The Impact of Advertisements Placement in the Computer Game on the Effectiveness of Social Campaign Messages

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Abstract:

Purpose: The article focuses on two aspects, spatial location of advertisements and the engagement of the player during the gameplay and investigates, how they influence the effectiveness of advertising in the context of social campaign.

Design/Methodology/Approach: The analyses are conducted based on data collected in the survey and recorded by EEG and eye-tracker devices.

Findings: The results obtained for the memorization may indicate that message order (first or last) in a sequence of advertisements has major bearing on attention and recall. The computed outcomes of engagement indices show that, depending on the method of calculation, obtained results can differ. Moreover, research with the use of eye-tracking devices can allow for accurate predictions of advertising effectiveness, at least in terms of recall. Results allow to state that it would be recommended to place social advertisements in such spots where the player has less to do and is not distracted by any tasks required to achieve progress in the game.

Practical Implications: The proposed solution of testing the effectiveness of computer games in presenting social campaigns messages can be used both by practitioners that develop such campaigns and by scientists aiming to conduct advertising research.

Originality/Value: Taking into account data from two different sources allows to capture both conscious and subconscious opinions about the social advertising message in the game, which shows the comprehensive image of the advertisement’s effectiveness.

Keywords: In-game advertising, computer games, cognitive neuroscience techniques, social advertising.

JEL codes: M39.

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1. Introduction

Since the time of the mass market entry, computer games have been used as an advertising tool. In the 1980s, they were based on modifications of available games and served to entertain a small, limited group of people. In those days, product placement in computer games was limited by technological possibilities. However, over time, the attractiveness of games, their quantity, the graphic possibilities have improved and the number of players around the world has increased, which has attracted potential advertisers. Initially, computer games were aimed mainly at computer enthusiasts, but now they have become a mass product, aimed at different types of players, in different age ranges, with different interests. A breakthrough product that changed the player's profile was The Sims, launched in 2000, which attracted women and girls. This has opened up a new space for advertising activities (Gee and Hayes, 2010).

In 2020, the global games advertising market was estimated to be worth just over 4.0 billion U.S. dollars and is expected to reach 4.8 billion by 2024 (Clement, 2021). Moreover, according to the forecasts, the year 2023 will mark a major milestone for the global games market. That year, the total number of players will surpass the three-billion mark (Newzoo, 2020). These two statistics prove that the computer game could be very promising as medium for advertising, not only commercial, but also social.

Generally, there are two tendencies of using games in advertising (Cauberghe and De Pelsmacker, 2010):
- Advergaming (advertising + gaming)
- In-game advertising (IGA) – in which game is used as a medium of advertisement (similarly to traditional product placement).

Advergaming approach covers games created especially for advertising specific product or service. In commercial marketing it was applied, among others, by Burger King (Hyman, 2007) and Doritos (Denton, 2019). Such type of the game was also used by American army to encourage young people to join it (U.S. Army, 2017). Similar methods are also used for the purposes of social campaigns. This is beneficial because games give possibility to implement educational elements and good game scenario compensates for a low budget. An example of such game is Food Force (United Nations World Food Programme, 2006). Such games might be addressed also to children to develop specific behaviors. As an example, on the Nourish Interactive website, which promotes healthy diet, there is a Kevin’s Build-a-Meal Game (Nourish Interactive, 2017). There are also games focused on the healthcare. One of such examples is Veevia Cancer Game (Wei and Wei, 2007).

However, creating a game from scratch for the purposes of campaign could be a time-consuming and complicated process. Much simpler approach is in-game advertising that uses the existing game, even not connected with the advertised
product or idea, only as a medium where advertisements are placed just like on TV. There are different ways of using the game as a means of advertising. The easiest way is to place advertising billboards. In 3D games, advertising billboards are placed according to the same rules as in the real world. An example is the 2008 advertising campaign of President Barack Obama, which used 18 games, including Need for Speed Carbon (Yenigun, 2012).

Nevertheless, especially in 3D games, billboards are quite problematic due to the low resolution of the screens. The inscriptions on advertisements are clearly visible only from a very close distance (Chang et al., 2010; Yang et al., 2006). This is a serious drawback for advertisements in the scope of social campaigns that promote positive ideas and behaviors and, to be effective, need to be understood accurately. We assume that a successful campaign does not always have to involve spectacular visuals – sometimes even a small element, if well prepared, can make a difference. Regardless of the scale of the actions taken, the overriding goal of each campaign is to change attitudes or behavior among its recipients. To achieve this goal, it is extremely important to prepare the visual identification of the campaign that will be clearly seen in the game. One of the important elements of such identification may be the campaign emblem – a simple image (sign or graphic), clearly linked to the promoted views or behaviors, which will be easy to remember.

