from a neutral magistrate prior to conducting either an arrest or a search. When the officers must present their evidence for probable cause to a neutral party, it is likely that it must be substantive and reasonably accurate. Many law enforcement situations, however, do not permit the warrant process because the evidence would disappear before a warrant could be obtained. This, of course, is true in the drunk driving enforcement process. Whereas in DUI enforcement, a warrant is not necessary, the Fourth Amendment requires that searches and seizures be justified by some quantum of individualized suspicion.

Subjectivity of Probable Cause

The problem with this probable cause requirement as applied in enforcement operations is that most of the signs and symptoms which courts have recognized as providing the basis for probable cause are 1) not specific to alcohol impairment, and 2) are subjective and therefore subject to considerable variation among observers. This being the case, there is an opportun-

ity for other subjective factors to influence the apprehension of drinking drivers, some of which could result in discrimination against certain types or classes of individuals. There is considerable evidence that individuals from lower socio-economic groups are over-represented among those convicted of drinking-driving offenses in many areas of the United States. Whether this simply represents a higher tendency of this group to drink and drive or whether it represents a discriminatory factor in the enforcement process is not clear. It is evident, however, that, to the extent that the enforcement process relies upon subjective symptoms, the opportunity for various types of prejudice to effect the enforcement process is increased.

Stopping Vehicles Systematically

As an alternative to the indiyidualized suspicion requirement for stopping vehicles in DUI enforcement, the Supreme Court has accepted the reasonableness under the Fourth Amendment of stopping and interviewing drivers briefly at checkpoints at which vehicles are stopped according to a formula which prevents individual officer discretion in choosing the vehicle to be inspected. Under this formula, the courts normally balance the state's interest in the stopping and inspecting the driver and vehicle as a requirement for protecting public health and safety, with the extent of the intrusion into the privacy of the individual vehicle operator.

The extent of the intrusion has generally been weighed on the basis of two considerations: 1) the discretion which the individual officer is allowed in selecting the vehicle to be inspected; and 2) the subjective impact upon the driver of the instrusion. The is measured in terms of the psychological impact of factors such as fright, embarrassment or annoyance presented by being stopped by the police. The courts have generally supported sobriety checkpoint operations where the checkpoint was established in such a way that it was clear to the driver that all vehicles were being stopped, and that he or she was not being singled out for special attention (Ifft, 1983; Compton and Engle, 1983).

Must Have Evidence of Drinking

Once stopped, however, the issue of "reason to believe" that an offense is being committed arises again (Compton and Engle, 1983). Typically, the checkpoint stop permits the detention of a driver for only a very brief period of questioning. Perhaps on the order of two minutes. This is generally insufficient to collect enough evidence to provide probable cause for an arrest. Further, many DUI roadblocks involve even briefer stops, limited to 15-30 seconds. It is necessary, then, during this time period for the officer to make a decision whether to detain the driver for a further investigation or to allow the vehicle to proceed. There are then two decision points in the normal roadblock activity. First, based on a brief interview, a decision as to whether to detain the driver for step 3 of the arrest process: either a preliminary breath test, roadside sobriety (psychomotor) test or both. And, following this third step, the decision as to whether there is probable cause to make the arrest.

Brief Interview Results in Few Arrests

In the typical checkpoint operation, the greatest time pressure is on the initial interview. At this point, the officer has the least possible information on which to base a decision on whether to detain or not detain the motorist. Unlike the normal patrol, he has no information from the first step of the arrest process, which is erratic driving and, unlike the normal patrol activity, the interview which is held must be very brief, since the driver is usually holding up traffic. Under these conditions, relatively few drivers are detained, and even fewer are arrested. While national roadside voluntary breath test surveys indicate that approximately 5% of the driving public are above .10% BAC during the late night hours in which checkpoints are normally conducted (Wolfe, 1975), most checkpoint operations have resulted in the arrest of less than 1% of the drivers being interviewed. This is shown in the data in Figure 1. The one clear exception to this generalization is the 5% arrest rate achieved by the Washington, DC Metropolitan Police. This Department made use of the electronic sensing system which is the subject of this paper.

FIGURE 1
RESULTS OF SOBRIETY CHECKPOINT
OPERATIONS IN THREE JURISDICTIONS

LOCATION	NUMBER INTERVIEWED	NUMBER DETAINED	NUMBER ARRESTED	PUBLIC REACTION % POSITIVE
DC	1,465	248 (17%)	71 (5%)	88%
MD:				
Harford Co. [1]	4,685	40 (1%)	17 (.4%)	86%
Montgomery Co. [2]	14,000	--	8 (.6%)	
Pr. Geo. Co. [3]	22,899	--	48 (.2%)	
DE [4]	12,654	701 (6%)	231 (2%)	

Notes: 1) Field Operations Bureau; 2) Hiland, 1983; 3) Mitchell, 1983; 4) Traffic Control Section, 1983.

