

Do the participants matter? Measuring individual differences over and above experimental manipulations

Human Factors Engineers and experimentally oriented social scientists tend to ignore individual differences and may miss important findings. The goal of Human Factors is to optimize systems to fit the needs users. However, users are not considered at the individual level, but rather at a coarser level, such as the human cognitive system. Traditional human factors research does not consider variation from individual differences, but attributes variation to cognitive differences between treatments. By attributing individual differences to noise, researchers can not rule individual differences out as a contributing factor of the results.

The goal of this work is to show how individual differences can be measured and influence findings in Human Factors research. Forty-two participants performed three trials of a computerized VCR programming task in which they entered information about a television show into a VCR interface on the computer. While performing this task, the VCR task was interrupted three times and replaced by a pursuit-tracking task. Root Mean Square Error (RMSE) data was collected from the tracking task providing an individual measure of tracking performance. A generalizability analysis including trial number, interruption number, and subject was performed on the tracking data to determine the source of RMSE variance. It was found that 31% of the variance in the RMSE was attributable to the subject variable and thus to individual differences, while 0% and 3% of the variance in the RMSE was attributable to experimental manipulations of session number and interruption number respectively.

This finding suggests that areas of experimental psychology, such as Human Factors, should include and account for individual differences in their experimental analysis. By including individual variance in data analyses, we, as scientists, will be better able to understand the mechanisms of observed effects, thereby improving our theories and quality of work.