A NEUROSCIENTIFIC APPROACH ON THE IMPACT OF INFORMATION OVERLOAD ON CONSUMERS' ATTENTION

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Abstract
Information overload represents one of the biggest problems of our times, as consumers are constantly exposed to different types of information from commercial and non-commercial sources. Especially in the advertising industry, the overload of commercial information determines the consumer to pay less attention to the advertised brands and products and reduce by this their effect on consumers. Therefore it is important to optimize the amount of information which individuals and consumer receive in order to increase its efficiency. In this paper there are presented the results of an eye-tracking experiment about the unconscious reactions of consumers towards information overload in advertising. There has been measured the view of the participants towards an advertising in an overload condition, containing a bigger number of objects in comparison to a reduced info condition of an advertising with a smaller number of objects. The results have shown that the consumer have watched the objects in the reduced info condition for a longer time than in the overload condition. Besides there was a smaller dispersion of attention in the reduced info condition, showing that the consumers have focused more on the main message of the advertising.

Keywords
Information overload, consumer behaviour, decision making, brands, eye-tracking tool

JEL Classification
M10, M31

Introduction

Information has been and continues to be a powerful resource for companies and individuals in the 21st century. Individuals and organizations are faced daily with dozens of information, which are perceived in a conscious or unconscious way. From a marketing perspective, the advertising industry is one on the first domains to invade consumers with information and messages about products and brands. In almost any field of the everyday life consumers get in contact with several marketing information, which they perceive more or less in a voluntary

way. From television programs, where advertising is broadcasted every half an hour to magazines which provide pictures or articles about the advantages or disadvantages of brands, to the social life, where each individuals wears branded products, the consumer is in contact with marketing information (Pieters et al., 2007). Moreover, the present development of internet and mobile connectivity increase even more the contact of consumers with information from their virtual world. Each consumer or individual receives daily or even hourly a huge amount of messages, posts, notifications and other types of information from his social networks or other associated sites. All these information affect the emotions and decisions as well as the cognitive ability of each individual. In this sense it is interesting to ask how much information is too much. There are several question which have to be asked in this information overloaded society. First of all is it really efficient for individuals and organizations to receive so much information and do they really have the ability to process all the received information. In order to deal with the huge amount of information, the concept of information overload has been developed, which aims to define the situation in which too much information becomes inefficient (Pentina and Tarafdar, 2014). In this paper we analyze from a neuroscientific point of view the effect of information overload on the attention of consumers. In the theoretical part of the paper, there are presented the main problems related to the phenomenon of information overload, with focus on the advertising industry. There are also presented different aspects related to the neuroscientific methods of analyzing consumer reactions. With the help of an eye-tracking experiment, we aim to measure the impact of the number of objects in an advertising on the attention of the consumers. There are presented the eye-tracking results for two advertisings, one having a small number of objects and one having a bigger number of objects (overload condition). The results of the total viewing times and of the entry times, show that for the advertising with a smaller number of objects, the consumer focuses more on the main message.

Literature Review

The large number of product features or alternatives offered by companies represent an information overload for the potential customer (Krishen et al., 2011). The individuals do not have an unlimited capacity for processing the information and this is suggested by the concept of information overload (Pentina and Tarafdar, 2014). Both theoretical and practical approaches of the information overload concept represent relatively new topics for researchers in the neuromarketing field in terms of the ethics of the activity and the application of it in the economy.

Information overload occurs when the amount of data entered into a system exceeds its ability to process it (Milord and Perry, 1977). According to Pieters et al. (2007) too much information can overwhelm the advertising message and lead to information overload for consumers. A person as a consumer or employee of a company, being overwhelmed by the large volume of information, could lose sight of the essential issues that might interest him and in this way could make distorted decisions, based only on emotional impulses. In spite of the fact that large amounts of information are distributed and processed, it does not necessarily mean that their beneficiaries are better informed. On the contrary, the excessive collection of information determines the occurrence of the information overload phenomenon both at the individual and organizational level according to CECCAR Business Magazine (2016) and it will lead to a reduction in decision-making quality. The concept of information overload was first proposed by Bertram Gross in 1964 (Gross, 1964) and it is more actual then ever in a society dominated by intelligent devices who process information in a more rapid and efficient way (Pelau and Ene, 2018).

Information overload has negative effects on both the attention of the consumer but also on the neurological functioning of the human body. It has negative effects on the human body, by increasing the cortisol level, that can increase and the stress level in the organism. In this

way, the brain can be overstimulated and can produce moments of fog in thoughts and actions Besides, the ability to do multitasking comes in detrimental of cognitive performance (Levitin, 2015). When individuals are exposed to information which are beyond their capacity to understand, accommodate and process, the information overload phenomenon appears (Farhoomand and Drury, 2002). Apparently even the phenomenon of fake news has appeared and has been developed as a consequence of the inability of individuals and consumers to process big amount of data (Lee et al., 2017; Tantau et al., 2018).

