

TRULY INTERACTIVE WEBSITES; AN EYE TRACKING APPROACH

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ABSTRACT

Designing effective websites remains a challenging task for both academics and practitioners. Attention is the starting point of any further cognitive process. The present study makes an attempt to assess which elements in a website gain individuals' attention by measuring actual behavior instead of self-reported data. An online experiment was conducted and an eye-tracking system was employed in order to track users' attention to three interactive versions of a website that present a high involvement product. Data analysis establishes that five out of six web characteristics proposed by Voorveld et al. (2011) increase the perceived interactivity. In addition, it is reinforced the notion that online users are goal-oriented for high involvement product, since they allocate increased attention to the informational text provided in the homepage, regardless of the website interactivity level. Useful insights are provided for online marketers and academics regarding the elements that make a website truly interactive.

INTRODUCTION

Attention capture is the starting point of any further cognitive process according to hierarchy of effect advertising models (eg. AIDA proposed by Strong, 1925). So, understanding what attracts individuals' attention in a website is of main importance since this will help digital marketers and academics not only to understand the underlying cognitive processes occurred in the online context but also to design more effective interactive websites. Kahneman (1973) (cited by Mackenzie 1986) defines attention as the amount of the mental effort or cognitive capacity devoted to a specific stimuli. Individuals sometimes pay more or sometimes less attention to different stimulus due to several reasons. First, people differ in their level of involvement. Highly involvement products motivate consumers to focus more processing resources to a stimulus leading to higher levels of attention ([Petty and Cacioppo, 1986](#)). Second, in the online environment, individuals tend to be more goal-oriented and tend to pay attention to the provided information ([Stanaland and Tan, 2010](#)).

However, attention is limited and selective and only a piece of information on a web site gains users' attention ([Molosavljevic and Cerf, 2008](#)). A website with an increased number of interactivity elements may distract the consumers' attention, especially when it is visually complicate ([Bezjian-Avery et al., 1998](#)). Interactivity has been defined as "*the immediately iterative process by which customers' needs and desires are uncovered, met, modified, and satisfied by the providing firm*" ([Bezjian-Avery et al. 1998, p. 23](#)). A growing number of internet-related literature distinct interactivity to actual and perceived (eg. [Thorson and Rodgers, 2006](#); [Wu, 2005](#); [Voorveld et al., 2011](#)). Actual interactivity is objectively assessed whereas perceived is subjectively experienced by the user. Recently, [Voorveld et al \(2011\)](#) point out six website elements that contribute positively to perceived interactivity [feedback form, product registration, product customization, information customization, tell a friend and dropdown menu].

In the study reported here, we employ an experimental design with the use of eye-tracking system to assess which elements gain users' attention in a website that performs in three levels of interactivity (high, medium and low) and presents a high involvement product. We make an attempt to respond to recent calls for further research on interactivity context by measuring actual behavior instead of self-reported data (Voorveld et al., 2011).

In particular, the purpose of the study is twofold. Firstly, it attempts to assess whether the six interactive elements proposed by Voorveld et al. (2011) employed in a high and in a medium interactive websites grasp users' attention. Secondly, it attempts to investigate any potential difference in the attention paid in the informational text, provided in the home page when it is presented in a high, medium or low interactivity website.

