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MEASURING STORE EMOTIONAL EXPERIENCE THROUGH FACIAL ELECTROMYOGRAPHY AND SKIN CONDUCTANCE

Luis Ângelo[1], Paulo Rita[2*], and Francisco Esteves[3]
[1]Auchan, PORTUGAL
[2]ISCTE Business School, Marketing, Operations and Management Department, PORTUGAL
[3]ISCTE-IUL, Psychology Department, PORTUGAL

ABSTRACT

Over the years, the retail industry has experienced many mutations. Therefore, characteristics such as fast adaptation and the ability to make right strategic decisions will most likely lead the company to achieve its intention: generate profit. In order to achieve such situation, knowing your client is the right tool to get the intended goal, so techniques and studies to understand customer behavior have been proliferating. In addition, there is increasing interest in customer experience and the impact that such situations have on customer buying behavior. Therefore, this project applied in a hypermarket of a retail company works as a constructive element on how to develop a Neuromarketing study, where the main goal is to analyze the emotional impact that basic experiential simulation, associated to variables identified on the in-store environment, has on potential customers. Finally, despite the results have not been as conclusive as expected, the experiential environments generated a slight activation that points towards a positive emotional responses.

*Corresponding author: Email: paulo.rita@iscte.pt; Tel: +351 217 903 433

[I] INTRODUCTION

Over the years, the retail industry has faced many complex changes and mostly the market itself has turned highly competitive. Based on this idea, many retail brands are focusing on new variables such as staging experiences within the in-store variables universe. This intention implied an obligation of really know and understand consumer behavior. In this paper we present evidences of a Neuromarketing study that used innovative psychophysiological techniques to the in-store experience.

The main objective of this article is to extract and analyze customers emotional response to the experiential environment staged. Moreover, as second level goals, this project works as constructive element on how to use a different market research tool.

In order to achieve the goals of this project, the conceptual model establishes the foundations of the project, based on three empirical/conceptual models.

The models are Pine and Gilmore [1] on how to stage experiences, Turley and Milliman [2] as identification framework of in-store environment variables and finally Peter Lang [3] integrative model, the major conceptual tool to extract information and measure the identified in-store variables simulated in an experiential way. The psychophysiological techniques in stake in this paper were EMG and SC activation.

After collecting the data; the following step included its statistical analysis through descriptive statistics and validation of the variables significance using Student t' test and Anova. These methods allowed a proper analysis and a conclusion based on statistical evidence.

[II] MATERIALS AND METHODS

2.1 Retail Industry

Acknowledging an increasing competition, Grewal *et al* [4] argued that customers' are demanding and willing to buy in a large variety of stores, given that they are always looking for the products that really fulfill their needs at the best price. Thus, maintaining a customer has become more and more complicated. Therefore there are some important levers of retail success to be taken into account. Grewal *et al* [4] proposed six major retail success levers: store factors, merchandise, supply chain, service factors, price, and technology.

2.2. Experience

In order to proceed with the concept of experience, Sands *et al.* [5] presented two existing models, one by Pine and Gilmore [1] and the other by Schmitt. The Schmitt's model characterizes by a typology of experience built on five key dimensions: Sense, Feel, Think, Act, and Relate (Sands *et al* [5]). On the other hand, Pine and Gilmore model, considered more fairly operational by Sands *et al.* [5], is based on building experiences upon four experience realms: aesthetic, educational, entertaining and escapist Pine and Gilmore [1].

Based on the stated above, Sands *et al* [5] argued that Schmitt's model appears to be appropriate to build brand experiences, while Pine and Gilmore model is a proper tool for the retail industry. Therefore, I'll dedicate my attention to the Pine and Gilmore's Model Pine and Gilmore [1].

Firstly, Pine and Gilmore [1] introduced their model by explaining the two dimensions of experience, one about the participation and the other about the unity or emotional bond created.

Regarding the first one Pine and Gilmore [1] argued that consumers can lie in two spectrums: passive participation - the consumer is a mere viewer of the event; active participation - originates from the consumers' ability to interact in the experience. In what the other dimension is concerned, Pine and Gilmore [1] divided it in two spectrums too: Absorption and Immersion. Absorption - the experience's ability as an assimilation event; Immersion - the ability to interact with the customers in a more deeply engaging moment.

