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Article

Effect of Personality Traits on Banner Advertisement Recognition

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Abstract: This article investigates the effect of personality traits on the attitude of web users towards online advertising. Utilizing and analyzing personality traits along with possible correlations between these traits and their influence on consumers' buying behavior is crucial not only in research studies; this also holds for commercial implementations, as it allows businesses to set up and run sophisticated and strategic campaign designs in the field of digital marketing. This article starts with a literature review on advertisement recall and personality traits, which is followed by the procedure and processes undertaken to conduct the experiment, construct the online store, and design and place the advertisements. Collected data from the personality questionnaire and the two experiment questionnaires (pre and post-test) are presented using descriptive statistics, and data collected from the eye-tracking are analyzed using visual behavior assessment metrics. The results show that personality traits and especially honesty–humility can prove to be a predictive force for some important aspects of banner advertisement recognizability.

Keywords: visual behavior; eye-tracking; online ads; recognition; recall

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1. Introduction

The internet is now an integral part of our everyday life, both on a personal and business level. Digital Marketing is a tool used to gain a better understanding and interpretation of the digital world. It is a tool that is also used on a personal level, since every user can introduce a certain image of themselves into the digital world, which is inextricably linked to the real world [1]. From a business point of view, digital marketing is a modern, dynamic tool with a constant evolution that every business should use to the extent that it is relevant to its operation and objectives. It creates opportunities for expansion activity and the diversification of functions and sources (e-commerce). The telling difference of digital marketing from classic marketing is that power no longer belongs to marketing executives but to the recipients of the marketing messages—the web users. From a Human–Computer Interaction (HCI) standpoint, digital marketing poses a sophisticated challenge as the marketing message and the way it is delivered should comply with specific user-centered requirements (guidelines) [2]. HCI is the area of study concerned with multi-discipline areas in which computer engineering, mobile systems, context, and user experience awareness come together. It is a field of research that finds applicability in a vast number of domains and, as considered in the present study, HCI plays a crucial role in the way digital marketing is approached. Human-centered design, user awareness, and user interface design affect users' actions and behavior when it comes to digital marketing and online shopping [3]. Studies have been conducted to measure the effectiveness of marketing methods and techniques intended to attract customers' attention and provide satisfactory results for both business partners and users. Businesses strive for better results and an understanding of potential users to maximize profits and give users reasons to make longer navigation paths when visiting online stores [4].

The subject of this paper is the study of the effect of personality traits on the attitude of users to online advertising. Personality traits have been a subject of study for psychologists

since the early 20th century. The study and growth of lexical hypotheses was the beginning of the development of this research field beyond norms and followed the methods of the time. With the current information load people are receiving daily, the correlation of personality traits with the way they perceive information is a key point for the development and optimization of existing systems and a better understanding of human nature. In the marketing domain, utilizing and analyzing personality traits and examining possible correlations between these traits and their influence on consumers' buying behavior is crucial not only in research studies but also in commercial implementations as it allows businesses and to develop sophisticated and strategic campaign designs in the field of digital marketing [5,6]. Thus, this article examines whether a personality trait exists that can act as a predictive factor for the purchase decisions of web users but also if it is correlated to the ability of consumers to recognize and recall online advertisements due to the specific characteristics of these advertisements (location, color, content, product advertised, banner type) or if they do not remember the advertisement at all. To this end, eye-tracking hardware and software were deployed and a user testing session was conducted. Eye-tracking allows for the study of the visual and cognitive behavior of users, and, in the specific framework of the current study, it allows the detailed recording and analysis of candidate consumers using non-intrusive, reliable, and low-cost metrics [7,8]. As part of our research, we decided to use a task-based experiment in which users were given a specific scenario to execute (see Section 3.2). In addition, the design of the experiment ensured that all users entered each subcategory of products in the store, as they had to buy at least two products from each, and thus each advertisement in each subcategory received equal treatment by each user and was given an equal chance to be noticed. Due to the difficulty of recruiting a higher number of participants during the period of COVID-19 restrictions, we applied a within-subject design [9].

2. Literature Review

2.1. Advertisement Recall

Attitude shaping is one of the most important concepts in both the theory and application of marketing. Understanding its impact is essential for a successful marketing strategy [10]. Due to the current continuous and increasingly intense evolution of technology, consumers are constantly watching advertising messages in the form of images, sounds, animated graphics, screen overlays, and video [11]. It is thus difficult for businesses to capture the interest of consumers, and it is even more difficult to be able to impress viewers with the advertising messages subconsciously so that they can be recalled by the consumers. Advertisement recall is when the recipients of an advertisement, due to a stimulus, remember and recall from their memory the advertising message they once watched and thus recall both the advertised product and the business that offers it [12]. In [13], Hoyer and MacInnis describe that people store emotions in their memory and focus on memory recall related to promotional products. According to their analysis, every recipient of an advertising message associates the advertising message with some emotions that they have experienced in the past; in this way, certain emotions triggered by advertisements are subconsciously correlated with the past emotions and situations of the individual recipient.

Often, companies and advertisers believe that the process of recalling advertising messages from memory depends solely on the memory of each recipient and not on the nature (content) of the advertising message itself [14]. This view contrasts with previous research showing that recipients of advertising messages unconsciously store information about the product being advertised, the business, and even the entire advertising message [15,16]. It is worth noting that the study in [17] shows that consumer attitudes towards online advertising affect advertisement recall positively. It was found that consumer communication and attention are directly related to consumer attitudes towards an advertisement, but the study concerns advertisements related to tourism. In addition, the authors argue that there is a positive correlation between consumer attitudes towards online advertising and the

"click" factor, and that attitudes towards advertising affect consumer perceptions of brands, as well as determining whether a purchase will be made.

Muñoz-Leiva et al. in [18], considering the rise of Web 2.0 and the impact it has had on the field of tourism marketing, with companies adjusting and adapting new strategies in this new environment, investigated the role of effectiveness, visual attention, and recall in advertisement. Deploying different techniques to ensure high reliability (i.e., within and between groups, eye tracking, and questionnaires) they showed participants three websites of a hotel (blog, Facebook, and Tripadvisor profile) in a random order to reduce bias and asked them to locate specific information. Based on the eye tracking results and the recall questionnaire, although banner blindness was not confirmed, users were not able to recall most of the banners—an observation that could be due to several factors (i.e., the use of famous people in the advertisements). The effectiveness of different websites and advertisements were strongly correlated, as a simplistic website design affected the visual behavior patterns of users. As a matter of fact, the brand and content of the advertisement did not stimulate memory recognition, as the study indicated that users were goal-oriented, which could have affected the results. In the present study, we employed different types of advertisements to test the recognition parameter and similar eye tracking metrics to correlate collected data with the viewing patterns of participants.

