THE EFFECTS OF COLOR ON APPROACH/AVOIDANCE BEHAVIOR

A Master's Thesis

by

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To my wonderful parents; Ünal Özmen and Oya Özmen

&

my precious grandmother Emine Alpergun

THE EFFECTS OF COLOR ON APPROACH/AVOIDANCE BEHAVIOR

Graduate School of Economics and Social Sciences
of
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by

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September 2014

I certify that I have read this thesis and have found it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Fine Arts in Interior Architecture and Environmental Design.

Assoc. Prof. Dr. Nilgün Olguntürk
Supervisor

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ABSTRACT

THE INFLUENCE OF COLOR ON APPROACH AND AVOIDANCE BEHAVIOR

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The aim of this study is to analyze the influence of color on approach avoidance behavior. For a better understanding of approach avoidance behavior both the hue of color and the location of color are studied. The experiment is conducted with six different sample groups and three different color settings which are gray, red and green. Under the three main color settings there were two sub settings as when the color is on the right and when the color is on the left. All the atmospheric properties other than color were kept same. University laboratory was turned into an environment where four identical stands that worked as displays for the items placed on them, a mirror and a seating unit was placed. The items exhibited were all women sports outwear of similar design and color. The participants were 108 students from Bilkent University. Each participant was taken in individually and asked to experience the space freely. Each participant was evaluated in terms of the total amount of time spent in the environment, number of items touched, time spent for investigating items, time spent for browsing items, number of items tried and their orientation patterns in the environment. All the constructs listed above were derived from the Mehrabian-Russell Stimulus Response Model. It was induced that the hue of the color does not have a significant influence on approach/avoidance behavior. However, the location of color in the environment has a strong influence on the orientation patterns of individuals and therefore associative with approach and avoidance behavior. It was observed that, people tend to go towards the differently colored part of the room.

Keywords: Approach/Avoidance Behavior, Color, Mehrabian-Russell Environmental Psychology Model

ÖZET

RENGİN YAKLAŞMA VE KAÇINMA DAVRANIŞLARI ÜZERİNDEKİ ETKİSİ

Özmen, İpek
İç Mimarlık ve Çevre Tasarımı Yüksek Lisans Programı
Danışman: Doç. Dr. Nilgün Olguntürk

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Bu çalışmanın amacı, rengin insanların yaklaşma ve kaçınma davranışları üzerindeki etkisini incelemektir. Yaklaşma ve kaçınma davranışlarının daha iyi anlaşılabilmesi amacıyla rengin hem nüans öelliği hem de çevredeki konumu çalışılmıştır. Deney, altı farklı denek grubu ile üç farklı renk düzenlemesinde yağılmıştır. Bu üç farklı renk, gri, kırmızı ve yeşil olarak belirlenmiştir. Her rengin altında iki farklı konum düzenlemesi olup renk önce odanın sağ sonra sol tarafına yerleştirilmiştir. Rengin nüansı ve konumu haricindeki tüm atmosferik özellikler sabit tutulmuştur. Üniversite'nin çevre laboratuarı içeride dört adet özdeş masa, bir adet ayna ve bir adat oturma ünitesi bulunacak şekilde yeniden düzenlenmiştir. Bu dört adet özdeş masa içeride sergilenecek olan öğelerin teşhiri için yerleştirilmiştir. İçeride sergilnen öğelerin tamamı benzer renk ve tasarımları olan spor kadın dış giyim ürünleridir. Deneyde yer alan katılımcıların tamamı Bilkent Üniversitesi öğrencileridir ve toplamda 108 kişi deneye katılmıştır. Tüm katılımcılar içeriye teker teker alınmış ve odayı istedikleri şekilde deneyimlemeleri rica edilmiştir. Katılımcıların davranışları içeride geçirdikleri toplam süre, dokundukları öğe sayısı, öğeleri incelemek için geçirdikleri süre, denedikleri öğe sayısı, öğeler arasında geçirdikleri süre ve içerideki yönelim biçimleri çerçevesinde değerlendirilmiştir. Bahsedilen davranışların tümü Mehrabian-Russell modelinden yola çıkarak belirlenmiştir. Yapılan deneyin sonucunda, rengin nüansının yukarıdaki davranışların hiçbiri üzerinde dikkate değer bir etkisi olmadığı gözlenmiştir. Buna rağmen, rengin çevredeki konumunun yönelim biçimleri üzerinde etkisi olduğu ve dolayısıyla yaklaşım ve kaçınma davranışlarıyla da alakalı olduğu gözlenmiştir. İnsanların, bir çevrede farklı şekilde renklendirlmiş bölümlere yöneldiği gözlenmiştir.

Anahtar Kelimeler: Yaklaşım/Kaçınma Davranışı, Renk, Mehrabian Russell Çevresel Psikoloji Modeli

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CHAPTER 1

INTRODUCTION

Shopping, beyond question, is one of the earliest activities of human kind. It might have taken many different shapes through the history of civilization but substantially the concept stays the same. In the primordial times, before the invention of money, what is meant by shopping is barter where people used to turn in an equal worth of something else in exchange of a need. Later on, everyone started to turn in a common merit in exchange of what is required, which goes by the name of money (Humphrey, 1985; O'Sullivan and , Sheffrin, 2003).

As primitive as the history of shopping, manufacturers, suppliers, designers, pretty much everyone in the industry are in a great race of attracting the customer. With the urge of the mass production, this race has grown major and has taken different shapes. Creativity and brand insight has become to be an important matter of concern in this race, as people's brand choices became to be a prestige element. This brought along the concepts of brand

patronage and brand loyalty (Lichtenstein, Ridgway and Netemeyer, 1993; Baker, Grewal and Parasuraman, 1994; Baker, Grewal, Parasuraman and Voss, 2002).

Product design, by all means, is probably the most important reason for choosing a brand among the others. However, what is more visible to everyone before the product itself is how that product is exhibited. In the current system, the main exhibition area for the product is the store environment. However, especially the background, shelf or stand is the immediate and more specific surrounding for the product. Once the customer is drawn to that specific environment, (s)he receives information about the product(s) placed in the environment and focus is shifted from the environment to the product itself. However, before that immediate surrounding of the product, the consumer should first be drawn to the store, which is the main environment.

Other than the product design itself, there are many different ways to draw the attention to the store. Advertisements, glass case design, music, odor, layout, color, lighting design, staff consumer relationships and many other factors are all influential on giving a reason to the consumer to choose a particular brand among others (Berman and Evans, 1979; Turley and Milliman, 2000). The above listed elements of a store are known to be influential on consumer behavior. What is meant by consumer behavior is; the process and activities people engage in when searching for, selecting, purchasing, using, evaluating, and disposing of products and services so as

to satisfy their needs and desires” (Belch and Belch, 2007). Based on all the information above, this study has chosen to investigate the influence of color design on consumer behavior. It is hypothesized that by the help of color design, it is possible to draw the attention of the consumer to an intended part of the store. Surely, this hypothesis is valid either for the whole store or a specific part of the store where a particular product is exhibited.

The main restriction of this study is not being able to work in a real store setting but in a laboratory where a prototypic store environment might be simulated and where people could walk through and investigate the merchandise like they do in a real store setting. As a solution for this, it is avoided to make people perceive the setting as it is a real store but more they are only asked to investigate the merchandise inside as the feeling of shopping is almost impossible to simulate. Another restriction is that, as the whole theory of the study depend on consumer behavior, the attendants of experiment should be observed by the researcher which might cause the attendants to feel nervous and change their natural behavior. Therefore, it is avoided to contact the attendants as much as possible unless they ask a question and all the information is given before they entered the setting so that the observer is no different than an ordinary staff in a real store.

1.1 Aim of the Study

This study is broadly about understanding consumer behavior in relation to store design. Consumer behavior is generally reviewed as the target consumer's mediating behavior displayed in between entering the shop and buying a merchandise (Billings, 1990). What is meant by mediating behavior in this study is whether consumers can be attracted to a specific part of the store, induced to spend more time in the store and to investigate more items closely in the store. A particular real life store setting is not used, however the study mostly focuses on women outwear items which displayed in the university laboratory .

Among many store design and ambient elements that might be influential on consumer behavior like; store layout, odor, music, temperature etc.; color scheme is chosen to be investigated over consumer behavior. In other words whether consumers can be manipulated to approach a specific part of the store, to spend more time in the store, to investigate the store in general and some items particularly by the help of color scheme of the store.

This study uses Mehrabian - Russell (MR) (1974) stimulus response model as an arbiter for the particular consumer behavior to be investigated in the research. The mediating behavior mentioned above are all derived from the Mehrabian - Russell (1974) theory and are used as the central constructs of this study. Therefore, it is possible to say that this study assembles consumer

behavior, environmental psychology and building science under the same roof. Per contra, by not working on a specific store setting, this study aims to make everything procured in this research to be a useful information and beacon for further studies and marketing strategies of many stores in several industries.

1.2. Structure of the Thesis

Research made on the topic practices upon many different disciplines such as environmental psychology, consumer behavior, marketing strategy and building science. For this reason, information gathered to build up the central constructs of this study are a combination of the disciplines listed above. In order to be able to analyze each topic particularly each discipline and the interdisciplinary relationships are examined separately in seven different chapters.

The first chapter is the introduction part. In this part, what is meant by mediating consumer behavior, Mehrabian - Russell (1974) model and store atmospherics are briefly explained. In addition to these, the aim and the scope of the study and also the structure of the thesis are also covered.

Second chapter is the behavioral analysis of the consumer over the Mehrabian-Russell stimulus response model. In this part, mostly the working principle of Mehrabian - Russell model is explained. The subdivisions of this

chapter include the dimensional structure of the model which is the Pleasure - Arousal - Dominance (PAD) scale, application of the model which is Stimulus - Organism - Response (SOR) theory and the individual differences that might be influential on the working principle of the model areexplained. PAD scale is a model that is developed to measure the emotional states where pleasure, arousal and dominance are the main dimensions. SOR theory is the main working principle of the MR model where the PAD scale refers to process that determines the final response of the organism. In this chapter the relationship between the structure and application of the model and how this relationship can be applicable to this research will also be analyzed (Mehrabian and Russell, 1974).

Third chapter is the definition of store atmospherics. Store atmospherics include all the tangible and intangible elements in the store that manipulate the behavior of the customers. As it is mentioned before there are many elements of store atmospherics including major subdivisions such as store ambient factor, store design factor and store social factor. These three main subdivisions include several other subdivisions. Store ambient factor, for instance includes many elements such as odor, temperature, music, lighting and texture. Similar to this, store design and store social factors also have several different elements. In this chapter, lighting as a store ambient factor and color as a store design factor areanalyzed along with their relationship and how they work in the store setting.

In chapter four, the experiment is explained including the aim of the study, research question and the hypothesis of the research. In this chapter the methodology is also covered explaining the experiment setting, data gathering and sampling methods and the procedure of the experiment. After the experimentation procedure is explained, the results induced from the study areanalyzed. Statistical analysis and statistical results areincluded in this part as well.

In chapter five the findings represented in the previous chapter arediscussed. More qualitative, solid and valid results derived from the quantitative and abstract statistical data arepresented in this chapter.

In chapter six the conclusion derived from combining the information gathered from the literature and results gathered from the experiment areexplained. In this chapter the limitations of the study along with the suggestions for improving the study and the study’s contribution to the current literature will also be discussed.

CHAPTER 2

BEHAVIORAL ANALYSIS OF THE CONSUMER

People buy. Almost everyone gets involved in a buying activity several times, all through their lives. When it is named shopping, as used in daily life, most of us perceive it as an arbitrary activity. However, when it is named buying, the necessitative aspect of it comes to light. It is not completely wrong that buying is an arbitrary activity yet it would be deficient to say that it is only an arbitrary one. It is highly necessitative. For this reason, the hypercorrect point of view would be defining shopping as a need that has an arbitrary aspect.

At this point, it would be accurate to analyze the shopping activity from the two different aspects mentioned above; the necessitative one and the arbitrary one. No matter which one, shopping activity that takes place in a retail setting, is induced by the awareness of an unsatisfied need (Bohl, 2012). This need should not always be thought of as some item. This need might range from running out of milk to simple urge to shop. Engel and Blackwell (1982) have designed a plain model to explain this behind the

scenes of consumption decision (see Figure 1). Resolving their model, they have proposed that there are five stages of information processing before someone decides to purchase something. The first stage, known as the problem recognition, is where the awareness of a so called need or problem commences. The next and the second stage, named as searching, is where the subject starts looking for several alternative solutions for the problem/ need recognized in the first stage. In the third stage, named as evaluation, is where the subject starts evaluating the several alternative solutions to come up with the best possible solution for the problem. It's not until the fourth stage the subject decides on which alternative will set the best solution for the problem and purchase anything. Therefore, this stage is called the purchase stage. In this fourth stage, subject makes up his/her mind and purchases the item that fits best as a solution to the problem/need. The purchase process might seem to be complete at this point yet it is not. The subject, or in other words the consumer after this point, goes into a post-purchase period where the given decision is re-evaluated depending on the yields of the product in the utilization phase (Engel and Blackwell, 1982). This model can be thought of as the shopping chain of a utilitarian shopper, which in other words is referred to as planned shopping behavior chain where cognition wins over emotions. In other words, if self control can predominate over impulsivity then the subject might be able to think consciously and in a restrained manner to review the options and making a decision among them to go for the most suitable one (Coley, 2002). However, most of the time self control might not be able to predominate over impulsivity. Ninety percent of the shoppers are overwhelmed by their emotions and their urge to buy and

so that the purchase occasionally happens on impulse (Welles, 1986). As Coley also proposes, when impulsivity (emotion) is stronger than the self control (cognition), the two stages (stage 2 and 3) are bypassed by the emotional process that happens right after the problem recognition stage (stage 1) (see Figure 2). Therefore, it would be possible to replace stage 2 and 3 with a single stage of emotional response in an adjusted model. In other words, analogically, it would be possible to replace the cognitive process of the subject with his/her emotional process (Coley, 2002).

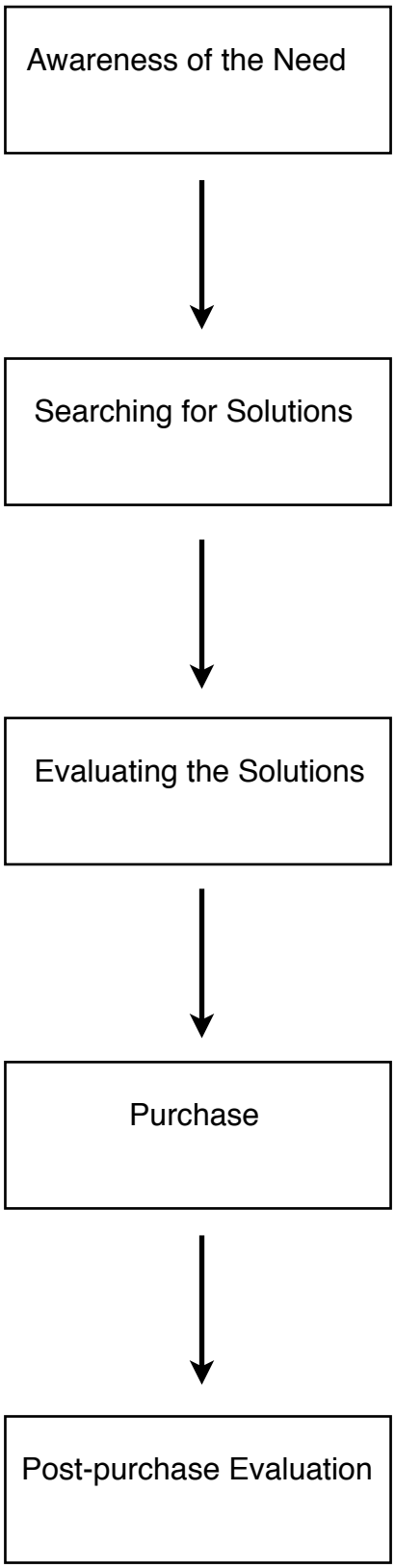

Figure 1. The model proposed by Engel and Blacwell (1982) on decision making process of the planned consumer

Until this point it is possible to see that, there are two main ways of purchasing an item. The first one is the planned purchase which is a cognitive process that does not include any emotionally given decision or any uncontrolled desire/urge to buy something. The subject of the purchase is usually a product oriented utilitarian shopper who is not easily susceptible by external stimuli (Dawson, Bloch and Ridgway, 1990; Babin, Darden and Griffin, 1995). A planned purchase, for instance, might start with realizing that there is no bread left at home so that the subject goes to the grocery store and directly travels to the bread aisle. At the aisle he/she will face with several types of bread with several different properties such as taste, color, smell, calorie value and price. After encountering alternative solutions, the subject would probably decide on a single type of bread considering the different properties and find the most suitable one. Then the subject would travel back to the cash point, purchase the bread and cap off the shopping.

On the other hand, if the subject have stopped by any other item or shelf on the way to the bread aisle or back and if that item is purchased among with the bread afterwards, this would be an unplanned purchase that stroke the subject instantaneously in the store. In other words this purchase can be categorized as impulse purchase. The subject of this type of purchase is usually a hedonic person who is more easily susceptible by external stimuli that urges him/her to buy (Babin et al., 1995).

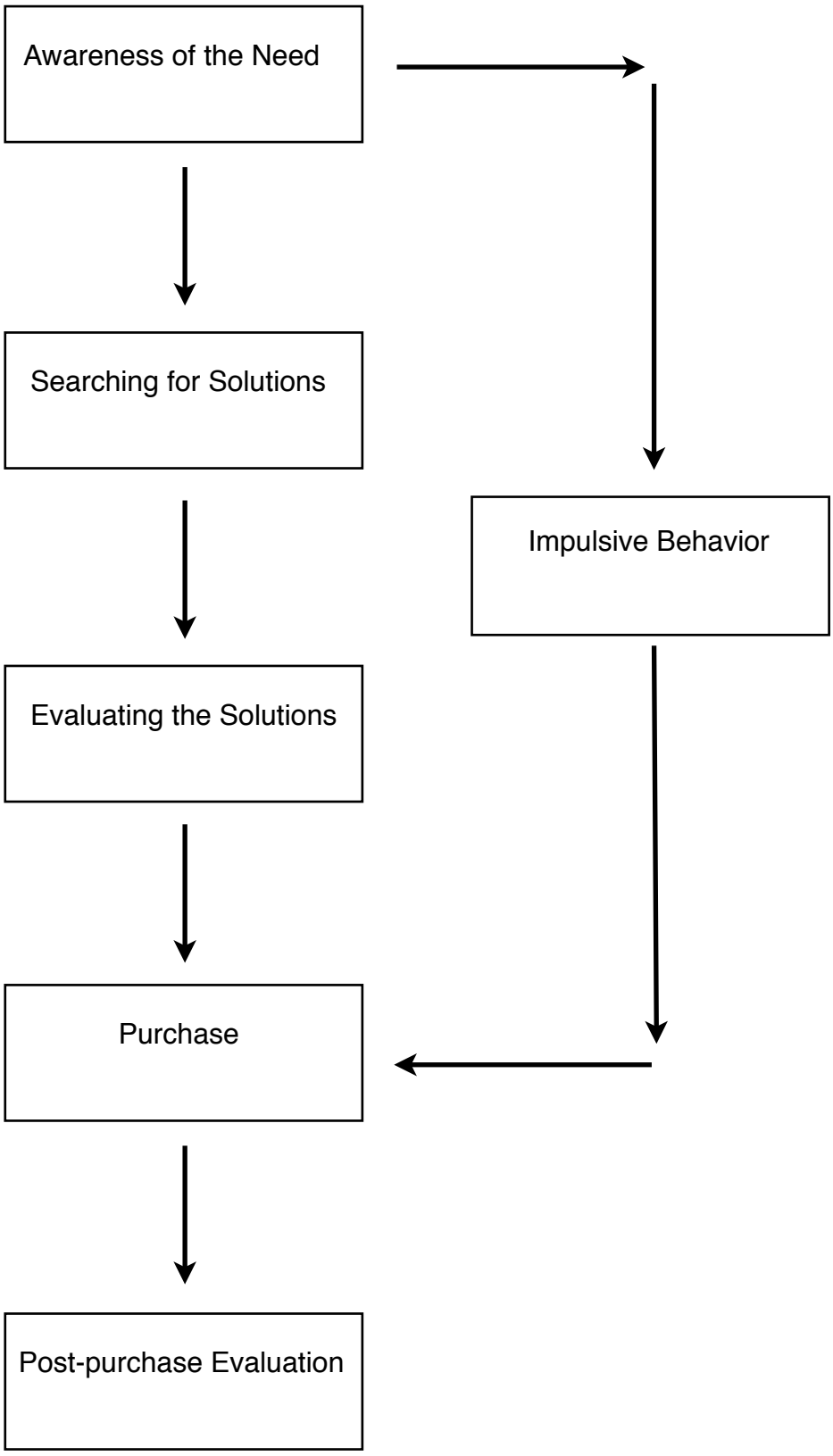

Figure 2. The adjusted model proposed by Coley (2002) on decision making process of the impulsive consumer

There might be several ways of impulse buying. This scenario might be valid for someone who goes to shopping with a specific item in mind yet purchases something unplanned as well as it is valid for someone who goes to shopping with nothing in mind but purchases something not planned before. Both cases would be counted as impulse buying. Stern (1962) has proposed a classification for this different ways of impulse buying. He asserts four main classes; pure impulse buying, reminder impulse buying, suggestion impulse buying and planned impulse buying. Pure impulse buying is the real impulse buying which is done only for a change or a break away that causes from an emotional urge to buy and which breaks the normal buying pattern of the subject. Reminder impulse buying is recalling of a need when facing the item randomly while shopping for something else. For example, while shopping for milk, buying cereals because milk reminded you of cereals which is lacking at home for a while or just encountering the cereals stand and recalling that there aren't any cereals left at home. Suggested impulse buying occurs when the subject encounters a product that is totally unfamiliar with and that he/she doesn't have any knowledge in advance so that the urge to buy comes out of the novelty. The impulse purchaser encounters the product and evaluates it while completing the sale at the point of purchase. Finally, the planned impulse purchase occurs when the subject is determined for a purchase when entering the store yet the decision is given upon the special offers, sales and similar offers. No matter for which of the above reasons, impulse purchase in general is an emotional response to the in-store stimuli, that motivates the purchaser to buy something that is not planned beforehand (Stern, 1962).

