

Cross-cultural analysis of neuroelectrical cognitive and emotional variables during the appreciation of TV commercials *

Giovanni Vecchiato^{1,2} - Wanzeng Kong³
Anton Giulio Maglione^{2,4} - Patrizia Cherubino^{2,5}
Arianna Trettel² - Fabio Babiloni^{1,2}

¹ Department of Physiology and Pharmacology, University of Rome, Rome, Italy

² BrainSigns s.r.l., Rome, Italy

³ College of Computer Science, Hangzhou Dianzi University, Hangzhou, China

⁴ Department of Anatomy, Histology, Forensic Medicine and Orthopedics,
University of Rome, Rome, Italy

⁵ Department of Economics and Marketing, IULM University, Milan, Italy

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giovanni.vecchiato@uniroma1.it

ABSTRACT

In this study we investigated the cerebral activity of a group of Eastern people during the observation of a Western and an Eastern version of the same TV commercial advertising a very popular smartphone. By comparing the electroencephalographic (EEG) signals in theta, alpha and heart rate (HR) activity of the population investigated, we estimated and compared the levels of memorization, attention, pleasantness and emotion perceived. Results present and increase of the pleasantness and emotion while watching particular scenes of interest of the Eastern version of the commercial. These findings suggest that this kind of technology is able to track variation of the cerebral

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activity related to cognitive and emotional processing across TV commercials. Moreover, there is the possibility to investigate frame segments of particular interest for marketers that could be properly adapted according to the cultural context in which the advertising campaign will be promoted.

Keywords: Neuromarketing; Emotion; Memorization; Attention; Chinese advertisement

1. INTRODUCTION

Advertisements are intensively presented on TV programs and magazines worldwide. Recent functional neuroimaging studies have begun to investigate how commercial brand information is processed in the brain (Paulus & Frank, 2003; Deppe, Schwindt, Kugel & Kenning, 2005; Vecchiato et al., 2011a). Although the experimental designs vary, these studies report activity in ventral and/or medial prefrontal cortex during the contemplation or consumption of familiar brand-name products.

Nowadays, researchers are attempting to investigate the signs of the brain activity correlated with an increase of attention, memory and emotional engagement during the observation of TV commercials (Langlebeden et al., 2009; Vecchiato et al., 2010). In fact, indirect variables of emotional processing could be gathered by tracking variations of the activity of specific anatomical structures linked to the emotional processing activity in humans, such as the pre- and frontal cortex (PFC and FC respectively; Davidson, 2004). In addition it is very well known the role of the frontal areas in cognitive processes such as memory and attention in complex tasks (Klimesch, 2009; Werkle-Bergner, Muller, Li & Lindenberger, 2006). Moreover, by monitoring autonomic activity such as the heart rate (HR) it is possible to assess the emotional state of the subject, as already suggested (Montano et al., 2009).

While the role of prefrontal cortex is then highlighted in the generation of appreciation for a brand, it is not really addressed the issue how this appreciation is spread across different cultural models. For instance, it is well known as different cultural model in Western and Oriental culture leads to different appraisal of the same experience or situation. Hence, it is of value to understand if people educated in different cultures could differently react to the same advertisement.

In this scenario, our purpose is to investigate the modulation of the Global Field Power (GFP) of the EEG rhythms elicited in the FC and PFC

during the observation of commercial advertisements. In particular, the aim of the present study is to analyze the level of memorization, attention and emotion perceived while Eastern subjects are watching an Eastern and a Western version of the same TV commercial.

2. METHOD

2.1. Experimental design

Twenty healthy undergraduate students of the Hangzhou Dianzi University (Hangzhou, Zhejiang, China) have been recruited for this experiment (age 22.95 ± 1.09 ; ten males). The task consisted in watching a ten minutes long documentary in which we inserted one advertising break, in the middle of the movie, formed by six TV commercials as experimental stimuli. Randomization of the occurrence of the commercial videos within the documentary has been provided. In the following we present the comparison of the neurophysiological activity related to the observation of two versions of a hi-tech advertisement, visible at the following links (Italian version: <http://www.youtube.com/watch?v=UrVygDG9AvQ>; Chinese version: http://www.youtube.com/watch?v=ACw4_8OdUR0), which have been both segmented in seven time intervals in interest. For each segment we compared the mean cerebral and heart rate activity in both advertisements.

2.2. Neurophysiological recordings and signal processing

Informed consent was obtained from each subject after explanation of the study. All subjects were comfortably seated on a chair in front of a computer screen showing the experimental stimulus. We collected the electroencephalographic (EEG) activity (IS 10-20) at a sampling rate of 256 Hz while the impedances kept below 5 k Ω by means of the gUSBamp amplifier (g.Tec medical engineering GmbH). The electrocardiographic (ECG) activity from the left wrist of all subjects has been recorded in order to extract the heart rate (HR) signal. The methodology related to the EEG and HR pre-processing has been extensively described in previous works (Astolfi et al., 2011; Borghini et al., 2012; Toppi et al., 2012; Usakli, Gurkan, Aloise, Vecchiato & Babiloni, 2009; Vecchiato et al., 2010; Vecchiato et al., 2011b).

Since for the phenomena we would like to investigate a clear role of the frontal areas have been depicted we used the frontal electrodes to compute the Global Field Power indices (GFP; Lehmann & Skrandies, 1980) used in the following of this study. In order to summarize the properties of the cerebral activation for the analyzed ads we used the theta and alpha to define the Memorization, Attention and Pleasantness indices as deeply described in previous works (Vecchiato et al., 2010; Vecchiato et al., 2011b). The GFP and HR signals of each subject have been averaged to obtain a mean waveform to be compared between the two commercials.

