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## **Contents**

Psychosemantic Diagnosis of Alcoholic Dependencies Tested at the Subconscious Level in Military Personnel with Posttraumatic Stress Disorder (PTSD) Semyon Ioffe, Sergey Yesin, and Boris Afanasjev	57
A Discussion of Two Diagnostic Features of the Polygraph Cardiovascular Channel Mark Handler, L.A. Geddes, and Joel Reicherter	70
Psychological Structure and Theoretical Concept of the Backster Zone Comparison Technique and the Quadri-Track Zone Comparison Technique James Matte	84
Criminalistic Diagnostic Investigation Using a Polgraph	91
State of Ohio vs. Sahil Sharma	100
An Introduction to the APA's Panel on International Developments in Polygraphy Frank Horvath	108
Polygraph in Belgium: An Overview of History and Current Developments Frederic Dehon	109
Model Policy for Post Conviction Sex Offender Testing	112
Model Policy for Paired Testing	117

## **Psychosemantic Diagnosis of Alcoholic Dependencies Tested at the Subconscious Level in Military Personnel with Posttraumatic Stress Disorder (PTSD)**

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### **Abstract**

Thirty-three military combatants, established on record as alcoholic beverages abusers, were tested. Nineteen were clinically diagnosed with stage 1 alcohol dependency syndrome, and 14 were not. To test combatants, words or short phrases were quickly flashed on the computer monitor screen. The participants being tested saw, instead of words, a row of 15 random numbers/consonants that the program overlaid over the words/stimuli. Participants pressed a special button at the occurrence of each stimulus on the monitor screen. The reaction was measured from the moment the stimulus was presented until the moment the button was pressed. During diagnosis at the subconscious level, 30 patients showed statistically significant reactions to the word "fear." Especially large statistical differences were observed during testing of the phrase "fear of death" between patients diagnosed with alcohol dependencies and those who were not. For the topic "alcohol," 12 patients responded with an increase in complex visual-motor reaction time and 7 with a decrease. In addition, 5 patients were diagnosed with hidden tendencies to alcohol abuse. A subconscious semantic response measurement technique allowed precise diagnosis of the psychosemantic nucleus and changes in the personality of PTSD patients with alcohol dependency.

### **Introduction**

The analysis of the clinical data, collected over many years of studying the psychological disorders following the stress of military action, acts of terrorism, natural catastrophes, transportation accidents, torture, physical or sexual violence/abuse, witnessing a violent death, armed assault, fire, and the like, have established that victims have common and repetitive symptoms of mental disorder with expressed and specific features. (Brahmsen, 1995; Dekel, Solomon, Ginzburg, Neria, 2003; Naparenko, Matchuk, 2001)

Taking into account that in accepted nosologic forms this phenomenon did not correspond to any previously identified disorder, it was suggested this phenomenon be given an independent syndrome called Posttraumatic Stress Disorder (PTSD). The term PTSD has been widely acknowledged in medical practice since 1980. It was included in the official list of American mental disorders,

*Diagnostic and Statistical Manual of Mental Disorder (DSM-III)* and also *DSM-IV* (1994). In 1995, this disorder and its diagnostic criteria from *DSM* were entered into the 10th edition of the *International Qualifier of Diseases*, the basic diagnostic standard used in European countries.

It has been well known that the majority of military personnel tested following combat have experienced significant stress overloads. According to some authors (Solovev, 2000; Tarabrina, 2001), 15%-25% of returning military personnel had PTSD, which was usually alleviated by dependencies on alcohol, narcotics, gambling, or other severe behavioral abnormalities.

It is often difficult for an individual to acclimate to war with its dangers and deprivations, and it is often a challenge to get used to a different set of life values and priorities. Adaptation to new conditions demands breaking former stereotypes of consciousness and behaviors.

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Without doing so, it may be impossible to survive in extreme situations. In real situations, where there is a possibility of death, the significant psychological pressure in some cases can reach such intensity that it results in disorganization and failure of the mind. It is one of the major reasons for the occurrence of PTSD, the direct consequence of conflicting behavior of the person in the individual's social environment: inability to accept new game rules, unwillingness to compromise, or attempts to resolve every day conflicts by force, etc. (Pozdidaev, 1999).

As a rule, society responds to recent military returnees with misunderstanding and apprehension that only deepens and aggravates their pain and reactions. Life experience for those who have experienced and lived through war is frequently complex, full of contradictions and cruelty. Change of heart, failures, exasperation, irreconcilability, and increase of conflicts on one hand; weariness and apathy on the other hand become characteristic attributes. Return to a peaceful life can proceed painfully slowly because reorganization of the psyche often takes many years (Duggan & Gunn, 1995).

Aspiring to escape reality; these people try to change their mental state with various substances, often with alcohol. When alcohol is ingested, it can create a temporary illusion of the elimination of emotional discomfort, reduction in the level of anxiety, the raising of self-esteem, restoration of mental equilibrium, and indemnification of an inferiority complex (Musienko & Baranenko, 2003). The drinking process grips these individuals with such force that alcohol starts to control their lives. These individuals become helpless to deal with the weakness caused by alcohol, mental dependencies are formed, and then physical need develops. Some authors have described this tendency of military personnel with PTSD to use alcohol in up to 76.3% of cases (Chernov, 2003). These alcoholic behaviors become a real problem for functioning in society.

The research and diagnosis of the psychological content of such behaviors have become today's issues. Traditional biographical methods and the methods of various tests and questioners have been

insufficient because the participant's conscious mind was between the researcher and the memory of the participant, which comprehended all input and output information and amended it according to the participant's personal coping strategy or the logic of the moment, etc. (Baranova, 1994). Our study has been devoted to finding a practical application for psychosemantic methods of testing, which would allow studying the contents of the psyche of the person who struggles with different dependencies (drug, alcohol, etc.) without the active participation of the person's conscious mind.

#### *Influences at the Subconscious Level*

The meaning of influence at the subconscious level has been closely connected to the question of the threshold of perceptions of the sensory organs (Dixon, 1971; Gershuni, 1955). For a signal to be perceived by the conscious mind, its exposure should reach certain parameters, e. g., the level of sound and light contrast in radio and television broadcasting. These requirements were developed empirically in full conformity with common sense and practical requirements (Dixon, 1971).

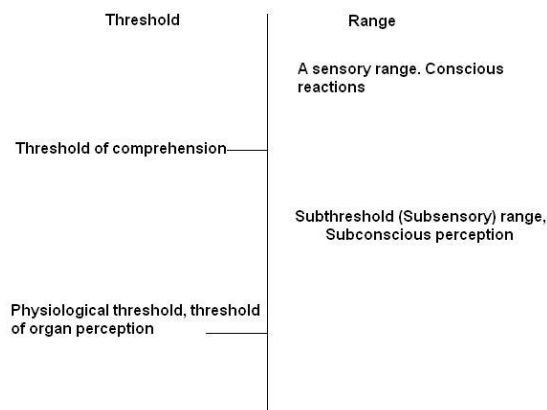
For many years, it was believed that, if any given stimuli had not been realized by the conscious mind, it meant it had no signal value and, hence, rendered no influence on the organism. However, a large amount of actual material has spoken to the opposite (Dixon, 1971; Kostandov, 1976).

The idea of people being influenced by subconscious stimuli came from Democritus, who wrote, "Much of what is perceived by the person is not realized" (Dixon, 1971, p. 207). Ideas about the possibility of subconscious perception were contained in *Timee* by Plato and in works by Aristotle. In particular, Aristotle had, for the first time, brought forward an idea that subconscious stimuli influenced the contents of dreams (Aristoteles, 1908).

The theory of hidden forms of consciousness, or unconscious perception, was first developed by Leibniz (1898). In his theory, Leibniz expressed more precisely the essence of subconscious perception and stated

the idea of the existence of the subconscious processes of creativity. He wrote, "The belief that the soul does not perceive anything besides what is realized by the soul is a source of big error." According to Leibniz, a person was exposed to plenty of different influences, almost imperceptible and insufficiently realized to be noticed; however, they could, under certain conditions, appear in the most unexpected form "to help to operate faster, obeying an instinct and not to be distracted with strong sensations perceived before from other objects whose number is indefinite".

Interest in this direction in psychology by the 20th century increased so dramatically that in 1910 in Boston an international meeting devoted to the participant of the unconscious mind was held during which original reviews of ideas that had taken place in the field of research of the unconsciousness were revived. The reaction caused by over the threshold stimuli reflected in the consciousness of the person became known as conscious perception and subconscious perception—the reaction caused by the subthreshold stimuli and not reflected in the conscious mind of the person.



*Figure 1.* Relation between stimuli threshold and perception of the stimuli. On the left stimulus threshold is shown, on the right, stimulus perception is shown. When stimulus parameters are between physiological organ perception and comprehension, perception of such a stimulus is subconscious. When stimuli are over the threshold of comprehension, perception of such stimuli is conscious.

Therefore, subthreshold ranges were settled between a physiological threshold and a threshold of comprehension (see Figure 1). As illustrated by others, the threshold of comprehension varied depending on the features of the psycho-physiological conditions of a person; but, during each moment of time, the position of a threshold was precise and definite (Stevens, 1951).

In 1939, Miller established that motivational aspects played an essential role in a person's subconscious perceptions. Immediate positive reinforcement of a participant after giving a right answer (when electroshock was administered as a negative reinforcement after wrong answers) sharply raised the participant's ability to distinguish geometric forms at subthreshold levels.

In psychophysiology, there also exists the phenomenon of perceptual defense, which consists of an increase or reduction of the thresholds of perception of an emotionally significant stimulus in comparison to a neutral stimulus. This concept has been well established, confirmed in many experiments and no longer challenged (Brown, 1961; Eriksen & Browne, 1956).

By the middle of the 20th century, many researchers received authentic experimental facts and confirmations of subconscious perception. It has been established, (Dixon, 1971) that:

1. The subjective experience called intuition, which in turn is formed by the subconscious acoustical and visual stimuli, can influence verbal reactions.
2. Different subconscious stimuli can influence perception, which is processed consciously.
3. The visual images presented on the tachistoscope below a threshold of perception can appear in subsequent dreams.
4. Subconscious stimulation can change the threshold of the conscious perception. (Dixon, 1971)

Wide introduction in the practice of psychological experiments in the use of EEG and the evoked potentials promoted increases in their methodological accuracy. Kostandov (1976) revealed significant increases in the ability to recognize emotionally significant words over the thresholds of neutral verbal stimuli. Thus, the effect of influences of the subthreshold emotionally significant verbal stimuli was that the bioelectric and vegetative reactions were formed at a lower intensity of the influence of the stimuli than its identification. Two types of reactions to the subthreshold emotionally significant stimulus have been obtained. In the first case (two thirds of the examinees), emotionally significant stimuli caused a reduction in the threshold of recognition, and in the second, an increase of thresholds against neutral stimulus.

Furthermore, it was established by Kostandov and Arzumanov (1978) that even between two subthreshold (subconscious) signals, time connections could be formed, but they appeared short lived and the authors concluded that these were stored only in short term memory. Also, the ability of a subthreshold conditional-reflex activation of the decision-making process was evidenced experimentally.

In summary, the results of the aforementioned experiments suggest that, in many cases the conscious perception could be formed by subthreshold stimuli, which could influence the estimation of the sizes and forms of perceived objects and also judgments about the substance of the phenomena. Thus, presently sufficient experimental and factual material concerning the phenomenon of subconscious perception exists; it is a natural and necessary mental phenomenon because, in any state, the person is participant to a constant stream of exteroceptive, interoceptive, and proprioceptive impulses of which only a small part reaches the conscious mind.

#### *Psychosemantics*

Many researchers have allocated a special role to semantic factors (i.e., semantic, information) during human life (Smirnov, Beznosjuk, & Zhuravlyov, 1995). In the process of the evolution of the psyche, the role of semantic signals has grown. The second

signal system was a system of semantic symbols, mainly of the verbal type, that are symbolic of language. Therefore, a basis of mental activity of the human brain was the semantic stimulus, a word or an image. A reaction to a particular stimulus resulted from activation of memory contents that corresponded to the stimulus in question.

Any stimulus that could be perceived by the psyche and capable of causing any reactions—except orientation reactions—(i.e., novelty) are called semantic. As the measure of maturity of the individual increased due to their life experiences, the number of stimuli that were meaningless and caused only an orientation reaction sharply decreased. Therefore, practically any information could be correlated to any already available elements of memory, traces of memory of previous events, which by any attributes were similar to information received presently. It was impossible to imagine what one did not know. Any perceived information immediately caused an associative chain of corresponding memories. From this reasoning followed that any perceived stimulus was stored in memory not in the form of an independent semantic element but only in an aggregate of associative connections with other elements (Smirnov et al., 1995).

Any internal or environmental change entailed change of mental activity and a respective alteration of behavior. If the stimulus was completely new to the perceived object and was not associated with anything from previous experience, the reaction to it was a defensive orientation: increases in the level of wakefulness, readiness for action, and the active analysis of stimulus after-action. If this stimulus was accompanied with significant life changes, a special meaning was appropriated to it. The meaning of stimuli (which the word or an image represented) was its connection and association with concrete changes of the emotional state. Thus, having determined a group of significant words that were emotionally associated for the individual, it became possible to change the person's mental activity and behavior in a different way by showing these words to the participant (Smirnov et al., 1995).

A measure of the importance of a word is the quantity of the associative connections to other words. On the basis of such words, the accent locus of latent information (ALLI) as a base semantic nucleus of personality is created (Smirnov et al., 1995). The personality never realized its own ALLI under any conditions. ALLI contained original reference points, allowing understanding of the principles of reaction of the person's psyche to different stimuli.

Thus, drawing up ALLI, for example, as a psychological portrait of the person being tested allowed researchers to determine the participant's true attitude to different spheres of life and activity; to answer the most innate questions (Smirnov et al., 1995); and to reveal motivation and propensities to addictive behavior, dependencies, etc. (Smirnov et al., 1995).

#### Method

Thirty-three military personnel with an average age of  $23.5 \pm 1.1$  years were investigated. All of them received medical treatment in the military hospital from the Trauma Department, (15 persons with trauma of the lower and upper extremities, 4 with no penetrating fragmental wounds of the skull, but with concussion syndrome), Surgery Department (3 persons with penetrating wounds of the thorax, 6 with wounds of the abdominal cavity), and the Neurology Department (5 persons with wounds of the peripheral nerves of the upper extremities). All had the accompanying diagnosis of PTSD.

Fourteen patients reported ingesting alcohol a few times per week (3 to 5 drinks), 11 drank at least once per week to a degree of heavy intoxication, and 8 patients also drank heavily for 2-3 days in a row. Nineteen (58 %) had been clinically diagnosed by a group of psychiatrists (specialists in substance dependency) with the syndrome of alcoholic dependence stage 1 (addicted to alcohol). These patients were assigned to a base group for clinical purposes. Fourteen patients (42%) had not been clinically diagnosed by the same group of psychiatrists as alcohol dependent and formed the control group (not addicted to alcohol).

The research procedure of the computer psychosemantic analysis to

subconscious stimuli to study the mechanisms of pathological processes of the psyche was used as in Smirnov et al. (1995):

#### 1. Subconscious presentation of stimuli:

a. Control stimuli were items that had no meaning to the subject. They were in the form of a row of randomly-chosen 15 numbers or consonants that flash across the screen at approximately 40 msec, registering through the retina into the brain. This control was then masked by a different row of randomly-chosen 15 numbers or consonants (500 msec duration). The first row, the control, was seen subconsciously. The second row, the masker, was seen consciously.

b. Probe stimuli were semantically meaningful stimuli in the form of a word that moved across the screen at 40 msec, registering through the retina into the brain. This probe/word was then masked by a row of randomly-chosen 15 numbers or consonants (500 msec duration). The probe/word was seen subconsciously and the masker row of numbers or consonants was seen consciously. Three groups of words were chosen for this study: Fear (fear, fear of death, fear of captivity, fear of injury), Alcohol (alcohol, vodka) and Name of the person studied (name, nick name, last name)

#### 2. The ability to develop new semantic meaning (reper) for some stimuli values (positive, negative or neutral) with the purpose of providing a scale for

psychosemantic elements. Reper is a different kind of control. It is a measurement developed to gauge defense reaction subconsciously (the subject's reaction to the "punishment" they receive during the test). This subconscious reaction was then measured to know how the subject's subconscious mind responds defensively. Word "cobra" was used to develop such a defense reaction.

3. The analysis of subconscious reactions to semantic stimuli.

The subconscious mind of the person responded to the information by influencing the participant's reactions. The reaction was measured as the time from the moment the subconscious stimulus was presented until the moment the button was pressed.

4. Construction and analysis of an individual psychosemantic space (accent locus latent information - ALLI).

The positive reference point (the name of the participant) was usually characterized by a faster reaction in comparison to a reaction to a group of neutral words. If words in the alcohol group were located near the group of neutral words (the difference between the average times of reaction statistically was not significant), it meant the participant being tested had a low emotional value for these words and could be considered as not having alcohol addiction or hidden tendency to alcohol.

In theory, the patients did not realize that they reacted to words that "were hidden" by the masker row of numbers. The brain, nevertheless, registers and reacts to the information hidden behind the row of numbers irrespective of the will and desire of the subject being tested. The subject cannot prepare beforehand for such a procedure and cannot control his reactions.

Each person reacts to words differently. If a row of stimuli contains unconditionally significant words or phrases for the patient, he unconsciously reacts to

their presentation differently than stimuli that carry little significance for him.

For testing, the participant was positioned comfortably in front of the computer monitor (standard desk top computer with windows 2000 or higher used) and asked to press the mouse button when control or probe group of words occurred except for the word "cobra" (reper/control word) for which the mouse was not to be pressed. Words of groups described above were quickly flashed on the computer monitor (green letters on black background) with an exposition time 40 or 500 msec. and random appearance within 700-1,200 msec. In the case of a mistake (pressing the mouse for the word "cobra"), the person heard through the headphones (with the maximum loudness of 80 to 100 decibels), "Don't press," so the word "cobra" gained new semantic negative value. The participant was compelled to avoid the unpleasant sound by making fewer mistakes. After thirty right answers per each word, required for statistical analysis, the test ended.

The subconscious mind of the person responded to this information by influencing the participant's reactions. We registered these reactions, measuring the time the mouse was pressed after presentation of the disguised word. Further, the program calculated statistical differences in reaction times of pressing the mouse during the presentation of indifferent (neutral) words and words from other groups, thus registering the speed of the complex visual-motor reaction in response to the presentation of various semantic stimuli in the subthreshold range. For calculation of the statistical data the STATISTICA program (StaSoft) was used; Student's distribution calculations were applied (Spiegel, 1992). The hypotheses were accepted at 95% significance.

To maintain independence between psychosemantic and clinical diagnosis and to establish the validity of the psychosemantic method described in details above, the patients were tested randomly. Information concerning the clinical diagnoses was available for comparison only after psychosemantic testing, analysis of the data and diagnoses were fully completed.

As all our patients were clinically diagnosed with PTSD and some of them with the subsequent alcohol addiction, using SSRM Tek, we were testing 2 hypotheses:

1. Was or is the emotion of fear (fear of death, fear of captivity, fear of injury) an underlying emotion of PTSD?
2. Who are at risk of having alcohol dependency or hidden tendencies to alcohol?

An alcohol abuse and dependence are

frequently under diagnosed in the clinical setting, typically due to inadequate screening and the unreliability of self-reported alcohol use (Myrick, 2006).

## Results

Statistically significant responses were obtained from up to 91% of the patients who responded to words or phrases in these semantic groups shown subconsciously  $p < .05$ : fear and fear of death, fear of captivity and alcohol.

Table 1. Results of psychosemantic testing in comparison with clinical data.