Until this point, it is certain that the purchaser enters the store either with the idea of a purchase in mind or totally randomly without even planning to purchase something. After this first step, purchaser encounters an in-store stimuli and he/she gives a response to what has been encountered. If the emotions (impulsivity) win over cognition (self control), the stimuli takes a positive feedback and the item is most likely to be purchased if anything does not interrupt with the emotional process (Tai and Fung, 2011). Herein, everything besides the emotional process that happens in the consumer, is clear. Therefore, the emotional process of the consumer should be resolved henceforth.

2.1. Mehrabian - Russell Stimulus Response Model

The two environmental psychologists Albert Mehrabian and James Russell (1974) have came up with a stimulus response model. What Mehrabian - Russell (M-R) model proposed is; focusing on the emotional impact that is created on an individual (the consumer) by the physical stimuli and the tangible behavioral response caused by this impact might explain how the environmental cues (store environment) influences the response (buying probability of the consumer) of the individual (Mehrabian and Russell, 1974). However, different than other environmental psychology models, this one has been reviewed by both Albert Mehrabian (1980) and Russell and Pratt (1980) separately afterwards, depending on the application of the model to store environments by other scholars and researchers like. For this reason, the

model has been applied and approved several times in store environments. Many studies that work on store atmospherics use M-R model to explain the possible emotional responses of the consumer. As Kotler's (1973) definition also states store atmospherics should create environments that triggers specific emotional impact in the consumer and this specific emotional impact is majorly described by Mehrabian and Russell (1974) model.

2.1.1. Working Principle of the M-R Model

The main working principle of the model depends on a process that consists of three elements. These three elements are; stimulus, organism and response (S-O-R paradigm) (see Figure 3). Rather than elements these three can be referred to as steps of the process as they work respectively. In order to be fully knowledgeable about the S-O-R paradigm, the stimulus taxonomy, the set of intervening mediating variables and the taxonomy of possible responses should be analyzed extendedly (Mehrabian and Russell, 1974). In this chapter, the S-O-R paradigm areexplained in general yet the organism dimension of the paradigm areexplained more exhaustively in the following sections. In this section, the stimulus and response taxonomy areanalyzed particularly.

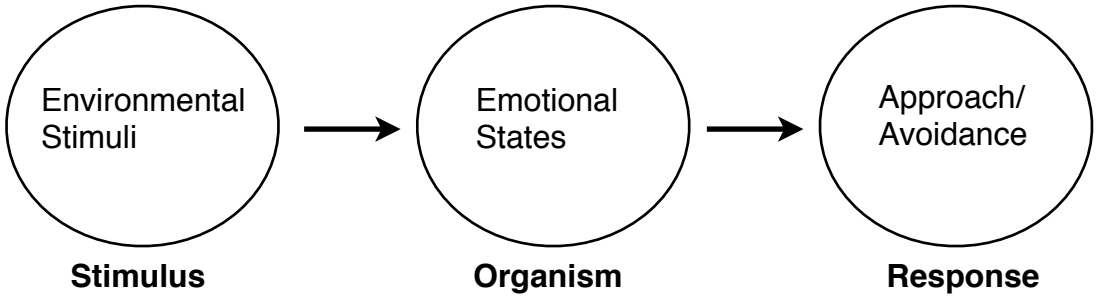

Figure 3. Chart showing the working principle of M-R model (S-O-R paradigm) (Tai and Fung, 2011)

2.1.1.1. Stimulus Taxonomy

Firstly, we have the stimulus or the environmental stimuli (S), that triggers the emotional response in the organism (O). Environmental stimuli exposure in a store can be in several ways such as the displays, layout, atmosphere, sales personnel, other customers, special offers, advertisement and many other elements. Therefore, to reduce it to a simpler level Mehrabian and Russell propose a general measure of store atmospherics which is the information rate or the “load” of the environment that causes a certain level of emotional response in the organism (consumer) (Mehrabian and Russell, 1974; Mehrabian, 1976). Mehrabian (1976) defines load in two main dimensions; novelty and complexity of the environment. Novelty is the level of familiarity between the environment and the consumer and how predictable that environment is to the consumer and complexity is the number of elements, features and changes in the environment (Mehrabian, 1976). Combining these two dimensions, a high load environment is novel, surprising, crowded

and should trigger stimulation in a person (Donovan and Rossiter, 1982). Billings (1990: 6) state that;

> The most common procedure is to describe an environment in terms of various objects in it and the relations among these objects. For example, a park may be described as a lake with trees, flowers, and picnic tables around it. However, this list of descriptors could continue forever; therefore, one list does not form a complete description of the setting. In addition, the items are too vaguely defined.

For this reason, using the information theory proposed by Mehrabian and Russell is acknowledged to be a more proper way to describe the level of stimuli in the environment. As described by Mehrabian (1976) the information rate in an environment is the amount of information perceived by the subjects in the environment per unit time. This rate is shortly entitled as “load” as it is mentioned above. Therefore, the higher the information rate in an environment is, the higher the load of the environment is. In sum, as the level of complexity and novelty increase the load of environment also increase.

As assumed by Mehrabian and Russell (1974), environmental load is directly related to arousal which is an emotional response. Therefore, arousal and load are directly proportional which means that as load increases the arousal level would also increase. In this case, a novel and complex environment should make a person feel stimulated, jittery, excited, frenzied and aroused . On the contrary, a common and simple environment should make someone

feel calm, relaxed and plodder (Donovan, Rossiter, Marcoolyn and Nesdale, 1994).

2.1.1.2. Response Taxonomy

Mehrabian and Russell (1974) propose that an individuals' response against an environment can be categorized into two main behavior; approach behavior and avoidance behavior. Therefore, no matter what the stimulus is or what happens emotionally in the organism the response will either be approaching the environment or avoiding it.

There are four main indicators of approach/avoidance behavior. These four indicators are; the individual might tend to spend more time in the store (approach) or leave the store (avoid), an individual might tend to browse through the items in the store (approach) or might remain vapid (avoid), an individual might tend to interact with other customers or sales personnel (approach) or might tend to stay isolated (avoid), an individual might tend to undertake task performances (approach) or spare undertaking task performances (avoid) (Mehrabian and Russell, 1974). Later on, Donovan and Rossiter (1982), adjusted this model and applied it to store environment. They proposed that, if an individual approaches a store, he/she will stay longer in the store, explore the merchandise closely, communicate with other customers and the sales personnel and tend to try the merchandise (see Table 1).

Table 1. The four basic responses of a consumer in a store in the case of approach/avoidance (Donovan and Rossitter, 1982)

Response	Approach	Avoidance
Physical	stay in the store	leave the store
Exploratory	investigate items	stay inanimate
Communicative	interact with others	stay isolated
Performative	take task performance	avoid task performance

Depending on the model explained above, this study also takes these four basic responses (physical, exploratory, communicative, performative) as indicators of approach/avoidance behavior to measure the influence of the three different color schemes (the stimuli). However, as all participants of the study are allowed to enter the room one by one and as there aren't any sales personnel in the room the communicative response is excluded and is not studied in this research.

2.1.2. Pleasure, Arousal, Dominance (P-A-D) Scale

After covering the stimulus and response taxonomies separately, the link between them should be analyzed as well. As it is mentioned before, the intervening variables, in other words the emotional process that happens in the consumer in between the external stimuli and the response given to that stimuli, areanalyzed in this chapter.

Mehrabian and Russell (1974) propose that whatever the response is (approach/avoidance), it is a result of three basic dimensions or states of emotion. These three states are; pleasure, arousal and dominance (P-A-D). In order to explain these three states in paired terms it is possible to say that what the consumer feels after encountering the external stimuli is pleasure-displeasure, arousal-nonarousal and dominance-submissiveness. If the positive parts of each pair is valid then the response is probably approach, if the negative parts of each pair is valid then the response is probably avoidance (Mehrabian and Russell, 1974).

Each dimension of P-A-D scale indicate a series of emotions that is triggered in the consumer. Pleasure indicates feeling happy, pleased, satisfied, contended, hopeful and relaxed. Arousal refers to feeling excited, frenzied, jittered, aroused and stimulated. Dominance refers to what degree the subject is in control of the environment, in other words to what extent the individual feels free to act against the stimuli (Donovan and Rossiter, 1982; Billings, 1990; Donovan et. al., 1994; Tai and Fung, 2011; Bohl, 2012). Mehrabian and Russell (1974) name this P-A-D scale as “inter-modality” which shows that emotional reactions indicate a common denominator of all human responses against all types of environmental setting. In other words it is possible to say that, the balance between pleasure, arousal and dominance defines an individuals response to any given environmental setting. Even earlier than M-R model’s assumptions, semantic differential studies have proposed that judgement of any complex stimuli can be dissociated into three basic dimensions. These dimensions are; evaluation,

activity and potency (Osgood, Suci and Tannenbaum, 1957). Herein, evaluation corresponds to pleasure, activity corresponds to arousal and potency corresponds to dominance (Billings, 1990). So, for a long period of time it is known that all judgmental human responses against any given environmental stimuli can be dissociated into three basic dimensions; pleasure, arousal and dominance.

Even if Mehrabian and Russell (1974) proposed that all three dimensions are assumed to work orthogonally, Donovan and Rossiter (1982) proposed that arousal and pleasure appear to interact in the determination of approach/ avoidance behavior. In neutral conditions, when the environment is evaluated to be neither pleasing nor displeasing by the subject, medium level of arousal tend to result in approach behavior (Donovan and Rossiter, 1982). However, in the same situation, when the arousal level is either too high or too low, subjects tend to avoid the environment (Donovan and Rossiter, 1982). Another condition, where pleasure and arousal seem to interact is when the environment is evaluated to be pleasing or displeasing by the subject. In a pleasing environment, if the level of arousal increase then the probability of approach behavior also increases. On the contrary, in a displeasing environment, as the level of arousal increase, the probability of avoidance behavior also increase (Donovan and Rossiter, 1982; Billings, 1990) (see Figure 4). This interaction between pleasure, arousal and approach/ avoidance behavior is named as the “inverted U relationship” (Mehrabian and Russell, 1974; Wohlwill, 1976; Donovan and Rossiter, 1982).

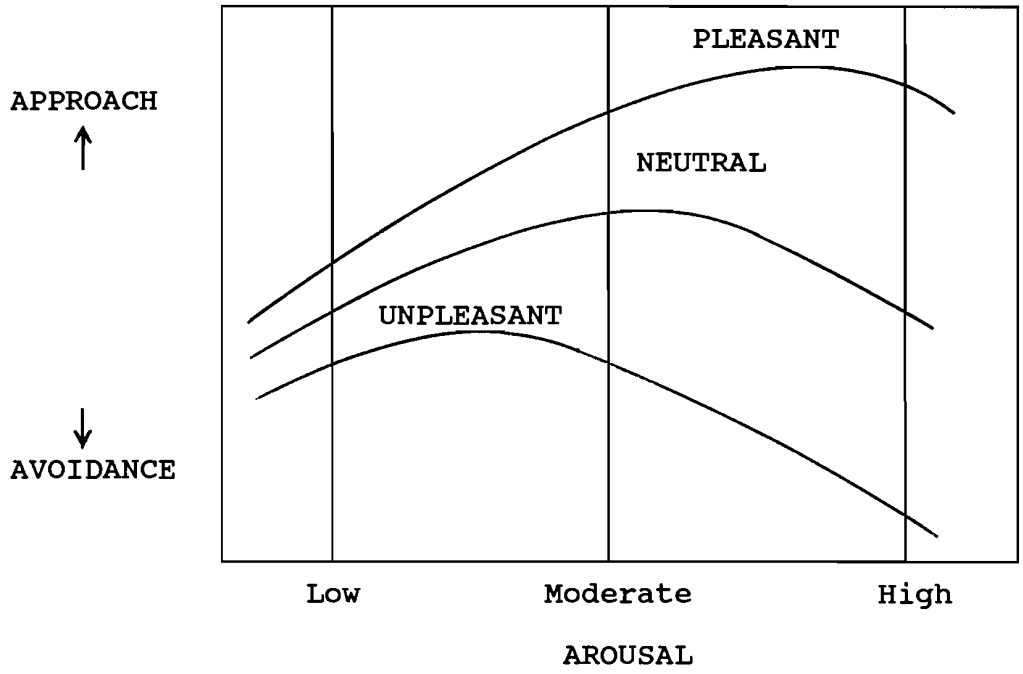

Figure 4. Graph showing the relationship between pleasure, arousal and approach/avoidance behavior (Billings, 1990: 13)

In the later studies of Russell and Pratt (1980), it is proposed that the dominance dimension should be deleted from the P-A-D scale. Russell states that dominance is mostly related to the individual features of the subject and it is not possible to apply dominance to situations that call for emotional responses. They also assume that using pleasure and arousal dimensions would be sufficient for demonstrating the possible emotional responses of the consumers against all types of environmental settings (Dawson, Bloch and Ridgway, 1990). However, as it is mentioned before, dominance is the measure of how free an individual feels to act against an external stimuli. In other words, how free that individual feels to exhibit approach/avoidance behavior. In that sense, dominance becomes a

significant way of representing the response that resulted from the balance between pleasure and arousal. Therefore, dominance might not be a part of the P-A-D scale yet can be perceived as a moderator between pleasure, arousal and approach/avoidance behavior. For this reason, dominance will not be ignored in this study and the model areused in its original tridimensional form.

2.1.3. Individual Features Influencing the Functioning of M-R Model

Given the same external stimuli, each and every individual might have a different reaction against that stimuli. Even if the outcome would be categorized as either approach/avoidance in any case, the processing of the information in between the income (stimulus) and the outcome (response) might differ from person to person. In this section, the reasons for this variety of information processing arediscussed.

Bohl (2012) states that the general features that might influence the attitude towards the environmental setting includes age, gender, community, financial status, marital status, psychological factors, lifestyle,value judgements and personality. However, like it is mentioned in the information rate theory of Mehrabian and Russell, categorizing people according to any factor that might differ from person to person is both impossible and would not give accurate results. Also it would be impossible to track people’s behavior considering their entire personal characteristics. For this reason, consumers

can be categorized depending on their features that appear to be more pertinent with their shopping habits. In this sense consumers can be categorized in three different ways; screeners and non-screeners, hedonic purchasers and utilitarian purchasers and maximizers and satisfiers. In addition to these, gender also plays an important role in the working principle of M-R model.

Mehrabian and Russell (1974), proposed to categorize consumers into two as screeners and non-screeners. They stated that people, who tend to filter the unnecessary information in the setting can be named as screeners. On the contrary, people who tend to perceive all the stimulus as equally important and receive all the information can be named as non-screeners. How these two types of consumers differ from each other is that, given a novel and complex environment (with a high information rate or high load) a screener would be less aroused from the external stimuli yet a non-screener would get highly aroused by the environment. In other words, even if the environment is a pleasant one, a screener might approach it finding the environment mildly arousing yet a non-screener might avoid the environment finding it too arousing depending on the inverted U relationship explained above. Therefore being a screener or a non-screener influences the working principle of the M-R model (Mehrabian and Russell, 1974).

Another individual feature that might affect the working principle of M-R model is if the individual is a hedonic or a utilitarian consumer (Dawson, Bloch and Ridgway, 1990; Babin and Darden, 1994). As it is mentioned

before, a utilitarian consumer is a product-oriented consumer who might not be influenced easily by ads, store environment or the attitude of the sales personnel. On the other hand a hedonic shopper is an impulsive consumer that might go shopping without a specific item or brand in mind and can easily be influenced by the ads, store environment, point of purchase displays, sales personnels' attitude and so on. Therefore, the Mehrabian-Russell model might work in a different sense on the two different types of consumers. For a utilitarian consumer, the level of pleasure, arousal and dominance presented by the store environment might not be an important concern and might not change the usual buying pattern exhibited. If the store environment does not cause an impulsivity in the consumer than the consumer would neither approach the store nor avoid it. On the contrary, for a hedonic consumer, the pleasure, arousal and dominance dimensions of a store environment might be a matter of interest and might cause the subject to either avoid or approach the store. If the outcome is approach then the shopping process would most probably end in an impulse purchase.

Another way of categorizing consumers is distinguishing them as maximizers and satisficers (Schwartz, Ward, Monterosso, Lyubomirsky, White and Lehman, 2002). Maximizers are the type of consumers that go through all the possible choices and choose the best possible option among them. However, satisficers are more likely to settle for a good enough option even if it is not the ideal one. Therefore, it can be hypothesized that maximizers might be less influenced by the external stimuli such as store atmospherics or the crowding as they are after the best possible product not the store as a whole.

Or if they are influenced by the external stimuli they might be disturbed more by something they find unpleasant or too arousing than satisficers might be.

Gender also plays an important role in influencing the working principle of M-R model. The effect of pleasure, arousal and dominance have different outcomes on men and women. For example d'Astous (2000) has found out that women are more disturbed by inappropriate temperature, store size and crowding than men are. Another study by Raajpoot, Sharma and Chebat (2008) have proposed that sales personnel's attitude does not play an important role in the overall evaluation of the store for women. On the contrary men do care about sales personnel's attitude when evaluating the store. Gender differences apply to color scheme preferences in the stores as well. Men stated shades of blue as their favorite color twice more likely than women, yet, women state pink and purple to be their favorite color twice more likely than men in stores (Ellis and Ficek, 2001). As the two genders have different preferences, store design might apply differently to each gender. Men might find a store that is colored in shades of blue pleasant yet women might find it unpleasant and so that the two might perform different approach/avoidance behavior against the same store design.

As might be expected, the individual differences discussed above, except gender, is impossible to detect and hard to control. However, given a definite proportion of a community, that group would include screeners as well as non-screeners and maximizers as well as satisfiers. Therefore, it is possible to say that the smaller sample of a community used in an experiment would

be expected to reflect the actual properties of the population in general. In this sense, for this study, it is possible to say that the individual characteristics of the attendants is not particularly profiled or picked yet are assumed to reflect the rest of the community. Also, as these individual differences is common for all the attendants it is expected that they don't significantly affect the results of the study or decrease the reliability of the results.

2.1.4. Summary of M-R Model

In order to draw a more concrete and visual profile of how M-R model works, it would be appropriate to summarize everything that has been covered in the previous chapters, in a more compact manner.

First of all, the target consumer profile is explained which is the impulse purchaser. The reason for aiming this type of purchasers is that, impulse purchasers are not product oriented, they are hedonic and can easily be influenced by advertisements, point of purchase displays, showcases, attitude of the sales personnel or other customers. However, most importantly as they view the product itself and the immediate surrounding of it as a whole, they evaluate the product within the store environment so they may also be easily influenced by color design.