One important aspect in consumer behavior is the usage and interpretation of color. Labrecque and Milne in [19] investigated the effect of color on marketing and specifically on consumer perception in various case studies. Based on theoretical and practical evidence from the field of color psychology and its practices in marketing, the researchers formed hypotheses to investigate how specific colors (white, yellow, pink) affect the perception towards a brand, whether excitement for a brand is stimulated by color (red, orange, yellow), if the element of competence is correlated with blue and brown, whether black, purple, and pink provide the sense of a sophisticated brand, or whether the asperity of a brand is indicated with brown and green. The results indicate a strong correlation between color and brand personality, with the red color being linked to excitement and blue positively correlated to competence. However, orange was negatively correlated with sophistication. Another interesting finding is that saturation was positively correlated to excitement and ruggedness. Thus, brand personality is highly correlated with color, and changes in color hues should not be taken lightly and require an in-depth understanding of color psychology. In the present study, the observations of this work were considered when designing the various banner advertisements to be tested (the colors of choice were mainly blue and white, colors that evoke trustworthiness, calmness, and loyalty for the advertised products).

2.2. Personality Traits

In psychology, the theory of personality traits refers to our attempts to best describe the human personality. Based on [20], traits include behavioral and emotional patterns as well as thinking of usual, established types of personality. In recent years, there have been various theories about personality traits, among which are the theoretical approaches to personality traits (trait theories) by [21,22] and the theory of the five personality factors.

McCrae and Costa [23,24]—influenced heavily by Goldberg's work [25]—showed great research interest in the five-factor model and established its validity. According to the approach of the five dimensions of personality, personality is defined as a perceptible yet distinctive set of fixed moods, tendencies, beliefs, desires, and adaptation patterns that determine the relatively permanent tendencies and behavioral patterns of an individual. The characteristics of the five-factor model are openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. The NEO Personality Inventory (Revised) (NEO-PI-R) is a new, revised version of the Big Five model developed in 1992 by Costa and McCrae [24] to further examine and analyze the traits of an individual.

The HEXACO model [26,27] emerged from a revision of the same lexical hypothesis on which the five-factor model was based. It defines six factors or dimensions of a personality:

honesty–humility (H), emotionality (E), extraversion (X), agreeableness (A), conscientiousness (C), and openness to experience (O). Each factor consists of characteristics that indicate high and low levels of the factor. There are two ways to measure one's personality traits using HEXACO; the most common involves the use of an automated report inventory or an observer's report. Each of the six factors is the result of a series of questions designed to measure each factor's level [28]. HEXACO-PI-R measures the six factors of HEXACO and divides each one to four "aspects" of every personality trait.

It is significant to describe how the Big Five Model fits the six-factor model of HEXACO developed by Ashton and Lee [26]. The HEXACO model has many elements in common with other feature models, but it is the only one that includes the honesty–humility trait [27,28]. Another difference is that the factor of neuroticism correlates with the emotionality factor in HEXACO. Accordingly, extraversion refers to participation in social gatherings (such as socialization, guidance, or entertainment) [27]. The conceptual content of the dimension includes characteristics such as talkativeness, sociability, and stinginess, as opposed to reservedness, passive attitude, and calmness, which thoroughly deconstructs this factor, showing similarities to the extraversion factor of the mode of the five factors. Depending on social or environmental circumstances, high levels in the extraversion dimension are likely to promote social gains (i.e., access to friends, associates, or even partners) [29]. This dimension seems however to be associated with interpretations that mimic social attention-management [30,31], or any form of resource and potential management [32].

Al-Samarraie et al. in [5] explored how users are affected based on their personality in terms of their information-seeking behavior. The researchers designed three different information-seeking tasks—a factual, an interpretive, and an exploratory based task—each one with its own instructions and focused on a specific research question. The findings indicate a strong correlation between high agreeableness and conscientiousness with eye movements in the seeking behavior of the participants. In addition, those who scored highly in conscientiousness tended to process information and complete the tasks faster than the other. On the other hand, users with high agreeableness in the exploratory task required a significantly lower count of fixations but demonstrated longer visit durations while extracting information. Overall, high extraversion was strongly correlated with performance speed in exploratory tasks, while the users with similar traits showed similarities in strategizing patterns in interpretive tasks. The research concluded that the analysis of the visual behavior of users can predict dominant personality traits. Even though this paper investigated users' personality traits with the Big Five test, it provides insightful information on the relationship between personality traits and visual behavior.

Brand personality is a definition that links human characteristics with a specific brand and the way people perceive that brand itself but also the consumers representing it; thus, brand equity is highly influenced by it [33]. Živanović et al. in [33] investigated how the HEXACO model fits with the theory of brand personality and how its factors can predict aspects of the relationship between a brand and consumer. Thus, the aim of the article was to examine the correlation of HECAXO's personality traits with brand personality and whether we can predict how successful those brand personality traits are. The results of the first study indicated a strong correlation between the "insidious" adjective and honesty–humility, and a positive correlation was found with being cheerful despite being a marker for extraversion. Moreover, high scores for honesty–humility and openness to experience and low emotionality indicate a positive correlation regarding attitudes towards a brand. The quality of a brand and loyalty had a significant predictive factor with the trait of honesty. The paper provides a helpful and useful insight into which brands are related to different personality traits and how they are affected by them—a significant factor in the design of our questionnaire.