*Patients of of base group (19) clinically diagnosed as PTSD and alcohol addicted patients. Patients of control group (14) clinically diagnosed as PTSD patients without alcohol addiction. 19 patients out of 33 patients of the psychosemantic test group shown alcoholic dependency (Group of words "Vodka") and corresponded with clinically defined group "Base" additional 5 patients also shown alcoholic dependency or hidden tendency to alcohol and correspond to clinically defined group "Control". All patients were clinically diagnosed as having PTSD after returning from combat area. We have diagnosed in 30 patients PTSD based on general "Fear". Though the patients diagnosed with "Fear of death" as being a reason for PTSD, concur with diagnosis of alcoholic dependency in the same patients (Group of words "Vodka").*

### Clinically Defined Groups

	Base	Control	Total	%Total
	19	14	33	58
<b>Psychosemantic test group of 33 patients</b>				
<b>Topic tested</b>				
<b>Group of words "alcohol"</b>				
"Alcohol"	17*	5*	22*	67
"Vodka"	19*	5*	24*	73
<b>Group of words "fear"</b>				
"Fear"	19*	11*	30*	91
"Fear of death"	19**	5**	24**	73
"Fear of a captivity"	16*	1*	17*	52
"Fear of injury"	11*	3*	14*	42

\*-  $p < .05$

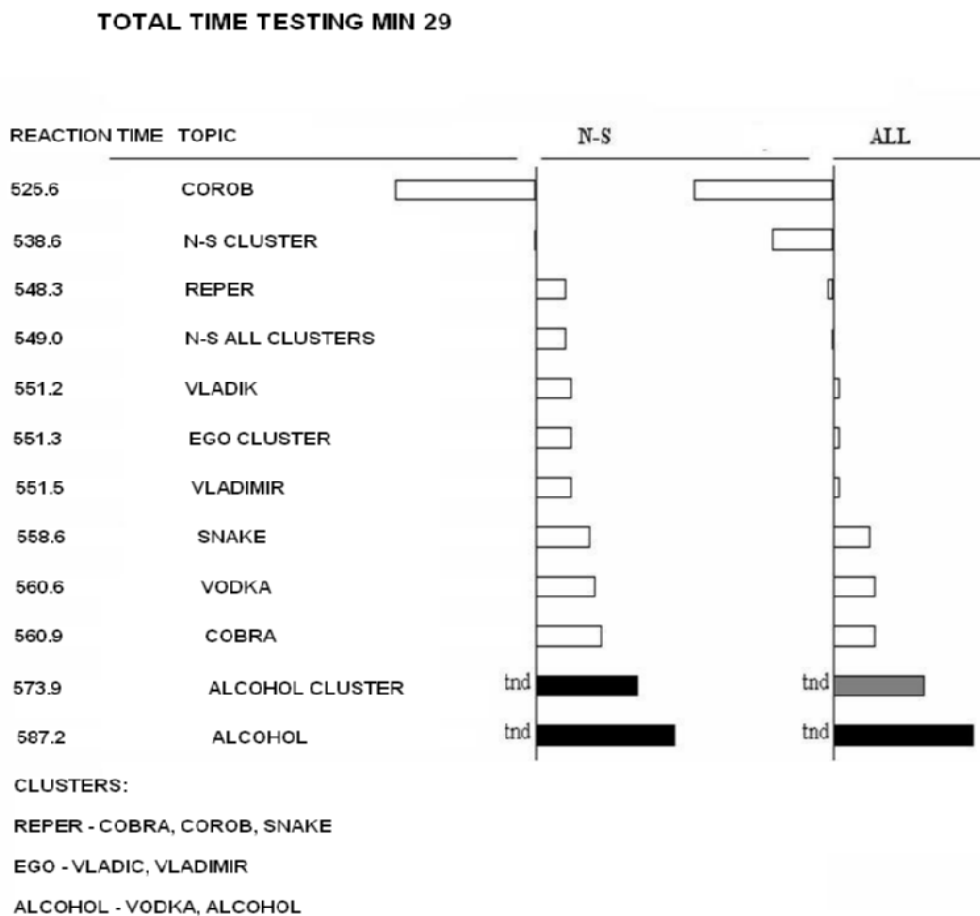
\*\* -  $p < .01$



Out of 33 patients tested for alcohol dependencies, using psychosemantic method, described above, 19 patients showed statistically significant results for alcohol dependencies and it fully corresponded to the clinical base group of patients (Table 1). In all cases, statistically significant differences in the average reaction times were revealed during the presentation of words that were connected with the topic vodka, which was tested against a group of control words.

In Figure 2, the average reaction time to a group of neutral words (NS) was 538.6

msec., [ $t(118) = 2.67, p < .05$ ] compared to a group of words associated with an alcohol topic which was 573.9 msec., and to the individual word "alcohol" the maximum delay in reaction time was 587.2 msec. [ $t(58) = 2.71, p < .05$ ]. Twelve patients (63%) out of 19 showed a delay in reaction time in pressing the mouse button to words in topic "alcohol", as shown in Figure 2; but 7 (37 %) patients showed an acceleration of time in pressing the mouse button to words in topic "alcohol" [ $t(118) = 2.22, p < .05$ ] (Figure 3 provides an example).



*Figure2.* Example of a patient exhibiting an alcohol dependency. Left column represent mean reaction time to single words or topics tested. "N-S" cluster a vertical line represent mean of the controls given before tested stimuli. "All" a vertical line represent mean of all controls given throughout testing. Dark color shows statistically significant response ( $p < .05$ ). Topic "alcohol" compared to "N-S" [ $t(118) = 2.67, p < .05$ ]. Word "alcohol" compared to "N-S" [ $t(58) = 2.71, p < .05$ ]. Topic "alcohol" compared to "ALL" [ $t(178) = 2.55, p < .05$ ]. Word "alcohol" compared to "ALL" [ $t(148) = 2.72, p < .05$ ].

TEST NUMBERS: 278

DATE: 27/12/2004 15:01

PATIENT: XXX

## TEST RESULTS

TIME OF THE TEST, MIN.: 57

TEST FINISHED FULLY 100%

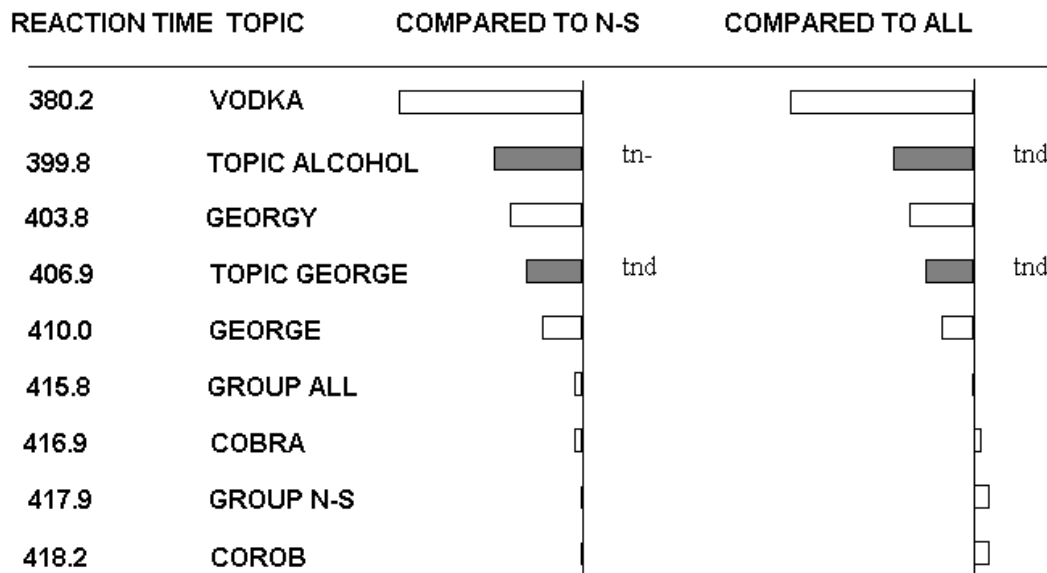


Figure 3. Example of a patient exhibiting a tendency to alcohol. Left column represent mean reaction time to single words or topics tested. "N-S" cluster a vertical line represent mean of the controls given before tested stimuli. "All" a vertical line represent mean of all controls given throughout testing. Dark color shows a statistically significant response ( $p < .05$ ). Topic "alcohol" compared to "N-S" [ $t(118) = 2.22, p < .05$ ]. Topic "George" compared to "N-S" [ $t(118) = 2.05, p < .05$ ]. Topic "alcohol" compared to "ALL" [ $t(178) = 2.19, p < .05$ ]. Topic "George" compared to "ALL" [ $t(178) = 1.98, p < .05$ ]. Figure 3

In addition, five patients, who corresponded to a clinical control group, were diagnosed with hidden tendencies to alcohol abuse based on statistically significant responses to words "vodka" and "alcohol" (Table 1; Figure 3). In addition, this was suggested based not only on their statistically significant reactions to words such as "vodka" and "alcohol" but also by the displacement of pathological emotional importance of groups of words for alcohol to a positive reference point (group of words Name), [ $t(118) = 2.05, p < .05$ ].

Our data on 19 patients from the clinical base group correlated perfectly with their clinical diagnosis.

During diagnosis of the individual psychosemantic space at the subconscious level of 30 patients a statistically significant response reaction was registered to the word "fear" in comparison with a group of meaningless words  $p < .05$ . Especially large response differences  $p < .01$  were seen in 24 patients when testing the phrase "fear of

death" (Table 1); 19 patients corresponded to the clinical base group and 5 patients to the control group. By our opinion that was, most likely, a consequence of combat trauma with the fear of death; this fear underlay the current psychopathological dependent behavior of patients in the clinically defined base group and patients from the clinically defined control group who were diagnosed, using the computer psychosemantic analysis, as having tendencies to alcohol abuse,  $p < .05$ .  
Discussion

Lack of efficiency in the methods used for the treatment of alcohol and other dependencies requires further research. The war veterans with PTSD represent a special category of people with alcohol dependency. Among the major social consequences of PTSD are the changes to the professional and, quite often, the marital status of the person because of an inability to work or an inability to sustain work; prolonged hospitalization, which changes the habitual social environment of the patient, then changes the total mental makeup and mental time orientation of the patient (Brahmsen, 1995).

Therefore, to be successful in rehabilitation work with patients who have PTSD, psychotherapy is a major task. Each psychotherapeutic school has focused on a certain time modality and prefers to deal either with the past, the present, or the future of the patient. (Greenson, 1972; Melges, 1982; Perls, 1969)

The therapists, focused on psychoanalysis, searched for the roots of past mental and behavioral disorders in the patients (Greenson, 1972). Psychotherapists of an existential-humanistic direction worked in the present modality (Perls, 1969). This was expressed in gestalt therapy and group therapy, where the patients learned to recognize their feelings and to operate in the "here and now." Psychotherapist Frederic Melges (1982) put forward a hypothesis that "the future influences the present" and has developed "psychotherapy focused on reconstruction of the future".

It is characteristic for veterans of war to re-experience psychologically their previous traumatic events as present events, which is

confusing (Brahmsen, 1995). To increase the efficiency of PTSD treatment for people with alcohol dependence, the strategy of psychotherapy should include not only procedures directed to general psycho-emotional relaxation and development of indifference and disgust for alcohol but also procedures to influence the roots of mental and behavioral disorders, such as reconciliation with the past and erasing the effects of the past, teaching the patient to work with the modality of the present, and reconstruction of the future.

For such a psycho-correctional orientation to become an effective tool, it should be based on in-depth analysis and qualification of the mental condition of the patient. If the mechanism of formation of the pathological need for alcohol were clearly understood, and if the mechanism of change of the hierarchy of the basic motives were also understood, then these categories would be filled with physical meaning and such hypothetical categories would obtain operational status.

This could provide an opportunity to change the internal world of the patient and the importance of the semantic elements of the person's psyche. Therefore, by operating within these categories, it might be possible not only to precisely diagnose the changes of the psyche for different patients but also to treat them etiopathogenically. For example, it would be possible to cancel a priority of dominating pathological motives for alcohol and to assign a priority of motivation to achieve a socially acceptable goal.

We have used a tool which permitted analysis of the complex visual-motor reactions in response to the presentation of various semantic stimuli in the sub-threshold range to study the psyche. Based on this approach, we have developed a research procedure with the potential of providing the diagnosis of alcohol or other dependencies. This procedure can provide objective information that has not been altered by the conscious mind of the participant being tested or the conditions of the experiment. This approach allows for the study of the psychosemantic nucleus of the personalities of PTSD patients with alcohol dependencies. It is also allows the

investigation of the mechanisms of pathological mental processes, the understanding of which are necessities for the effective treatment of such conditions.

For example, having statistically significant results for psychosemantic testing for topics "fear" and "alcohol" in 5 patients from the control group suggests that either they are consciously under reporting their consumption and trying to consciously hide their alcohol tendency or they are in state of conscious denial of their tendency or they do not consider a drinking habit as a dangerous social and health problem.

The positive reference point (the name of the participant) was usually characterized by a faster reaction in comparison to a reaction to a group of neutral words. If words in the alcohol group were located near the group of neutral words (the difference between the average times of reaction statistically was not significant), it meant the participant being tested had a low emotional value for these words and could be considered as not having alcohol addiction or hidden tendency to alcohol.

If words in the alcohol group were located near a positive reference point and there was a statistical difference of the average values with the group of neutral words, this meant that these concepts had high positive importance and high emotional content for the participant being tested. Because stimuli that were relevant to the needs of the personality were perceived more correctly and more quickly (a principle of a resonance) than nonrelevant ones, we have concluded that significant displacement of the responses for words in the group alcohol to a positive reference point signaled the presence of hidden tendencies for alcohol abuse.

Also, as we observed patients, some showed a delay in reaction time to "Alcohol" topic while others showed acceleration. These reactions were attributed to the different forms of psychological protection used by the patients.

The presence of such protective mechanisms in individuals' psyches, in our opinion, may have caused individual

distinctions in the ways people reacted to stress. For example, hysterogenic people, with replacement as their primary type of protection, poorly recognized the stressogenic stimuli and they subjected these stimuli to greater distortion which was then expressed in greater reaction delay. Other types of behavior distinguished people who were inclined to other types of psychological protection, such as isolation or rationalization. Persons of similar typology identified negative stressogenic stimuli that are expressed in the reduction of their reaction times.

Computer-based psychoanalysis such as the approach described here may afford the speedy uncovering of subconscious tendencies and/or preferences of the participant being tested and has established basic positive personal motivation (Smirnov et al., 1995), which has served as a guide for the prescription of a precise treatment. This has defined the direction and character of change of the psyche and consequently the behavior of the patient (Smirnov et al., 1995).

## **Conclusion**

This research once again confirmed the presence of the phenomenon of subconscious recognition of semantically meaningful stimuli for different patients. Psychosemantic testing allowed for differentiating the forms of psychological protection used by the patient. When groups of words which included alcohol, were presented in the subconscious mode, patients with hysterogenic type, replacement as the primary type of protection, responded with a delay in their reaction times and an acceleration in isolation or rationalization.

Hidden tendencies could be diagnosed using psychosemantic testing including alcohol abuse (5 patients). Psychosemantic diagnosis of dependencies at the subconscious level allowed researchers to determine groups of words significant to the individual and to receive the objective information not altered by the conscious mind of the participant and not limited to the artificial conditions of the experiment.

This technique allows precise diagnosis in the changes of the personality of PTSD patients with alcohol dependency.

The study of the psychosemantic nucleus of the personality allows researchers to begin new approaches to etiological and pathogenic simultaneous treatments (treatment of motives/causes of such

conditions) and to develop a new view of the nature and mechanisms of the pathological mental processes, which are necessary both to fundamental science and its practical applications.

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## **A Discussion of Two Diagnostic Features of the Polygraph Cardiovascular Channel**

**Mark D. Handler<sup>1</sup>, L.A. Geddes<sup>2</sup>, and Joel M. Reicherter<sup>3</sup>**

### **Abstract**

The cardiovascular readings observed during a psychophysiological detection of deception examination change following emotion evoking questions. The changes can be observed in the baseline and tracing amplitude waveform recordings. The authors explored the cause of these changes and the physiological phenomena being recorded. The amplitude changes that accompany a change in arterial blood pressure were shown to be related to the relationship between cuff pressure and blood pressure measured at the monitoring site. Changes in tracing baseline were shown to accompany a change in blood pressure monitored at the cuff site. The purpose of this paper is to propose possible explanations for what is actually being displayed on the cardiograph tracing. This paper discusses the duplication of earlier works and the use of modern polygraph instruments to explore physiological changes known to be associated with Sympathetic Nervous System (SNS) arousal. Additionally, this research project may be considered an educational paper intended to assist the reader in understanding the basic principles underlying cardiovascular recordings monitored on the cardiograph tracing during a polygraph examination.

### **Introduction**

Several publications have listed the various features that are considered to be diagnostic when evaluating polygraph tracings. The Defense Academy for Credibility Assessment (DACA), formerly DoDPI, teaches the preferred and standardized evaluation system used throughout the Federal government (DoDPI, 2006). The most recent DACA Test Data Analysis chapter lists baseline arousal as the primary feature and duration of that arousal as a secondary feature. Other publications (Abrams, 1989; Matte, 1998; Reid & Inbau, 1977; Shurany & Ravid, 2005) have listed the various features considered to be diagnostic when evaluating polygraph tracings which include both baseline arousal and amplitude changes.

The cardiovascular circulation is a closed system consisting of the heart muscle,

arteries, capillaries, and veins. One of the primary purposes of the cardiovascular system is to transport nutrients and oxygen to body tissues and remove metabolic wastes and carbon dioxide from the body tissues.

In polygraphy, we are primarily concerned with observing changes that occur in the heart muscle and blood vessels. This is generally accomplished through continuous measurements obtained with a partially inflated blood-pressure cuff. Emotion-evoking questions have been shown to produce a change in the cardiograph tracing (Geddes & Newberg, 1977). These changes include baseline rise and sometimes a visually discernable change in pulse-amplitude (Geddes & Newberg). This paper will focus on these two changes in the cardiograph tracings and discuss their origin and diagnostic significance.

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Methods described by Geddes (1970) were used to replicate previous experiments using a modern computerized polygraph instrument.

Modern polygraphs continuously monitor cardiovascular activity by maintaining an inflated cardiovascular cuff during the course of chart recording. One of the diagnostic features routinely discussed in polygraph literature is baseline arousal. Baseline arousal is a rise in diastolic tracings from a pre-stimulus level. Another feature that has been considered diagnostic is changes in the amplitude of the cardiovascular tracing. The authors suggest that pulse amplitude and baseline changes considered diagnostic are primarily due to changes in blood pressure versus blood volume. The paper will discuss experimental methods used to test this hypothesis.

## Background

One of the earliest documented applications of the blood-pressure cuff used to detect deception was utilized by Dr. William Marston in 1915. To detect deception, Dr. Marston used a technique of discontinuous blood-pressure measurement to obtain systolic blood pressure readings during questioning of a subject. Dr. Marston would infer guilt or innocence based on these repeated measurements taken over a short period of time. It was Dr. Marston's discontinuous measure of blood pressure that led to the *Frye Decision*. In 1923, the U.S. District Court of Washington, DC concluded the discontinuous method of measuring systolic blood pressure (as a "unigraph" recording vs. the contemporary polygraph) lacked general acceptance by the scientific community. In 1921, John Larson assembled one of the first portable instruments capable of producing a continuous method of recording relative blood-pressure changes.

Emotion-evoking questions are known to cause a baseline arousal and sometimes a change in pulse amplitude. The change in pulse amplitude can be either an increase or decrease in the tracing. It is somewhat of a paradox that most often a decrease in amplitude accompanies a baseline rise. Typically, baseline changes in the cardiograph tracing may occur during a phasic or tonic change.

The polygraph setting is a rather unusual circumstance. A subject is presented a threatening stimulus question while instructed not to move. In a typical physically threatening scenario, the well known "fight, flight or freeze" response would induce acute cardiovascular activity. In a polygraph milieu a decline in heart rate and pulse amplitude may accompany an undulating blood pressure waveform.

The initial cardiovascular response observed after the onset of the stimulus question mimics the physically threatening stimulus response. The subsequent polygraph waveform profile however, reflects a conflict between the CNS and the vegetative output. In the physically threatening milieu, the cognitive and emotionally driven limbic system divisions of the CNS will marshal the body systems to react. Specifically, the cardiovascular system is preparing to deliver more blood to the skeletal muscles for the "fight, flight or freeze" response.

A complete physiologic explanation of this dichotomy of the cardiovascular waveforms observed during a polygraph examination, vis-à-vis, what would be observed during a typical "fight, flight or freeze" response exceeds the mission of this paper. Instead we focused on the changes observed in pulse amplitude and tracing baseline.