Secondly, the working principle of M-R model is covered. M-R model is an environmental psychology model that is developed by Albert Mehrabian and James Russell in 1974. M-R model has a tridimensional paradigm based on a stimulus, an organism and a response (S-O-R paradigm). The stimulus that areused in this study arethe store color scheme of the environment. The organism that will absorb this information arethe impulse participants of the experiment. After the participant receives the information, it is assumed that another tridimensional sub-process will start. Keeping in mind that the paradigm is still in the second stage which is the organism stage, the participant will go through different emotional responses that is a combination or pleasure, arousal and dominance. Pleasure is the evaluation of the environment as either pleasant or unpleasant. Arousal defines how stimulated the participant gets as a result of the load of the either pleasant or unpleasant environment. If the environment is pleasant then high levels of environmental load will have a positive outcome. However, if the environment is not categorized to be pleasant then high levels of environmental load will result in negative outcome. Dominance, meanwhile will indicate how free the participant feels to act against information received from the environment. Proceeding to the last stage, the response stage, if the environment has a positive influence on the participants the result is assumed to be approaching the store. On the contrary, if the environment has influenced the consumer negatively than the probable response areavoiding the environment. So the adjusted M-R model used in this study areas shown in Figure 5;

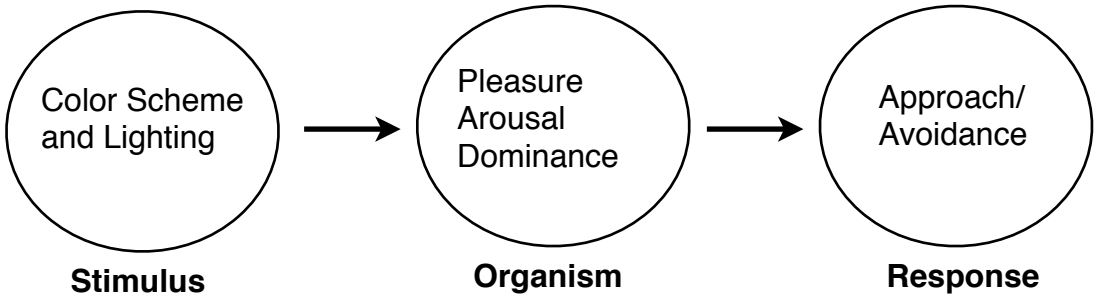

Figure 5. Adjusted model that shows the working principle of S-O-R paradigm in this study (Mehrabian and Russell, 1974)

There arefour main indicators of whether the participants approached or avoided the environment. These four indicators will be; the amount of time spent in the environment, the number of items touched in the environment, the amount of time spent for browsing items and the number of task performances undertaken. An increase in the four listed behavior is assumed to indicate that the participant has approached the environment and vice versa. In addition to this, in order to be able to observe whether the participant is particularly approaching the color surrounding the display or not, the direction patterns of the consumers are also recorded. The tendency to go towards the colored side can also be perceived as an indicator of dominance showing that the consumer feels in control of the environment and would be able to move freely in it. Therefore, the final form of the model as it areused in this study is as it is shown in Figure 6;

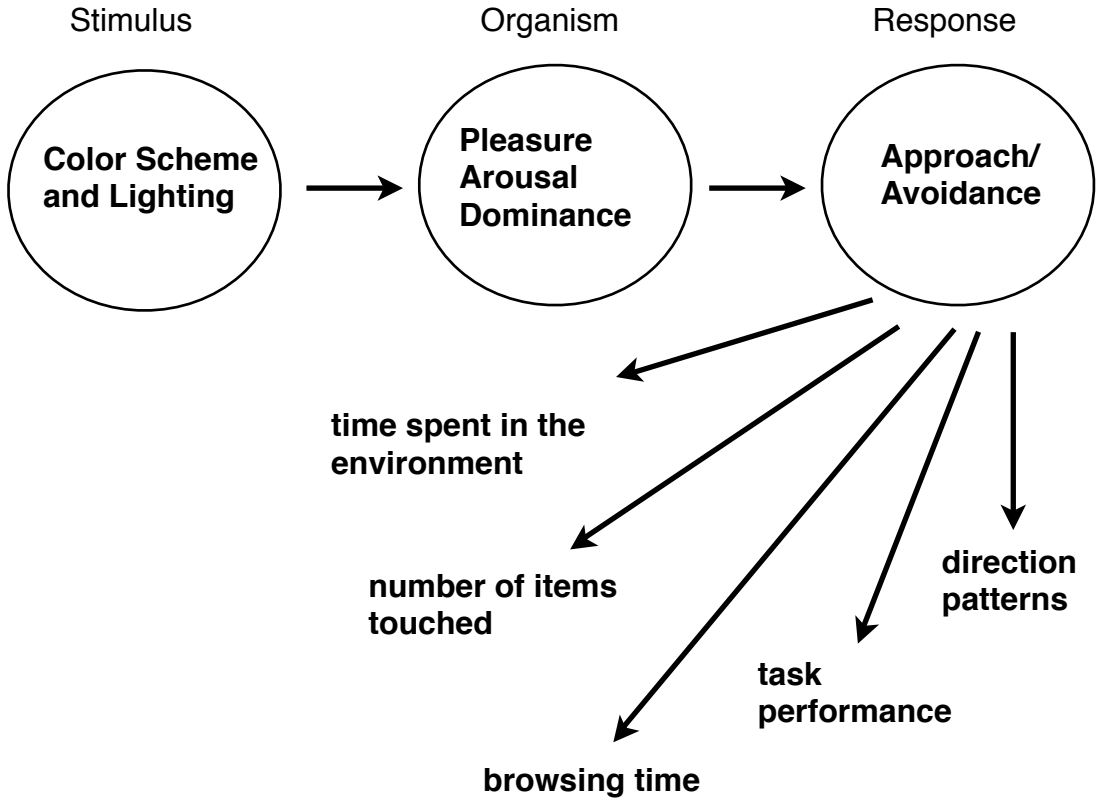

Figure 6. The final form of the model as it areused particularly for this study

To summarize, it is assumed that the four main responses towards an environment; physical, exploratory, communicative and performative, indicate whether the individual approaches or avoids the environment. In this study, communicative responses are eliminated as only one participant is present in the room at a time. The other three responses are observed. The time spent in the environment is accepted as the physical response of the individual. If the individual tends to stay more in the environment, (s)he also tends to approach the environment and vice versa. Number of items touched, time spent for browsing and investigating items are accepted as the exploratory responses of the individuals. If the individual tend to touch more items and

spend more time browsing and investigating items then the individual also tends to approach the environment and vice versa. Number of task performances undertaken is accepted as the performative response. Trying on the items are referred to as undertaking task performances and therefore if the individual tends to try on more items then (s)he also tends to approach the environment and vice versa. Lastly, to be able to observe whether the individuals physically approach/avoid the colour setting, the location of colour also changes in addition to its hue. If the individual diverges to the color then (s)he also tends to approach the environment. If the individual converges to the color then (s)he also tends to avoid the color.

CHAPTER 3

STORE ATMOSPHERICS

3.1. Definitions and Approaches

Store atmospherics is firstly studied by Philip Kotler in 1973. He defined store atmospherics as " buying environments (designed) to produce specific emotional effects in the buyer that enhances his purchase probability" (Kotler, 1973: 50). In other words, depending on the information provided by the M-R model (Mehrabian and Russell, 1974), store atmospherics should be used to make the consumer approach the store initially and then the product collaterally. The end purpose aimed for the consumer is principally to make the consumer leave the store with a purchase, a purchase either in mind or an unintended purchase that is not planned beforehand. According to Kotler, even if the purchase is made over the merchandise, the evaluation does not remain limited to the merchandise itself. Consumers evaluate the product as a whole with its immediate surrounding, in other words with the store atmosphere. Kotler states that:

> One of the most significant features of the total product is the place where it is bought or consumed. In some cases, the place, more specifically the atmosphere of the place is more influential than the product itself in the purchase decision (Kotler, 1973: 48).

Therefore, it is possible to say that the atmosphere of the store is a more important marketing tool than the product itself. Even if store atmospherics is usually pushed into the background, it actually should even be the primary concern of the retailers. Even if the store atmospherics does not directly increase the purchase rate, it might result in changing the mediating behavior of the consumer that might end up in a purchase.

Kotler (1973) categorizes store atmospherics into four main groups. These four main groups are the visual, aural, olfactory and tactile dimensions. The visual dimensions include the color, brightness, size and shape of the store, the aural dimension include the volume and the pitch of the music used in the store, the olfactory dimension includes the scent and freshness of the odor used in the store and lastly the tactile dimension include softness, smoothness and temperature of the store (Kotler, 1973). Therefore, when designing the store, by means of these sensory channels, retailers might attain the objective of making the consumer approach the store. For instance as Kotler (1973) also states, the EL AL Airlines (Israel) want to achieve a friendly and a warm look in their offices by means of light and color scheme. In this case, light and color scheme are the sensory channels that are used to attract the customer.

Later on, many other scholars worked on the definition, importance and substance of store atmospherics as well. Donovan and Rossiter (1982), the first scholars to combine M-R model of Mehrabian and Russell (1974) with store atmospherics of Kotler (1973) in the same study. Different than other studies they stated that:

> Store atmosphere effects are basically emotional states that (1) are difficult to verbalize, (2) are transient and therefore difficult to recall, and (3) influence behavior within the store rather than gross external behavior such as choosing whether or not to patronize the store (Donovan and Rossiter, 1982: 35).

Therefore, it would be almost impossible for the consumers to recall how they felt in the store in an interview conducted after their shopping experience. Also, consumers would not be aware of how they feel as the emotional response against the store atmosphere would happen unconsciously. For this reason, Donovan and Rossiter (1982) state that the methodology (interviewing the customers) is not an appropriate way of understanding their emotional responses within the store.

Donovan and Rossiter (1982), have proposed that, store atmospherics has a great influence on the triggering of the three emotional states pleasure, arousal and dominance. However, dominance is not as potent as pleasure and arousal are in predicting consumer response against the environmental setting. As mentioned in the previous chapter, they also proposed that

pleasure and arousal are related to each other in an inverted u correlation and work together in constituting approach/avoidance behavior.

Bitner (1992) added a new dimension to the store atmospherics topic by referring to the term as “servicescapes”. According to this study:

> Specifically the dimensions of the physical surroundings include all of the objective physical factors that can be controlled by the firm to enhance (or constrain) employee and customer actions. Those factors include an endless list of possibilities, such as lighting, color, signage, textures, quality of materials, style of furnishings, layout, wall decor, temperature and so on (Bitner, 1992: 65).

Even if Bitner (1992) discussed the store atmospherics thoroughly, what she mainly added to the literature is the case of the employees in the servicescape. Bitner stated that many studies that processed store atmospherics lack the dimension of the employees and only have concerns about the consumers. Employees are probably more important than the customer as their performance and satisfaction is also another element of store atmospherics that influence the approach/avoidance behavior of the consumer which affects the performance of the sales personnel. Therefore, it is possible to say that the relationship between the customer and the employees is a vicious circle (Bitner, 1992) (see Figure 7).

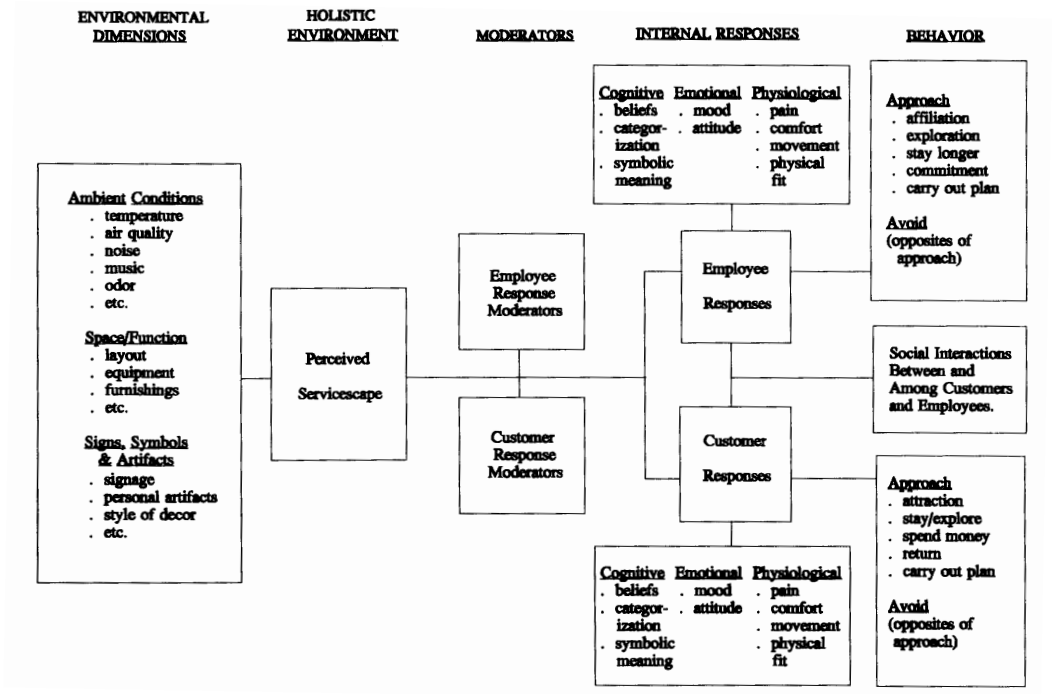

Figure 7. The relationship between user-environment in service organizations (Bitner, 1992: 60)

The environmental cues provided by the store creates a non-verbal communication, an “object language” (Ruesch and Kees, 1956) between the consumer and the store which lets the consumer constitute a general belief about the store such as whether the store is a low-end or a high-end store, whether it is expensive or not, whether it is stylish or ordinary and so on. The same thing is also valid for the employees as well. This process is the cognitive process that occurs both for the consumers and the employees (Bitner, 1992).

In addition to the cognitive processes of the customers and employees, an emotional process also occurs, depending on the environmental cues presented. As it is mentioned in the previous chapter, Bitner (1992) also

exploits M-R model to explain consumers' and employees' emotional responses. However rather than using the pleasure, arousal and dominance scale, Bitner (1992) uses Kaplan's (1987) tridimensional scale of complexity, mystery and coherence. However she links the three elements with the tridimensional P-A-D scale of Mehrabian and Russell (1974).

Bitner (1992) categorizes store atmospherics in three main sub-divisions as; ambient conditions, spatial, layout and functionality conditions and signs, symbols and artefacts. She states that "ambient conditions include background characteristics of the environment such as temperature, lighting, noise, music and scent. As a general rule, ambient conditions affect the five senses" (Bitner, 1992: 66). Bitner also defines and categorizes the two other conditions. She states that the spatial layout and functionality condition is "in which machinery, equipment and furnishings are arrange, the size and shape of those items and the spatial relationships among them" (Bitner, 1992: 66). The signage, symbols and artifacts refer to the signage and ads located in the store to communicate with the customers and found to reduce stress in the store (Bitner, 1992).

Another study on the same topic by Baker (1987) identifies store atmospherics into three as well but with different topics and content. Baker specifies three subtopics as ambient factors, design factors and social factors. Ambient factors include air quality, scent, cleanliness and noise and do not have a great influence on the purchase decision as long as they simply meet the required standard conditions. The design factors are divided

into two as aesthetic and functional factors. Aesthetic factors include; color, materials, decor, scale, shape, texture and pattern. Functional factors include layout, comfort, signage and accessories. Lastly, social factors also have two subdivisions as audience and service personnel both including the number, appearance and behavior of that group of people (Baker, 1987) (see Table 2).

Even if Baker's (1987) categorization of store atmospherics appear appropriate, Berman and Evans (1979) are not satisfied with the current condition of the subject and developed a more detailed categorization with larger number of atmospheric variables. They have proposed a whole new category named external variables which included building characteristics, surrounding stores, location, congestion, traffic and so on (Bohl, 2012).

Table 2. Categorization of store atmospherics (Baker, 1987: 80)

Ambient Factors	Background conditions that exist below the level of our immediate awareness	Air Quality - Temperature - Humidity - Circulation/Ventilation Noise (Level/Pitch) Scent Cleanliness
Design Factors	Stimuli that exist at the forefront of our awareness	**Aesthetic** Architecture Colour Style Materials Décor Scale Shape Texture, Pattern **Functional** Layout Comfort Signage Accessories
Social Factors	People in the Environment	**Audience (Other Customers)** Number, Appearance, Behaviour **Service Personnel** Number, Appearance, Behaviour

The new categorization proposed by Berman and Evans (1979) is later on exploited in Turley and Milliman's study (2000) with an additional section proposed by Turley and Milliman (2000) which is the "Human Variables" (see Figure 8). Among the divisions proposed by Berman and Evans (1979) and Turley and Milliman (2000) only general interior variables section is related to this study and therefore only that part aresummarized in this chapter. General interior variables, as can be seen in the figure 8, includes merchandise, paint and wall paper, width of aisles, lighting, color scheme, scents, ceiling composition, flooring and carpeting, wall composition, tobacco smoke, temperature, cleanliness and music. As also stated in Bohl's (2012) review, many scholars such as Bellizi, Crowley and Hasty (1983), Bellizi and Hite (1992), Babin, Hardesty and Suter (2003) and Morrin and Chebat

(2007) have worked the influence of color scheme on approach/avoidance behavior.

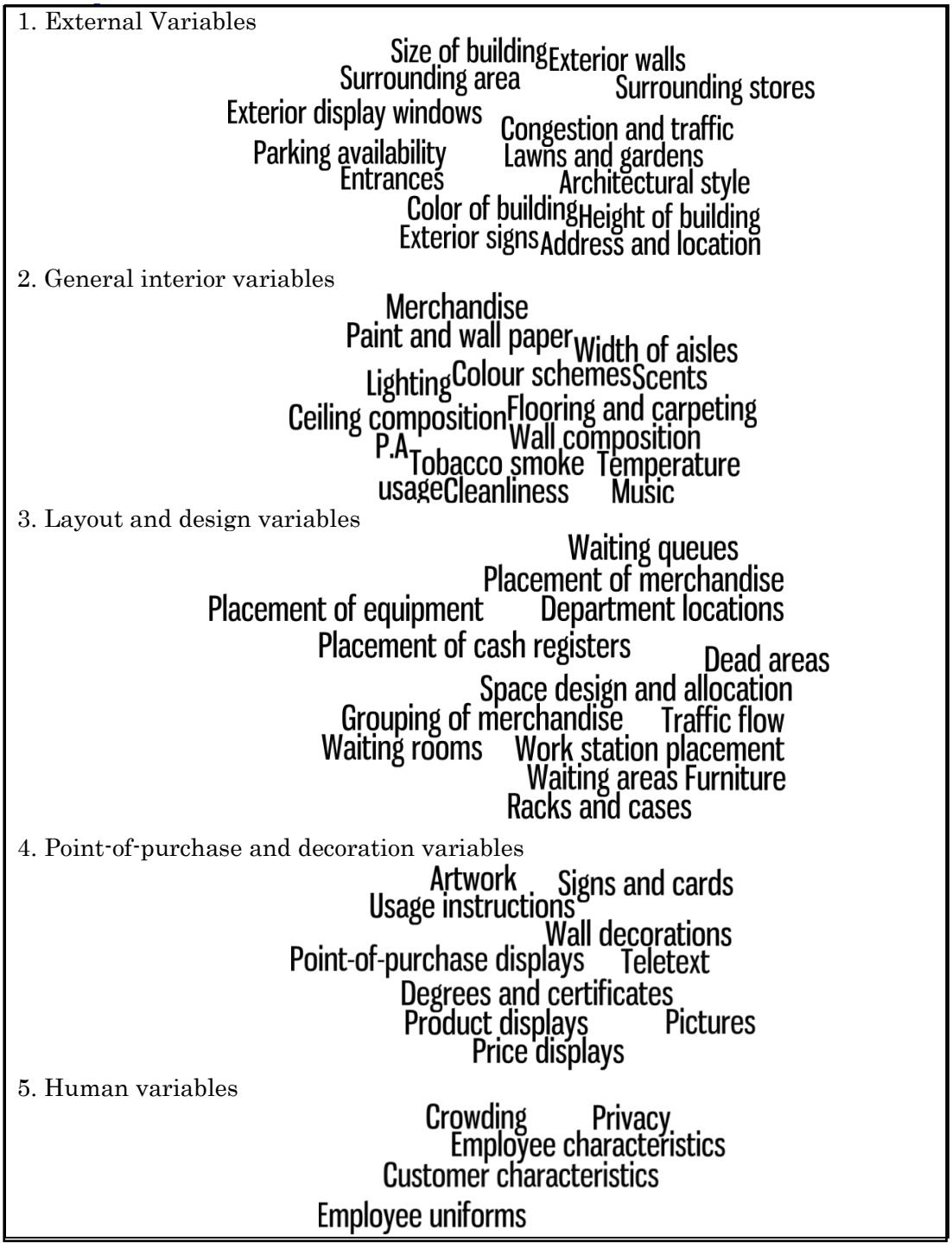

Figure 8. Categorization of store atmospherics (Turley and Milliman, 2000: 194; Bohl, 2012: 8)

In general they have found out that customers tend to spend more time in the store, feel attracted to a retail display, constitute a different store and merchandise image depending on the color scheme preference of the store. When it comes to lighting Baker, Levy and Grewal (1992) have stated that lighting can influence in store behavior as well as store image, examination and handling of merchandise. This finding by Baker et. al (1992) is also supported by Summers and Hebert (2001). However, Areni and Kim (1994) found out that lighting did not have any significant effect on consumer behavior (see Section 3.2).

Depending on the information provided above it is possible to say that the immediate physical environment around a merchandise is at least as much important as the merchandise itself. The physical surrounding of a merchandise have a remarkable influence on the emotional responses and mood states of the purchaser. Taking the store atmospherics or in other words environmental cues as the stimulus of the S-O-R paradigm of M-R model (1974), it is possible that this stimulus may cause a change in the emotional states of the purchaser and therefore will cause an outcome of either approach/avoidance. In short, the physical surrounding of a merchandise may be used as a tool to make the consumer approach that merchandise or avoid it. The particular effect of color in that manner is explained in the following chapter.

3.2. Influence of Color on Consumer Behavior and Requirements for Retail Settings

It has long been proved that color has a remarkable influence on human cognition and emotional responses. This makes it predictable that color schemes used in the retail setting would influence the consumer behavior as well (Jacobs and Suess, 1975).