IMPROVING THE DETECTION OF DRINKING

A large number of different symptoms of drinking have been used by the police to determine whether the officer should proceed to do a further investigation of the driver to determine whether he has been impaired by alcohol. The Oregon Supreme Court has recently taken judicial notice of several of these signs of intoxication, including the following: (1) odor of the breath, (2) flushed appearance, (3) lack of muscular coordination, (4) speech difficulties, (5) disorderly or unusual conduct, (6) mental disturbance, (7) visual disorders, (8) sleepiness, (9) muscular tremors, (10) dizziness, and (11) nausea. (State vs. Clark, 286 OR 33, p.2d 123 (1979).)

Detecting Odor of Alcohol

It is notable that odor of the breath is the number one sign listed and is in all probability the most frequently cited symptom of drinking used by the police. Despite this, it is well known that ethyl alcohol has little or no detectable odor, particularly at the low concentration present in breath. What is interpreted as the smell of alcohol on the breath is principally odors produced by the cogeners, which are a component of the liquor normally consumed. The cogeners are what give each type of liquor its distinctive flavor and odor. Liquors such as scotch and bourbon produce more of an odor on the breath than does vodka.

In addition, Borkenstein (1983), in studying the relationship between drinking and breath odor, noted that certain individuals appear to produce a stronger odor of drinking with a lower amount of alcohol than other individuals. That is, the extent to which the odor of the breath will reflect drinking is determined in part by an individual's metabolism as well as by the type of alcohol consumed. Thus one source of error in detecting the odor of alcohol on the breath is that this stimulus will vary both with the type of alcohol consumed and with the metabolism of the individual driver.

A second potential problem in the use of breath odor is the well-known effect produced by residual alcohol in the mouth. Residual quantities of any liquor consumed will remain in the mouth for a period of approximately 15 minutes. This can produce an odor of alcohol even if the individual has a zero BAC.

Screening Substances

Finally, the ability of the officer to smell "alcohol" is also affected by screening odors. Among these can be those produced by substances taken internally, such as mouthwashes or breath mints and other candies and by external odors such as those produced by after shaves and perfumes. Screening odors can also come from environmental sources, such as exhaust fumes, leaking gasoline, the smoke of safety flares, and other sources of fumes.

Thus, while breath odor is a primary symptom relied on by the police and well accepted by the courts, it is subject to a large number of variables which are independent of the actual breath alcohol content.

Use of Preliminary Breath Tests

One possibility for strengthening this second phase of the DUI arrest process would be to move forward the preliminary breath test to the initial interview. This would require testing all drivers who demonstrated erratic or illegal driving, as is done in Great Britain under the Road Safety Act of 1967. In the United Kingdom, accident involvement or illegal driving is sufficient "probable cause" to permit the limited "search" of the driver which is presented by the preliminary breath test. It is not clear whether in the U.S. such erratic driving would be sufficient "probable cause" or reason-to-believe that an offense had been committed to permit the police officer to make this search under the Fourth Amendment limitations on unreasonable searches and seizures.

Even more questionable is whether a preliminary breath test "search" is permissible at a sobriety checkpoint. In Sweden, such tests are made on all

individuals stopped at roadblocks. In the United States, since there would be no observation of erratic driving, there would be no "reason-to-believe" that the individual was committing an offense. Therefore, it is questionable whether the appellate courts would uphold the authority of the police to make this search at a checkpoint without collecting other evidence of impairment. However, some constitutional authorities argue that the preliminary breath test is such a small intrusion that the Supreme Court would find it an acceptable procedure in an otherwise legal sobriety checkpoint.

ELECTRONIC SENSING

Recently a new technology has become available which is particularly applicable to the second step of the enforcement process, the initial detection of drinking by the driver. This technology involves alcohol detectors which make use of sensors similar to those in the preliminary breath test devices--semiconductor (Taguchi cell) sensors or fuel cell sensors (Voas, 1983a). However, rather than requiring the subject to blow into the instrument through a mouthpiece, these devices have sampling systems which pull air from in front of the face and analyze the mixture of environmental and expired air for alcohol. Because the sample analyzed includes both expired and environmental air, these devices are not as accurate as the preliminary breath test, but they are more accurate than the subjective sniffing for the odor of alcohol which is the normal process used by the police.