## Pulse Amplitude Changes

Geddes and Newberg (1977) conducted research that addressed pulse-amplitude change. These researchers demonstrated how oscillation amplitude is related to arterial blood pressure. They and other investigators have shown when cuff pressure exceeds systolic blood pressure, the brachial artery collapses. Blood travels to the upper edge of the cuff and stops. Some small oscillations are transmitted to the upper edge of the cuff as the blood is forced against the occluded portion of the brachial artery. As the cuff pressure was slowly reduced, less of the brachial artery is occluded until cuff pressure equaled systolic pressure. When cuff pressure was reduced below systolic pressure, pulse



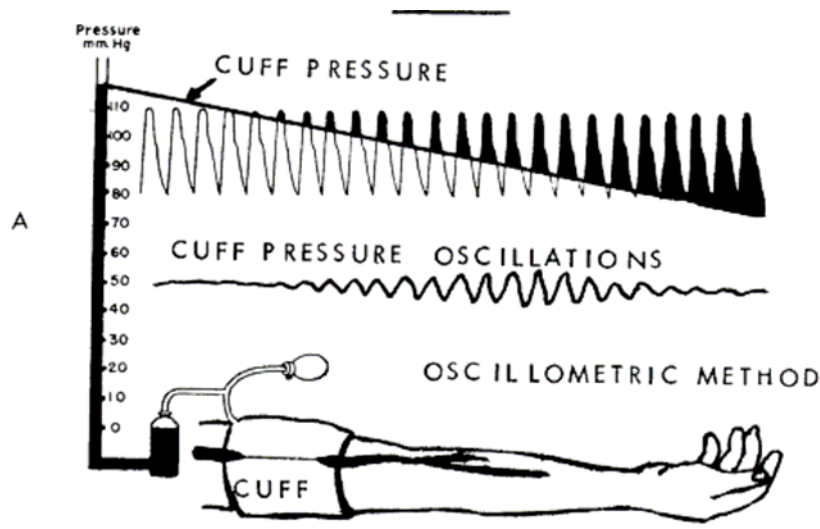


Figure 1. Characteristics of the oscillometric method of measuring indirect arterial blood pressure. The shaded area on the pulses in Figure 1 shows the relative portion of the brachial artery that is open. When the cuff pressure exceeds systolic pressure, the underlying artery is occluded and no blood will flow through the brachial artery. Small oscillations are caused when the blood is pulsating against the partially closed artery and communicated to the cuff. As cuff pressure falls, more blood is allowed to pass through the artery and oscillations increase to a maximum value and then begin to fall. It has been found that cuff pressure for the point of maximum oscillations is approximately equal to mean arterial pressure (Mean Arterial pressure is approximately Diastolic Pressure plus  $1/3$  of Pulse Pressure for the brachial artery). This graph was previously published in *Polygraph* and is reprinted here with the permission of the American Polygraph Association.

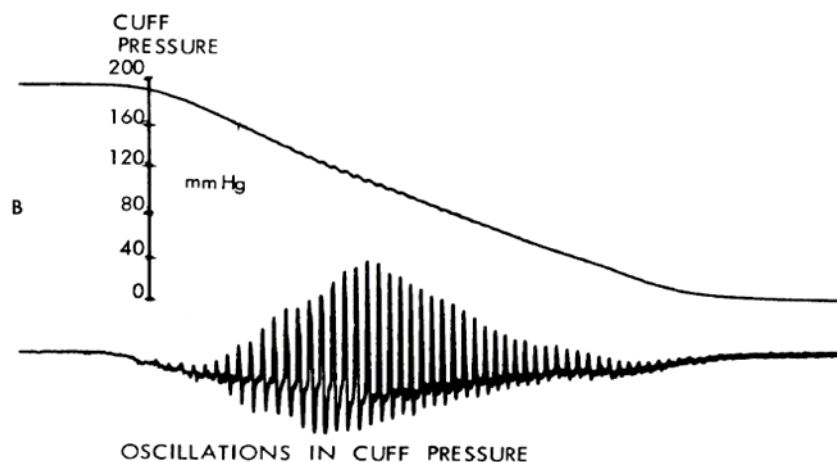


Figure 2. A typical record obtained from a human subject using a 12-cm cuff. Cuff pressure and amplified cuff oscillations are presented. This graph was previously published in *Polygraph* and is reprinted here with the permission of the American Polygraph Association.

amplitude tracings could be observed in the recordings. The amplitude of the pulse tracings increased as the cuff pressure continued to decline. As the counter-pressure against the tissue continues to fall, more blood passes through the artery and more of the artery is open during the cardiac cycle.

As cuff pressure on the overlying tissue is further reduced the oscillations begin to decrease because the artery wall is less flexible. As the cuff pressure continues to fall, these oscillations decrease until cuff pressure falls to zero. (See Figures 1 and 2)

To understand how the cardiovascular channel of the polygraph works, it is necessary to understand the principle that underlies operation of the oscillometric method of measuring arterial pressure noninvasively. Figure 2 is a record of decreasing cuff pressure and the amplified cuff-pressure oscillations. Note their increase, reaching a maximum and decreasing as cuff pressure continues to decrease. The cuff pressure for maximum-amplitude oscillations was shown to correspond to mean aortic pressure by Posey, Geddes, Williams and Moore (1969).

The foregoing predicts that if cuff pressure is set to a value below the cuff pressure for maximum oscillations, the amplitude of the cuff-pressure oscillations will decrease if the arterial pressure increases. Conversely, if the cuff pressure is set at a pressure above the cuff pressure for maximum oscillation amplitude, a rise in arterial pressure will increase the oscillation amplitude. Since most modern polygraph examiners operate with cuff pressure in the 60 – 80 mm of Hg range, the cuff pressure is below the point of maximum oscillations or below mean arterial blood pressure.

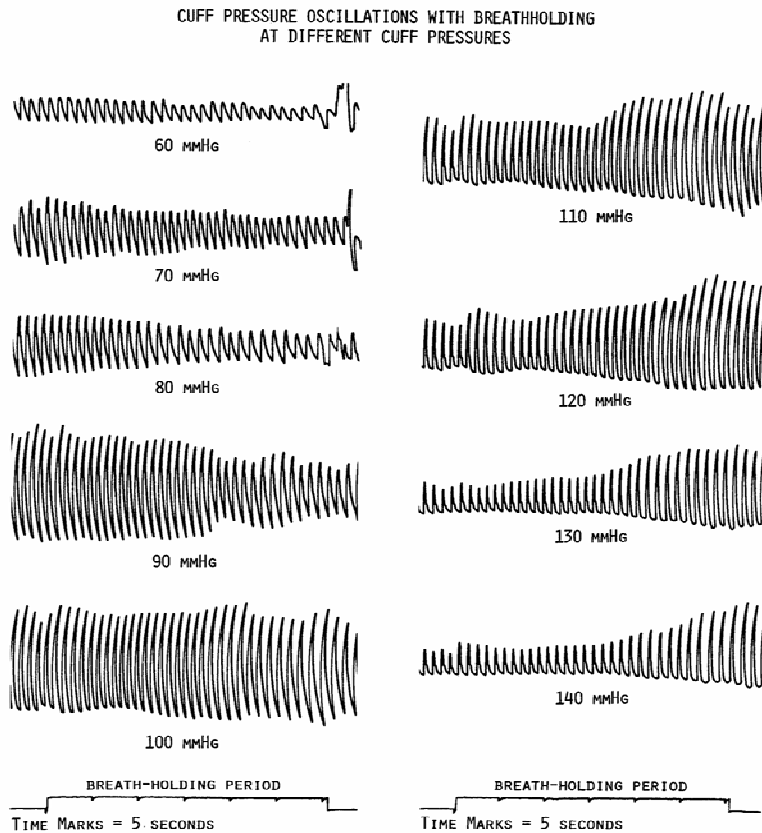
Geddes and Newberg (1977) tested and found support for this hypothesis by applying

a stimulus to raise the arterial pressure of a subject and measuring amplitude changes at varying arterial pressures. These investigators first determined the cuff pressure for maximum oscillations by using the method shown above in Figure 2. Once maximum oscillation pressure was determined, the investigators could determine cuff pressures to use to test the hypothesis. In the case demonstrated in Figure 3, the investigators determined the maximum oscillation blood pressure for this individual to be about 95-100mmHg.

The investigators had the subject use a breath holding technique to cause a rise in arterial pressure and measured cuff pressure and oscillations with a two-channel graphic recorder.

Additionally they attached a conventional polygraph instrument via a T-tube to the blood pressure cuff to ensure the same results would be displayed on a polygraph. It should be noted that a T-splitter may confound the measurements of both devices since their mechanisms move according to pressure waves, which affects the mechanism in the other device.

The first author replicated a portion of the above study using a modern polygraph instrument. The first author attached the blood pressure cuff to the upper arms of two healthy adult male subjects and recorded the cardiograph tracing while the subjects held their breath. For the first trial, the cuff pressure was set below maximum oscillation pressure. For the second trial, the cuff pressure was set above maximum oscillation pressure. Figures 4 and 5 display sections of typical charts obtained during this exercise. The first author repeated the experiment several times with similar results for both subjects.



*Figure 3.* The results of the subject are shown in figure 3. When cuff pressure was initially set at 60-70 mmHg the breath holding caused a barely perceptible decrease in amplitude. As cuff pressure approached 80-90 mmHg the reduction in amplitude became clearly discernable by the human eye. At about 100 mmHg, the breath holding did not alter the tracing amplitude. As cuff pressure was increased, breath holding resulted in marked amplitude increases. The investigators reported all subjects tested displayed similar results. This graph was previously published in *Polygraph* and is reprinted here with the permission of the American Polygraph Association.

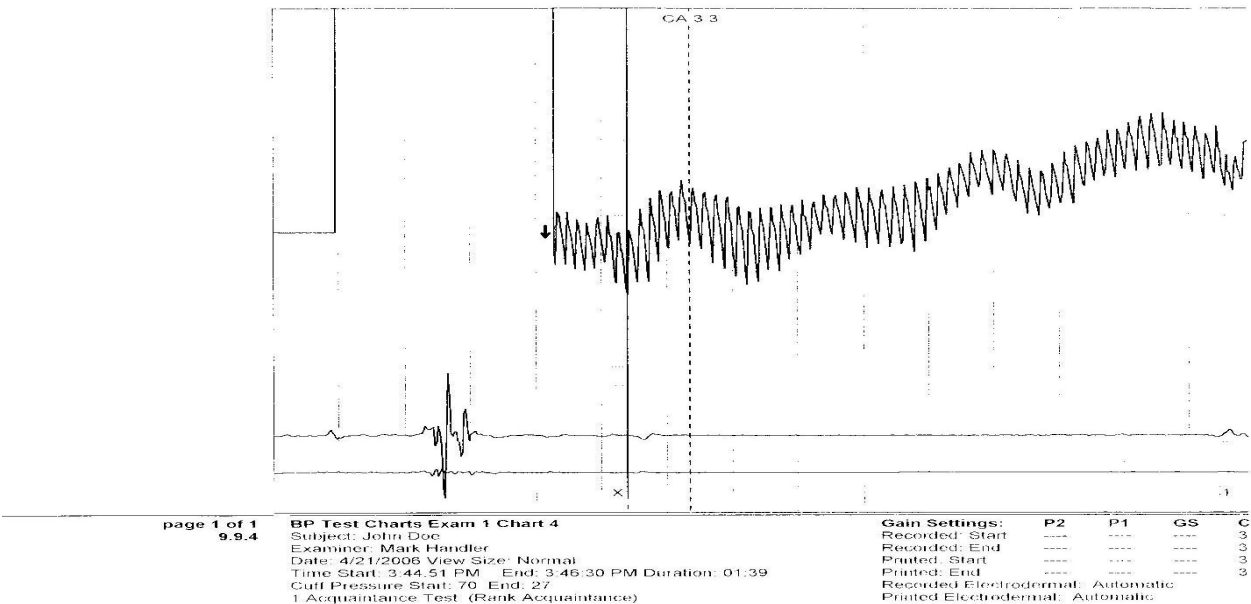


Figure 4. This tracing was obtained using a Lafayette Instrument computerized polygraph (LX-4000). With the cuff pressure set at 70 mmHg, breath holding caused a rise in baseline and a decrease in amplitude.

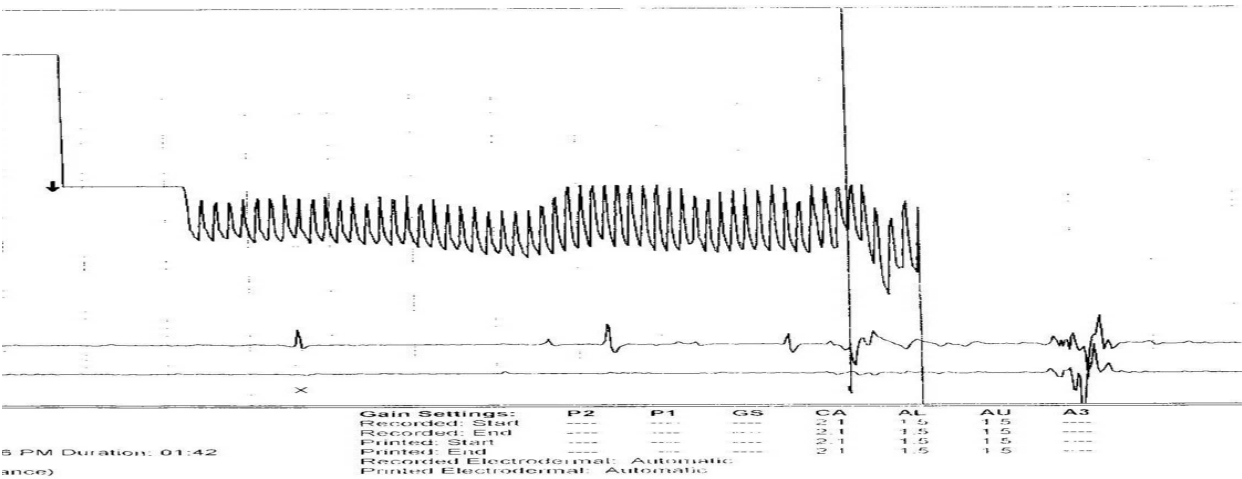


Figure 5. This tracing was obtained using a Lafayette Instrument computerized polygraph (LX-4000). With the cuff pressure set at 113 mmHg, breath holding caused a slight rise in baseline and an increase in amplitude.

What is important to note is that there is a cuff pressure-arterial pressure relationship where amplitude oscillations are maximized. As these two pressures move further away from one another the pulse amplitude will decrease. Matte (1996) and DACA (Anatomy and Physiology) have published the amplitude of the cardiograph

tracing represents Mean Arterial Blood Pressure. This appears to be supported by our experiments with modern polygraph equipment and those of earlier investigators.

**Baseline Changes**

Cardiograph baseline changes typically present as either a tonic (long term) rise or a

phasic (short term) rise and fall. Phasic changes are generally associated with SNS arousal. They rise quickly and generally fall to the pre-stimulus level or a new level. Both Matte (1996) and DACA (Anatomy and Physiology) have published that baseline changes are manifested by changes in blood volume at the site where it is being recorded. Matte states the cardio cuff is measuring net volumetric changes in the arteries, arterioles, capillaries, venules and veins.

A counter-pressure in excess of 40 mmHg can cause the collapse of the underlying tissue capillary beds (Marieb, 1999). Since polygraph examiners typically inflate the cuff to a level above 40 mmHg, the capillary beds below the cuff may be compressed and no swelling could occur below the cuff due to an increase in blood volume. This means that the rise in cardiograph baseline may be due to something other than blood volume changes in the tissue below the monitoring site. Since the capillary beds are compressed under the cuff during a polygraph examination, this would lead one to question how much baseline arousal in the cardiograph tracing results primarily from increased blood volume changes.

### Theoretical Considerations

To test how changes in arterial pressure affect polygraph tracing amplitude and baseline, it is necessary to manipulate the *measured* arterial pressure of a subject while recording the cardiograph channel on a polygraph instrument without actually changing the subject's blood pressure. This is done so that we have presumably not altered any volume change at the monitoring point because of a change in the subject's blood pressure. If we can falsely change the measured relative blood pressure without causing any volume change, we can isolate the blood pressure effect on the cardiograph tracing. We were able to conduct a simple experiment to show the effect a change in measured relative blood pressure has on our two tracings of concern.

Geddes (1970) has demonstrated a simple method to modify the blood pressure recorded at the cuff. This is done by simply manipulating the level of the cuffed arm of the subject by raising it above the level of the

subject's heart. This is best accomplished by having someone grasp the subjects arm and raise and lower the arm while monitoring the cardiograph channel. *It is important to ensure the subject does not raise or lower their own arm.* If the subject moves their own arm, the compression of their muscle against the brachial artery causes a rise in baseline. See the below Figure 6 for an explanation of this procedure.

## Methods

### Participants

The participants were three healthy adult males age 35, 42 and 44. None reported any significant health problems and none were currently taking any prescription medications.

### Apparatus

For the arm-cuff testing, a standard 12-cm blood-pressure cuff was wrapped around the upper arm of three healthy adult male subjects while seated in a plastic portable polygraph chair. For the finger-cuff trials, a "finger-cuff" sold by the Lafayette Instrument Company was wrapped around the subject's thumb. We used a Lafayette Instrument Company computerized polygraph instrument (LX-4000) to record the cardiograph channel.

### Procedure

The arm-cuff method consisted of comfortably seating the subject in the polygraph chair in a quiet polygraph suite and wrapping the cuff around the left upper arm. The chart recording function was started and the cuff inflated. After the cuff was inflated, the cuff was "massaged" to equalize pressure and then the cuff pressure was adjusted again to the target pressure. The subject was instructed not to attempt to raise or lower their arm. They were told to allow the assistant to move their arm for the test. Once the tracing was stabilized, an assistant slowly raised the subject's right arm from the chair rest to above the subject's head as shown in figure 6. The assistant grasped the subject's wrist with one hand and placed their other hand under the subject's elbow. While the assistant watched the polygraph chart, they slowly raised or lowered the subject's left arm while maintaining support under the elbow and



*Figure 6.* The importance of cuff location during the arm-cuff experiment. In situation **a**, blood pressure is measured at the heart level. In situation **b**, the first author demonstrates a correct way to support the subjects arm during height manipulation. When blood pressure is measured with the arm elevated, it is reduced by 22.4 mmHg per foot of vertical distance from the heart.

using the wrist to lift or lower the subject's arm.

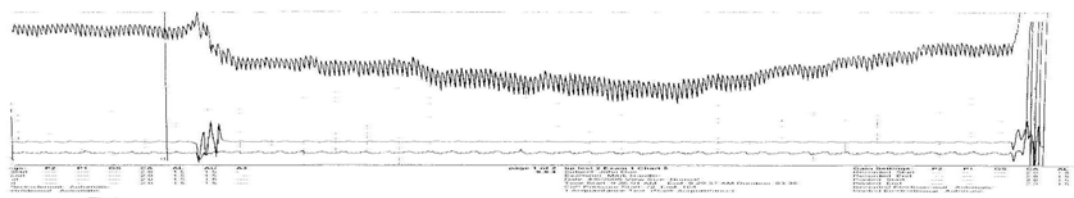
The finger-cuff method consisted of comfortably seating the subject in the polygraph chair in a quiet polygraph suite and wrapping the cuff around the left thumb. The cuff was inflated and the chart recording function started. After the cuff was inflated, the cuff was "massaged" to equalize pressure and then the cuff pressure was adjusted again to the target pressure. The subject was instructed not to attempt to raise or lower their arm. They were told to allow the assistant to move their arm for the test. Once the tracing was stabilized, an assistant slowly raised the subject's left arm from the chair rest to above the subject's heart using the assisted method described earlier.

In the first trial, the target cuff pressures were set at approximately 60 - 70

mmHg. In the second trial, the target pressure was approximately 110-115 mmHg.

## Results

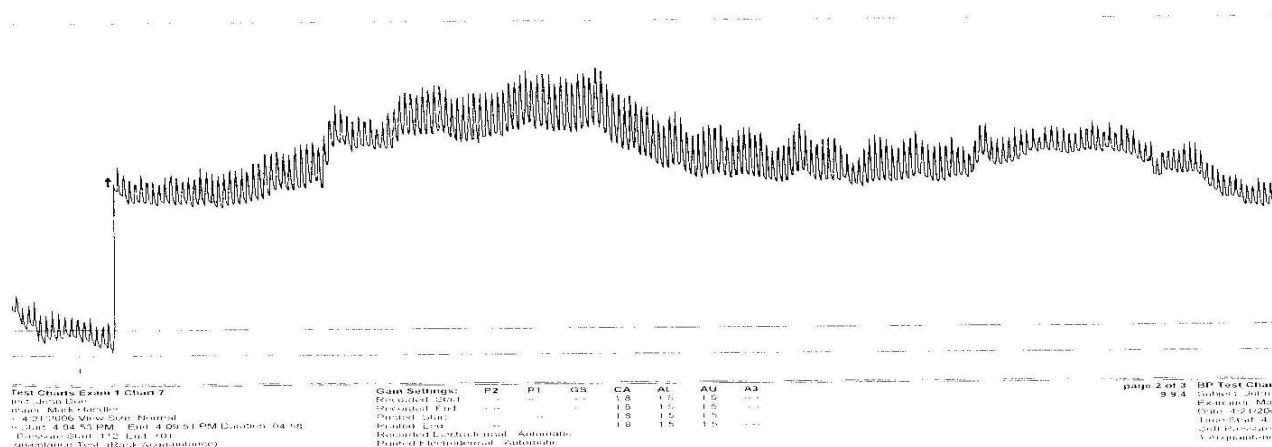
Figure 7 displays the typical results of a subject with the arm-cuff pressure set below mean arterial pressure. In this trial the experiment began with the subject's arm at heart level. The assistant raised and then lowered the subject's arm. Raising the subject's arm caused a lowering of the blood pressure monitored at the cuff. The tracing amplitude increases and the baseline decreases as the monitored blood pressure is lowered. Lowering the subject's arm causes a rise in blood pressure monitored at the cuff. The pulse amplitude decreases as the baseline increases. This tracing is typical for all subjects tested at this lower target pressure.



X Begin raising arm.

XX Begin lowering arm.

