Journal of Economic Psychology 31 (2010) 785–793

Contents lists available at ScienceDirect

Journal of Economic Psychology

journal homepage: www.elsevier.com/locate/joep

Application of frontal EEG asymmetry to advertising research

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ARTICLE INFO

Article history:
Received 16 December 2008
Accepted 11 August 2009
Available online 28 April 2010

JEL classification:
M370

PsycINFO classification:
2229
2560
3940

Keywords:
Biometric consumer research
Frontal asymmetry
EEG
Advertising
Copy testing
Brain waves
Neuromarketing

ABSTRACT

The aim of the study was to identify frontal cortex activation in reaction to TV advertisements. We compared three consecutive creative executions of the world-famous Sony Bravia ads (“Balls”, “Paints”, and “Play-Doh”). We were looking for left hemispheric dominance, which according to the adopted theoretical model, indicated approach reactions of respondents to incoming stimulation. We ha ve found that dominant reactions were present only in response to one of the tested ads – “Balls”. Target group respondents reacted in such way to *emotional* part of the ad, as well as to its *informational* part (including product-benefit, product, and brand exposure scenes). No similar pattern was found for the remaining two ads. It yields a conclusion that frontal asymmetry measure may be a diagnostic tool in examining the potential of advertisements to generate approach related tendencies. We believe that methodologies based on measuring brain waves activity would soon significantly enrich marketing research portfolio and help marketers to go beyond verbal declarations of their consumers.

1. Introduction

Marketers are more and more skeptical of using only verbal measures to pre-test TV advertisements because of their limitations in providing an effective measure of internal reaction to external stimuli. The affect that consumers experience also cannot be adequately measured by self-reported verbal indicators, due its complexity and non-propositional structure (Davidson, 2004; Panksepp, 1998; Zajonc, 1980). Respondents tested using self-reported verbal measures are also more likely to give socially acceptable answers or not contemplated feedback (Nighswonger & Martin, 1981). Furthermore, many non-volitional and almost reflexive aspects of consumer behavior have not been fully emphasized in psychological measurement (Bargh, 1996; Cacioppo & Berntson, 1992; Cacioppo, Tassinary, & Berntson, 2007). Consumers may still have a “feeling of knowing” experience, even though they cannot trace a clear memory by verbal measures. Frequently unconscious processes may influence human functioning.(Berridge & Winkielman, 2003; Braidot, 2005; Kenning, Plassmann, & Ahlert, 2007; Ohme, 2007; Zajonc & McIntosh, 1992; Zaltman, 2000, 2003). In addition, scientific research indicate that our

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doi:10.1016/j.joep.2010.03.008

"conscious window" starts to be fully opened in ca. 300 ms after the stimuli, what means that most events below this threshold which are registered by our brain cannot be reported verbally (Libet, 2004). However, there is compelling evidence that some psychological processes, particularly those which occur beyond our conscious awareness, could be better understood by analyzing the consumer's brain and body responses, what in result points to utilizing different neuroscientific approaches to handle with this challenge (Ambler, Braeutigam, Stins, Rose, & Swithenby, 2004; Bechara, 2004; Damasio, 1994; Kenning et al., 2007; Ohme, 2003; Posner, 2004; Smith & Kosslyn, 2007).

2. Theoretical overview

2.1. Neurophysiologic measures to enrich marketing research

In the domain of psychologically supported marketing research, an experimental study using neurophysiological techniques usually starts with an intention to examine consumers' cognitive or affective processes in response to prefabricated marketing stimuli. These cognitive or affective processes, separately or jointly, serve as psychological antecedents to a variety of neurophysiological consequences produced by the human nervous system. Combining different physiological measures, such as EEG with peripheral GSR or EMG measures, it is now possible to offer cross-validation for the effects of external stimuli on consumers' psychological responses (Berman, Jonides, & Nee, 2006; Cacioppo & Berntson, 1992; Ohme, Reykowska, Wiener, & Choromańska, 2009).

