THE EFFECT OF COLORS OF E-COMMERCE WEBSITES ON MOOD, MEMORIZATION AND BUYING INTENTION

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Abstract

This paper aims at studying the impact of the colors of e-commerce websites on consumer memorization and buying intention. Based on a literature review we wish to introduce the theoretical and methodological bases addressing this issue. A conceptual model is proposed, showing the effects of the color of the e-commerce website and of its components Hue, Brightness and Saturation, on the behavioral responses of the consumer memorization and buying intention. These responses are conveyed by mood. Data collection was carried out during a laboratory experiment in order to control for the measurement of the colored appearance of e-commerce websites. Participants visited one of the 8 versions of a website designed for the research, selling music CDs. Data analysis using ANOVA, regressions and general linear models (GLM), show a significant effect of color on memorization, conveyed by mood. The interaction of hue and brightness, using chromatic colors for the dominant (background) and dynamic (foreground) supports memorization and buying intention, when contrast is based on low brightness. A negative mood infers better memorization but a decreasing buying intention. The managerial, methodological and theoretical implications, as well as the future ways of research were put in prospect.

Keywords: color, consumer behavior, e-commerce, web design, mood, memorization.

1 INTRODUCTION

E-commerce website interfaces seek to entice consumers in a buying intention and manifest a buying behavior, by activating their sensorial system, specifically their sight or hearing. The perception of a website atmosphere lies almost exclusively in its visual aspect since 80% of the information processed by Internet user's brain comes from sight (Mattelart, 1996). Color constitutes an important sight stimulus for online consumers, since it is a key website characteristic, associated with the information displayed as well as with the overall website aesthetics. As such, color is deemed as a significant website factor, positively influencing the frequency of a consumer visiting a website (Lemoine, 2008) and affecting online shopper responses (Eroglu *et al.*, 2001, 2003).

Although the color variable is a widely researched topic in various fields (Divard and Urien, 2001), to this day there is a lack of studies focusing on color in the online context. Research is limited to the impact of colors on web site readability, offering recommendations about how to choose the most harmonious colors (Hill and Scharff, 1997; Hall and Hanna, 2003; Nielsen (2000). Yet, color is omnipresent on e-commerce websites. Aware of the significant and widely known impact of the atmosphere inside stores on consumer activities and behavior in a traditional buying situation (Kotler, 1973; Donovan and Rossiter, 1982; Filser, 1994, 2003a, 2003b; Lemoine, 2003), there is a need to investigate the effects of colors as a component of e-commerce interfaces, on online consumer behavior.

Color has always been used by human beings as an aid to recognize important information among other. In addition, it can aid an individual's memory in retaining and recalling information in many activities, including education or purchases. Similarly, in the online context, the color of an e-commerce website can possibly improve consumer memorization of information presented in the website.

With the large amount of information presented on e-commerce websites, memorization becomes an important factor for buying online since consumers are often facilitated in their purchases when they can retain information from one page to another. This implies that memorization of information in an e-commerce website may have an impact on consumer buying intention and can potentially be facilitated by the website colors. However, the relationship between memorization and purchase intention online has not been investigated. In addition, there is a lack of research regarding color and its effect on memorization and buying intention in e-commerce websites.

In an attempt to address this gap, the aim of this paper is to examine how the colors of an e-commerce website can help consumers to memorize information so as to end up buying on the website. The paper presents an empirical study of the effects of e-commerce website color on the memorization of product information and buying intention. Unlike most empirical studies dealing with color by comparing warm and cold colors, we examine color by focusing on its hues, brightness and saturation so as to demonstrate that its influence varies according to the intensity of each of these three components. Our findings show that the colors used on an Internet website have a positive effect on memorization of product information and buying intention, which is also mediated by mood. They also show that mood acts as a mediating variable for the effect of colors on memorization.

2 BACKGROUND

Color contains three principal components (Trouvé 1999):

- The hue (or chromatic tonality), which is the attribute of the visual sensation defined according to the colors denominations such as blue, green, red;
- The saturation, which provides the proportion of chromatically pure color contained into the total sensation;
- The brightness, which corresponds to the component according to which a surface illuminated by a source seems to emit more or less light.