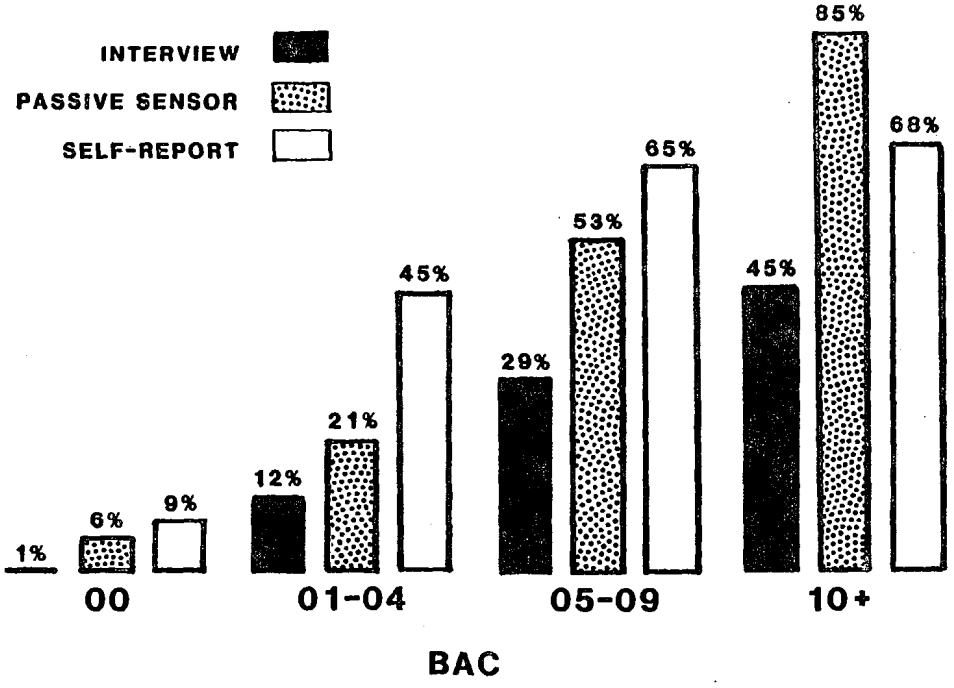
Electronic sensors employing either the Taguchi cell or a fuel cell react directly to ethyl alcohol and are not sensitive to the cogeners or to most metabolic products. The fuel cell may be somewhat sensitive to acetone which can be produced in the body in diabetics and in those on certain types of diets. However, the amount of acetone is very small compared to the amount of alcohol and the possibility that the acetone could produce a significant reaction in devices designed to provide a rough screening for alcohol is small. Thus electronic screening for ethanol has a significant advantage over the use of the natural olfactory sense in that the basic material producing the reaction is the substance of interest--ethanol--and not a correlate of drinking such as the cogeners in liquor which are not necessarily directly related to the amount of alcohol consumed or in the blood.

Another feature of the use of electronic detectors is that it is generally possible under operational conditions to bring the detector much closer to the mouth of the subject than the policeman can bring his nose. Since the concentration of expired air in ambient air falls off rapidly as distance from the subject's nose and mouth increases, the capability of sensing ethanol is reduced rapidly as the distance between the face of the subject and the sensor increases. Police officers standing outside the car conversing with the driver are normally at a distance of at least 24" from the source of alcohol. A passive electronic sensor, on the other hand, can be brought to within 4 to 6" of the mouth of the driver without producing a negative or belligerent reaction on the part of the driver (Voas, 1983b). This smaller distance produces a higher signal in and of itself and makes the electronic sensor more sensitive than the human nose.

The potential advantage provided by passive sensing is shown in Figure 2. Zusman and Huber (1979) conducted a roadside survey of drivers in which interviewers made estimates of whether the driver "had been drinking." After this estimate had been made, the drivers were asked whether they had been drinking in the last two hours. Finally, the drivers were asked to provide a breath sample for BAC analysis. In Figure 2, the proportion of drivers estimated to have been drinking and the proportion who admitted drinking in each BAC range in the Zusman and Huber study is compared with the proportion of positive passive sensor readings for the BAC interval obtained by the D.C. police when using the passive sensor under operational conditions (Voas, 1983a).

FIGURE 2

COMPARISON OF THREE TYPES OF DRIVER DRINKING MEASURES:
PERCENT POSITIVE INDICATIONS AS A FUNCTION OF BAC



As can be seen, the interviewer estimates of drinking are conservative, with less than half of the drivers with BACs above .10% being identified as having been drinking. About a third of the drivers who had BACs in the impaired range above .05% denied drinking. The passive sensor identifies half of the drinking drivers in the .05-.09 range and 85% of those above .10% BAC. Thus, the electronic sensor has a distinct advantage in identifying drivers at an illegal BAC. Since interviewer estimates and self-admission of drinking in Figure 2 are based on a research survey in which there were no arrests or other adverse actions, the differences might be even greater in an enforcement roadblock where drivers would be expected to be more likely to deny drinking, and police interviewers might be even more conservative in their judgments in order to avoid detaining a non-drinking driver.

LIMITATIONS IN ELECTRONIC SENSING

The capabilities of passive electronic sensing and the human nose can be contrasted as shown below:

	HUMAN NOSE	ELECTRONIC SENSING
Sensitivity	Relatively insensitive because of distance from subject.	More sensitive because it can be brought within 4" of subject's face.
Specificity (general)	Reacts principally to "cogeners," not ethyl alcohol.	Reacts to alcohols of all types.
Effect of:		
Mouth alcohol	Will give "false positive" indication for 10-15 minutes after drinking.	Same
Mouthwash	Mouthwash may cover up alcohol smell for 10-15 minutes after use.	Will give "false positive" result for 10-15 minutes after use.
Aftershave	Smell may cover up alcohol for some time after use.	As soon as skin is dry, it has no effect.
Perfume	Smell may cover up alcohol for some time after use.	As soon as skin is dry, it has no effect.
Smoking	May cover up alcohol smell.	No effect on fuel cell sensors. Will give "false positive" reading on Taguchi cell sensors.
Gasoline	May cover up alcohol smell.	No effect on fuel cell detectors. Will give false reading on Taguchi cell sensors.