THEORITICAL BACKGROUND AND HYPOTHESIS FORMULATION

Authors agree that there is a great incongruence between the level of actual and the level of perceived interactivity (Voorveld et al., 2011). Three interactivity dimensions are specified to the literature. The first dimension is two-way communication which relates to the immediate communication between companies and users (Liu and Shrum, 2002; McMillan and Hwang, 2002; Voolverd et al., 2011). The second dimension is synchronicity which refers to the time of the response (Liu and Shrum, 2002; McMillan and Hwang, 2002; Johnson et al., 2006; Song and Zinkhan, 2008; Voolverd et al., 2011). The third relates to the perceived control of the user over his navigation (Liu and Shrum, 2002; McMillan and Hwang, 2002; Song and Zinkhan, 2008; Voolverd et al., 2011). Recently, Voorveld, Neijens and Smit (2011) make an invaluable contribution by providing six unique characteristics that make the brand websites truly interactive. The three interactive elements, which belong to the two-way communication dimension, are (1) the option to recommend the site/product to a friend, (2) feedback form, (3) product registration online. The other three interactive elements, within the active control dimension, are (1) product customization (2) information customization (3) dropdown menu. The above findings are based on respondents' answers. Though they are very helpful they cannot answer to which elements individuals pay attention. It should be underlined that the level of attention paid to a stimulus varies based on the level of involvement. When the product under consideration is of high personal relevance then individuals allocate a greater degree of attention (Petty and Cacioppo, 1986). Attention refers to sensations. It has been demonstrated that shifts in visual attention and eye movements are related (Kuisma et al., 2010). The present study seeks to examine whether the elements that are considered to increase the perceived interactivity of a website that presents a high involvement product are seen and used. We use eye-tracking data to answer to the following question:

RQ1: Do participants pay attention to the interactive elements in a website of a high involvement product?

According to Tellis (2004) consumers can be distinct into four separate states of attentiveness to ads which are search, active processing, passive processing and avoidance. In general lines consumers tend to search for information for high involvement goods (Zaichkowsky, 1985). In the online context users attentiveness tend to be either search or active processing, especially for a high involvement product (Palla, Tsiotsou and Zotos, 2013). In addition, online users are more task-oriented as compared to users of traditional media (Kuisma et al., 2010). Website visitors search for information consciously. They tend to use the provided information more actively as compared to users of other media. So it is expected that

individuals exposed to website of a high involvement product will pay attention to the text information regardless of the number of interactivity elements. Stated differently, the attentiveness to informational text will not differ among the different interactivity levels. Attentiveness is measured in terms of relative fixation frequency and total fixation duration.

H1: The informational text of the home page will receive the same amount of attention when it is provided in a low, in a medium as well as in a high interactive website.

METHOD

The Personal Involvement Inventory proposed by Zaichkowsky (1985) employed to conclude that students accept the laptop as a high involvement product (sample: 32 students). A fictitious brand for a laptop was designed in order to avoid pre-attitudinal effects. For the needs of the experiment, three interactive versions (low, high, and medium) of a website for the laptop were constructed. The informational text and the images remained constant in all three versions. The interactivity elements employed in every level followed the recommendations of the relevant literature (Table 1). [Following Sohn et al. \(2007\)](#) the low-interactivity site was a one-page document containing nothing but the text information and photo images of the product. Two experienced web-designers served as judges to verify the actual level of interactivity on each website. 17 items were used taken from Liu (2003), McMillan and Hwang (2002) and Song and Zinkhan (2008) to measure the level of perceived interactivity in an additional online pre-test (sample: 40 students). The results confirm that each webpage provided the expected level of interactivity.

Fifteen [15] students participated in a controlled experiment for extra credit in a marketing module. Five [5] were exposed to the low, five [5] to the medium and five [5] to the high interactive version of the website. Participants sat in a quiet room in front of a typical PC and asked to hold their heads relatively steady. Participants' eyes were calibrated to the screen using Tobii Studio software to ensure accurate recording of participants' fixations.

They were instructed to navigate a website for a new brand of a laptop which is not marked in their country. They were asked to relax and navigate to the website as they did at home at their own time and pace. Participants were informed that they were free to proceed with virtual e-shopping if they wish, in order to assess their actual behaviour. Once the navigation process was completed, participants were instructed to fill in the questionnaire regarding perceived interactivity, product involvement (for manipulation check) and demographics. Manipulation check indicated the appropriate level of interactivity in each website and the laptop was recognized as a high involvement product by the participants.

For collecting data on eye movement, a Tobii X2-30 Eye tracker (Sweden) was used. Eye movements were collected with 30-Hz frequency. Following Lee and Ahn (2012) attention was measured with total fixation duration [fd] and relative fixation frequency [rff]. Relative fixation frequency [rff] was calculating by taking the number of fixation on the element (Area of Interest) divided by the total number of eye fixations landing on the screen (Kuisma et al. 2010). Fixation is a stable gaze focused on a specific area ([Balatsoukas and Ruthven 2012](#)).