To this day, the effects of the three color components on the Internet have been but seldom documented. In the offline environment, Bellizzi and Hite (1992), Dunn (1992), Drugeon-Lichtlé (1996) and Pantin-

Sohier (2004) chose hue as the main variable in their experiments and showed that brightness and saturation should be taken into consideration when conducting experiments about color. As Valdez (1993), Drugeon-Lichtlé (2002), Camgöz et al. (2002) and Gorn et al. (2004) show about the brightness component of color, an experiment involving color should compare hue and brightness rather than warm and cold colors when trying to figure out what consumers recall and what spurs them to buy.

On a website, the interface design is driven by a graphic chart. This prescribes a set of guidelines, which take two colors into account: the foreground color also called "tonic" or "dynamic" color and the background color, labeled "dominant color" by webmasters. These colors reveal the contrast, which correspond to a strong opposition between the foreground and the background colors, as defined by W3C (Accessiweb, 2008). Its main function relies on facilitating the readability of the displayed information, and *a fortiori* the memorization process.

Hill and Scharff (1997) have demonstrated the importance of contrast (dynamic color vs. dominant color) when searching for information within a page. They obtained better readability scores when resorting to chromatic colors (green dynamic color on yellow dominant color). The results of the research of Corah and Gross (1987) suggest that recognitions between the colors were carried out when the differences of contrasts between the various and standard forms were larger. Camgöz et al. (2002) observed that brightness, saturation and hue had a specific impact on each colored screen background they observed during an experiment in which colored labels had been stuck to screen backgrounds.

Hall and Hanna (2003) studied the impact of dominant and dynamic colors on how readability was perceived and aesthetic aspect experienced, as well as on the memorization of information and on intentions. According to them, sites promoting knowledge transfer must display black texts on white backgrounds, a-chromatic colors with maximum contrast. Above all, they indicate that e-commerce websites should merely use chromatic colors due to the higher aesthetic appreciation score which is correlated to higher purchase intention. These results underline that when studying color on a website, it is important to take into consideration color components (hue, brightness and saturation), as well as the contrasts of the foreground and background colors.

3 RESEARCH MODEL

The model explains how the colors of an e-commerce website and their components - hue, brightness and saturation - can have an impact on the buyer's affective state of mood and cognitive states of memorization and buying intention (Figure 1).

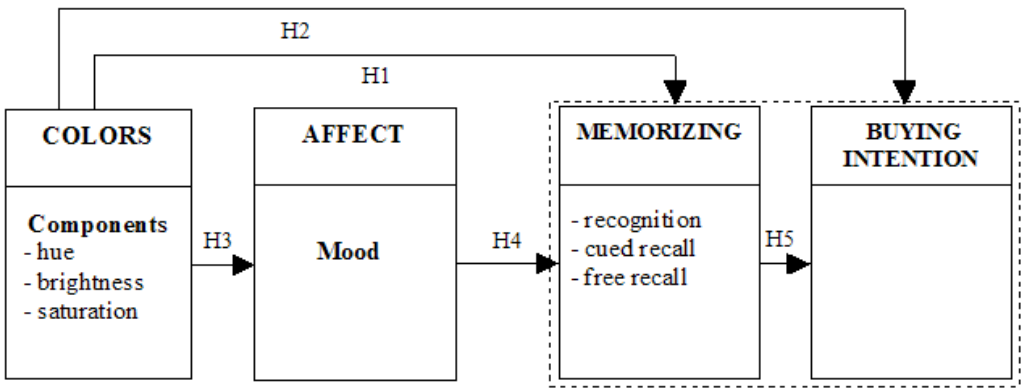

Figure 1: Conceptual model of the research

3.1 Memorization

Memorization is a very important factor for the large number of information-based websites that currently exist. It is important for e-learning applications, since the user goal is usually to retain the information beyond the time the page is being read. This also applies to information included in e-commerce websites, since consumer tasks are often facilitated by memorizing information while

navigating. Drawing on offline setting, memorization can be influenced by the colors of an e-commerce website.

In order to understand the effects of color on consumer memorization we have to take into account the quality and quantity of information a consumer has memorized while visiting an e-commerce website. We suggest that memorization varies according to the colors of the website, and especially according to the contrast between background and text colors. As we stated earlier, the aim of this research is to investigate the effects of the components of colors rather than colors themselves.