Residual Alcohol

Electronic sensing encounters the same problem as the human nose in the case of residual mouth alcohol (Figure 2). In fact, since it is more sensitive to ethanol than is the human nose, it is probable that mouth alcohol creates a greater problem for the electronic sensor than it does for the police officer. On the other hand, the presence of mouth alcohol logically demonstrates that the driver has been drinking. The only exception to this logic is the use of mouthwashes. Studies by Voas (1983c) of the effect on passive sensors of popular mouthwashes indicates that the effect is essentially similar to the drinking of liquor. That is, the effect lasts for

approximately 10 to 15 minutes, and the passive sensors are not able to distinguish between the use of a mouthwash containing alcohol and the drinking of liquor. This is a place where the human nose may have some advantage because the "cogeners" which accompany mouthwashes are different in odor from the cogeners which accompany normal beverage alcohol.

This problem, however, is not a serious one operationally, since it is rare that an individual uses a mouthwash while driving a car. It is much more likely that mouth alcohol will be present in a driver because of drinking just prior to entering the vehicle or actualy drinking in the vehicle. If such drinking has occurred, then the officer is not only justified but required to extend the investigation to determine whether sufficient alcohol has been consumed to impair driving. The purpose of determining whether there is "odor on the breath" is to determine whether drinking has occurred, not whether the driver is impaired.

Internal Screening Substances

Electronic sensors can also be sensitive to certain screening substances if they contain alcohol or other active hydrocarbons. The main internal substances which present a problem are, as already discussed, residual alcohol from drinking alcoholic beverages, and mouthwash which contains alcohol. In rare cases, acetone (produced by diabetics and some dieters), can also produce a false signal on the semiconductor sensor. A third major problem for the semiconductor sensors, but not the fuel cell sensors, is tobacco smoke and the accompanying carbon monoxide, which will produce a positive reaction when an active smoker exhales into the passive sensing device. This source of contamination, however, is relatively easily controllable if the subject is requested to put down the cigarette and a period of 1-2 minutes is allowed for the lungs to clear of smoke and carbon monoxide. With this precaution, the Taguchi Sensor will give an accurate reading. The fuel cell sensor will not react to cigarette smoke (Voas, 1983c); however, the sensitivity can be reduced by repeated exposure to cigarette smoke.

External Screening Substances

Among the externally applied substances which can affect passive electronic alcohol sensors are aftershaves and hairsprays which contain alcohol. However, studies by Voas (1983c), have demonstrated that as soon as the skin is dry to the touch, the amount of alcohol evolved off the skin from such products is too small to produce a positive signal on a passive alcohol sensor. This is true even though the human nose may continue to detect the perfume or the smell of the aftershave. Thus, toiletries which can produce a significant screening odor for the human nose may not affect electronic alcohol sensors and, to this extent, the electronic sensor can produce a more accurate measurement of breath alcohol.

Environmental Screening Substances

Environmental sources of contamination for certain of the passive sensors are similar to that of the human nose. Gasoline fumes will produce a positive signal on the Taguchi Sensor, but do not affect the fuel cell sensor (Voas, 1983c). Gasoline fumes can screen the odor of alcohol from the human nose, producing a failure to detect alcohol. Experience in the field, Voas (1983b), indicates that gasoline fumes are not a major problem in terms of producing false detections of drinking. This is because environmental sources of fumes which can produce a positive reaction on the electronic sensor can be distinguished from products in the expired air by taking multiple samples into the electronic sensor. If a positive reaction occurs when the device is held 4-6" in front of the driver's mouth but does not occur when the device is held away from the driver, then it is clear that the device is reacting to expired air. If a positive signal is occurring when the device is not in front of the face of the driver, then there is evidence that there is environmental contamination. By making repeated measurements in different positions, the officer is able to distinguish between environmental contaminants and products in the expired air.

SUMMARY OF THE ADVANTAGES AND DISADVANTAGES OF PASSIVE SENSING

In summary, in contrasting the use of the human olfactory sense with electronic detectors, it is clear that the electronic detectors possess a number of potential advantages:

1. Electronic sensors detect alcohol directly rather than indirectly.

2. They can be brought closer to the subject and therefore are more sensitive than the human nose.

3. They are less likely to fail to detect alcohol on the breath due to screening odors from the surface of the skin or from the environment.

While electronic sensing has these advantages, it shares with the human nose the disadvantage that it will produce a positive indication on an individual with mouth alcohol. However, since at this stage in the DUI investigation, the issue is not impairment but is whether the driver has been drinking. A reaction to mouth alcohol is not an error in the normal sense. The signal is correct in that it indicates the individual has been drinking --the practical problem for the officer will be that an evidential test taken after the required waiting period may show a BAC which is below the level required to sustain prosecution for the offense.

Detecting Contaminants

With respect to the problem of contaminants or screening substances, two currently available electronic detection methods--the Taguchi cell and the fuel cell--have different capabilities which can be used to minimize the posibility that a contaminant produces a false positive result. The fuel cell is relatively more specific for alcohol than is the semiconductor. It

appears not to react to gasoline and/or cigarette smoke--the most common environmental products which could produce a false positive result. The fuel cell, however, is limited in that it can take a test only at one-to-two minute intervals because the cell requires some time to recover from each test.