Supported on these dimensions, Pine and Gilmore [1] purposed four realms constructed along the two dimensions. The four realms are Educational, Escapist and Esthetic or Aesthetic and Entertainment Pine and Gilmore [1].
In the realm of entertainment, the customer participates passively in the experience and the connection with the experiential environment is by absorption Pine and Gilmore [1].
As for the Educational realm, it involves the customers' active participation and absorption connection.
Concerning an Escapist experience, consumers' participate actively in the experiential environment and their connection is by immersion Pine and Gilmore [1].
Finally, Esthetic or Aesthetic experiences involve the customers' immersion in the event, but contrary to Escapist they participate passively Pine and Gilmore [1].

2.3. In Store-Atmosphere

The term atmospheric connected to in-store was firstly coined by Kotler according to Sands *et al* [5]. Moreover, Sands *et al* [5], based on Turley and Milliman [2], argues that since Kotler many researches have been made to investigate the impact of visual, aural, olfactory and tactile dimensions in the behavioral aspects.

Therefore, Turley and Milliman [2] showed that atmospheric variables can be constructed in order to generate stimuli that will affect the consumers and, in consequence, result in a behavioural response. Consequently, they also stated that an atmosphere that leads to certain stimulus at a given point in time, can also change and lead to contrasting stimulus later on Turley and Milliman [2].

In-Store Environmental Variables

To explore in-store environmental variables, one needs to identify the variables in cause. In order to do so Turley and Milliman [2] based on Berman *et al* [6], proposed a framework divided in five categories. The 1st four categories were the exterior of the store, the general interior, the layout and design variables, and the point-of-purchase and decoration variables. The last category presented by Turley and Milliman [2] was the human variables.

Focusing on the most relevant categories of in-store variables for this paper, first there is the General Interior Variables Turley and Milliman [2] that include: Flooring and carpeting, lightning, Tobacco smoke, Ceiling composition, Merchandise, Music, Scents, among others variables.

Turley and Milliman [2] came to the conclusion, that general interior variables influence behaviors such as approach/avoidance, time spent and sales. Moreover, they also identified that the most studied general interior variable is Music.

Concerning this category Turley and Milliman [2] identified 14 empirical studies directly linked to this category. And according to the authors, most of the information regarding variables in this category leads to conclude influences such as impact on consumer choices and on sales.

Another relevant category indicated by Turley and Milliman [2] was Point-of-Purchase and Decoration. The variables included in this category are: Point of purchase display, artwork, signs and cards, product display, wall decorations, usage instructions, degrees and certificates, price display, pictures and teletext.

Finally, the last Category identified by Turley and Milliman [2], Human Variables includes the following variables: Employee characteristics, customer characteristics, employee uniforms, privacy, and crowding.

Turley and Milliman [2] added this category to the Berman *et al* [6] model. The authors identified two subareas, influence of other customers and the influence of employees Turley and Milliman [2]. Regarding the first subarea, Turley and Milliman [2] stated that most literature is centered on the crowding variable. The other subarea, more important for this study, is identified in Turley and Milliman [2] as one critical aspect. The reviews of studies lead the authors to conclude that these variables create impact on consumer behavior, both positive and negative

2.4. Neuromarketing

2.4.1. The existing Market research

Currently there is a debate around all the ranges of market research techniques and studies, and their accurate outcome.
Ariely *et al* [7] argued that despite all the range of techniques available for marketers and managers, all of them present some arguable level of realism and quality of data, leading therefore to possible unsound moves.

According to Ohme *et al* [8] this flaw was previously also indicated by others researchers, who considered that the existing market research tools have problems to measure clients behavior at a subconscious and emotional level.

Furthermore, even if Noble admits that those market research techniques and studies have positive aspects, he also adds that they have an important weak point that should be acknowledged, from what people say and think there is a big difference (Lawton *et al* [9]).