In general, information is stored according to an encoding process enabling one to sort out information thanks to criteria which will then allow one to retrieve this information. The role of these criteria is to connect a piece of information to other similar information already stored (Ladwein, 1999). In order to examine the information memorized by each participant, we resort to recognition and recall, two procedures belonging to a method of information retrieval based on overall stimulus in long-term memory. Be it free or cued, recall enables individuals to mimic mentally a stimulus to which they are not exposed during the evocation, for instance, their past reaction to a promotional action (Filser, 1994). Thus, we can hypothesize:

H1: The components (hue, brightness, saturation) of colors of an e-commerce website will have a positive effect on memorization

3.2 Buying intention

Intention is activated by a desire or a need (Darpy, 1997) and desire is viewed as an active process (O'Shaughnessy, 1992). Although buying intention is more than a mere desire, it is not a promise to buy (O'Shaughnessy, 1992), it is the outcome of a cognitively handled desire. According to Darpy (1997), echoing the studies of O'Shaughnessy (1992), Howard (1994) and Belk (1985) *"Intention results from a desire or a need handled on the cognitive level and leading to purchase planification"*.

Among the environmental factors recognized to produce important emotional and behavioral reactions on the consumer, color seems to play a big role. It serves to retain consumers longer on the e-commerce website according to certain criteria related to their perception of the interface. In particular, pleasure is increased with use of colors whereas the boredom can result from a weak use of them (Lemoine, 2008). This duration can help maintaining user interest in a site (Bucklin and Sismeiro, 2003, Hanson, 2000) and give users more time to consider and complete purchase transactions (Bucklin and Sismeiro, 2003). By enhancing consumer interest, it helps to generate repeat visits, which lead to greater long-term sales (Moe and Fader, 2004). From a business investment point of view, Demers and Lev (2001) show that sites with longer visit duration also have higher monthly stock returns. Therefore, it can be assumed that e-commerce website colors are likely to have an impact on buying intention, as they can prolong the visit duration. As already mentioned we are interested in the effect of color components, hue, brightness and saturation. Therefore, we propose:

H2: The components (hue, brightness, saturation) of color of an e-commerce website will have a positive effect on consumer buying intention

There are many entries which are available in the memory and in the external environment. They can potentially be considered in the decision task, but only a few will be used to make a choice during a precise occasion. Tactical choices are effectively at the base of decisions tasks regarding the products we buy, including:

- considerations linked to the price (cheaper, use less of it, cost a cheaper price);
- considerations linked to the performance (the product functions in these conditions, it owns these qualities);
- considerations linked to the affect (I like the product, I love the product);
- normative considerations (my father advised me to buy it, my mother always uses this product);

It is important to understand the procedures which determine which small sample from the entry among the whole possibilities can be used as a base to make a choice. For these reason, we propose:

H5: Memorization will have a positive effect on consumer buying intention

3.3 Mood, a mediating variable

We wish to bring to the fore the effects of colors on affect, which includes mood experienced when visiting the e-commerce website. Mood refers to affective states of mind less likely to reach our conscience. Moreover they last longer than emotions but are less intense (Forgeas, 1999). According to Odom and Sholtz (2004), different colors tend to incur different moods. Studies have demonstrated the association of colors and mood by using diverse methods such as the objective impressions (printings), the clinical observations, the introspection and the experimental investigations (Wexner, 1954). Chebat and Morrin (2006) measured the effects of cold vs warm colors of a mall decoration on consumers. The showed that these were more guided by affective mechanisms such as mood, of by other cognitive states, such as the evaluation of the mall environment quality. We believe that same mechanisms can exist in an online context. Once again, we investigate the direct and interaction effects of the components of colors. Hence, we suggest the following hypotheses:

H3: The components (hue, brightness, saturation) of color of an e-commerce website will have a positive effect on consumer mood

H4: Consumer mood will have a positive effect on memorization

When used in compliance with the contrasts advocated by Itten (1970), color can prove very timesaving, a major asset of the relationship between consumers and websites.

4 RESEARCH METHOD

A lab experiment was conducted with 440 participants in order to test the proposed hypotheses. An e-commerce website selling music CDs was especially designed for the experiment. For each CD, participants could see the CD cover, the album title, the artist name, and seven pieces of information, music style, online store price, music company price, sale percentage, delivery time, state (new or used), delivery charge. In addition, there was a CD description of 160 characters (around 20 words), next close to the CD cover.

Each respondent visited the website with a graphic chart which was randomly selected among the eight charts prepared for the experiment, explained in the next section. A balanced distribution of the graphic charts among all respondents was ensured. After viewing two CDs, an easy to see link appeared on the participants screen. The respondents were asked to complete a questionnaire with questions about memorized information, mood state and buying intention. Demographic data were also collected. Then each participant was asked to go to another room to pass the Ishihara's test. This last stage was the only reliable way to know if the respondent was color blind or not. This guaranteed the validity of our sample, by keeping people with a perfect vision of colors. After discarding questionnaires that were incomplete or filled by color blind people (8% of the males), 296 valid responses were used for the analysis, with each graphic chart being visited by 37 respondents.