FINDINGS

Fixations were identified by using the Tobii Studio software. The Tobii Studio software provides the opportunity to define Areas of Interest (AoI), specified areas which may be boxes or rectangular of content, to find how many times (number of fixations) and for how long (fixation duration) participants fixated on the specific area (AoI) of the webpage. We define an AoI for each interactivity element as well as for the informational text and the images. In the high interactive webpage 10 AoI were specified, whereas in the medium 7 and in the low 2.

In order to answer to the first research question we analyse the data released from participants exposed to high and medium interactive websites (low interactive website does not employ any interactivity element) [tables 2&3]. Two levels of website interactivity were examined in order to increase external validity. Regarding the home page, the “informational text” was the element that gain more attention for both high [rff: 24%, fd: 14.98] and medium [rff: 33.6%, fd: 20.96] interactive websites. “Information customization” is the second [high: rff: 17.8% fd: 7.77 & medium: rff: 18%. fd: 10.93]. The third for those exposed to high interactive websites is “product customization” [rff: 10%, fd: 6.42] whereas for those exposed to the medium are the “images” [rff: 7%, fd: 4.56]. Data are also presented in the form of heatmaps (Appendic B: Images 1-6)

It should be also added that in the high interactive website three participants visit the product customization site. The total fixation duration for the first participant is P1= 33.02 and the fixation count 148.00, for the second P2:0.20 and 1.00 and the third P3= 26.66 and 100.00 respectively. Moreover, two participants visit the product registration site. The total fixation duration for the one participant is 3.97 sec. and the fixation count 18.00 and for the other 2.08 and 11.00 respectively.

The “dropdown menu” was used by all participants for at least four times whereas; no one participant visits the feedback form. Two participants proceed with virtual order of the product in the high as well as two other in the medium interactive website. Regarding the lowest mean time to first fixation for the high interactive website is the “e-order” [2.61 seconds] and for medium the “images” [2.21 seconds]. Data are also presented to tables 2 and 3 (Appendix A).

To test the H1 a Multivariate analysis of variance (Post Hoc Tukeys’ B test) was conducted with relevant fixations frequency (rff) and total fixation duration (fd) as the dependent variables and the interactivity level as the fixed factor. Box’s test is not significant [$p=.970 < 0.05$]. The Levene’s test of Equality of Variance indicated that non-significant results were obtained from both dependent variables [rff: $p=.457 < .05$ and tfd: $p=.686 < .05$]. The Test of between subjects effects indicate that for the dependent variable “relative fixation frequency” is found a significant effect of the interactivity level, $F(2,12) = 15,547$; $p = .000 < .001$. There is not a significant effect between the total fixation duration and the interactivity level, $F(2,12) = 2.459$; $p = .127 > .005$ (Appendix C: figures 1 & 2).

Pairwise comparisons indicated that individuals exposed to the low interactivity website statistically differ in terms of relative fixation frequency with those exposed to the high and medium interactive website [mean difference low-high: .452, Sig: .000, mean difference low-medium: .355, Sig.: .001]. However, individuals exposed to the high and medium interactive website do not statistically differ [mean difference high –medium: - 0.97, Sig.: .278]. Therefore the hypothesis H1a) is accepted and H1b) is rejected.

DISCUSSION

Eye tracking proved to be a useful method for understanding which elements gain users' attention in a website. We were able to answer two questions. The first relates to the interactive elements that are actually seen and used in a website of a high involvement product. Data analysis indicated that participants see and use the five out of the six interactive elements proposed by Voorveld et al. (2011). It seems that these elements [information customization, product customization, dropdown menu, tell a friend, product registration] make a website truly interactive. No one participant visited the "feedback form". A plausible explanation may be the fact that it is a service provided by the website in stages after the awareness/ information of the product. When an individual visits for first time a website for a new brand, usually searches for information regarding the product.

