# A Proposed Framework for Polygraph Test Questions

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## Introduction

Polygraph test question construction, review and presentation are essential skills for poly- graph examiners. The American Polygraph Association (APA) recognizes its importance in its educational standards that mandate 32 instruction hours for polygraph students on these areas. All APA polygraph education programs teach specific rules for question development, how they are introduced to the examinee and how they are presented during testing. The rules evolved over generations of polygraph examiners and there is wide consensus among practitioners about what those rules are. What has yet to appear is a theoretical framework for polygraph test questions; There seems to be fairly good agreement on the *how* of polygraph questions, but not the *why*. Why should relevant questions be direct and use action verbs? Why are emotionally charged words, legalisms and specialized jargon avoided? Why should comparison questions be broad or ambiguous but relevant questions must be clear and as narrow as possible? Why do we review all the test questions with the examinee before running charts? Why don't we test anyone after they've been through an intense interrogation? We know the rules, but those rules are not organized within some larger concept. Rather than a theoretical framework, professional faith is invested in the list of rules, most of which have no known originator.

To understand why the polygraph works it is first necessary to abandon the assumption that the act of lying is what instigates poly- graph reactions. The reliance upon the notion that lying causes reactions and truthtelling does not is a common misapprehension. It would be true if the polygraph were a "lie detector", but no such device exists. This is not to deny lying very likely plays a mediating role in the ultimate size of the physiological reactions due to associated emotions such as guilt or fear of detection (see Kahn, Nelson & Handler [2009] for an excellent review). Lying ap- pears to augment the intensity of the reaction (Elaad & Ben-Shakhar, 1989), but something else is going on to trigger the reaction.

There is evidence that overt lying may not even be necessary for the polygraph to function. This evidence comes in three parts. The first is found in the directed-lie comparison (DLC) question. When an examinee answers "no" to a DLC she or he is not being deceptive as we generally define the term. The examinee has no intent to misrepresent the truth. The examinee is not trying to fool the examiner. The act of answering incorrectly on DLCs is not even the examinee's idea – the examinee is merely following instructions. Nevertheless,

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the DLC seems to function well as a comparison question (Honts & Raskin, 1988; Horowitz, Kircher, Honts & Raskin, 1997). Second, polygraph examiners who have conducted the Silent Answer Test (Horvath & Reid, 1972) can attest that an examinee will react to the same test questions irrespective of whether the examinee answered the questions out loud. Lying is neither sufficient nor even necessary to explain those reactions. Without an examinee answer, the source of the reaction must be the question itself. Finally, most examiners will have noticed that the examinee normally begins to react before the question is completely asked and before the examinee answers. If the act of lying were the cause of the reaction, its onset would be tied to the lie rather than to the question.

Polygraph examiners who assume the polygraph is a "lie detector" may be vulnerable to certain errors as they develop polygraph test questions. Many of those errors are the focus of this paper. If deception is not what causes reactions, how can the polygraph detect deception? As we discuss in the next section, it doesn't – exactly.

**The Basics**

Polygraph testing is a straightforward Stimulus-Response paradigm. As in all such paradigms, a stimulus is presented, a response is recorded, and inferences are based upon the relationship between the two. In polygraphy the stimuli are the test questions (not the examinee's answer) and physiological arousals are the responses. These test questions vary from one another in some essential characteristic, and differences in arousal intensity are believed to covary with that characteristic.

Distilled to their essence there are three types of polygraph questions. There are neutral questions, which as the name suggests, are those that are not evocative in any way. There are relevant questions, which are evocative, and address the behaviors or actions of interest. The third category of question is called a comparison question, also evocative, the reactions to which polygraph examiners use as a benchmark to gauge the significance of the examinee's reactivity to the relevant question. During polygraph testing these three types of questions are interspersed in a sequence, repeated several times, and the resulting arousals are tracked with any of several available scoring systems. Some polygraph techniques include other kinds of questions. Cushman and Krapohl (2010) summarized the available evidence for these other kinds of questions, and reported that they have either been found to be invalid or have no published research.