Abbasi et al. in [34] attempted to explore and detect which personality traits affect consumer behavior regarding videogames. The design and research process followed involved the completion of two separate questionnaires. Based on HEXACO's personality

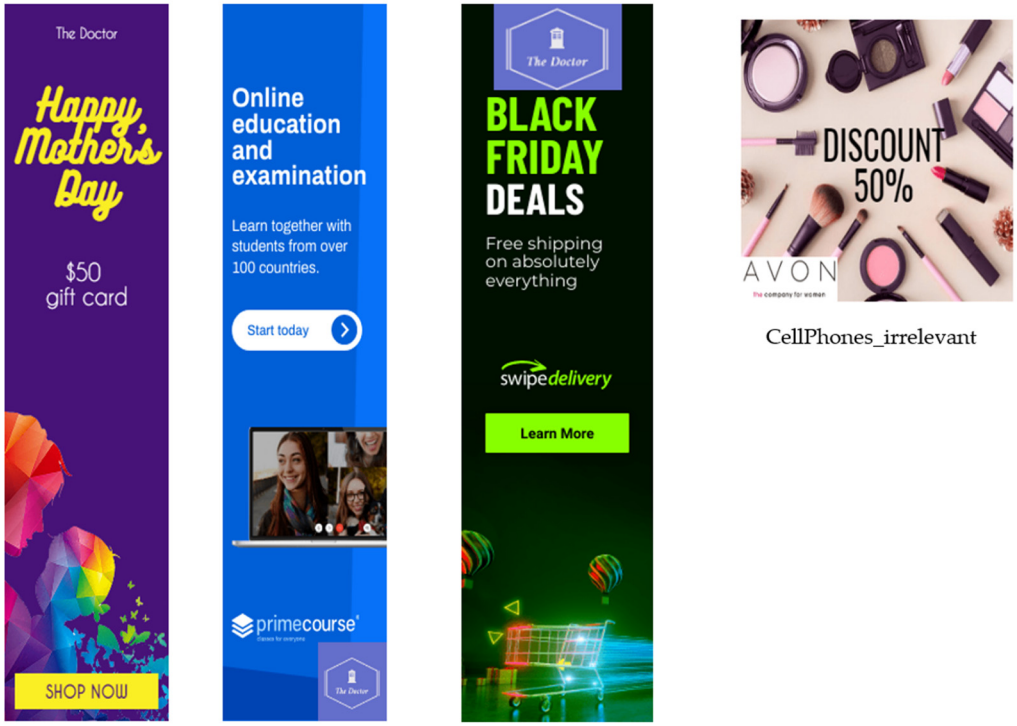
factors, research questions were formed to investigate and evaluate the hypothesized degree of influence of each factor in correlation to the existing literature review. The results showed that there is no strong correlation between the honesty–humility trait and the type of videogame consumer. The same conclusion was reached in the case of the emotionality hypothesis, as there is no evidence to support a link between these two concepts. On the other hand, participants with high extraversion scores were more likely to enjoy playing videogames. Videogame consumers scored significantly higher in agreeableness, which can be correlated to the social aspect of the factor. Differences can be found in the scores of conscientiousness, where consumers who played videogames scored higher. Finally, the hypothesis for openness to experience was supported, as strong evidence was found of videogame consumers scoring higher.

The aim of the present study is to contribute to this research and deepen our understanding of the field of advertising and how different types of advertising are related to personality types. More specifically, the research questions in this study were formed to examine and find statistical proof to support an understanding of which recognition factors are correlated to which personality trait of HEXACO's model and to what extent. The reason for choosing the HEXACO model is the fact that HEXACO—in contrast to the Big Five model—includes the honesty–humility trait; also, to the best of our knowledge, there are no prior studies in the related literature using HEXACO in the domain of display advertisements.

3. Materials and Methods

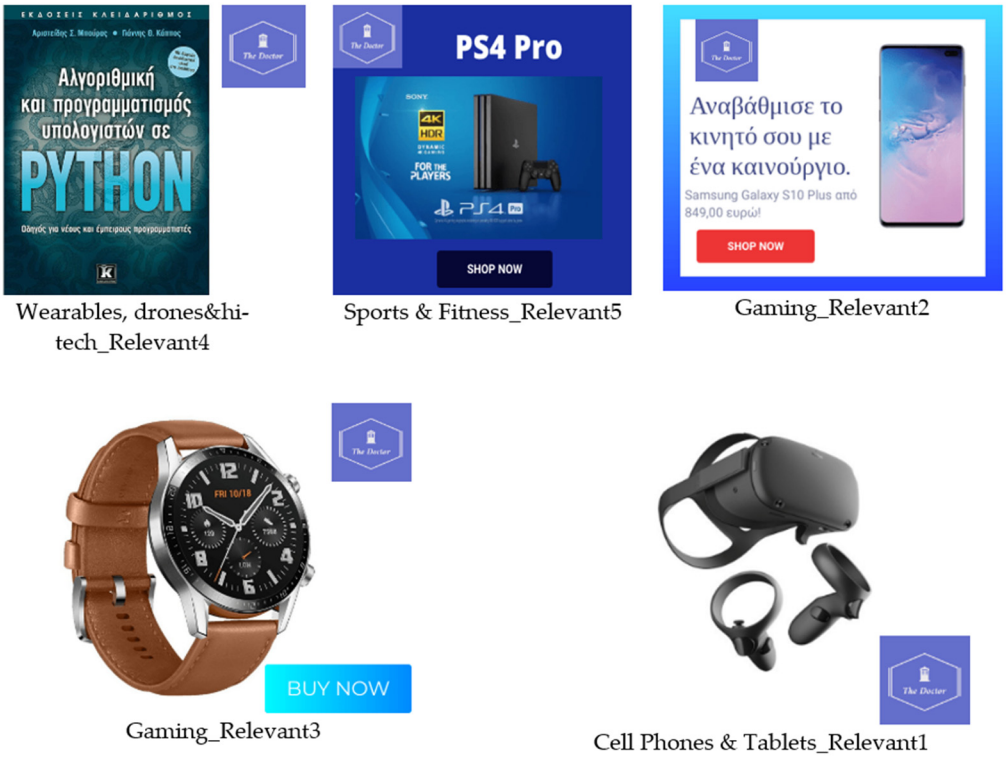
The designed experiment aimed to record and analyze the online buying experience of consumers. Moreover, it investigated how consumer habits and experiences influence future purchase decisions. For this purpose, an online store with electronic products classified into subcategories (six) was created in WordPress [35], a popular CMS combined with the Woo Commerce plugin [36], and participants were assigned a specific scenario (task) to execute. Inside the e-shop pages, a set of advertisements was specially constructed and placed to examine how participants reacted to these marketing stimuli. Advertisements were interactive and had various forms ranging from fixed banners of various sizes, to animated banners, gif banners, and pop-up advertisements (Figures 1–3).

