Psychophysiological methods in lie detection

It has been widely acknowledged that there is a link between the physiologies of the body in connection to psychological thought responses in individuals. Psychophysiological methods measure these physiological changes, which include; facial expressions, pupil dilation, voice frequency, heart rate, breathing patterns, skin conductance, and changes within the brain (Andreassi, 2000). This essay will explore and assess the usefulness of two key psychophysiological methods; the polygraph that measures body signals, and the fMRI that measures brain signals.

Since the late 1800s, psychophysiological methods have been implemented to detect lies. The first methodological instrument to detect lies was an early version of the polygraph, and was created by Lombroso in 1885. Initially, polygraph instruments simply measured blood pressure, yet contemporary polygraphs measure a number of physiological responses such as; respiratory rate, blood volume, pulse rate and galvanic skin response (Lykken, 1998). The polygraph, which is usually referred to as a lie detector test, measures the physiological responses whilst asking the individual a series of questions. It is the most widely known psychophysiological method used by governments to detect lies. However, only the USA, Japan and Israel use it for interrogation of criminal suspects, and for assessing employees undertaking certain sensitive private sector roles in organisations. Although commonly used in the USA, suspects and employees cannot be compelled to take the test, and similarly with other European countries that do not use the polygraph, an individual’s common knowledge of their human rights and the country’s right to exercise this prevents the practice of polygraph testing,

whereas in Japan and Israel, the right to exercise these human rights can be extremely limited (Vrij, 2008).

The two main questioning techniques implemented within the polygraph test are the control question test (CQT), and the guilty knowledge test (GKT). The control question test is the most commonly used technique alongside the polygraph to detect lies from suspected criminals. It initially asks the individual a series of baseline questions that can give a simple yes/no answer, and the interviewer is aware of the known correct answers. For example, a baseline question may be ‘ is your name Brandon?’ During responses to the baseline questions, the individual’s physiological responses are recorded as reliable indicators of truth. The next stage in CQT asks the individual questions relating to the crime. The physiological responses to these questions are compared alongside the results of the baseline questions. The theory is that deceptive answers will produce physiological responses that differ from non-deceptive responses. As a consequence, the CQT aims to detect lies by analysing these two responses (Ben-Shakhar, 2002).

Alternatively, the general knowledge test (GKT), developed by Lykken (1998) does not claim to detect lies but measures orienting reflexes. An orienting reflex occurs when an individual is confronted with a personally significant stimulus. Orienting reflexes result in physiological responses which are measured through the polygraph. In this test, a series of questions are asked describing alternative facts surrounding the crime the individual is accused of. For example, the individual is asked to say ‘ no’ to every question that is presented to them. They are shown different knives, one of which is the knife

used in the crime. As long as information surrounding the crime scene has not been leaked, only the guilty individual of a crime will show an orienting reflex to the specific knife that was the murder weapon, as it represents a personally significant stimulus (Vrij, 2008).

With regards to the CQT, there a number of flaws. Firstly, baseline questions are such that there is no concentration required to answer them, so the individual may be thinking about numerous other events, objects or people, which could be the stimulus for their recorded baseline physiological response. This would hamper the results and make the process void. Similarly, the difference between the two physiological responses; baseline answers and crime-related answers, may not reflect deception, but may reflect other emotions such as anxiety, surprise or stress (Ben-Shakhar, 2002). An innocent individual, when asked about the nature of a crime will elicit a different physiological response from their baseline questions, due to the explicit details of the crime. Fear of being falsely accused and bearing the consequences of this error, is one aspect that may cause strong reactions to the questions relating to the crime, and this physiological response may indicate to the interviewer that this innocent person is guilty (Honts and Perry 1992).