The second relates to the attention paid to the informational text provided in the home page of a high involvement product. Data analysis conclude on the acceptance of H1(a) and the rejection of H1(b). However, the fact that total fixation duration does not differ among the three levels of interactivity seems to be a satisfied condition to conclude that individuals pay the same amount of attention to the informational text in every interactive version. Relative fixation frequency differs since individuals exposed to high and medium interactive websites devote fixations to the other interactive elements presented in each website. The findings of the present study indicated that, regardless of the website interactivity level, individuals' attention is goal directed when the presenting product is of high involvement. It is, therefore, reinforced the notion that attention is not totally responsive; individuals voluntarily direct their attention in line with their goals ([Lee and Ahn, 2012](#)).

The current research suggests that when designing a website for a new brand, online marketers should consider that the first objective of the visitors is to search for information regarding the product. The results of this research can help business to employ the appropriate web features in order to design truly interactive web pages and therefore, increase their marketing edge.

This study supports Liu and Shrum (2002) suggestion that the rush to employ interactive elements into the marketing context should be mediated or tempered by fully understanding both; what interactivity can do well and most importantly what it cannot do. Before adopting the latest technological advances firms need to take into consideration first their advantages and limitations.

Future eye-tracking research in other forms of advertising messages and other types of products would shed more light in the website design. Additional research that examines low involvement products would provide useful insight to online marketers. The assessment of the facial expresses could also help academics and practitioners to answer unresolved questions regarding users' emotions. Finally further investigation in the cognitive process of the interactive elements would provide insights into the cognitive psychology in the online environment.

Several limitations of this study, encompassing the nature and size of the sample should be taken into consideration when interpreting the study's results and developing future research to extend and expand its scope.

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Information regarding the eye-tracking Tobii X2-30 : <http://www.tobii.com/de/eye-tracking-research/global/products/hardware/tobii-x2-30-eye-tracker/>

APPENDICES

Appendix A: Tables

Table 1: Interactivity elements employed in every interactivity level

Interactivity elements		Interactivity level		
		High	Medium	Low
Two way communication Liu and Shrum 2002; McMillan and Hwang 2002; Voolverd et al 2011	option to recommend the site to a friend	✓	✓	
	capability to register the product online	✓		
	feedback form	✓	✓	
	telephone number	✓	✓	
	e-mail	✓	✓	
	online service	✓		
	e-shop	✓	✓	
Time or synchronicity Liu and Shrum 2002; McMillan and Hwang 2002; Johnson et al. 2006; Song and Zinkhan 2008; Voolverd et al 2011	click to call – we call you back now	✓		
	online service	✓		
	number of clicks required to reach certain information	✓	✓	
	response time	✓		
Control Liu and Shrum 2002; McMillan and Hwang 2002; Song and Zinkhan 2008; Voolverd et al 2011	an option to customize products	✓		
	capability to customize information	✓		
	dropdown menu	✓	✓	

Table 2: Interactivity elements – high interactive website

Areal of Interest	High Interactivity	Relative fixation frequency (mean)	Fixation duration (sec.) [participants]	Other (click mouse – visit the site)
Text – information		24%	14.98	
Info customisation		17.8%	7.77 [5/5]	3 click
Images		11.5%	5.53	
Product customisation		10%	6.42 [5/5]	1 click
Product registration		6%	3.48 [4/5]	
Order now		2.5%	1.19 [5/5]	
Service online		2%	0.67 [2/5]	1 click
Tell a friend		1%	0.77 [4/5]	
Feedback form		-	-	No one visit the site
Dropdown menu		-	-	4times each participant

Table 3: Interactivity elements – medium interactive website

Medium interactivity Areas of Interest	Relative fixation frequency (mean)	Fixation duration (sec.) [participants]	Other (click mouse – visit the site)
Text – information	33.6%	20.96 [5/5]	
Info customisation	18%	10.93 [5/5]	4 click
Product customisation	12%	6.55 [5/5]	
Images	7%	4.56 [5/5]	10 click
Order now	2%	2.06 [5/5]	1 click
Feedback form	-	-	No one visit the site
Dropdown menu	-	-	➤ 3 times each participant