The semiconductor, or Taguchi cell, is less specific for ethanol. However, it has the advantage that it can sample continuously. This means it is possible to contrast the response when the device is held close to the subject's mouth with the response when it is held away from the subject. If contamination is a problem, the positive signal will occur even when the device is well away from the subject's mouth. If, however, the signal light goes out when the device is held away from the subject and comes on only when it is held close to the mouth it is clear that whatever is being measured in the expired air.

SECTION II: APPLICATION OF PASSIVE SENSING TO CHECKPOINT OPERATIONS

In **Delaware, vs. Prouse, 440 US 648,** (see Ifft, 1983), the Supreme Court established a balancing test approach to the use of checkpoints for enforcement operations. The need of the State to use the checkpoint system was to be balanced against the extent of the intrusion which the checkpoint presented to the driver. If the State's need was great (that is, the danger to the public which the State was trying to control was significant) and if the enforcement method used produced a minimal intrusion on the public, then a stop which was not based on probable cause would meet the requirements of the Fourth Amendment which prohibits "unreasonable" searches and seizures.

It is clear from the decisions both of the Supreme Court, and lower Appellate Courts, that assurance of a minimum intrusion is a major requirement for checkpoint operations. The extent of intrusion has been measured in terms of at least three factors: (1) the time delay caused to the motorist, (2) the extent of the physical searching of his person or vehicle, and (3) the psychological impact surrounding the stop. The psychological factor relates to the fear produced in the driver by being stopped. The Supreme Court reasons that a well-lighted roadblock with a number of signs of official authority is less frightening to the motorist than being followed and stopped by an individual patrol car (Ifft, 1983; Compton and Engle, 1983).

"Screening-Out" Mode

Electronic breath sampling can be a method for ensuring a minimal intrusion which meets the court guidelines because: (1) it does not involve the intrusion which is required for normal preliminary breath testing, and (2) it can make a rapid determination of whether there is any evidence of drinking. The Taguchi sensor, for example, can make a determination within five to ten seconds as to whether there is alcohol in the breath of the driver. When used to screen out non-drinkers, the device permits rapid screening of the large majority of drivers at checkpoints who have not been drinking heavily. It is merely necessary for the officer to bring the device within four to six inches of the face of the driver and have the driver say a few words. If the detector light does not come on, it is highly probable that the individual has not been drinking heavily enough to produce impairment (Voas, 1983a). Used in this fashion, the device can rapidly screen out those who have not been drinking and they can be sent on their way with a minimal intrusion both in time and in terms of a physical search.

In those cases in which a signal light indicates that the detector is picking up alcohol, the officer can proceed in the normal way, detaining the individual on the same basis that he would detain an individual if he were not using an electronic sensor. In this "screening-out" mode, the electronic detector does not increase the probability that an individual will be detained and investigated for alcohol, so it has no impact on those individuals that are ultimately arrested and brought into court. On the other hand, it does allow the officers at the roadblock to avoid detaining members of the public who have not been drinking or at least have been drinking so little that their blood alcohol is well below the levels normally associated with impairment.

"Screening-In" Mode

Such passive sensors can also be used in the "screening-in" mode in which those that give a positive light are detained for further investigation. When used in this mode, it is important that the succeeding investigation is one which can be conducted rapidly and with minimum intrusion since the passive sensors will normally detect a number of individuals who have been drinking but are not significantly impaired by alcohol. This is because they will react to mouth alcohol and because they will pick up individuals at BACs below the level (.10%) which is normally required for prosecution of a DUI case.

Therefore, it is important that, if the positive signal is to be used as a basis of detaining the driver, passive sensing is followed by a testing procedure which can be conducted rapidly. Most effective for this purpose is the use of a preliminary, active breath test device which will provide an immediate quantitative BAC within a period of one to two minutes. If the individual detained is not at a BAC associated with impairment, then the driver can be released from the roadblock within two to three minutes, which is generally well within the time that would be acceptable to the courts as representing a minimal intrusion. A potential problem with an immediate preliminary breath test is that mouth alcohol could produce a spuriously high result on this device which would require further detaining of a driver who ultimately could not be charged with DUI. It also has the practical problem that the driver may refuse to submit to a preliminary breath test.

An alternate followup testing procedure is the use of roadside sobriety tests to detect impairment. These tests are useful since they measure impairment while the information given by passive sensing is simply that the individual has been drinking. These tests, however, normally involve a greater intrusion on the individual than preliminary, active breath tests, since the driver must be invited out of the vehicle and required to perform somewhat embarassing exercises at the curb. Further, the roadside sobriety tests normally take a longer period of time than does the preliminary breath test.

Thus, over all, the intrusion involved in the use of roadside sobriety tests is somewhat greater than using the preliminary breath test. On the other hand, the courts have generally been more sensitive to the use of breath tests as representing "searches" under the definition of the Fourth Amendment, than they have of the roadside sobriety tests. Therefore, even though the sobriety tests may take a somewhat longer time and be more inconvenient and embarassing to the motorist, they may be less likely to produce a constitutional issue than the use of the preliminary breath test.