The first study that has reviewed the available literature and concluded that color is influential on the consumer in the retail setting is Crowley's (1993) study. She has conducted a study that uses four pure colors; blue, green, yellow and red with no black or white mixed into the paint. Keeping all the other variables constant, 100 females are shown slides of a furniture store simulation designed separately with these four colors and are asked to imagine as if they are going furniture shopping. All the attendants then are asked to evaluate the store for each color setting (Crowley, 1993: 64). Crowley (1993) states that color affects both the evaluation of the store by the consumer (pleasure) and the stimulation level of the store on the consumer (arousal). The level of arousal and pleasantness of a color can be decided considering it's hue which is determined by its wavelength. Colors with short wavelength are referred to as cool colors where violet being the color with the shortest wavelength followed with blue. Colors with long wavelength are referred to as warm colors where red being the color with the longest wavelength followed with orange (Babin, Hardesty and Suter, 2003).

Valdez and Mehrabian (1994) have conducted a study about how color influences emotions. They have controlled the lighting by conducting the experiment in a windowless room with fluorescent lighting that imitates daylight. They have used seventy-six colors from Munsell Color System (1915) to display ten hues with varied levels of saturation. They have particularly used PAD scale (Mehrabian and Russell, 1974) as mood a descriptor. Their results showed a correlation between color and emotion, but with more emphasis on color brightness and saturation than variety of color. They have concluded that short wavelength colors (cool colors) are preferred depending on a linear association between affective tone and wavelength. Therefore, it is proposed that cool colors would evoke more pleasant feelings than warm colors.

Bellizi, Crowley and Hasty (1983) have conducted a study for a better understanding of how color influences the store preferences. Five colors are used in the study which are: red, yellow, blue, green or white. Groups of 25 women are exposed to each of that five colors on a retail furniture display. Their findings suggested that, in general the color preference in a store physically attract shoppers toward a retail display because of color's influence on perceptual quality. Particularly they have proposed that cool colored environments are more preferable than warm colored environments in the retail setting. Even more particularly, Bellizi and Hite (1992) have studied on blue and red only to be more accurate with whether cool or warm colors are more preferred in a retail setting. They have studied in two laboratory settings that are designed to simulate store environments where

blue is applied to one and red to the other. Their findings suggest that a blue background will lead to less postpone in purchase decision than a red background would do. Therefore it is possible to say that blue/violet environments would increase the pleasure and purchase intentions more than orange/red environments would do.

The same rule of inverted U activation curve which is also valid for lighting is valid for color schemes as well. Extreme wavelengths would cause more arousal than mild wavelengths. Red/orange at one end of the linear scale would cause similar arousal levels with violet/blue at the other end of the line which can be categorized as extreme. Therefore too much of arousal, no matter whether the color scheme appears pleasant or not, would lead to avoidance behavior (Babin, Hardesty and Suter, 2003). As the response given to colors is more instinctive and some are learned, extreme wavelengths are associated to danger and therefore they trigger the feeling of stimulation (arousal) (Wilson, 1966). However, even if it is assumed that the two ends of the U (red and violet) would cause similar levels of arousal, Mehrabian and Valdez's (1994) study propose that tones of red/orange cause more arousal than tones of violet/blue.

Color does not only trigger a cognitive and emotional response but also create a store image in consumers' minds when combined with other ambient factors such as lighting or music. Baker, Levy and Grewal (1992) propose that when bright light is used together with popular music and warm colors, consumers tend to think that store is a discount image (low end) store.

However when soft light is used with classical music and cool colors, consumers tend to think that store is a prestige image (high end) store (Baker, Levy and Grewal, 1992; Babin and Darden, 1995; Bellizi and Hite, 1992; Schlosser, 1998). Particularly for women fashion outwear stores, the image of the store is usually associated with self image and therefore store's image in that sense usually influences the in-store behavior, purchase and store patronage decisions (Lichtenstein, Ridgway and Netemeyer, 1993). Therefore, to summarize, it is possible to say that when warm colors are used with bright light the store creates a discount image feeling and in that sense for women fashion outwear stores, this might lead to avoidance due to self image. On the contrary, when cool colors are used with soft lighting the store creates a prestige image feeling and in that sense for women fashion outwear stores, this might lead to approach behavior due to self image (Babin, Hardesty and Suter, 2003).

There are also studies available that examined the effects of other colors on emotional responses which have included extreme wavelength colors as well as mild wavelength colors. Kaya and Epps (2004) studies the influence of several colors on emotional responses of university students. They have used red, yellow, green, blue and purple individually and concluded that green received the highest number of positive responses (95.9%) followed by yellow (93.9%), blue (79.6%) and red (64.3%). People stated that green evoked the feelings of relaxation, calmness, happiness, comfort, peace,hope and excitement which are adjectives suitable both for pleasure and arousal (Kaya and Epps, 2004). These findings are also consistent with Hemphill's

studies conducted in 1996. A different level and type of experiment conducted by Küller, Mikellides and Janssens in 2009 which compared achromatic settings with chromatic settings and achromatic settings among themselves, Küller et al. (2009) proposed that the color alterations in a room had effects on the people in the room in many different levels. The perception of the room as well as the emotions and physiology of the people inside are affected by the color scheme. They have concluded that when used in moderate levels, colors can be used to improve the overall mood and emotions of people. Barlı, Aktan, Bilgili and Dane (2012) have studied with green and red color settings and found out that usage of green color have positive effects on time spent in the store and number of purchases yet the opposite is valid for red setting. Time spent in the store is positively associated to soft lighting design and negatively associated with red indoor color. Barlı et al.(2012) have findings consistent with Mehrabian and Valdez (1994) who have proposed that green-yellow, blue-green and green are the most arousing color schemes whereas purple-blue and yellow-red are the least arousing ones. Green color's arousing influence are associated with its location at the bottom of the inverted U activation curve.

On color design of store interiors Bolen (1988) states that:

> Walls and floors also give color, shape and personality to retail design. Different colors mean different things to people. By painting the walls with different shades and designs each area of the store can take unique personality (Bolen, 1988: 136).

Table 3 summarizes the general appearance, mental associations, direct associations, objective and subjective impressions of several colors located on the several different points of the inverted U activation curve (see Table 3) (Bolen, 1988).

Table 3. Color psychology and color therapy (Birren, 1966: 143)

Color	General Appearance	Mental Associations	Direct Associations	Objective Impressıon	Subjective Impression
Red	brilliant, intense, opaque, dry	hot, fire, heat, blood	danger, special days	passionate, exciting, active	intensity, rage, fierceness
Orange	bright, luminous, glowing	warm, metallic, autumnal	halloween	jovial, lively, energetic	hilarity, satiety
Yellow	sunny, radiant	sunlight	caution	cheerful, vital	high spirit, health
Green	clear, moist	cool, nature, water	clear	refreshing, peaceful, innocent	terror, guilt, disease
Blue	transpare nt, wet	cold, sky, water, ice	service, flag	melancholy, sober	gloom, fear
Purple	deep, soft	cool, mist, dark, shadow	mourning, easter	mournful, mystic, pompous	loneliness, desper
White	spatial, light	cool, snow	cleanliness	pure, clean	brightness
Black	spatial, dark	neutral, night, emptiness	mourning	funeral, depression deadly	death, negation

Bolen states that, keeping in mind the appearance and impression of each color, one can design appropriate atmospheric environments with color for any type of service ranging from night club to bakery stores (Bolen, 1988).

Another handbook that gives significant advice about color design in retail settings is the handbook of Lewison and Delozier (1986). They state that color is the most important element of an object/place that gives the first impression. They state that color is what keeps consumer's attention on the store and stimulates them to buy. They also state that, the psychological effect of color depends on its tridimensional structure made up of hue, value and intensity. Hue stands for the name of the color, value defines the lightness of darkness of the hue and intensity defines the brightness or dullness of the hue. The anatomy of color is important for the retailer not only for selling the merchandise but also providing the appropriate space and atmosphere for exhibiting the merchandise. The most important impact of color is observed when colors are categorized as warm and cool colors (Lewison and Delozier, 1986) (see Table 4). They state that red should be used extremely carefully as it is the most stimulating color. In that sense too much of red can be overpowering and too much stimulating so that red should be used as an accent color in a few points of the store. Yellow is also similar to red and is highly stimulating that it should be used carefully and not too frequently in the store. Orange similar to red and yellow is again a high intensity color yet may be used more frequently when compared to the previous two. Tones of blue are usually associated with the sky and with coolness therefore is used to create a calm and relaxing shopping atmosphere. As blue is usually paired with masculinity it is usually used in men's outwear stores. Green is very similar to blue in evoking calm, pleasant emotions in the consumer. Green is usually associated with newness, peacefulness and restfulness. Authorities assume green to be the most

popular and accepted color. As it is a soft and calm color it is suitable for many uses in the retail setting. Lastly, violet is used very rarely in the retail environment. When used extensively, violet is recorded to dampen the purchase spirit (Lewison and Delozier, 1986).

Table 4. Chart showing the connotations of warm and cool colors (Lewison and Delozier, 1986: 286)

Warm Colors			Cool Colors		
Red	Yellow	Orange	Blue	Green	Purple
Love	Sunlight	Sunlight	Coolness	Coolness	Coolness
Romance	Warmth	Warmth	Aloofness	Restful	Rich
Sex	Cowardice	Openness	Fidelity	Peace	Dignity
Courage	Openness	Friendly	Calmness	Freshness	Retiring
Danger	Friendly	Glory	Piety	Growth	
Fire	Gaiety	Gaiety	Masculine	Softness	
Sinful	Glory		Assurance	Richness	
Warmth	Brightness		Sadness	Go	
Exciting	Caution				
Vigor					
Cheerful					
Enthusiast					
Stop					

Lightness and darkness of colors is also covered by Lewison and Delozier (1986) in terms of the aesthetic and functional considerations of a store setting. They state that as the lightness of the color increase in a store, especially in a small scale store, it is possible to make the store look larger. This might be a significant point for both the appearance and the functionality of the retail space. In terms of atmospherics the lightness and darkness of a color might be associated with the dullness of the space and therefore if a store looks dull, the consumer should not be expected to spent long periods of time in the store. On the other hand, dark colors have attention grabbing property so that the consumer can be drawn to the store by the use of darker colors yet dark colors should be used responsibly (Lewison and Delozier, 1986).

Depending on the information provided above on color design in store environments, the lighting (see Appendix D) and color scheme that would be used in the experiment is determined. As recommended by IESNA (2000) and North America Philips Lighting handbooks (2010) the average level of illuminance in the experiment room is determined in between the range of 300lx and 600lx. Also depending on the information about the most appropriate type of lighting that can be used in stores, concealed wall washers are used in the experiment room and the stands that are carrying the merchandise are located under the wall washers. In that sense, wall washers are working both as a perimeter lighting and counter lighting. As the experiment is a small scale space, wall washers are enough to illuminate the whole room appropriately. Fluorescent Philips Daylight Preheat bulbs of

2500lm and 6200K are used to provide an illumination which uniform and which has a good color rendering index (North America Philips Lighting handbooks, 2010).

For the color scheme preference of the room, gray which is an achromatic color that worked as a control group, green which is at the bottom of the inverted U shape activation curve and a color which is declared to be the most popular and accepted color among the others is used against red which is known to be the most stimulating color. Depending on this given information on color theory green is expected to be approached and red is expected to be avoided due to arousal levels. Gray, is expected to be in the middle as being the control set (Babin, Hardesty and Suter, 2003; Crowley, 1993; Bolen, 1978; Lewison and Delozier; 1986; Mehrabian and Valdez, 1994).

CHAPTER 4

THE EXPERIMENT

4.1. Aim of the Study

The aim of this study is to investigate the effects of color on approach/ avoidance behavior. In order for this study to be useful and applicable in different settings and different user profiles, a generic setting is created and random participants are included in the experiment

4.2. Hypotheses

1. Approach/avoidance behavior (total time spent, number of items touched, time spent for browsing and investigating items and number of task performances undertaken) is dependent on the hue of color.

2. Approach/avoidance behavior (total time spent, number of items touched, time spent for browsing and investigating items and number of task performances undertaken) is not dependent on the location of color.

3. Red engenders avoidance behavior which leads to a decrease in the total time spent, number of items touched, time spent for browsing and investigating items and number of task performances undertaken

4. Green engenders approach behavior either located on the left or right which leads to an increase in the total time spent, number of items touched, time spent for browsing and investigating items and number of task performances undertaken

5. Gray engenders neither approach nor avoidance behaviour either located on the left or right which means the values for total time spent, number of items touched, time spent for browsing and investigating items and number of task performances undertaken are in between the values valid for red and green.

6. Direction patterns of people in the environment is dependent on the hue of the color.

7. Direction patterns of people in the environment is dependent on the location of color.

8. Red recedes the people in the environment whereas green attracts and gray is neutral. In other words people direct towards green and against red. Gray does not cause a significant change in direction.

4.3. Method of the Study

Methods used in this study are described in three sections as; sample group, experiment setting and procedure. In the sample group section how the sample group is determined and demographic information about the attendants are presented. In the next section, experiment setting, the three different color arrangements are explained and in the last section, the procedure and how the experiment is conducted are explained.

4.3.1. Sample Group

The sample group used are 111 students from Bilkent University in Ankara, Turkey. Most of the students are from the Interior Architecture and Environmental Design (IAED) department (70.3%). For each experiment setting, a different group of attendants is used, yet the sampling method used in each setting is the same and is random sampling.

The age and gender of the participants are not a parameter in the study and are not used as a central construct in the further steps of the study. For this reason, age and gender of the participants are not picked intentionally or on any particular basis and is only used for portraying the demographic profile of the sample group. The overall mean age of the participants is found out to be 22.7 years. The mean age calculated for the achromatic setting (gray setting) is 22.9 years, for the first chromatic setting (green setting) is 21.7 and for the second chromatic setting (red setting) is 23.5. Most of the students are second year students (57.7%) of the university independently of their age. In terms of gender profile, 75% of the attendants are females and 25% of the attendants are males.

4.3.2. Experiment Room

The experiment room is the environmental laboratory of the Interior Architecture and Environmental Design department of Bilkent University. The room is 4.10m wide and 4.18m deep which makes 17.138m^2 of free exhibition space. The height of the room is 3.85m to the ceiling and 2.90m to the wall washer unit. Whole room is painted in S 0300 N (NCS Color Atlas, 2004) matte white and the floor is covered in 30X30cm gray tiles.

Four identical stands are designed particularly for the items to be exhibited on. All four stands are 70cm deep, 100cm wide and 50cm high above the floor. All stands are painted in S 0300 N matte white similar with the ceiling

and walls to procure a color unity in the room. A tall dressing mirror is placed on the wall across the entrance and a seating unit is provided for the attendants to put their belongings on or sit when needed. This seating unit is covered with S 0300 N matte white colored fabric (see Figure 9).

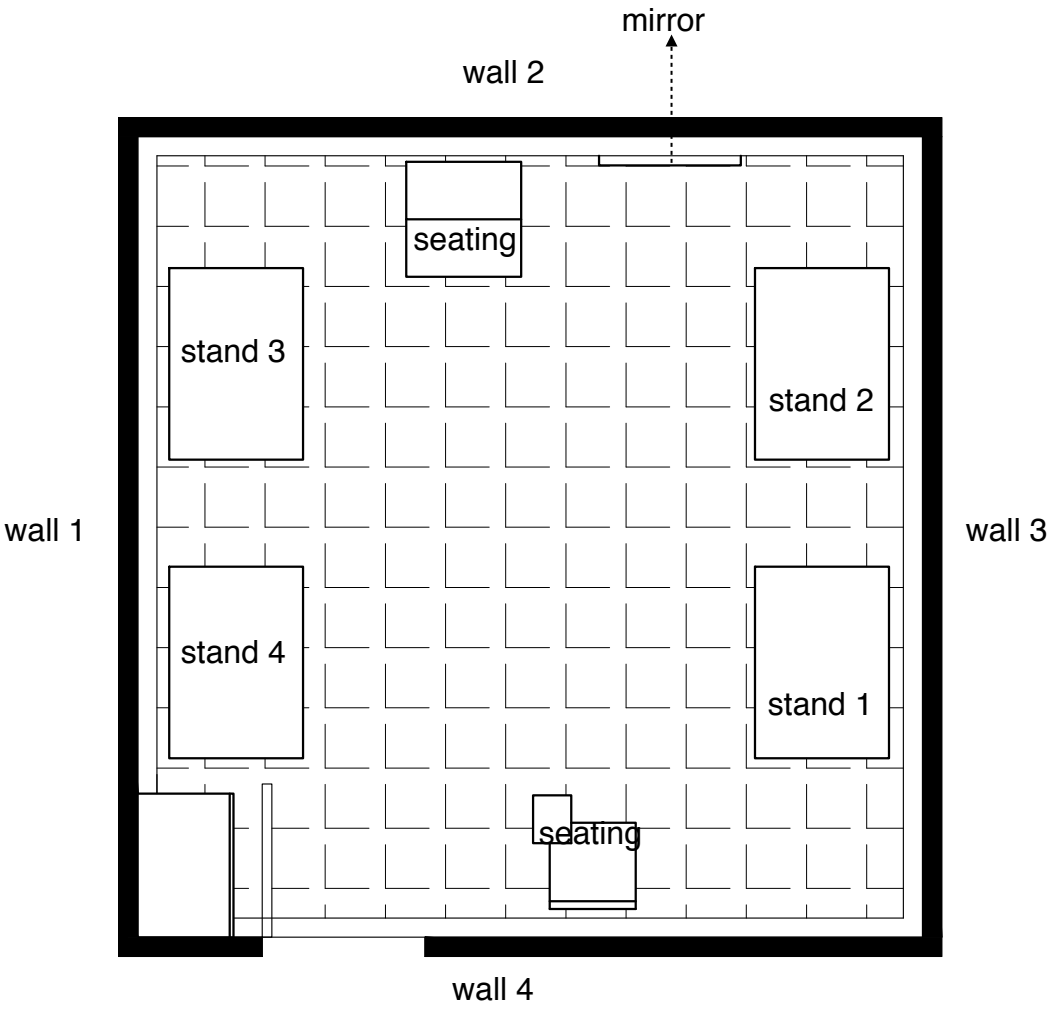

Figure 9. Plan of the room showing the placing of the units (not to scale)

There are no windows in the room, therefore, there is not a daylight interference with the interior setting. Artificial lighting is the only possible

lighting method in the room and there are three different lighting settings that are; cove lighting, wall washer and spotlight. Cove lighting and wall washers are installed on the same wooden unit mounted on the two vis a vis side walls (on the right hand side and left hand side) of the room in reference to the door. The wooden unit that holds the wall washers and cove lighting together starts 65cm below the ceiling and is 30cm high and 25cm deep itself. Both the wall washers and cove lighting have fluorescent units with electronic ballasts which is controllable both by switches and dimmers (see Figure 9). In terms of lighting, only wall washers are used to illuminate the room. There are six bulbs placed in the two face to face wall washer units. All six bulbs used in the experiment are identical fluorescent bulbs of Philips TLD 36W/54 Daylight Preheat 2500lm. All bulbs are selected particularly to be 6200 K in color temperature for the output to be as close as possible to the natural daylight. The color rendering index of the bulbs is 72 Ra8. The lighting design of the room is kept constant for all settings.

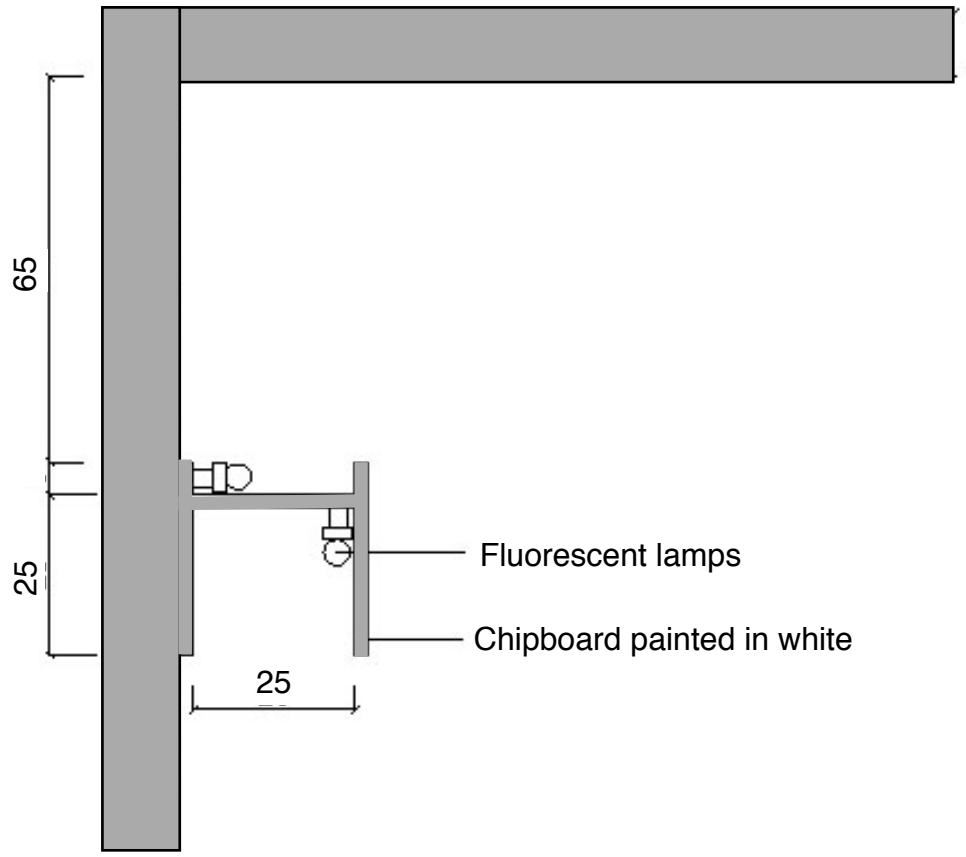

Figure 10. Wall washing installation dimensions

There are three main background colors for displays in the experiment room. Fabrics are stretched on the walls to change the background color. The location of the fabric is changed alternately between the two side walls that the wall washers are placed on as an immediate background for the display units. As an achromatic control S 6000 N gray is used in the first experiment setting. In the sequel, S 3060-G green is used as the second setting and lastly S 2060-R red is used as the third setting. These three colors are particularly selected from Natural Color System Atlas (NCS) (2004) as corresponding colors in terms of whiteness, blackness and lightness to keep these values controlled and only leaving the hue as a variable (see Figures

11, 12 and 13). All the color alterations, are applied to the both sides of the room (see Figures 11a/11b, 12a/12b and 13a/13b).

