

Polygraph Terms for the 21st Century

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Abstract

This paper explores the phenomena described as “psychological set” and “anti-climax dampening concept” outside of the polygraph lexicon for more parsimonious terms. Unique to the polygraph field, these terms are discussed in their historical context with an attempt to reconcile their meaning with vocabulary and concepts from related sciences. The purpose of this paper is to propose a modernization of our language to align it with mainstream terms and concepts. The authors argue that the term “psychological set” and “anti-climax dampening concept” are inadequately defined while the construct of *salience* may be more suited to providing an accurate conceptual framework to describe the psychophysiology underlying the science of polygraph testing.

Introduction

William of Occam was a 14th century Franciscan friar who is known today for “Occam’s Razor” (Wikipedia, 2007), the maxim named after him. Occam stated “Entities should not be multiplied unnecessarily.” The “razor” portion of the term refers to the “shaving” of the unnecessary to arrive at the simplest possible explanation. The implication of Occam’s Razor is that the simplest explanation is often the best. This principle has been expressed in Latin as the “*lex parsimoniae*” principle, the law of parsimony or the law of succinctness (Wikipedia). Many disciplines employ the concept of parsimony to allow those who are not intimately familiar with their discipline to comprehend and bridge ideas.

The polygraph has long been relied upon as decision support tool, and the science of polygraph testing is best understood in a vocabulary in common with the related sciences of psychology, physiology, and psychophysiology. More courts are recognizing polygraph professionals as experts, and accepting the testimony of these examiners. Adjudicators and other decision makers rely on input from examiners when making decisions that affect people’s freedom and livelihood. With this comes the burden of ensuring proffered testimony is based on scientific evidence and scientific theories that have adequate general acceptance among the scientific community and can withstand scrutiny. This evidence requires the professionals involved in the discipline of forensic psychophysiological detection of deception (PDD) to embrace the more commonly accepted vocabularies of the fields of psychology, physiology, and psychophysiology. By so doing we can more easily explain to other professionals the mechanisms underlying polygraph testing. We must speak a common language with those who may be called upon to critique our examination.

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In 1996, a group of professionals interested in PDD testing presented a *Brief of the Committee of Concerned Social Scientists as Amicus Curiae in Support of the Respondent* to the United States Supreme Court in the case of United States vs. Edward Scheffer (No. 96-1133). In this brief the committee pointed out that during a 1996 survey of members of the Society for Psychophysiological Research, roughly two thirds of the MDs and PhD members supported PDD testing alone or when accompanied by other information (Honts & Peterson, 1996).

In order to foster better understanding of PDD testing among professionals in other disciplines, we must continue to improve the science of polygraph while adhering closely to, and aligning with, principles and knowledge from related sciences. This will ultimately result in improved general acceptance of the science of PDD testing. To achieve parity among the forensic sciences we must be able to communicate. To this end we should seek terms or descriptors to aptly and succinctly describe what we are measuring.

Background

In 1960, Cleve Backster described the terms “anti-climax dampening concept” and “psychological set” in a school handout (Matte & Grove, 2000). These two terms are widely used in polygraph testing. “Psychological set” was said to have come from what was described as a “widely used textbook *Psychology and Life* by Floyd L. Ruch (1948)” (Matte & Grove). “Psychological set” was defined as follows:

A person's fears, anxieties and apprehensions are channeled toward the situation which holds the greatest immediate threat to his self- preservation or general well being. He tunes in that which indicates trouble or danger by having his sense organs tuned for a particular stimulus, and he tunes out that which is of a lesser threat to his self-preservation or general well being (Matte & Grove, 2000, p. 197).

Matte and Grove (2001) described the “anti-climax dampening concept” as being based on the theory of “psychological set”. Matte and Grove asserted that the concept implies that a lying subject will tune in the relevant questions and tune out the comparison questions and the truthful subject will do the opposite. They further state that an examinee may direct his attention to the most intense relevant question and may perceive but not be affected by a weaker relevant question.