USE OF PASSIVE SENSING AT A CHECKPOINT

Sobriety checkpoints conducted around the country have fallen roughly into two categories. In some applications, a few vehicles will be selected from the traffic flow and the drivers will be examined at some length with a relatively long interview involving the checking of driving licenses and vehicle registrations before release from the checkpoint. During the period that these cars are being checked, the traffic will flow normally along the roadway. This is the approach recommended by the National Highway Traffic Safety Administration (Compton and Engle, 1983).

A second approach to the checkpoint operations is to attempt to stop all vehicles coming down the roadway and interview all drivers very briefly limiting the interview to 15-30 seconds. This procedure is designed to produce as many contacts between the police and the public as possible in order to maximize the deterrent impact of the program. In this procedure, the driver is normally not required to produce a driver's license. Usually, in fact, the officer barely has time to greet the driver and have a few words of conversation before the vehicle must be allowed to move on to avoid creating a large backup in the traffic. Under such conditions, relatively few drivers are normally arrested because the police officer has little opportunity to examine the driver (see Figure 1). Arrests by the Maryland State Police when using this procedure have run about one in a thousand drivers examined (Field Operations Bureau, 1983).

In June of 1983, the Traffic Division of the Washington Metropolitan Police Department began to use this high-volume procedure of stopping all vehicles for brief interviews (Voas, 1983b). During the course of the summer, three checkpoint operations were conducted: Friday, June 24th, Friday, August 5th, and Saturday, September 24th. The officers were provided with the passive electronic sensors. Using these sensors, the officers at the checkpoint were able to rapidly screen out the individuals who had not been drinking and to concentrate more attention on those drivers who gave evidence of drinking both on the passive sensor and through other signs to the police officer.

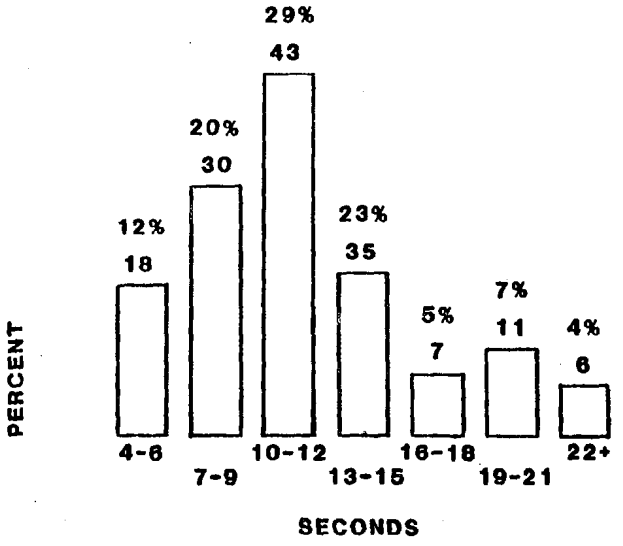
The policy on the use of the passive sensor called for the use of the device as soon as the driver had come to a stop at the checkpoint. If no positive signal was obtained within five to ten seconds after the driver began to speak, he would be released from the checkpoint and sent on his way. In this way, interviews with non-drinking drivers were limited to 10 to 15 seconds. At the September 24th checkpoint, 150 of the 893 interviews selected at random were timed. Figure 3 gives the distribution of times required to conduct these interviews. The median time was 11 seconds and 84% of the interviews were conducted in 15 seconds or less.

With those drivers in which the first indication on the passive sensor was positive, the police officer removed the passive sensor, allowed the signal light to go out and then replaced the passive sensor in front of the driver's face for a second time. If a second signal was received, the officer would direct the driver to the curb where a preliminary breath test using the Alco-Sensor III device was conducted.

If the BAC as measured on the Alco-Sensor III was at .05% or above, the driver would be invited out of the car and asked to perform roadside sobriety tests. If these tests indicated impairment, then the individual was charged with DUI and taken to a mobile van where an evidential breathalyzer test was conducted. Drivers who gave preliminary breath tests well above the .10% BAC were immediately charged and taken to the van since the District of Columbia has a two-level law with .10% being illegal per se. When the BAC was well above .10%, the driver could be charged under the per se law, which did not require evidence of impairment. However, in the .05% to .09% region, it is necessary for the officer to provide confirmation of impairment through the use of sobriety tests.

FIGURE 3

DISTRIBUTION OF INTERVIEW TIMES
CHECKPOINT OPERATION USING PASSIVE SENSOR



RESULTS OF CHECKPOINT OPERATIONS

It was not possible to obtain an accurate count of those interviewed on the first night of roadblock operations (June 24th). The impact of using the passive sensor in checkpoint operations, however, can be illustrated by data collected on the night of August 5, 1983, when the D.C. Police established a roadblock on Canal Road near Georgetown in D.C., and on the night of September 24th, when the roadblock was established on the Southeast Freeway in D.C. Figure 4 gives the results of the August 5 roadblock. On that evening, 572 drivers were interviewed between 11:30 p.m. and 4:30 a.m. and, of these, 102 were detained for preliminary breath tests. Of these, 39 were charged with driving under the influence or driving while intoxicated. The 18% detained and the 7% arrested are considerably greater proportions of the drivers interviewed than in similar high-volume checkpoints run by the Maryland and Delaware police. A slightly lower proportion of the drivers interviewed were arrested and detained at the September 24 roadblock, as shown in Figure 5.