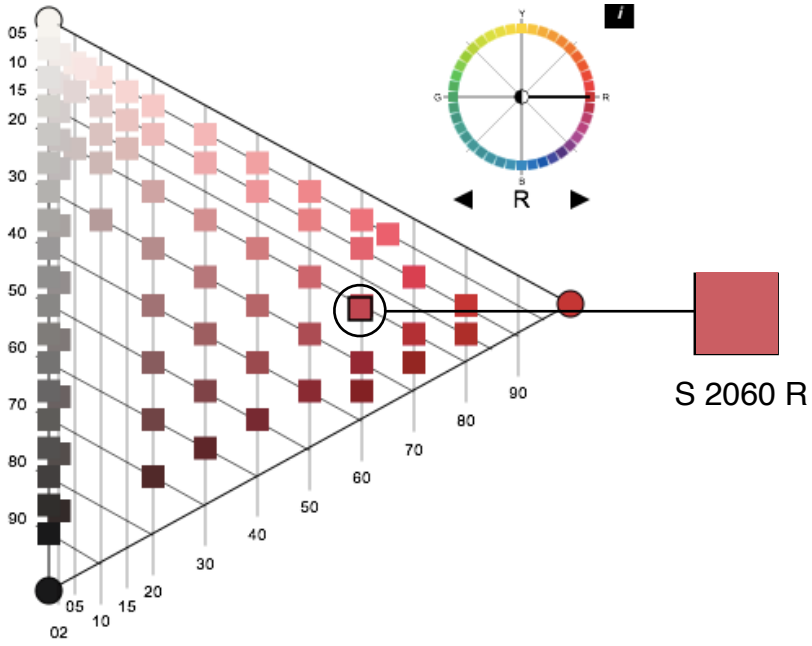

Figure 11. NCS illustration of red setting

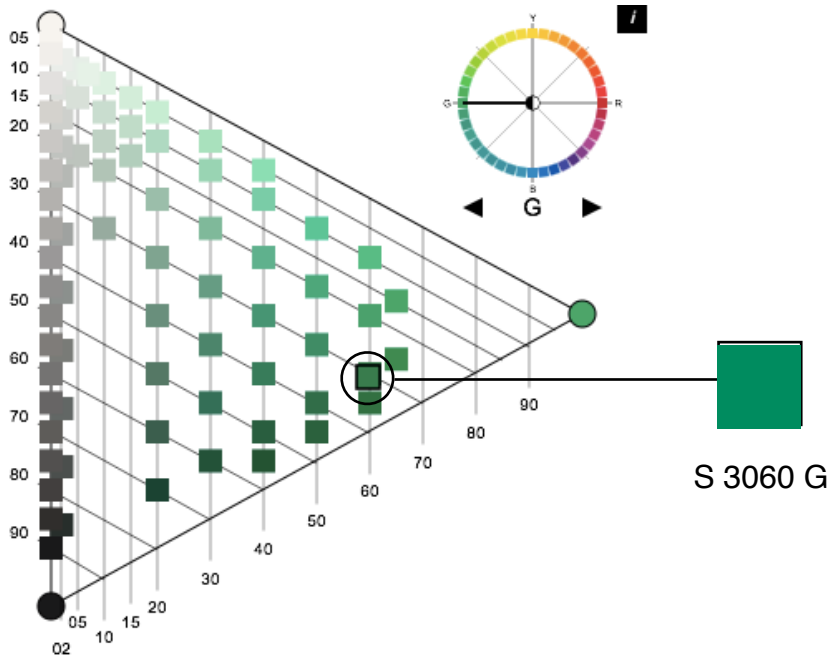

Figure 12. NCS illustration of green setting

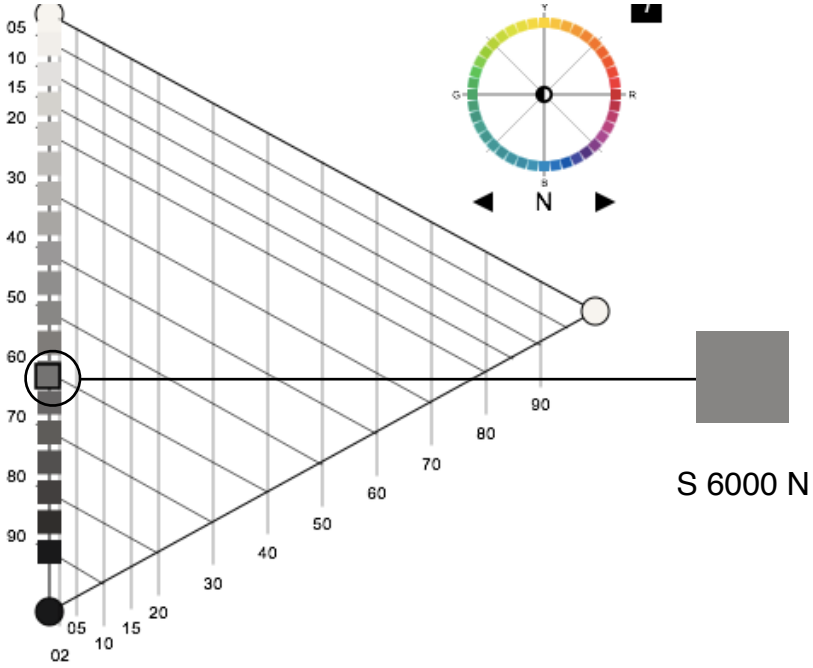

Figure 13. NCS illustration of gray setting

All the colors in the room including the colors applied particularly for the study and the colors that are already applied before the study are all identified depending on the NCS Atlas. The illuminance level of 480lx on the stand level in the room, in each color setting, is kept the same.

Figure 14a. The visuals of the room showing the gray color setting

Figure 14b. The visuals of the room showing the wall across the gray color setting

Figure 15a. The visuals of the room showing the green color setting

Figure 15b. The visuals of the room showing the wall across the green color setting

Figure 16a. The visuals of the room showing the red color setting

Figure 16b. The visuals of the room showing the wall across the red color setting

An average of 480lx is in between the defined range of 300lx-1000lx for store settings as recommended by IESNA (2000) and is in between the defined range of 300lx -500lx for stores not located in large shopping centers as recommended by North America Philips Lighting Handbook (2010). As the wall washers are the main and only illuminance source in the room, the focus is on the display units with a specifically assigned background for the items exhibited on the stands.

4.3.3. Procedure

The procedure of the experiment is presented in this section under three main topics; lighting scheme and color alterations, planning of the experiment and phases of the experiment.

4.3.3.1. Lighting Scheme and Color Alterations

The lighting sources in the room used in this study are wall washers. Keeping the focus on the walls is aimed more than keeping the focus on ceiling as the walls are the main surfaces that the color alterations is applied on. For this reason, only wall washers are used all through the experiment. By this way, the walls are illuminated more than the other surfaces in the room. As the display stands are right in front of the walls and under the wall washer units, the illuminance level on the horizontal surfaces of the stands is very

important. The required illuminance level range is recommended to be between 300lx and 600lx for middle category stores (neither prestige image nor discount image) (Rea, 2000) . After determining the required illuminance range for the purpose of performed activities, the present illuminance level in the room is measured and an illuminance scheme is constituted for the whole room (see Figure 17).

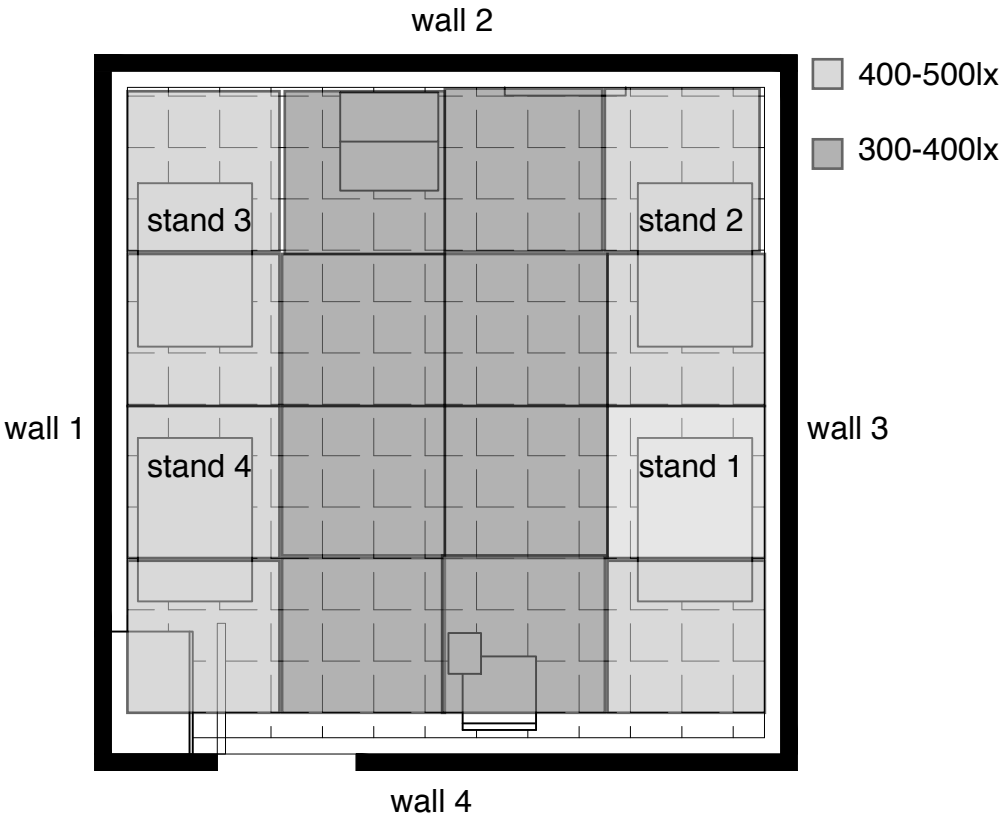

Figure 17.The lighting scheme of the room from eye level under wall washers (not to scale)

Together with the general illuminance level in the room the surface luminance of the wall 1 and wall 3 along with the surface luminance of all four stands are also measured for all six settings (three for when the color alterations are on the right and three for when the color alterations are on the left) as the stands and walls are the surfaces of interest in the room (see Table 5 and Table 6). The luminance levels on the walls are measured at the eye level.

Table 5. Luminance levels of the wall and stand surfaces when the color alteration is on the right side (on wall 3 side)

Right Side	Wall 1	Wall 2	Wall 3	Stand 1	Stand 2	Stand 3	Stand 4
Gray	71.0	73.2	61.5	81.8	81.3	97.6	97.9
Green	72.4	74.8	64.7	85.6	84.9	99.1	100.4
Red	73.1	75.0	65.3	87.3	86.8	100.0	101.7

All values presented in Table 5 are in cd/m^2

Table 6. Luminance levels of the wall and stand surfaces when the color alteration is on the left side (on wall 1 side)

Left Side	Wall 1	Wall 2	Wall 3	Stand 1	Stand 2	Stand 3	Stand 4
Gray	62.8	73.6	72.3	96.4	94.0	80.4	81.5
Green	63.0	74.1	73.8	98.9	93.5	82.6	82.8
Red	63.7	74.9	74.6	101.3	94.6	83.1	84.2

All values presented in Table 6 are in cd/m^2

4.3.3.2. Planning of the Experiment

There are two main concerns about planning the experiment; the theoretical framework of the experiment and how that framework is to be applied to the setting of the experiment.

In the first place the theoretical framework of the experiment should be determined and set. What is meant by theoretical framework is; the dependent variables, independent variables, central constructs, research methods that areused while conducting the experiment, determining which data aregathered particularly and what might be useful for the study. Almost all the constituents listed above, especially the dependent, independent and control variables and central constructs, are deduced through the Mehrabian - Russell stimulus response model. As it is referred above, the MR model underlies a remarkable part of this research in many aspects. The research concentrates on the approach/avoidance behavior mainly. In order to explore this, the data gathered for the total amount of time spent in the environment, the number of items touched, the amount of time spent for investigating items, the amount of time spent for browsing items, whether any items are tried on and whether any specific direction is observed. Therefore, it can be said that, the dependent variables of the experiment are; the total amount of time, the number of items touched, the amount of time spent for investigating items, the amount of time spent for browsing items, number of task performances undertaken and whether any specific direction is observed. The independent variables of the experiment are the color alterations. In this

sense, the gray setting which is an achromatic setting, works as a control group among all three settings. The questionnaire presented before the test includes demographic information. These information includes their age, their department, whether they had any visual impairment and if yes what that impairment is (see Appendix A and Appendix B). For identifying color blindness Ishihara's (1917) color blindness test is applied to the attendants (see Appendix C). All the other information mentioned above (the mediating behavior), is observed and written down on a data sheet constituted beforehand (see Appendix D).

As for the setting of the experiment, in the first place, using real life stores seemed to be a suitable option. Different stores of a chain that has similar consumer profile, price range, store design and merchandise quality have been useful. However, tracking the consumers and controlling the environment is almost impossible in this option. Research in this area also proved that chain stores would not grant permission for research studies in their stores. In this sense, conducting the experiment in a controlled laboratory setting is a better option in terms of having control over the number of variables and the relationship between the variables. As a final decision, the university laboratory is determined to be the experimental setting. The experiment room is altered to be a generic environment reflecting some aspects of shopping with items for display and engendering an environment suitable for observing the approach-avoidance behavior. The experiment room provided an area for the attendants to wander around freely

and look up for items exhibited there. In this sense, the four stands with items on them (mostly women generic sports outwear) are placed in the room as well as a mirror and a seating unit as it is mentioned before. While the layout stays the same, the color alterations are done in the room and the behavioral changes in the attendants is observed.

4.3.3.3. Phases of the Experiment

The experiment is conducted in three main phases. In the first phase the attendants visit the room in the gray setting. However, this setting included two sub settings which are when the gray wall is on the right hand side and when the gray wall is on the left hand side. In both sub settings all the other elements of the store is kept the same. This sub setting system is repeated for all three color settings; gray, green and red. In each setting the attendants who visit the room are different people so that nobody visit the room more than once. For all three settings, the attendants are given the demographic questionnaire before they have any visual contact with the room. After they are done with the questionnaire, Ishihara's color blindness test is applied to all attendants (see Appendix C). After the test, the attendants are told to enter the room and do whatever they like to within the setting. This way, they do not hesitate to try on or touch the items and also they are not directed to do so either. Unless the attendants particularly ask if they can try on the items or if they can touch anything they want to, they are not told anything specific apart than that they are free to do as they like. After the attendants

state that they are done with the room they are taken outside. None of the attendants are interrupted or contacted unless they ask something about the room. All the information about the aim or procedure of the experiment is kept confidential. This procedure is repeated for all three main settings and all six sub settings. In between each sub setting the room is closed for an hour and the placement of the colored fabric on the wall is changed. In between the main settings, the room is again closed for an hour and the present fabric on the wall is taken off and the next colored fabric is applied on the wall. Attendants do not have access to the room in these adjustment periods.

4.4. Findings

In this section the results obtained from processing the data gathered in the experiment is presented. The tool used for processing the data is Statistical Package for the Social Sciences (SPSS) 21.0. Firstly Independent Samples T-Test for the Equality of Means is conducted and then if needed Chi Square Test of Independence is conducted to find out whether the approach/ avoidance behavior is dependent on hue of color and the location of the color in the environment.

4.4.1. Effects of Color on Approach/Avoidance Behavior

The effects of color on approach/avoidance behavior is analyzed under six main topics which also are the central constructs of the study. These six topics are; total time spent in the environment, number of items touched, time spent for investigating items, time spent for browsing items, number of task performances undertaken and the direction patterns of the attendants. In order to be able to understand the relationship between the color and each of the mediating behavior mentioned above, t test for equality of means and chi square test of independence are applied to all six elements separately.

4.4.1.1. Total Amount of Time Spent

The total amount of time spent is measured for all three main settings and for all six sub settings. What is meant by total amount of time spent is the period of time passed between the attendants entering the room and leaving the room.

For the gray setting, when color is on the right hand side (wall 3), total amount of time spent range from 41 secs to 165 secs yet the mean amount of time spent is calculated to be 87 secs. The amount of time spent for the gray setting when color is on the left hand side (wall 1) ranges from 49 secs to 172 secs yet the mean amount of time is calculated to be 97 secs. The average amount of time spent in this setting is found out to be 92 secs.

Depending on the t test results for this color scheme, no significant difference is observed between the right hand sided setting and left hand sided setting (t=-0.588, df=34, p=0.561) (see Table 7).

Table 7. T-test results showing the comparison of right and left hand side locations of the gray setting in terms of total time spent

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
totaltime	Equal variances assumed	.254	.618	-.588	34	.560	-5.722
	Equal variances not assumed			-.588	32.987	.561	-5.722

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
totaltime	Equal variances assumed	9.732	-25.501	14.056
	Equal variances not assumed	9.732	-25.523	14.079

For the red setting, when color is on the right hand side (wall 3), the amount of time spent range from 52 secs to 155 secs yet the average amount of time spent is calculated to be 103 secs. In the same setting when color is on the left hand side (wall 1) the amount of time spent range from 57 secs to 165 secs yet the average amount of time spent in the store is calculated to be 90 secs. The average amount of time spent in this setting is found out to be 97 secs. Depending on the t-test results obtained, no significant difference is observed between the right hand sided setting and the left hand sided setting

for this color scheme in terms of total time spent (t=1.371, df=34, p=0.180) (see Table 8).

Table 8. T-test results showing the comparison of right and left hand side locations of the red setting in terms of total time spent

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
totaltime	Equal variances assumed	1.644	.208	1.371	34	.179	13.722
	Equal variances not assumed			1.371	31.855	.180	13.722

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
totaltime	Equal variances assumed	10.010	-6.620	34.064
	Equal variances not assumed	10.010	-6.671	34.115

For the green setting, when color is on the right hand side (wall 3), the amount of time spent range from 55 secs to 126 secs yet the average amount of time spent is calculated to be 80 secs. For the same setting when color is carried from right hand side to left hand side, the amount of time spent range from 35 secs to 158 secs yet the average amount of time spent is calculated to be 84 secs. The average amount of time spent in this setting generally is found out to be 82 secs. Depending on the t test results, no significant difference is observed for this color scheme, between the right

hand sided setting and the left hand sided setting in terms of total time spent (t=-1.034, df=34, p=0.308) (see Table 9).

Table 9. T-test results showing the comparison of right and left hand side locations of the green setting in terms of total time spent

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
totaltime	Equal variances assumed	13.896	.001	-1.034	34	.308	-6.056
	Equal variances not assumed			-1.034	24.111	.311	-6.056

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
totaltime	Equal variances assumed	5.854	-17.953	5.842
	Equal variances not assumed	5.854	-18.135	6.024

For the total amount of time spent in the environment, location of the colored area does not seem to have a significant influence on the attendants. For this reason it would be appropriate to move on the influence of the hue of color on the total amount of time spent. In this sense, three different color settings are compared in pairs for both locations at a time.

When comparing the first pair it is possible to see that using neither red, nor gray had a significant influence on the total amount of time spent in the environment (t=-1.295, df=70, p=0.200). So, it can be said that for the gray-

red pair the hue of color is not influential on the total amount of time spent in the environment (see Table 10).