Appendix B: Website Images and Heatmaps

Image 1: High Interactive Website



Image 2: Heatmap for the High Interactive Website (5 participants)

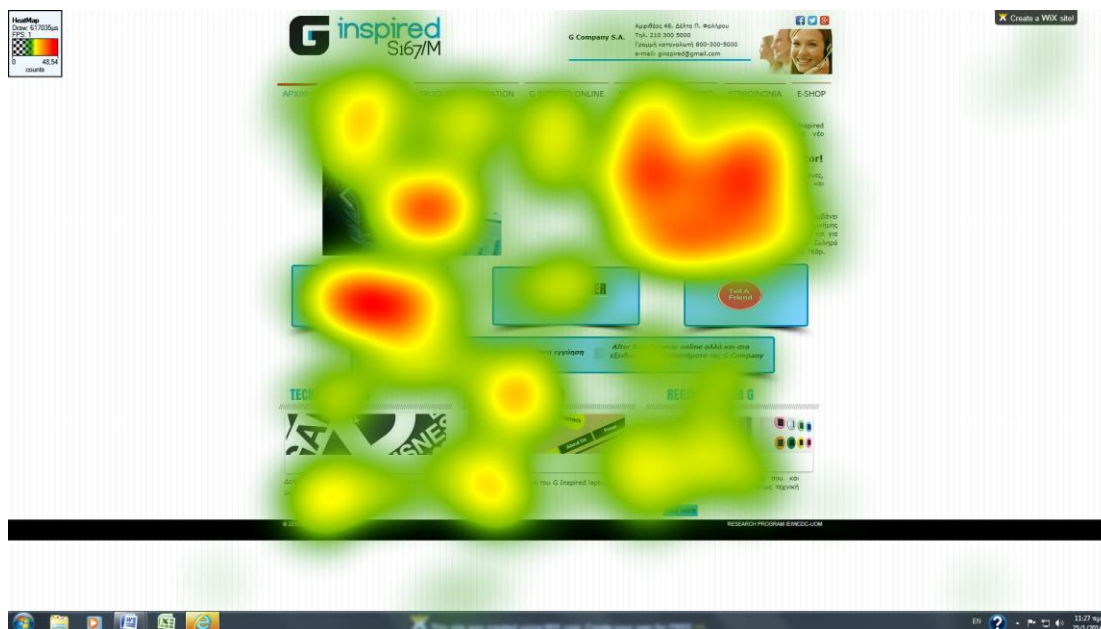


Image 3: Medium Interactive Website

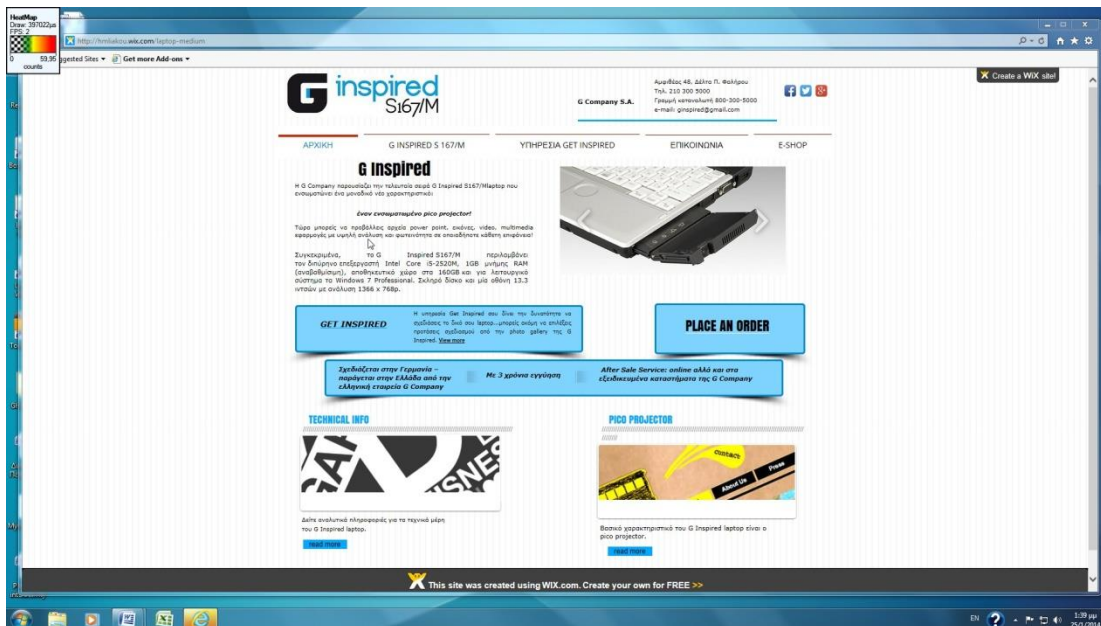


Image 4: Heatmap for the Medium Interactive Webpage (5 participants)

