



The Use of Polygraph Test in Clinical Forensic Psychiatry Settings

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The polygraph has and still is often referred to as the ‘lie detector’ and has received much interest since its initial introduction in the early twentieth century. Despite many concerns regarding its underlying theory, it is widely used by 79% of adult sex offender programmes in the United States (McGrath et al. 2010). Its use in the United Kingdom however has only steadily been increasing over the last two decades. Its limited use in the UK has largely been due to extensive criticism of the tool, which has included a working party review by the British Psychological Society in 2004.

5.1 How the Polygraph Works

A polygraph test should consist of three parts as recommended by the American Polygraph Association (2011): (1) a pre-test interview, (2) an in-test data collection phase and (3) test data analysis. Nelson in 2015 clearly described the polygraph test and the purpose of the pre-test interview being to ‘*orient the examinee to the test procedures, the purpose of the test and the investigation target questions*’. It involves an interview, a review of the target questions and an acquaintance test which orients the examinee to the instrument and establishes a baseline of physiological responses to a known lie. This has been found to increase the accuracy of the polygraph test (Kircher et al. 2001). The examinees’ suitability for the test is also reviewed which includes a brief review of their health and if there are any adverse health conditions which may exclude them from taking the test on the given day, in addition to obtaining informed consent to undertake the test. The interview that is conducted can be a free narrative, semi-structured or structured interview in which the test questions

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(relevant questions and comparison questions) are formulated and then reviewed with the examinee before moving to part two of the test.

The second part or phase of the test is the in-test data collection and can be achieved by using any of a variety of validated diagnostic or screening test formats (American Polygraph Association 2011). Nelson (2015) described *'all screening and diagnostic polygraph techniques include relevant questions (RQs) that describe the examinee's possible involvement in the behavioural issues under investigation. Effective relevant questions will be simple, direct, and should avoid legal or clinical jargon and words for which the correct meaning may be ambiguous, confusing or not recognizable to persons unfamiliar with legal or professional vocabulary. Each relevant question must address a single behavioural issue'*.

In addition to establishing relevant questions pertinent to the behavioural issue, comparison questions are also established in the pre-test interview and together form the test questions. Most polygraph tests utilise the comparison question technique (CQT) which is unsurprisingly the most researched polygraph technique. There are two types of comparison questions: the traditional one is the Probable Lie Comparison (PLC) and the other more recent and alternative type is the Directed Lie Comparison (DLC). The use of PLCs has been a heavily criticised aspect of polygraphy by various adversaries and will be discussed later as it has been an area identified as questionable ethically. In developing the DLC questions in a polygraph test, the process is transparent and does not require the examinee to deny a common behavioural issue. Importantly, DLCs have been shown to be as effective as PLCs as summarised by Blalock et al. (2011, 2012) and in a meta-analytic study (APA 2011).

In the third phase the test data are evaluated by numerically coding the differences in reaction to RQs and CQs. The theory of polygraph testing is that responses to RQs and CQs vary significantly as a function of deception and truth-telling in response to the RQs (Nelson 2016). Nelson (2015) has gone on to liken the scoring of polygraph tests with other scientific tests in medicine, psychology and forensics, in that observable and measurable criteria are identified, scoring features are transformed into numerical values, numerical cut-off scores are established statistically and then applied, and decision policies are developed. The final score(s) then indicate deception or truth-telling to the behavioural issue(s).

The polygraph is a scientific instrument which can display a representation of certain bodily activities, such as heart rate, blood pressure, respiration and palmar sweating (Gale 1988). It is assumed that when people experience fear, they experience autonomic changes within the body (Abrams 1991). It has been reported that these autonomic changes are induced by a 'stress response' during lying and are predominantly outside conscious control (Grubin 2008). For example, fear can lead to abrupt changes in perspiration, an increase in heart rate and a change in the breathing rate (Abrams 1991). These physiological changes can be recorded and measured by the polygraph; respiratory activity is recorded via convoluted rubber tubes which are placed over the chest and abdominal area, electrodermal activity (perspiration) is recorded via two small metal plates which are attached to the fingers, and a blood pressure cuff is used to record heart rate (Krueger 2009). It is assumed that almost all people experience fear of being discovered when they lie

(Wilcox 2000). Therefore, the polygraph records autonomic responses indicative of fear during a series of questions, which in turn is used to establish whether the person is likely to be lying (Kokish 2003). Thus, the polygraph itself does not detect lying per se but instead measures the physiological arousal that may be the product of lying (Gannon et al. 2008; Lewis and Cuppari 2009).