*Figure 7.* An example of the cardiograph tracing obtained by manipulating the subjects arm with the arm-cuff pressure set below mean arterial pressure. The X marks the point at which the assistant began raising the subject's arm. The XX marks the point where the assistant began lowering the subject's arm.



X Begin lowering arm.

XX Begin raising arm.

*Figure 8.* An example of the cardiograph tracing obtained by manipulating the subjects arm with the arm-cuff pressure set above mean arterial. The X marks the point at which the assistant began lowering the subject's arm. The XX marks the point where the assistant began raising the subject's arm.



Figure 9 The importance of cuff location during the finger-cuff experiment. In situation **a**, blood pressure is measured at the heart level. In situation **b**, the first author demonstrates a correct way to support the subjects arm during height manipulation. When blood pressure is measured with the arm elevated, it is reduced by 22.4 mmHg per foot of vertical distance from the heart.

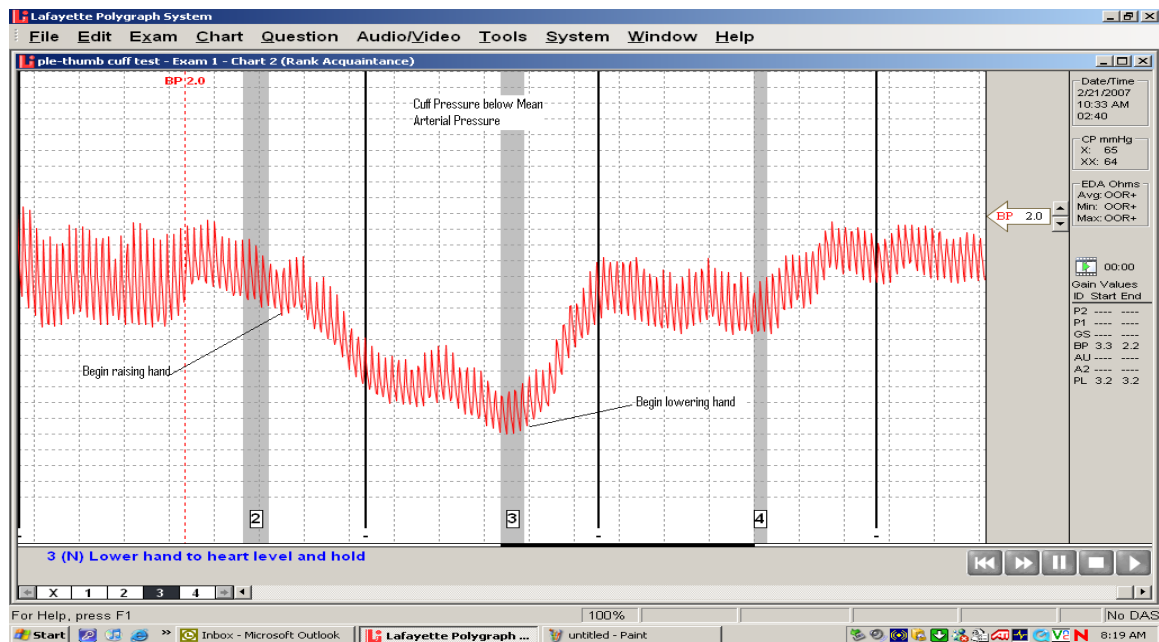


Figure 10. An example of the cardiograph tracing obtained by manipulating the subjects arm with the finger-cuff pressure set below mean arterial pressure. The chart is noted at the point where the assistant began raising and lowering the subject's arm.



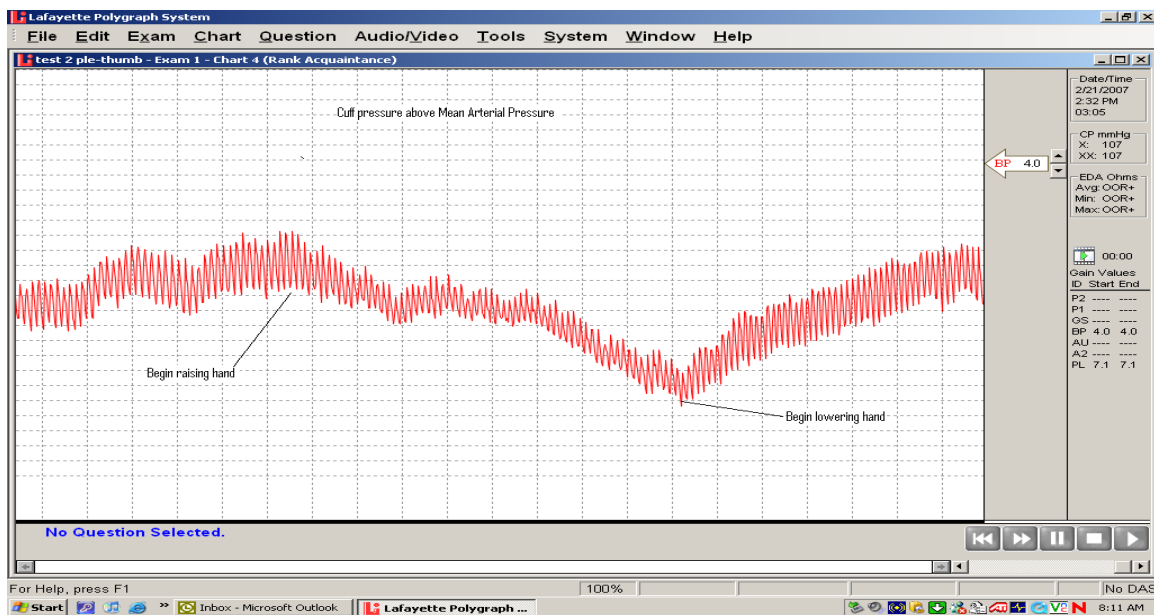


Figure 11. An example of the cardiograph tracing obtained by manipulating the subjects arm with the finger-cuff pressure set above mean arterial. The X marks the point at which the assistant began lowering the subject's arm. The chart is noted at the point where the assistant began raising and lowering the subject's arm.

Figure 8 displays the typical results of a subject with arm-cuff pressure set above mean arterial pressure. In this trial the experiment began with the subject's arm held above the head. The assistant lowered the subject's arm which caused a rise in blood pressure monitored at the cuff. The tracing baseline increased as the pulse amplitude increased. The assistant then slowly raised the subject's arm which caused the blood pressure monitored at the cuff to fall. The tracing baseline decreased and the amplitude decreased. This tracing is typical for all subjects tested at this higher target pressure.

Figure 10 displays the typical results of a subject with a finger-cuff pressure set below mean arterial pressure. In this trial the experiment began with the subject's arm at heart level. The assistant raised and then lowered the subject's arm. Raising the subject's arm caused a lowering of the blood pressure monitored at the cuff. The cardio tracing baseline decreases and as the blood pressure lowers at the monitoring point. Lowering the subject's arm causes a rise in blood pressure and the baseline to increase. Note: Comparatively smaller amplitude

changes were noted during these trials. This tracing is typical for all subjects tested at this lower target pressure.

Figure 11 displays the typical results of a subject with a finger-cuff pressure set above mean arterial pressure. In this trial the experiment began with the subject's arm at heart level. The assistant raised and then lowered the subject's arm. Raising the subject's arm caused a lowering of the blood pressure monitored at the cuff. The cardio tracing baseline decreases and the cardio pulse amplitude decreases as the monitored blood pressure lowers at the cuff. Lowering the subject's arm causes a rise in blood pressure measured at the thumb and causes the baseline and cardio pulse amplitude to increase. This tracing is typical for all subjects tested at this lower target pressure.

This simple experiment demonstrates the changes observed in the cardiograph tracings when measured blood pressure is changed without SNS arousal. By raising and lowering the subject's arm, we manipulated the blood pressure recorded at the cuff site without attempting to raise the subject's

arterial pressure. Since we presumably did not alter the subject's arterial pressure, we did not cause any swelling of the underlying tissue. These experiments tend to support the earlier work of Geddes and Newberg (Geddes and Newberg, 1977). If the cuff pressure is set below maximum oscillation pressure, as typically done in modern polygraphy, a rise in arterial pressure will result in a baseline rise and a decrease in pulse amplitude

## Discussion

An inference can be drawn that the cardiograph changes are manifested from arterial pressure changes based on the tracings obtained via the Finapres and the experiments conducted in this paper. We have demonstrated that pulse amplitude is a function of the relationship between arterial pressure and cuff pressure. The changes that occur in pulse amplitude size are dependent on a number of factors that include systolic and diastolic changes throughout the examination and the cuff pressure. This can be confounded by the starting points of each in relation to one another. Since cuff pressure remains relatively constant throughout the chart collection phase, the primary variable is a change in blood pressure at the monitoring site.

Since mean arterial pressure is a function of systolic and diastolic pressures then it could be inferred that they are the primary cause for change in pulse-amplitude. Increases in systolic and diastolic pressures caused by SNS arousal will result in a rise in arterial pressure. As shown earlier this will result in a mean arterial pressure that is further from cuff pressure and the cause of a decrease in pulse amplitude.

It would seem impossible to have a baseline arousal without a decrease in pulse-amplitude, but this is not uncommon in polygraph. One possible explanation is the lowered cuff pressure in modern polygraph recordings. Computerized polygraph allows us to operate with lower cuff pressures and accommodate through the use of amplification.

The physiological source of the cardiograph tracing has been a point of

contention. Prior studies, including the one done by Podlesney and Kircher (1999) provided data from which inferences may be drawn. These researchers reached the same inference as we did, that the cardiograph reflects variations in arterial blood pressure.

The results of the experiments discussed in this paper provide a possible physiological basis for the changes observed in the cardiograph tracing. Our results replicated the earlier work of Geddes and Newberg using modern polygraph equipment and we reached the same conclusions.

As professionals we should strive to learn as much as we can about what we actually record. With the many different disciplines studying the human body and human behavior, we owe it to our profession to seek guidance from experts in these different fields of study. Many psychophysiology and anatomy researchers have conducted studies that can be applied to polygraph. If these experts can help shed more light in an area of polygraph, we should take advantage of their work. Inter-discipline cooperation will assist us to gain and maintain the respect of our fellow professionals.

## Limitations and Further Research and Development

Since actual arterial blood pressure was not monitored during these experiments, we cannot say with certainty the source of baseline arousal is strictly due to arterial blood pressure change. During the Finapres experiments conducted by Podlesney and Kircher (1999) they too did not directly measure arterial blood pressure. Also we cannot say with absolute certainty we did not raise the subject's blood pressure during the arm raising experiment.

It is suggested that polygraph instrument manufacturers collaborate with other medical instrument manufacturers to provide alternative instrumentation capable of measuring mean arterial blood pressure dynamics without the use of a cardio cuff. The current cuff used to obtain data for the cardiograph channel, partially occludes circulation distal to the applied location. This occlusion has been the source of discomfort to

polygraph examinees and may limit the number of questions asked during a polygraph chart. An alternative method of recording arterial pressure that does not cause discomfort may allow examiners to ask more questions during a single polygraph chart.

The Finapres may provide an attractive alternative to cardiovascular recordings. During Probable Lie Testing the validity coefficients between the Finapres and cardiograph were statistically indistinguishable (Kircher, Packard, Bell & Bernhardt, 2001). Unfortunately the Finapres may be cost-prohibitive to most end users of polygraph.

Routine inclusion of blood volume or pulse volume measurements needs to be explored as well. Polygraph examiners should contact their instrument manufacturer regarding photoplethysmograph components.

Since the cardio cuff acts as a tourniquet, over the duration of a polygraph recording, any digital blood volume recording must be done on a non-restricted arm.

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## **Psychological Structure and Theoretical Concept of the Backster Zone Comparison Technique and the Quadri-Track Zone Comparison Technique**

**James Allan Matte**

During the course of three and a half decades of conducting polygraph examinations including numerous quality control reviews of examinations administered by other polygraphists, it became quite apparent that the theoretical concept and psychological structure of the Backster Zone Comparison Technique were not fully understood by many polygraphists who administered the Backster ZCT or its derivatives (Federal ZCT, Quadri-Track ZCT, Integrated ZCT, Utah ZCT). This is evident by some of the modifications that were made to Backster's ZCT that failed to consider the consequences of those seemingly unimportant changes that redirected or fractured the flow of the examinee's psychological set, thus adversely affecting the technique's accuracy. There appeared to be an equal lack of understanding and appreciation for the *theoretical concept* of the Backster ZCT which necessitates that a *structured pretest interview* that is designed to psychologically prepare the examinee for the administration of the test be administered in an unbiased manner. The pretest focuses on the relevant and comparison questions, formerly known as control questions, without inviting outside issues that can interfere with the examinee's psychological set.

However, the polygraph community's recent emphasis in combating the use of countermeasures, mental countermeasures in particular, has resulted in some additional modifications that appear on the surface to address the mental countermeasure problem, but in fact these modifications create a significantly greater problem wherein the cure is worse than the disease. Therefore, a presentation of the theoretical concept and psychological structure of the Backster Zone Comparison Technique, from which the Quadri-Track Zone Comparison Technique and the other aforementioned techniques originate, is most timely.

Several polygraph techniques have emerged over the past half century which have proven themselves in the field with empirical data and studies that support their reliability, that do not fall within the family of zone comparison techniques, such as the Reid Technique and its derivative Arthur Technique. Heated debates have occurred regarding the efficacy of various components of those techniques versus the components of the zone comparison techniques, such as the use of non-exclusive versus exclusive comparison questions, done without realizing that each type of comparison question was designed specifically for the particular technique developed by its author. Hence the non-exclusive comparison question designed for use with the Reid and Arthur technique would not be appropriate for the Backster ZCT, which requires a distinct separation of relevant versus comparison question. The exclusive comparison question would be too weak for use with the Reid and Arthur technique that has twice as many relevant versus comparison questions. Backster, Reid and Arthur were masters at their craft and spent many years in the development and refinement of their individual techniques which have all withstood the test of time, usage and study, hence command adherence to their individual theoretical concept and psychological structure without unnecessary modification. Therefore, this thesis's sole focus is on the theoretical concept and psychological structure of the Backster Single-Issue Zone Comparison Technique and its derivative Quadri-Track ZCT, which in no way challenges the scientific merits of non-zone comparison techniques.

The Backster Zone Comparison You-Phase Technique is a true single-issue test that offers two threats to the examinee who must chose which of those two threats presents the greatest peril to his security and well-being. The first threat comprises the two

relevant questions dealing with the same single issue. The second threat is in the form of comparison questions dealing with earlier-in-life activities that the examinee wishes to conceal from the polygraphist. In order for the examinee to be given a clear choice between those two threats, a time bar is used to clearly separate the time period covered by the comparison questions from the time period covered by the relevant test questions. The placement of the comparison questions in an earlier-in-life time frame also makes them structurally less intense than the relevant questions thus obviating an equal threat to the guilty examinee that would cause an inconclusive test result. Backster thus introduces us to his "Either-Or" rule, which dictates that the examinee ideally should respond to either the relevant questions which he labeled the "Red Zone" or the comparison questions which he labeled the "Green Zone" but not to both. In order to facilitate the focus of the examinee's psychological set on the Red Zone or the Green Zone, he restricted its scope to two relevant questions dealing with the same specific issue flanked by the comparison questions immediately preceding and following them without any other type of question in between them that would interfere with the flow of the examinee's psychological set. Hence, like a beam of light that becomes more intense as it narrows its scope, the guilty examinee's narrow focus is riveted onto the two relevant questions that present the greatest threat to his well-being which should dampen out his concern over the neighboring comparison questions that are structurally less intense, whereas the properly indoctrinated innocent examinee who is truthful to the relevant questions will find his psychological set focused onto the comparison questions that are deliberately designed to elicit mental effort and exercise known to produce an autonomic response. To the guilty, the relevant questions have greater signal value; to the innocent, the comparison questions have greater signal value. The reason for having two relevant questions regarding the same issue rather than one is to achieve internal reliability.

Although the comparison questions are structurally less intense than the relevant questions, they must be presented to the examinee in a manner that conveys *equal*

*importance* to the results of the examination. Therefore, special care must be taken during the review of the test questions with the examinee that the comparison questions be introduced with a preamble that convinces the examinee of their importance rather than a timid and subdued review that minimizes their significance. Furthermore, each relevant question is immediately preceded by a comparison question that offers the innocent examinee an opportunity to respond and dampen the potential response offered by the neighboring relevant question which could still offer the threat of error to the innocent examinee (Ekman, 1985; Matte & Reuss, 1989; NRC 2003). It is therefore imperative that the examinee's psychological set be self-directed onto the Red or Green Zone questions without any influence from the polygraphist who must maintain total impartiality. It is also imperative that no accusatory or interrogative approach be used by the polygraphist during any portion of the pretest interview and the collection of the physiological data. Violation of this procedural requirement will invalidate the test data.

In order to prevent the introduction of other issues that would compete and interfere with the examinee's psychological set which should be focused on the Red Zone or Green Zone test questions, the polygraphist must use a standardized pretest interview designed to prepare the examinee psychologically for their introduction (Matte, 2002). Attempts at eliciting information from the examinee at this point would raise outside issues that would fracture or divert the examinee's psychological set from the programmed dual threat offered by the Red and Green Zone test questions.

Therefore, Backster provided for two symptomatic questions designed to assure both the innocent and guilty examinee that no surprise or unreviewed questions will be asked during the test. Those two symptomatic questions are positioned in a manner that encases and frames the Red and Green Zone test questions, with the first symptomatic question preceding the first comparison question, and the second symptomatic question serving as the last test question with orienting value. This allows those examinees who relieve on the last test question having orienting value to relieve on the symptomatic question rather than the preceding red or

green zone question. Furthermore, the first symptomatic question is used as a buffer between the first comparison question and the preceding Preparatory/Sacrifice Relevant question which is known to elicit an autonomic response from both the innocent and guilty examinee due to its being the first relevant threat on the test. Backster changed the position of Symptomatic Question #25 from position 3 to position 2 in 1983 to conform with the position of that Symptomatic Question in his exploratory tests. Nevertheless, he does permit repositioning of Symptomatic Question #25 to its original position #3.

The Sacrifice Relevant question has a dual function in that it also acts as a Preparatory question for the introduction of the two relevant test questions. The two relevant questions, which are used for the determination of truth or deception to the target issue, must be short, succinct and thoroughly reviewed with the examinee so that they do not elicit any mental effort or exercise except in the deception syndrome. Published research (Boiten, 1993; Bongard, Pfeiffer, Al'Absi, Hodapp, & Linnenkemper, 1997; Fokkema, 1999; Lee, 1953; Ring, Carrol, Willemsen, Cooke, Ferraro, & Drayson, 1999; Winzer, Ring, Carroll, Willemsen, Drayson, & Kendall, 1999) has demonstrated that mental effort will cause an autonomic response undistinguishable from deception. By the same token, short relevant questions may be attacked as having insufficient identification of the offense or matter being tested, which can easily be rectified by using the Sacrifice Relevant question as a Preparatory question that fully identifies the issue. However, the excessive length of a relevant question is not the only factor that can elicit mental effort or exercise. The content of a relevant question that compels an examinee to search his memory will also elicit mental effort, such as the veracity and accuracy of a lengthy written statement. Conversely, comparison questions which encompass a lengthy period of the examinee's earlier-in-life activities are intentionally designed to elicit mental effort and exercise that will cause an autonomic response from the innocent examinee.

An important feature of the technique's psychological procedure is the order as well as

manner in which the test questions are reviewed with the examinee. The relevant questions, starting with the Preparatory/Sacrifice Relevant question, are reviewed first. Then a preamble explaining the importance of the comparison questions is followed by a review of those comparison questions. Acquiring feedback from the examinee as to their understanding and correct interpretation of those test questions will prevent erroneous results (Matte, 2002). A good example is the Fear of Error (comparison) question versus the Hope of Error (relevant) question used in the Quadri-Track ZCT, a close derivative of the Backster ZCT. Cleve Backster recognized the logic and diagnostic value of the Quadri-Track ZCT's Fear and Hope of Error questions, stating that these two questions did not deal with a different group of people nor did they require a different or additional zone designation, hence the change in the name from Quadri-Zone to Quadri-Track ZCT. During the pretest interview, the examinee is primed to provide a negative answer to the Fear of Error comparison question. Most examinees do indeed answer that question in the negative due to the manner in which the pretest is conducted. The two questions are listed below:

Comparison Q: Are you *afraid* an error will be made on this test regarding the target issue?  
Relevant Q. Are you *hoping* an error will be made on this test regarding the target issue?