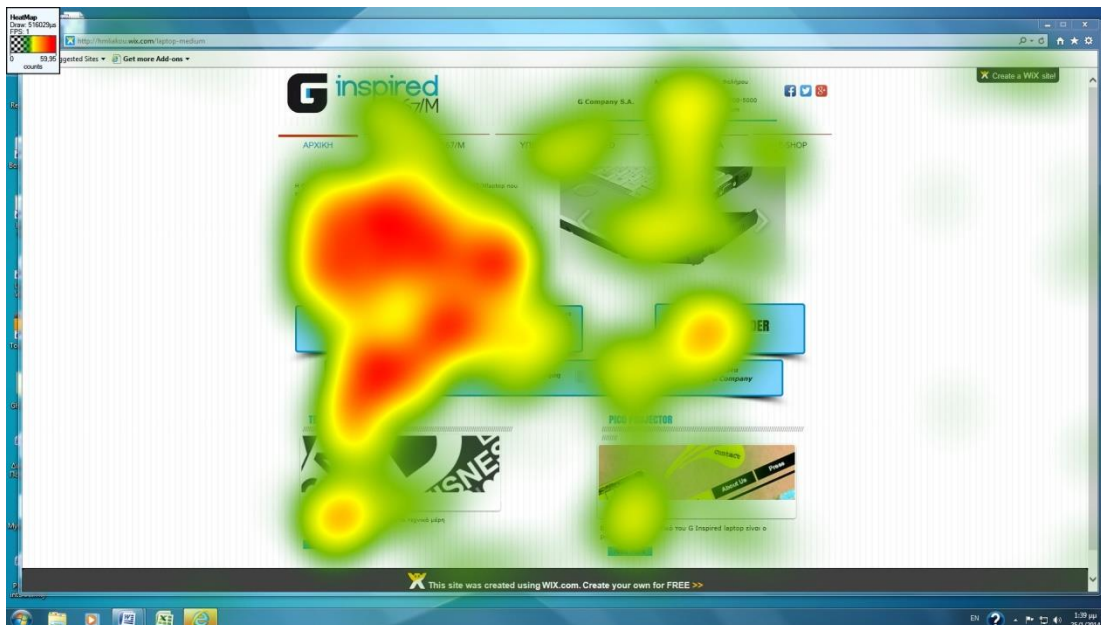


Image 5: Low Interactive Website

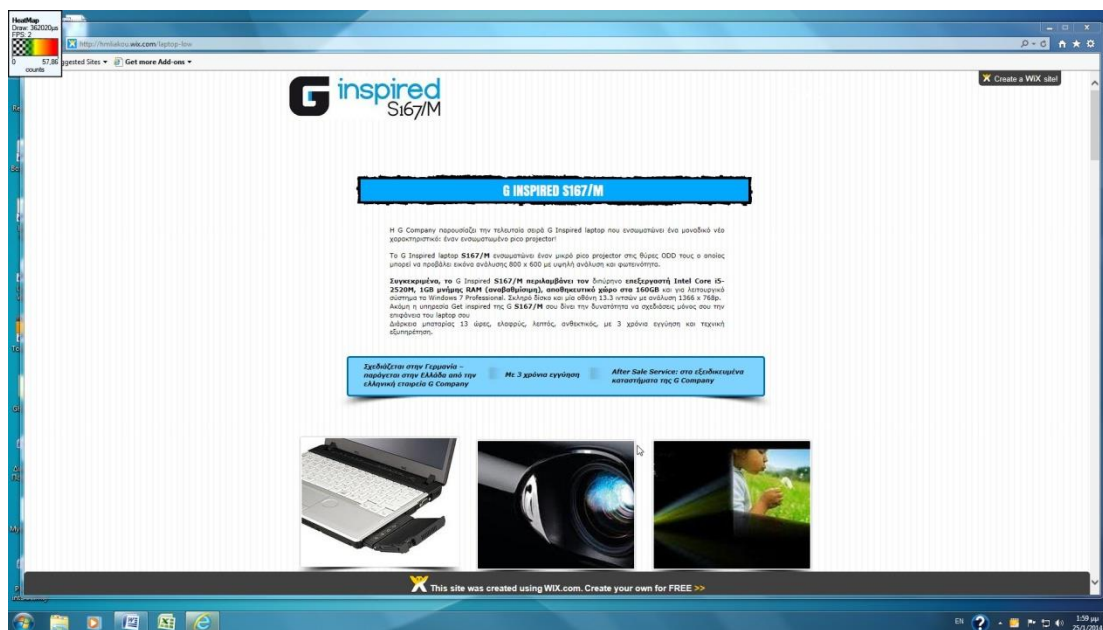


Image 6: Heatmap for Low Interactive Website (5 participants)