It has been said that '*polygraph testing is neither a deterministic (i.e., perfect and infallible) observation of deception or truth-telling nor a direct physical or linear measurement of deception or truth*' (Nelson 2015).

The polygraph examination used in post-conviction settings is usually the comparison question test (CQT) (Bashore and Rapp 1993). This test includes three types of questions concerning the matter under investigation: relevant, irrelevant and comparison. Relevant questions are very specific and tap into the issue of interest (Ogilvie and Dutton 2008), whereas irrelevant questions are neutral and unrelated to the matter under investigation (Ansley 2008). Finally, control questions are designed to be unrelated to the specific incident but nonetheless emotionally provocative for innocent subjects and to which both innocent and deceptive subjects are likely to respond 'no' to (Bashore and Rapp 1993). They typically involve questions regarding a subject's general honesty or historical misdeeds (Cross and Saxe 2001). The aim of the comparison question is to encourage innocent individuals to lie and experience physiological discomfort (Gannon et al. 2008). An example would be: 'Have you ever stolen anything?' (Bashore and Rapp 1993). Since most individuals display some autonomic reactivity to almost any type of question, neutral questions are used to establish a baseline of reactivity against which to compare the strength of the reactions produced by the relevant questions (Kleiner 2002).

The CQT often consists of between 10 and 12 questions, including up to four comparison questions (Honts and Reavy 2009). However, it can also be used as a multiple-issue examination, whereby a discussion about a specific allegation or incident will be replaced with a structured interview aimed at addressing areas pertinent to risk and/or compliance.

By comparing physiological responses to these three types of questions, a decision can be made about truth-telling. The CQT premises that the questions posing the biggest threat to the examinee will elicit the strongest physiological responses. Thus, for innocent examinees it is proposed that the comparison and relevant questions share equal stimulus significance, and therefore physiological responses to relevant questions will be less or equal to those of the comparison questions (Verschuere and Ben-Shakhar 2011). In contrast, for those individuals who have something they wish to hide, the relevant questions are likely to lead to greater physiological responding compared to comparison questions (Verschuere et al. 2007). Thus, when the physiological responses, as recorded by the polygraph, show greater reactivity to control questions, the respondent is classified as Deception Indicated or Significant Responses. When the pattern of responding is greater for comparison questions the individual is classified as No Deception Indicated or No Significant Responses. Finally, if the pattern of responding to both relevant and comparison questions are equal or fluctuate significantly, then the test result is Inconclusive (Ben-Shakhar 2008; Ogilvie and Dutton 2008).

All questions constructed for a polygraph examination require the individual to respond with a 'yes' or a 'no' (American Polygraph Association 2009). These questions are formulated in the pre-test interview based on the information provided. The pre-test interview consists of: greeting the individual, providing an explanation of the procedure and instrument, obtaining the examinee's informed consent, determination of the suitability of the subject for testing, an acquaintance test to establish a baseline to a known and deliberate lie, a structured interview (to review the examinee's background and the case facts and to obtain a detailed review of each issue of concern with an opportunity for the examinee to provide their version of all issues under investigation) and a review of the test questions to be asked during the polygraph examination (American Polygraph Association 2009).

Concerns about the CQT have been documented but it is used by 35 states in the United States to monitor sexual offenders in the community (Consigli 2002). Its use has also grown in popularity in the United Kingdom, being used within high-security psychiatric hospitals as part of identifying and addressing treatment needs (Ho et al. 2013). Despite persistent criticism over its use, accuracy estimates for the CQT have ranged from 74% to 89% and 59–83% for guilty and innocent examinees, respectively (Meijer and Verschuere 2010), suggesting that it has some clinical utility. Additionally, the National Research Council (2003), reviewing 37 laboratory and 7 field studies, showed a ROC of 0.85 and 0.89, respectively. These figures led the research panel to conclude that specific-incident polygraph tests can discriminate lying from truth-telling at rates well above chance, though well below perfection.

5.2 PCSOT

It is likely that the polygraph is so extensively used owing to its ability to provide fuller and more accurate information about an offender's history, paraphilic interests (including 'unhealthy' sexual fantasies) and offence behaviour, all of which can increase the reliability of risk assessment and thus the more effective planning of treatment so as to meet the needs of the individual (Emerick and Dutton 1993; English et al. 2000; Heil et al. 2003). However, the polygraph has not been used extensively in the United Kingdom due to the view of the British Psychological Society (2004) at that point in time that it lacked a valid theoretical underpinning and had limited evidence from research in the clinical setting.