We conducted a careful review of the Ruch (1948) text, and several other editions by the same title and author, but failed to find the term “psychological set” mentioned anywhere. Though the quotation listed earlier is correct, Ruch's textbook never uses the expression “psychological set” as had been reported by Matte and Grove (2001). Therefore, whatever the origin of the expression, we have ruled out Ruch as the original source. Matte and Grove stated that Titchener had also used the term “psychological set” in a 1914 textbook. We conducted a search of the electronic version of that book through Questia, an on-line library of books and journals, and were unable to find the term “psychological set.” For the moment we are left to conclude that the commonly held belief in the origin of the expression “psychological set” may be mistaken.

There was a related problem when a search was undertaken with psychological literature databases. A PsycINFO search conducted for the term “psychological set.” PsycINFO is an abstract (not full-text) database of psychological literature from the 1800s to the present. About ten abstracts returned that included the term “psychological set.” “Psychological set” was used as a term of convenience as opposed to a term of construct. The abstracts varied in the context in which they applied the term and none used the expression to refer to the same phenomenon we do in polygraphy. There appears to be a disparity between polygraphy's use of the expression “psychological set” and the rest of science.

The term “psychological set” and its earlier synonym “mental set” have been used in mainstream psychology to refer to problem solving situations when people rigidly use strategies that have worked in the past, often with a detrimental effect. Both terms have been used extensively to describe the results

of experiments by Rees and Israel in the 1930s, Luchins in the 1940s and others. "A mental set exists when people use problem- solving strategies that have worked in the past." (Weiten, 2007) This concept is not in accord with how the expression is used in polygraphy.

In a rejoinder to Matte (2000), Honts (2000) stated "The notion of "psychological set" is a contrivance of the polygraph profession and has received little scientific validation. Moreover, "psychological set" is not a term that is currently used much in mainstream psychological science." Our recent Internet and literature search clearly supports Honts' assertions. The paucity of information on the definition of "psychological set" and "anti-climax dampening concept" led us to search for terms that were more conventional.

We question the broad assumption of the current psychological set theory. The current theory posits that an examinee will focus their fears or anxieties on either the comparison or the relevant questions. Recent research (Offe & Offe, 2006) has shown this to not be the case. These investigators reported the differential reactivity is achieved through differential significance of the relevant questions only and not through the comparison questions. In other words, both guilty and innocent participants reported similar levels of stress for the comparison questions. The difference in reported stress was found in the perceived salience of the relevant questions by both groups of participants.

There is a more accurate alternative to "psychological set". Krapohl (2001) pointed out that in polygraphy we gauge differential arousal or differential reactivity between comparison and relevant questions. From this differential reactivity we infer the relative *salience* of these two categories of questions. Greater *salience* to one category than the other permits highly accurate assessments of credibility. This is accomplished through measuring differences in reactivity to the relevant and comparison stimuli. While field examination techniques are distilled to the procedural assignment of points and use of threshold cut scores, the mathematical operations are intended to provide statistical inferences regarding the significance of differences in the subject's response to the test stimuli.

Wikipedia describes *salience* in neuroscience as the "state or quality of standing out relative to neighboring items. *Salience* is considered to be a key attentional mechanism that facilitates learning and survival by enabling organisms to focus their limited perceptual and cognitive resources on the most pertinent subset of available sensory data." *Salience* describes that which is particularly important or relevant. As discussed below, the concept of *salience* applies to field polygraphy and laboratory based examinations and studies. The Oxford Dictionary of Psychology defines *Salience* as "the prominence, conspicuousness, or striking quality of a stimulus" (Colman, 2001).

Despite their prominent use by polygraph examiners, the terms "psychological set" and "anti-climax dampening concept" are rarely recognized by practitioners in sister sciences. An exhaustive search of the online EBSCO database of psychological literature, along with a keyword search on the Internet failed to find the expression "anti-climax dampening concept" described outside of PDD testing. The expression "psychological set" was found to denote a different phenomenon unrelated to that for which it is used in polygraphy. It would appear that both expressions are idiomatic terms with either conflicted or no meaning beyond the small field of polygraphy. While researching these terms, the first author contacted numerous professionals in the academic field of psychology. One researcher informed the first author that electronic correspondences containing the term "anti-climax dampening concept" were being flagged as possibly containing adult content.