Table 10. T test results showing the comparison of gray setting and red setting in terms of total amount of time spent

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
totaltime	Equal variances assumed	.444	.508	-1.295	70	.200	-9.056
	Equal variances not assumed			-1.295	69.826	.200	-9.056

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
totaltime	Equal variances assumed	6.994	-23.005	4.893
	Equal variances not assumed	6.994	-23.005	4.894

Comparing the gray setting with the green setting, it is possible to see that the results are similar to the gray-red pair. Using neither gray nor green changed the total amount of time spent in the environment (t=1.024, df=70, p=0.309) therefore, it is possible to say that the hue of color is not influential on the total amount of time spent for this pair as well (see Table 11).

Table 11. T test results showing the comparison of gray setting and green setting in terms of total amount of time spent

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
totaltime	Equal variances assumed	4.822	.031	1.024	70	.309	5.778
	Equal variances not assumed			1.024	57.756	.310	5.778

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
totaltime	Equal variances assumed	5.641	-5.473	17.029
	Equal variances not assumed	5.641	-5.515	17.071

Comparing the two chromatic settings; red and green it is possible to see that the results look different in reference to the two previous pairs. Using green or red in the environment causes a change in the total amount of time spent (t=2.534, df=70, p=0.014). In this sense it is possible to say that the hue of color is influential on the total amount of time spent in the environment for the red-green pair (see Table 12).

Table 12. T test results showing the comparison of red setting and green setting in terms of total amount of time spent

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
totaltime	Equal variances assumed	10.049	.002	2.534	70	.014	14.833
	Equal variances not assumed			2.534	56.051	.014	14.833

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
totaltime	Equal variances assumed	5.853	3.159	26.508
	Equal variances not assumed	5.853	3.108	26.559

As the t-test results indicate that there is a significant difference between the red setting and the green setting in terms of the total amount of time spent in the environment further analysis is required to find out whether this difference is dependent on the color scheme. The chi-square test results show that the difference between the means of two settings is not dependent on the color scheme (χ^2=2.006, df=1, p=0.157). Therefore, it is possible to say that even if there seems to be a difference between the two settings in terms of total time spent in the environment, it is not possible to say that this difference is dependent on the hue of the color (see Table 13 and 14).

Table 13. Cross tabulation showing the comparison of red setting and green setting in terms of total amount of time spent

Count

		coloumns		Total
		<81	≥81	
rows	red	14	22	36
	green	20	16	36
Total		34	38	72

Table 14. Chi-square test of independence results showing the comparison of red setting and green setting in terms of total amount of time spent

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.006[a]	1	.157		
Continuity Correction[b]	1.393	1	.238		
Likelihood Ratio	2.016	1	.156		
Fisher's Exact Test				.238	.119
Linear-by-Linear Association	1.978	1	.160		
N of Valid Cases	72				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 17.00.
b. Computed only for a 2x2 table

4.4.1.2. Number of Items Touched

Number of items touched is measured for all three main settings and for all six sub settings. Anything further than investigating the items by looking,

including just touching the item briefly to taking the item and investigating closely, is counted as touching the item.

For the gray setting, when color is applied to the right hand sided wall (wall 3), the number of items touched range from 2 items to 13 items yet the mean number of items touched is calculated to be 4 items. For the same setting when color is carried to left hand side (wall 1) , the number of items touched range from 2 items to 14 items with a mean value of 6 items. For this setting the general mean value for number of items touched is calculated to be 5 items. Depending on the t test results, a significant difference is observed in this color scheme for the right hand sided setting and left hand sided setting (t=-2.411, df=34, p=0.02) (see Table 15).

Table 15. T test results showing the comparison of right and left hand side locations of the gray setting in terms of number of items touched

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
itemstouched	Equal variances assumed	1.546	.222	-2.411	34	.021	-2.444
	Equal variances not assumed			-2.411	32.547	.022	-2.444

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
itemstouched	Equal variances assumed	1.014	-4.505	-.384
	Equal variances not assumed	1.014	-4.508	-.381

As the t test results indicate that there is a significant difference between the left hand sided and right hand sided color locations in terms of the number of items touched for the gray setting, further analysis is required to confirm that this difference is dependent on the location. The chi-square test results show that the difference in number of items touched detected between the two settings is actually dependent on the location (χ^2=7.481, df=1, p=0.006). Therefore it is possible to say that the number of items touched depends on the location of the color in the environment for the gray setting (see Table 16 and 17).

Table 16. Cross tabulation showing the comparison of right and left hand side locations of gray setting in terms of number of items touched

Count

		coloumns		
		<4	≥4	Total
rows	Right	11	7	18
	Left	3	15	18
Total		14	22	36

Table 17. Chi-square test of independence results showing the comparison of right and left hand side locations of gray setting in terms of number of items touched

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.481[a]	1	.006		
Continuity Correction[b]	5.727	1	.017		
Likelihood Ratio	7.837	1	.005		
Fisher's Exact Test				.015	.008
Linear-by-Linear Association	7.273	1	.007		
N of Valid Cases	36				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.00.
b. Computed only for a 2x2 table

For the red setting, when color is on the right hand sided wall (wall 3), the number of items touched range from 1 items to 11 items with a mean value of 5 items. When color is carried to the left hand sided wall (wall 1) the number of items touched range from 2 items to 12 items yet the mean value is calculated to be 5 items. For this setting the general mean value for number of items touched is calculated to be 5 items. However, for this color scheme, t test results show that there is not a significant difference between the right hand sided setting and left hand sided setting (t=0.490, df=34, p=0.627). Therefore it is possible to say that number of items touched is not dependent on the location of the colored wall for this color scheme (see Table 18).

Table 18. T test results showing the comparison of right and left hand side locations of the red setting in terms of number of items touched

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
itemstouched	Equal variances assumed	.098	.756	.490	34	.627	.444
	Equal variances not assumed			.490	33.452	.627	.444

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
itemstouched	Equal variances assumed	.907	-1.399	2.288
	Equal variances not assumed	.907	-1.400	2.289

For the green setting, when color is applied to the right hand sided wall (wall 3), the number of items touched range from 1 items to 8 items with a mean value of 4 items. When color is carried to left hand sided wall (wall 1), the number of items touched range from 1 items to 9 items yet the mean value is calculated to be 4 items. For this setting the general mean value for number of items touched is calculated to be 4 items. Similar to the red color scheme, for the green color scheme, no significant difference is observed between the right hand sided setting and the left hand sided setting (t=0.724, df=34, p=0.474). Therefore it is possible to say that number of items touched is not dependent on the location of the colored wall for green color scheme (see Table 19).

Table 19. T test results showing the comparison of right and left hand side locations of the green setting in terms of number of items touched

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
itemstouched	Equal variances assumed	.074	.787	.724	34	.474	.500
	Equal variances not assumed			.724	33.519	.474	.500

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
itemstouched	Equal variances assumed	.691	-.904	1.904
	Equal variances not assumed	.691	-.905	1.905

Analyzing the t test and the chi-square test results for all three settings, it is possible to see that the number of items touched is not dependent on the location of color in the environment except for the gray setting. For the gray setting (achromatic setting) the number of items touched increased from right hand side to left hand side depending on the location of color. In order to be able to understand the influence of hue of color on the number of items touched, the three different color settings are analyzed pairwise similar to the procedure followed in the total amount of time spent.

Comparing the gray setting with the red setting, it is possible to see that no significant difference is observed between the two color settings in terms of the mean number of items touched (t=0.475, df=70, p=0.637). Therefore, it is

possible to say that the hue of the color is not influential on the number of items touched for this color pair (see Table 20).

Table 20. T test results showing the comparison of gray setting with the red setting in terms of number of items touched

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
itemstouched	Equal variances assumed	.642	.426	.475	70	.637	.333
	Equal variances not assumed			.475	67.698	.637	.333

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
itemstouched	Equal variances assumed	.702	-1.068	1.734
	Equal variances not assumed	.702	-1.069	1.735

When comparing the gray setting with the green setting, similar results are encountered. Depending on the t test results, it is possible to say that there is no significant difference between the gray setting and the green setting in terms of the number of items touched (t=1.692, df=70, t=0.096). Therefore, it is possible to say that the hue of color is not influential on the number of items touched for this color pair as well (see Table 21).

Table 21. T test results showing the comparison of gray setting with the green setting in terms of number of items touched

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
itemstouched	Equal variances assumed	4.127	.046	1.692	70	.095	1.083
	Equal variances not assumed			1.692	59.258	.096	1.083

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
itemstouched	Equal variances assumed	.640	-.194	2.360
	Equal variances not assumed	.640	-.198	2.364

Lastly, comparing the two chromatic color settings; the green setting and the red setting the results stay the same with the two previous color pairs. It is possible to say that no significant difference is observed between these two color settings in terms of the number of items touched (t=1.326, df=70, p=0.188). Therefore, it is possible to say that using neither red nor green has an influence on the number of items touched (see Table 22). As a result, it can be said that the hue of color is not influential on the number of items touched in general.

Table 22. T test results showing the comparison of red setting with the green setting in terms of number of items touched

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
itemstouched	Equal variances assumed	1.840	.179	1.328	70	.188	.750
	Equal variances not assumed			1.328	65.507	.189	.750

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
itemstouched	Equal variances assumed	.565	-.376	1.876
	Equal variances not assumed	.565	-.378	1.878

4.4.1.3. Time Spent for Investigating Items

Time spent for investigating items is measured for all three main settings and for all six sub settings. What is meant by time spent for investigating items is the sum of all measured time periods spent separately for investigating each item. The result obtained by summing is the total amount of time spent for investigating items.

For the gray setting, when color is applied to the right hand sided wall (wall 3), the amount of time spent for investigating items range from 4 secs to 66 secs yet the mean value is calculated to be 25 secs. When color is carried to

the left hand sided wall (wall 1) this time period range from 17 secs to 109 sec with a mean value of 45 secs. For this setting in general, the mean amount of time spent for investigating items is calculated to be 35 secs. Depending on the t test results, there appears to be a significant difference between when the colored wall is on the left hand side and when it is on the right hand side for this color scheme (t=-3.031, df=34, p=0.005) Time spent for investigating items increased (from 25 secs to 45 secs) when gray is applied on the left hand side of the room when entered from the door.

Table 23. T test results showing the comparison of right and left hand side locations of the gray setting in terms of time spent for investigating items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timeitem	Equal variances assumed	1.487	.231	-3.031	34	.005	-20.111
	Equal variances not assumed			-3.031	30.241	.005	-20.111

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timeitem	Equal variances assumed	6.636	-33.596	-6.626
	Equal variances not assumed	6.636	-33.658	-6.564

As the t test results indicate that there is a significant difference between the left hand sided and right hand sided color locations in terms of the time spent for investigating items for the gray setting, further analysis is required to find

out whether this difference is dependent on the location. Depending on the chi-square test of independence results it is possible to say that the difference in the time spent for investigating items between the left hand side and the right hand side for gray setting is actually dependent on the location of color (χ^2=4.050, df=1, p=0.044). As a result it is possible to say that the time spent for investigating items differ depending on the location of color for the gray setting (see Table 24 and 25).

Table 24. Cross tabulation showing the comparison of right and left hand side locations of the gray setting in terms of time spent for investigating items

Count

		coloumns		
		1	2	Total
rows	1	11	7	18
	2	5	13	18
Total		16	20	36

Table 25. Chi Square test of independence results showing the comparison of right and left hand side locations of the gray setting in terms of time spent for investigating items

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.050[a]	1	.044		
Continuity Correction[b]	2.813	1	.094		
Likelihood Ratio	4.134	1	.042		
Fisher's Exact Test				.092	.046
Linear-by-Linear Association	3.938	1	.047		
N of Valid Cases	36				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.00.
b. Computed only for a 2x2 table

For the red setting, when color is placed on the right hand sided wall (wall 3), the amount of time spent for investigating items range from 15 secs to 102 secs yet the mean value is calculated to be 46 secs. When color is carried to the left hand sided wall (wall 1) this period of time measured to range from 7 secs to 78 secs with a mean value of 36 secs. For this setting in general the mean amount of time spent for investigating items is calculated to be 41 secs. Depending on the t test results, no significant difference is observed between the right had sided setting and the left hand sided setting for this color scheme (t=1.116, df=34, p=0.272) (see Table 26).

Table 26. T test results showing the comparison of right and left hand side locations of the red setting in terms of time spent for investigating items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timeitem	Equal variances assumed	.716	.403	1.116	34	.272	8.333
	Equal variances not assumed			1.116	31.623	.273	8.333

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timeitem	Equal variances assumed	7.466	-6.839	23.506
	Equal variances not assumed	7.466	-6.882	23.548

For the green setting, when color is placed on the right hand sided wall (wall 3), the amount of time spent for investigating items is measured to range from 6 secs to 64 secs yet the mean value is calculated to be 35 secs. When color is carried to the left hand sided wall (wall 1) this time period is measured to range from 3 secs to 76 secs with a mean value of 30 secs. For this setting in general, the mean amount of time spent for investigating items is calculated to be 33 secs. For this color scheme, it is possible to say that the location of the colored wall to be either on the right hand side or on the left hand side does not seem to differ in terms of time spent for investigating item, depending on the t test results (t=0.347, df=34, p=0.731) (see Table 27).

Table 27. T test results showing the comparison of right and left hand side locations of the green setting in terms of time spent for investigating items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timeitem	Equal variances assumed	.219	.643	.347	34	.731	2.222
	Equal variances not assumed			.347	33.026	.731	2.222

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timeitem	Equal variances assumed	6.412	-10.808	15.253
	Equal variances not assumed	6.412	-10.822	15.267

Depending on the chi square test of independence results on SPSS, time spent for investigating items does not differ depending on the location of color except for the gray setting. For the gray setting, time spent for investigating items differ depending on the location of the gray colored wall. The mean amount of time spent for investigating items increased from 25 secs to 45 secs when the gray wall is carried from right hand side to the left hand side. However, for the other two settings the location of color is not influential on the time spent for investigating items. Getting done with the location of color, the influence of hue of color on the time spent for investigating items is analyzed. Similar to the two previous topics, all three color settings are analyzed pairwise.

Comparing the gray setting with the red setting, it is possible to say that there is not a significant difference between the time spent for investigating items values of the gray setting and the red setting (t=-1.205, df=70, p=0.232). Therefore, it is possible to say that the time spent for investigating items is not dependent on the hue of the color for this pair. In other words using neither gray nor red causes a difference in the time spent for investigating items (see Table 28).

Table 28. T test results showing the comparison of gray setting and red setting in terms of time spent for investigating items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timeitem	Equal variances assumed	.281	.597	-1.205	70	.232	-6.333
	Equal variances not assumed			-1.205	69.981	.232	-6.333

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timeitem	Equal variances assumed	5.255	-16.814	4.148
	Equal variances not assumed	5.255	-16.814	4.148

For the second pair, which is the gray and green color setting pair, the results does not seem differ much from the previous pair of gray and red. It is possible to say that the time spent for investigating items does not seem to depend on the hue of the color for this pair either (t=0.354, df=70, p=0.724).

Therefore, it is possible to say that using either gray or green does not seem to cause a difference in the time spent for investigating items (see Table 29).

Table 29. T test results showing the comparison of gray setting and red setting in terms of time spent for investigating items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timeitem	Equal variances assumed	.022	.882	.354	70	.724	1.722
	Equal variances not assumed			.354	68.440	.724	1.722

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timeitem	Equal variances assumed	4.858	-7.967	11.412
	Equal variances not assumed	4.858	-7.971	11.415

Lastly, as a third pair, the two chromatic settings; red and green arecompared. In this third pair, the results encountered are still similar to the results obtained for the two previous settings. Similarly, for this pair, it is possible to say that the time spent for investigating items is not dependent on the hue of the color used in the environment (t=1.643, df=70, p=0.105). In other words it is possible to say that using neither red nor green in the environment causes a difference in the time spent for investigating items (see Table 30).

Table 30. T test results showing the comparison of red setting and green setting in terms of time spent for investigating items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timeitem	Equal variances assumed	.627	.431	1.643	70	.105	8.056
	Equal variances not assumed			1.643	68.103	.105	8.056

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timeitem	Equal variances assumed	4.904	-1.726	17.837
	Equal variances not assumed	4.904	-1.731	17.842

In general, it is possible to see that the time spent for investigating items is not dependent on the hue of color used in the environment. When it comes to the location of color, it is possible to see that only for the gray setting, the location of color has an influence on the time spent for investigating items.

4.4.1.4. Time Spent for Browsing Items

Time spent for browsing items is measured for all three main settings and for all six sub settings. What is meant by time spent for browsing items is the sum of all measured time periods spent in between two investigated items, time spent before investigating the items and time spent after investigating the items. For the gray setting, when color is on the right hand sided wall

(wall 3), the amount of time spent for browsing items range from 26 secs to 135 secs yet the mean value is calculated to be 61 secs. When color is carried to the left hand sided wall (wall 1) the amount of time spent for browsing items is measured to range from 9 secs to 120 secs with a mean value of 52 secs. For this setting in general the mean amount of time spent for browsing items is calculated to be 57 secs. Depending on the t test results, no significant difference is observed between the right hand sided wall and the left hand sided wall in terms of time spent for browsing items for this color scheme (t=1.808, df=34, p=0.082). Therefore, it is possible to say that the location of color is not influential on the time spent for browsing items for the gray color scheme (see Table 31).

Table 31. T test results showing the comparison of right and left hand side locations of the gray setting in terms of time spent for browsing items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timebrowse	Equal variances assumed	1.869	.181	1.808	34	.079	14.389
	Equal variances not assumed			1.808	26.654	.082	14.389

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timebrowse	Equal variances assumed	7.958	-1.783	30.561
	Equal variances not assumed	7.958	-1.949	30.727

For the red setting, when color is applied to the right hand sided wall (wall 3), the amount of time spent for browsing items is measured to range from 25 secs to 80 secs yet the mean value is calculated to be 56 secs. When color is carried from right hand sided wall to the left hand sided wall (wall 1) the amount of time is measured to range from 19 secs to 111 secs with a mean value of 54 secs. For this setting in general the mean amount of time spent for browsing items is calculated to be 55 secs. Depending on the t test results, time spent for browsing items does not seem to differ between the left hand sided wall and the right hand sided wall, for this color scheme (t=0.752, df=34, p=0.458). Therefore, it is possible to say that the location of color is not influential on the time spent for browsing items for the red color scheme (see Table 32).

Table 32. T test results showing the comparison of right and left hand side locations of the red setting in terms of time spent for browsing items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timebrowse	Equal variances assumed	1.384	.248	.752	34	.457	5.389
	Equal variances not assumed			.752	28.751	.458	5.389

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timebrowse	Equal variances assumed	7.168	-9.179	19.957
	Equal variances not assumed	7.168	-9.277	20.055

For the green setting, when color is applied to the right hand sided wall (wall 3), the amount of time for browsing items is measured to range from 17 secs to 75 secs yet the mean amount of time is calculated to be 46 secs. When the colored fabric is carried to the left hand sided wall the amount of time spent for browsing items range from 25 secs to 100 secs with a mean value of 55 secs. For this setting in general the mean amount of time spent for browsing items is calculated to be 51 secs. Depending on the t test results for this color scheme, it is possible to say that time spent for browsing items does not appear to differ when the location of the colored wall is on the right hand side and when it is on the left hand side (t=-1.480, df=34, p=0.148). Therefore, it is possible to say that the location of color in the environment is not dependent on the time spent for browsing items for the green color scheme either (see Table 33).

Table 33. T test results showing the comparison of right and left hand side locations of the green setting in terms of time spent for browsing items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timebrowse	Equal variances assumed	.302	.587	-1.480	34	.148	-8.056
	Equal variances not assumed			-1.480	33.105	.148	-8.056

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timebrowse	Equal variances assumed	5.442	-19.115	3.004
	Equal variances not assumed	5.442	-19.126	3.015

Depending on the statistical results presented above, it is possible to say that the time spent for browsing items does not differ between the right hand side and left hand side color locations for none of the color settings. Therefore, it is concluded that the location of color is not influential on the time spent for browsing items for none of the color settings. Moving on to the influence of the hue of color on the time spent for browsing items, all color settings are compared pairwise like it is done for all the previous ones.

The first pair to be compared is the gray setting and the red setting. Depending on the t test results, it is possible to see that no significant difference is observed between the color schemes ($t=-0.501$, $df=70$, $p=0.618$). Therefore, it can be said that using either gray or red in the environment does not make a difference in the time spent for browsing items (see Table 34).

Table 34. T test results showing the comparison of gray and red settings in terms of time spent for browsing items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timebrowse	Equal variances assumed	.018	.894	-.501	70	.618	-2.722
	Equal variances not assumed			-.501	68.632	.618	-2.722

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timebrowse	Equal variances assumed	5.435	-13.563	8.118
	Equal variances not assumed	5.435	-13.567	8.122

The second pair to be compared is the gray setting and the green setting. Depending on the t test results for this pair, it is possible to see that the results are similar to the previous pair. No significant difference is observed between these two color schemes (t=0.842, df=70, p=0.403). Therefore, it can be said that using either gray or green in the environment does not make a difference in the time spent for browsing items (see Table 35).