2.4.2. Neuromarketing

This discipline appeared, according to Lawton *et al* [9], in University laboratories in an attempt to understand what goes inside consumers' head. Therefore, Neuromarketing comprehends the use of neuroscientific methods to explore consumers' behavior and reactions to marketing stimulus Lee *et al* [10]. Or even, the discipline that focus on analyzing consumers' (conscious and unconscious) response Valentine *et al* [11].

According to Anonymous [12], Neuromarketing covers five major areas. The areas are brands, products, packaging, advertising and in-store environment Anonymous [12].
In consequence Neuromarketing reveals to be an important tool in decoding consumer behavior at a subconscious level. Therefore, by applying neuroscientific techniques Marketers aim to be able to measure effectively marketing stimuli, such as interest, preference, satisfaction, attraction, attention, and emotions.

2.4.3. Neurometric: Emotions

According to Castellar [13] emotional reactions are normally a consequence of environmental stimulus surrounding a person. He argues

that what distinguishes emotions from other types of behaviour is there unconscious root, Castellar [13].

2.4.3.1 Identifying emotions

According to Machleit *et al* [14], in order to measure emotional response, Marketing often recurs to three models of the psychology subject. Those models are differential emotions theory Machleit *et al* [14], eight basic emotion categories Machleit *et al* [14], and pleasure, arousal and dominance dimensions of response Machleit *et al* [14]. As observed, the existing methods are tightly connected to interrogative techniques.

In order to study emotions, Castellar [13] presented three ways to properly analyse emotional responses: verbal information, external behaviour and physiological response. These three ways were also referred by Hazlett *et al* [15].

A) Verbal Information

As Castellar [13] noticed verbal information allows inferring experiential information. This way to explore emotions is cognitive and interrogative, hence emotional conclusions are a result of human answers that possibly will be rational and conscious (although the processes behind these answers might be unconscious).
Nevertheless, as Hazlett *et al* [15] indicated, there is some agreement in the research world that the verbal measurement of emotions present limitations. According to them, emotions are not a language-based process; rather it should include cognition in order to properly infer the emotions of an experience through words

B) External behaviour

Pointed out by Castellar [13] as the emotional behaviour that is manifested by approach or avoidance movements, contacts and interactions with persons or objects, or even gestures and facial expressions.

C) Physiological response

Finally, according to Castellar [13], physiological response are changes in human body resultant from emotional response. This creates two categories of emotional responses, a positive or a negative. Castellar [13] also clarifies that these responses only can be access through a set of psychophysiological techniques. The techniques access different parts of the nervous system: autonomic (such as the electric activity of the skin); somatic (e.g., Electromyographic activity or also known as the muscular activity); and finally central (e.g., electroencephalographic activity or evoked potentials, both related with Brain activity).

2.4.3.2 Psychophysiological models

Castellar [13] indicated that psychophysiological models are divided in three main contradictory ideas, which are Central-peripheral, cognitive-physiological and dimensional-specificity. An overview done by Castellar [13] identifies the existing psychophysiological model. In this paper we only explore the integrative model of Peter Lang.

Integrative model of Peter Lang

Castellar [13] identifies Lang as the developer of the theory on emotions. According to him, Peter Lang [3] looked at emotions not as a unitary phenomenon but as a phenomenon which implies three independent systems (external conduct, verbal information and the physiological response).

This proposition implies the existence of a hierarchical structure composed by an inferior level in which the specificity dominates and a higher level where dimensionality predominates Castellar [13]. This situation is easily understood by an experimental project done by Lang,

relating Skin Conductance (specificity) and Evoked Potentials (dimensionality) as dimensions of Arousal.

Relatively to the divergence on Central-peripherals and physiological-cognitive, Lang understood that emotions can be manifested through cognitive, behavioral and physiological responses Castellar [13].
In conclusion, Lang purposed a model that is at the same time peripherical and central, physiological and cognitive, and finally dimensional and specific Castellar [13].

2.5. Psychophysiological techniques and the physiological response

Electrodermic activity

According to Mandryk *et al* [16] and Castellar 13], this type of technology extracts information from the palm of the hands, i.e., existing glands in the hands react to psychological and thermal conditions. Focusing on the first condition, the psychological significance of the Electrodermic activity is associated to biological factors of environment adaptation Castellar [13].