4.1 Experiment design

Carrying out this experiment under laboratory conditions allows us to draw valid conclusions about the groups surveyed (Jolibert and Jourdan, 2006). Internet enables one to conduct non-intrusive studies, meaning that Internet users are not even aware that their behavior is being analyzed (Dreze and Zufryden, 1997). However, when conducting a study focusing on color, one has to control and neutralize three major elements: screens, ambient light, and, above all, the participants' color perception (Fernandez-Maloigne, 2004). Since, these elements cannot be controlled in a distance study carried out over Internet, a controlled laboratory setting had to be used for our study. Table 1 explains how each of the three elements was controlled, while further, detailed information can be found in Appendix 3.

 Figure 2: *The screen adjustment (calibration) of screens is possible with a probe*	We can make sure that the colors featuring in the different charts framing our experiment appear just as we have defined them on the screens of our participants.
 Figure 3: *The luxmeter enables to set up the brightness of the room at 1000 lux*	By carefully defining the color of the walls and the brightness of the environment in which participants stay we can make sure that the colored appearance of the websites used for the experiment will not be altered by a too dim lighting or, on the contrary, by a too brightly lit room.
 Figure 4: *Sample of the Ishihara test*	One must make sure that participants do not have any color vision deficiency, which is extremely hard to check. Only two solutions can be resorted to: one can either rely on the good faith of the participant's statement, or ask an eye specialist to provide a certificate stating the participant's vision is not impaired[1].

Table 1: *Conditions of the experiment*

In order to measure the differences in color perception, we created 8 different graphic charts with varied hues, brightness and saturation. In accordance with Gorn (2004), we set the saturation levels at 100%, because at that level, the hues are most distinct. The color stimuli were modified in accordance with Munsell's (1969) system, considered as the most accurate one (Aumont, 1994), which enables defining precisely several levels of brightness and saturation for each hue (Table 2).

Graphic charts	Plan	**Background**				**Foreground**				**Plans explanations**
		Name	H	B	S	Name	H	B	S	
Chart 1 – chromatic colors- Green and Yellow	1	Magnolia yellow	60	100	20	Newsvine Green	120	40	100	(Hill and Scharff, 1997) showed that the sharp contrasts of his chart offered users the fastest reading speed possible.
	2	Magnolia yellow	60	100	20	Granny Apple Green	90	80	100	Same chart as in the Plan 1 with increased dynamic color brightness (from 40 to 80).

[1] Asking a participant for such a certificate would assuredly have let him/her guess that our experiment was focused on color, which would have biased the experiment. Following recommendations from eye specialist Professor Lanthony, we decided to have each participant take the Ishihara test in a room separate from the one where the experiment was conducted.

	3	Newsvine Green	120	40	100	Magnolia yellow	60	100	20	Same colors as in Plan 1. Dynamic and dominant colors were switched.
	4	Newsvine Green	120	40	100	Sunflower yellow	60	100	60	Same color's chart as in Plan 3 with a decrease in dynamic color brightness (from 80 to 40).
Chart 2 – Achromatic colors - Black et White	5	White	0	100	0	Black	0	0	0	This chart is the most widely used one on e-commerce websites.
	6	White	0	100	0	Grey	0	60	0	Same color's chart as Plan 5 with increased dynamic color brightness (from 0 to 60).
	7	Black	0	0	0	White	0	100	0	Same colors as in Plan 5. Dynamic and dominant colors have been switched.
	8	Black	0	0	0	Grey	0	60	0	Same chart as in Plan 7 with a decrease in dynamic color brightness (from 100 to 60).

Table 2: Factorial Design of the Experiment

As Gorn et al. (2004) stated, setting the hue, and then saturation at a level of 100% is a way to make sure the hues will be more easily distinguished. Therefore we cannot measure the effect of the saturation variable in H1, H2 and H3. In addition, they have demonstrated that bright colors are more prone to entail relaxing feelings than less bright colors are. That is why we decided to upgrade the brightness levels of our chosen colors.

The factorial design includes 8 treatments (4 x 2) related to the 8 graphic charts conceived for the website dedicated to the experiment. We also observed the results related to brightness and saturation variations depending on the hues carefully selected beforehand.