Table 35. T test results showing the comparison of gray and green settings in terms of time spent for browsing items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timebrowse	Equal variances assumed	1.221	.273	.842	70	.403	4.167
	Equal variances not assumed			.842	61.355	.403	4.167

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timebrowse	Equal variances assumed	4.951	-5.708	14.041
	Equal variances not assumed	4.951	-5.733	14.066

The last pair to be compared is the two chromatic settings; the red setting and the green setting. The t test results for this pair also indicate similar results to the two previous pairs. Depending on the t test results, it is possible to say that no significant difference is observed between the two color settings in terms of time spent for browsing items (t=1.527, df=70, p=0.131). Therefore, it can be said that, using either red or green in the environment does not make a difference in terms of the time spent for browsing items (see Table 36).

Table 36. T test results showing the comparison of red and green settings in terms of time spent for browsing items

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
timebrowse	Equal variances assumed	2.490	.119	1.527	70	.131	6.889
	Equal variances not assumed			1.527	65.966	.131	6.889

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
timebrowse	Equal variances assumed	4.510	-2.107	15.884
	Equal variances not assumed	4.510	-2.116	15.894

As a result, it can be said that the time spent for browsing items works totally independent of the location and hue of the color used in the environment. For all three color schemes, the statistical results indicated that the location of color does not lead to a difference in the time spent for browsing items. The t tests conducted for all three color pairs indicate that the hue of the color is also non-effective on the time spent for browsing items.

4.4.1.5. Number of Task Performances Undertaken

Number of task performances undertaken is measured for all three main settings and for all six sub settings. What is meant by undertaking task performances is any further interaction with the item than just touching it.

Playing the items upon in front of the mirror or trying the items on are counted as undertaking a task performance.

For the gray setting, when color is applied on the right hand sided wall (wall 3), the number of task performances undertaken is counted to range from 0 items to 4 items with a mean value of 1 items. When color is carried to the left hand sided wall (wall 1) the number of task performances undertaken range from 0 items to 4 items with a mean value of 1 items. For this setting in general the mean number of task performances undertaken is calculated as 1 items. Depending on the t test results, the number of task performances undertaken have absolutely no difference between the right hand sided wall and the left hand sided wall, for the gray color scheme ($t=0.000$, $df=34$, $p=1.000$). Therefore, it is possible to say that the number of task performances undertaken is totally independent of the location of color for the gray setting (see Table 37).

Table 37. T test results showing the comparison of right and left hand side locations of the gray setting in terms of task performance

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
task	Equal variances assumed	.422	.520	.000	34	1.000	.000
	Equal variances not assumed			.000	33.663	1.000	.000

Independent Samples Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
task	Equal variances assumed	.362	-.735	.735
	Equal variances not assumed	.362	-.735	.735

For the red setting, when color is on the right hand sided wall (wall 3), the number of task performances undertaken is counted to range from 0 items to 4 items with a mean value of 1 items. When the colored fabric is carried to the left hand sided wall (wall 1), the number of task performances undertaken is counted to range from 0 items to 3 items with a mean value of 1 items. For this setting in general, the mean number of task performances undertaken is calculated to be 1 items. Depending on the t test results conducted for this color scheme, number of task performances undertaken does not seem to differ between right hand sided wall and the left hand sided wall for the red setting (t=0.147, df=34, p=0.884). It is possible to see that for this color scheme the right and left hand side locations are not exactly the same like they are in the gray setting in terms of the number of task performances undertaken still the location of color is not influential on the number of task performances for the red setting as well. (see Table 38).

Table 38. T test results showing the comparison of right and left hand side locations of the red setting in terms of task performance

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
task	Equal variances assumed	.634	.431	.147	34	.884	.056
	Equal variances not assumed			.147	32.494	.884	.056

Independent Samples Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
task	Equal variances assumed	.378	-.712	.823
	Equal variances not assumed	.378	-.713	.824

For the green setting, when color is applied on the right hand sided wall (wall 3), the number of task performances undertaken is counted to range from 0 items to 3 items with a mean value of 1 items. When color is carried from right hand sided wall to left hand sided wall (wall 3) the number of task performances undertaken is counted to range from 0 items to 2 items with a mean value of 1 items. For this setting in general the mean number of task performances undertaken is calculated to be 1 items. Depending on the t test results for this color scheme, number of task performances undertaken does not appear to differ between the right hand sided wall and the left hand sided wall (t=0.398, df=34, p=0.693). It is possible to see that the results are similar to the red setting. The two color locations does not seem to act exactly the same like it is in the gray color setting yet there is not a significant difference between the two locations. Therefore, it can be said that the number of task

performances undertaken is independent of the location of color for the green color scheme as well (see Table 39).

Table 39. T test results showing the comparison of right and left hand side locations of the green setting in terms of task performance

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
task	Equal variances assumed	.092	.763	.398	34	.693	.111
	Equal variances not assumed			.398	33.351	.693	.111

Independent Samples Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
task	Equal variances assumed	.279	-.457	.679
	Equal variances not assumed	.279	-.457	.679

Taking a look at the statistical results presented above, it is possible to see that the location of color for all three color schemes seems to be non-effective on the number of task performances undertaken. Moving on to the influence of the hue of the color on the number of task performances undertaken, all colors are again compared pairwise separately.

The first pair to be compared is the gray setting and the red setting. The t test results for this pair indicate that there is not a significant difference between the two color schemes in terms of the number of task performances undertaken (t=-0.539, df=70, p=0.592). Therefore it is possible to say that the

number of task performances undertaken is not dependent on the hue of the color for this pair of settings (see Table 40).

Table 40. T test results showing the comparison of gray and red color settings in terms of task performance

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
task	Equal variances assumed	.705	.404	-.539	70	.592	-.139
	Equal variances not assumed			-.539	69.868	.592	-.139

Independent Samples Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
task	Equal variances assumed	.258	-.653	.375
	Equal variances not assumed	.258	-.653	.375

The second pair to be compared is the gray color setting and the green color setting. For this pair, similarly with the previous pair of gray and red, t test results indicate that there is not a significant difference between the two colors (t=0.000, df=70, p=1.000). Different that the previous pair, it is possible to see that the elements of this pair act exactly the same in terms of the number of task performances undertaken. Therefore, rather than saying there is not a significant difference between gray and green setting it would be more appropriate to say that there is not any difference between the two settings. In this sense, the hue of color is not influential on the number of task performances undertaken for this pair as well (see Table 41).

Table 41. T test results showing the comparison of gray and green color settings in terms of task performance

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
task	Equal variances assumed	.698	.406	.000	70	1.000	.000
	Equal variances not assumed			.000	65.882	1.000	.000

Independent Samples Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
task	Equal variances assumed	.225	-.449	.449
	Equal variances not assumed	.225	-.450	.450

Lastly, comparing the two chromatic settings; red and green the results are no different from the first pair of gray and red. T test results indicate that there is not a significant difference between using either red or green in the environment in terms of the number of task performances undertaken (t=0.599, df=70, p=0.551). This pair is not the same with the previous pair of gray and green that red and green do not act as the same setting. However, they act similarly so that it is possible to say that the hue of color is not influential on the number of task performances undertaken for the red and green color pairs as well (see Table 42).

Table 42. T test results showing the comparison of red and green color settings in terms of task performance

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
task	Equal variances assumed	3.899	.052	.599	70	.551	.139
	Equal variances not assumed			.599	64.558	.551	.139

Independent Samples Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
task	Equal variances assumed	.232	-.323	.601
	Equal variances not assumed	.232	-.324	.602

4.4.2. Direction Patterns

Direction patterns is observed for all three main settings and for all six sub settings. What is meant by direction patterns is whether the attendants approach the colored wall or avoid it when they first enter the room. The direction behavior here to be observed, is also closely related to which side of the room is regularized to be colored. So actually what is aimed by observing this particular direction is to find out whether the tendency towards that specific section of the room is dependent on the color scheme or not. All four stands located in the room are numbered as stand 1, stand 2, stand 3 and stand 4. Stand 1 and 2 are located on the same side and stands 3 and 4 are located together across them. Stands 1 and 2 are in front of the right hand sided wall and stands 3 and 4 are located in front of the left hand sided

wall. Attendants' direction patterns are tracked according to the stand numbers. The main reason for changing the location of the colored wall continuously is to find out whether the location of the colored wall influences the behavior of the attendants. This influence is also ranked according to different color schemes as different colors might have different degrees of influence on the direction patterns.

For the gray setting, when color is on the right hand sided wall, 66.7% of the attendants chose to go to the right when first entering the room. In the same setting 33.3% of the attendants chose to go to the left. When color is carried to the left hand sided wall 72.2% of the attendants chose to go to the left when first entering the room. In the same setting 27.8% of the attendants chose to go to the right.

Depending on the t test results on SPSS, attendants' direction patterns differ when the gray wall is located on the left hand side and the right hand side ($t=-2.062$, $df=34$, $p=0.047$). Therefore, it is possible to say that, the attendants tend to go preferably to the gray colored part of the room (see Table 43).

Table 43. T test results showing the comparison of right and left hand side locations of the gray setting in terms of direction patterns

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
direction	Equal variances assumed	.000	1.000	-2.062	34	.047	-.333
	Equal variances not assumed			-2.062	34.000	.047	-.333

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
direction	Equal variances assumed	.162	-.662	-.005
	Equal variances not assumed	.162	-.662	-.005

For further analysis of the difference between the two color locations for the gray setting, chi-square test is also conducted for the same data. The results show that the direction patterns of the attendants is actually dependent on the location of the color used in the environment (χ^2=5.461, df=1, p=0.019) (see Table 44 and 45).

Table 44. Cross tabulation showing the comparison of right and left hand side locations of the gray setting in terms of direction patterns

Count

		Direction patterns		
		right	left	Total
Location of color	right	12	6	18
	left	5	13	18
Total		17	19	36

Table 45. Chi-square test results showing the comparison of right and left hand side locations of the gray setting in terms of direction patterns

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.461[a]	1	.019		
Continuity Correction[b]	4.012	1	.045		
Likelihood Ratio	5.611	1	.018		
Fisher's Exact Test				.044	.022
Linear-by-Linear Association	5.310	1	.021		
N of Valid Cases	36				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.50.
b. Computed only for a 2x2 table

For the red setting, when color is on the right hand sided wall, 88.9% of the attendants chose to go to the right when first entering the room. In the same setting 11.1% of the attendants chose to go to the left. When color is carried to the left hand sided wall, 72.2% of the attendants chose to go to the left when first entering the room. In the same setting 27.8% of the attendants chose to go to the right.

Depending on the t test results on SPSS, attendants' direction patterns differ when the red wall is located on the right hand side and onto elect hand side (t=-3.931, df=34, p=0.000). Therefore, it is possible to say that, there is a significant difference between when the red setting is on the right hand side and when on the left hand side in terms of attendants‘ direction patterns (see Table 46).

Table 46. T test results showing the comparison of right and left hand side locations of the red setting in terms of direction patterns

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
direction	Equal variances assumed	2.556	.119	-3.931	34	.000	-.556
	Equal variances not assumed			-3.931	32.912	.000	-.556

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
direction	Equal variances assumed	.141	-.843	-.268
	Equal variances not assumed	.141	-.843	-.268

For further analysis of the difference between the two color locations for the red setting, chi-square test is also conducted for the same data. The results show that the direction patterns of the attendants is actually dependent on the location of the color used in the environment (χ^2=11.250, df=1, p=0.001) (see Table 47 and 48). It is possible to say, the association between the location of the red colored wall and the direction patterns of the attendants is stronger than it is for the gray setting. As a result, it is possible to say that the attendants preferably go to the red colored part when first entering the room.

Table 47. Cross tabulation showing the comparison of right and left hand side locations of the red setting in terms of direction patterns

Count

		Direction patterns		Total
		right	left	
Location of color	right	15	3	18
	left	5	13	18
Total		20	16	36

Table 48. Chi-square test results showing the comparison of right and left hand side locations of the red setting in terms of direction patterns

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.250[a]	1	.001		
Continuity Correction[b]	9.113	1	.003		
Likelihood Ratio	11.971	1	.001		
Fisher's Exact Test				.002	.001
Linear-by-Linear Association	10.938	1	.001		
N of Valid Cases	36				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.00.
b. Computed only for a 2x2 table

For the green setting, when color is on the right hand sided wall, 77.8% of the attendants chose to go to the right when first entering the room. In the same setting 22.2% of the attendants chose to go to the left. When color is carried to the left hand sided wall 83.3% of the attendants chose to go to the left when first entering the room. In the same setting 16.7% of the attendants chose to go to the right.

Depending on the t test results on SPSS, attendants' direction patterns differ when the green wall is located on the right hand side and the left hand side (t=-3.931, df=34, p=0.000). Therefore, it is possible to say that, there is a significant difference in the green setting between when the colored wall is on the right hand side and when the colored wall is on the left hand side in terms of attendants' direction patterns (see Table 49).

Table 49. T test results showing the comparison of right and left hand side locations of the green setting in terms of direction patterns

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
direction	Equal variances assumed	2.556	.119	-3.931	34	.000	-.556
	Equal variances not assumed			-3.931	32.912	.000	-.556

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
direction	Equal variances assumed	.141	-.843	-.268
	Equal variances not assumed	.141	-.843	-.268

For further analysis of the difference between the two color locations for the green setting, chi-square test is also conducted for the same data. The results show that the direction patterns of the attendants is actually dependent on the location of the color used in the environment (χ^2=11.250, df=1, p=0.001) (see Table 50 and 51). It is possible to say, the association

between the location of the green colored wall and the direction patterns of the attendants is stronger than it is for the gray setting yet the same with the association found out for the red setting. As a result, it is possible to say that the attendants preferably go to the green colored part when first entering the room.

Table 50. Cross tabulation showing the comparison of right and left hand side locations of the green setting in terms of direction patterns

Count

		Direction patterns		Total
		right	left	
Location of color	Right	13	5	18
	Left	3	15	18
Total		16	20	36

Table 51. Chi-square test results showing the comparison of right and left hand side locations of the green setting in terms of direction patterns

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.250[a]	1	.001		
Continuity Correction[b]	9.113	1	.003		
Likelihood Ratio	11.971	1	.001		
Fisher's Exact Test				.002	.001
Linear-by-Linear Association	10.938	1	.001		
N of Valid Cases	36				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.00.
b. Computed only for a 2x2 table

After analyzing the influence of the location of color on the direction patterns of the attendants, it is found out that changing the location of color in the environment leads to a difference in the direction patterns of the people in the environment as supported by the t test results. The result induced from the statistical data is that people prefer to go to the colored part of the room. Chi-square test results show that the direction patterns of the attendants is dependent on the location of the colored wall of the room. Moving on to the influence of the hue of the color, all three color settings will again be analyzed separately in pairs.

The first pair to be analyzed is the gray setting and the red setting. Comparing these two settings it is possible to see that the hue of the color does not lead to a significant difference in the direction patterns of the attendants ($t=0.466$, $df=70$, $p=0.642$). In other words, it can be said that, using either gray or red in the environment does not make a difference in the direction patterns of the attendants (see Table 52).

Table 52. T test results showing the comparison of gray setting and red setting for both locations in terms of direction patterns

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
direction	Equal variances assumed	.438	.511	.466	70	.642	.056
	Equal variances not assumed			.466	69.997	.642	.056

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
direction	Equal variances assumed	.119	-.182	.293
	Equal variances not assumed	.119	-.182	.293

The second pair to be analyzed is the gray setting and the red setting. Comparing these two settings it is possible to see that the hue of the color does not lead to a significant difference in the direction patterns of the attendants similar to the previous pair (t=-0.466, df=70, p=0.642). In other words, it can be said that, using either gray or green in the environment does not make a difference in the direction patterns of the attendants (see Table 53). Also it is possible to see that the slight difference caused by changing the hue of the color for the gray and green setting is exactly the same with the slight difference observed between the gray and red setting.

Table 53. T test results showing the comparison of gray setting and green setting for both locations in terms of direction patterns

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
direction	Equal variances assumed	.437	.511	-.466	70	.642	-.056
	Equal variances not assumed			-.466	69.997	.642	-.056

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
direction	Equal variances assumed	.119	-.293	.182
	Equal variances not assumed	.119	-.293	.182

The last pair to be compared is the pair of two chromatic settings; red setting and the green setting. Comparing these two settings it is possible to see that the hue of the color does not lead to a significant difference in the direction patterns of the attendants similar to the two previous pairs (t=-0.935, df=70, p=0.353). In other words, it can be said that, using either red or green in the environment does not make a difference in the direction patterns of the attendants (see Table 54). Also it is possible to see that the slight difference caused by changing the hue of the color for the red and green setting is even less than the difference observed in the gray and red/gray and green settings.

Table 54. T test results showing the comparison of red setting and green setting for both locations in terms of direction patterns

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
direction	Equal variances assumed	.000	1.000	-.935	70	.353	-.111
	Equal variances not assumed			-.935	70.000	.353	-.111

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
direction	Equal variances assumed	.119	-.348	.126
	Equal variances not assumed	.119	-.348	.126

The results obtained from the statistical tests presented above show that the direction patterns of the attendants in the environment differ when the location of the colored wall is changed. As the chi-square test results also support, the direction patterns of the attendants in the environment depend on the location of the colored wall. Therefore, it is concluded that the attendants tend to go the differently colored part of the room preferably when first entering the environment. However, the t test results show that the hue of the color is not effective on this decision making process. In this sense, the final statement is that the attendants tend to go towards the differently colored part of the room preferably when first entering the environment regardless of the hue of the color used.

CHAPTER 5

DISCUSSION

In this study, the effects of color on approach/avoidance behavior is studied. Gray, green and red colors are separately applied to a single wall in the experiment room along with wall washers as a light source. The location of the colored wall is changed between the right and left hand sided walls of the room in reference to the entrance. The difference in attendants' behavior in between the three main color settings and six different location sub settings are observed in terms of time spent in the environment, number of items touched, time spent for investigating items, time spent for browsing items and number of task performances undertaken in the environment which are the central constructs proposed by Mehrabian and Russell (1974) stimulus response theory as indicators of approach/avoidance behavior. In addition to the elements proposed by M-R model, an additional construct is added to be able to observe whether there is a direct approach to the colored side of the room or not. This construct is named as the direction pattern performed in the store and is an indicator of whether colored wall caused the attendants to

approach that part of the wall directly. Direction pattern of the participants are assumed to be an indicator of the dominance dimension of the tridimensional P-A-D scale proposed by Mehrabian and Russell (1974) and an indicator of attendants' solid approach behavior.

Depending on the information gained from the literature, all three settings had expected approach rates. As it is mentioned before, the arousal levels caused by the colors work as an inverted U activation curve. This means that violet on the one side of the U shape and red on the other side would cause similar levels of arousal which is an extreme amount due to their wavelength and when used predominately in an environment, too much of arousal might lead to avoidance behavior (Babin, Hardesty and Suter, 2003). In this sense red being predominately used in the experiment room is expected to cause avoidance behavior. Green on the other hand is accepted to be the most popular color that would evoke the most positive emotions in the individuals (Lewison and Delozier, 1986). Therefore, green is expected to cause approach behavior more than red and gray. Lastly gray, being an achromatic and neutral color, is supposed to be neutral as well in terms of triggering emotional responses in the individuals so is expected to cause approach behavior more than red but less than green (Lewison and Delozier, 1986).

The observations made in this study have both similarities and differences with the literature in this sense. The results of the statistical analysis of the data collected from the experiment show that the usage of colors green, red and gray in the environment does not cause significant approach or

avoidance behavior. Red is expected to engender avoidance behavior, green is expected to engender approach behavior and gray, being the only achromatic color, is expected to be neutral in terms of engendering approach/avoidance behavior (Babin, Hardesty and Suter, 2003). However, the observations made in this study showed that none of the color schemes engendered avoidance behavior. On the other hand they did not engender a specific approach behavior either. In this sense approach/avoidance behavior is observed to be independent of the hue of color used. In addition to this, the location of color is expected to be influential on the direction patterns of the attendants. However, red is again expected to engender avoidance behavior which means that the attendants will go in the opposite direction of where red is located. Green is expected to engender approach behavior which means that the attendants will go towards the green colored part of the environment. Lastly, gray is expected to be neutral in terms of direction patterns. In this sense, attendants are expected to go neither towards nor reverse of the gray colored part of the environment. However, the observations showed that all three color schemes engendered approach behavior and most of the attendants preferred to go towards the colored wall regardless of the hue of the color. It is possible to summarize the results of the study this way. In the following paragraphs the results of the statistical analysis are discussed comprehensively.

Time spent in the environment is observed to differ independent of the location of color for all three color settings; gray ($t=0.588$, $df=34$, $p=0.561$), red ($t=1.371$, $df=34$, $p=0.180$) and green ($t=-1.034$, $df=34$, $p=0.308$). In this

sense, it is possible to say that the total amount of time spent in the environment is not dependent on the location of the color. Analyzing the influence of hue on the total amount of time spent, it is found out that for the gray and red (t=-1.295, df=70, p=0.200) and gray and green (t=1.024, df=70, p=0.309) pairs the hue of color is non-effective. However for the red and green color scheme there appears to be a difference between the mean total amount of time spent in the environment (t=2.534, df=34, p=0.002). Yet, this difference is observed to be independent of the location of the color ($\chi^{2=}$ 2.006, df=1, p=0.157).