From a technical point of view, there are two procedures to measure Electrodermic activity. The first, the endogenous, allows the registration of the natural activity of the sudoriferous glands through the placement of two electrodes (Monopolar).

The second procedure (exogenous) measures the resistance or the conductance of the skin. In order to do so, two electrodes are place in the palm of the hand where there is sudoriferous activity Castellar [13].
Moreover, as Ohme *et al* [8] notice, conductance of the skin permits the analysis of changes resultant from the activation of autonomic nervous system. That activation is an indication of arousal (Ohme *et al*) [8], which in consequence is a reaction that reflect emotional response Mandryk *et al* [16].

Nevertheless, the limitation of this technique, according to Ohme *et al* [8], is the ability to measure the level of arousal, not the direction of the emotional response. Therefore, the real emotional measure of a stimuli could not be defined on its own, but it is also true that it could work effectively combined with other techniques as a validation or correlative tool.

Finally, methodologically speaking, Castellar [13] indicated that the electrodes should be placed in a bipolar way in the intermediate phalanges of the index and middle fingers).

Electromyographic activity (EMG)

The Electromyography measures the muscles activation based on their contraction resultant from an electrical reaction Mandryk *et al* [16] and it is considered the principal psychophysiological measure of the somatic nervous system Castellar [13].

Moreover, Ohme *et al* [8] also showed that several researchers validated the Electromyographic (EMG) activity as a method of both emotional valence and intensity.
According to Castellal [13] there are two general ways to measure the Electromyographic activity.
The first has a preferably neurophysiologic use and consists in registering activity through the placement of an electrode needle under the skin Castellar [13].
The second has a preferably psychophysiological use and consists in registering activity of determined muscles through the placement of superficial electrodes Castellar [13].
According to Dimberg *et al* [17], Ohme *et al* (2009) [8] and Mandryk *et al* [16], the muscles identified in the face, as eliciting emotional responses, are the Zygomaticus major (positive emotional response) and Corrugator supercilii (negative emotional response).

Finally, Mandryk *et al* [16] stated that the major disadvantage of this second EMG procedure is the fact that results can be distorted by other muscle activity - talking for instance*.*

Technology Available to perform Neuromarketing

Looking over the technologies available, it is important to have in mind that there is an opposition between technologies, due to its different applications and outputs.

If neuroimaging technologies work entirely in a neurophysiologic level, adjusted to Central and Dimensional perspectives, psychophysiological technologies are used as a way to extrapolate physiologic information, which is clearly linked with peripheral information presented concerning emotions.and specific perspectives, as it could be acknowledged from the information presented concerning emotions.

Neuroimaging Techniques

The table below **[Table-1]** shortly explains the characteristics of the three most used technologies in Neuromarketing studies.

Table 1: Neuroimaging techniques (Source: Adapted from Ariely *et al* [7]; and Perrachione *et al* [18])

Neuroimaging Techniques			
Technique	**Instrument**	**Physical Measure**	**Applied Measure**
fMRI	MRI Scanner	Blood Oxygenation level dependent-BOLD	Metabolic activity
EEG	Electrodes in the scalp	Electrical field in the cerebral cortex	Neural activity
MEG	Requires a magnetically shielded room	Magnetic fields	Neural activity

Psychophysiological Techniques

Regarding these technologies, their usability has been essentially in psychology or related sciences that study human behavior. So, in the scope of Neuromarketing, its use is scarce and the existing studies were performed relatively to advertising, as can be confirm in the research of Ohme *et al* [8]. From all the technologies available to study emotional response, Castellar [13] argued that psychophysiological techniques were the most influential, due to its advantages to register peripherical changes in the human body in result of emotional response. Despite the scarcity of information, the psychophysiological techniques identified by Perrachione *et al* [18] were Voice Pitch analysis (VPA), Galvanic Skin Response (GSR) and Eyetracking. Here should also be included the Electromyography (EMG) **[Table-2]**.

