

## A METHODOLOGICAL NOTE ON PSYCHOPHYSIOLOGICAL STUDIES IN PARAPSYCHOLOGY

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The search for psychophysiological measures related to the psi process has recently been the center of much interest in parapsychology. (For a review, see Beloff, 1974.) Studies have been reported relating performance on various types of psi tasks to physiological measures both within and between subjects. This note is not meant to discuss the findings or merits of such studies, but rather to discuss a methodological factor present in some of this type of research.

Specifically, the point to be made here concerns experiments investigating possible relationships between psi performance and physiological activity using within-subject designs. In some cases, a correlation (or equivalent statistic) is made between psi scores and corresponding physiological measures without considering possible artifacts due to chronological trends in both factors. The reality of this potential artifact came to the author's attention in some unpublished work investigating trial-by-trial psi performance and frontalis EMG (electromyographic) activity. One subject showed a significant correlation, but the other nine did not. Further investigation revealed that an apparent decline in psi performance in the session had interacted with an incline in EMG activity to produce the significant correlation. However, a continuous increase in EMG activity, or EMG gradient, is a common reaction to some tasks if the subjects are motivated (Goldstein, 1972). Other subjects had shown the EMG gradient in this task, but no psi ability. Since the significance was due to monotonic trends rather than measures rising and falling together, the interpretation of a meaningful relationship between psi and EMG activity seemed questionable.

The possibility that similar trends may produce significant but not meaningful correlations is always a problem when using correlation (or equivalent) statistics with chronological data. However, particular caution is needed when investigating psychophysiological correlates of the psi process. Declines in psi performance are common

and can occur over trials, runs, and sessions (Rao, 1966; Thouless, 1972). Likewise, chronological psychophysiological trends can occur in response to many tasks. The EMG gradient is a common effect if the subject is motivated to perform well on the task. However, if the subject finds the task boring or becomes drowsy, a decline in EMG activity is expected. Chronological trends within the session have also been noted in EEC studies and have been discussed as possible artifacts in studies of alpha activity (Brolund & Schallow, 1976; Lynch & Paskewitz, 1971). The mental and physical activities required by the task, as well as the subjects' responses to the experiment (e.g., motivation, apprehension, novelty, boredom, etc.) can produce chronological trends in most physiological measures. Also, artifacts such as body movements and fatigue may enter into the situation. The possibility of such trends needs to be considered over the relevant time periods whether the analysis is between trials, runs, or sessions.

If a significant relationship between psi performance and physiological processes in a within-subject design is due to monotonic trends, interpretation becomes difficult. The trends *may or may not* be due to the same causes. Specification of the underlying factors is complicated by the present lack of understanding of the relationship between psychological and physiological processes. For example, the much publicized ideas of "alpha state" and alpha learning have recently received widespread criticism (Brolund & Schallow, 1976; Prewett & Adams, 1976; Walsh, 1974; Lynch & Paskewitz, 1971). In general, fundamental variables such as the subject's expectancy and level of arousal are very difficult to measure and control (Johnson & Lubin, 1972).

With our present level of knowledge, it seems very possible that both psi performance and various psychophysiological measures may at times show monotonic chronological trends that are not meaningfully related. At present, confident interpretation can be made only when the variables can be shown to rise and fall together. As a step toward more confident interpretation—and hopefully more consistent findings—it should become standard procedure to check for chronological trends in both psi performance and physiological measures. When such trends occur, further research is needed before a convincing interpretation can be made.

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