In the United Kingdom, large evaluation studies of polygraph with sexual offenders in the community have been conducted. Initially (Grubin 2006 and 2010) conducted a pilot of voluntary polygraph testing across ten English probation areas. The results found that polygraph offenders were 14 times more likely to disclose information relevant to their treatment, supervision and risk assessment, compared with a comparison group of offenders who received standard supervision without a polygraph. It was noted that taking the polygraph was voluntary and therefore raising questions about motivation of those that chose not to take the test. It has been noted that the comparison group were not robustly

matched, and the time points for recording disclosures were not adequately matched either (Gannon et al. 2012).

In order to address some of these issues, a further pilot was undertaken. In 2012 Gannon et al., evaluated a mandatory polygraph pilot of adult sexual offenders on licence and under supervision by probation. Overall, the findings '*suggest that the polygraph increases the chances that a sexual offender under supervision in the community will reveal information relevant for their management, supervision, treatment or risk assessment*'. This is the only study found that has estimated the cost-effectiveness of polygraph and been used to recommend targeting the use of polygraph with high- or very-high-risk sexual offenders.

Therapists evaluating and/or treating sexual offenders need valid, reliable information from the sex offender (Abel and Rouleau 1990). Without this, the therapist is less able to identify the precise treatment needs of the patient (Abel and Rouleau 1990) and is less able to accurately manage risk (Wilcox 2009). However, it has been suggested that sexual offenders are extremely reluctant to disclose their offending histories (Blasingame 1998), thus making risk assessment and treatment provision extremely difficult.

It is widely acknowledged that past behaviour is the best predictor of future behaviour (American Polygraph Association 2009) and that the frequency of offending, the number of prior victims and the variety of unhealthy behaviours are all empirically linked to the risk of re-offending (Serin et al. 2001). As a result, it is vital that clinicians have accurate information on the offender's sexual history. Support for the use of the polygraph is helping to achieve this aim and has been provided by English et al. (2000) using an American sample. They found that post-conviction sex offender polygraph tests often identify new crimes and high-risk behaviours which were not previously known. Further, agencies in the United States that use the polygraph for post-conviction sex offender purposes reported that it greatly enhanced the number of disclosures made by the individual and that, as a result of this, it led to better management and supervision of the individual and more appropriate treatment (English et al. 2000). Some research has been conducted in the UK (Gannon et al. 2014; Grubin 2010) which has found similar findings in relation to increased disclosures for those undertaking a polygraph and offender managers reporting an increase in supervision or changing focus in supervision as a result of the disclosure made during a polygraph.

Research has consistently shown that the polygraph increases disclosures of the number of offences (Ahlmeyer et al. 2000; English et al. 2003; Wilcox 2002), the number of victims (Wilcox 2002; Wilcox and Sosnowski 2005), the range of paraphilias (Ahlmeyer et al. 2000; Wilcox and Sosnowski 2005), the age of offending onset (Wilcox 2002) and the number of high-risk behaviours (Buschman et al. 2010; Grubin et al. 2004) when compared to admissions through clinical interviews and file reviews. Additionally, the polygraph has been suggested to be effective as a 'truth facilitator' (Grubin 2002). Individuals can reveal information regarding their sexual history at three time points: when they are anticipating a polygraph examination, during the pre-test interview or during the post-test interview (once the polygraph examination has been conducted, an interview is conducted to discuss the results)

(Krueger 2009). It is not uncommon for subjects to disclose information prior to the actual examination (Abrams 1991; Blasingame 1998), possibly owing to fear of being found 'deceptive'. Further, Grubin and Madsen (2006), using a US sample of 176 sex offenders who had undergone a polygraph examination, found that 44% of individuals reported that they were more truthful with their probation officers than they otherwise would have been. Kokish et al. (2005) also found that the polygraph accurately identified truth-telling 92% and deception 82% of the time, suggesting that it is a reliable and valid instrument for use in post-conviction settings.

Crossover sexual offences are defined as those in which victims are from multiple age groups, multiple gender groups and multiple relationship categories (Heil et al. 2003). Typically, when offence crossover is disclosed, assigned risk level increases (Gannon et al. 2008). Thus, it is important that for risk assessment to be reliable, information regarding crossover offending be obtained. Abel and Rouleau (1990) have suggested that individuals with only one paraphilia are rather uncommon and that the majority of sex offenders have multiple paraphilic interests; thus, research needs to look into ways in which to increase the disclosures of such high-risk behaviours.

Research suggests that the level of disclosures about crossover offending increases as a result of a polygraph examination. For example, Heil et al. (2003) found that prior to the polygraph only 7.2% of the sample of inmate sexual offenders had both child and adult victims; after the polygraph however this rose to 70%. In addition, English et al. (2000) reported that the individuals studied reported mixed-gender victims only 10% of the time; post-testing this increased to 29%. Thus, the polygraph may not only be useful at increasing disclosures regarding sexual history, but this information may also be helpful in increasing our knowledge and understanding of the prevalence of crossover offending. Indeed, Cann et al. (2007) conclude that at least 25% of convicted sexual offenders in England and Wales sentenced to at least 4 years in custody have engaged in some form of crossover behaviour.