Table 2: Psychophysiological techniques (Source: Adapted from Perrachione and Perrachione, Perrachione *et al* [18] Added EMG information based on Castellar [13]

Psychophysiological Techniques			
Technology	**Instrument**	**Physical Measure**	**Applied Measure**
VPA	N/A	Vocal cord vibration	"Arousal"
GSR (SC)	Electrodes in the palm of the Hand	Skin effects	"Arousal"
Eyetracking	N/A	Pupil Dilatation	"Arousal"
EMG	Electrodes placed in the face	Skeleton-Muscle	Affective valence

Conceptual Model

The three main authors that structure my project are Turley and Milliman [2], Pine and Gilmore [1] , and Castellar [13]. First, Turley and Milliman [2] proposed a reviewed categorization framework. In Table-3 we adapt the variable chosen to the categorization and present some examples of empirical studies made on each of the in-store variables. Second, to properly explore and study the experiential construct, we present the Pine and Gilmore Model Pine and Gilmore [1] on how to stage experiences. This model helps to identify a strategy when developing an experience [**Table–3**].

Table 3: Model to stage experience (Adapted from Pine and Gilmore [1]).

Conceptual Model to Stage Experience			
Developed by	Variable	Customer	
Pine and Gilmore (1998)	Entertainment	Passive participation	Absorption
	Educational	Active participation	
	Escapist	Active participation	Immersion
	Aesthetic	Passive participation	

Regarding the cognitive dimension, the purpose is to apply and interpret a cognitive questionnaire that centers on the valence dimensions: like and interest. The physiological dimension uses two supporting techniques, EMG and SC. The Electromyography (EMG) records the electrical activity of the facial muscles in which two muscles are identifiable, Zygomaticus Major and Corrugator Supercilii. Each muscle brings forth different conclusions, the Zygomaticus reacts with higher activity in a positive

emotional stimuli, the Corrugator is strongly activated by negative emotional stimuli. The Skin Conductance records the arousal level.

Due to the inability to infer whether the arousal level symbolizes a positive/negative emotional reaction, it will work as a supportive tool of the results on the EMG.

Finally, the Integrative model of Peter Lang Castellar [13], it is included as a way to structure conceptually the measurement of the emotional response **[Table-4]**.

Table 4: Conceptual Model to analyze emotions (Adapted from Castellar [13])

Used by	Identifying Emotions	Proposed by	Models	Dependent Variable	Technique used
Castellar (1996)	Physiological Response	Peter Lang (1968)	Physiological	Emotions	EMG
					SC
	Verbal Information		Cognitive		Questionnaire

[III] RESULTS

The data was validated and analyzed through the combination of channels. Here channels are Zygomaticus, Corrugator, Skin Conductance and Cognitive answers.

Glasses product

Firstly, it is important to state that the differences between the two conditions in the different channels (EMG-Zygomaticus and Corrugator; SCL), in this scenario, were not significant, meaning that in all comparisons the $\rho>0,05$. This information can be confirmed in the SPSS Outputs 1, 2, 5 and 6 in appendix (pages 64-66). In light of this evidence, the hypotheses are analyzed through the average activation of the EMG (Zygomaticus and Corrugator), the average arousal level of the SC and the relative frequencies of the cognitive questionnaire.

The results of the statistical tests showed that there is no statistical significant difference between the samples tested. Moreover, in general terms, from the four hypotheses formulated only the H4 turned to be valid.

In order to reach some conclusions, a second level analysis showed through average activation per channel and relative frequency per question of the cognitive questionnaire that, there are slight evidences in the data that point in the direction of Corrugator) is considered to point in the direction of a negative emotional response to the lack of experiential environment.

Concluding, although the statistical tests do not validate the difference between samples tested, I consider that in general terms a situation simulated with an experiential construction (lightning presence) points out to a positive emotional response, while the lack of an experiential construction (lack of lightning presence) points out to negative emotional responses.

Pillows product

Regarding this scenario, once again the statistical tests performed (ANOVA for repeated measures) showed no

experiential environments being associated to positive emotional responses. To reach this direction, I consider the average activation of the zygomaticus (slight higher activation in the lightning situation) and the answers to the cognitive questionnaire (higher relative frequency of answers to the light situation). So, despite the hypothesis H1 has not been considered valid, the second level analysis shows that it points in the proper direction of the formulated hypotheses. This information linked with the validation of the hypothesis H4, evidences that the data extracted from the considered channels (Cognitive questionnaire and EMG-Zygomaticus) points in the direction of a positive emotional response to the experiential environment simulated.