Similarly with GKT there are criticisms, including that it cannot be implemented when the individual being tested does not claim a lack of knowledge. For example, in a rape case the suspect admits sexual contact but claims that consent was given (Vrij, 2008). Likewise, Raskin (1988) demonstrates the example of several suspects admitting that they were involved in a crime, yet all denied to be the chief perpetrator. Also the British

Psychological Society review (2004) suggests that individuals who claim to be witnesses of a crime, but negate involvement would also invalidate the GKT. This invalidation would occur in all three examples because they all readily admit knowledge of the crime/crime scenes, so it is extremely likely that they would produce the same physiological response to the individual who was the guilty perpetrator of the crime. Thus the interviewer could not decipher guilty parties from innocent parties. Additionally, the GKT interviewer needs to know specific details of the crime/crime scene in order to generate appropriate questions that this questioning technique demands (Vrij, 2008).

Since the 1970s, there have been several criticisms of the scientific validity of both these questioning techniques. Primarily, there is “ No known physiological response or pattern of responses unique to deception” (Raskin, 1986 p. 31). The general consensus is that there is no specific physiological response to lying that encompasses all individuals. As a result, bodily signals to detect deception may not be as useful as brain signals. This has led to the exploration of functional magnetic resonance imaging (fMRI) of the brain as a component for the detection of lies.

The fMRI approach to detecting deception has been argued to yield greater accuracy than the techniques of the polygraph, but this technique is still in the early stages of being developed so that it can be used within criminal and employment contexts. Changes in cerebral blood flow and oxygen consumption in the brain are measured with the fMRI scanner. These changes are associated with neuronal activity, and these patterns may indicate when an individual is lying or attempting deception. Recent research

groups have devised methods that they claim show identification of brain activity patterns that are consistent when the individual is lying. These studies included offering cash incentives if the participant could deceive the experimenter, in order to enhance their emotional state and achieve conditions parallel to that of a guilty criminal (Kozel et al, 2004). fMRI scanning detects the relative changes in brain blood flow and oxygen consumption between two conditions (Simpson 2008). For example, the participant “ must construct a new item of information (the lie) while also withholding a factual item (the truth)” (Spence et al, 2004, p. 1757). Studies have shown that areas of the pre-frontal cortex exhibit a greater activation when lying than when telling the truth (Spence, 2008).

Because this approach does not just measure autonomic arousal like the polygraph, fMRI scanning may be more useful as a technique to detect deception. Proponents of this technique, state that observing the locus of deception in the brain is more accurate than bodily signals of deception (Simpson 2008). However, contrasting studies reveal that no specific brain region (e. g. the pre-frontal cortex), cannot be measured to accurately detect deception for all individuals (Monteleone et al, 2009). Moreover, any data collected can take several hours to analyse; as a result this technique is both time consuming and expensive in terms of staff required, and adding to the fact that each machine is extremely costly. In addition, any head movement from participants whilst in the fMRI machine can undermine data. To avoid this, individuals are strapped down, which can cause added discomfort and stress, on top of the fact that they are in an alien, claustrophobic environment. This environment is also extremely noisy when the machine is

in use, resulting in difficulties of communication between participant and interviewer, ensuing with the participant having to respond to visual stimuli by button pressing (Spence, 2008). In summary, fMRI scanning is “ difficult to apply in real life.... and would only be worth it if they exceed accuracy levels which are achieved with traditional methods that are easier to apply” (Vrij, 2008, p. 366).

In conclusion, psychophysiological methods do elicit certain merits, however they cannot definitively detect lies. Although a link between the physiologies of the body in connection to psychological thought responses in individuals has been established, it is still unclear as to how foolproof this link is in relation to differentiating the truth from lies. Whilst the polygraph is the most widely used psychophysiological method used to detect lies, it clearly has underlying ethical issues and cannot account for numerous variables that may occur when individuals are tested in certain conditions. Both the CQT and the GKT share a number of flaws, which undermine their usefulness, but at the same time it can be understood why they are still implemented; due to the fact that there is no other viable replacement at this moment in time. The use of fMRI scanning to detect lies has been considered, as brain signals are perceived as truer representations of deception than bodily signals. However, not only do researchers struggle to pinpoint the brain activation site of deception, they also face immense economic and practical downfalls with the future application of this technique. Thus, the need for continued experimentation and research of psychophysiological methods is essential to attain a more accurate and reliable source that can be used to detect lies.