The vast majority of research conducted in the field of post-conviction polygraph testing with sex offenders has been conducted in community-based samples in the United States. Indeed, research on the use of the polygraph in such settings in the United Kingdom is extremely slim. Pilot studies have taken place (Wilcox 2002; Grubin 2002; Grubin et al. 2004; Gannon et al. 2012) but these have looked at community-based samples (i.e. individuals on probation or parole) and none have considered the use of the polygraph in other settings such as mental health.

Whilst there are several types of polygraph tests, there is much evidence to validate the use of post-conviction sex offender (PCSOT) tests. The sexual history examination (SHE) obtains a fuller and more accurate account of an offender's sexual history, including the range of unhealthy behaviours in which he has engaged, the age at which these commenced and any unidentified paraphilias (English et al. 2003; Grubin 2008). The information obtained from the SHE can assist in the tailoring of treatment for the offender in addition to providing an opportunity for a more comprehensive assessment of risk (Wilcox 2002, 2009). It is widely acknowledged that sexual offenders minimise the extent of their offending, unhealthy sexual behaviours and/or fantasies (Ahlmeyer et al. 2000; Blasingame 1998; Grubin 2009).

In spite of this, without valid, reliable and detailed information pertaining to historical and current behaviours, the treatment provided is likely to be insufficient in addressing and managing risk (Abel and Rouleau 1990; Wilcox 2009). As a result, polygraph testing has been introduced to validate sex offenders self-reports (Hindman and Peters 2001) and to facilitate the gathering of historical information pertinent to risk (Emerick and Dutton 1993; English et al. 2000; Heil et al. 2003; Kebric 2009), with many therapists believing that therapy cannot be conducted adequately without the polygraph (Abrams 1991).

It is likely that the polygraph is used due to its ability to provide fuller and more accurate information about an offender's history, paraphilic interests (including deviant sexual fantasies) and offence behaviour, all of which can increase the reliability of risk assessment and promote honest disclosure (Levenson 2009). The use of the polygraph as a 'truth facilitator' is extremely important as risk assessment remains an inexact science (Cortoni 2009).

Support for the polygraph as a truth facilitator has predominantly come from studies carried out in the United States and Canada. For example, English et al. (2000) found that PCSOT often identifies unknown crimes, high-risk behaviours and a broader victim profile. Additionally, McGrath et al. (2007), using a sample of 208 adult male sexual offenders, found that during the polygraph examination, 4.3% admitted having had contact with a victim and 15.7% masturbating to offence-related sexual fantasies. It was estimated that between 60% and 80% of these disclosures were not previously known, and 96% of service providers rated such disclosures as 'helpful' or 'very helpful' in informing treatment and supervision. Finally, Hindman and Peters (2000) compared polygraphed and non-polygraphed sexual offenders on disclosures relating to male victims. They found that 30% of the former admitted to having a male sexual offence victim, compared to 17% of the latter, and the total number of victims jumped from an average of 1.25–9 per person. Clearly without the polygraph this information would have remained unknown and untreated (Levenson 2009).

As described above, research has consistently shown that the polygraph increases disclosures of the number of offences (English et al. 2003; Wilcox 2002), the number of victims (Wilcox 2002; Wilcox and Sosnowski 2005), the range of paraphilias (Ahlmeyer et al. 2000), the age of offending onset (Wilcox 2002) and the number of high-risk behaviours (Buschman et al. 2010; Grubin et al. 2004) when compared to admissions through clinical interviews and file reviews. When considering the impact of such disclosures in a high-security psychiatric hospital, the potential of the polygraph examination increases dramatically. There are currently four high-security hospitals within the United Kingdom. One of their aims is to protect the public from individuals deemed to be a high risk of harm and who are identified as suffering from a mental disorder. Due to the risky nature of these individuals, it is imperative that supervision and treatment is tailored to the specific patient and that all risk factors are identified. In addition, this is a unique setting and unique population. Whilst research in this field is limited, there have nonetheless been suggestions that individuals suffering from personality disorder and psychopathy experience general physiological hypo-responsivity, making polygraph examinations difficult to conduct (Meijer and

van Koppen 2008; Verschuere and Ben-Shakhar 2011). Additionally, mentally disordered sexual offenders routinely engage in cognitive distortions, for example, perceiving children as wanting sex with adults. These cognitive distortions are likely to reduce feelings of guilt and anxiety, resulting in reduced detection during the CQT examination (Meijer and van Koppen 2008). As a result, it is surprising that the use of polygraph examinations within high-security psychiatric settings has not yet been researched in the United Kingdom.