Therefore, in the case of the in-game advertising method, it is necessary to place static ads appropriately and the player should reach such a level of commitment to the game that he plays it for as long as possible. Playing the game longer will give us a higher probability that social advertising will be noticed and thus remembered. The situation is similar in the case of TV commercials - once displayed, an advertisement will be remembered by a handful of people, but if it is repeated several dozen times, the number of recipients who will remember it will increase. What matters in the game is “its life expectancy”. The number of views of the advertisement depends on the player’s engagement, because the more the player gets involved, the longer he plays it, and consequently, the longer he plays it, the more often he watches the advertisement. The second aspect is the location of advertising. It should be placed in such a way that it is well visible and at the same time does not affect the game.

Therefore, the aim of the article is to present results of an experiment that intended to check how the location of advertising elements (campaign emblems) in the games and the engagement of the player during the gameplay influence the effectiveness of social campaign message.

2. Effectiveness of Advertising Placement in Games

Most effectiveness research has focused on the impact of in-game advertising on participants’ cognitive response indicating their awareness. Such awareness is generally measured in terms of memory. The most common variables utilized in IGA effectiveness studies are measures such as brand recall and brand recognition.
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(Jeong and Biocca, 2012; Martí-Parreño et al., 2017; Nelson, 2002; Nelson et al., 2006), since they give an indication of people’s intentional and conscious recollection of the advertisements. However, some researchers have also employed measures that determine memory effects that occur without intentional or conscious recollection (Yang et al., 2006).

Effectiveness of in-game advertising, regardless of its measure, may depend on many different factors. The most important groups of these factors are following: characteristics of the advertisements, characteristics of the player and the characteristics of the game (Herrewijn and Poels, 2014b). Details on factors belonging to these three categories and references to the research articles investigating their influence on advertising effectiveness are summarized in the table. Research in this field was conducted mostly for commercial marketing, but the most of results and conclusions can be also applied in social advertising context.

Table 1. Factors influencing the effectiveness of in-game advertising.

| Group of factors                  | Factors in the group                                      | References                                                                 |
|-----------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------|
| Characteristics of the advertisements | Type of brand                                           | (Mackay et al., 2009; Martí-Parreño et al., 2017; Mau et al., 2008; Nelson, 2002; Nelson et al., 2006) |
|                                   | Type of ad                                               | (Dardis et al., 2012; Grigorovici and Constantin, 2004; Nelson, 2002)    |
|                                   | Prominence of the ad/brand in the game world (size, color, attractiveness and spatial position) | (Grigorovici and Constantin 2004; Schneider and Cornwell 2005; Acar 2007; Lee and Faber 2007; Jeong and Biocca 2012; Peters and Leshner 2013; Herrewijn and Poels 2014a; I. Chaney et al., 2018; Nguyen et al., 2020) |
| Characteristics of the player     | Game experience/skills                                   | (Chaney, Lin, and Chaney 2004; Schneider and Cornwell 2005; Lee and Faber 2007; Leng, Quah, and Zainuddin 2010; Kim and Leng 2017). |
|                                   | Physical and social setting in which the game is played (single, multi-player) | (Dardis et al., 2012)                                                                 |
|                                   | Game difficulty                                          | (Herrewijn and Poels, 2013; Hwang et al., 2017)                             |
|                                   | Game type                                                | (Bracken and Skalski, 2009; Gangadharbatla, 2016; Jeong et al., 2011; Lewis and Porter, 2010; Terlutter and Capella, 2013; Wu et al., 2018; Yang et al., 2006; Yoo and Peña, 2011) |
| Characteristics of the game context | Congruity between the game and the ad                     | (Chang et al., 2010; Lee and Faber, 2007; Lewis and Porter, 2010; Peters and Leshner, 2013; Williams et al., 2011) |
|                                   | Player’s experience (arousal, immersion, engagement)     | (Grigorovici and Constantin 2004; Lee and Faber 2007; Bardzell, Bardzell, and Pace 2008; Nicovich 2010; Jeong, Bohil, and Biocca 2011; Jeong and Biocca 2012; Yoon and Vargas 2013; Vermeir et al., 2014) |

Source: Own study.
Considering the aim of this article we have focused on research that studied the impact of prominence (spatial location) and player’s experience (engagement) on the effectiveness of in-game advertising.