The proportion of drivers detained was generally greater in the period after midnight than before. The relatively lower numbers of drivers interviewed between 1:00 and 3:00 in the Canal Road operation (Figure 4) was due to the backlog of cases already being processed in the police vans at the roadside. Each of the three vans present could accommodate four to five individuals during the period in which they were being processed for arrest. This arrest processing is a rather lengthy procedure, since two breath tests (separated by 30 minutes) are required.

FIGURE 4

SUMMARY OF CANAL ROAD CHECKPOINT OPERATIONS
AUGUST 5, 1983

TIME	INTERVIEWED	DETAINED NO.	DETAINED %	ARRESTED NO.	ARRESTED %	AVERAGE BAC
11:30 - 12:00	90	14	16	2	2	.085
12:00 - 1:00	203	26	13	8	4	.116
1:00 - 2:00	95	20	21	11	12	.120
2:00 - 3:00	25	8	32	8	32	.139
3:00 - 4:30	159	34	21	10	29	.117
TOTALS	572	102	18	39	7	.113

FIGURE 5

SUMMARY OF SOUTHEAST FREEWAY CHECKPOINT OPERATIONS
SEPTEMBER 24, 1983

TIME	INTERVIEWED	DETAINED NO.	DETAINED %	ARRESTED NO.	ARRESTED %	AVERAGE BAC
11:00 - 12:00 (A.M.)	145	18	12	3	2	.100
12:00 - 1:00	154	22	14	5	3	.110
1:00 - 2:00	163	32	20	4	2	.105
2:00 - 3:00	151	28	19	7	5	.162
3:00 - 4:00	144	25	17	7	5	.123
4:00 - 5:00	136	21	15	6	4	.114
TOTALS	893	146	16	32	4	.126

BACs of the drivers arrested appear to be fairly uniform throughout the evening, with a possible rise in the hour between 2:00 and 3:00 a.m. Overall BACs at the three checkpoints were consistently lower than those typical of the drivers arrested during the special patrol program which is conducted year 'round in the District of Columbia on Thursday, Friday, and Saturday nights. A comparison between the distribution of BACs of drivers arrested at the two Friday night checkpoints (June 24 and August 5) with drivers arrested on eight Friday nights by the regular DUI patrols is presented in Figure 6.

In order to avoid biases due to day of week and hour of night, the BAC data selected for the drivers arrested by the regular patrols were limited to the 11:30 to 3:30 a.m. hours on Friday during which the roadblocks were conducted. As can be seen in this figure, the BAC levels at sobriety checkpoints are lower than those produced by the patrol system.* The number of regular patrol arrests above a .15% BAC is twice (41 vs. 20%) of the checkpoint arrests, while the number below .10% BAC is half (19 vs. 37%) that of the arrests made at the checkpoints. It is clear that the checkpoint operation is impacting a different class of drinking drivers--at least in terms of the amount of alcohol consumed. What other correlates there may be of the lower BACs in the drivers arrested at sobriety checkpoints as compared to the drivers arrested in normal patrol activities remain to be determined.

FIGURE 6
COMPARISON OF BACs OF DRIVERS APPREHENDED AT CHECKPOINTS WITH DRIVERS ARRESTED IN NORMAL PATROL OPERATIONS

BAC INTERVALS	82 Drivers Arrested at Sobriety Checkpoints		81 Drivers Arrested During Normal Patrol Operations	
	No.	%†	No.	%
Refusals	12	--	17	--
.00 - .04%	0	0%	2	3%
.05 - .09%	26	37%	10	16%
.10 - .14%	30	43%	26	41%
.15 - .19%	11	16%	12	19%
.20 - .24%	3	4%	9	14%
.25 or greater	0	0%	5	8%
TOTAL	82	100%	81	101%
MEAN BAC	.113		.145	

†--% of those with known BAC

* It should be noted that the .145% average arrest BAC for the DC regular patrol is somewhat lower than for most city police departments. This may be due, in part, to the active enforcement of the DC .05% BAC impaired statute.

The roadblocks in which passive screening is used appear to result in the arrest of a somewhat different population than that which is apprehended by normal patrol operations. This can be considered both a positive and negative feature of the checkpoint operation. It is negative in the sense that the higher the BAC, the higher the probability of crash involvement. Therefore, it can be argued that the greatest safety gains are achieved by arresting drivers with the highest BACs. On the other hand, such high BAC drivers would be very difficult to deter by normal enforcement operations since many of them are believed to be problem drinkers who have little control over their drinking and will continue to offend despite apprehension, conviction and punishment. During the ASAP program, a BAC of .15 or above (20% of arrested roadblock drivers, 40% of arrested normal patrol drivers) was considered a sign of problem drinking.