Most polygraphists would be elated at acquiring a negative answer to the comparison question and would not tempt fate by querying the examinee about the reason for his negative answer, wanting to immediately proceed to the relevant (Hope of Error) question. However that is precisely what the polygraphist must do; query the examinee about his reason for the negative answer in order to acquire feedback that will insure that he interpreted the question properly. Otherwise that comparison question could be ineffective. This author has found a significant percentage of examinees who have provided a negative answer and upon inquiry, stated that they were not afraid that an error would be made on the test regarding the target issue because they were innocent and did not commit the crime. After pointing out that the mere fact that they may be innocent does not have any

effect on the accuracy of the polygraph instrument nor the competency of the polygraphist, but had they provided a negative answer because they believed in the accuracy of the test, then their negative answer would be the correct one. With this explanation, many of them reconsidered their answer, leaning towards an affirmative one. This requires that the polygraphist reassure them of the accuracy of the test again, and request their vote of confidence. This process has not failed the author in acquiring a negative answer in many years. Reciprocally, during the pretest interview, immediately after listening to the examinee's version of the incident, the examinee is assured by the polygraphist that he is assumed to be innocent of the offense for which he is being tested until all of the physiological data has been collected, analyzed and scored for definitive results. By

reminding the examinee of the polygraphist's confidence in them a conflict is created for the innocent examinee who wishes to provide an affirmative answer. This feedback insures the effectiveness of that comparison question which may truly identify an innocent examinee's fear of error that can avoid a false positive result. The Hope of Error relevant question is designed to elicit an autonomic response from the guilty examinee who will have no fear of error but in fact will hope that an error will be made on the test regarding the target issue. Hence feedback is essential, otherwise a fearful innocent examinee who misinterprets the Fear or Error question will not be identified, and a guilty examinee will react due to his misunderstanding of the question.

#### **Order of Review: Relevant**

##### **Backster ZCT**

- 39. Preparatory/Sacrifice Relevant Question
- 33. Relevant Question
- 35. Relevant Question
- 46. Exclusive Comparison Question
- 47. Exclusive Comparison Question.
- 48. Exclusive Comparison Question
- 25. Symptomatic Question
- 26. Symptomatic Question.
- 14J Neutral/Irrelevant Question

##### **Quadri-Track ZCT**

- 39. Prep/Sacrifice
- 33. Relevant Question
- 35. Relevant Question
- 46. Exclusive Comparison
- 47. Exclusive Comparison
- 23. Fear of Error Comparison
- 24. Hope of Error Relevant
- 25. Symptomatic Question
- 26. Symptomatic Question.
- 14J Neutral, Irrelevant

#### **Order of Questions on the Test:**

##### **Backster ZCT**

- 14J Neutral, Irrelevant Question.
- 25. Symptomatic Question
- 39. Preparatory/Sacrifice Relevant
- 46. Exclusive Comparison Question.
- 33. Relevant Question.
- 47. Exclusive Comparison Question.
- 35. Relevant Question
- 48. Exclusive Comparison Question
- 26. Symptomatic Question.

##### **Quadri-Track ZCT**

- 14J Neutral, Irrelevant Question
- 39. Prep/Sacrifice Relevant
- 25. Symptomatic Question.
- 46. Exclusive Comparison
- 33. Relevant Question
- 47. Exclusive Comparison
- 35. Relevant Question.
- 23. Fear of Error Comparison
- 24. Hope of Error Relevant
- 26. Symptomatic Question.

Note: The two relevant questions (33 & 35) are rotated in position after the first chart and subsequent charts thereafter in order for each relevant question to be compared with each comparison question.



Listed above is the order in which the test questions are reviewed, followed by the order in which they are asked on the test. The fact that some of the test questions elicit a negative answer while others elicit an affirmative answer and the examinee is not apprised of the order in which the test questions will be asked on the test, hampers attempts at disassociation.

Neither the comparison questions nor the relevant questions should start with the same wording. This avoids the possibility that the examinee will believe that the same test question is being repeated because something is wrong, which would increase his anxiety towards that question.

The name of any individual, especially a victim, mentioned in the test should be fully identified in the Preparatory/Sacrifice Relevant Question and at least in one of the two relevant questions used for a determination of truth or deception, so as to avoid rationalization on the part of the examinee or psychological conflict with that of another victim unknown to the polygraphist.

When there are several target issues to be covered during a polygraph examination, the target containing the greatest score for Adequacy of Case Information, Target Intensity, and Distinctness of Issue is scheduled as Test A (Matte, 1996 p.326). The next target containing the second highest score is scheduled as Test B, and the third highest score is scheduled as Test C. Usually no more than three single-issue You-Phase Zone Comparison tests are scheduled in one session. However, it is most important that the examinee be apprised of each issue to be tested and that they will each be covered in separate tests. However, only the test questions for Test A are to be reviewed with the examinee who now knows that the other issues will be addressed in separate tests. Failure to advise an examinee of all issues that will be covered in the examination may cause the absorption of all issues by the examinee into Test A, thus confounding the examinee's psychological set, whereas prior notification of each test will allow the examinee's selective attention to be focused on the specific issue

being tested, knowing that the other issues will be covered in separate tests.

There has recently been a surge of interest in the use of mental countermeasures and methods of countering them. One of those methods attempts to deter such usage by instructing the examinee to repeat the last word of each question followed by his one-word answer, which it is thought would defeat attempts at disassociation.

However, repetition of the last word of a question by the examinee plus the utterance of his answer indeed requires the examinee's attention and mental effort which can produce distortion in the breathing tracing and an autonomic response in all three tracings. Furthermore the utterance of some words from a test question, particularly in sex offenses, can also have an emotional impact that can produce an autonomic response. An example is relevant question: "In July 2001, did you force your penis inside Tracy Jones' vagina?" Answer: "Vagina, no."

Historically, the repetition of the last word of each question has been occasionally used in the administration of Peak-of-Tension Tests such as the Guilty Knowledge Test or the Concealed Information Test, but these are not classified as 'Lie Tests' (Lykken, 1960, 1981). They are recognition tests to determine whether the examinee can identify the correct alternative to several equally plausible alternative answers to questions about the crime. The control question test such as the Zone Comparison Technique is in fact a *Lie Test* whose psychological theory and structure is quite different than the Peak-of-Tension Test. In the former, both the innocent and guilty examinee are very much aware of the nature and threat of the relevant test questions, whereas in the latter, only the guilty examinee is aware of the key (relevant) question. As explained earlier in this article, the comparison questions are designed to elicit mental effort and exercise whereas the relevant questions are formulated to be short, succinct and devoid of any mental effort except in the deception syndrome. This makes the zone comparison test far more complex in its psychological structure and administration

and far more likely to produce false positive results when this protocol is violated.

This article is not intended as a lesson plan in the administration of the Backster Zone Comparison Technique or any of its derivative zone comparison techniques. However an understanding of the basic theory, principles and protocol related to the zone comparison technique should aid polygraphists in avoiding well-intentioned but misguided modifications to a well founded

technique or procedures that violate its established protocol.

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## **Criminalistic Diagnostic Investigation Using a Polygraph<sup>1</sup>**

### **1. Basic criminalistic criteria of using a polygraph**

Interrogation using a polygraph (IUP) is a new method of diagnostic investigation for Russian criminalistics.

During many decades of the XX-th century the Soviet jurisprudence had been considering the process of obtaining information from a person with the help of a polygraph as a pseudo-scientific method, and the use of a polygraph in law-enforcement practice was considered to be actually unacceptable. In 1993, according to the federal law on operational search activities (OSA), IUP was permitted for application, and since then it has been progressively used in the activity of law-enforcement authorities and other federal agencies of Russia.

In the beginning of the XXI-st century the competent authorities of the country used IUP in the law-enforcement activity (LEA), for personnel testing (screening) and for investigative practice (including procedural conditions). According to the estimated assessment for 2005, federal authorities of Russia conducted around 25 000 IUP of different purpose.

Introduction of IUP into domestic criminalistic practice have increased the range of efficient methods and means of prevention, detection and investigation of crime, and initiated a new trend in criminalistic technique dedicated to an objective diagnostic of crime traces kept in human memory.

Long ago, psychology, psychophysiology and neurophysiology have proved that the outside events are perceived by different receptors and fixed in the memory as different mental images. Particularly, the information received visually is transformed into a collective activity of many neurons as a result of activity of different brain structures, and these neurons form a neuron trace of any event in form of engrams, i.e. traces of memory

formed as a result of receipt of some information about the event. Then this neurophysiologic reflection of a certain event fixed in the memory becomes a mental image of this event in the conscience of a person. When it is needed, a person extracts the information about this event from his memory and – with certain limitations and rather conditionally – it can be presumed that the person “reproduces” a corresponding mental image and then “reads” it from the memory, materializing it by oral or written communication, or by physical activity (for example, drawing a pattern or a picture). If some information is received through an acoustic analyzer, then, actually, the same process takes place: processing a wording, the human brain identifies meanings of the words, determines the sense and records it in the memory as a set of corresponding engrams.

As mentioned above, such rather simplified explanation – how a person perceives the events from the outside, fixes them in the memory and further reproduces them in the conscience – is directly related to criminalistics which distinguishes two classes of crime traces: materially fixed traces and “ideal” traces – mental images, impressed and kept in a human memory.

The criminalistic science have identified that “ideal” traces have three principle diversities in comparison with material traces: they are hidden from direct investigation; mental images are possible to examine only when they are materialized by a person possessing such an intangible trace orally or in written form; and materialized mental images are much more informative then material traces.

Evidently, an event (for example, a crime) initiates in psychics of different people different trace-generating processes and creates in their memory mental images which are quite different due to some primary subjective human factors. These factors are:

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<sup>1</sup>Reprinted with permission from Unity Dana.

- a) conditions and circumstances of human perception of the outside world (crime);
- b) physical and emotional state of a person;
- c) his sense and social attitude;
- d) his cultural and national individuality etc.

When a person reproduces ("reads") an "ideal" trace from his memory the situation becomes more complicated, because the number of factors influencing the process of materialization of mental images is growing.

First of all, the primary subjective human factors mentioned above can react again, independently and, in total, unpredictably both for the person – image-carrier as well as for the outsider (for example, for the investigator). Second, forgetting is an objective factor resulting in a natural destruction of an "ideal" trace. And third, when an "ideal" trace is being materialized a secondary subjective human factor can be involved – the volition to deliberately falsify the mental image according to personal intentions, own requirements and reasons of a person. In other words, forming and materialization of an "ideal" trace depend on psychological characteristics of its carrier, i.e. of a certain person.

It is known that materially fixed trace can be destroyed by natural, man-caused and other exposure as well as by an intended destruction (deliberate elimination of crime traces by criminal).

In comparison with a materially fixed trace, an "ideal" one can be destroyed only by objective factor – by forgetting. But it can not be eliminated deliberately: a human being is not able to forget something knowingly (on purpose), to "erase" from his memory undesired events of the past or their separate circumstances.

This is the principle advantage of "ideal" trace over materially fixed one.

And this advantage makes conditional upon the effectiveness of IUP application for disclosure, investigation and prevention of crimes.

An "ideal" trace is fixed in human memory as engrams, i.e. a complex of structural-&-functional changes in a set of brain neurons. If human memory is correctly applied to, the engrams "are reactivated when required and become active. ...The reactivation can happen spontaneously, as well as under influence of different internal and external factors. The status of the engram (including its presence or absence in the human memory – *author's remark*) can be evaluated only by test results"<sup>2</sup>, particularly, polygraph test.

Engrams of some event, of course, can not be directly investigated and can not be identified, however they are diagnosable in human memory. Such criminalistic diagnostics is based on the fact that activation of engrams is exhibited by the change of neuron activity of brain structures and is followed by response of physiological systems (for example, respiratory, cardiovascular, etc.). And these responses are externally registered by a polygraph during a specifically arranged testing procedure, i.e. during IUP.

Quite a number of events (or their separate circumstances) of his life are inevitably forgotten by a person. But, an emotional impression (for example, a crime) is fixed almost immediately and automatically in an emotional memory. The trace of emotional memory can not be erased and is not subjected to amnesia (forgetting). Corresponding engrams are kept throughout the entire life and make possible during IUP to diagnose effectively "ideal" crime traces hidden in the memory for 10-15 years, and even longer.

## **2. Brief characteristics and structure of interrogation using a polygraph**

Research of a human memory by IUP for the presence or absence of "ideal" traces (mental images) of some event or their

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<sup>2</sup>Principles of psychophysiology. M.: INFRA-M, 1998. P. 120.

deliberate falsification during materialization allows for the independent evaluation of the reliability of information which has been earlier communicated by this person to somebody and which was subjected to checking.

Nowadays in the law-enforcement practice specialized computer polygraphs are used for implementation of IUP. They register dynamics of breathing, cardiovascular system and electric properties of skin, as well as speech and physical activity of a person.

As soon as IUP was introduced for application in procedural conditions (see sec. 3) a specialized polygraph appeared to be needed which would allow to fix the behavior of the examined person, but not only register his physiological reactions. The first computer polygraph in Russia – “PIK-01A” model, - which makes a synchronized video-recording of the examined person and his physiological reactions, was created in 2004.

In the world-wide and domestic practice ***IUP is used to achieve the targets of two classes.*** First, it is used for investigations and official proceedings. In this case an examined person is subjected for testing to verify the information communicated by him earlier, when this information is crucial for inquiry and investigation of crime. Second, IUP is used during work with personnel in order to prevent infractions and crimes – so called screening tasks.

***Reliability (“accuracy”) of IUP results,*** according to the evaluation of domestic and foreign experts, is 85-95% which is rather high. For example, according to the reports of polygraphologists (IUP specialists) of US Federal authorities, summarized for many years, “the number of known in federally-administered polygraph examinations of criminal suspects is less than 1% of all polygraph examinations”<sup>3</sup>.

***IUP is performed only on a voluntary basis.*** This is the basic principle of IUP. The background is not only the moral reasons and respecting human rights and

freedom, but mainly the IUP process itself. According to the rules settled in the world-wide practice, a polygraphologist informs an examined person during a pre-testing interview that he (or she) may stop the IUP any time and refuse to further participation in this procedure.

If a person is not willing to be tested by polygraph, it is actually impossible to make him do it: he just would not allow the transducers to be placed and would not follow the instructions of polygraphologist and answer his questions.

In order to have a clear understanding of a real process of interrogation using a polygraph let us address to the IUP technique applied during investigations.

The entire structure of IUP – starting from the moment of the first contact with a polygraphologist regarding polygraph examination of somebody up to issuing the final documents stating the results of the IUP – consists of nine stages.

The first stage of IUP technology is ***the estimation of the investigated case*** (crime or incident) which came to be a reason to use a polygraph. Studying the investigated case a polygraphologist finds out the reasons why it is needed for the investigation to carry out an IUP, as well as to identify the availability of legal, procedural and organization factors which could make the use of polygraph difficult or eliminate the possibility of its use at all. These factors are: a person is not willing to be examined by polygraph; a person is physically or psychologically exhausted; a person has a disease of respiratory or cardiovascular systems at the aggravation stage; polygraphologist has lack of time which makes it impossible to perform a correct IUP, etc.

Being sure that there are no obstructions to use this method, a polygraphologist, together with a person authorized for the investigation determines a set of questions which are to be clarified by a

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<sup>3</sup>The accuracy and utility of polygraph testing // Department of Defense, Washington, D.C. 1984. P. 63.

polygraph, as well as proper conditions and time for IUP. The proper choice of questions for examination is very important since it determines the tactics for every next step of IUP.

Often during this stage it is found out that for the proper IUP it is required to obtain some additional information, to make some search and investigating actions and, thus, to postpone the IUP for a later period of time. Sometimes a polygraphologist may come to a conclusion that it is useless or inadmissible to use a polygraph, since IUP could affect the process of investigation.

So, this evaluation stage being formative in the IUP arrangement is completed by one of the three alternatives:

- a) taking a decision that using a polygraph is efficient (immediate IUP);
- b) taking a decision to arrange additional preparation for IUP (postponed IUP);
- c) motivated refuse to perform IUP.

Taking one of the above decisions at the end of the first stage, a polygraphologist takes the entire responsibility for performance (or failure to perform) of the IUP, and thus he excludes any possibility for incorrect, ineffective or inadmissible use of polygraph.

If it is decided to carry out an IUP immediately or to postpone it, a polygraphologist gets down to its preparation.

The second stage of IUP is **studying the record of the investigated case**: a polygraphologist thoroughly studies all the data available and settles a number of subproblems.

First, a polygraphologist has to go into the question of the investigation, to understand the investigated case, to be able to keep in mind all the necessary details of the case which could be required him further during pre-testing interview and testing itself.

Second, studying the case a polygraphologist chooses the data of the following three categories:

- a) true information about the person subjected to IUP or about the investigated case;
- b) any facts or data which are not related to the case but which the examined person is going to conceal during the IUP due to any reasons;
- c) different versions of the investigation about participation of the person subjected to IUP in the event investigated.

Studying the records a polygraphologist pays special attention to the so called particular characteristics of the investigated event which could be known only to the persons who have committed the crime or who are involved in it.

The data selected by a polygraphologist during studying the records serve him as an informational basis for the third stage of IUP – **selection of methods and tests for polygraph testing and formulation of the questions for tests**.

The world-wide practice have accumulated a huge experience of conducting polygraph interrogations and generated certain algorithms of their performance as per specific classes of cases investigated. In addition it should be underlined that this stage is certainly a creative part of preparation to polygraph testing and a polygraphologist should have good knowledge of theory and IUP technology as well as a certain art of human ingenuity.

During the next **organizational stage** a polygraphologist, together with an authorized investigator, settles the following technical issues: selects proper time and place (premises) for the polygraph interrogation; decides if it would be efficient to make audio- or video-recording of the IUP, etc.

During this very stage a polygraphologist should “calculate” a chapter of possibilities and choose a proper tactics for the pre-testing interview and following polygraph testing.

So, the final results of this stage are:

- a) arranging the correct working conditions for testing;
- b) a complex of tests and questions for polygraph testing;
- c) a detailed knowledge of record by a polygrapholog.

As soon as the preparation is completed the fifth stage of IUP begins – **pre-testing interview**, which can last 20-30 min., but sometimes one or several hours, depending on a specific situation. During such interview a polygrapholog introduces a polygraph to the examined person and makes him familiar with the whole procedure, as well as notifies him that any attempt to lie, to conceal the information would be immediately identified by his physiological reactions registered by the polygraph. A pre-testing interview allows a polygrapholog to establish a necessary psychological contact with the examined person, evaluate his adequacy for the coming testing, and obtain the required information about his life, etc. During the preliminary interview a polygrapholog attentively listens to the interpretation of the investigated event offered by the examined person.

As soon as the pre-testing interview is completed, the main IUP stage comes – **polygraph testing**.

During polygraph testing, a polygrapholog discusses with the examined person before each test all the questions included into this test, and, if necessary, edits or adjusts them. A number of the tests to be used is determined only by a polygrapholog according his personal experience, the plot of the investigated event, testing conditions and so on and can consists of 4-5 up to several dozens tests, depending on the complication of the IUP targets.

The seventh stage of IUP is the **analysis of polygramms**, i.e. analysis of graphic pattern physiological reactions registered by the polygraph on a diagram paper or on the computer screen, and the **interpretation of test results**.

Carrying out the tests, step by step, a polygrapholog, on his own and with the help of a computer polygraph, analyses physiological reactions of the examined person to the questions asked to him.

Based on the evaluation of the reactions a polygrapholog makes his judgment about a personal significance of the questions asked for the examined person. Using the number of logical rules, a polygrapholog makes a conclusion regarding the reliability of the information communicated by the examined person earlier, or, in other words, regarding the presence (or absence) of the information concealed by this person.

As soon as testing is completed, the eighth IUP stage comes – **after-testing interview**, which depends on the results of the testing performed. If it was found out that the examined person have concealed something when asking the questions and it has been earlier agreed with the authorized investigator, it is recommended immediately to carry out an after-testing interview and try to incline this person to confession. A polygrapholog should not blame him to be a liar, but just underline that one or several questions of the test caused expressive reactions, and asks the examined person to provide his own explanations why it happened.

According to the domestic experience and the data provided by foreign specialists, it often happens that examined persons who have concealed the true information before IUP testify the confession after such a psychological influence.

The last ninth stage is a **preparation of the concluding document**, which includes the results obtained and provides the answers to the questions brought forward to IUP by the investigation.

The structure of the interrogation using a polygraph carried out at clearance and investigation of the crime is provided in Fig. 1.

### **§3. Interrogation using a polygraph carried out at clearance and investigation of crimes**

As soon as IUP was legalized in Russia in March, 1993 this method has been



progressively used in OSA to obtain orienting information.

Studying the experience of polygraph applications for the disclosure and investigation of crimes from the point of view of criminalistic practice allowed for the determination of **three groups of investigative situations**, when IUP comes to be the most effective:

- 1) there is no possibility to obtain the required information for investigation without a certain person involved;
- 2) it is possible to obtain the required information by traditional criminalistic or OSA methods, but it needs high expenses, a lot of time or human operational forces;

3) it is needed to get the information urgently (within one or two days or even just a couple of hours), but traditional means and methods can not provide for a quick arrangement. This target can be achieved only by IUP which determines the presence or absence of the required information in the human memory. Even if there is a lack of time, a professional polygraphologist can carry out IUP, strictly following all requirements of every stage described above.