2.1 Prominence of the Advertising

Most of research on the prominence is focusing on the spatial position and size of advertisements in the game environment. The placement of the advertising is called as a prominent or focal when it is highly visible because of its size and/or position on the screen (Gupta and Lord, 1998). The opposite of this is a subtle placement in which advertising is peripherally placed on game screen or in the background or its size is very small (Gupta and Lord, 1998).

Previous research has already established that the recall rate of advertisements is influenced by the placement of the advertisement in the game. Generally, advertisements that appear in central locations are recalled at a higher rate than those that are peripheral to the game and results of most studies in this scope confirms that result (Chaney, Lin, and Chaney 2004; Schneider and Cornwell 2005; Acar 2007; Lee and Faber 2007; Leng, Quah, and Zainuddin 2010; Cauberghe and De Pelsmacker 2010; Vashisht and Sreejesh 2015).

Findings concerning the size of advertisements/brands are not that consistent. Research of Chaney et al. (2018) indicate that large size brands placed in a game are recalled and recognised significantly better than smaller size billboards. On the other hand, Nelson (2002) found there was no difference in brand recall between large and small product placements. Grigorovici and Constantin (2004) looked at the impact of advertising inside 3D virtual environments and found that ad size does indeed have an influence, although this effect varied according to the type of in-game ad that was used. Product placements, for example, had a greater impact when big, visible objects were integrated in the virtual environment, whereas billboards benefitted most from the integration of smaller size object.

2.2 Player’s Experience

It has been shown that computer games are able to evoke a wide variety of psychophysiological responses or player experiences. The influence of these player experiences has been studied in a few IGA effectiveness investigations before. They have mostly focused on the impact of the intensity of arousal, involvement and immersion on brand or advertising awareness.

The aspect of player’s experience is very important from the point of view of IGA effectiveness because of the assumptions of the limited capacity model of attention. According to his model, an individual’s total attentional capacity at any specific point in time is limited and divided between the primary task and the secondary task (Kahneman, 1973). The more an individual allocates his or her cognitive capacity to
processing the primary task, the less he or she has capacity to process the secondary
task. As a consequence, by devoting attention to playing a game, the player will
have less available attention capacity to process the additional stimuli of
advertisements in a game. This dependence was already confirmed by several
different studies (Schneider and Cornwell, 2005; Yang et al., 2006).

There is also research that have also suggested that the relationship between the
level of engagement in games and recall rate of advertisement is not a simple one.
When gamers are uninterested in the gameplay, they are more likely to be distracted
by stimuli external to the game. Consequently, they do not pay much attention to the
advertisements in the game and the recall rate of advertisement is lower. When the
game is perceived to be more exciting or faster in pace, gamers are more involved in
the game and may notice more of the advertisements in the game (Leng et al., 2010).

However, at higher levels of involvement, the gamer may focus so much of his
attention on the primary task of playing the game that there is no additional attention
capacity to notice advertisements in the game (Lee and Faber 2007). Therefore, the
relationship between the recall rate of advertisements and the level of engagement of
the gamer had been suggested to follow an inverted U-shaped curve.

Another findings link the player’s experience with spatial location of the ad. Chaney,
Lin, and Chaney (2004) proved that when advertisements appear in a spot where the
gamer is likely to be very focused on the game, then the gamer is unlikely to notice
the advertisement. In such case the ad is ineffective. Our research aims to follow and
check these findings in the context of simple platform game and social advertising
elements.

2.3 Measuring Engagement

Player engagement is one of the dimensions of gaming experience and can be
associated with many concepts such as (Filsecker and Kerres, 2014; Schoenau-Fog,
2011), flow (Chen, 2007; Csikszentmihalyi, 1991), gameflow (Sweetser and Wyeth,
2005), presence (Lombard and Ditton, 2006; Tamborini and Skalski, 2006),
immersion (Brown and Cairns, 2004; Jennett et al., 2008; Mcmahan, 2003), pleasure
(Costello and Edmonds, 2009), motivation (Iacovides et al., 2011; Przybylski et al.,
2010; Yee, 2006), enjoyment (Ijsselsteijn et al., 2008), arousal (Ravaja et al., 2006)
and fun (Koster and Wright, 2004). Therefore, for the recipient to feel as many
positive emotions as possible, it is necessary to maintain the player's commitment
and concentration at a certain level, e.g., by introducing unexpected action phrases
that will encourage him to continue exploring further areas of the game. First, to
assess whether the game does not discourage the participant, it is necessary to
conduct research on the participant's engagement in the game. Also, the growing
community of video players creates demand among game developers or researchers
for examining player engagement.
The most common methods used to test a player's engagement in digital games are the following (Martey et al., 2014):