The opposing simulated situation (no light), points out to a negative emotional response. To reach this direction, I reflected on the information extracted through SC and Corrugator channels. Regarding the Corrugator channel, the average activation revealed to be slightly prominent in the no light situation, which means that the information extracted and analyzed at a second level points in the direction of the formulated hypothesis (H3). Concerning the arousal level, I consider that the information analyzed at a second level revealed that the arousal level was slightly higher in the no light situation. This means that the extracted information points in the direction of not validating the hypothesis formulated (H2). Therefore, the information extracted from these two channels (SC and EMG-

statistical significance ($\rho>0,05$) on the samples tested (SPSS Outputs 3,4,and 7 pages 64-66 in appendix). Consequently, the validation of hypothesis is done by analyzing the average activation of the EMG (Zygomaticus and Corrugator), the average arousal level of the SC and the relative frequencies of the cognitive questionnaire.

Hence the results of the statistical tests showed that there is no statistical significant difference between the samples tested. Moreover, from all the eight hypotheses formulated only the H11 was considered valid. So, to reach some statistical directions I analyzed the information based on a descriptive statistics (Second level analysis).

Starting with the simulated situation that includes the presence of store employees' as educational help, the information was validated through the EMG-Zygomaticus and Skin Conductance channels. The evidences found on the hypothesis formulated (H7, H8) point out to a positive emotional response. Hence, the analysis of the average activation (Zygomaticus) and average arousal level (SC) suggests slightly higher results, that point in the direction of a positive emotional response for the presence of store employees' as tool of educational help.

In what concerns the situation with the educational posters in the scenario, the information was validated through cognitive questionnaire. In this situation I had, in fact, a hypothesis that is valid, H12. Moreover, it should be noted that in this situation it was registered the second highest average arousal level (SC channel). Nevertheless, the hypothesis H6 was not considered to point in the right direction. Assuming these evidences, I consider that the educational posters point out to a positive emotional response, mainly through the result of the cognitive questionnaire (higher relative frequency), despite being a weaker experiential variable (only one channel point consistently in this direction).

Also regarding the two previous situations (employees' presence and Posters) simulated in the pillows scenario, it should be noted that the results of average activation of the Corrugator channel could be understood as pointing out to a negative emotional response. Nevertheless, this situation can be explained through the effort that each candidate made to read the information in the posters and to visualize better the store employee. Acknowledging this, I have to note that this type of experience should not be considered when thinking in consumer response to store environmental variables studies through psychophysiological techniques.

Finally, regarding the scenario that includes a situation without any kind of educational help, the evidences extracted from the hypothesis formulated (H9 and H10) do not point out to a negative emotional response. Nevertheless, the only channel that could point out to a negative emotional response is the cognitive questionnaire. In this case, since the Corrugator channel results were influenced by meaningless facial activity, due to an effort to read and to properly see the store employee, this situation was not considered to point in any direction.

In conclusion, despite the statistical tests do not validate the difference between samples, I consider that in general terms both educational experiences seem to point out to a positive emotional response, excluding thereof the influential situation stated above. Concerning the lack of educational experience, it is important to attain the lack of evidences pointing in any kind of direction (neither positive nor negative).

Tableware Stimuli

Firstly, it is important to state that from the statistical tests performed (Student t' test of paired sample), the conclusion was that none of the samples revealed to be statistically significant ($\rho > 0,05$) (SPSS outputs 1, 2, 5, 6 pages 64-66). Hence, the validation of hypothesis is done by analyzing the average activation of the EMG (Zygomaticus and Corrugator), the average arousal level of the SC, and the relative frequencies of the cognitive questionnaire.

Moreover, it is also important to state that the simulated situations in this scenario (tableware) are weak, due to some contradictory facts. Therefore, I used a different perspective and rather looking to the data as positive and negative emotional responses, I firstly analyzed the situations that generated engagement from the candidates' behalf.