It would seem Backster (1960) created the term "anti-climax dampening concept" in an attempt to explain to those unfamiliar with polygraph the notion of *salience*. It appears that the term was used to explain how an examinee can fail to react significantly while lying to a particular question, because a concurrent test question holds greater salience for the examinee. .

Polygraph examiners generally report the examinee as being deceptive regarding the relevant issue under investigation. The ability of polygraph to discriminate crime roles has not been thoroughly researched. Explicit laboratory research on role discrimination using the polygraph is limited to one published study (Podlesny & Truslow, 1993).

Salience in Field Polygraphy

The National Academy of Sciences report discussed a variety of psychological phenomena as the basis for *salience* of the test stimuli, including fear, stress, guilt, anger, excitement, and the examinee's orienting response to information (National Research Council, 2003).

In criminal specific testing situations, it is generally accepted within the polygraph profession that the driver for *salience* is fear of the consequences associated with detection of deception. For the innocent examinee this would make the comparison questions more salient: for the guilty the relevant questions would be more salient. A measure of differential reactivity in this type of test could then be explained by the degree of *salience* an examinee places on a question or questions.

We must also consider the effects of habituation. For an innocent examinee it is possible that both the relevant and comparison questions are initially threatening and possess similar degrees of *salience*. As the examination proceeds, however, the relevant questions become less threatening than the comparison question to the innocent examinee. Iacono, Boisvenu and Fleming (1984) reported that habituation can be pronounced over the course of an examination.

Habituation describes the decrease in physiological responsivity that occurs with repeated presentation of the same stimulus (Andreassi, 1995). The Russian psychologist Sokolov (1963), distinguished between the Orienting Reflex (OR) and a Defense Reflex (DR). Sokolov showed that the OR occurred as a result of exposure to a novel stimulus and the DR to a potentially painful one. Habituation studies have shown that in general there is less habituation with very intense stimuli, more important stimuli, more novel and complex stimuli (Andreassi). In general, the OR habituates rapidly and the DR very slowly.

It is quite possible that an important stimulus (such as the question with more *salience*) can generate prolonged responses, without necessarily generating defense responses. Sokolov (1963) demonstrated stimulus complexity (the information inherent in the stimulus) was shown to be an important determinant of its resistance to habituation (Cacioppo, 2000; Sokolov). It is possible that both the relevant and comparison questions generate ORs, and one is more important, possessing "signal stimulus" qualities, and thus habituates more slowly. It is also possible that one is eliciting DR and other OR. In 1963 Sokolov reported some success in differentiating the OR from the DR (Cacioppo; Sokolov). Turpin reported difficulties replicating Sokolov's work in this area (Cacioppo; Turpin, 1986).

Sokolov's framework of either OR or DR can be applied to polygraph. It is possible the innocent examinee habituates to the less threatening relevant question while the comparison questions maintain a greater *salience*. The opposite effect would be assumed to occur with a guilty (lying) examinee.

Salience in Laboratory Based Polygraphy

Scientists who study PDD testing have been able to show that when studies are properly designed (realistic settings, employing field examination techniques and using experienced examiners; see, Kircher, Horowitz & Raskin, 1988) very good results can be achieved. In 1996, the 17-member ad hoc Committee of Concerned Social Scientists reviewed the scientific literature and found nine high quality laboratory studies involving 457 examinations. Those scientists found that excluding inconclusive results (approximately 10% of the cases) the examiners correctly classified about 90% of the guilty subjects and 92% of the innocent subjects (Honts & Peterson, 2001).

Anderson, Lindsay, and Bushman (1999) reported: "...correspondence between lab and field based effect sizes of conceptually similar independent and dependent variables was considerable. In brief, the psychological laboratory has generally produced truths rather than trivialities." This study examined empirical data across a broad range of psychological domains and found external validity of psychological tests to be high.

