How reliable is the galvanic skin response (gsr) as a ‘lie detector’?

The Galvanic Skin Response (GSR) is ‘ a change in the electrical properties of the skin’ (Sharma, Kacker and Sharma 2016, p. 13) and measures changes in the conductance of the skin produced by sweat glands, especially on the palms and soles of feet (Engler, Lloyd, Martin-Koob and Naze, 2011). The skin conductance level can act as an initial base level, from which feedback instruments can measure the GSR using copper electrodes. The psychogalvanic reflex is an unconscious response to a stressful stimulus and is controlled by the sympathetic division of the autonomic nervous system (Sharma, Kacker and Sharma, 2016).

The body has several physiological responses to the stress caused by lying, such as an increase in GSR, heart rate and respiration, due to the release of hormones in the adrenal gland (Engler et al., 2011). These reactions are caused by the fight-or-flight response to a stressor in the environment and are the kind of results expected on a polygraph test (Handler and Honts, 2007). If a person is lying their skin resistance is lower, due to the production of more sweat, and their hands are colder (Villarejo, Zapirain and Zorrilla, 2012). These physiological responses can, therefore, be measured and used as a form of ‘ lie detection’. The GSR is a key component in the physiological measurement of arousal in response to both critical, neutral and control questions in polygraph tests, as a means of indicating if someone is telling the truth.

Two key theories explain the physiology of the GSR; vascular and secretory (Lader and Montagu, 1962). The vascular theory suggests GSR is caused by changes in the tone of blood vessels in the skin. Whereas the secretory theory proposes the GSR is due to changes in the secretory activity of the

sweat glands. The second theory carries more weight, with Lader and Montagu (1962) finding the psycho-galvanic reflex is due to pre-secretory activity in the sweat glands, and not vasomotor activity.

There are two levels of GSR which can be measured to indicate deception. The resistance level is the static level between two electrodes of a circuit, but a temporary change in the resistance level can be caused by the presentation of a stimulus that prompts a stress response. There is usually a lowering of the resistance level in response to an emotion-provoking stimulus, with a lower resistance level indicating a smaller GSR (McCleary, 1950).

There is some criticism of using GSR as a ‘ lie detector’, with research finding polygraph tests are only accurate about 65 percent of the time. It has also been found there is a 50 percent chance an innocent person will fail the test and be viewed as deceptive (Lykken, 1984). It is thought the anxiety caused by undergoing a lie detector test, even when you’re being honest, can result in similar readings seen in a guilty party. It is unclear whether the stress response that is detected using the polygraph test, such as a change in GSR, is uniquely indicative of lying or if this same response can be produced for other reasons. This evidence, therefore, undermines the reliability of using GSR as a ‘ lie detector’, and by extension the use of lie detection tests through physiological measures.

Atkinson et al., (1993) suggest using GSR as a ‘ lie detector’ has poor reliability as people who are frequent liars may show little arousal to the behaviour, and so wouldn’t display the typical physiological reactions one

would expect to find in a person who is lying. Furthermore, a subject who has undergone a polygraph test several times in the past may be able to create baseline results which are similar to reactions to the critical questions, therefore skewing the results of the lie detector test and making the GSR a less reliable measure of deception. This could be done by tensing their muscles during neutral questions to prompt a spike in the polygraph results, or by thinking about something exciting, this will prompt a change in GSR and heart rate that would typically indicate deception (Atkinson et al., 1993). This shows how the ‘ automatic’ change in GSR due to the arousal caused by the stress of lying, could be manipulated by subjects, making this method of lie detection less reliable.

The inter-rater reliability of polygraphs, using GSR, has also been called into question as there is a large degree of variability in the conduction of these tests. Every subject responds to stressful situations differently and the way the questions are asked, as well as what questions are asked, can have an impact on how reliable the polygraph test itself is. Different examiners could give two varying interpretations of the polygraph results, with one determining the subject is lying due to the results, whilst another could decide the subject is being truthful and there are no marked changes in GSR, or other factors like breathing rate (National Research Council, 2003). It is also important to note that up to three times a minute there are random natural spikes in GSR (Engler et al., 2011), these changes may be misinterpreted by examiners as being a response to a critical question that could indicate deception. This inconsistency in the conclusions of polygraph tests means the method of using GSR as a ‘ lie detector’ may be unreliable.

Due to these concerns polygraph tests results, including where GSR is an included measure of arousal, has caused controversy over whether they should be admissible in court (Saxe, Dougherty and Cross, 1985). This demonstrates how unreliable these methods are in lie detection. Research has indicated there are no physiological responses or combinations of responses, that can determine alone how truthful a subject is (Gallai, 1999). Therefore, after considering the literature and empirical evidence of GSR and its physiological basis, GSR can be concluded to be fairly unreliable as a ‘ lie detector’. However, it can still be beneficial in giving an initial indication that the body is under stress possibly due to lying.

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