In this experiential scenario, like in the other two scenarios, the results of the statistical tests showed that there is no statistical significant difference between the samples tested. Moreover, the second level analysis (descriptive statistic) did not allow any kind of specific direction in the emotional response. Nevertheless, the second level analysis (descriptive statistic) shows that the average activation in some channels (Zygomaticus, Corrugator and Cognitive questionnaire) turned to be slightly higher in the situation with a constructed product display. This information is also presented and was referred in the analysis of hypotheses H13, H15 and H16. Based on this evidence, I consider in fact that a situation with a constructed product display points in the direction of creating engagement compared with the opposing simulated situation.

In conclusion, despite not being possible to point in any kind of direction of emotional response, the extracted information from the channels allowed to acknowledge that a constructed product display in the scenario creates engagement. This perspective could lead to emotional response; however one may not be able to determine the direction of that emotional response due to the weakness of the data

[IV] DISCUSSIONS

Being aware that the retail industry is a fast changing environment in all its variables (e.g. price, product development, promotions, in-store environment), the data collected and now summed up revealed some interesting findings, through the use of different methods and tools to analyze consumer behavior.

The evidences of the bibliographic review pointed out that retail managers are constantly attempting to boost their business. Moreover, regarding the constructive process of each experiential situation, it involved simple changes in the environment, which do not mean a significant investment but rather a use of existing resources. Hence, the lack of big differences in the activation within each channel is believed to be the consequence of the stated above. This resulted in none of the statistical tests being statistically significant (all $\rho > 0,05$).

Starting with the in-store variable (lightning), despite I cannot postulate a statistical significant difference in the samples tested

and supported on a second level analysis (descriptive statistic), I consider that the information collected shows slightly differences in the samples (Zygomaticus and Cognitive questionnaire), pointing out in the direction of a positive emotional response. The opposing simulated situation (no light) goes in the direction of a negative emotional response. To reach this direction, I considered the information extracted through SC and Corrugator channels. Therefore, the lack of experiential environment is considered to point in the direction of a negative emotional response.

So combining our results with the bibliographic review, we consider our findings consistent with the perspectives reviewed by Turley and Milliman [2]. This means that experiential environments, including lightning, can influence the subconscious behaviour of a customer and most likely generate interest over a product while in-store. The flaw is the inability to prove the influential direction on sales, nevertheless the influential on the enhancement of the product can ease the outcome, the sale.

Moreover, my data also evidenced an example of a possible risky situation resultant from the cognitive questionnaire. The fact arose due to the divergence in what people say. The cognitive questionnaire implied testing two valence dimensions (like and Interest), and despite being two different valences the intention was to point in the same direction. In the first question the answers were clear and consistent and pointed to a higher relative frequency for the presence of lightning in the scenario. The divergence appeared in the second question. In this case, the pattern of answers showed higher relative frequency for an option that was in fact a tricky option (product display that was not altered). Therefore, this example becomes an evidence of a possible flaw associated with the quality of information that is extracted in interrogative studies.

Concerning the second, it includes two simulated situations with in-store variables (Store employees'; Posters/Signs). The overall conclusion of my data was that, although I could not postulate a significant value of the statistical tests, the second level analysis shows differences in the samples that point in the direction of positive emotional responses for educational experiential construct. On the contrary, the lack of experiential construct did not point in any kind of direction of emotional response, due to the lack of consistency in the data collected.

Despite this, between both experiential environments, my analysis evidenced that the presence of store employees' as educational element point out a higher positive emotional response compared with the presence of educational poster, hence the human variable is possibly understood as the most influential of the customer emotional response.

Hence connecting with the information reviewed by Turley and Milliman [2], signs with more information are more effective, meaning increasing sales. This just proves that positive

emotional response expectably links with more likelihood of sales.

Concerning the human variable, Turley and Milliman [2] showed that employees' presence is seen as evidence of service quality, e.g. the employees' presence near a product will make the customer notice the overall service as having more quality. Hence, the overall perception of the service could presumably lead to more sales.

Moreover, my data also shows the divergence between what people say and think as Lawton et al [9] noticed. This fact was seen through the comparison of the EMG-Zygomaticus and the cognitive answers that validated different simulated situations of positive emotional response. In the EMG-Zygomaticus case, the presence of store employees' as an educational tool point out to a positive emotional response. While in the cognitive questionnaire, the situation that consistently generated higher relative frequencies was the simulation with posters as an educational tool. Nevertheless, it should be referred that both situations are part of the educational experience strategy, so there is not an indication in the opposite side.