To set our first experimental conditions we resorted to the graphic chart used by Hill and Scharff (1997) which supported the best readability rate in relation to contrast and we chose as chromatic colors a yellow dominant and a green dynamic. Starting from this chart, we reduced the brightness level of the two colors so as to obtain the second experimental design. For experimental designs 3 and 4 we kept the same colors but switched dynamic and dominant colors. Experimental designs 5, 6, 7 and 8 are based on black and white (achromatic colors), the most frequently used colors on e-commerce websites. Brightness and saturation levels were identical with those used for chromatic colors in experimental designs 1, 2, 3 and 4 respectively (Table 2).

4.2 Measures

4.2.1 Memorization

Memorization was measured by measuring recognition, cued recall and free recall.

To measure recognition, participants were asked to recognize two CD covers, each among two other covers of different albums by the same artist. Recognition scores ranged from 0 to 2, one for each CD cover they could recognize. Measuring recognition was not deemed useful since the participants answered to the questionnaires a few minutes after visiting the e-commerce website and 100% of them recognized both CD covers. Thus, we decided not to include recognition further in our analysis.

Cued recall was measured by asking the respondents to answer to a question with 3 alternative values (correct, wrong and *"I don't know"*) for each of the seven pieces of information related to a CD cover. Scores could thus be graded from 0 to 7 for each item visited. Since participants were required to check out two CD covers, scores for cued recall ranged from 0 to 14.

In order to measure free recall, participants were asked to answer to an open-ended question related to an image about the CD cover they had just seen. The question was *"What do you remember from the information associated with this CD cover?"*. Free recall was measured by counting the number of the items that participants could recall from those used in the CD description. Since participants could see two CD covers, each having a 20-element description, free recall value ranged from 0 to 40. (Figure 1)

The score of commercial information memorization was the sum of the recognition score, cued recall score and free recall score ranging from 0 to 56.

4.2.2 Mood

To measure moods we resorted to Mayer and Gaschke's (1988) Brief Mood Introspection Scale (BMIS). It includes 16 items rated on a 5-point Likert scale ranging from definitely do not feel (1) to definitely feel (5). We selected it because it provides a quite exhaustive range of moods and is easy to supervise. The scale is presented in Appendix 2.

4.2.3 Buying Intention

We used a four items scale developed by Yoo and Donthu (2001). The items were measured on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Already used in a similar context, its internal consistency was good, presented in Appendix 1.

5 DATA ANALYSIS AND RESULTS

We follow both the General Linear Model (GLM) to test the effect of the colors of the graphic chart on mood, memorization and buying intention and variance analysis (ANOVA) to analyze empirical data to test the significance of the links between variables and the validity of the scales. The effect of saturation on the dependent variables of our model was not possible to be tested because, as explained earlier in the experiment design, saturation was set constant in order to facilitate the measurement of hue and brightness. We also examined interaction effects between hue and brightness with a series of regressions on each of the dependent variables.

5.1 Direct effects of the colors of the graphic chart on memorization

The colors did not show a significant impact on cued recall, according to the GLM analysis. However, an interaction effect between hue and brightness on free recall exists ($F = 2.484$; $p \leq 0.061$) (Table 3).

Effects of graphic chart colors on cued recall			
	DF	F	p-value
Hue	3	0.404	0.750
Brightness	1	0.771	0.381
Hue x Brightness	3	0.616	0.616
Effects of graphic chart colors on free recall			
	DF	F	p-value
Hue	3	0.288	0.834
Brightness	1	0.049	0.835

Hue x Brightness	3	2.484	0.061*

Table 3: Effects of Graphic chart colors on cued and free recalls

After studying the ANOVAs carried out, we note that brightness affects free recall most significantly when hue n°2 (green dominant color, yellow dynamic color) is used. With a low level of brightness (brightness 1) participants remember the content of the website better than with a high level of brightness (brightness 2) (Figure 5).