Generally speaking, physiological arousals can be either spontaneous or associated with a stimulus. Those that are spontaneous are not informative, at least not in polygraph testing, and we will not consider them further. Arousals that correspond with the test stimuli may be informative if they are elicited by a certain stimulus characteristic. There are three characteristics of a stimulus that will evoke physiological responding. They are novelty, intensity, and salience (Dawson, Schell, & Filion, 2007). Please note that deception is not included in this list. Presence or absence of the three characteristics will determine whether there are non-random arousals to the stimuli. When present, increases and decreases in the degree of these characteristics are reflected in corresponding increases and decreases in the amplitude of the subsequent arousals (Barry, 1975; Hovland & Riesen, 1940; Katkin, 2003; Lole, Gonsalvez, Blaszcznski & Clarke, 2012).

The novelty of a stimulus regards whether it is unexpected, new, different, or surprising in a given context. In polygraph testing novelty can be a contaminant because it does not contribute to the goal of veracity testing. Reactions to an unexpected or surprising stimulus can only reveal that it was unexpected or surprising. Novelty is therefore strenuously avoided in the examination protocol. Steps to avoid novelty include reviewing all questions before the test, using a neutral or irrelevant question as the first question in the test sequence, and by first performing a practice test with the examinee. Examiners strive to ensure extraneous sights and sounds do not intrude upon the testing. Test question development con- siders whether there are dramatic differences in question length, and during testing every effort is expended to avoid attention-grabbing differences in test questions due to the pitch, speed, emphasis and hesitations in the examiner's voice.

Stimulus intensity refers to that which is painful or very aversive. A real-life example of stimulus intensity is the sound of fire and smoke alarms. They are exceptionally loud, harsh, and cause a physiological response. They are intended to capture attention, be arousing and motivate people to move to safety. As with stimulus novelty, stimulus intensity is a contaminant in polygraph testing. It elicits arousals but those arousals are not meaningful toward the aim of deception detection. The polygraph testing protocol, therefore, calls for presentation of the test questions in a normal volume and the testing procedure that carefully attends to the comfort of the examinee.

The third and final characteristic of a stimulus that elicits a physiological response is salience, a term used here to refer to the person- al meaningfulness, significance or importance of the stimulus. The term "personal" is central to this definition, as it can vary from individual to individual, and in degree between guilty and innocent examinees. Salience is the stim- ulus characteristic that governs test question construction and presentation. In polygraph testing, the meaningfulness of a question can be assessed by observing the frequency and magnitude of physiological arousals that ac- company the presentation of the question.

Polygraph relevant test questions can be especially meaningful if an examinee intends to lie to them. Similarly, relevant questions are probably meaningful to truthful examinees inasmuch as they relate to the reason the examinee is taking the test. It is logical to conclude that all examinees consider relevant questions important and therefore arousing.

What support is there, beyond the reason- ableness of the assumption, that relevant questions are judged to be important by all examinees? There are two converging lines of evidence. One is the finding that, on aver- age, differential arousal between relevant and comparison questions is smaller for truthful examinees than it is for deceptive examinees (Franz, 1989; Krapohl, Gordon & Lombardi, 2008; Krapohl & McManus, 1999; Patrick & Iacono, 1989; Raskin, Kircher, Honts, & Horowitz, 1988). Consequently, decision ac- curacy is higher for deceptive examinees than it is for truthful examinees across virtually every polygraph technique (Nelson, 2015). This is consistent with an expectation that truth- tellers share some concern for relevant questions.

A second finding comes from the research with the Relevant-Irrelevant Test (RIT), which contains no comparison questions. In the RIT, the consistency of reactions to the relevant questions is used as an indication of deception whereas the opposite provides the basis for a decision of truthfulness. If truthtellers did not find relevant questions salient there could be an expectation that they would pass the RIT in equal proportions to liars who failed this test. Research on the RIT find that it produces high rates of false positives and low rates of false negatives (Horowitz, Kircher, Honts & Raskin, 1997; Krapohl & Goodson, 2015; Krapohl & Rosales, 2014) indicating that both truthtellers and liars find relevant questions personally significant. When added to the evidence from the comparison question test regarding response asymmetry, the trend in the findings support a conclusion that relevant questions can be expected to be important to truthtellers and liars.

