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Neuromarketing tools to predict the level of perceiving and understanding texts in commercials

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Abstract:

The research aims to develop a valid method for objective indicators recording in real time for assessing the degree of text comprehension in commercials. Neuromarketing approach is used, since there is now broad understanding that objective psychophysiological indicators could be useful for the estimation of consumers' attention in reading and watching commercials.

Keywords: *consumer behavior, neuromarketing, advertising effect*

1. Introduction

Neurophysiological methods successfully complement traditional methods of consumer behavior study (Cosic, 2016; Schwarzkopf, 2015). However, there are still gaps in the knowledge of how the human brain processes marketing incentives (Kenning et al., 2007); further development of the methodology is needed (Daugherty et al., 2018; Singh & Jain, 2018).

2. Background of the study

Nowadays, growing amount of academic literature is focused on the consumer perception of advertising (Bartholmé & Melewar, 2011; Phillips et al., 2014). Most papers discuss consumer perception of visuals and assess emotional reactions of consumers (Falk et al., 2013; Suomala, 2018; Telpaz et al., 2015; Weber et al., 2015), while modern commercials contain a lot of information in text form (Karagevrekis, 2012). Therefore, it is important to propose indicators of perceiving and understanding texts in commercials, and to estimate predictive ability of such indicators.

3. Data and sample

We studied the relationship between multimodal psychophysiological parameters and the process of text comprehension using eyetracking for visual attention estimation, electroencephalography (EEG) to assess cognitive load and polygraphic indicators (skin-galvanic reaction (SGR), photoplethysmogram) that reflect respondent's emotional state during text reading.

- 17 respondents participated in the study (9 males, 8 females, 25-35 years old (standard dev. +3.1).
- Respondents executed psychological tests (as Luriya memory test and reading rate test).
- Respondents viewed different stimuli on a projector screen that locates on distance 5 meters from respondents' eyes (diagonal of the screen 2,8 meters). Images were presented in HD quality.
- 86 slides with different kind of commercial texts and test questions were presented in the experiment.
- Different features of text and background were studied.

Apparatus:

- ABM X24 256 Hz EEG;
- Polygraph Energy 256 Hz;

- Eye tracker SMI RED 250 Hz with Ogama software for proper event detection.

We estimated background features (as color and signal-noise ratio), text difficulty (estimated based on Flesch-Kinkaid Readability Test, Coleman-Lian Readability Test, SMOG and other tests of text readability.

$$0.39\left(\frac{\text{total words}}{\text{total sentences}}\right)+11.8\left(\frac{\text{total syllables}}{\text{total words}}\right)-15.59 \quad (1)$$

Example of equation (1) for text difficulty estimation (Flesch-Kinkaid Readability Test). The final score calculated as a mean of several similar tests.

Marked key information perceiving was tested. Negative polarity for commercial texts was applied in several test slides.

4. Results and discussion

Dependence EEG, eye-tracking parameters and polygraph indices from text features were revealed. For different colors texts were unified by formula (1).

1. Eye tracking parameters correlate with a background color. Fixation number significantly depends on color (Fig. 1).

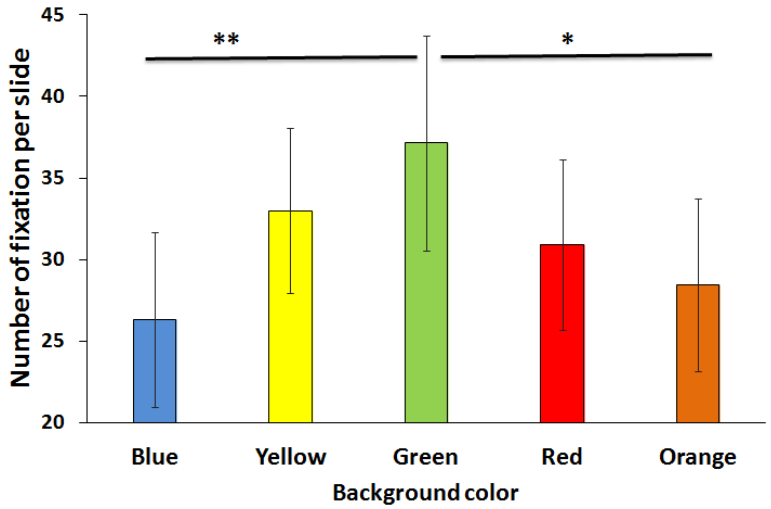

Fig. 1. Number of fixation during reading commercial texts on a background color. ** p<0.05, * p<0.01.