During operational search activity and investigations IUP helps to evaluate the reliability of information communicated by an examined person. IUP is rather efficient when during operational search activity it needs to reduce the number of people aroused suspicion.

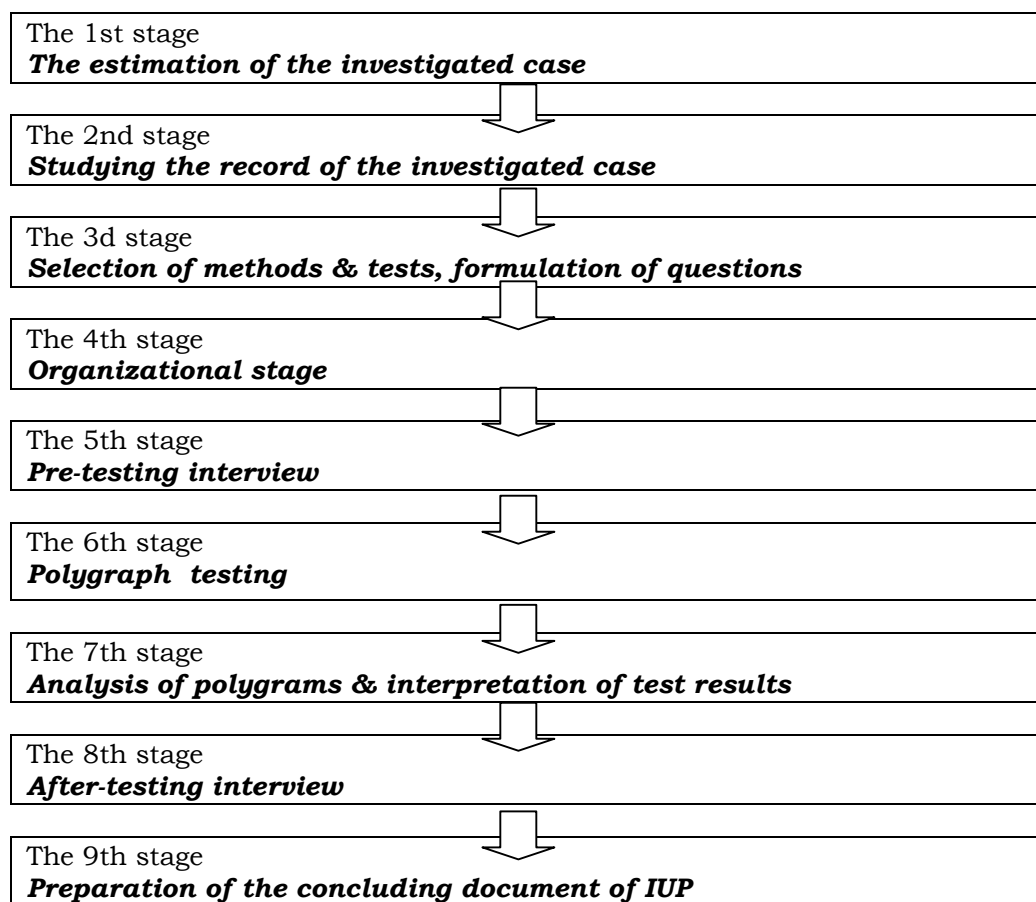


Figure. 1. Structure of interrogation using a polygraph at clearance and investigation a crime

This is proved by the examples mentioned in the review of General Prosecutor's office "Generalization of practice utilizing the possibilities of polygraph during investigating of crimes" (2005). Let us describe a couple of them.

The first one is the investigation of the criminal case regarding murder of Mrs. Z-va (Amurskiy region.). "Before Mrs. Z-va disappeared, she lived together with Mr. B-ev who can be characterized as an aggressive and cruel man. B-ev testified that Z-va was gone away, and he was at his acquaintance's place during the period of time interesting for the investigative process. As a result of examination by investigation the alibi of the suspected person was not confirmed, and the location of his brother (who had committed this crime – according to the changed evidence of B-ev) was not identified, and it was decided to... carry out an IUP. The results of IUP were beyond any expectations. These results indicated that B-ev could be involved in a number of similar crimes. As a result of diligent work of the investigators there were found undeniable arguments that B-ev had killed his own father who was wanted as a missing person, his cohabitant, as well as his acquaintances Bar-ov and G-k. On May 10, 2005 B-ev was convicted of all the incriminated crimes and sentenced by Amurskiy Regional Court to a long-term imprisonment".

The second example comes from the practice of one prosecutor's office in Chelyabinskiy region. which handled the criminal case concerning the disappearing of Mr. U-ov. "It was found a person driving the car which, according to the evidence of Mrs. U-va, her husband left home in. The driver presented the documents proving that the car, which had been wanted immediately after the disappearance, was sold by Mrs. U-va. This fact, as well as protocols of relatives' & neighbours' examination provided a reliable background to make Mrs. U-va suspected in the murder of her husband. The IUP results complied with the investigation records. As soon as the suspected lady studied the conclusion of polygraphologist she confessed that she had committed the crime and

mentioned the place where the corpse had been hidden".

These examples demonstrate that during crime investigations IUP provide the following possibilities:

a) to get actual data from the examined person or find out some circumstances of the investigated case which are significant for timely arrangement of operational search activity or which essentially expand the range of evidence;

b) to specify the actions of suspected persons or to eliminate the contradictions appeared during investigation;

c) to find out unknown information about crime committed by the suspected person;

d) make use of IUP results, demonstrate to the examined person that during testing it was found out that he conceals some important information and thus incline him to confession.

The certain efficiency of polygraph used in the operational search activity made the criminalists look for the ways of IUP application for investigation in procedural conditions.

In Russian procedural practice a polygraph was first used in 1994, in case of V.Syntsov who had been arrested for espionage and disclosure of state secret to a foreign state, as well as for practice grafts.

Investigation decided to use a polygraph at the stage when actual evidence on the criminal activity of the suspected person was partially accumulated, and it was required to find out some circumstances of unlawful activity of Syntsov. The results of IUP were provided as a conclusion of the specialist. The bill of indictment issued by The Head Military Prosecutor's Office mentioned several times that "besides his own confession Syntsov is accused by the conclusion of specialists which used the results of polygraph interrogation"<sup>4</sup>.

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<sup>4</sup>*Kholodny Yu.I.* Using a polygraph for prevention, clearance and investigation of crime. M.: EH «The world of security», 2000. p. 109-110.

A significant experience of IUP application in procedural practice and use of its results as evidence has been gained during last ten years. There are different ways to attach IUP results to the case.

According one way, the case investigator (within the frames of separate instructions for operational search measures) requests agency of inquiry to carry out an IUP, and then he documents the results obtained in the files as abstracts from IUP reference or report. According other way, the conclusion of polygrapholog with IUP results is attached to the case, and after that the case investigator conducts an interrogation of polygrapholog (about IUP results and technology of analysis of the polygrams registered). The person who has been tested by IUP is interviewed as well, along with presenting of IUP results.

Case investigator may assign IUP results as "other documents" (sec. 6, part 2, article 74 of Code of Criminal Procedure of Russian Federation) and further use them as evidence which is then reflected in the bill of indictment.

In 2001 the specialists of the Institute of Criminalistics of the Center of Special Technologies of FSS of Russia for the first time carried out IUP in form of a forensic psychophysiological expertise. According to the statements of investigators of federal authorities in different regions of Russia, several dozens of forensic psychophysiological expertise have been carried out before the middle of 2006. A lot of results were recognized as evidence by different courts, including criminal military division and judicial division of The Supreme Court of RF. IUP in form of forensic psychophysiological expertise is the most promising procedure for the procedural practice.

#### **4. Screening interrogation using a polygraph for prevention of crimes**

It is well known that illegal actions or crimes committed sets a seal on an individual and form a certain custom of his behaviour which, in a large number of cases, directly shows what kind of behaviour at the same or

similar conditions can be expected from this person in the future.

The background of screening IUP which appeared in the USA during 1930-s of the XX-th century was initiated by employers (governmental institution, commercial organization) aiming to employ people who would never cause any harm or damage to employers' business and would follow the prescribed discipline rules while performing their duties. Therefore initially the target of such IUP was to prevent official crimes and infringements of law committed by personnel at work, by "rejecting" those persons who concealed some deviations from requirements of the employer, i.e. hid the so called **risk factors**.

According to the data from American police polygraphologs, there are over 200 risk factors in the USA, which are studied when recruiting personnel to police. Every police authority selects those risk factors which are the most important for a certain region of the country and for the social group of people being selected to serve in police. According to the information from one of the Vermont state police authorities (USA), only 40% out of 184 candidates for police service were successful at screening IUP. American police polygraphologs made the conclusion that "a preemployment polygraph examination enables a police department to research an applicant's background more thoroughly in two hours than an experienced background investigator can do in three days. In addition, the majority of rejectionable offenses would not, in most circumstances, be uncovered during background investigation"<sup>5</sup>.

Foreign experience has demonstrated that preventive IUP, depending on certain conditions and requirements of employer, should be used in the following three situations: a) employing for a job; b) during periodic (scheduled) personnel inspection; c) selective check of personnel (off-schedule). Screening IUP appeared in Russia only in the beginning of 1990-s and got wide application in a number of governmental (for example, in Ministry of Internal Affairs and FSS) and non-governmental institutions.

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<sup>5</sup>Prior L.E. Polygraph testing of Vermont state police applicants // APA Newsletters. 1985. V. 14. № 3. P. 257.

It was proved by domestic practice that a screening IUP can successfully diagnose concealed risk factors which are concealed by the examined person. These factors can be as follows: connection to criminal groups, commitment of some illegal actions in the past, involvement in drug-dealing activity, as well as hidden individual characteristics (alcohol-, drug-, gambling-inclination, etc.)

It has to be noticed that a polygraph can be efficiently used for prevention of crimes and infringements of law in economics where, according to the judicial statistics, 30% of criminal offence of commercial interests are committed by “insiders”.

To illustrate the applied possibilities of IUP for fighting against the mentioned category of penal crimes let us briefly specify the possibilities of polygraph in the financial and banking field where the staff is the most important internal source of risk, according to the estimation of local and foreign researchers.

From the point of view of practice, the entire variety of criminal offence of infrastructure and property of the bank can be divided into two big classes: a) crimes committed by outsiders, i.e. persons who are not members of the staff, or without the help of the latter; b) crimes which can not be committed without involvement of bank personnel.

The second class (class “b”) includes two groups of crimes:

a) crimes committed by bank personnel without involvement of outsiders. It can be, for instance, stealing of different

kinds and illegal use of cash balance or equal funds, as well as illegal offence connected with misapplication of the official status, conditioned by commercial bribery, when a subject of the crime can be only a person performing a managing function, or realized in the computer security range;

b) crimes committed by outsiders with bank personnel involved. This group of crimes includes: stealing of money from current and settlement accounts of customers (when money is transferred to other accounts as per falsified payment instructions); appropriation of funds by stealing charge documents from the cash account; illegal possession of confidential information by stealing documents, etc.

According to the practice, it is inevitable that in a bank there always a more or less large “risk group” is formed, consisting of employees who are inclined to criminal offence – by their own initiative, forced by external circumstances or under pressure of structures unfriendly to the bank.

Application of screening IUP to the bank personnel – during pre-employment, periodic or selective check of personnel – is an efficient preventive measure restraining and reducing the occurrence of illegal offence. The Russian labor laws and federal law on commercial secret are the reliable basis for active application of IUP for prevention of crimes and infringement of law in the financial and banking field, as well as in those fields of economics where a commercial secret policy may be introduced.

**IN THE COURT OF COMMON PLEAS**

**SUMMIT COUNTY, OHIO**

<b>STATE OF OHIO</b>	)	<b>CASE NO.: CR 06-09-3248</b>
	)	
<b>Plaintiff</b>	)	<b>JUDGE HUNTER</b>
	)	
<b>vs.</b>	)	<b><u>ORDER</u></b>
	)	
<b>SAHIL SHARMA</b>	)	
	)	
<b>Defendant</b>	)	
	)	
	----	

This matter came before the Court on Defendant's Motion to Admit Polygraph Examinations and Motion to Dismiss. The Court has been advised, having reviewed the Motions, responses, and oral arguments held in chambers and at hearing. Upon review, the Court finds Defendant's Motion to Dismiss not well taken and it is denied and Defendant's Motion to Admit Polygraph Examinations well taken and it is granted.

**Procedural History**

The State has filed an indictment against the Defendant Sahil Sharma for one count of sexual battery, a third degree felony. Shortly after the indictment was issued, counsel for Defendant and the Summit County Prosecutor's Office explored the use of a stipulated polygraph to assist resolving this matter, but the Prosecutor's Office subsequently declined to utilize polygraph testing. Defendant has taken three polygraph tests herein - one before the; indictment was filed and two subsequent to the indictment. Defendant has filed three separate motions relating to these polygraph examinations - Motion for Discovery, Motion to Admit

Polygraph Examinations, and Motion to Dismiss. As it relates to the Motion for Discovery, it his Court granted Defendant's request for a list of criminal cases, felony three sexual offenses; and above, in which the Summit County Prosecutor's office used the services of William Evans 1as a polygraph expert and/or in which the Prosecutor's Office used a polygraph to resolve a case and/or by stipulation for the years 2005 to present. The State complied with this Order. As it relates to the Motion to Dismiss and Motion to Admit Polygraph Evidence, the Court set a hearing for April 2, 2007, with briefing deadlines.

On April 2, 2007, Defendant had three expert witnesses testify - William Evans, Steven Stechschulte, and Dr. Louis Rovner. Four exhibits were admitted into evidence - the polygraph report from Mr. Evans, the polygraph report from Mr. Stechschulte, the polygraph /report from Dr. Rovner, and published research article by Dr. Rovner titled "The Accuracy of Physiological Detection of Deception for Subjects with Prior Knowledge." The State cross-examined said witnesses but did not call any witnesses or put on any evidence.

This matter is now ripe for review.

### **Brief History of Polygraph Usage in Ohio**

In the seminal case of *State v. Souel* (1978), 53 Ohio St.2d 123, the Ohio Supreme Court addressed the narrow issue of whether the results of a polygraph examination were admissible into evidence when the defendant, who previously consented by stipulation to said examination, subsequently wished to withdraw his consent prior to trial. The defendant therein filed a motion to suppress the polygraph test results because the results came back unfavorable to his case - indicating that Mr. Souel was deceptive in his response to the polygraph questions.

In *Souel*, the Court analyzed the use of polygraphs for trial, reviewing decisions on the subject in other state jurisdictions, the United States Supreme Court case of *Frye v. United States* (1923), 293 F. 1013, and related learned treatises regarding the reliability and admissibility of polygraphs. Ultimately, the Court held that, despite ongoing controversy concerning the degree of accuracy of the polygraph device, the polygraphs should be admissible into evidence at trial for purposes of corroboration or impeachment provided that the following safeguards were met:

“ (1) The prosecuting attorney, defendant and his counsel must sign a written stipulation providing for defendant’s submission to the test and for the subsequent admission at trial of the graphs and the examiner’s opinion thereon on behalf of either defendant or the state.

2) Notwithstanding the stipulation, the admissibility of the test results is subject to the discretion of the trial judge, and if the trial judge is not convinced that the examiner is qualified for that the test was conducted under proper conditions he may refuse to accept such evidence.

(3) If the graphs and examiner’s opinion are offered in evidence the opposing party shall have the right to cross-examine the examiner respecting:

(a) the examiner’s qualifications and training;

(b) the conditions under which the test was administered;

(c) the limitations of and possibilities for error in the technique of polygraphic interrogation;  
and,

(d) at the discretion of the trial judge, any other matter deemed pertinent to the inquiry.

(4) If such evidence is admitted the trial judge should instruct the jury to the effect that the Examiner’s testimony does not tend to prove or disprove any element of the crime with which a defendant is charged, and that it is for the jurors to determine what weight and effect such testimony should be given.” *Souel*, 53 Ohio St.2d at syllabus one (adopting the polygraph testing safeguards found in *State v. Valdez* (1961), 91 Ariz. 274.

Important therein, the Ohio Supreme Court stated that “[d]espite the ongoing controversy concerning the degree of accuracy of the polygraph device, it is our opinion that observance of the *Valdez* qualifications establishes a proper foundation for the admission of polygraph test results, and that these results have probative value in the determination of whether the examinee has been deceptive during interrogation. We note with approval the sentiments expressed by the Supreme Court of Wyoming in *Cullin v. State*, supra, a very recent decision on the precise issue *sub judice*, wherein the following appears at page 458: **‘We see no reason why the polygraph expert should be treated in any more restrictive (manner than other experts. That the polygraph deals with mind and body reactions should (not subject it to exclusion from consideration any more than other testimony of a scientific nature.** We have long utilized the expertise of psychiatrists and psychologists to furnish advice and assistance to the jury to explore the mysteries

of the mind with respect to mental illness as a defense. Medical doctors are regularly called upon to testify as to the intricate workings of the body in sensitive questions of a complex physical condition or cause of death. It is the normal obligation of the trial judge to protect the jurors from exposure to evidence which might mislead them, regardless of whatever kind of scientific evidence is under scrutiny. The device of cross-examination soon smokes out the inept, the unlearned, the inadequate self-styled expert.” *Souel*, at 133-134 (emphasis added).

Based upon the above rationale, the Ohio Supreme Court held that under the circumstances of that particular case the trial court did not err in admitting the polygraph test results into evidence and the expert opinion relating to said results. *Id.*, at 134.

The very next year the Ohio Supreme Court held in *State v. Levert* (1979), 58 Ohio St.2d 213, 215, that the exclusion of the polygraph expert’s testimony at trial did not violate the defendant’s Sixth Amendment due process rights, but stated that “we are unconvinced that a departure from the safeguards enumerated in *Souel* is required or would be wise at this time.” (Emphasis added).

In 1991, the Ohio Supreme Court in *State v. Davis* (1991), 62 Ohio St.3d 326 declined to expand *Souel* to require the State, through discovery, to produce the results of polygraph examinations administered to three state witnesses under Crim R. 16(B)(1)(d). Although the *Davis* Court upheld *Souel* as it relates to the admissibility of polygraph results when the parties enter into a stipulation, it did state: “[t]he nature of polygraphs is different from traditional scientific tests. Most, if not all, scientific tests involve objective measurements, such as blood or genetic typing or gunshot residue. In a polygraph test, the bodily response of the examinee to his answers is dependant upon the subjective interpretation thereof by the examiner. Inasmuch as the test is not perceived by the profession to be reasonably reliable, its admissibility is limited to situations where the parties stipulate to its admission.” *Davis*, at 341. (This Court notes that the aforementioned statement concerning the reliability of polygraph tests is somewhat inconsistent with the *Souel* decision. In *Souel*, the Supreme Court found that polygraph experts should be treated the same as any other expert. In *Davis*, the Supreme Court found that polygraph tests are not reasonably reliable due to the subjective readings of the polygraph examiners.

The Ninth District Court of Appeals has followed the *Souel* decision regarding the requirement that both parties stipulate to the polygraph examination prior to its introduction at trial. In *State v. Roper*, 2005-Ohio-6327, the Ninth District held that it was not an abuse of discretion for the trial court to deny the defendant’s request that his unstipulated polygraph test results be admitted into evidence, especially where the jury found the defendant not guilty on both charges of rape *Roper* at P23 The Ninth District recently opined further regarding unstipulated polygraphs. In *State v. Dunlap*, 2007-Ohio-1624, the Court found that there was no ineffective assistance of counsel claim for the failure to obtain and use polygraph test results where the record does not indicate that a stipulation was ever entered into regarding a polygraph examination. *Dunlap*, at P6-7.

This Court notes that the Ohio Supreme Court has not directly readdressed the issue of the reliability and relevancy of polygraph tests since it issued the *Souel* and *Davis* ruling in 1979 and 1991 respectively. Both *Souel* and *Davis* predate Ohio’s adoption of the *Daubert* test (*Daubert v. Merrell Dow Pharmaceuticals, Inc.* (1993), 509 U.S. 579) regarding the reliability and relevancy of proffered scientific evidence. *Souel* and *Davis* also predate the amended II version of the Ohio Rules of Evidence and Ohio R. Evid. 702 (effective 7/1/94). As such, the Ohio Supreme Court has not addressed the reliability and admissibility of polygraph test results for its use at trial under the *Daubert* test and Ohio R. Evid. 702.

Ohio Evid. R. 702, as amended 7/1/94, states:

“A witness may testify as an expert if all of the following apply:

- (A) The witness' testimony either relates to matters beyond the knowledge or experience possessed by lay persons or dispels a misconception common among lay persons;
- (B) The witness is qualified as an expert by specialized knowledge, skill, experience, training, or education regarding the subject matter of the testimony;
- (C) The witness' testimony is based on reliable scientific, technical, or other specialized information. To the extent that the testimony reports the result of a procedure, test, or experiment, the testimony is reliable only if all of the following apply:
  - (1) The theory upon which the procedure, test, or experiment is based is objectively verifiable or is validly derived from widely accepted knowledge, facts, or principles;
  - (2) The design of the procedure, test, or experiment reliably implements the theory;
  - (3) The particular procedure, test, or experiment was conducted in a way that will yield an accurate result."