− Questionnaire (Lombard and Ditton, 1997) – researched person determines the level of engagement in particular elements of the game;
− Engagement based on attention using eye tracking (ABE) (Ismail et al., 2012; O’Brien and Toms, 2008; Read et al., 2009; Renshaw et al., 2009; Texeira et al., 2012) – measure based on time during which the respondent looked at the monitor. Referring to the time when the person was not looking at the monitor, one can deduce how much attention the tested person was focused on the game;
− Electrodermal activity (EDA), also known as galvanic skin reaction (GSR) – allows to determine the emotions of the tested person based on measurement of skin conductivity (Lim and Reeves, 2010; Mandryk and Inkpen, 2004; Ravaja et al., 2006);
− Mouse clicks and mouse movement (Dale et al., 2007) – measurements of the number and location of clicks and mouse movement allow you to determine the level of player activity during the game;
− Engagement indexes measured by EEG (Pope, Bogart, and Bartolome 1995; Freeman et al., 1999; Berka et al., 2007; Smith and Gevins 2005; Yamada 1998; Kamzanova et al., 2011; McMahan, Parberry, and Parsons 2015).

The above-mentioned methods are limited. In the self-reported survey, the researcher relies on the observations of the respondent. The test person may have difficulty in remembering his or her feelings during the whole game. It is difficult to determine the exact timeframe within which the growth of interest in the game begins and ends based on this study.

Attention-Based Engagement (ABE) depends not only on the player's engagement but also on the type of game and the situation in the game. During the fight, the player's focus on the game will be remarkably high, because he/she has to react quickly to the opponent's actions, while the wandering around the city can be smaller.

Galvanic skin response (GSR) allows you to define emotions in the first place. However, not always a player's engagement can be emotional. Certain elements of the game may not generate emotions until some success or failure is achieved.

Mouse clicks and mouse movements are strongly dependent on the scenario of the game itself. They can be useful if you are able to refer to other players. You can tell from them which player is more and which one is less involved. For example, during a fight, the mouse movements will depend on the weapon chosen by the player and the way the opponent fights. They may, therefore, be incomparable between opponents.
It is necessary to look for such methods of engagement research that will allow determining the level of engagement at any time in the game, while not being dependent on other factors. This would be possible with the use of cognitive neuroscience techniques. They are becoming more and more useful because they allow us to get to know the current state of the brain. This task is facilitated by the indexes calculated based on the recorded signals. In the literature on the subject, numerous indices of engagement can be found, which will be presented later in this chapter. They allow us to know the level of human engagement in each activity in a given moment.

New developments of wireless electroencephalographic systems (EEG) provide recording and access to neuronal activity, enabling the computer to retrieve and analyze information from brain waves. Using the EEG, along with an eye tracker device, we can determine the preferences of the player, as well as the moment of the game which is not interesting, and we can improve it to make the player fully active in the game.

Using the EEG to measure the involvement in performing different tasks is not a new concept. Pope et al. (1995) built a system to control the level of automation of tasks based on whether the operator had increased or decreased his engagement. Freeman et al. (1999) extended this system by evaluating the performance of each task with the use of absolute values of commitment. Berka et al. (2007) has invented a more accurate and effective method for people to interact with technology, with the ability to develop more productive work environments that increase motivation and productivity. The results suggest that the commitment measured using the EEG reflects information gathering, visual processing, and attention allocation. Smith and Gevins (2005) used a flight simulator to study the reactions of the human brain to low, medium, and high difficulty exercises. Studies have shown increased activity of the frontal lobe waves together with decreased activity of parietal lobe alpha waves during demanding tasks.

In turn, Yamada (1998) measured the activity of theta waves along with blinking of the eye and discovered that children playing video games had higher activity of theta waves during more frequent blinking. These results suggest that interesting tasks cause higher activity of theta waves, while the task inhibits the activity of blinking eyes. Kamzanova et al. (2011) compared the sensitivity of a series of EEG engagement indices by examining time pressure individuals performing tasks of varying degrees of stress to determine which one was most effective. McMahan et al. (2015) investigated in Super Meat Boy game whether there is a connection between engagement and arousal in events of death and general entertainment. The results of their research suggest that by combining engagement data with arousal data, we can establish thresholds indicating when a player has left the flow state.

