

Short-term media effects include the alterations of sensitivity towards the real violence from the past

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Abstract

The purpose of this study was to identify the impact of TV news on the perception and processing of emotional footage of a historical documentary. We noted that the emotional frames taken from TV news stories are relatively weak emotional stimuli compared to the emotional frames of historical documentary. The subjects exposed to the pre-stimulus evaluated the Holocaust pictures as more unpleasant and more activating than those not exposed to it. The event-related potentials (ERP) recorded during the presentation of the negative (historical) images had various amplitudes of oscillations due to the preliminary affective impact of TV news footage. The amplitude of the frontal ERP component that related to the decision-making (P300) was bigger in the group without preliminary exposure to the emotional TV news frames due to the reduced sensitivity to the content of images. In this case, the historical images attracted less attention and demanded less emotional effort for emotional evaluation of visual information, analysis, retrieval of information from memory and semantic processes, namely searching for the meaning of the pictures (occipital P300 and the late positive potential). Short-term media effects include alterations of sensitivity towards the emotional content of visual information.

Keywords: Emotion; violence; Holocaust TV news;

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1. Introduction

One of the most traumatic events in recent history is the Holocaust because of its absolute inhumanity recognised as a manifestation of mass violence. Social representations of world history demonstrated the cross-cultural consensus and recognised the Holocaust as one of the most important events in world history (Grimm, 2015; Grimm et al., 2016; Liu et al., 2005; Tukaiev et al., 2020). Levy and Sznajder (2002) analysed the nature of ‘good and evil’ that symbolises the Holocaust. It showed that memories of the Holocaust contribute to the creation of a common European cultural memory (Adimora, Ngwuchukwu & Onuoha, 2016; Kligler-Vilenchik, Tsfati & Meyers, 2014). Liu and Hilton (2005) recognised the role of the memory of the Holocaust in creating, maintaining and changing new identity. Leggewie and Lang (2011) stressed the importance of the Holocaust when it came to European memory culture. They have constructed the whole memory culture with the Holocaust in the centre of it all. The studies of the Holocaust concern the long-term consequences of the survivors, including the adaptive challenges in the second and third generations, such as the changes in the stress-induced level of cortisol in descendants (Nasir & Naim, 2018; Sagi-Schwartz, 2015).

Collective memory and retention of historical information seemed to have central importance for social identity. Although in modern society people of different ages recall events of the past but the generations reflect different interpretations of some events (Roediger & Abel, 2015). It manifests itself in relation to the violent past – to the genocides in post-genocidal states (Roediger & Abel, 2015; Tukaiev et al., 2020; Ungor, 2014). The attitude to such events and the problem of moral dilemmas have become of current importance for the society. However, the differences in the assessment of the Holocaust remembrance cultures by Israelis and Europeans are striking. Gavriely-Nuri and Lachover analysed obituaries in Israeli newspapers and found evidence for a ‘cosmopolitan turn in collective memory construction’ (Gavriely - Nuri & Lachover, 2012), which is stimulated by the transnationalisation of media communication processes and which supports the acceptance of peace-promoting views. Similar views are expressed by Levy and Sznajder (2002, 2006) and Silbermann and Stoffers (2000). Zuckermann (1999, 2004), examining different Holocaust remembrance cultures in Israel and Germany, found ‘ideological’ instrumentalisation on both sides, which inhibits a truly cosmopolitan memory.

Measurements of the real reactions to the traumatic past events present a serious challenge for the researches in social and clinical psychology and neuroscience. However, there is no data examining the psycho physiological impact of the Holocaust, whereas most of the experimental studies display acts of aggression in the fictional movies, TV news and on TV in general (Geipel, Hadjichristidis & Surian, 2015; Grossman & DeGaetano, 2009; Harrison et al., 2012; Havrylets, Rizun, Tukaiev & Makarchuk, 2015; Havrylets, Tukaiev, Rizun & Makarchuk, 2013; Havrylets, Tukaiev, Rizun & Shenderovskij, 2019; Huesmann, 2007; Rizun, Havrylets, Tukaiev, Khylyko & Vasilchenko, 2018; Tukaiev et al., 2018). The short-term effects of mass media are cumulative (Cruz & Bushman, 2014; Giles, 2003; Holbert, 2005; Ross, Louis & Sasso, 2019) and lead to profound psycho physiological changes (Havrylets et al., 2019; Rizun et al., 2018; Tukaiev et al., 2018). It is known that watching negatively accented mass media causes increasing insusceptibility to aggression and violence (Bushman & Geen, 1990; Havrylets et al., 2019) and, more, enhanced aggressive behaviour of viewers (Wood, Wong & Chachere, 1991). This implies that watching historical documentaries containing real violence and feeling the anguish of the past events impact the emotional condition of individuals to a different extent.