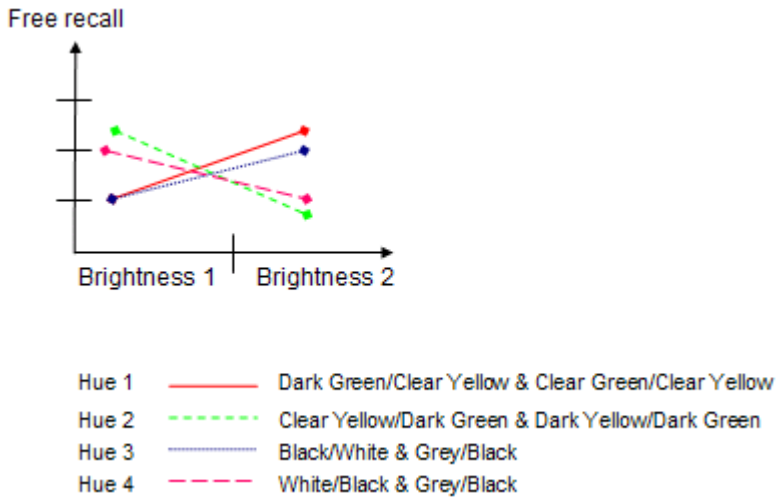

Figure 5: Effects of brightness on free recall

The results from table 4 indicate that neither hue (p=0.750) nor brightness (p=0.381) have a significant direct effect on cued recall and recognition. Furthermore, we do not find interaction between hue and brightness on cued recall and on recognition (p=0.616).

These results also indicate that hue and brightness have no significant direct effect on free recall (p=0.834 and p=0.835) respectively. This seems reasonable since hue or brightness of the text of the website (foreground color) and hue and brightness of its background do not necessarily have to facilitate the retention of information. However, the interaction of the hue and brightness components of colors has a significant effect on free recall ($F=2.484$; $p \leq 0.061$*). R^2 represents 3% which is low but sufficient. We can thus accept the hypothesis indicating that color components of a website have an interaction effect on the memorization of the consumer. H1 is therefore accepted.

From this result, we understand that a lower contrast between dominant color and dynamic color enhances the memorization of the commercial information given on the website.

5.2 Direct effects of the colors of the graphic chart on buying intention

The results of the GLM analysis demonstrate that a graphic chart of an Internet website is very influential on buying intention (Table 5). Brightness has a significant positive effect on buying intention ($F = 15.201$, $p \leq 0.000$) (Table 5). In line with our results for memorization, we note that when the dominant and dynamic colors' brightness is not too strong, buying intentions are the highest (Table 4).

	DF	F	p-value
Hue	3	0.349	0.790
Brightness	**1**	**15.201**	**0.000*** **
Hue x Brightness	**3**	**3.732**	**0.012***

Table 4: Effects of graphic chart colors on buying intention

The GLM analysis shows that hue and brightness have a positive interaction effect on buying intention ($F = 3.732$; $p \leq 0.012$). It also indicates that brightness plays an important role, having a direct effect on buying intention ($F = 15{,}201$, $p \leq 0{,}000$***). The results of the ANOVA show that the effect of brightness on buying intention is only significant for hues n°1 (yellow = dominant color, and green = dynamic color) and n°2 (green = dominant color and yellow = dynamic color), with a chromatic color hue, but has no particular effect with a black and white hue's chart. Further analysis help to explain this effect. In fact, the GLM analysis shows an interaction effect between hue and brightness on buying intention ($F = 3.732$; $p \leq 0.012$*). When contrast is higher and brightness increases, buying intention increases (Figure 6). Therefore, H2 is accepted.

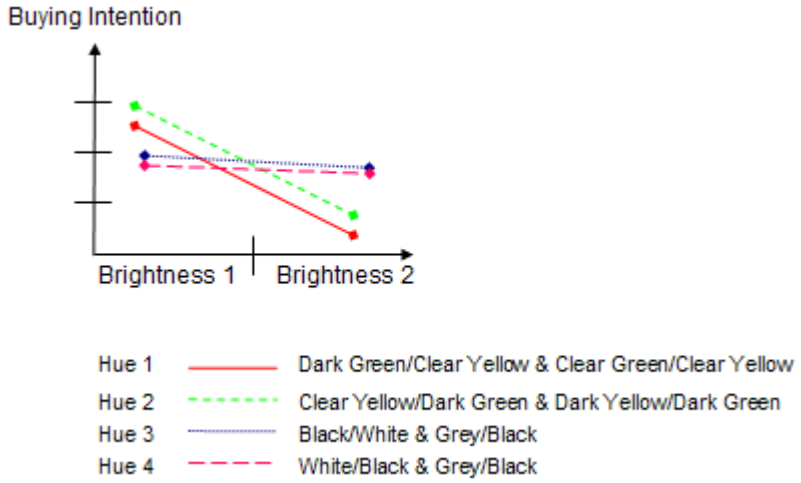

Figure 6: Effects of brightness on buying intention

5.3 Relationship between memorization and buying intention

A simple regression enables us to observe that free recall has a positive effect on buying intentions ($t = 3.824$; $p \leq 0.051$*). The more information an individual memorizes about a product, the stronger her or his buying intention will be (Table 5).