On the other hand, Ewing et al. (2016) investigated the sensitivity of EEG power in the (front) theta and (parietal) alpha bands to changing levels of demand for play.
Besides, he also conducted a study that assessed the adaptive performance of Tetris in terms of system behavior and user experience. Vourvopoulos's (2017) research focuses on the impact of how gaming experience has on modulating brain activity, as an attempt to systematically identify elements that contribute to high BCI control and that can be used in the design of a neurogame.

For our purposes we will use EEG with an eye-tracker to measure the engagement of experiment’s participants in the game and visibility of social advertising elements. Along with the questionnaire data, it will allow us to study the effectiveness if IGA in simple 2D platform game depending on the ad spatial location and player’s engagement.

3. Materials and Methods

The experiment was attended by 32 people, but only 28 people joined the main survey. Four people were not taken into account because the specified target group had to be mainly occasional players and those who liked 2D platform games. The results of survey are presented in Table 2. In addition, respondents had to list three things that they like in playing games (story – about 70%, collecting items - about 40%), and whether they like 2D platform games - everyone answered positively.

| Question                                      | Answers                  | Number of people |
|-----------------------------------------------|--------------------------|------------------|
| How often do you play computer games?         | Every weekend            | 8                |
|                                               | Occasionally             | 7                |
|                                               | Rarely                   | 13               |
| What player would you describe yourself?      | Commonly known gamer     | 3                |
|                                               | Reactional player        | 25               |
| What is your preference for the way you play? | Single Player            | 21               |
|                                               | Multiplayer              | 7                |

*Source: Own study.*

3.1 Description of Game

The game was downloaded from the Unity Asset Store (2D Platformer - Asset Store, n.d.) and adapted for testing in the Unity engine. Before the start of the game, participants got instructions on how to move and on the goal that need to be achieved to win the game. In order to succeed each player had to collect three keys, which guaranteed the entrance to the room where the last opponent (so-called Boss) was located (Figure 1).
In addition, the game also featured emblems connected with social advertising and social campaigns messages promoting various health issues (Table 3). The emblems were in the background, so the player did not have to avoid them.

**Figure 1. A screenshot of the game showing the fight with the Boss**

![A screenshot of the game showing the fight with the Boss](image)

*Source: Authors’ elaboration.*

**Table 3. Description of signs**

| Level in the game | Name of sign | Emblem | Description |
|-------------------|--------------|--------|-------------|
| I                 | Pregnant woman | ![No alcohol](image) | Prohibition of drinking alcohol during pregnancy |
| II                | Key          | ![No alcohol](image) | Prohibition of driving on alcohol |
| II                | Alcohol      | ![No alcohol](image) | Prohibition of drinking alcohol |
| III               | Stop         | ![No alcohol](image) | Prohibition of driving under the influence of alcohol |
# Table 1: Sign Indicators

| Level in the game | Name of sign | Emblem | Description |
|-------------------|--------------|--------|-------------|
| Bottle            | Prohibition of drinking alcohol |
| Tap               | Prohibition of drinking tap water |
| IV                | Prohibition of using drugs |
| V                 | Key2        | Prohibition of driving on alcohol |

*Source: Authors’ elaboration.*

## 3.2 Procedure of the Experiment

EEG data were collected from 28 healthy people (4=female, 24=male), the average age was 23 years. The persons were informed about the course of the examination. They then signed their consent to participate in the study and were seated in a comfortable chair with access to the keyboard and mouse. The next step was to put on the cap (Nautilus Research Wearable EEG Headset with 24 electrodes) and connect the electrodes to the participant's scalp and connect them to the data recorder of the participant's brain. The channels have been distributed according to the 10-10 system, the international EEG electrode distribution system (Jurcak *et al.*, 2007). In addition to the EEG, the study used the Eye Tracker (EyeTribe device with a frequency of 30 points per second) to track image elements that were particularly important to the respondent.

Before the gameplay, there was information shown what the game will be about, its goal, and instructions how to move around. Then, after clicking the "Play" button, a black screen appeared, lasting 60 seconds, during which the participant silenced himself. The recorded signals during the play were used to calculate the EEG indicators. On the basis of the respondent's engagement, concentration, and responses (in relation to the game and the recalled ads), a comparison of responses and indicators was made. It enabled to investigate which social advertisements have been remembered and whether this is related to player’s engagement.

## 3.3 Game Survey
After the game was finished, an interview was conducted about the general impressions of playing the game. There were also questions which stage in the game was the hardest, which game elements should be improved, and what was the declared engagement during the levels and the fight. The last questions focused on free recall of the social advertisements’ emblems.