Past explanations of the comparison question test have relied most heavily on the fear of detection (FoD) model, that is, the physiological arousals on relevant questions by liars were due to their worry about being revealed as the guilty party whereas innocent examinees were fearful of comparison questions because of a belief those questions would reveal their involvement in non-relevant socially proscribed behaviors. Related perspectives include psychological set, fear of punishment, conditioned reactions and conflict theories. Insufficiencies in the FoD model became clear with the advent of the directed-lie version of the comparison question. Fear could not explain reactivity to the directed lies, and these questions appeared to perform as well as traditional probable-lie comparison questions (Honts & Raskin, 1988; Horowitz, Kircher, Honts & Raskin, 1997). Additionally, the FoD failed to explain why high polygraph accuracy was found in low-motivation laboratory studies of the polygraph in which the participants had little reason to fear detection (Bradley & Ainsworth, 1984; Honts, Raskin & Kircher, 1987; Horvath, 1988; Horvath & Palmatier, 2008). It also provided no explanation for tentative evidence of a high false positive rate among truthful examinees

tested by law enforcement to support claims of having been victims of a violent crime (Barland, 1982; Raskin, Kircher, Honts, & Horowitz, 1988). Finally, data from a lab study by Offe and Offe (2007) suggested that differential reactivity arises from the salience of the relevant questions, not from the comparison questions. For these reasons an alternative to the FoD model was necessary.

A new theory was proposed by Ginton (2009) that appears to address the shortcomings of the FoD model. Called Relevant-Issue Gravity (RIG), the theory is premised on differences in the binding power of relevant questions upon the attention of truthtellers and liars. It takes as given that all examinees find relevant questions salient. The difference is that for the guilty examinee there is a memory of the behavior, called an episodic memory, that drives the salience, a memory the innocent examinee does not have. RIG theory predicts that the episodic memory resident in the guilty examinee compels the examinee's attention to the relevant question, which will give rise to a physiological response that is expected from salient stimuli. Truthtellers, in contrast, with no episodic memory for the relevant topic, find a larger portion of their attention shifted to distractor items, which polygraph examiners call comparison questions. From this vantage, the true purpose of comparison questions is not to impose fear to compete with the fear of the relevant question. Rather, comparison questions are placed in the question sequence to test the degree to which an examinee's attention can be shifted from the relevant questions. The expectation is that the presence of an episodic memory pertaining to the relevant issue can be revealed by the persistence of re-activity to relevant questions. Not only does the RIG theory overcome the incompatibilities between FoD prediction and the evidence, it is consistent with Offe and Offe's conclusion that a large contributor to decision accuracy is how much reactivity takes place on the relevant question when it is juxtaposed in a sequence with potential distractors.

The central role memory plays in the process of deception can easily be demonstrated with a simple thought experiment. Here it is. We propose the reader prepare to tell a lie for the following question: In what month were you born? Regardless of what month the reader has chosen to offer as the lie, the first answer to come to mind was the correct month, not the lie. The false answer never comes to mind first. This demonstrates a core function of the mind, to seek accurate information stored in memory before deciding on the answer. If the memory exists, asking the right question of an attentive person will trigger the memory. This is true for both liars and truthtellers, and can be exploited in polygraph testing by carefully choosing test questions.

To summarize the basics:

1. Polygraph testing is a Stimulus- Response paradigm. Questions are the stimuli and the physiological arousals are the responses.

2. The three characteristics of any stimulus that evokes a physiological response are novelty, intensity, and salience.

3. In general, the more of any of these three characteristics a stimulus has, the greater the response.

4. Polygraph is a test of salience. Deception is inferred from physiological arousals that signal the degree of salience. Fear or other emotions, as well as cognitive load, may follow the internal appraisal of salience and mediate the response intensity but they are not the initiator of polygraph reactions.

5. Relevant questions can be salient to both truthtellers and liars, though they generally differ in the degree of that salience.

6. Questions cause people automatically to seek accurate information in the form of memories to answer the question, irrespective of how they answer.