2. EEG parameters also depend on background color that is relevant to eye tracking data.

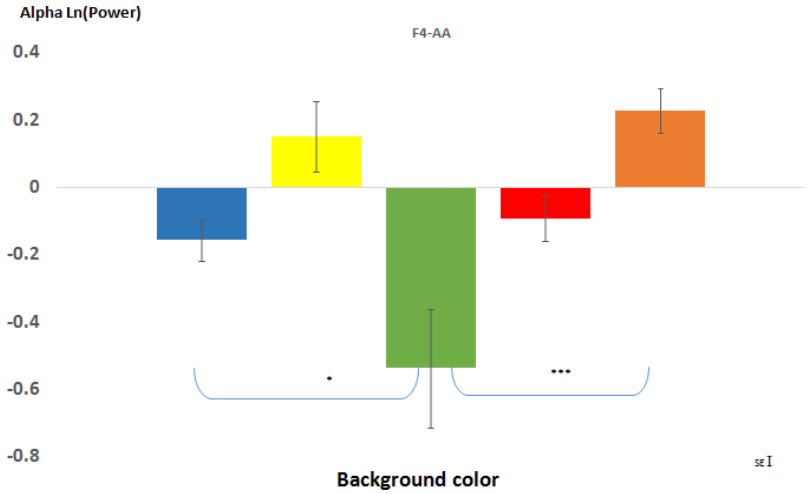

Fig. 2. Alpha band power in F4 channel during reading commercial texts on different background colors. * p<0.01, *** p<0.001.

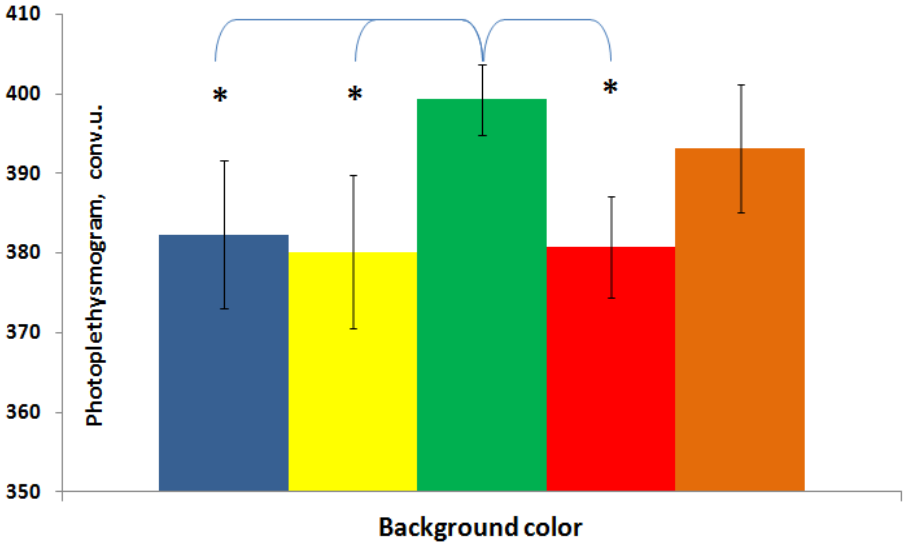

Fig. 3. PPG signal recorded synchronously with gaze tracks and EEG showed similar dynamics and revealed significant difference for the green color of the background.

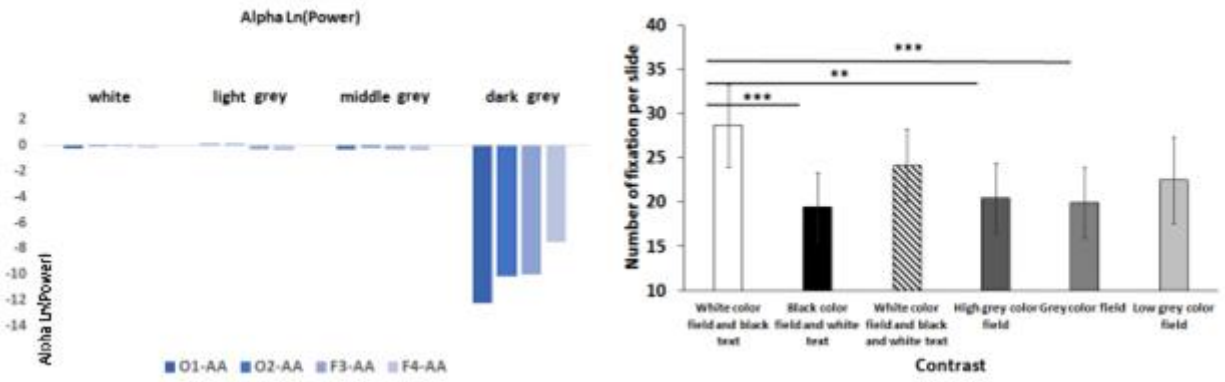

Fig. 4. Difference in EEG parameters (in alpha band) and gaze fixations in reading text with several levels of contrast.

Fig. 1-4 show high sensitive of complex biometrics methods in testing commercials (in particular in reading texts in commercials). Synchronous changing of EEG, polygraphics and eye tracking parameters gets the assuming of its workability in estimation perceiving audiovisual content on billboards, TV and the Internet.

5. Conclusion

Dependence reading quality of positive/negative polarity, noise ratio and background color was supported for commercial texts in the experiment. Innovative synchronous recording of EEG, eye tracks and polygraph indices was used for estimation of reading texts in commercials. High level of the interrelation between metrics was obtained. The advantage of the approach is the possibility of building stable predictive metrics based on real-time indicators. Further, the unique predictive model will be developed based on the integrated use of neuropsychological indicators.

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