The underlying causation of differential arousal may or may not be very different in laboratory based polygraph examinations, relative to field examinations. Arousal could result from a number of causes including guilt, fear, excitement or content complexity (Vrij, 2000). While it is difficult to determine the cause of the arousal, the fact remains that high levels of accuracy have been found in laboratory polygraph studies (see extensive review by Honts, Raskin, & Kircher, 2005). The consistency of these findings suggests that primary emphasis on fear as the basis for reaction may be misguided. The degree of *salience* an individual places on a particular question can be inferred to be the source of differential reactivity.

Salience is a term used throughout the forensic scientific community. A Wikipedia search for the term “*Salience*” as used in just the neurosciences listed eight major branches and over 25 major themes of research (Wikipedia, 2007). As a scientific construct, *Salience* has more universal understanding than the undefined construct of “psychological set.”

With an increasing emphasis on *Daubert* and similar requirements for court admissibility, it would seem unwise to limit our understanding of the psychological mechanisms of polygraphy to a single explanation, and especially unwise to continue to endorse an explanation that lacks general acceptance and definition. The National Research Council (2003) discussed the psychological mechanisms underlying the polygraph with consideration for a number of recognizable psychological constructs, including conditioned response theory (Davis, 1961), dichotomization theory (Ben-Shakhar, 1977), conflict theory (Davis), arousal theory (Ben-Shakhar, Liebllich, and Kugelmass, 1970; Prokasy & Raskin, 1973), threat of punishment theory (Davis). We propose that the construct of *salience* has better general acceptance and recognition, and provides a more adequate conceptual vocabulary for achieving an integrative understanding of the variety of psychological response elements underlying the physiological mechanisms monitored by the polygraph test.

While the undefined construct of “psychological set” cannot adequately accommodate the various explanations provided by these different theoretical frameworks, the general concept of *salience*, or the tendency for people to notice and focus on the outstanding or important features of a given stimulus or information context, provides a general explanation of the phenomena that people will attend to some stimuli more than other in any context, whether mundane or unique. Moreover, *salience* does so without moving precipitously into un-supportable or reductionistic explanations about the reasons that certain stimuli are selected as more important than others (e.g., fear, threat, etc), and leaves our understanding of such reasons to correlations that are best established through empirical inquiry.

Summary

“Psychological set” and other terms such as “GSR”, “control questions” and “stim tests” are idiomatic jargon used within the polygraph profession, and should be discarded in favor of more generally accepted and empirically supported constructs. The expressions “psychological set” and “anti-climax dampening concept” do not convey their meaning in common terms to those outside the polygraph community. This does not mean that “psychological set” and “anti-climax dampening concept” are by definition wrong, any more than “psychogalvanic reflex” is wrong but only that the concepts are already captured in more modern language. The term *salience* is more widely understood in the scientific literature and its use by the polygraph profession will serve to garner more respect than the use of jargon.

The science of PDD will benefit by the acceptance of sister disciplines. This is more likely to happen if we share a common language. One prominent researcher criticized our use of such terms, writing: “Alice-in-Wonderland (AW) terminological usage employs basic terms in a systematically misleading and taxonomically anarchic way (Furedy, 1991)”. As Krapohl stated, “it does not benefit the science of PDD to set itself apart from the family of behavioral sciences” (Krapohl, 1996).

Approximately forty years ago, Cleve Backster helped crystallize essential concepts by giving them names and definitions, an important step in the evolution of the field. Without a doubt these terms and expressions were vital for the profession to communicate within itself. Now at the beginning of the 21st century, as polygraphy has moved from the realm of investigative aid to a forensic scientific tool, polygraph practitioners and researchers must embrace the language of science if they are to communicate with the larger scientific community. The time has come to recognize that *salience* is the widely accepted and overarching concept that encompasses both “psychological set” and “anti-climax dampening concept.” *Salience* has the distinct advantage of both explaining the phenomena and having a more universally recognizable meaning. If the polygraph profession is serious in its pursuit of general acceptance, it must be prepared to replace its idioms with language and constructs that have more in common with other sciences. *Salience* is an important step in that direction.

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