In each of these sub-categories, the constructed advertisements were placed (banners and pop ups of different types and sizes or relevance) to serve the research goals. Starting from the home page of the store, there was an advertisement in the form of an animated banner (160 × 600) on the right side of the page featuring irrelevant content. In the "Cell Phones & Tablets" category, we placed two advertisements with dimensions of 336 × 280. The first one included a product of the e-shop with a direct link to it, bypassing the typical navigation path. The second one was an advertisement of irrelevant content, and upon clicking, it led to a new website. An advertisement was considered irrelevant when the depicted product was not offered in the e-shop or it was not relevant to the rest of the e-shop products. The first pop-up with relevant content was placed in the "Books" subcategory as it included a 20% discount coupon. In addition, this category displayed an irrelevant advertisement with a dimension of 160 × 600. In the subcategory "Sports & Fitness", the second pop-up of the store with irrelevant content appeared after three seconds. The time delay was added to simulate realistic online store conditions but also to observe the real reactions of our users in case they were disoriented and distracted. The second and last 50% discount coupon was placed in the online shopping cart just below the order submission button. In the "Gaming" category, two 336 × 280 advertisements are placed with relevant content (products included in the e-shop) and the same applied to the "Wearable, Drones & Hi-tech" category, with one relevant advertisement of 336 × 280 dimension added on the right side. Finally, the "TV & Multimedia" contained an irrelevant advertisement with a size of 160 × 600.



Homepage_animated | Books_irrelevant | TV & Multimedia_irrelevant | CellPhones_irrelevant

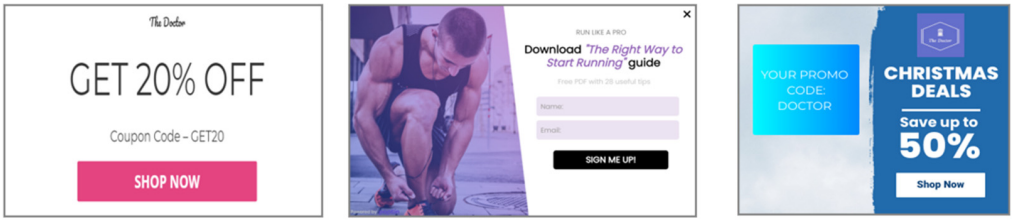
Figure 1. Constructed banner advertisements with irrelevant content and the category in which they were placed.



Wearables, drones&hi-tech_Relevant4 | Sports & Fitness_Relevant5 | Gaming_Relevant2

Gaming_Relevant3 | Cell Phones & Tablets_Relevant1

Figure 2. Constructed banner advertisements with relevant content and the category in which they were placed.



Pop Up Promo Pop Up Cart Promo

Figure 3. Constructed pop-up and promotional advertisements.

Throughout the scenario execution, participant data were recorded using the eye-tracking equipment including gaze sequences, fixations in areas of interest, and points/areas with particularly high visual traffic. All the above data were subsequently analyzed using statistical tools and descriptive statistics to draw conclusions.

In addition to the eye-tracker data, the study aimed at examining consumers' visual behavior and relating it to their personality traits. After studying and analyzing the existing personality tests, we chose HEXACO-60, the six-factor personality test [28], for the analysis of the personality of each user. Then, with the statistical analysis, we studied how the dominant personality traits of each user affected their ability to recognize specific advertisements, and the personal reaction participants had for each advertisement individually. In addition, we examined the role of advertisement content relevance (i.e., whether and to what extent the relevance of an advertisement affects its recognition).

3.1. Participants and Procedures

The experiment was conducted in the premises of the University of Patras (Rio campus) at the Computer Engineering and Informatics Department. Eye-tracking equipment included a Tobii T120 on-screen eye tracker and Tobii Studio software. Due to the global pandemic, strict observance of safety and personal hygiene measures was deemed necessary. Despite the adverse conditions, 31 willing participants came to the campus to be part of the study (15 males and 16 females) with the highest percentage of the sample aged from 24 to 29 years old (N = 13, 41.9%).

The task assigned to users was specifically chosen so that all users would have to enter each subcategory of store products, as they were asked to put at least two products from each subcategory in their cart. Thus, the advertisements in each subcategory would receive equal management and treatment by each user. Based on current literature [7,8], eye-tracking experiments are heavily task-dependent and goal-oriented—factors that we must be taken into consideration in the experimental design to avoid users' task bias. Due to the pandemic conditions and the difficulty of reaching a higher number of participants, we followed another commonly seen experimental choice in eye-tracking, which is a within-subject design [7,8], in the sense that all users were exposed to all banner advertisements. To avoid user bias, our experiment included only one task, which was to navigate as a consumer throughout the e-shop and complete a purchase based on certain conditions [7]. These parameters were constrained by another formality implemented in eye-tracking research, involving task-based scenarios to allow a non-restricted navigation or search, as related work shows that users' viewing patterns and movements are affected in pre-defined tasks. Thus, we designed a task that would be engaging, resembling a real-life consumer scenario, and that would decrease the chance of collecting data from goal-oriented users—another factor that affects internal validity in eye-tracking research [9].

3.2. Experiment Protocol, Metrics, and Instruments

As far as the research process is concerned, upon entering the laboratory space, participants were informed of the safety measures they had to follow and were sited in front of the eye-tracker for it to be calibrated. In terms of questionnaires, three different questionnaires were used: a personality questionnaire, a pre-test, and a post-test questionnaire. To save

time, the personality questionnaire was answered earlier by each participant as it included 60 questions [28]. Participants then were directed to the pre-test questionnaire—an online form—the purpose of which was to obtain demographic information with questions about age, gender, etc., as well as the general perception of the participant regarding e-marketing, shopping habits (products, type of sales, etc.), and digital advertising. Data collected with the pre-test questionnaire allowed us to statistically correlate the questions with the recorded behavior of the sample during task execution, and this was completed with the analysis of the personality test. The questionnaire was constructed (phrased and structured) so as not to cause suspicion about what would follow as we did not want to influence the results of the experimental process and bias users.