Physiological measurements, like electroencephalography (EEG), allow identifying the relationship between the physiological and cognitive outputs of the participants (Potter & Bolls, 2012). Watching historical or up-to-date videos (documentaries, TV news) or images containing real violence and feeling the anguish of the present or past events impacts the emotional condition of individuals to a different extent. Based on the present cognitive-physiological patterns, we will analyse the responses

to the TV-mediated historical events. Focusing on emotionally grave and distressful historical experiences, we will investigate the stress factors of up-to-date negative TV news on the history-based media communication by using psycho physiological indicators. Such an approach will allow us to reveal the general patterns of distress-induced reactions to tragic historical events.

The following research questions (RQs) have been identified:

RQ 1: How does watching historical documentaries containing real violence impact the EEG modulations of individuals?

RQ 2: Can the event-related potentials (ERPs) serve as objective criteria of moral dilemma behaviour?

We will conduct media effect studies on historicising TV formats and investigate the following characteristics: impact of the historical media on physiological response, influence of the preliminary negative TV news images on the following reactions. The excessive presentation of negative up-to-date images before the exposition of victim images in the context of the Holocaust could evoke defensive reactions, weariness or even aggression or desensitisation. Therefore, there is a strong need to test empirically, which factors promote a humanity effect and which framework is required to account for successful comprehension of history. We addressed this need in this article.

The purpose of this study was to examine the effect of negative emotional context created by the exposure of relevant images from TV news on the perception of target visual stimuli –victim images from the Holocaust documentary.

2. Method

2.1. Participants

Thirty-eight healthy right-handed volunteers (21 women and 17 men), first–third year students of the Taras Shevchenko National University of Kyiv, Educational and Scientific Centre ‘Institute of Biology and Medicine’ and Faculty of Psychology aged 18–27 years ($M_{age} = 18.5$, $SD = 2.06$ years) participated in this study. The participants were eligible to enrol in the study if they had normal or corrected-to-normal visual acuity, normal colour vision, had no clinical manifestations of mental or cognitive impairment, and verbal or non-verbal learning disabilities. Exclusion criteria were: the use of psychoactive medication, drug or alcohol addiction and psychiatric or neurological complaints.

This study was approved by the Bioethics Commission of Educational and Scientific Centre ‘Institute of Biology and Medicine’, Taras Shevchenko National University of Kyiv, and written informed consent was obtained from each subject in accordance with the World Medical Association declaration of Helsinki – ethical principles for the medical research involving human subjects (Helsinki, Finland, June 1964).

2.2. Electroencephalography recordings

The EEGs were recorded monopolarly using EEG 23 Ch system Neurocom (XAI-MEDICA, Kharkov, Ukraine). The electrodes (silver/silver chloride) were placed on the scalp at symmetrical anterior frontal (Fp1, Fp2), frontal (F3, F4, Fz, F7, F8), central (C3, C4, Cz), parietal (P3, P4, Pz), occipital (O1, O2) and temporal (T3, T4, T5, T6) recording sites according to the international 10–20 scheme. All electrodes were referenced to the interconnected ear reference electrodes. The interelectrode impedance levels were below 5 k Ω . The sample rate of all channels was 500 Hz. A high-frequency filter with a 30-Hz cut-off frequency and a power network filter (50 Hz) were used; the time constant of the amplification tract was 0.3 seconds.

