

usually unaware of any emotional disturbance. There are no obvious respiratory, vascular, or cutaneous responses which can be used as an index of response. In rare cases, where the emotion is deep or excites violent reaction, there may be increased depth of breathing and increased pulse and respiratory rates. This is demonstrated in Table I. During the height of the reaction the alveolar CO₂ concentration was lowered from 5.49% to 2.95% ; the pulse rate increased from 78 per minute to 90 per minute ; the respiratory rate also increased. Changes such as these are not easily induced in normal subjects ; they do not compare in simplicity, reliability, or effective standardization with electromyographic recordings.

The value of the method in clinical diagnosis must depend upon the development of a systematic technique and this paper does not attempt to assess its status in relation to other psycho-diagnostic techniques. It is not a measurement of personality though it may help to determine certain hidden aspects of the personality. In Fig. 6 reactions are shown to random-spaced stimulus words which were clearly associated without any conscious control by the subject. The method has been limited to emotional states in normal subjects, and further experiments applied to abnormal populations may reveal useful information. Interpretation of the tracings requires no particular skill and is devoid of complexities of data, mathematical calculations, or conflicts arising from the personality of the examiner. The validity of electromyographic responses need not be questioned as they are based on recognized physiological principles concerned with the functional activity of skeletal muscle. The results of the

present experiments indicate, therefore, that physiological tension in muscle is increased in emotional states and this tension can be recorded by electrical means. It remains for further experiment to determine the relation between the central mechanisms involved in mental activity and the peripheral muscular response. Such experiments should help to elucidate the neurophysiological basis of many concepts of function associated with emotion.

Summary

A method is described for recording emotional responses in normal individuals. Leads are taken from the temporal muscles. In relaxed subjects an electroencephalogram is recorded, but with appropriate stimuli ; an electromyogram is superimposed on the tracing.

The degree of response is related to the frequency, number, amplitude, and duration of muscle action potentials.

Conscious control by the subject is minimal and insight may be gained into hidden aspects of personality.

The reliability and validity of the method are indicated and its value in diagnosis and research discussed.

REFERENCES

- Adrian, E. D., and Bronk, D. W. (1929). *J. Physiol.*, 67, 119.
 —, and Matthews, B. H. C. (1934). *Brain*, 57, 355.
 Davis, F. H., and Malmö, R. B. (1951). *Amer. J. Psychiat.*, 107, 908.
 Forbes, T. W., and Andrews, H. L. (1937). *Science*, 86, 474.
 Hoefler, P. F. A. (1941). *Arch. Neurol. Psychiat. Chicago*, 46, 947.
 Liberson, W. T. (1945). *Dig. Neurol. Psychiat.*, 13, 594.
 Lundervold, A. (1952). *J. nerv. ment. Dis.*, 115, 512.
 Luria, A. R. (1932). *The Nature of Human Conflicts, or Emotion, Conflict and Will*. Liveright, New York.
 Peterson, F., and Jung, C. G. (1907). *Brain*, 30, 153.
 Ruesch, J., and Finesinger, J. E. (1943). *Arch. Neurol. Psychiat., Chicago*, 50, 439.
 Weddell, G., Feinstein, B., and Pattle, R. E. (1944). *Brain*, 67, 178.

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