After submitting the pre-test questionnaire, users went through the calibration process and were then directed to the home page of the online shop and were given the scenario (task) to be executed; they could explore on their own until they had placed the required number of products in their shopping cart. The script was given on a separate printed form and the instructions were as follows:

> *Welcome to our online store.*
> *Your mission is to an order that will contain at least two items from each product category of the store place in your cart.*
> *In case you find online discount coupons, use them before placing your order.*
> *The process is completed upon order submission.*

At this point, eye-tracking stopped, and users were asked to fill-in the post-test questionnaire. The purpose of the post-test questionnaire was to examine the attitude of consumers towards advertisements, the interference of privacy caused by advertisements, and the degree of annoyance in the first part. In the second part of the questionnaire, we uploaded each advertisement used in the store and invited users to recognize the advertisements according to the characteristics that interested them: i.e., location, content, color, type of advertisements, or if they did not recognize it at all (could not recall having seen the advertisement during the test). The questionnaire closed with a question about the discount coupons and the overall feeling regarding the advertisements of the specific store. The purpose was to scientifically confirm the reason why users recognized advertisements and examine whether there was a correlation with their personality.

Table 1 depicts the internal consistency of the HEXACO-60 scales. As seen in the table, the internal consistencies' reliabilities ranged from 0.615 to 0.862 in the sample. The highest reliability of the HEXACO-60 scales is in the dimension of honesty–humility, and the lowest reliability is in the dimension of agreeableness. The results for Cronbach's alpha reliability levels are consistent with other existing research on personality traits [27,28].

Table 1. Internal consistency of the HEXACO-60 scales in self report.

Personality Dimensions	Cronbach′s Alpha α
Honesty–humility	0.862
Emotionality	0.683
Extraversion	0.797
Agreeableness	0.615
Conscientiousness	0.697
Openness to experience	0.815

Table 2 shows correlations among the HEXACO-60 scales for the sample of 31 participants. As seen in the table, there is a statistically significant correlation between honesty–humility and agreeableness (r (29) = 0.410), between honesty–humility and openness to experience (r (29) = 0.417), and between agreeableness and conscientiousness (r (29) = 0.367). Furthermore, the highest correlation was r (29) = 0.699 between agreeableness and openness to experience. Finally, there is a negative correlation between emotionality and extraversion (r (29) = −0.424). As expected, we find low and negative correlated scores of honesty–

humility with the other six factors as its variance is not presented well. Despite that, in honesty–humility and agreeableness, we expected a weak correlation between them as agreeableness is constructed differently from the standardized five factor models, as it lacks the aspects of anger and hostility, which explains the lowest Cronbach's alpha level ($\alpha = 0.615$) for agreeableness and suggests that the participants lacked indicative responses [26,27].

Table 2. Correlations between the HEXACO-60 scales in self report.

HEXACO—60 Scale	H	E	X	A	C	O
Honesty–humility (H)	1	0.224	−0.209	0.410 *	0.337	0.417 *
Emotionality (E)		1	−0.424 *	0.227	0.291	0.154
Extraversion (X)			1	−0.057	0.217	−0.013
Agreeableness (A)				1	0.367 *	0.699 **
Conscientiousness (C)					1	0.479
Openness to experience (O)						1

* $p < 0.05$ ** $p < 0.01$.

Table 3 presents the results of the logistic regression analysis performed for every recognition factor (location, product, content, color, banner type, do not remember at all) as a dependent variable to examine whether there are strong correlations between recognition factors and personality traits. Based on the results, only Product6 (Relevant3) and conscientiousness are statistically dependent (p-value = 0.040). For the other factors, the results indicate that there is no statistically significant relationship between HEXACO's personality traits and recognition factors for products. Further analysis also shows that only Content1 (Irrelevant_TV) and honesty–humility are statistically dependent (p-value = 0.040), while the results for other factors indicate that there is no statistically significant relation between HEXACO's personality traits and recognition factors for content. Regarding color, the results show that Color2 (Irrelevant2) and honesty–humility are statistically dependent (p-value = 0.035) and Color3 (Animated-Irrelevant) and extraversion are statistically dependent (p-value = 0.034). For the other factors, the results indicate that there is no statistically significant relationship between HEXACO's personality traits and color. Regarding the banner type, Banner3 (Animated) and honesty–humility are statistically dependent (p-value = 0.018) and Banner4 (Irrelevant1) and openness to experience are statistically dependent (p-value = 0.045). Finally, we included the option of whether participants could not remember a particular advertisement at all. We found that Not at All2 (Irrelevant2) and honesty–humility are statistically dependent (p-value = 0.007) and Not at All3 (Animated-Irrelevant) and honesty–humility are statistically dependent (p-value = 0.038); finally, Not at All12 (Promo Cart) and conscientiousness are statistically dependent (p-value = 0.050). For the other factors, the results indicate that there is no statistically significant relation between HEXACO's personality traits and the recognition factor of not being able to remember the advertisement.

Table 3. Correlations between personality traits and recognition factors.

	B	Wald	*p*-Value
Product 6 (Relevant3) Conscientiousness	2.22	4.20	0.040
Content 1 (Irrelevant TV) Honesty–humility	−2.65	4.06	0.044
Color 2 (Irrelevant 2) Honesty–humility	−1.56	4.45	0.035
Color 3 (Animated–Irrelevant) Extraversion	−7.23	4.50	0.034
Banner 3 (Animated) Honesty–humility	−2.51	5.56	0.018
Banner 3 (Irrelevant 1) Openness to experience	−2.39	4.01	0.045
Not at all 2 (Irrelevant 2) Honesty–humility	2.67	7.16	0.007
Not at all 3 (Animated–Irrelevant) honesty–humility	2.16	4.32	0.038
Not at all 12 (Promo Cart) Conscientiousness	−2.61	3.85	0.050

Eye-Tracking Results

To allow further analysis from the eye tracking data, areas of interest (AOIs) were created so each advertisement could be analyzed individually based on certain metrics. In our research, we focused on the metrics of time to first fixation (in seconds) and visit duration with the representative heatmaps.