Upon review, the Court finds that, in the case at hand, the reliability of the polygraph tests administered and expertise of the three examiners interpreting said results warrant their admissibility herein. As it relates to Evid. R. 702(A), little doubt exists that the use of polygraph tests and the interpretation of the test results relate to matters beyond the knowledge or experience possessed by lay persons (or dispels a misconception common among lay persons). Polygraph tests, just as DNA tests, ballistic tests, fingerprint analysis, and a handwriting analysis all are science related matters beyond the knowledge of a layperson. To hold otherwise, polygraphs could be used without the necessity of putting the examiner on the stand at trial - ie., with no testimony as to the manner in which the test was performed and the results were interpreted, and without testimony concerning the qualifications of the examiner.

As it relates to Evid. R. 702(B), the Court finds that the witnesses William Evans, Steven Stechschulte, and Dr. Louis Rovner are all qualified to testify as the implementation of the individual polygraphs and test results. Although the State has not challenged the qualifications of these three individuals, this Court independently finds that they all have specialized knowledge, skill, experience, training and education regarding polygraph testing.

William Evans is a graduate of the National Training Center of Polygraph Science in 1977, and has received post-graduate training in computerized polygraph testing with the Department of Defense in 1995, and post conviction sex offender testing with the Maryland Institute of Criminal Justice in 2001. Mr. Evans has lectured state-wide and nationally on numerous topics related to polygraphs including at the National Training Center for Polygraph Science, American Association of Police Polygraphists and has written articles relative to polygraphs for the Ohio Police Chief Magazine and for the criminal bar associations for the Akron Bar Association and Cuyahoga County Bar Association. He has spent the last thirty years providing polygraph services for local law enforcement agencies, local prosecutors' offices including the Summit County Prosecutor's Office, the Ohio Attorney General's Office, and for private defense counsel. Mr. Evans has conducted thousands of polygraph examinations. This Court further notes that the Summit County prosecutor's Office has used him on numerous occasions for investigatory purposes and by stipulation. Furthermore, on at least one occasion since 2005, the State used Mr. Evans to perform polygraph tests for a felony three sexual offense or above to resolve a case by stipulation - *State v. Bradshaw*, CR 04-051797.

Steven Stechschulte is a graduate from the National Training Center of Polygraph Science in 1993. He completed his internship with the Ohio Attorney General's Office at their Bureau of



Criminal Identification (B.C.I.) locations in London, Freemont, and Bowling Green, Ohio. Subsequent to receiving his certification, Mr. Stechschulte became employed full time as is B.C.I. polygraph examiner for the next twelve and a half years. Since February of 2006, Mr. Stechschulte has been in private practice. Mr. Stechschulte is a member of the Ohio Association of Polygraph Examiners and served two years as its president and two years as vice-president, and two years as Chairman of the Board of Directors. He is also a member of the American Association of Police Polygraphists and is certified by the National Training Center of Polygraph Science, the Ohio Association of Polygraph Examiners, and the Ohio Association of Polygraph Examiners. He has performed over 2700 criminal polygraphs while employed by the B.C.I. and approximately 40 to 45 criminal polygraph tests while in private practice. He has also performed 33 post-conviction sexual offender tests for the Lucas County Probation Department.

Dr. Rovner is a graduate of the Los Angeles Institute of Polygraph in 1986. Dr. Rovner has a doctorate in psychology with a specialty in psycho-physiology, a masters degree specializing in biopsychology. He has been an instructor more than twenty years in psychology and statistic courses at the University of Utah, California Lutheran University, and Westminster College. He has taught psychology, physiology, and psycho-physiology at the Los Angeles Institute of Polygraph. He is currently an instructor at the Marston Polygraph Academy in San Bernadino, California. He is also guest lecturer at numerous schools and at private and organizational seminars. He has also published articles on polygraph issues, including on the subject of polygraph accuracy. He is a member of the American Psychological Association, the Society for Psycho-physiological Research, and the American Psychology Law Society and is on the panel of experts for the Superior Court of Los Angeles.

Upon review, this Court finds that Mr. Evans, Mr. Steven Stechschulte, and Dr. Louis Rovner are all imminently qualified as experts in the field of polygraph testing based upon their individual knowledge, skill, experience, training, and education.

As it relates to Evid. R. 702(C), the Court finds that polygraph testing is reliable as a scientific test and procedure. Dr. Rovner testified that his doctoral thesis was on the validity of the use of the Utah Zone Comparison Polygraph Test to determine a participant's truthfulness. This two-year controlled study was presented to the Society for Psycho-physiological Research in 1979 and published in the Journal of Polygraph for the American Polygraph Association. Based upon this objective study, the overall accuracy for polygraphs were - 95.5% for the standard non-informational group (no prior knowledge of polygraph testing procedures), 95.5% for the informational group (knowledge of polygraph testing procedures, and 71 % for the informational practice group (knowledge of polygraph testing procedures and previous experience in taking polygraphs.<sup>1</sup>

Dr. Rovner further testified that the results of his study are consistent with subsequent studies on the subject. In fact, he indicated that his testing procedures and results were recently replicated in a new study that is to appear in the Journal of British Psychological Society later this year.

Dr. Rovner indicated that in 2003 the National Academy of Sciences commissioned a ;governmental study of its peers as to the accuracy rate for polygraph tests. The study indicated an average accuracy rate of 86% for laboratory research and an average accuracy rate of 89% for field research. Another study by the Department of Defense indicated an 86% accuracy rate overall for polygraphs.

Dr. Rovner also testified that polygraphs are generally accepted within the scientific and psychological community. In mid 1980, the Gallup Organization surveyed the members from

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<sup>1</sup> See Rovner Transcript pages 171 through 177 for a detailed discussion of his controlled study, the test results, and false positive and false negative error rates.

Society for Psychological Research regarding the acceptance rate for polygraph tests. The survey indicated an 83% approval rating for polygraph tests as a viable and valid technique. A second survey was done in mid 1990 duplicating the 83% acceptance rate.

Dr. Rovner also indicated that polygraphs are used on a regular basis throughout the United States and world. In fact, he indicated that, in the United States, polygraphs are used by the Department of Defense, the FBI, CIA, NSA, DEA, and Secret Service; all branches of the military; and numerous state and local law enforcement agencies in Ohio and throughout the country. He estimated that the annual budget for the Department of Defense for polygraph testing alone is approximately \$50 million.

William Evans, Steven Stechschulte, and Dr. Louis Rovner independently conducted polygraph tests on the Defendant. Mr. Evans and Mr. Stechschulte performed different variations of the Modified General Question Test (MGQT) on Mr. Sharma. Dr. Rovner performed the Utah Zone of Comparison Test. The MGQT and Utah Test are similar in their implementation, except they use a different order of questions asked of the participant. Both tests are widely used in the polygraph community. All three polygraphists used the most advanced computerized polygraph machines. All three individuals independently found that Mr. Sharma was not being deceitful during the examination concerning questions asked.<sup>2</sup> Both Mr. Evans and Mr. Stechschulte had their polygraph tests independently peer reviewed prior to issuing a final report. Lastly, all three believed that Mr. Sharma did not use any countermeasures to skew the test results and further, that the fact that he had more than one polygraph test did not have an adverse effect on the test results. Concerning the contention that the Defendant may have been over-tested, both Mr. Evans and Dr. Rovner were of the opinion it had multiple testing posed no legitimate concern. Based upon the testimony at hearing, this Court finds that their individual polygraph tests are based on reliable scientific, technical, or other specialized information in accordance with Evid. R. 702(C).

Upon review, this Court finds that significant advancements have occurred concerning (the reliability and relevancy of polygraph tests since 1991. The United States Supreme Court has suggested such advancements in the Court's concurring opinion in the case of *United States v. Sheffer* (1998), 523 U.S. 303. In Justice Kennedy's concurring opinion, joined by Justices O'Connor, Ginsberg, and Breyer, he noted the tension between Justice Thomas's majority opinion (upholding the per se exclusion of polygraph test results under military law) and the concurring opinion finding the per se exclusion is not so arbitrary or disproportionate that it is (unconstitutional), but stated that the military's per se exclusion was not probably wise at this time, and implied that a subsequent case may arise that would warrant overturning the per se exclusion in favor of permitting the various courts and jurisdictions to determine whether polygraph evidence should be admitted at trial. *Sheffer*, at 318.<sup>3</sup>

Regarding the admissibility of polygraph tests at trial under federal law, not in the military setting, Justice Thomas recognized the divergence of opinion and noted that two of the Circuit Courts have abandoned the per se exclusionary rule as it relates to Federal, non-military law, and replaced it in favor of leaving its admission or exclusion to the discretion of the district courts under the *Daubert* test - namely, the Fifth Circuit Court of Appeals in *United States v. Posado* (CA5 1995), 57 F.3d 192, 434, and the Ninth Circuit Court of Appeals in *United States v. Cordoba* (CA9 1997), 104 F.3d 225. *Sheffer*, at 311.

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This Court notes that the Summit County Prosecutor's Office routinely uses polygraphs as a

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<sup>2</sup> Rovner noted that even if all three polygraph tests had a ten percent error rate, the probability that all three {examiners made the exact same mistake is probably one out of one thousand (Rovner, Trans. Pp. 206-207).

<sup>3</sup> Justice Stevens, in his dissenting opinion, stated more emphatically that in recent years polygraph testing has gained increased acceptance as a useful and reliable tool, and that the confrontation clause of the Sixth Amendment and due process clause of the Fourteenth Amendment are fundamentally more important than the military's reasons for finding polygraph's unreliable. *Sheffer*, at 322-326.

means to clear defendants post indictment. In fact, one of the top five reasons for the Prosecutor's Office dismissing an indictment during the year 2004 was because the polygraph for other test result cleared said defendant (Summit County Prosecutor's Newsletter, October of 2004). Furthermore, the Prosecutor's Office has used polygraphs as a means to resolve at least two sexual offense cases since 2005. Thus the Prosecutor's Office regularly relies on the test to resolve certain cases. In doing so, the Office apparently accepts the validity and reliability of the polygraph test process. Yet, in other cases, perhaps for policy or strategic reasons, the Prosecutor's Office chooses not to utilize a polygraph test. Such is the situation in the case herein, even when one of the Defendant's polygraph examiners is regularly used by the State for testing. Currently, under the holding in *Souel*, the Prosecutor's Office has the right to refuse to stipulate to a polygraph test. This unfettered discretion gives the Prosecutor the ability to pick and choose in which case a polygraph will be utilized. On the other hand, a defendant who wishes to utilize polygraph test results has limited choice and cannot present expert polygraph evidence in his defense unless the State consents.

Given the advancements in polygraph technology since 1978, this Court finds that the Sixth Amendment and Fourteenth Amendment warrant the admission of non-stipulated polygraph evidence in this limited situation in which the trial court has independently found that the proffered polygraph is reliable under Evid. R. 702 and only when the polygraphist is subject to cross-examination and where limited jury instructions are utilized, as required by *Souel*. Rovner succinctly stated – "Polygraph instruments have become far better at measuring and recording physiological responses. \*\*\* Our knowledge of how to structure and conduct a polygraph test, our knowledge of how to evaluate the results of a polygraph test, and our knowledge of how to estimate accuracy is light years beyond what it was in 1978." (Rovner Trans., pp. 246, 248).

The Court in *Souel* cites the variable skill of the polygraph examiner as a major reason to object to polygraph evidence. In the instant case however, that concern is alleviated by the (demonstrated expertise of the Defendant's three experts as described hereinabove, including Mr. Evans, regularly used by the State for polygraph testing. The Court in *Davis* was concerned that the polygraph examination was open to subjective interpretation. In the instant case however, the Defendant's three experts all conclusively determined that Mr. Sharma was root deceptive as to their questions. Furthermore, Mr. Evans and Mr. Stechschulte had their polygraph tests peer reviewed in order to alleviate said concerns.

Under the unique circumstances of this case, where this Court has conducted an evidentiary hearing to evaluate the reliability of the instant polygraph evidence, where all three polygraphists have testified as to the general acceptance of polygraph use and methodology, and where all three testified that the Defendant was not being deceptive in his answers to their questions pertaining to the charge of sexual battery, this Court finds that the polygraph evidence are admissible at trial. Given the quality of the polygraph examiners and the demonstrated reliability of the polygraph evidence, the overall advancements in polygraph testing, and the Defendant's right to subpoena witnesses to assist in presenting a defense, this Court finds that the polygraph test results shall be admitted herein.

However, this Court determines the polygraph test results to be admissible only provided that the Defendant's polygraph experts be subject to cross examination and, more importantly, provided that the Defendant first take the witness stand in his own defense. The Court will not allow polygraph evidence containing statements of the Defendant unless he also testifies and is subject to cross-examination. Additionally, if the polygraph evidence is admitted, the Court will instruct the jury to the effect that the examiner's testimony does not tend to prove or disprove any element of the crime which is charged and that it is for the jury to decide what weight to give to the testimony.

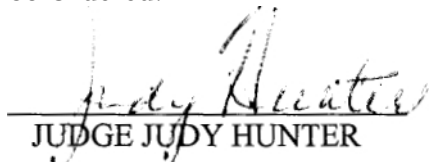
With this ruling, the Court recognizes that it is not following established State precedent regarding the requirement that the parties stipulate concerning the admissibility of the polygraph

tests in order to present polygraph evidence at trial. However, based upon the unique circumstances of the case herein and the great advancements in the technology of polygraph examinations and greater consensus by the scientific community as to its accuracy, this Court will admit the polygraph tests and polygraph testimony over the State's objection to its admissibility without prior stipulation.

Based upon the above ruling on the Defendant's Motion to Admit the unstipulated polygraph test results, the Court denies Defendant's Motion to Dismiss this matter under Civ. R. 48(B).

The final pretrial set for July 31, 2007 at 3:00 P.M. and trial set for August 13, 2007 at 9:00 A.M. are confirmed.

So Ordered.



JUDGE JUDY HUNTER

CC: Attorney Kirk Migdal  
Assistant Prosecutor Margaret Kanellis

## **An Introduction to the APA's Panel on International Developments in Polygraphy**

**Frank Horvath, Ph.D.**

In 2005, at the APA seminar in San Antonio, the first-ever APA "International" panel was organized. The purpose of the Panel was to serve as a forum for discussion of contemporary events in Polygraphy and Credibility Assessment in countries outside of the U.S. The advent of the internet, changes in social, political and legal areas, the menace of terrorism and the growing problem of transnational crime have raised the need for an awareness of developments in the field of Polygraphy. The panel was the APA's initial step in that direction.

The International Panel presentations, hopefully, will be a continuing feature of the annual seminar. Generally the organization will be as follows: Each Panel will consist of three or four presenters, each from a different country. Panelists will make a 20-30 minute presentation, after opening remarks from the moderator. After the featured "country" presentations, the moderator will summarize and integrate the important points. That will be followed by a question and answer session, with questions posed by audience members to the panelists. This organization is intended to promote greater interest in international issues and a better understanding of how practices and policies in other countries are related to those in the U.S.

In addition to a presentation at the seminar, each panelist also agrees to prepare a more detailed paper, in a relatively consistent way, that will be submitted to the APA's Editor for publication consideration. Examples of items that are to be covered in each of the papers include: Who is credited with the initial development of polygraph testing in the country? When? Who uses polygraph testing? How many examiners are there and how are they selected and trained? What kind of instrumentation is used? What are the dominant procedures ("techniques") in use? What are the legal issues of most concern? What is the public perception of Polygraphy?

In the last issue of *Polygraph* a paper from the first International Panel was published. In this issue of we are pleased to publish a paper from the second International Panel in 2006. In this paper, Mr. Frederic Dehon describes Polygraphy in Belgium.

### **About the Author**

**Frederic Dehon** is a police officer in the Belgian Federal Police agency. He was attached to the National Reserve for almost three years for riot control duties and Embassy protection. In 1994 he was attached to the police uniformed patrol division and in 2000 was advanced to the position of Detective in the fraud squad.

In 2004 Frederic was trained as a polygraph examiner at the Canadian Police College and since then he has carried out a large number of polygraph examinations in support of police investigations, mostly in murder and sex crime investigations. He is an active member of the American Polygraph Association and has made presentations on polygraph testing and interrogation at a number of international polygraph seminars sponsored by the U. S. Department of Defense.

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# **Polygraph in Belgium: An Overview of History and Current Developments**

**Frederic Dehon**

## **1) History**

Belgium “discovered” polygraph testing in 1997. In that year, a paedophile, a serial killer of children, was found to be active in Belgium. The case was so outstanding that the politicians and other governmental leaders decided to apply new technologies to the investigation. One of these new technologies was polygraph testing. In this case an informant was administered a polygraph examination. He produced a test outcome that was “Deception Indicated” (DI). The investigators used that test result to guide them in their search for bodies; their search was quite successful. As the polygraph testing proved to be useful, it was decided to continue its use in other criminal cases.

Over the next few years, it became clear that polygraph testing had a future in Belgium. However, to use the services of polygraph examiners from Canada and South-Africa, as had been done, was too expensive. So, in 2001, the first two Belgian police officers were sent to the Canadian Police College for training.

## **2) Training**

The first two polygraph examiner-trainees were recruited from two different police forces. One was selected for training from the gendarmerie and the other one from the Judicial Police. Both had been police detectives for many years.

Both trainees went to the Canadian Police College (CPC) for a three month long course. There they learned about the application of the Modified Zone Comparison Test (MZCT). In 2004, two other persons were recruited to be trained at the CPC. This was done because it was clear that two examiners were not enough.

There is no polygraph examiner training school in Belgium and, as far as I know, in Western Europe.

## **3) Examiners**

The Federal Police of Belgium has three polygraph examiners at the present time because one of the trained persons left the unit for another position. All of the examiners are police officers and we are the only polygraph examiners in Belgium. At present, all of the examiners are males. I don't know if that will change in the future.

Polygraph tests are regulated by law in Belgium, even though the use of such tests is very new. Polygraph testing is recognized as a specialized interrogation method. It can be used as an element of an investigation but not as evidence.

## **4) Association**

There is no professional association in Belgium for polygraph examiners. However, in the last year, we started a “region 6” of the well established Canadian Association of Police Polygraphists (CAPP). We are part of the persons coming from European countries who are members of CAPP.

## **5) Examinations**

Before 2001, somewhat less than 100 polygraph examinations were carried out in Belgium by examiners coming from other countries. In 2001, two Belgian examiners tested 60 persons from May to the end of the year.

In 2002, they tested 192 persons.

In 2003, they tested 251 persons.

In 2004, three examiners, including me, tested 277 persons.

In 2005, we tested 318 persons.

As of August, 2006 they had tested 215 persons.

Most of the cases in which we do polygraph testing involve sexual matters or murders. We also will do examinations in cases such as arsons or thefts.

## **6) Testing Issues**

We don't have to deal with countermeasures in Belgium because polygraph is not as popular there as it is in others countries. Also, most of internet sites on this topic are written only in English. In Belgium the three main languages are Flemish, French, and German.

## **7) Legal Issues**

As mentioned before, there is a law in Belgium governing the use of polygraph testing. In the law, the testing is seen as an element of an investigation, similar to other scientific evidence, e.g., DNA, but it can't be used as direct evidence.

In Belgium, a confession is not seen in the same way that it may be viewed elsewhere. This is because it is recognized that someone can "come back" on (retract) his confession. But of course, confessions can be and are used in court trials in Belgium.

In some very prominent cases, such as murders, that are judged by a Special Court with 12 jurors, the presiding official can decide to show the polygraph test results during the trial.

## **8) Political And Social Issues**

I can't address this particular point because I'm not familiar enough with the political situation regarding polygraph testing. But, it must be kept in mind that the decision to use polygraph testing in the first place was taken at the "political" level.

In specific cases, the news media will sometimes present information about polygraph testing when it is used in certain criminal cases.

## **9) Testing "Techniques"**

We only use the MZCT. For example, if the issue involves a shooting on the street a sample question list might be:

For the "A series" of questions:

- Is today Wednesday?
- Are you now in Brussels?
- Do you live in Belgium?
- Are you afraid I'll ask you a question we didn't review?
- Do you intend to answer truthfully all of the questions on this test?
- Not connected with this case (NCWTC) besides what you told me (BWYTM)] do you now remember telling a lie to
- somebody (else)?
- NCWTC (BWYTM) do you now remember hurting somebody (else)?
- NCWTC (BWYTM) do you now remember committing an illegal act that you have not been caught for?
- On 23 May 03, did you shoot in the Bull Head street?
- On 23 May 03, was it you who shot in the Bull Head St?
- On 23 May 03, were you the person who shot in the Bull Head St?

