Introducing Neurophysiological Methods For Sport Management Science

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Aim

The aim of this project is to introduce neurophysiological methods to the field of sport management. Specifically, we introduce and use the electroencephalography (EEG) event-related potential (ERP) method. We argue that the EEG ERP measure is the most feasible tool for sport management scholars seeking to expand the methodological and theoretical boundaries of the field.

Literature review

All psychometric measures are subject to common methodological biases when cognitive processing and demand characteristics can affect one's response (Podsakoff, MacKenzie, Lee, J.-Y., & Podsakoff, 2003). Neuroscience methods, however, can provide objective measures of one's response which he/she cannot cognitively report. Also, neuroscience methods are superior to general physiological measures in that, a physiological measure such as heart rate can detect one's emotional arousal but cannot identify its valance (i.e., whether it was a positive/negative response), while previous research indicates neurophysiological methods can be used to detect emotions at either end of the spectrum.

Compared to other neurophysiological methods (e.g., fMRI; PET; MEG), EEG is the most cost effective method and therefore feasible for small sport management research laboratories (Dickter & Kieffaber, 2014). For example, it would require millions of dollars to establish a PET or fMRI laboratory while an EEG laboratory could be set up with less than a one-tenth of that amount. Among the many EEG techniques, in this study, we demonstrate the ERP method to measure sport consumer response.

ERPs can provide unique insights in complement to the findings of EEG recordings. A body of research has demonstrated that rewarding stimuli elicit greater relative left, versus right, frontal activity, indicative of motivation to approach a given stimulus which is also reflective of greater positive affect (Harmon-Jones, Gable, & Peterson, 2010; Lee, 2014). These and similar results have been further explored by consumer researchers and neuroscientists alike, resulting in a unique field of inquiry known as decision neuroscience, to investigate precise neural mechanisms by which consumers decide to engage in certain buying behaviors.

Methods

The current study intends to expand the research on sport involvement utilizing EEG to examine affective processing in highly involved and low involved sport spectators. Participants were divided into two groups based on their level of basketball involvement. The highly-involved participants were identified as those with experience playing varsity basketball while the low involved participants were identified as those who do not claim to be basketball fans. A series of affective stimuli, specifically dunk shots from a professional basketball league, were presented to the participants while their brain wave activity was recorded using EEG.

An ANOVA design was used with involvement level being the between subjects variable. Participants were 30 right handed young men aged between 18 and 32 (M = 24.77; SD = 4.70). The dependent variables of interest were the ERP brainwave responses to the affective stimuli.

ERPs were measured by 16-channel EEG electrode sensors. The EEG magnitude in the alpha band on the left and right anterior cortex was the specific hemispheric specialization of interest. The P3 wave of F3 and F4 area was the ERP component of interest. Lateralization was computed by subtracting right frontal amplitude from left frontal amplitude. A sport involvement scale, developed by Beaton et al. (2011), was used to check the assigned conditions of highly involved and lowly involved groups.

Results and discussion

Consistent with the goal of the between-groups assignment, the highly involved group showed higher scores in the summated sport involvement scales and intentions to attend future games ($ps < .01$). Results of an ANOVA showed a significant difference ($F [1, 18] = 11.13$, $p < .01$) of lateralization across groups. Brain response to a skilled athlete performance were greater in the high involvement group compared to the low involvement group.

The use of EEG within the current study is an improvement upon previous similar studies due to the ability of EEG to gauge real-time objective measure of participant responses to sport-related imagery. This measure is especially helpful in predicting consumer behavior because it can yield information the participants themselves may be unaware of (i.e., subconscious information). The utility of real-time physiological measures is not limited to research contexts but can be highly advantageous in practice as well. In addition to providing marketing professional with information about consumers' views and preferences they cannot verbalize, these measures can use this insight into consumers' emotions to strengthen marketing/branding strategies and narrow the focus of such efforts to more effectively engage the consumer. Further implications of the findings, limitations, and directions for future research will be discussed in the presentation.

References

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