Despite the fact that in the last decades several authors have investigated the capability of using the technology of measuring brain waves (EEG but also its modification such as SST-steady state topography) to understand the bases of processing of commercial messages, the number of relevant and acclaimed scientific studies is rather scarce (for review see: Wang & Minor, 2008). Most of this research was focused on investigating memory (Rossiter, Silberstein, Harris, & Nield, 2001; Silberstein, Harris, Nield, & Pipingas, 2000), attention (Smith & Gevins, 2004) and emotional processes (Kemp, Gray, Eide, Silberstein, & Nathan, 2002) and to asses predictive value of obtained results in the light of marketing practices and/or theories. In addition, there is also research using EEG (in event-related potential methodology) not only to dynamic but also static marketing stimuli e.g. studies of brand extension issue (Ma, Wang, Shu, & Dai, 2008; Zhang, Wang, Li, & Wang, 2003). We believe that the frequency of EEG application to advertising research will grow rapidly; as today, we possess technological and computational capabilities sufficient to perform most sophisticated experiments. Due to unsurpassed high time resolution of milliseconds (Nunez & Srinivasan, 2006) we have an opportunity to detect very small changes in commercial stimuli, which in turn can prove to have substantial effect in terms of marketing efficacy (Ohme et al., 2009).

2.2. Frontal asymmetry as an indicator of approach-withdrawal tendencies

A large body of research on the relation between emotion and motivation has postulated the existence of two overarching motivational systems that organize behavior. One system involves behavior prompted by a possible desirable outcome, whereas the other involves behavior prompted by a possible aversive outcome. Davidson, Schwartz, Saron, Bennett, and Goleman (1979) proposed a similar model linked to research on frontal electroencephalographic (EEG) asymmetry during emotional states. He proposed that the left frontal cortex (PFC) is involved in a system facilitating approach behavior, whereas the right PFC is involved in a system facilitating withdrawal behavior from aversive stimuli. Using EEG measures to index ongoing frontal brain electrical activity during the processing of different affects, Davidson and Fox found substantial empirical support for the model in adults and infants (for review, see: Davidson, 1993; Davidson & Rickman, 1999; Fox, 1991).

To explain frontal asymmetries for valence emotional processing, the Davidson's model assumes that processing related to emotional valence itself is not lateralized in the PFC. Rather, emotion-related lateralization is observed because emotions contain approach and/or withdrawal components. Therefore, emotion will be associated with a right or left asymmetry depending on the extent to which it is accompanied by approach or withdrawal behavior (Davidson, 1993, 2004). Subsequently, Davidson, Marshall, Tomarken, and Henriques (2000) hypothesized that the approach and withdrawal systems would be associated with pre-goal attainment emotions; i.e. emotions that are typically generated while attempting to achieve a goal. For example, the approach system would be associated with enthusiasm but not contentment, which would be considered a post-goal attainment emotion. On this view, emotion should be understood in the context in which it arises. Different contexts can provide information about the function of an emotion. Lang, Greenwald, Bradley, and Hamm (1993) also emphasized the importance of function-in-context in understanding emotion.

To date, numerous independent studies have examined the relationship between emotion or emotion-related constructs and asymmetries in EEG activity over the frontal cortex. A review of these studies clearly suggests the existence of asymmetries in frontal EEG activity, including resting levels of activity and state-related activation (Coan & Allen, 2003). These asymmetries are ubiquitous and involved, both in trait predispositions to respond to emotional stimuli related to moderating function of the frontal cortex, and in changes in emotional state, which can be treated as a marker of emotional intensity (Coan & Allen, 2003). In our recent study (Ohme et al., 2009), the asymmetry model has been confronted with electromyographic (EMG) measures, which have been an instrument to test facial muscle movements, and they in turn are considered to reflect expression of positive or negative emotions (Dimberg, Thunberg, & Elmehed, 2000; Larsen, Norris, & Cacioppo, 2003). The research yielded empirical evidence that EEG analysis is a promising measure of emotional valence. Moreover, that study showed that the model of emotional frontal asymmetry (as hypothesized by Davidson) may be applied to analyze TV advertisements.