

Anomalous psychophysiological baseline effects in research using randomized emotional and control events.

Dick J. Bierman, Starlab Research Labs, Brussels, Belgium, Uni. of Amsterdam

In experiments on the effect of emotional and control events on psychophysiological variables, the value of these variables preceding the events is used as a baseline to be subtracted from the response value. The underlying assumption is that the value of this baseline is independent of the future stimulus condition (emotional or control). This should clearly be the case if the events are properly randomized. However Radin and also Bierman (1999) reported that in independent experiments mean baseline differences were found preceding emotional and control events. These experiments utilized a simple protocol in which the events were randomized with replacement. Simulations of subject's anticipation strategies did show that small differences could be expected only when randomization without replacement was used. When proper randomization was employed any strategy failed due to the gambler's fallacy as was confirmed by simulations. So the source of these differences in mean baseline values remained a mystery. In order to exclude systematic methodological errors the published literature was explored to find experiments that used randomized emotional and control events and for which baseline data were available for at least 3 seconds preceding the event. Two such experiments were found. One was one of the famous card-guessing experiments by the Damasio group (see Bechara et al, 1997) and the other an experiment on the speed with which fear arises in phobics (Globisch et al, 1999). In both experiments differences in the predicted direction were found before the emotional and the non (or less) emotional events. The Stouffer z-value for the two studies combined was significant ($z=2.15$; $p < 0.02$ one-tailed). The differential effect preceding the stimulus was about 10% in the animal fear study and about 30% in the gambling study.

Both studies used randomization without replacement. Simulations show that, depending on the subjects' anticipatory strategy, baseline differences of only about 1-3% can be explained by this mechanism. It is concluded that the baseline differences preceding emotional and control events seem to constitute a true anomaly.

Bechara, A., Damasio, H., Tranel, D., Damasio, A. R. (1997). Deciding advantageously before knowing the advantageous strategy. *Science*, **275**, 28 February 97, 1293-1295.

Bierman, D. J. & Radin, D. I. (1997). Anomalous anticipatory response on randomized future conditions. *Perceptual and Motor Skills*, **84**, 689-690.

Globisch, J., Hamm, A.O., Estevez, F., and Öhman, A. (1999). Fear appears fast: Temporal course of startle reflex potentiation in animal fear subjects. *Psychophysiology*, **36**, pp. 66-75.