2.3. Stimuli

For the current experiment, we used three sets of images (80 frames in each set). The selection of the stimuli encompassed several steps in accordance with the principles, which we described earlier (Havrylets, Rizun, Tukaiev & Khylyk, 2016). First, we selected a pool of images from the neutral and negative TV news stories previously shown on TV and from the Holocaust documentary 'Night and Fog' (1955, France). Then, 4 coders (2 women and 2 men, aged 18–19 years ($M_{age} = 18$, $SD = 0.5$ years), first year students of the Taras Shevchenko National University of Kyiv, Educational and Scientific Centre 'Institute of Biology and Medicine', assessed the emotional valence of every images in the pool using a 10-grade 'negative–positive' Likert-type scale (–5, very negative; 0, neutral; +5, very positive). All coders' scores were averaged, classified in ascending order, and put within one of groups by negativity–positivity. We divided the whole scale span into three parts:

1. Negative images (valence values vary from –5 to –1),
2. Neutral images (valence values vary from –1 to +1),
3. Positive images (valence values from +1 to +5).

As a result, we selected 80 negative TV news images, 160 neutral TV news images (randomly divided in half for two parts of the experiment) and 80 negative images from the Holocaust documentary.

2.4. General procedure of trial

The participant was seated in a comfortable armchair in a dimly lit recording booth in front of the standard 17 fLCD monitor with a distance of 80 cm away from the computer screen. During the experiment, subjects were asked to look straight ahead and avoid extraneous movements. We recorded EEG using the following protocol. After adaptation to the study condition (2 minutes), EEG was registered during the two periods of resting-state EEG, one with eyes closed (3 minutes), the other with eyes open (1 minute) and during the presentation of images (total time of series = 6–7 minutes).

The central processing of visual information depends on the emotional context. In two experiments, we studied the effects of negative emotional context created by the exposure of relevant images from TV news on the perception of target visual stimuli –victim images from the Holocaust documentary. For this purpose, we divided the sample (38 healthy volunteers) into two groups. The first group (23 volunteers) was demonstrated a video set comprised of 80 negative images, selected from the Holocaust documentary 'Night and Fog' (1955, France), and 80 neutral images. The second group (15 volunteers) was presented emotional frames taken from TV news plots (150 images) in order to investigate the pre-stimulus modulations of perception and processing of the emotional frames of historical documentaries.

We used, in our study, the simple discrimination task in 'oddball' paradigm to investigate modulations of ERP components during the presentation and processing the emotional frames of TV news plots and historical documentary. Presentation time was 500 ms, interval between stimuli was 2.4 seconds \pm 30%. The computer selected the image with a 50%–50% probability (1:1). Time analysis of stimuli was 150 ms before the presentation of images and 1,000 ms after the beginning of the image presentation. During the exposure, ERPs were recorded. We analysed average signal amplitude of ERPs in the time intervals of 40–80, 80–120, 120–220, 220–300, 300–400 and 400–700 ms after the onset of the exposure.

The processing of the data was carried out using the software package Neurocom (XAI-MEDICA, Kharkov, Ukraine).

3. Results and Discussion

At the end of the experiment, the participants assessed each set of images on the scales of 'relaxing-activating' and 'unpleasant-pleasant'. We noted that the emotional frames taken from negative TV news plots are relatively weak emotional stimuli compared to the emotional frames of historical documentary. The subjects exposed to the pre-stimulus evaluated the Holocaust pictures as more unpleasant (-5.00 ± 1.20 vs. -4.2 ± 1.21) and more activating than those not exposed it (3.00 ± 1.60 vs. 2.53 ± 1.6).

We have analysed the evoked potentials recorded in the cortical areas that participate in the analysis of the visual stimulus, namely the occipital lobe (visual cortex responsible for processing visual information), parietal areas (secondary and tertiary cortical associative fields of the visual analyser), frontal cortex (responsible for the extraction of meaning, the content of the image, its evaluation, the formation of mental images and their actualisation), temporal zones (cortical representation of the limbic system, which is associated with the processes of memory formation, perception and reproduction of emotions).

We demonstrated that the ERPs recorded during the presentation of the negative (historical) and neutral images had various amplitudes of oscillations. The ERP amplitude of N200 (180–250 ms after stimulus presentation) and P300 (280–350 ms) in frontal zones was bigger in response to the neutral pictures than to the negative historical ones. The P300 component reflects conscious cognitive processes, such as attention, decision-making and comparison of information (Polich, 2007), the activation of the memory trace after the detection of the target stimulus (Verleger, 1988). We can assume that this indicates that the 'abstract stimuli' are more familiar to the participants, but it takes greater effort to recognise them.