Despite its perception as a 'lie detector', the polygraph as a 'truth facilitator' has gained much favour in the literature. For example, Grubin (2009) suggests that the disclosures that an individual makes are much more important than whether the individual 'passed' or 'failed' the examination, as 80% of all polygraphed individuals (regardless of whether they passed or failed the examination) disclosed additional information relevant to their treatment and supervision. Interestingly, Grubin et al. (2004) suggested that most information is disclosed during the pre-test interview, well before the sensors of the polygraph are actually connected. Additionally, Grubin and Madsen (2006) found that 44% of an American sample of sexual offenders reported that they were more truthful with their probation officers as a result of the polygraph, suggesting that it can increase honesty in treatment settings. Despite consistent findings to support the view of the polygraph as a 'truth facilitator', very few studies have considered the implications of such disclosures in formulating risk and treatment provision.

5.3 Ethical Issues and Conclusion

As previously discussed, the polygraph measures physiological changes associated with deception. It is now understood that these measures do not measure deception directly, as noted by Ben-Shakhar (2008), who added that physiological changes that are recorded may also be triggered by surprise, cognitive load, loud noises and fear of being classified as 'deceptive' when in fact the participant is not. The first three of these are controlled by the polygraph examiner by ensuring that the polygraph examination is conducted in a quiet room away from distractions and that the participant is made aware of all questions that will be asked during the test. The last of these confounding variables is invariably present in some participants; however, the use of the CQT enables a baseline of physiological responding to be established so as to limit the chances of 'false-positive' (when a truthful examinee is reported as being deceptive) and 'false-negative' (when a deceptive examinee is reported as being truthful) errors (Wilcox et al. 1999). Whilst these errors may still occur, the polygraph examiner ensures that a post-interview be conducted so that the results of the polygraph can be discussed with the individual.

Another area of criticism of polygraph has been the use of PLC questions and that they are manipulative in nature (Lykken 1981; Saxe 1991). The assumption made in these criticisms is that the polygraph is measuring lies, when in actual fact it records responses to stimuli, like many scientific tests (Nelson 2015). DLCs have been considered ethically more acceptable (Honts and Reavy 2009)

and have also been found to be effective with different languages and cultures (Nelson et al. 2012).

The polygraph is not without its critics, particularly with relation to field studies. Whilst they allow us to investigate real-world examples, they falter at their inability to establish ground truth. Without having a method which is independent of the outcome of the test, we are unable to accurately judge the reliability of the polygraph examination itself (Honts and Kircher 2011). Further, it has been suggested that the ability of the polygraph in obtaining new information is more related to its intimidating effect than its accuracy (Meijer and Verschuere 2010), with Matthews (2011) suggesting that deliberate disclosures are more dependent on the motivation of the offender than the polygraph itself. Finally, Grubin (2010) has raised the issue of the impossibility of teasing out the effects of the polygraph from the effect of treatment, as it may in fact be the latter which results in increased disclosures. As a result, the polygraph is rarely used in isolation, but instead forms part of a comprehensive assessment of risk and need (Levenson 2009).

Countermeasures are of concern to polygraph examiners and are behaviours which the individual may employ during the polygraph examination so as to distort the physiological responses to comparison questions (for example, by increasing the physiological responses to comparison questions so as to appear innocent) (Honts et al. 1994). Countermeasures can involve both physical (e.g. pushing toes to the floor) and mental (e.g. counting backwards from 7) (Honts et al. 1994). In reality it is extremely difficult to alter physiological responses on all relevant questions, but nevertheless, this is a concern for polygraph examinations. By employing the use of somatic activity sensors (such as on the seat, under the arms and feet during the polygraph test), both overt and covert physical activity is likely to be detected. The literature indicates that these sensors can increase the ability of the examiners to detect and observe such attempts at faking (Ogilvie and Dutton 2008; Stephenson and Barry 1986).

Mental countermeasures are much harder to detect. Some examples of mental countermeasures that have been studied include post hypnotic suggestion or stimulant medications. There has been mixed findings as to the effectiveness of such measures (Timm 1991; Ben-Shakhar and Dolev 1996; Waid et al. 1981). Other countermeasures employed may involve sleep deprivation, physical exhaustion, meditation or mental activity.

Despite this area being of concern to polygraph examiners, little research has looked into the employment of countermeasures with contemporary testing procedures or the effect on the accuracy of the tool.

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