	Buying intentions
Memorization	0.044*
Constant	2.096**
$F = 3.824$; $R^2 = 0.013$	

* $p < 0.1$ ** $p < 0.01$

Table 5: Regression between memorization and buying intention

5.4 Mediating effects of mood

GLM analyses show that hue and brightness have a significant interaction effect on negative mood ($F = 3.042$; $p \leq 0.029$) (Table 6).

	Effects of graphic chart colors on positive mood			**Effects of graphic chart colors on negative mood**		
	DF	F	p-value	DF	F	p-value
Hue	3	0.374	0.772	3	1.159	0.326
Brightness	1	0.041	0.840	1	0.334	0.564

Hue x Brightness	3	0.916	0.434	3	3.042	0.029*

Table 6. Effects of graphic chart colors on mood

ANOVAs show that graphic charts based on hues n°1 (dynamic = Newsvine Green / dominant = Magnolia yellow and dynamic = Granny Apple Green / dominant = Magnolia yellow) and n°4 (dominant = black and dynamic = white) offer an interaction effect between hue and brightness. When hue n°1 (Newsvine Green/Magnolia yellow and Granny Apple Green/Magnolia yellow) is used, an increase of the brightness level entails a significant increase of negative mood ($F = 3.066$; $p \leq 0.084$), while with hue n°4 (White/Black - Grey/Black), an increase of the brightness level contributes to toning down negative mood ($F = 3.815$; $p \leq 0.055$). To test the mediating character of the mood variable, we used the process recommended by Baron and Kenny (1986, p.1177) by calculating the four successive regressions:

- Mediator = a (independent variable) + b; this regression has to be significant;
- Dependant variable = a' (independent variable) + b'; this regression has to be significant;
- Dependant variable = a" (independent variable) + b" (mediator variable) + c ; mediator has to be significant in this relation;

If all these conditions are satisfied, the effect of the independent variable must be less strong in the third equation than in the second (this effect then shows the significance of the associated coefficient with the independent variable). Baron and Kenny (1986) underline that *"the perfect mediation exists if the independent variable has no effect when the mediator is controlled."* We have thus found that mood was effectively a mediator of the "color –memorization/buying intention" link.

Another regression shows that negative mood does not have a significant effect on memorization.

6 DISCUSSION

Our research enabled us to bring to the fore the effects of the colors used on e-commerce websites on consumer memorization and buying intention. It also shows that negative mood as a mediating variable reinforces these effects.

Green and yellow hues, which are chromatic colors, are more likely to enhance the memorization of the displayed information than black and white (achromatic colors) are. These results must be related to the studies conducted by Silverstein (1987) who noticed that monochrome screens entailed more eyestrain and overall tiredness. Therefore, e-merchants should be aware of this and choose carefully the hues of the dynamic and dominant colors that they will use on their site so as to adjust them to their target. They should also take into account the aesthetic and functional impact of those colors: their contrast makes it easier to find the information on a webpage. Moreover, low brightness fosters better memorization scores and stronger buying intention. We also noticed that consumers recalled more easily information that they had trouble to read on an e-commerce website. However, let us note that they did not necessarily feel like buying a product from this type of website afterwards.

As Camgöz et al. (2002), Gorn, et al. (2004) and Valdez (1993) had shown about the brightness component of color, it seems more interesting to compare hue and brightness than to compare warm and cold colors when trying to examine what consumers recall and what leads them in purchasing. Indeed, in everyday life there is no support helping consumers to recall the content of an e-commerce website they visited or to compare it with another offer.

Moreover it appears indispensable to put into practice the conditions under which we conducted our experiment – conditions complying with the criteria used to evaluate the color quality of digital interfaces – which enable one to benefit from an accurate and easy to implement tool (Fernandez-Maloigne, 2004 ; Munsell, 1969).

For future experiments related to the measurement of consumer memorization or buying intention in front of a website, one should undoubtedly take into consideration brightness and saturation rates. Coupled with the use of sound on e-commerce websites, these analyses would enable us to reach a better understanding of the effects of the atmosphere pervading such or such e-commerce website on

consumers, especially according to a holistic rather than atomized approach to the phenomenon. The three-dimensional textures used on billboards or virtual worlds such as Second Life question the merely three-dimensional aspect of color as measured under those conditions.