The information overload does not have a positive impact on the companies either, because combined with the excessive bureaucracy and other factors, it reaches a misalignment with the business objectives and thus contributes to mistakes in the decision-making process. Various international studies conducted among managers show that information overload (including big data) represents the main cause of poor quality decisions. One of the biggest issue of information overload is that it may cause disruption of attention. Companies must take into consideration the phenomenon of information overload both in relation to their employees and in the relationship with stakeholders. Employees need clear rules, procedures, measures to avoid as much as possible and to combat the information overload (Lefter and Dragolici, 2018).

Neuroscientific approaches are an important way to measure the reactions of consumers to different stimuli and therefore they are also important in the measurement of the consumers' reaction to information overload. A better understanding of the unconscious states can be now provided by neuroscientific research and the tools used. Lim (2018) is of the opinion that the application of neuroscience tools by which the reactions of the subjects and implicitly of the consumers can be measured will bring significant progress in the theory and practice of business development and administration. Many types of human reactions can be measured with modern techniques such as: the electroencephalogram, the magneto encephalogram, the resonance imaging functional magnetic, the eye-tracking too and galvanic response. In the past the reactions have been difficult to measure with the classical research instruments (Pop, et al., 2013). The goal is to examine the consumer reactions and emotions by combining the research methods of consumer behavior with medical tools (Daugherty and Hoffman, 2017).

Eye tracking devices are a good method to measure the unconscious reactions and the attention of consumers to different stimuli. Eye-tracking is a revolutionary technology that follows the view of the consumers when they look at an image displayed on the screen. The instrument records every unconscious movement, it measures the exact times in which a certain point was fixed, including the number of revisions, the dilation of the pupils, but also the movements of the subjects. The various stimuli carefully selected generate unconscious reactions, which will then be analyzed based on key performance indicators. At the same time, the purpose of this tool is to determine which stimuli activate the attention of the subjects and which are consciously or unconsciously ignored (Rosca, 2017). From a neuroscientific point of view, this field of measurement of consumer reactions is a topic of interest both for researchers in the field of consumer behavior at international level and for companies, as well as for the end user (Dragolea and Cotîrlea, 2011).

Methodology

The objective of our research has been to determine the unconscious reactions of consumers to visual object overload in advertising. Starting from the hypothesis that a high number (overload) of objects or information in an advertising will distract the attention of the consumers from its main message. A high number of objects or too many information will determine the consumer to analyze all these information to the detriment of the logo or the main message communicated in the ad. In order to test our hypothesis, we have compared the unconscious reactions of consumers towards two advertisings, with the help of an eye tracking device. Among other images the consumers had to watch for 10 seconds two tourism

advertisings with different number of objects. The first advertising (overload condition) contains three different images of an exotic destination, a text with the main message, the logo of the offering company and another text box with different information about the location (a total of 6 objects). The second advertising (reduced info condition) contains only three objects, namely the text with the main message, a picture of the destination and the logo of the offering company. Both advertising have targeted exotic destinations, being dominated from a visual point of view by a sky-blue color and exotic elements. Both offering companies are local brands and have a under average familiarity.
The eye-tracking experiment has been carried out on a number of 20 participants, with ages between 20-25 years. For testing our hypothesis, we have compared with the help of the discriminant analysis in SPSS 20.0 the total viewing time (dwell time in ms) and the entry times (the moment of the first watch in ms) for the two advertisings (overload condition with 6 objects and reduced info condition with three objects). The results are presented in the following section of the article.

Results and discussion

The discriminant analysis of the total times resulted from the eye-tracking experiment show that the consumer watches for a longer time the objects of the advertising in the reduced info condition in comparison to the overload condition, as it can be observed in table no. 1. Significant results can be observed for the comparison of the total viewing times of the text with the main message of the advertising (F=41.7, p=0.000), for the comparison between picture 2 in the overload condition with the single picture in the reduced info condition (F=15.7, p=0.000) and the logos of the two advertisings (F=5.2, p=0.027). The main message of the advertising in the reduced condition has been watched for an average time of M=5599.4 ms (SD=1563.1), which represents more than twice of the time in which the text message has been watched in the overload condition (M=2168.1 ms, SD=1787.1). The single picture of the reduced info condition has been watched for a longer time (M=2344.8 ms, SD=1206.6) in comparison to any of the three pictures in the overload condition (M_1=1886.4 ms, M_2=1024.9 and M_3=1669.8). The logo of the two advertisings has the shortest viewing time for both conditions. The logo of the reduced info condition (M=823.2, SD=624.3) has been watched for a longer time in comparison to both the logo (M=438.2, SD=415.0) and the description (M=664.9, SD=1288.1) provided in the advertising in the overload condition. Moreover only 17/22 consumers have watched the logo in the overload condition in comparison to the 20/22 consumers who have watched it in the reduced info condition. The description of the touristic destination in the overload condition has been watched only by half of the participants (11/22) showing that it did not catch their attention.