7. The use of comparison questions (distractor items) in a test is to help assess whether the examinee has an episodic memory in the scope of the relevant question inasmuch as

examinees who have such memories will produce larger relative reactions to relevant questions than examinees who do not. Examinee answers to comparison questions do not necessarily need to be lies for these questions to serve their function as distractors but should trig- ger the person's search for accurate information or memories should trigger the person's search for accurate information or memories.

**Implications**

If the previous assumptions are correct they give rise to guiding principles regarding examinee suitability and test question construction, introduction and presentation. The principles also reveal shortcomings of the "lie detector" and FoD perspectives in polygraph testing. We address these in the next four sections.

**Suitability**

*Effects of Priming or Conditioning*

It is generally accepted among polygraph practitioners that exams should be rescheduled if the examinee had recently been interrogated extensively. The reason is self-evident. If polygraph is a test of salience, and salience has been artificially imposed upon the relevant topic by an intense accusatory period shortly before polygraph testing, reactivity would be expected to appear on the relevant questions irrespective of whether the examinee was deceptive. For this reason, examiners typically allow a cooling-off period between an interrogation and a polygraph examination.

*Testing Possible Victims of Trauma*

It may be recalled from an earlier discussion that being asked a question will cause an individual to search his or her memory for ac- curate information, regardless of the answer chosen. Good polygraph questions are in- tended to target the recollections of deceptive examinees while simultaneously allowing truthful examinees to know such recollections do not exist in their memories. This process works well for most cases. An exception might be when the recollection is associated with trauma, such as having been a victim of a sexual assault. Test questions that trigger that type of memory can be very personally meaningful as well as emotionally disturbing. For these individuals physiological responding to relevant questions may have an explanation other than deception. One expected effect of an association between trauma and relevant questions that bring to mind that trauma is that polygraph examinees with those memories could be inclined toward false positive results. There has been one study that provides a glimpse of this possibility. In a reanalysis of a 1977 blind scoring study by Frank Horvath, Barland (1982) and Raskin et al. (1988) reported that almost all false positive errors in that study of field cases were from tests of victims. While more work is needed to con- firm that finding, it is consistent with the notion that test questions that force the recall of a harrowing experience will always be highly significant to the examinee, and consequently more likely to elicit physiological responses that may be indistinguishable from those associated with deception.

**Test Question Construction**

*Taboos*

Overly intrusive test questions about very personal conduct can present special challenges in polygraph testing. This is most true on the topic of sex, an area that until recent years was routinely found in the polygraph examinations of police officer candidates. For the aver- age individual, questions over personal sexual practices can be unsettling. This is because in most cultures queries about such topics, especially from strangers, are a substantial breach of etiquette. The topic of sex is always salient in such circumstances. For this reason, relevant questions about sexual practices may elicit physiological arousals among truthful examinees due to embarrassment, anger, defensiveness, or the concealment of tangentially related behaviors the examinee prefers not to discuss. Collectively, the polygraph profession found long ago it needed to be very careful of sexually based comparison questions, a recognition that the very strong reactions they often cause could risk a false negative result except under certain conditions.

There are two common circumstances where sex-based relevant questions may not be so problematic. One is when the examination is focused on a criminal sexual offense for which the examinee is a suspect. In these kinds of cases the relevant questions regard a particular criminal act, not the examinee's sexual behavior in general. Relevant questions are structured to prompt a memory of a very specific event in the mind of the guilty examinee, one for which the truthful examinee is certain he did not commit. For comparison questions one of the recommended practices for tests about sexual crimes is to cover broad areas of sexual activities (Abrams, 1989; Krapohl & Shaw, 2015; Matte, 1996; Reid & Inbau, 1977) where the concern addressed in the previous paragraph may be exploited for the benefit of the exam. Because of the power of sex-based comparison questions is so potentially great, they are restricted to examinations in which the relevant questions are about a sexual crime: Sexual activities are never covered in comparison questions in tests where the relevant question does not also cover sexual activities.

A second circumstance where sex-based relevant questions may be less troublesome are in the testing of convicted sex offenders in treatment. One of the pertinent factors that distinguishes these examinees from others is that they will have had multiple lengthy and in-depth conversations with therapists and parole/probation officers regarding their sexual interests and activities well before the offenders are subject to polygraph testing. As such the taboo normally associated with sexual inquiries may be less upsetting, even expected, than it would be for the average citizen in the community.