At the roadblock, the lower BAC drivers apprehended may be principally the social drinkers who can more easily change their drinking and driving behavior and who are more likely to be deterred by being apprehended and convicted of drinking and driving. Moreover, these individuals, at lower BACs, may be significantly deterred by the experience of being checked for alcohol with the passive screener and/or by being detained for preliminary breath testing and/or sobriety testing.

An important feature of the checkpoint operation is the impact upon the individuals not arrested. The numbers of individuals interviewed and then released is ten times as great as the number arrested. Therefore, a large effect can be produced if these individuals are deterred by their experience at the roadblock. Moreover, they are likely to report this experience to friends and associates thereby producing a ripple effect which will impact many more drivers. High volume roadblocks can, therefore, have a major impact, as long as the driver interviewed and released is impressed with the possibility that he might have been arrested had he been drinking more heavily.

This, of course, depends on the apparent credibility of the officer's attempts to determine the drinking status of the driver. In high volume roadblocks in which the officer is permitted such a short interview that the probability of his detecting the heavy drinking driver is low, there is danger that the checkpoint operation will lose credibility. The use of a passive sensing system can avoid this since it will, in fact, identify most of those who have been drinking to a significant extent. Therefore it does produce an impact on the public since they recognize that they are undergoing a significant alcohol screening process.

The Passive Sensor, therefore, has considerable potential for checkpoint operations when used either in the "screening out" mode where its principal function is to minimize the intrusion on the non-drinking public and in the "screening in" mode where it can also identify a greater number of drinkers for further investigation. This latter use of the passive sensing is dependent, however, upon a followup system of rapid investigation using either a preliminary alcohol measuring device or rapid sobriety testing procedures, so that those individuals who are screened in by the passive sensor but are not impaired can be rapidly released.

REFERENCES

Borkenstein, R.F.; Personal Communication, June 1983.

Compton, R.P.; and R.E. Engle; "Safety Checkpoints for DWI Enforcement." NHTSA report, in press, July 1983. Available from National Highway Traffic Safety Administration, 400 7th Street, S.W., Washington, DC 20590.

Field Operations Bureau; "Sobriety Checkpoint Program Evaluation Report." Maryland State Police, Traffic Planning Unit, April 20, 1983. Available from Maryland State Police, Pikesville, MD 21208.

Harris, D.H., Dick, R.A., Casey, S.M., Jarosz, C.J.; The Visual Detection of Driving While Intoxicated, NHTSA Report No. DOT-HS-7-01538; April 1980. Available from NTIS, Springfield, VA 22161

Hiland, Jack; "Drinking and Driving in Montgomery County, Maryland: Trends." August 1983. Available from Department of Family Resources, 101 Monroe Street, Rockville, MD 20850.

Ifft, Richard A.: "Curbing the Drunk Driver Under the Fourth Amendment: The Constitutionality of Roadblock Seizures." The Georgetown Law Journal, Vol. 71, No. 5, June 1983.

Mitchell, D.; "Prince Georges County Alcohol Program Data, 1981-1983." Available from Special Operations Division, Prince Georges County Police, 3415 N. Forestedge Road, Forestville, MD, August 1983.

National Highway Traffic Safety Administration; "Manual on Improved Sobriety Testing." NHTSA Staff Report 1982, available from NHTSA, 400 7th Street, S.W., Washington, DC 20590.

Traffic Control Section; "DUI; Monthly Report," Delaware State Police, August 1983. Available from Delaware State Police, P.O. Box 430, Dover, DE 19903 -- Attn. Traffic Section.

Voas, R.B.; "Drinking and Driving: Scandinavian Laws, Tough Penalties and United States Alternatives." NHTSA Report on Contract No. DTNH-22-82-P- 05079, July 1, 1982. Available from the National Highway Traffic Safety Administration, 400 7th Street, S.W., Washington, DC 20590.

Voas, R.B.; "Laboratory and Field Tests of a Passive Alcohol Sensing System." Abstracts and Reviews in Alcohol and Driving, In press. 1983(a). Available from the Insurance Institute for Highway Safety, Watergate #600, N.W., Washington, DC 20037. 1983(a)

Voas, R.B.; "Use of Passive Sensor at Sobriety Checkpoints." Preliminary Report, August 8, 1983(b). Available from the Insurance Institute for Highway Safety, Watergate #600, N.W., Washington, DC 20037.

Voas, R.B.; "Study of Passive Sensor Contaminants," Insurance Institute for Highway Saety, Contract report. August 4, 1983(c). Available from IIHS, Watergate #600, N.W., Washington, DC 20037.

Wolfe, A.C. Characteristics of Late-Night, Weekend Drivers: Results of the U.S. National Roadside Breath-Testing Survey and Several Local Surveys. In Alcohol, Drugs and Traffic Safety, Proceedings of the 6th International Conference, Addiction Research Foundation, Ontario, Canada, p. 41-49, 1975.

Zusman, M.E.; and Huber, J.D., 1979. "Multiple Measures and the Validity of Response in Research on Drinking Drivers," Journal of Safety Research, Vol. II, No. 3, pp. 132-137.