Tables 4 and 5 present the data collected from the eye-tracker for both relevant and irrelevant advertisements in terms of time to first fixation on each advertisement. The tracker data show that only 8 of the 31 users fixated on the animated banner advertisement with a mean time of 15.58 s and a maximum time of 59.04 s. Nevertheless, these eight users focused their attention to a great extent, as it seems from the mean, which is the highest mean fixation for all the irrelevant advertisements. As for the relevant advertisements, the first advertisement was placed in the "Wearables, Drones & Hi-Tech" category. The tracker data show that 23 of the 31 looked at the advertisement with a mean time of 8.04 s and a maximum time of 37.04 s (M = 8.04, SD = 9.38). For the relevant2 advertisement, the tracker data show that 24 of the 31 looked at the advertisement with mean time of 7.64 s and a maximum time of 29.65 s (Mean = 7.63, SD = 7.88). Similarly, for the relevant3 advertisement, 24 of the 31 participants fixated on the advertisement with a mean time of 9.94 s (Mean = 9.94, SD = 9.64). It is worth mentioning that advertisements with relevant content played a significant role in leading to the users' first fixation, as they attracted the users' attention longer and an increased number of participants fixated on it.

Table 4. Time to first fixation of relevant advertisements.

Time to First Fixation—Relevant Advertisements						
	Relevant1 (Cell Phones & Tablets)	**Relevant2 (Gaming)**	**Relevant3 (Gaming)**	**Relevant4 (Wearables, Drones & Hi-Tech)**	**Relevant5 (Sports & Fitness)**	**Cart Promo**
N	24	24	24	23	25	23
Mean	6.11	7.63	9.94	8.04	12.24	18.61
SD	8.12	7.88	9.64	9.38	11.74	14.14
Max	28.61	29.65	32.72	37.04	39.23	63.95
Min	0.28	0.26	0.93	0.33	1.00	2.09

Table 5. Time to first fixation of irrelevant advertisements.

Time to First Fixation—Irrelevant Advertisements				
	Irrelevant1 (Cell Phones & Tablets)	**Irrelevant2 (Books)**	**Irrelevant_TV (TV & Multimedia)**	**Animated Banner (Homepage)**
N	22	21	27	8
Mean	7.69	10.91	6.99	15.58
SD	10.02	10.18	7.53	21.02
Max	34.78	35.41	28.29	59.04
Min	0.76	0.14	0.39	0.00

Figures 4–6 depict the heatmaps from the eye-tracking data collected during the experiment. A heatmap is a graphical way to visualize user visual behavior (number and duration of fixations). The warm colors indicate areas that attracted the highest visual attention, and the cool colors point to areas with the lowest attention number of fixations. Tables 6 and 7 present the eye-tracking results for the visit duration of relevant and irrelevant advertisements, respectively. According to these data, on the homepage, consumers focused less on the image at the beginning of the page and more on the different products. More precisely, the visualization shows that users fixated more on the products on the first and third row. This fact can be supported by the visit duration table, as participants—after fixating on the advertisement for the first time—usually did not go back

to look at the advertisement again with N = 40 visits and mean = 0.51 s. In addition, the horizontal banner attracted their attention as well.

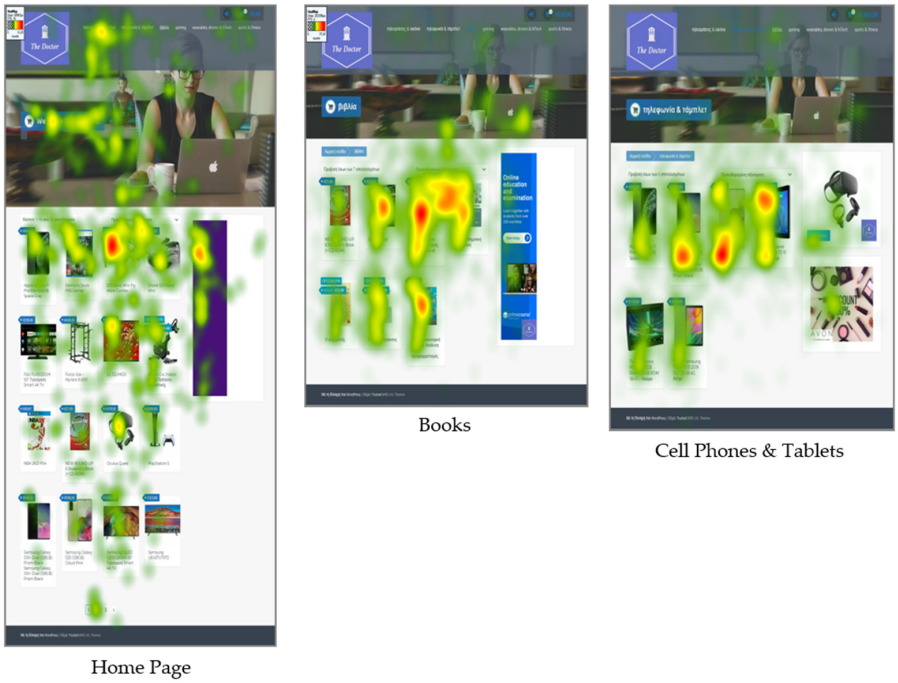


Figure 4. Heatmaps of banner advertisements with irrelevant content.

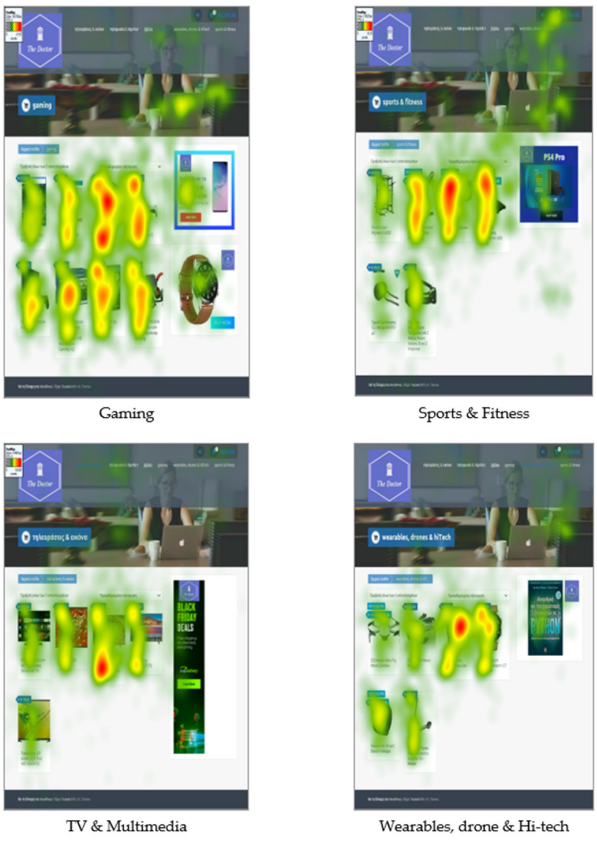


Figure 5. Heatmaps of banner advertisements with relevant content.