### 3.2 Measures

Measuring the level of engagement and memory of a player is one of the elements determining their experience while playing a computer game. In particular, it can be used to determine player preferences. For this purpose, the relevant indicators of engagement have been calculated, as indicated in Table 4. These indices were selected for the study because they were used by their developers to study player engagement in computer games or simulations.

#### Table 4. Description of the indices used in the study

| Index | Formula | Counting method |
|-------|---------|-----------------|
| Index 1 (McMahan et al., 2015) | $\frac{\beta 3}{\alpha 2 + \theta}$ | Average registration value of all electrodes on the head |
| Index 2 (McMahan et al., 2015) | $\frac{\theta}{\alpha 2}$ | Average registration value from electrodes placed on the frontal lobe (theta band) and parietal lobe (alpha band) |
| Index 3 (McMahan et al., 2015) | $\theta$ | The average value of registration from electrodes placed on the frontal lobe (theta band) |
| Index 4 (Kamzanova et al., 2011) | $\frac{\beta 4}{\alpha 3 + \theta}$ | Average registration value from electrodes: F3, F4, F7, F8, Cz, P3, Pz, P4 |
| Index 5 (Kamzanova et al., 2011) | $\frac{\beta 5}{\alpha 4 + \theta}$ | Average registration value from electrodes: F3, F4, F7, F8, Cz, P3, Pz, P4 |
| Index 6 (Chaouachi and Frasson, 2012) | $\frac{\beta 6}{\alpha 5 + \theta}$ | Average registration value from electrodes: P3, C3, Pz, Fz, Cz, FPz |

**Source:** Authors’ elaboration.

Memorization of social advertising emblems was measured during the post-game survey. Participants of the experiment were asked to recall freely the signs that they remember. The recall was not aided by the experimenter.

### 4. Results

Based on the questionnaire, the memorization rate of each emblem was calculated by dividing the number of people who saw the mark by the total number of participants in the study (Table 5). Calculations were made based on formula:
**Memorization rate** = \[ \frac{\text{Number of people seen the sign on the basis of the survey}}{\text{Number of people who took part in the experiment}} \] \hspace{1em} (1)

**Table 5.** Emblem memorization rate expressed as a percentage.

| Name of the advertisement | No. of people declaring to see the emblem | Memorization rate |
|---------------------------|------------------------------------------|-------------------|
| Pregnant woman            | 25                                       | 0.89              |
| Key                       | 14                                       | 0.5               |
| Alcohol                   | 10                                       | 0.36              |
| Stop                      | 12                                       | 0.43              |
| Bottle                    | 17                                       | 0.61              |
| Tap                       | 20                                       | 0.71              |
| Drag                      | 11                                       | 0.39              |
| Key2                      | 13                                       | 0.46              |

*Source: Authors’ elaboration.*

Most of the participants of the experiment have remembered the emblem showing pregnant woman on the first level. The least remembered was alcohol bottle placed next to the doorway to the last level.

Engagement indices were calculated based on registered EEG signals for all participants in the experiments. Results, presented in Table 6, show the values if each index during the presentation of every emblem used in the game. These are also associated with game elements that accompanied each social advertising element. The context of showing the signs during the game could be either static or dynamic. Static (S) means that the player does not need to perform any task, dynamic (D) that the game requires specific actions (fight, jump, etc.).

**Table 6.** Player’s engagement during the presence of social advertising emblems on the screen

| Emblem                  | Game element | Static/dynamic | Inde x1 | Inde x2 | Inde x3 | Inde x4 | Inde x5 | Inde x6 |
|-------------------------|--------------|----------------|---------|---------|---------|---------|---------|---------|
| Moving to the next level| S            | -0.07          | -0.02   | -0.14   | 0.016   | 0.30    | 0.30    |
| Doorway to the last level (Boss) | S           | -0.14          | -0.04   | -0.13   | -0.01   | 0.20    | 0.24    |
In addition, it was examined whether there was a correlation between engagement indices and memorization rates. It was obtained that for Index1, Index2, Index4 the correlation is weak, for Index3 moderate, while for Index5 and Index6 strong. For the indexes with negative sign (Index1, Index2, Index3, Index4), when the engagement increases then the recall rate decreases. On the other hand, for indexes with a positive sign (Index5 and Index6), when the engagement increases, the recall rate also increases. Emblems were then categorized into two groups – static and dynamic. For each group mean engagement for every index was calculated. Results are presented in Table 7.