*Evocative Terms*

In work unrelated to polygraph testing Brad- ley and Lang (1999) investigated the affective power of single words. They asked undergraduate college students for subjective ratings on common English words along the dimensions of happy vs unhappy, excited vs calm and controlled vs in-control. From this they developed affective norms for more than 1000 words. The Bradley and Lang data indicated certain terms had a combination of significant arousal and negative valence. This subset of words was judged as strongly stimulating in a negative emotional direction. Said simply, they were significantly more disturbing than are most words. Among the strongest were rape, mutilate, murderer, assault, violent, crucify and slaughter. Relatedly, many polygraph students are taught to avoid these kinds of words because they are suspected of causing reactions in themselves. For practical reasons Bradley and Lang could not assess the affective power of all words, but the concordance between their findings and common polygraph instruction would indicate the indiscriminate use of potentially evocative words may come with a risk of adding a confounding source of salience to polygraph questions. Similar evidence is found in the work of Dindo and Fowles (2007).

*Doubt*

Polygraph test questions can garner importance to the examinee if he is uncertain of the truthfulness of his answer. Ambiguous test questions complicate the examinee's mental search for information, increasing cognitive demands and sometimes anxiety or other emotions. Questions that induce doubt will be salient by their nature. Doubt may be harmful or helpful to polygraph testing, depending on whether test questions evoking doubt are relevant or comparison questions.

If relevant questions are insufficiently clear to the examinee due to unfamiliar terminology, ambiguous expressions, poorly chosen words, excessive complexity or scoping that exceeds an examinee's capacity to completely recall or effortlessly process what is being asked, reactivity can occur to the question that is unassociated with deception. It is one of the reasons polygraph students are instructed to use clear and concise relevant questions and to stay away from legal terminology[3], scientific names, or words unfamiliar to the examinee. Unless the examinee is a specialist in a given field, memories associated with the behavior of interest will not be associated with specialized terms. Examiners are instructed in school to use the examinee's vocabulary in relevant test questions to minimize examinee doubt. Similarly, compound relevant questions or "shop- ping list" relevant questions may introduce complexity that also induces reactivity due to processing demands, a problem that can be avoided by merely testing separate behaviors in separate test questions.

In contrast to doubt's negative effect on relevant questions, uncertainty can be very useful with probable-lie comparison (PLC) questions and is regularly used by examiners. The more doubt the question can induce the more effective it can be. Polygraph students are taught to make PLCs as broad as possible. The rationale for this approach is usually based on in- creasing the likelihood that the examinee will be lying to the PLC. Since lying is not necessary for comparison questions to function (remember DLCs?) the more plausible mechanism is that the significance of the question has been enhanced by the examinee's uncertainty. The effect of doubt can easily be demonstrated using a volunteer attached to a polygraph who is asked a series of unrehearsed and increasingly difficult trivia questions that require strictly *yes* or *no* answers. Reactivity will generally covary with the level of uncertainty the volunteer experiences.

One of the longstanding debates among poly- graph examiners is which type of PLC is superior, broad questions proposed by John Reid which can incidentally encompass the relevant topic (Reid & Inbau, 1977) or a later version introduced by Cleve Backster that is specifically designed to exclude the relevant topic (Matte, 1996). They are often referred to as "non-exclusionary" and "exclusionary" PLCs, respectively. Backster argued that exclusionary PLCs reduced the chance that a guilty examinee would confuse a PLC with a relevant question, the consequence of such confusion leading to an inconclusive result rather than a correct deceptive one. Those in the Reid camp advocate for the non-exclusionary approach, arguing it functions better than does the exclusionary PLC. History proved Backster to be the more persuasive one, and exclusionary PLCs came to be the dominant method in the field.