The historical images attracted more attention and were more emotional (occipital P300). This required more integration efforts to process the depicted information and to establish its semantic content. The images surprised the subjects (frontal N400) and activated their mental-psychological processes at the highest level of integration (process of analysis, retrieval of information from memory, semantic processes, namely searching for the meaning of the pictures (late components (400–600 ms) in the frontal and occipital zones).

We demonstrated that the ERPs recorded during the presentation of the negative (historical) images had various amplitudes of oscillations due to the preliminary affective impact of TV news frames.

The ERP amplitude of N200 (180–250 ms) and P300 in frontal zones was bigger for the group without the preliminary exposure to the emotional TV news frames due to the reduced sensitivity to the content of images. It is worthwhile noting in this case the decrease in the amplitude of N200 that arises during the perception and the arbitrary cognitive processing of stimuli (Lange, Wijers, Mulder & Mulder, 1998). P300 allows for tracking down the timing of subjective evaluation and what exactly affects it. The direct relationship between latency P300 and the reaction time of the subject in the experiments indicates that P300 is part of the cognitive procedure that supports the formation of an internal model of the environment in which the stimulus is evaluated (hypothesis of context update) (Oliver-Rodriguez, Guan & Johnston, 1999). In our case, the historical images demanded less attention and less emotional efforts for emotional evaluation of visual information, analysis, retrieval of information from memory and semantic processes, namely searching for the meaning of the pictures [occipital P300 and the late positive potential (LPP)]. Short-term media effects include the alterations of sensitivity towards the emotional content of visual information.

Received data help clarify possible mechanisms involved in the perception of negative information. Our data are consistent with Moser & colleagues (Moser, Hajcak, Bukay & Simons, 2006) that shown emotion modulation of ERPs namely enhancement of the emotional responses to unpleasant stimuli. We detected the negative stimulus-specific enhancement in amplitude of N400 (250–500 ms) and LPP

in occipital zones in the response on the victim images from the Holocaust documentary. It should be noted that modulation refers to emotional (negative) stimuli. Bocanegra and Zeelenberg indicated that emotional stimuli trigger a general enhancement in the efficiency of visual processing. Although emotional stimuli can weaken the perception of the subsequent neutral stimulus, two stimuli are present without a significant temporal difference due to the temporal competition for attention (Bocanegra & Zeelenberg, 2009). Thus, the capture of attention by emotional stimuli can be accompanied by global inhibition of other representations in the cortex, and LPP can reflect this global inhibition.

The increase in the amplitude of component N400 (250–500 ms) under these conditions indicates analysis of meaningfulness of the visual stimuli (Federmeier & Kutas, 2002). Emotional stimuli strongly modulate LPP (LPP, 400–600 ms) (Sabatinelli, Lang, Keil & Bradley, 2006). The increase in LPP the amplitude in the frontal and occipital regions for images from the Holocaust documentary in a negative emotional context indicates the activation of the processing of incoming information in the top-down scenario, since the amplitude and latency of the LPP component increases with top-down processing of incoming information (Moradi, Mehrinejad, Ghadiri & Rezaei, 2017). It should be noted that top-down processing of sensory information is characterised by directed attention, caused by the perceptual anchoring of a new stimulus with a pre-formed hypothesis and expectations. LPP is associated with increased effectiveness of processing, building mental images and recalling existing patterns for similar stimuli and paradigms (Ruchkin, Johnson, Mahaffey & Sutton, 1988).

4. Conclusions

Emotional visual stimuli are a complex substrate that requires the activation of numerous brain processes during processing incoming information. Negativity of stimuli (images from TV news) creates an emotional context for target visual stimuli – victim images from the Holocaust documentary and has an active impact on the perception processes that is expressed in modulating the level of attention and the processes of forming memory traces. Comparative analysis of ERP components found a significant influence of the context created by negative emotional stimuli, namely the negative context promotes the processing incoming sensory information in the top-down scenario, which includes the activation of the mechanisms of memorisation and selective attention.

Authors' contributions

All authors contributed equally to this work, and read and approved the final manuscript. S.T. and J.G. conceptualised the overall project, created the behavioural tasks, and designed the research; S.T. conducted studies and collected the data; S.T., Y.H., V.R., J.G., A.E., I.Z. and M.M. carried out data analysis, wrote, and edited the manuscript.

Conflict of interest

The authors declare that they have no competing interests.

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