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8 APPENDICES

8.1 A1: Buying intention scale (from Yoo B. and Donthu N., 2001)

N°item	Item	Corrected Correlation	Without item	Quality of representation	Contribution to the factor
1	I will certainly buy products coming from this website in a near future.	.791	.864	.825	.908
2	I intend to buy on this website in a near future.	.834	.837	.863	.929
3	It is likely that I buy on this website in a near future.	.791	.870	.824	.908
4	I plan to buy on this website in a near future.	.832	.865	.842	.927
Cronbach Alpha		0.899			
Eliminated Items		-			
Bartlett Sphericity Test		*Approximate Chi²= 563.367 – ddl 3 = – Sig. = .000*			
KMO value		*.749*			
Recommended value		*2.512*			
% of information		*83.739*			

8.2 A2: Brief Mood Introspection Scale (BMIS)- Mayer J. D. et Gaschke Y. N. (1988)

N°item	Item	Corrected Correlation	With out item	Quality of representation	Contribution to the factor 1	Contribution to factor 2
1	Happy – Hum1	.377	.779	.505	-	.505
2	Fed up - Hum2	.412	.846	.540	.658	-
3	Caring – Hum4	.512	.838	.526	.725	-
4	Nervous – Hum5	.537	.834	.712	.751	-
5	Satisfied – Hum6	.411	.776	.631	-	.631
6	Grouchy – Hum7	.486	.759	.628	-	.628
7	Sad – Hum9	.588	.826	.653	.807	-
8	Jittery – Hum10	.571	.772	.755	-	.755
9	Loving – Hum11	.407	.776	.514	-	.514
10	Drowsy – Hum12	.394	.854	.753	.583	.643
11	Lively – Hum13	.544	.853	.600	.605	-
12	Gloomy – Hum14	.634	.819	.746	.850	-
13	Tired – Hum15	.459	.842	.661	.683	-
14	Active – Hum16	.475	.778	.631	-	.631
Cronbach Alpha		0.814				
Eliminated Items		Peaceful – Hum3, Affectionate – Hum8				
Bartlett Sphericity Test		*Approximate Chi² = 985.340 – ddl = 28 – Sig. = .000*				
KMO value		*0.854*				
Recommended value					*3.304*	*1.120*
% of information		*64.882*				

8.3 A3: Devices and installation required to conduct the experiment properly

8.3.1 Experiment room (Fernandez-Maloigne, 2004)

Measurements were taken at different intervals thanks to a luxmeter:

- Keep a distance of about one meter between the back of the room and the screen,

- A relationship between idle screen luminance and peak luminance (luminance is the Y coordinate of the XYZ model),

- Peak luminance of the screen,

- Room lighting (ambient illumination),

- Background chromaticity related to the D65 illuminant,

- Maximum observation angle (CRT[2] screen) of 30°,

- High-quality assessment monitor, size 50-60 cm (22" - 26").

8.3.2 Participants (Lanthony, 2005)

- An Ishihara test for determining color blindness was conducted in another room than the experiment's one room so as to check that participants were not color-blind and thus in a position to provide valid answers.

8.3.3 Screens

All the screens used during the experiment were calibrated

- The screens must warm up for an hour before calibration;

- Hue, Brightness, Saturation as well as the R, G, B channels for each screen used must be possible to modulate;

- A CRT display must be used rather than a plasma screen;

- The target to be taken into account by the probe must be a 2.2 - 6500 Kelvin (Gamma, color temperature);

- Ambient light compensation must be disabled;

- The BLACK point must have a light level of 0.8° while that of the WHITE must reach 90°. If the weakest screen is no higher than 80°, you must calibrate all the screens to this level°. This might very likely be the case with old screens;

- The luminance of the WHITE for the contrast must be set so that four more or less WHITE squares are visible to the naked eye;

- The luminance of the BLACK, for brightness, must be set so that four more or less BLACK squares are visible to the naked eye;

- Identification of color controls: press the radio button on "RGB slider";

- Place the probe which will then provide the test patterns on the screen using the suction pads enabling it to stay stuck;

- The measurements mentioned above can be taken again two weeks afterwards, but normally they should not be altered if no one changed the screen settings;

- The probe allows to generate the ICC profile;

- Save the ICC profile which will be set automatically afterwards.

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[2] CRT screens or old generation screens