Backster's rationale would be correct if one looked at the polygraph strictly as a "lie-detector". As a "lie-detector" the guilty examinee would be lying to the relevant topic with both the relevant question and the non-exclusionary PLC, potentially producing equivalent reactions to both categories of question and an inconclusive outcome. If "salience detector" is a better description of the polygraph, it is reasonable to anticipate Reid's more expansive non-exclusionary PLC would perform better than Backster's narrower PLC. Reid's broader question would be expected to engender more uncertainty for the examinee. Large-sample research suggests that Reid was correct (Amsel, 1999; Horvath & Palmatier, 2008). The non-exclusionary PLC produced higher polygraph classification accuracy for both truthful and deceptive examinees in those studies, though the evidence is mixed as to which group benefited more. Increased salience imposed via greater doubt may be a significant contributor to this difference.

*Task Demands*

As discussed earlier, DLC questions appear to function well as distractors even though they do not require deception as the PLC does[4]. The question is why this may be true. Returning again to the assumption that polygraph is a test of salience, why should DLCs evoke reactions?

The answer may be that DLCs are the only questions in the series of questions that include special instructions. That is, on DLCs and only on DLCs does the examinee need to remember to answer differently from the other questions. This is called a task demand. In psychology task demands are processes that

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[3]One of the test questions in polygraph screening of individuals seeking a US Government security clearance uses the word "espionage," a term so specialized that examiners often must read or recite the legal definition to the examinee. It is a test question that speaks to a specific law rather than to a behavior (e.g., giving classified information to a foreign government without authorization), likely making it a less effective polygraph question. By way of example, consider the following two questions regarding income tax evasion. Question 1: Did you commit tax fraud in 2019? Question 2: Did you submit a falsified tax form to the IRS in 2019? The first question addresses the law, the latter the behavior. Most examiners are likely to agree that the second question is better because the language is probably how the examinee would have encoded the act in his memory. Because polygraph examiners are trained in the selection of test questions, it seems reasonable that the "espionage" question is the product of government policy drafted by those not familiar with the current understanding of polygraph.

are required to perform a task. The more difficult is the task the greater is the task demand. Because answering a DLC entails a different task from answering other questions, it gains significance for the examinee. To make DLCs more salient in practice, they are always linked to a memory. They are also examinee-referential, that is, they ask about the examinee's behavior (e.g., Have you ever broken a minor traffic law?) versus non-self-referential and trivial DLCs (e.g., Is Hawaii an island?) because the latter has been shown to be significantly less effective (Horowitz, Kircher, Honts & Raskin, 1997). This would be predicted using the salience model. The combination of linking the DLC with an episodic memory along with the added task demands associated with answering DLCs provide a better explanation for their evocative power than does the FoD model.

**Test Question Introduction**

*Excessive Emphasis*

A subtle influence could be caused by examiner behavior during the pretest interview. Examples might include where the examiner states he or she does not believe the examinee on the relevant topic(s), and that the examination is merely pro forma for an inevitable failed outcome. In the same vein, if an examiner relates to the examinee that the only questions on the examination that matter are the relevant questions, the instruction may diminish the distracting power of comparison questions and shift reactivity in the direction expected of deceivers. In both cases the examiner has imposed personal importance upon the relevant questions, increasing the likelihood of greater reactivity to them irrespective of whether the examinee is innocent.

Conversely, an overemphasis on comparison questions can also influence detection accuracy. If accusations can affect relevant questions, so too can they affect comparison questions. Similarly, a disproportionate amount of time invested on one question or category of question can signal to the examinee that they are more important than other questions. In this way these questions may inadvertently acquire additional salience above that which they would have otherwise.

**Test Question Presentation**

*Uniformity*

As discussed previously, novelty or surprise can evoke physiological responding. For this reason, the presentation of test questions during physiological recording should not vary in ways that are novel or surprising. Examples of the kinds of differences that may be novel include changes in the pitch, speed, fluidity, or volume in which some questions are presented but not others. Examiners with latent expectation bias may inadvertently change how some questions are asked, and thereby load novelty, a contaminant, onto those questions.