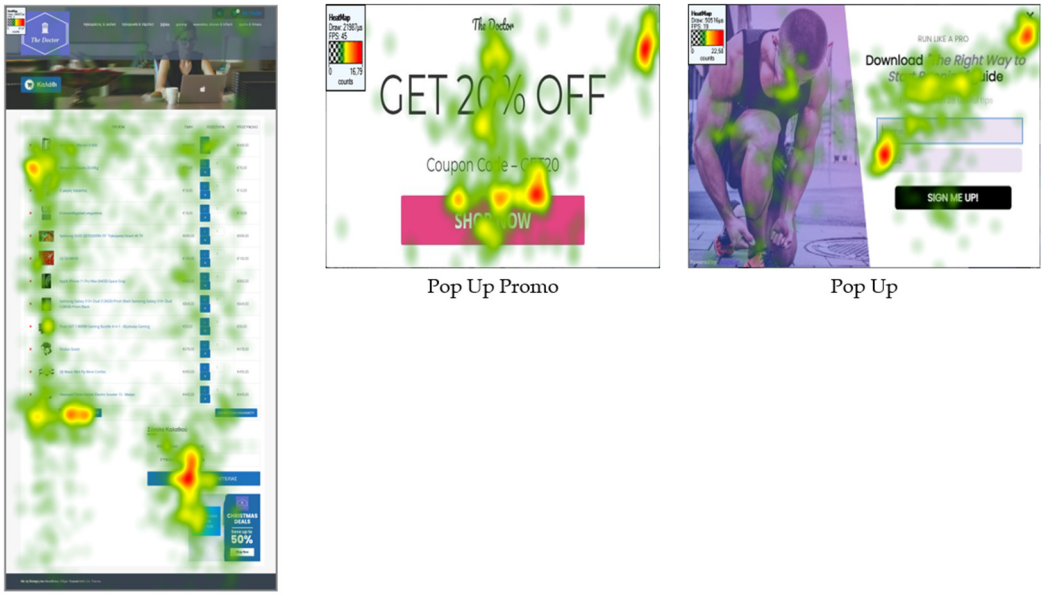


Figure 6. Heatmaps of pop-up and promotional advertisements.

Table 6. Visit duration for relevant advertisements.

Visit Duration—Relevant Advertisements						
	Relevant1 (Cell Phones & Tablets)	**Relevant2 (Gaming)**	**Relevant3 (Gaming)**	**Relevant4 (Wearables, Drones & Hi-Tech)**	**Relevant5 (Sports & Fitness)**	**Cart Promo**
N	113	74	52	60	107	98
Mean	0.50	0.62	0.47	0.50	0.49	0.57
SD	0.52	0.47	0.32	0.33	0.55	0.50
Max	4.06	2.05	1.55	1.74	3.09	2.70
Min	0.02	0.12	0.01	0.04	0.01	0.01

Table 7. Visit duration for irrelevant advertisements.

Visit Duration—Irrelevant Advertisements				
	Irrelevant1 (Cell Phones & Tablets)	**Irrelevant2 (Books)**	**Irrelevant_TV (TV & Multimedia)**	**Animated Banner (Homepage)**
N	110	77	118	40
Mean	0.49	0.51	0.54	0.51
SD	0.47	0.50	0.63	0.37
Max	3.34	2.80	4.57	1.82
Min	0.02	0.04	0.01	0.06

In the other categories, products seemed to gain more attention than the banners. Participants tended to look at the areas with product information (description, image, price, etc.) and pay less attention to banners. This is also evident from the heatmaps in Figures 4 and 5, where the "reddish" areas depicting a high number of fixations are on product-related information and not on the advertisements. In particular, in the "Books" category, despite the higher number of revisits of N = 77, the mean time was 0.51 s. The same pattern was observed in the rest of the categories and could provide valuable insights for web page designers and marketing experts regarding advertisement placement. In the "Gaming" category, consumers paid more attention to banners compared to the banners placed in other categories. Another interesting fact is that despite the high count of

revisits (N = 98 and mean = 0.57 s) on the promotional banner, participants—as mentioned earlier—could not recognize or recall the promo code banner. On the pop-up advertisement in the "Sports & Fitness" category, the close button attracted the most fixations (which is rather expected), while on the "Promo Pop-Up", it was the promo code itself as well as the close button that shared the most fixations.

4. Discussion

At first, we attempted to investigate whether there is a relationship between personality traits and location, and the results indicate there is no statistical evidence to support this relation. Furthermore, we examined the relationship between personality traits and the product recognition factor. Only Product6–Relevant3 and conscientiousness with a *p*-value of 0.040 was found to be statistically dependent and influence recognizability, while for the other factors, there was no statistical significance in our sample. Conscientiousness is strongly correlated with a user's pursuit of perfection and organizational skills. In this case, as it is correlated with a specific product relevant to the e-shop, it indicates the users' self-awareness of the task at hand, and the effect it had on their purchase decision making.

Only Content1–Irrelevant_TV and honesty–humility with a *p*-value of 0.040 were found to be statistically dependent. For the rest of the advertisements, there was no statistical significance in our sample. In this advertisement, the content pictured Black Friday sales, which can relate to the consumer's need to purchase products and services at the best price possible, as high honesty–humility scores indicate users with low tendencies of greediness.

We also examined the relationship between personality traits and the recognition factor of color. Color2–Irrelevant2 and honesty–humility with a *p*-value of 0.035 and Color3–Animated (Irrelevant) and extraversion with a *p*-value of 0.034 were found to be statistically dependent. As expected, with high scores of extraversion, users are easily distracted by visual stimuli due to their low attentional control and disengagement [37,38]. In the Irrelevant2 advertisement, the main color was blue, which partially confirms the previous findings about the color blue and its characteristics of competence, sociability, and liveliness, which are characteristics of high scores in HEXACO's extraversion scale, as it was the only statistically significant advertisement with this color.