Finally, regarding the last in-store environmental variable product display, the results can be seen as contradictory or divergent with my study. Nevertheless, this view is wrong; it is true that concluding whether one scenario generated positive emotional response compared with the opposing scenario, in this simulated environment, was not possible. To overcome this perspective, I used a different approach. So, I intended to identify which simulated situation created a higher engagement.

The data collected of this in-store variable shows that the simulated situation (constructed product display) within the perspective of experiential environment points in the direction of creating engagement.

Hence, although I could not determine any direction of emotional response, the extracted information from the channels allowed acknowledging that a constructed product display in the scenario points in the direction of creating engagement. This perspective could lead to emotional response, without being able to determine the direction of that emotional response due to the weakness of my data.

Therefore, connecting my conclusions with the research done by Turley and Milliman [2], product display is seen as a variable that influence buying intentions and sales. So, since the constructed product display points in the direction of creating higher engagement compared with the opposing situation, it can be considered consistent with the authors' perspective that an experiential setting can presumably influence sales or being an influential factor of purchase intentions.

The general conclusion of this project supports that, using the conceptual model of Pine and Gilmore Pine and Gilmore [1] on how to stage experience is in fact an important tool to construct scenarios according to an experiential strategic view. This

SPECIAL ISSUE

strategic view could be seen as too theoretical, but no other model is adjusted to support the construction of experiential environments regarding in-store variables.

Moreover, also a part from the discussion of my data, Ariely *et al* [7] argued that the costs associated with the technology used (psychophysiological techniques in this case) in a Neuromarketing study are normally referred as justification to reject the application of this highlighting study about consumer behaviour. Nevertheless, I should also note that this fact was referred to the neuroimaging techniques. Hence, through this project, companies, managers and marketers can become aware of other techniques apart from neuroimaging, some of them more cost effective than others.

Finally, it is important to address the research goals. Starting with the main goal, the results do not allow to infer more than emotional response directions, therefore I conclude that this purpose was not fully achieved. Regarding the second level goals, I conclude that they were properly achieved and this project can be seen as a learning tool to managers, retailers, and entrepreneurs

Limitations

Regarding limitations, I have to point out that the major one is the lack of studies published about Neuromarketing and even the existing ones seem to be short on information or with an important volume of conceptual information, hence lacking empirical data. This evidence was also raised in studies of Ohme *et al* (2010) [19] and Valentine *et al* (2009) [11].

Moreover, in the data collection step two facts arose. First, due to my lack of experience in video recording and quality of the camera, the final result seen by candidates had low quality. In consequence it limited and influenced the outputs. Second and final, when the candidates had to read information from the poster and to focus on the employees' presence showed a limitation of the EMG technology. The candidates were obliged to make an effort to properly perceive what they were seeing. This situation generated meaningless facial activity

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CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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ABOUT AUTHORS

Paulo Rita *is Professor of Marketing at ISCTE Business School (ISCTE-IUL), Lisbon, Portugal, and Member of BRU-IUL Research Center. He holds a PhD in Marketing from Cardiff Business School, UK and a PostDoc in E-Marketing from the University of Nevada Las Vegas, USA. Prof. Rita is an Executive Committee Member of EMAC (European Marketing Academy), and an Executive Committee Member of EDAMBA (European Doctoral Programmes Association in Management and Business Administration). He is Director of the PhD in Marketing (ISCTE-IUL) and Director of the Master in Hospitality and Tourism Management (ISCTE-IUL) in partnership with the University of Central Florida, Orlando, USA. His research Interest focus on Consumer Behavior, E-Commerce, Business Intelligence and Tourism Marketing.*

Luis Angelo *is graduated in Geography by Lisbon University and Master in Science of Business Administration by ISCTE-IUL (Portugal). He is management controller at Auchan Group in Portugal*

Francisco Esteves *is Assistant Professor at Department of Social and Organizational Psychology at ISCTE-IUL.*