To avoid this possibility examiners can opt for the digitized voice for reading the questions during the test. Digitized voices are not encumbered with the degree of variability that human voices have. They present every question the same way every time. Reducing variability in the presentation of the test questions is expected to reduce the variability in the subsequent responses. Automated presentation of test questions may incrementally increase polygraph accuracy (Honts & Amato,

[4]Users of the DLC methodology were likely taught to have the examinee think of a transgression but not to tell the examiner what it is. The real purpose for discouraging the examinee from discussing the transgression is not found in the literature, but because the present authors present when it took place, they can now reveal that the prohibition on soliciting info¬rmation on DLCs was based on politics rather than science. The DLC entered the mainstream in the early 1990s as a replacement for the PLC in US government security screening. The shift was due to examinees complaining in large numbers to leadership and legislators about the intrusiveness of some of the questions, meaning PLCs. Moreover, some examinees lost their security clearances after making admissions on PLCs. Because not all examinees got the same PLCs, one's disqualifying admissions may have come about because of the PLC the examiner chose rather than the standardized coverage of the relevant questions everyone received. To address this problem, US government examiners were taught to explicitly tell examinees not to disclose their transgressions regarding DLCs, only to think of one or two peccadillos in the area the DLC covered. This became doctrinal even to those outside of government who adopted the DLC. A problem recognized by many examiners who use DLCs is that some examinees can habituate to these questions quickly. One reason for the habituation may be that the examinees begin to answer the DLCs by rote without accessing the related transgression in memory. Perhaps a better approach would be to tell the examinee that he will be asked after the exam what the transgression was and so he will need to recall it, though never actually pursuing the matter after testing. This manipulation would make for a partial test of the salience model proposed here.

1999). Almost all computer polygraphs offer a digitized voice option for reading the test questions. One obvious precaution is to ensure that an unfamiliar accent or poor quality of voice synthesis does not create a distraction in itself. There is at least one type of uniformity that should be avoided during testing. That is the practice of beginning several different relevant questions with the same phrase, thereby preventing the examinee knowing which question it is until late into the question presentation. If an examinee intends to deceive on one of the questions, the introductory phrase may prompt an initial reaction to each test question that begins with the same phrase, introducing noise into the physiological data. The problem could be more severe if relevant and comparison questions both share the same phrase.

*Extraneous Stimuli*

Unexpected sights and sounds during testing may also induce phasic responses. If examiners clear their throats, shift in their chair, or do other things just before asking a test question, these sounds may be novel enough to induce a reaction. Likewise, examinees can usually hear when an examiner types on the keyboard and may interpret the typing as an indication something occurred on the chart at the question when typing took place. This may cause reactions.

Examinees normally have a field of view of 210 degrees, and if the examiner is in that visual range his or her movements can catch the attention of the examinee. If found to be novel or interesting to the examinee, the movements may be responsible for reactivity. Examiners must be mindful that novel sights and sounds in the polygraph suite interfere with the testing process.

To control the potential effect of extraneous sounds on the polygraph data, including those caused by outside noises not under the control of the examiner, sound-abating headphones can be placed on the examinee. If the digitized voice is also used through the head- phones, reactions are more likely to be associated with the test questions than the outside distractions.

## Conclusion

We propose here an alternate to the FoD model to better explain the underlying causes of reactions during polygraph testing. The FoD model, a longstanding hypothesis in the poly- graph field, only predicts effects when fear is the dominant factor during polygraph testing. Others have previously identified this model's insufficiency (Khan, Nelson & Handler, 2009). Complete reliance on the FoD model can lead to errors in question development and the interpretation of physiological responses that accompany those questions. In its place we encourage consideration of the effects of novelty, intensity and salience when developing, reviewing and presenting polygraph questions. We also invite investigation of Ginton's (2009) Relevant-Issue Gravity framework, a perspective not yet widely appreciated in the field. It expands upon the basis that the polygraph is a test of salience, provides a more generalizable foundation for how comparison questions function, and invites the possibility of an entirely new category of comparison question. It is one of the stronger candidates to replace the

FoD model.

As a closing comment we observe that the development of theoretical frameworks is sometimes viewed by some as merely academic exercises. If an existing model is "good enough," there is no need for a new one, they might argue. No model will change how we go about our practice. Perhaps they have a point.

**Except:**

In the world of polygraph, where there are often substantial consequences that can accompany polygraph results, we would submit that any framework that can reduce errors of process should be of interest to all practitioners. In this paper we offer the possibility of just such a framework, constructed from the work of many before us, and encourage further tests that may prove, disprove or improve it.

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