Banner3–Animated and honesty–humility with a *p*-value of 0.018 and Banner4–Irrelevant1 (Avon) and openness to experience with a *p*-value of 0.045 were found to be statistically dependent. For the remainder of the advertisements, there was no statistical significance in our sample. Based on previous eye-tracking research, animated banners are ignored by users as a type (i.e., animation); however, we found enough evidence to correlate it with a personality trait to confirm or deny the impact of a trait to visual stimuli and animation.

Finally, we examined the relationship between personality traits and participants' ability to recognize or remember the advertisements at all. Not at All2–Irrelevant2 and honesty–humility with a *p*-value of 0.007, Not at All3–Animated–Irrelevant and honesty–humility with *p*-value = 0.038, and finally Not at All12–Promo Cart and conscientiousness with a *p*-value of 0.050 were found to be statistically dependent. For the remainder of the advertisements, there was no statistical significance in our sample. Yet again, honesty–humility plays a significant role in consumers' recall ability and relevance. In this case, users that could not recognize irrelevant advertisements were strongly correlated with honesty–humility traits. Thus, users with high scores in extraversion, emotionality, and conscientiousness did not recognize relevant advertisements.

5. Limitations

This study acknowledges some limitations which arose during the experiment's execution and analysis. One of the most important factors that limited the number of participants was the COVID-19 pandemic, as prior to the lockdown, participants hesitated to take part in the research out of fear and insecurity regarding their safety.

As far as the experiment design is concerned, a limitation arises from the topic of the displayed advertisements. Participants were exposed to a high volume of advertisements as they were placed in every category of the website. To ensure that participants would be exposed to at least one advertisement, a scenario was formed that asked the users to visit every category of the website. The time for which a user was exposed to an advertisement is a serious limitation as we do not have a standard measure, which greatly affects the average fixation duration on the advertisement. The size of the banner advertisement is another limitation as it can influence the total count of fixations, as there were limitations in the placement of extra banners in the WordPress theme applied to the online shop, we used to conduct the experiment.

To focus more on the buying behavior, this study used questionnaires to investigate consumers' behavior and attitudes towards brands and products. The study did not address the issue of how the product price can influence the behavior of the consumer or the correlation between price and advertisements. More generally, product pricing and shopping cart cost was not a factor we included in our experiment, and participants were asked to place products in their cart knowing from the start that they would not actually buy them or execute any kind of financial transaction.

Another consideration is the followed experimental methodology. The task-based scenario was an alternative option to ensure our participants would enter every category of the e-shop. Despite that, tasks can significantly increase the number of goal-oriented users that do not approach the experimental process as a real-life scenario but as a task that needs to be executed. Thus, in future research, to ensure higher validity of our sample, the experimental process should be completed by within-group and additionally between-subject samples to be able to correlate the results and avoid bias. In addition to that, we can consider the option of exposing participants to a variety of different commercial websites to ensure the validity of our results as past studies have shown [17,18]. The fact that users navigated a fully functioning e-shop and were given specific tasks is not a limitation of our study, as our purpose was not to investigate the choice of products that were put in the cart but to examine whether users noticed the displayed advertisements during this buying process. Still, product descriptions and prices were realistic.

Finally, the fact that the products displayed in the advertisements are in some way similar to the products of the website poses another limitation. It is important for future research to study how the behavior of the potential customers is affected when they are exposed to an advertisement for a product that they are unfamiliar with, as well as how this interaction can change the buying behavior on the website.

6. Conclusions

Visual attention, relevance, and recognition factors are intertwined when attempting to predict and model human behavior and—in our case—the effect of online advertisements on purchasing behavior. In our study, we implemented the framework of the HEXACO personality traits model to examine whether there is evidence of specific traits that affect recognition and visual behavioral patterns and how eye-tracking analysis can support our findings. To conclude, personality traits and especially honesty–humility can act as a predictive force for some important aspects in consumers' banner advertisement recognition ability. Despite that, we must consider the internal validity of our sample and how it may have affected our results.

Previous researchers have attempted to investigate the issues of effectiveness, recall, and visual attention of banner advertisement while considering the impact of personality traits [15,16,37,38]. Although there are differences in the personality models, as discussed in previous chapters, it is of crucial importance to examine how other studies have approached this issue. Kobayashi et al., in [39], implement the Big Five model to predict users' receptiveness and how BFM is influenced by different creative designs in web advertisements and cognitive bias. The results indicate that high openness to experience and extraversion have a strong correlation with click-through rates, while there were no

significant results to suggest that cognitive bias was affected by BFM. Souiden et al., in [40], examine the effect of extroversion and introversion in consumer attitudes to general and online advertising. Based on their findings, consumers having higher scores in extraversion shows a strong correlation with attitudes towards advertising in general and online, while the same pattern is not indicated for introverts. In their efforts to signify the importance of personality traits in online advertisement, Açan et al. [41] studied the intercorrelations between Big Five personality traits, perception towards online advertisement, and purchase intentions using established model scales. With a study sample group of 278 participants, the results indicate a low correlation between purchase intentions and personality traits, while purchase intentions are strongly correlated with consumer perceptions.

Despite HEXACO's increasing popularity in recent academic research [42], there are limited studies that investigate its impact in the marketing or advertising sector. Our research signifies the importance of the HEXACO model in banner advertisement and its unique structure, as our preliminary analysis and results address the predictive factor of the honesty–humility personality trait in banner recognition and advertisement recall.

In the future, we intend to enrich our sample with a variety of users (age, background, etc.), as the present research was mainly addressed to graduate students. An interesting point would be to study how expert and novel users perceive advertisement messages and how their expertise or familiarity affects their ability to recognize specific details of an advertisement based on their personality traits. Moreover, the present research focuses on the content of the advertisements (relevant and irrelevant) in correlation with the personality traits. The next step is to focus our attention on specific types of advertisement appeals to examine how the advertised content is perceived and influences consumers based on their personality traits.

Regarding future work, neuromarketing is a promising and rising scientific field that has inspired the current article. To further extend our research, our aim is to include emotional and facial expression recognition analysis. Understanding how each individual human reacts to emotional feedback and how our personalities affect our approach and the way we conceptualize brand advertisement and decision making is a growing field of research in the scientific community.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and the Institutional Review Board (or Ethics Committee) of University of Patras. Data collected through questionnaires were anonymous and did not contain any personally identifiable information. Eye tracking recordings did not contain video or sound recording.

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