

6. THE PATTERNING OF PHYSIOLOGICAL RESPONSES

The conventional polygraph, with its three physiological indicators, obviously can be used to detect deception more accurately than would occur by chance alone. The reported accuracies are rarely below 75 percent and sometimes approach 100 percent. Two factors which probably influence a major portion of this variability are the procedures used by the examiner and the physiological responsiveness of the person being tested. Let us first consider the latter problem.

The three indicators used in the standard polygraph (breathing pattern, cardiac pattern, and GSR) measure only a few of a large number of known, autonomic response mechanisms. Measurement of autonomic responses is desirable because they are not primarily under the direct, voluntary control of the person being observed, even though some such influence is possible—more so for breathing and less so for the GSR. Activity of the autonomic nervous system can be measured by at least the following physiological responses:

Galvanic skin response	Blood volume in forefinger, leg
Breathing:	Blood oxygen saturation
Pattern of response	Skin temperature
Amplitude	Muscle tension potentials
Rate	Hand and finger tremors
Time	Eye movements
Vascular response:	Pupil diameter
Systolic blood pressure	Gastrointestinal motility
Diastolic blood pressure	Electroencephalograph
Pulse rate	Ballistocardiograph
Pulse time	Salivation
Pulse wave velocity	
Volume pulse	

This list could be extended and also replicated because there often are several ways to measure each physiological response. For example, there are at least four different ways to measure the GSR:

- Skin conductance.
- Log conductance.
- Skin resistance.
- Log resistance.

At the outset, it is important to realize that the autonomic responses are not necessarily highly correlated with each other. That is, even though all of these response mechanisms are influenced by the autonomic nervous system, the influences are not identical. Some mechanisms show large responses while others, at the very same time, show little response. Two mechanisms which show a large, initial response to an emotional stimulus may not adapt (i.e., return to their initial levels) at the same rate.

A wide range of physiological responses have been studied in connection with psychosomatic medicine, physiological correlates of personality, medical diagnosis, the measurement of anxiety states, and psychotherapy. In these areas of research, many studies may be found which clarify some of the problems encountered in the practice of lie detection.

Some investigators, such as Ax (1960), Wenger (1961), Malmo (1950), and Lacey (1958c) have measured simultaneously up to ten physiological variables and have evaluated the results in accordance with objective criteria. Methods for the simultaneous recording of up to 29 physiological processes and for automatic data reduction systems have been described by Ax (1960), Zimmer (1961), and Clark (1961).

According to Lacey (1958c), individuals exhibit idiosyncratic patterns of physiological response which tend to be repeated in various stress-evoking situations; six variables were measured. If such individual consistency is confirmed, physiological responses in emotional states would have to be interpreted on an individual, rather than on a general basis and a significant change introduced in lie detection procedures. Wenger (1961) measured eight autonomic responses in four different emotional situations. Although stable response specificity and stereotype occur to some degree, they are interpreted by Wenger as

galvanic skin response because of the impossibility of determining the source of galvanic skin response reactions. Others use the galvanic skin response as an aid but ignore it when its excursions conflict with the pneumograph and cardiosphygmograph patterns."