Appendix C: Figures

Figure 1: Relative fixation frequency – informational text

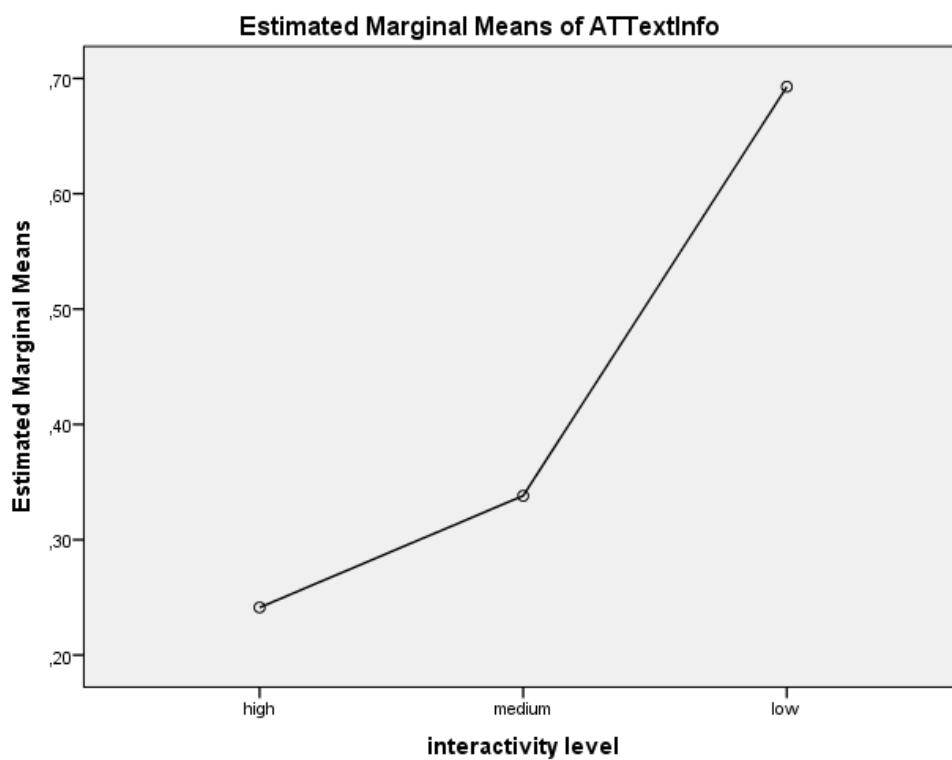


Figure 2: Total fixation duration – informational text