**Table 7. Mean engagement for emblems displayed in static and dynamic context**

| Emblem                  | Game element | Static/ dynamic | Inde x1 | Inde x2 | Inde x3 | Inde x4 | Inde x5 | Inde x6 |
|-------------------------|--------------|-----------------|---------|---------|---------|---------|---------|---------|
| Water                   | S            |                 | -0.24   | -0.12   | -0.19   | -0.04   | 0.21    | 0.26    |
| Column destruction      | D            |                 | -0.01   | 0.12    | 0.08    | 0.02    | 0.12    | 0.11    |
| Spikes                  | D            |                 | -0.13   | -0.05   | -0.21   | -0.06   | 0.31    | 0.39    |
| Fighting the monster    | D            |                 | -0.31   | 0.09    | -0.27   | -0.09   | 0.34    | 0.40    |
| Entering the last level | S            |                 | 0.25    | 0.26    | 0.14    | 0.11    | 0.34    | 0.27    |

Pearson correlation coefficient between engagement and memorization rate:

|                     | pearson correlation coefficient | -0.08 | -0.06 | -0.31 | -0.11 | 0.55  | 0.59  |

Source: Authors’ elaboration.
Using the Student's t statistic test, it was examined whether there was a difference in means between static and dynamic sign display. It was obtained that $p = 0.382125$ with $\alpha = 0.05$ and $df = 10$. Therefore, there is no basis for rejecting the hypothesis that the average commitment for both groups is the same.

Data recorded with eye-tracker were used to examine the visibility of the social campaign’s emblems placed in the game. For this purpose, the number of times an average person looked at a sign was calculated (Table 8). The result shows that most people noticed the emblem representing a pregnant woman - 25 people and the average time of looking at the sign was 2 seconds.

**Table 8. Average time and number of glances at each sign**

| Emblem     | Average number of glances | Average time of glances | No. of people declaring to see the emblem | Level | No. of people that reached the level |
|------------|---------------------------|-------------------------|------------------------------------------|-------|-------------------------------------|
| Pregnant woman | 72                        | 2.311378                | 25                                       | I     | 28                                  |
| Key        | 27                        | 0.879667                | 14                                       | II    | 28                                  |
| Alcohol    | 13.73077                  | 0.44902                 | 10                                       |       |                                    |
| Stop       | 17.23077                  | 0.565488                | 12                                       | III   | 28                                  |
| Bottle     | 16.80769                  | 0.527995                | 17                                       |       |                                    |
| Tap        | 47.26923                  | 1.539069                | 20                                       | IV    | 22                                  |
| Drag       | 9.692308                  | 0.323447                | 11                                       |       |                                    |
| Key2       | 5.153846                  | 0.173572                | 13                                       | V     | 9                                   |

*Source: Authors’ elaboration.*

The average time of glances was then calculated for emblems in static and dynamic groups. Mean values were $M_S = 0.953409$ and $M_D = 0.739$ respectively. Using Student's t-statistic test, we obtained $p = 0.708965$ with $\alpha = 0.05$ and $df = 6$, which leads us to conclude that there is no reason to reject the hypothesis that the average gaze time for the static and dynamic group is the same.

We have also checked whether there is a correlation between engagement (index values) and the time of looking at a given sign. The analysis was conducted with the use of Pearson coefficient. The general case results present average engagement for each level compared with time of looking at signs on this specific level. The results show that correlation is very strong and negative (Table 9). Therefore, as the player's engagement increases the time spent looking at the characters decreases. In case of individual emblems the correlation is moderate or strong. Depending on the engagement index it is also negative or positive (Table 10). In the negative case, the situation is analogous to the previous one. On the other hand, in the positive case, i.e., for Index5 and Index6, when the engagement increases the time of looking at the signs also increases.

**Table 9. Pearson correlation coefficient (general case).**
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| Index1 | Index2 | Index3 | Index4 | Index5 | Index6 |
|--------|--------|--------|--------|--------|--------|
| Pearson correlation coefficient for the time of looking at a given sign | -0.815 | -0.829 | -0.908 | -0.871 | -0.776 | -0.815 |

Source: Authors’ elaboration.