For the "B series" of questions:

- Is today Wednesday?
- Are you now in Brussels?
- Do you live in Belgium?
- Are you afraid I'll ask you a question we didn't review?

- Do you intend to answer truthfully all the questions on this test?
- In the 23 first years of your life (BWYTM) do you now remember ever telling a lie to somebody (else)?
- In the 23 first years of your life (BWYTM) DYNR ever hurting somebody (else)?
- In the 23 first years of your life (BWYTM) DYNR committing an illegal act that you have not been caught for?
- Do you know for sure who shot in Bull Head Street?
- Did you participate in any way in the gunfire on 29 May 03?
- Were you physicaly present in that street when someone shot?

## **10) Research**

No research has been made in Belgium in regards to polygraphy. We do know that a student at Netherlands University is doing a research project now in regards to the results of polygraph testing and the results at trials. We don't know the results of that project.

## **11) Instrumentation**

We use Lafayette LX-4000 instruments.

## **12) Problems / Issues**

There are some concerns we have about polygraph testing in Belgium as it is now being done. But we are a new program and it is too early to discuss these here with any authority.



## **American Polygraph Association – Model Policy**

### **Model Policy for Post Conviction Sex Offender Testing**

#### **Introduction**

Post conviction sex offender testing (PCSOT) differs from pre-conviction testing. Historically, pre-conviction polygraph testing has primarily been used in investigation of reported wrongdoing and screening for, or periodic testing of employees. Post conviction sex offender testing involves various applications, some of which are similar to pre-conviction testing and others that are dramatically different.

As a group, convicted sex offenders with their psychological disorders and knowledge of polygraph procedures, must be considered high risk when determining who is likely to attempt to defeat the examination process. Because of these and other psychological factors associated with the polygraph testing process, the American Polygraph Association (APA) has developed this “best practices” model policy.

The APA recognizes that the polygraph profession can best serve treatment and supervision missions related to sex offenders by functioning with a Containment Model. Open communication between team members is of paramount importance. Working as a member of a team, the polygraph examiner, the treatment provider, and the supervisory officer can best protect society. The role of the polygraph examiner in the containment approach is to verify or refute information provided by the offender and to serve as a deterrence tool.

The APA recommends does not recommend revocation of an individual under court supervision or termination of treatment based solely on the results of one polygraph examination.

As with any polygraph examination, PCSOT examinations do not take the place of an investigation if information is learned about the offender violating his or her probation.

Instead, the polygraph is used to enhance the surveillance process. A thorough investigation should always be conducted in conjunction with the PCSOT polygraph examination if the probation department is considering revoking an offender's probation.

This model policy is based on the latest scientific studies. It is understood that various jurisdictions have restrictions or guidelines that might conflict with the recommendations in this model policy. When the local restrictions conflict with these recommendations, the examiner should comply with local restrictions. It is suggested that examiners in these jurisdictions coordinate with the APA to update their local regulations to the latest scientifically validated procedures.

#### **1. General Provisions**

1.1 All polygraph examiners that are members of the APA should comply with all APA Standards and Practices unless in conflict with the law, in which case the law shall prevail.

1.2 PCSOT examiners are required to satisfy the provisions set forth in the Standards of Practice for investigative examinations.

1.3 It is recommended that individuals who are under the age of 12 not be subject to PCSOT examinations.

#### **2. Examiner Requirements:**

2.1 To ensure an adequate fundamental polygraph education, examiners should have graduated from a polygraph training program that was accredited by the APA.

2.2 To ensure competency in the area of PCSOT, polygraph examiners should have successfully completed a minimum of forty (40) hours of specialized post conviction sex offender training that adheres to the standards

established by the APA. This specialized course must be approved by both the General Chairs of the PCSOT and Continuing Education Committees.

2.3 An instructor who teaches a PCSOT course shall possess a primary instructor certificate issued by the APA and have conducted a minimum of 200 PCSOT examinations.

2.4 Polygraph examiners should successfully complete a minimum of thirty (30) continuing education hours every two (2) years. Sixteen of those hours should be of specialized sex offender polygraph training.

2.5 A polygraph examiner should, where applicable, be licensed (or certified) by the regulatory organization in all testing jurisdictions.

2.6 Because of the unique roles of polygraph examiners and therapist/treatment providers, and to avoid conflicts of interest, PCSOT examiners who are therapists/treatment providers shall not conduct polygraph examinations on an individual that they directly or indirectly treat or supervise.

2.7 Because of the unique roles of polygraph examiners and parole or probation officers, and to avoid conflicts of interest, PCSOT examiners who are probation or parole officers shall not conduct a polygraph examination on any individual that they directly or indirectly supervise.

2.8 PCSOT examiners should have completed a minimum of 50 examinations in accordance with APA standards. Examiners who have conducted fewer than 50 such exams should conduct PCSOT exams under the close supervision of an APA recognized PCSOT examiner until 50 exams have been completed in accordance with APA standards. At least 25 of the 50 supervised examinations should be PCSOT exams.

### **3. Environment**

3.1 All examinations should be administered in an environment that is free from distractions that would interfere with the examinee's ability to adequately focus on the issues being addressed.

### **4. Equipment**

4.1 Examiners should use an instrument that is properly functioning in accordance with the manufacturer's specifications.

4.2 The instrument should record continuously during the tests: thoracic and abdominal movement associated with respiratory activity by using two pneumograph components; electrodermal activity reflecting relative changes in the conductance or resistance of current by the epidermal tissue, and; cardiovascular activity to record relative changes in pulse rate and blood pressure. The instrument should include a separate data channel specifically designed to record covert body movements. A channel that detects vasomotor responses and other validated data channels may also be recorded.

### **5. Scheduling**

5.1 Polygraph examinations should be scheduled at least two (2) hours apart but each examination should be at least 90 minutes in duration. To avoid a reduction in examiner performance due to fatigue, the scheduled work day should not exceed ten (10) hours in any twenty-four (24) hour period.

5.2 To safeguard against the possibility of client habituation and familiarization between the examiner and the client, the polygraph examiner should not conduct more than four separate examinations per year on the same client. This restriction does not include a retest due to a lack of resolution during an initial examination.

A continuation of a previously started examination is not considered a separate examination.

5.3 An examiner should not plan to or conduct an examination of less than 90 minutes in duration from the start of the pretest interview through the end of the post test interview, unless circumstances arise beyond the control of the examiner. These circumstances could include: an examinee who is not willing or suitable to continue the exam; an examinee making pretest admissions of several previously undocumented victims, thereby rendering the sexual history document incomplete; an examinee not cooperating

during the in-test phase of the examination, and; court order where a complete post test interview is not permitted.

5.4 Because the time requirements to competently complete sexual history disclosure examinations, an examiner should not conduct more than three (3) sexual history disclosure examinations in the same day.

5.5 Notwithstanding rare and exceptional circumstances, an examiner should not conduct more than a total of five (5) polygraph examinations in the same day.

## **6. Preparation**

6.1 An examiner should ensure they use professionally recognized polygraph equipment that is functioning in accordance with the specifications of the manufacturer.

6.2 An examiner's preparation to conduct each examination should include:

6.2.1 Reviewing the written sexual history documentation if one has been collected by the therapist or referring agency before conducting a sexual history disclosure examination.

6.2.2 Reviewing all pertinent documentation concerning the instant offense prior to conducting an instant offense examination so to enable to examiner to identify testable issues and to develop relevant and other technical questions.

6.2.3 Identifying appropriate relevant issues, possible relevant questions and other technical questions based on communication(s) with the applicable supervisory officer, treatment provider, or both, prior to the conduct of a maintenance or monitoring examination.

6.2.4 Becoming knowledgeable of the conditions relevant to the offender being in the community as well as rules and directives of the treatment provider for each offender to be tested.

## **7. The Examination Process**

7.1 The polygraph examiner should respect the rights and dignity of all persons to whom he or she administers polygraph examinations.

7.2 The polygraph examination should routinely consist of a pretest phase, the in-test phase and the post-test phase.

7.3 The pretest phase should be appropriate for the technique utilized.

7.4 The examinee shall consent in writing or recording to the administration of the examination and release of information disclosed, to include the professional opinion of the examiner, to those specified on a consent document, and others as required by law.

7.5 Sufficient time shall be spent to ensure the examinee has a reasonable understanding of the polygraph process and the requirement for cooperation.

7.6 A comprehensive discussion of issues to be tested shall take place with the examinee, including an opportunity for the examinee to fully explain his or her answers.

7.7 An appropriate review of all test questions shall take place with the examinee, allowing sufficient time to ensure the examinee recognized and understands each question.

7.8 The administration of polygraph testing shall conform to professional standards for the conduct of the utilized polygraph technique.

7.9 An acquaintance test should be administered during the first examination of each examinee by each examiner unless precluded by the protocol of a validated polygraph technique.

7.10 The examiner should discuss the examination results with the examinee, unless precluded by law, to afford the examinee a reasonable opportunity to explain reactions noted during testing.

7.11 When appropriate, additional testing should be arranged and ultimately conducted.

## **8. Polygraph Testing Principles**

8.1 Examinations should follow established professional practice guidelines which discourage the mixing of issues on the same test series.

8.2 Examinations should follow established professional practice guidelines regarding crossing the time barrier.

8.3 Examinations should follow established professional practice guidelines regarding crossing the frame of reference.

8.4 The offender should complete his or her sexual history form prior to the conduct of a sexual history disclosure polygraph examination.

8.5 The sexual history documentation should be reviewed in the treatment setting prior to the conduct of the sexual history disclosure examination.

8.6 The examiner should document all admissions and clarification of relevant information during the pretest phase of the examination.

8.7 The examiner should not conduct the in-test phase of the examination if the examinee discloses several new victims that had previously been hidden by the offender during the treatment process.

## **9. Question Formulation**

9.1 The polygraph examiner is responsible for ensuring all polygraph test questions are properly constructed and appropriate for the technique utilized.

9.2 There should not be more than four (4) relevant questions per test series.

## **10. Test Evaluation**

10.1 Polygraph examiners should not render a conclusive diagnosis when the physiological data lacks sufficient quality and clarity.

10.2 Polygraph examiners should employ quantitative or numerical scoring for polygraph examinations.

10.3 Polygraph examiners should evaluate and report the results based on the test data. Examination results of single-issue tests should be reported as Deception Indicated (DI), No Deception Indicated (NDI) or Inconclusive (INC) / No Opinion (NO).

10.4 Examination results of multiple-issue tests should be reported as Significant Response (SR), No Significant Response (NSR) or No Opinion.

10.5 To reduce the rate of incorrect test results on the multiple-issue test the examiner should not conclude that an offender has Significant Response to one or more test question(s) and have No Significant Response to (an)other test question(s) within the same test series.

10.6 If an offender has Significant Responses to one or more of the relevant questions in the same test series, he or she is to be deemed to have Significant Responses to the test. The polygraph examiner should not report the results of the polygraph examination as No Significant Responses or render an opinion of truthfulness unless all relevant questions on the test series are scored as No Significant Responses.

10.7 Polygraph examiners should seek peer review regularly, but for at least two examinations per year. The peer review should also be utilized at the request of the treatment provider or supervisory officer.

## **11. Documenting and Reporting Examinations**

11.1 It is recommended that all PCSOT examinations be electronically recorded in their entirety unless prohibited by state statute, government regulation or contractual obligations. Audio/video is preferred, but audio-only is acceptable. If an examination is going to be submitted for a quality peer review, the test in its entirety must be videotaped.

11.2 Reports should be factual, comprehensive, and free of any opinions or

recommendations about court supervision, incarceration or treatment.

11.3 Reported examiner conclusions concerning the veracity of the examinee should be limited to those based on analysis of the recorded physiological data resulting from the complete and proper administration of a

standardized validated technique consistent with the APA Standards of Practice.

11.4 Written, audio and audiovisual documentation developed during and while reporting on an administered PCSOT examination should be maintained for at least one year.

## **American Polygraph Association – Model Policy**

### **Model Policy for Paired Testing**

On May 14, 2007 the APA Board of Directors approved of the Model Policy for Paired Testing. As with all model policies, it is a non-binding reference for best practices in this area. This document was crafted over the course of several months by APA members Barry Cushman and James McCloughan, with input from others. The approved model policy is below.

#### **1 Paired Testing Introduction**

1.1 Polygraph testing can offer a unique and significant contribution to the pursuit of justice. One notable application is the paired-testing methodology. The paired-testing method is useful in reducing the incidence of perjury; affording advantages to the party who offers truthfulness; and moderating the time and expense of legal proceedings that rely heavily on the testimonial evidence of the parties involved. For the paired-testing method to be effective, certain conditions must be met, including the type of testimony, number of testifiers, use of validated testing methods, and the competency of the polygraph examiners. The purpose of this model policy is to inform the judicial system, examiners, attorneys, and the public of the paired-testing protocol and how and when it is best used.

#### **2 Rationale**

2.1 Paired testing (also known as the “Marin Protocol”) is a method of utilizing polygraph testing in situations in which two or more subjects assert contradictory accounts of a particular incident in such a way that at least one of the subjects must certainly be lying. The method utilizes two independent examiners with established accuracy and error rates to assess the veracity of at least two subjects in such circumstances in which opposing parties assert diametrically opposed information as factual.

2.2 Because base rates are often unknowable in real world conditions, the confidence that can be placed in polygraph results is often

difficult to quantify. Paired testing can overcome this problem when two examinees offering conflicting testimony are both tested. Though the base rate of deception in one standalone examination is often uncertain, it is reasonable to conclude that the combined base rate of deception for precisely two conflicting accounts is one half, or 50%. Therefore, when one examinee is found deceptive and the opposing examinee is found truthful, confidence in the accuracy of the combined conclusions can be very high. The same reasoning applies to those situations in which two or more witnesses asserting consistent testimony are tested and all are found to be either truthful or deceptive.

2.3 It is a well accepted mathematical principle that the probability of two independent events occurring simultaneously is the product of their individual probabilities.

2.4 Paired-testing capitalizes on this principle. Examiners must, at a minimum, have proven average accuracy rates of at least 86%, the median accuracy of examiners in single-issue polygraphy as concluded in the 2003 National Research Council report. In a paired-testing scenario in which one such examiner (i.e., one demonstrating the minimum 86% accuracy rate) finds one party truthful and the second such examiner finds the opposing party deceptive, then the chances of both of them being wrong is the product of their individual error rates, i.e.,  $0.14 \times 0.14 = 0.0196$ , or about 2%.

2.5 As with any forensic examination, polygraph examinations do not replace the process of justice but instead serve as a component of the process. When utilized properly, the paired testing method can help to both strengthen and expedite the process of justice.

2.6 The decision to use the paired-testing method and the weight that should be given to the results rests with the decision maker(s)

within the given process in which it is being utilized.

### **3. Standards of Practice**

3.1 All American Polygraph Association (APA) examiners conducting paired testing polygraph examinations shall comply with the APA Standards of Practice, as well as federal and local legal requirements, including but not limited to the Employee Polygraph Protection Act (EPPA), the Equal Employment Opportunity Commission (EEOC), and the Americans with Disabilities Act (ADA), unless legally ordered to do otherwise; all such deviations shall be noted and explained in the examiner's report..

3.2 This model policy is based on the latest scientific findings. It is understood that various jurisdictions have restrictions or guidelines that might conflict with the recommendations in this model policy. Where restricted by laws contrary to this model policy, examiners shall comply with the law. It is suggested that examiners in such jurisdictions coordinate with the APA to update their local regulations to the latest scientifically validated procedures. In circumstances in which an examiner must deviate from the current best practices as discussed herein, such deviations shall be noted and explained in the examiner's report.

### **4. Examiner**

4.1 The statistical foundation for the validity of the paired-testing protocol is dependant upon the proven ability of each examiner to conduct such exams. Therefore, only a Full or Associate APA member who possesses a valid license or certificate (in jurisdictions where applicable) and who has demonstrated an acceptable level of accuracy and competency shall be eligible to conduct such examinations. Competence is not determined primarily on examiner training, years of experience, or the number of exams conducted, but rather by an examiner's personally demonstrated capabilities.

4.2 Any examiner conducting paired-testing examinations must have successfully completed the following requirements prior to engaging in paired-testing examinations:

4.2.1 Demonstrate competence in conducting scientifically sound polygraph exams, including proper pre-test practices, question formulation, question presentation, and data collection.

4.2.2 Demonstrate competence in chart interpretation. Competence is determined by successfully blind scoring a total of 100 polygraph exams in which ground truth is known, with a minimum of 40 truthful or deceptive cases in the sample. The minimum acceptable level of accuracy is 86% excluding inconclusive scores, which must not exceed 20%.

4.3 A different examiner should test each examinee except in those rare circumstances in which it is impossible or when it is agreed by the parties it is impractical.

4.4 The polygraph examiner's function is to conduct a fair and impartial examination. Each examiner should be unaware of the other's conclusion prior to both of them reaching a final, written opinion.

### **5 Environment**

5.1 All examinations shall be administered in an environment that is free of both aural and visual distractions that would interfere with the examination process.

### **6 Equipment**

6.1 Polygraph examinations are required to be conducted with APA-approved instrumentation and are required to record, at a minimum, the following channels or components:

6.1.1 Respiration patterns recorded by pneumograph components. Thoracic and abdominal patterns are required to be recorded separately, using two pneumograph components.

6.1.2 Electrodermal activity reflecting relative changes in the conductance or resistance of current by the epidermal tissue.

6.1.3 Cardiograph to record relative

changes in pulse rate, pulse amplitude, and relative blood volume.

6.1.4 Other physiological data may be used which have been shown to have diagnostic value in polygraph testing, and for which the examiner is qualified to interpret.

6.2 The polygraph shall be equipped with a movement sensor.

## **7 Recording**

7.1 A paired-testing examination shall be audio-visually recorded in its entirety.

## **8 Pre-Test Interview and In-test Practices.**

8.1 The examiner shall ensure the examinee has a reasonable understanding of the polygraph process and the requirement for voluntary cooperation.

8.2 The examiner shall adequately discuss the issue or issues to be tested and to allow the examinee to fully explain his or her answers.

8.3 The examiner shall ensure the examinee understands each question. Attempts by the examinee to rationalize should be neutralized by a pretest discussion in which the examinee demonstrates he or she understands the test questions to have the same meaning as does the examiner. Questions are required to be asked in a form that would prevent a reasonable person, facing a significant issue, from successfully engaging in a rationalization process.

8.4 The examiner shall not display or express bias regarding the truthfulness of the examinee prior to the completion of testing.

## **9 Testing**

9.1 Examiners shall use a validated polygraph testing technique meeting the following minimum requirements:

9.1.1 The technique must have demonstrated an average minimum accuracy of 86% or greater based on a preponderance of the published peer-reviewed research, and;

9.1.2 The technique must be acceptable to the examiner's certifying body or the parties for which the paired tests are being conducted; and

9.1.3 The technique must be one in which the examiner's accuracy was certified by the above-described certification method (4.2).

9.2 Each paired testing examination should be limited to a single-issue of not more than three (3) relevant questions. If more issues need to be explored, such tests should be administered separately. At least one issue shall be agreed upon for examination purposes in order to ensure the continuity of the paired examinations within the process.

9.3 An acquaintance test shall be conducted and discussed as part of the examination process.

## **10 Test Evaluation**

10.1 The examiner shall evaluate chart data utilizing only those specific (numerical) evaluation method(s) with which he was certified or deemed competent. It is recommended that Evidentiary Scoring Rules be utilized; however, examiners utilizing alternative numerical scoring rules who have demonstrated an accuracy rate that meets or exceeds that which is required by their certifying bodies (or parties for whom paired testing is being conducted) may use either method.

10.2 The examiner will render the appropriate opinion of the examination based on the aforementioned process and as set forth in the APA Standards of Practice and Code of Ethics.

10.3 If sufficient criteria do not exist to render an opinion, or if the tracings are too unstable to render a conclusive decision, the examiner shall report the exam as Inconclusive (INC) or No opinion (NO).

## **11 Post-Test Interview**

11.1 The subject shall be given an opportunity to explain any responses to any of the questions. The examiner shall advise the



subject of the final results of the examination after evaluation and scoring of all test data.

## 12 Quality Control

12.1 It is recommended that all paired-testing examinations be subject to an independent quality control review in which all examiners cooperate and provide any and all materials requested for such a review.

12.2 When such a review is requested by either party, examiners shall cooperate with the reviewer(s), fully disclosing all relevant information regarding the examination. Any doubts as to relevancy are required to be resolved through disclosure.

## 13 Retention of Records

13.1 It is recommended all relevant data be retained for a minimum of five (5) years, but in no event shall records be destroyed prior to the resolution of any legal proceedings in which the polygraph data, findings, opinions, etc., might be at issue.

## 14 Resolution of Issue

14.1 Whereas paired-testing is designed to reduce the error rate when determining the veracity of two parties with diametrically opposed accounts of the issue at hand, paired-testing's ability to resolve opposing accounts within the statistical framework of this model only extends to those polygraph results which support a common conclusion regarding the incident under investigation.

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