Table no. 1 Overload vs. reduced information condition of eye tracking results based on total viewing time of objects

Object in advertising	Mean total time (ms) in overload condition	Mean total time (ms) in reduced info condition	SD total time (ms) in overload condition	SD total time (ms) in reduced info condition	F	p
Message Text	2168.1	5599.4	1787.1	1563.1	41.7	.000
Picture 1 vs single picture	1886.4	2344.8	1293.2	1206.6	1.3	.254
Picture 2 vs single picture	1024.9		873.5		15.7	.000
Picture 3 vs. single picture	1669.8		1344.7		2.7	.103
Logo vs Logo	438.2	823.2	415.0	624.3	5.2	.027
Description vs Logo	664.9		1288.1		.245	.624

Source: Own research results

Regarding the entry times (the moment when the consumer has first watched an object in an advertising), the significant differences between the entry times for the two conditions, have been for the message text (F=181.7, p=0.025), the comparison between picture 1 (F=5.661, p=0.022) and picture 2 (F=4.183, p=0.048) in the overload condition and the single picture in the reduced info condition (table no. 2). It can be observed that the message text has been the most attractive one, by having an entry time at 304.1 (SD=966.5) ms for the reduced info condition and 817.1 (181.7) in the overload condition. From the standard deviation values, it can be also observed that the dispersion of reactions is lower for the reduced info condition, proving its attractiveness. Picture 1 (entry time 720.5) and picture 3 (entry time 1797.5) in the overload condition have been watched sooner but for a shorter time than the single picture (entry time 2195.5) in the reduced info condition. The logo and the description text have been watched last, but it had a higher dispersion of views for the overload condition (M_{logo}=4468.8, SD_{logo}=3601.6) in comparison to the reduced info condition (M_{logo}=4236.1, SD_{logo}=1915.2)

Table no. 2 Overload vs. reduced information condition of eye tracking results based on entry times of viewing the objects

Object in advertising	Mean entry time (ms) in overload condition	Mean entry time (ms) in reduced info condition	SD entry time (ms) in overload condition	SD entry time (ms) in reduced info condition	F	p
Message Text	817.1	304.1	966.5	181.7	5.443	.025
Picture 1 vs single picture	720.5	2195.5	1510.8	2324.7	5.661	.022
Picture 2 vs single picture	3692.0		2302.9		4.183	.048
Picture 3 vs. single picture	1797.5		1490.2		.415	.523
Logo vs Logo	4468.8	4236.1	3601.6	1915.2	.065	.800
Description vs Logo	3110.6		3550.6		1.557	.220

Source: Own research results

The results of our eye tracking experiment show that an advertising with a lower number of objects gives the viewer the possibility to focus more on the objects of the advertising, by watching them more attentively for a longer time. The lower standard deviation value show a unitary tendency of focusing on the main message of the ad. On the other hand, an advertising with a high number of objects has the capacity provides theoretically more information about the advertised product or destination (in this case), but because of the dispersion of the attention of the viewer, his/her capacity to focus or to memorize the main message is lower. We have also observed, situations in which the user has focused on certain details of the advertising and not on the main message or advertised product (Nistoreanu et al. 2019).

Conclusions

The results of our research confirm the fact that information overload has a negative effect on the attention of the consumers by reducing their focus on the main message of the advertising. The analysis of the views of the consumer show that in an overload condition the consumers have the tendency to watch all displayed objects, having less time to focus on the main message of the advertising. On the other hand, in the reduced info condition the participants have watched the reduced number of objects for a longer time and have focused more on these by having lower standard deviations for it. This results suggest that advertisings should be created with a smaller number of objects and details, in order not to distract the attention of

the viewer. Advertisings should have an attraction element, but it should not distract the attention of the viewer from the main message and the advertised brand.
This results can be also extended to other fields as for instance news posted on the internet or on other social media. Too much information provided to a consumer doesn't necessarily lead to a better informed individual, but on the contrary to a more confused one. Receiving too much information will determine the consumer not to pay attention anymore to the received information and therefore it will not have an effect on his decisions or feelings. The same happens in advertising, where too much information and promotion of a brand will rather distract the attention of the consumer than to inform him about the advertised product.
An important challenge of the advertising industry (and not only of the advertising companies) is to determine the right amount of information sent to its consumers in order to attract their attention and make them focus on the brand.

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