Statistical analysis has been performed through Student's t-test, $\alpha = 0.05$.

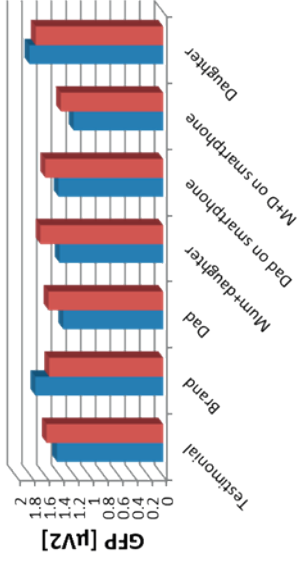
3. RESULTS

The following figures show the values of MI, AI, PI and HR in the seven segments of interest by comparing the Western and the Eastern version of the analyzed TV commercials.

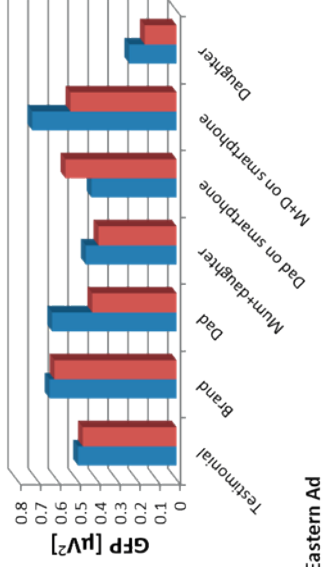
Figure 1 presents the GFP values for the Memorization and the Attention Index for both advertisements. The seven columns show the difference of the cerebral variables existing between the two TV commercials. Both Memorization and Attention Index are characterized by no statistical difference between the two conditions in all segments.

Figure 2 presents the GFP values for the Pleasantness Index and Heart Rate measurements, the seven columns show the difference of the cerebral and autonomic variable existing between the two TV commercials. As far as concern the Pleasantness Index, we observe that the Western Ad is characterized by negative GFP values for all segments of interest. Instead, the Eastern version of the ad elicited values of PI close to the zero and also positive ones. The difference of the PI are statistically significant in each segment of interest except for the Brand one, where on the screen is presented the same logo for both advertisements. As far as concern the analysis of the Heart Rate, the two commercials present the same HR values in almost all segments except for the two ones in which the only father appears on the screen and the one in which both mother and daughter act. In both cases the HR values are higher for the Eastern ad.

Memorization Index



Attention Index

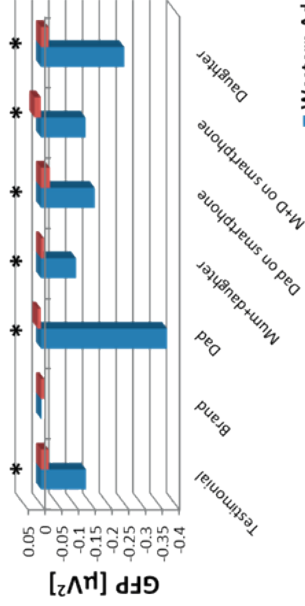


■ Western Ad ■ Eastern Ad

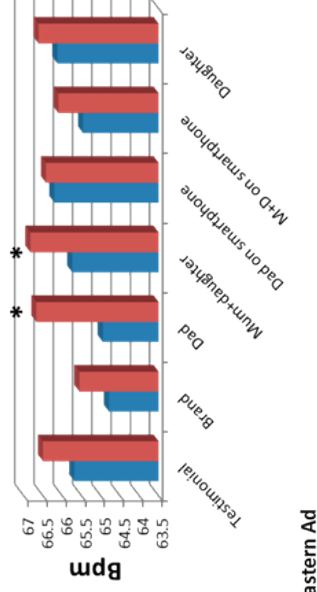
Figure 1.

Average values of Memorization Index (upper row) and Attention Index (lower row). Each column refers to a single segment of interest showing the values of the cerebral variables for both Western (blue) and Eastern (red) advertisement. No statistical difference among the experimental conditions.

Pleasantness Index



Heart Rate



■ Western Ad ■ Eastern Ad

Figure 2.

Average values of GFP for the Pleasantness Index (upper row) and Heart Rate values (lower row). Each column refers to a single segment of interest showing the values of the cerebral variables for both Western (blue) and Eastern (red) advertisement. The differences of the Pleasantness Index are statistically significant for each segment except the Brand one (as the symbol * indicates). The differences of the Heart Rate values are statistically significant for the Dad and Mum + Daughter segments (as the symbol * indicates), with $p < 0.05$.

4. DISCUSSION

Overall, this result suggest that from a cognitive point of view the two versions of the advertisement elicit the same level of memorization and attention while, by comparing the PI values of the two versions of the ad, we can observe that the Eastern TV commercial is perceived more pleasant with respect to the Western one. This result suggest that these two segments of the Eastern ad have been perceived with a more positive emotion with respect to the same scenes of the Western ad (Vecchiato et al., 2011b).

5. CONCLUSION

Present findings suggest how Eastern population investigated is more attracted from actors and situations they perceive more familiar with respect to ones presented in the Western version of the TV commercial analyzed. This could be of help for marketers since it seems to be important to adapt the commercial campaign according to the country in which it has to be promoted. Further analysis and experiments will be performed in order to better investigate cultural difference and similarity between Eastern and Western population during the fruition of TV commercials.

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