Table 10. Pearson correlation coefficient (detailed case).

| Emblem          | Index1  | Index2  | Index3  | Index4  | Index5  | Index6  |
|-----------------|---------|---------|---------|---------|---------|---------|
| Pregnant woman  | -0.06839| -0.01915| -0.1428 | 0.01558 | 0.30343 | 0.296364|
| Key and Alcohol | -0.13569| -0.0426 | -0.12555| -0.00649| 0.200065| 0.244007|
| Stop            | -0.23779| -0.12311| -0.19062| -0.03765| 0.211297| 0.258965|
| Bottle          | -0.03359| 0.037904| -0.06047| 0.024677| 0.188833| 0.229048|
| Tap             | -0.15303| 0.026838| -0.16787| -0.0715 | 0.325848| 0.39592 |
| Drug            | -0.06206| 0.017864| -0.05372| -0.01712| 0.068414| 0.079553|
| Key2            | 0.254844| 0.25645 | 0.137601| 0.109701| 0.341064| 0.273607|

Source: Authors’ elaboration.

5. Discussion

The aim of the article was to present results of an experiment that intended to check how the location of advertising elements (campaign emblems) in the games and the engagement of the player during the gameplay influence the effectiveness of social campaign message. We wanted to check, if the placement of social advertising elements and the engagement of players can significantly influence the effectiveness of ads in terms of their recall.

Referring to the results of social advertising memorization, it was found that most people (almost 90% of the respondents) remembered the sign on which the pregnant woman was placed. The reason for this is to place the sign when jumping from platform to platform when, as confirmed by the survey, the player's engagement was high. In addition, from the platform where the sign was located, the next level was moved to the next level, which could also affect the memory. Moreover, the average time of looking at the sign was 2 seconds, which could also be relevant. In addition, the majority of respondents, i.e., 70% remembered the sign showing the ban on using drinking tap water, which was in the place where players jumped on the platform to avoid spikes. It can be assumed that the combination of medium
engagement in the case of a spike element in the game and high for a moving platform helps to remember social advertising.

On the other hand, the signs located on the Level II, which was a transition level, were remembered by 43% of people on average. It would seem that there will be many more because each time the key is lifted, there is a close-up on the door and the graphic emblems next to it. This fact may also be influenced by the short time of looking at the advertisements, but also by the lack of action at this level. On Level V 13 people indicated an advertisement with a ban on driving under the influence of alcohol, which may be due to the fact that a fairly similar sign was placed at the door, but on Level II. Low memorization is also for a sign representing drugs at Level IV. Probably because the monsters absorbed more attention than the sign in the background that did not stand out.

The results obtained for the memorization may indicate that message order (first or last) in a sequence of advertisements has major bearing on attention and recall. Although some evidence supports a recency effect (the last presented information such as advertisement or placement is remembered better), majority literature supports the primacy effect (Gupta and Gould 2007). Drawing on primacy theory, it is suggested that the first advertisement in a computer game is likely to be recalled more than subsequent ones. This effect can be also observed in our findings, since the pregnant woman emblem, which was presented as first, was memorized best.

The computed outcomes of engagement indices show that, depending on the method of calculation, obtained results can differ. Pearson correlation coefficient values show that, based on four indexes (Index1 to Index4), higher engagement decreases the recall rate. However, this correlation is weak or moderate. On the other hand, results obtained for Index5 and 6 indicate strong positive correlation between engagement and memorization rates for the presented emblems. The discrepancy in results would need further research concerning the detailed comparison of engagement indexes.

Categorization of social advertising emblems into two categories – static and dynamic (in terms of player’s activity and tasks during the presentation of each sign) allowed to compare whether there is a difference between average engagement and memorization rates calculated for each group. Although some differences can be observed (in favor of static group), the tests do not show that they are statistically significant.

Data gathered with eye-tracker allowed to calculate the average number of glances and average time of looking at each sign. These results confirmed the memorization rate calculated based on questionnaires – the more glances (longer time of looking), the better was the recall of the emblem. This allows us to state, that research with the use of eye-tracking devices can allow for accurate predictions of advertising effectiveness, at least in terms of recall.
On the other hand, the analyses show that the greater engagement of the player causes the reduction of number of glances at the social advertising emblems. This result confirms previous findings by Chaney et al. (2004). Therefore, it would be recommended to place social advertisements in such spots where the player has less to do and is not distracted by any tasks required to achieve progress in the game. The outcomes that we have obtained should be strengthened by conducting a study with larger number of participants.

Moreover, the use of various indexes of engagement can be ambiguous. Further research is needed to determine, which index would be the best in the context of our research. It would be also advised to focus on more factors that can influence the effectiveness of social advertising placement in games. The dependencies between these factors can be complex and discovering the relationships between them can substantially contribute to the advertising effectiveness research.

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