In terms of number of items touched, location of color in the environment is not a determinant for the red (t=0.490, df=34, p=0.627) and green (t=0.724, df=34, p=0.474) settings. However, for the gray setting, the location of color appears to make a difference in the number of items touched (t=-2.411, df=34, p=0.02) . When the gray is on the right hand side majority of the attendants tend to touch less than 4 items (56%). When the color is carried to the left hand side, 44% of the attendants tend to touch more than 6 items which is the majority of the attendants. Therefore, the number of items touched have increased from right hand side to left hand side. Further analysis indicate that the difference between the right hand sided and left hand sided setting is dependent on the location of the color (χ^2=7.481, df=1, p=0.006). In general, when the three color schemes are to be compared, number of items touched is not dependent on the hue of the color used. For all three pairs; gray and red (t=0.475, df=70, p=0.637), gray and green (t=-1.692, df=70, p=0.096) and red and green (t=1.326, df=70, p=0.188) the

number of items touched does not differ dependent on the hue of the color used. Therefore, hue of color turns out to be non-effective on the number of items touched.

Time spent for investigating items, appears to be dependent on the location of color in the environment only for the gray setting (t=-3.031, df=34, p=0.005). Fifty-six percent of the attendants tend to spend less than 25 secs when the color is on the right hand side. When the color is carried to the left hand side 44% of the attendants tend to spend between 25 secs and 45 secs for investigating items. Further analysis indicate that this difference between the right hand side and left hand side is actually dependent on the change in the location of color (χ^2=4.050, df=1, p=0.044). Therefore it is possible to say that for the red (t=1.116, df=34, p=0.272) and green (t=0.347, df=34, p=0.272) settings, time spent for investigating items works independently with the location of color. When the three color schemes are compared, for all three pairs; gray and red (t=-1.205, df=70, p=0.232), gray and green (t=0.354, df=70, p=0.724) and red and green (t=1,643, df=70, p=0.105) the hue of color appears to be non-effective on the time spent for investigating items.

In terms of time spent for browsing items the location of color albeit is not a significant determinant. For all three colors; gray (t=1.808, df=34, p=0.082), red (t=0.752, df=34, p=0.458) and green (t=-1.480, df=34, p=0.148), time spent for browsing turned out to be independent of the location of the color. In general, comparing all three colors, for all three pairs; gray and red

(t=-0.501, df=70, p=0.618), gray and green (t=0.842, df=70, p=0.403) and red and green (t=1.527, df=70, p=0.131) the time spent for browsing items appears to be unrelated to the hue of the color used.

Similarly with the previous case, number of task performances, in other words the number of items tried appears to be independent of both the location and the type of color. For all three colors; gray (t=0.000, df=34, p=1.000), red (t=0.147, df=34, p=0.884) and green (t=0.398, df=34, p=0.693) the location of color in the environment is not influential on the number of task performances. When it comes to the hue of color, number of task performances appear to be independent of the color used for all three pairs; gray and red (t=-0.539, df=70, p=0.592), gray and green (t=0.000, df=70, p=1.000) and red and green (t=0.599, df=70, p=0.551). As a result it is possible to say that the number of task performances is both unrelated to the hue and the location of the color.

When it comes to analyzing the direction patterns of the attendants, the results seem to differ from all of the previous cases. In this case, the location of color used turned out to be influential on the direction patterns of the attendants. For the gray setting 66.7% of the attendants preferred to go right when the color is on the right side and 72.2% of the attendants preferred to go left when the color is located on the left. This number is even greater for the red setting, 88.9% of the attendants preferred to go right when the color is on the right hand side and 72.2% of the attendants preferred to go left when the color is on the left hand side. Lastly for the green setting, the

numbers are not as great as it is for the red setting yet still higher than the ones measured on the gray setting. 77.8% of the attendants preferred to go right when the color is on the right hand side and 83.3% preferred to go left when the color is on the left hand side. The t test results show that for all three colors; gray (t=-2.062, df=34, p=0.047), red (t=-3.931, df=34, p=0.000) and green (t=-3.931, df=34, p=0.000) the direction patterns appear to differ with the changing color location. Further analysis show that the difference in the direction patterns between different color settings is actually dependent on the location of the color for all three color settings; gray (χ^2=5.461, df=1, p=0.019), red (χ^2=11.250, df=1, p=0.001) and green (χ^2=11.250, df=1, p=0.001). However, the hue of color used does not appear to be influential on the direction patterns. Comparing the three color pairs; gray and red (t=0.466, df=70, p=0.642), gray and green (t=-0.466, df=70, p=0.642) and red and green (t=-0.935, df=70, p=0.353) the direction patterns does not seem to differ depending on the hue of the color.

In the beginning of the study, approach/avoidance behavior is categorized under four main behavioral responses. These responses are; physical responses, exploratory responses, communicative responses and performative responses. It is already mentioned that, as the attendants have experienced the room individually the communicative responses are eliminated from the study. The other three behavioral responses are used in the study. To explain briefly the total amount of time spent in the store stands for the physical behavioral response. Number of items touched, time spent for investigating items and time spent for browsing items stand for the

exploratory behavioral response. Number of items tried (task performances undertaken) stands for the performative behavioral response. Depending on the statistical analysis, the physical response dimension of the approach/ avoidance behavior is observed to be independent of both the location and hue of the color. The exploratory response dimension of approach/avoidance behavior is observed to be totally independent of the hue of the color and partially dependent on the location of color only for the gray setting. The performative response dimension of approach/avoidance behavior is observed to be totally independent of both the location and hue of the color. Therefore, taking the above listed results into consideration, hue of color is not influential on the approach/avoidance behavior. The location of the color is only partially influential on the exploratory dimension of approach/ avoidance behavior and only for the gray setting. Other than this, location is also not influential on the approach/avoidance behavior.

Independently of the listed indicators of approach/avoidance behavior, the solid physical approach/avoidance behavior is also recorded by observing the direction patterns of the attendants. Depending on the statistical analysis, it is concluded that the direction patterns of the attendants is highly related to the location of color in the environment so that the attendants tend to go towards the differently colored part of the room first when entering the room. However, this directional response changes regardless of the hue of the color as all three color schemes triggered a similar response in the attendants.

CHAPTER 6

CONCLUSION

Influence of color on approach/avoidance behavior is studied in this dissertation. Using the Mehrabian Russell stimulus response model as the basis for interpreting approach/avoidance behavior, an experiment room in Bilkent University is used to demonstrate the necessary environment. The room only carried the basic properties of a store like stands displaying a variety of items, a mirror and a seating unit for the attendants to sit or to put their belongings while exploring the room. This study aimed to provide useful information for scholars studying on the same topic, for retail designers and for the store managers in the sense of useful marketing strategies. By this study, it is simply aimed to research whether it is possible to make people approach the environment or a specific section of an environment by using color.

In the beginning of this study it is hypothesized that approach/avoidance behavior, measured by the total amount of time spent in the environment, time spent for investigating and browsing items, number of items touched

and number of task performances undertaken, is dependent on the hue of the color used in the environment. However, the results of this study indicate that the hue of the color is not influential on the approach/avoidance behavior performed. On the same topic (related to the previous assumption) it is also proposed that, according to their arousal levels, red is expected to trigger avoidance behavior whereas green is expected to trigger approach behavior. Gray, on the other hand, is expected to trigger neither approach nor avoidance behavior as it was mentioned in the previous paragraph. However, the results show that none of the color settings cause approach/avoidance behavior prior to the others. As the results indicate that changing to hue of the color does not make a significant difference in the indicators of approach/ avoidance behavior it is possible to say that the two are not related to each other.

It is also hypothesized that, approach/avoidance behavior is not dependent on the location of color. In other words as long as hue is determined, it does not matter where you put the color in the environment in terms of approach/ avoidance behavior. The results of this study show that, for the chromatic color settings; red and green the location of color is not influential on the approach avoidance behavior. However, for the achromatic color setting; gray, the location of color is partially (only for the exploratory dimension) influential on the approach/avoidance behavior. As gray is determined to be the neutral (control) setting, this result is unexpected when compared to the literature. The other two achromatic settings are expected to be more sensitive in terms of location as they trigger different levels of arousal. It can

be said that this assumption is mostly confirmed by the findings of the study that the location of color is not significantly influential on approach/avoidance behavior.

Another hypothesis proposed by this study is that, the direction patterns of the people in the environment is dependent on the location of the color. The results of the analysis show that the location of the color in the environment is highly influential on the direction patterns of the people. So this assumption is also confirmed by the findings of the study. However, on the same topic, it was hypothesized that the hue of the color would also be influential on the direction patterns of the people. In this sense, it was proposed that as red is expected to cause avoidance behavior, people would tend to move away from the red colored wall. On the other hand, the reverse was proposed for th green so that as green causes approach behavior people would tend to go towards the green colored part of the environment. Lastly, gray, as is labeled to be an achromatic and neutral color is expected to cause neither approach nor avoidance behavior so that people would neither go towards nor reverse of the gray colored part of the room. However, the findings indicate that, even if people tend to go towards the differently colored part of the environment, this occurs regardless of the hue of color. Therefore, it is possible to say that the location of color is influential on the direction patterns of the people yet the hue of color used is not significant.

The results of this study can be used efficiently by the scholars studying on the same topic, retail designers who aim to create buying atmospheres that attract people and increase the probability of purchase and also by store

managers as a marketing tool in terms of attracting people to the desired section of an environment or to a desired set of items. Previous studies are mostly limited to M-R model's central constructs and none of them studied the physical approach tendencies. Also many of the studies on this topic have found a significant correlation between color scheme used and approach/avoidance behavior (Bellizi et al., 1983; Bellizi and Hite, 1992; Wilson, 1996; Babin et al., 2003; Kaya and Epps, 2004). However, this study proposes that color scheme and approach/avoidance behavior are not significantly correlated. In this sense, this study contributes to the literature by providing a different approach to the subject by investigating the direction patterns of the attendants in the environment and also by proposing something different from what have been proposed until today.

6.1. Limitations of the Study

The biggest limitation of this study is that, the experiment could not be conducted in a real store environment due to permission reasons. Also, a real store setting wouldn't be under the control of the researcher as much as it is under control when the experiment is conducted in a laboratory. However, even if laboratory is a better option control-wise, it is impossible to demonstrate a real shopping experience in a laboratory. It is not because it is impossible to create a demonstrative store environment but because it is impossible to simulate the mood states and the impulsivity of the consumer when the attendants know that they are a part of an experiment. In addition

to this as the laboratory is not as big as a usual store, the time spent in the environment or time spent for browsing items can not be compared to the actual durations in a real store setting. Due to the scale of the room, the number of items placed is not as much as it is in a real store, so the number of items touched, time spent for investigating items and number of items tried cannot be compared to the numbers that can normally be obtained in a real store. However, based upon the findings of this study, the results that can be observed in real life cases can be estimated.

6.2. Recommendations for Future Research

This study can be conducted for different cultures in order to be able to find out whether the observations are universally valid or limited to cultural properties.

In order to obtain more realistic data, this study can be repeated in a real store setting by controlling other atmospheric variables such as the odor, music, temperature, air quality and so on. As people do not know that they are being observed, their real life shopping behavior can be observed when repeating the study in a real store setting. This way purchase probabilities and consumer behavior can also be observed to carry this study to a marketing strategy and consumer behavior level.

For studying other atmospheric variables, the same methodology can be used to investigate the effects of music, odor, lighting or temperature on approach/avoidance behavior. In terms of elaborating the study different lighting schemes combined with a greater variety of colors can also be experimented.

In this study the indicators of approach/avoidance behavior are expected to be independent of the location of color. For this reason, the total amount of time spent, time spent for investigating and browsing items, number of items touched and number of task performances undertaken are all recorded and analyzed generally changing the location of the colored wall. For further analysis on the influence of location, these recordings and analysis can be made separately for the differently colored wall and the other three walls to observe particular behavior in front of the differently colored wall.

To broaden the analysis about the influence of hue on the approach/ avoidance behavior, different colors can be used for the same study such as comparing violet (similar to red) with yellow (similar to green) or increasing the number of colors for further analysis. Another option can be eliminating the achromatic setting from the experiment and comparing the chromatic colors in between or vice versa.

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APPENDICES

APPENDIX A — TURKISH QUESTIONNAIRE

Merhabalar,

Sizden ricamız bu alanı dilediğiniz gibi dolaşıp, aşağıdaki soruları cevaplamanız. İçeride istediğiniz kadar zaman geçirmekte, ürünlere dokunmakta ve denemekte özgürsünüz. Şimdiden teşekkürler.

Hangi bölümde okuyorsunuz?

……

……

Kaç yaşındasınız ve şu an kaçıncı sınıfa gidiyorsunuz?

……

……

Herhangi bir görme bozukluğunuz var mı?

Yes **No**

Eğer cevabınız evet ise, görme bozukluğunuzu açıklayın.

……

……

……

APPENDIX B — ENGLISH QUESTIONNAIRE

Hello,

We ask you to experience this space as you wish and then to answer this questionnaire. Feel free to spend as much time as you want to in the room and also to touch and try on the items exhibited inside. Thank you already.

In which department do you study in?

……

……

How old are you? and What grade are you going into?

……

……

Do you have any visual impairment?

Yes **No**

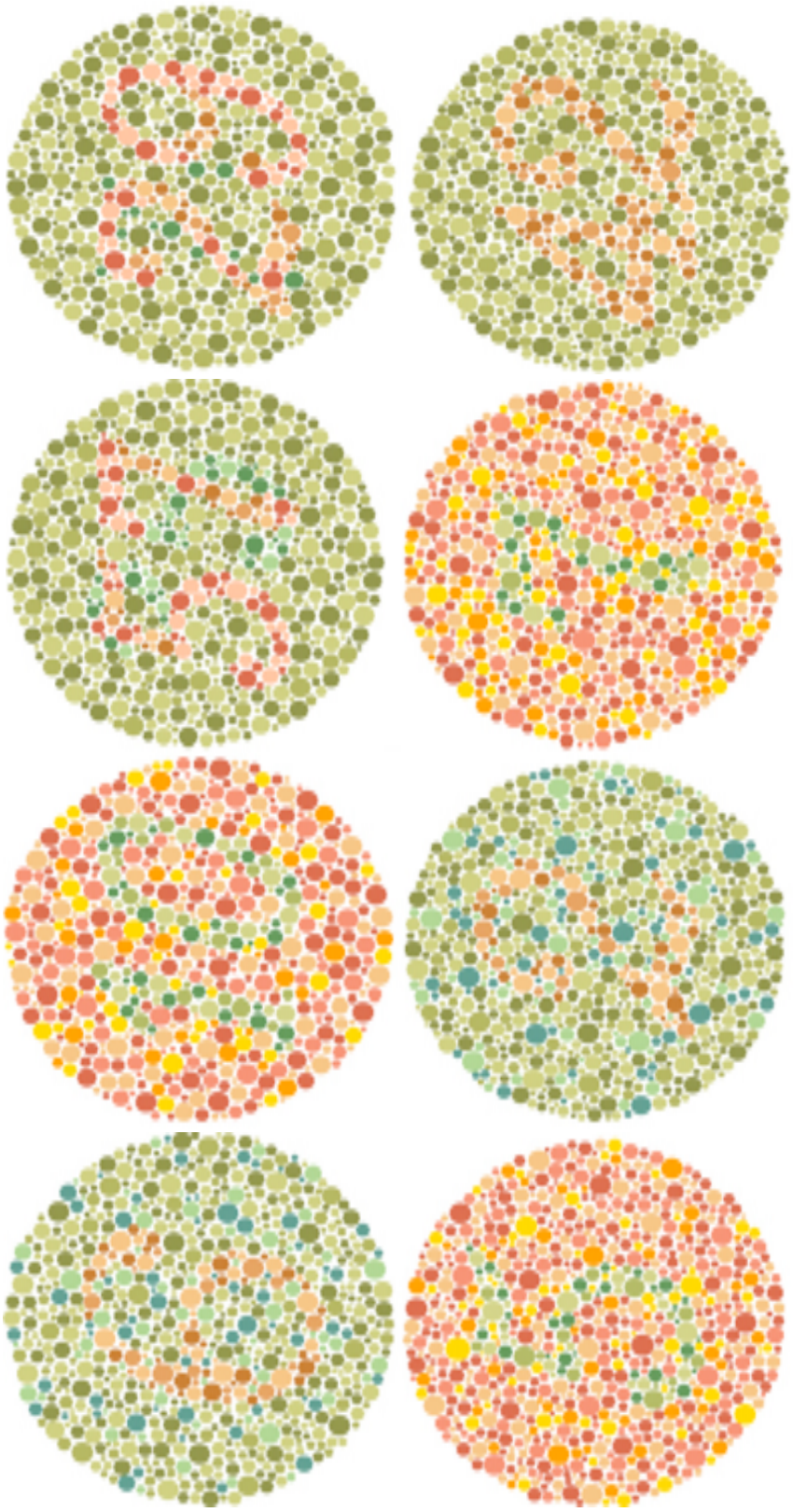
If yes, please specify your visual impairment.

……

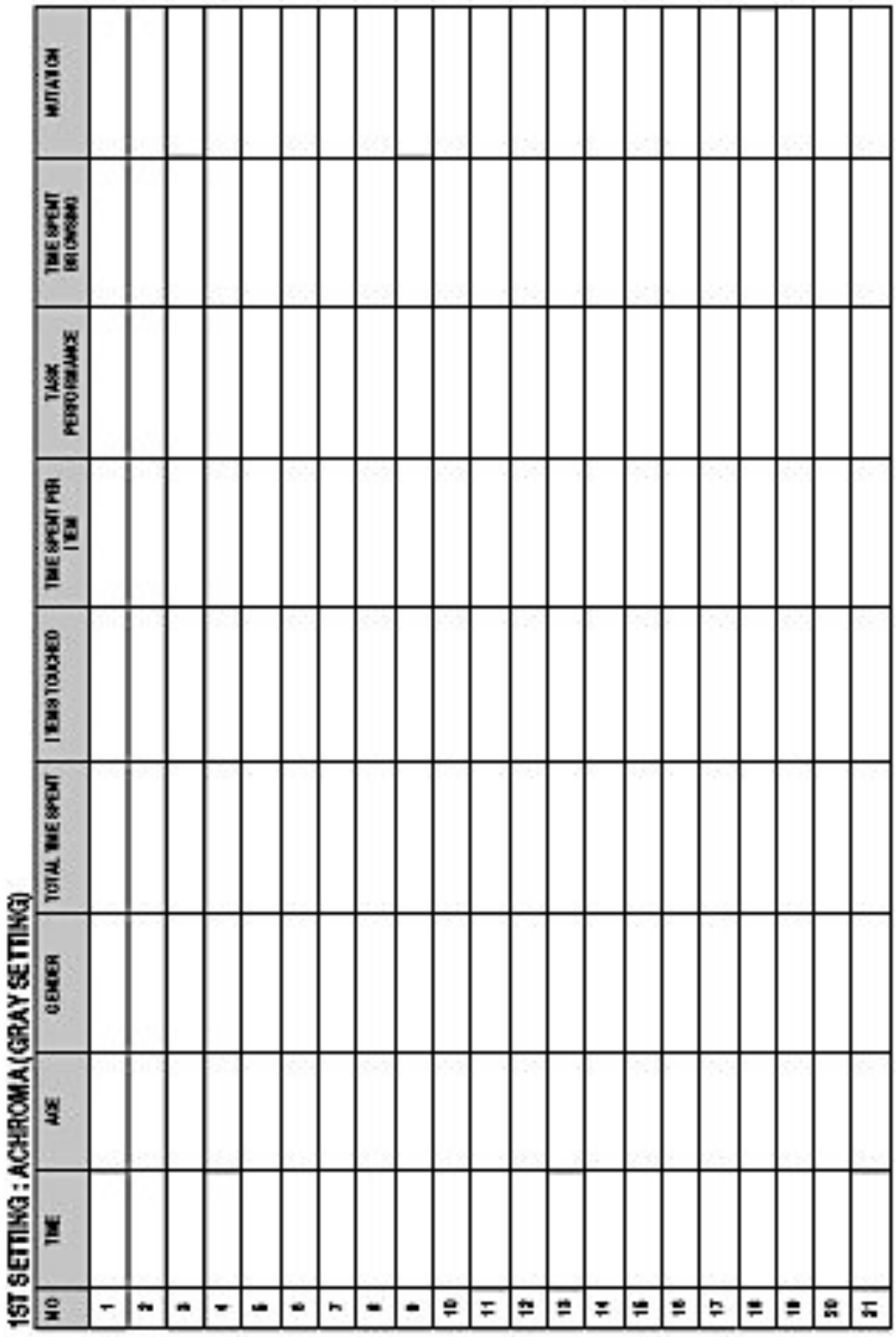
……

……

APPENDIX C — ISHIHARA COLOR BLINDNESS TEST



Appendix D — DATA SHEET



1ST SETTING : ACHROMA(GRAY SETTING)

NO	TIME	AGE	GENDER	TOTAL TIME SPENT	ITEMS TOUCHED	TIME SPENT PER ITEM	TASK PERFORMANCE	TIME SPENT (BEGINNING)	MUTATION
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
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