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„When colors are (not) different. The perception of colors in brands"

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Abstract

The protection of brand colors is only starting to find its way into trademark law even though the effects of colors have been widely researched. Especially the methodology for measuring color / brand associations is still lacking. Also, from a marketing perspective the advantages or disadvantages of having very distinct colors in a market category has been widely overlooked by the scientific community. In this study, fake brands were introduced in a between subject design. In our first condition the usage of color was a very distinct feature for our target brand. In our second condition all brands used different prominent colors. After participants were introduced to our brands and their products, they were then asked to correctly match brands names with products images while their response times were measured.

Both conditions did not influence the number of correct responses or response times. It seemed to have made no difference for participants if a brand was the only one that used colors or not. But product images with a brand logo or color were recognized significantly better than without brand specific features.

By measuring the response times, we also investigated a different approach for measuring color / brand associations by using an implicit associations paradigm in a Matching Task. Our results suggest that simply measuring the reponse times may be a too simple approach. Future research may extend our study design for more viable results.

Keywords: color, brands, distinction, associations, memory

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Introduction

In 2002 the Austrian telecommunications provider max.mobil was renamed to T-Mobile and changed its branding from black and orange colors to a very bright magenta. Their brand color was reinforced even more by their new logo which only consisted of a square colored in magenta as well. T-Mobile was the first brand in the Austrian telecommunications provider market to introduce a very bright and prominent color for its branding. Until then, other providers had only used black and reddish colors for their branding meaning that, compared to other brands, T-Mobile's color scheme was very noticeable and different. Nowadays most market categories are filled with a diverse color pool but there are still some, where colors are rarely used (for example washing machines, dryer or pipes in the Austrian market). Through colors, a brand can establish an effective visual identity and stand out from other competitors. This not only helps forming a specific brand personality but also gives them a visual advantage when being presented side by side with other competing brands (Hoek & Gendall, 2010). When most brands only use similar colors or no colors at all, new brands could gain an advantage by being the only ones that use prominent and distinct colors. This would increase the likelihood that consumers will associate that color with the brand more easily. Or would it? Even though studies about the effects and advantages of colors on human perception are vast and there are also plenty of studies about the effects of distinctiveness, evidence about the effectiveness of color as a distinctive attribute of a brand is scarce and has been overlooked by the scientific community. Furthermore the legal protection of colors is not only very difficult in some courts, the methodology for proving an existing color / brand association has been highly criticized for several reasons (Hoek & Gendall, 2010).

Distinctiveness

To the authors knowledge, there have been no studies that examined if being the only brand with prominent colors lead to an advantage for T-Mobile. However, studies about

the effects of distinctiveness are vast and have a long history. Schmidt (1991) defines the term Primary Distinctiveness as "[...] the structure of the to-be-remembered material activates an overall conceptual organization or framework. One or more items in the material do not fit this overall structure, and thus these items are distinctive." (Schmidt, 1991, p. 529). This relates to the definition of "conceptual coherence" suggested by Murphy and Medin (1985) who proposed that concepts are coherent which fit people's background knowledge or naive theories of the world. This definition also includes the different types of Restorff phenomena classified by Wallace (1965). Making sure that products are distinct from competing products can have a variety of advantages for a brand. Being distinct in a store environment is one obvious benefit because consumers seem to spend very little time on choosing products. A field study in a supermarket store, where shoppers who bought coffee, toothpaste, margarine or cold cereal were observed and interviewed afterwards, found that the average walking time between arriving and departing from the product category display was less than 12 seconds. About 42 percent of shoppers even took only 5 seconds (Dickson & Sawyer, 1990). In another study about laundry detergents it also took consumers, again including their walking time, only an average of 13 seconds to complete their in-store decision. Also, 72 percent of consumers looked at only one package and only 11 percent looked at more than two (Hoyer, 1984). Having only a very short time window in which consumers look for products it can be beneficial if a products stands out and is easily located. And in fact, there is evidence that distinctiveness is an effective way to increase the find-ability of objects (Duncan & Humphrey, 1989; Treisman & Gelade, 1980). Duncan and Humphrey (1989) also found that the find-ability was not only influenced by the distinctiveness of search-objects but also by the similarity of competing objects.

Most studies reported that distinctiveness mainly increases recall and not recognition (McLaughin, 1968; van Dam, Peeck, Brinkerink, & Gorter, 1974) but Karis, FabianiI, and Donchin (1984) reported that items in a list of words, which were isolated by changing its size were not only recalled more often but also recognized faster. Additionally, it has been

shown that memory is better for names that were associated with distinct faces than for names associated with non distinctive faces (Watier & Collin, 2012).

Copycats

Copycats try to profit from the memorability and good reputation from well-known, already established brands by imitating perceptual attributes such as color, shape, size or lettering of another leading brand in order to gain an advantage. A national survey in the US found that almost half of store brands they examined were similar to a national brand in color, size and shape (Scott Morton & Zettelmeyer, 2004). Being visually similar to a known and well-received brand can lead to better quality ratings and better rating in general (Loken, Ross, & Hinkle, 1986). But blatant imitation can also negatively impact consumers rating and lead to consumers disliking a product (Loken et al., 1986; van Horen & Pieters, 2012). Other brands not only have to deal with the fact that copycats try to profit from their marketing efforts and costs, it has also been found that visual similarity among brands creates confusion for consumers and reduces market transparency (Kapferer, 1995). Of course, copying other brands can lead to expensive court cases in regulated markets. Especially trademark infringements are more likely to cause legal actions (Collins-Dodd & Zaichkowsky, 1999). But copycatting strongly depends on the legal definition of copyright infringement and can sometimes be hard to prove. For example in France, in order to sue one need to prove that there has been "perceptual confusion" among consumers when paying "average attention". In other words, it must be proven that people actually bought the wrong product (which would be considered "behavioral confusion"). Gathered survey data with theoretical questions (where participants are able to think about their answer) are not considered valid proof for imitation (Kapferer, 1995).

Colors in brands

Colors are an important part of perception. In search-tasks colors are also used to increase the find-ability of an object when other distractors are present (Bundesen, 1990;

Wolfe, 1994). Evidence also suggests that the recognition of colored images is better than of the same images in gray-scale (Spence, Wong, Rusan, & Rastegar, 2006; Wichmann & Sharpe, 2002). Other Studies have shown that colors can signal the maturity of fruits (Cantu, Griskevicius, & Redden, 2012), can influence the perception of taste (Johnson & Clydesdale, 1982), can have an impact on the perceived lightness of an object (Hagtvedt, 2014) and can also affect the perception of price and quality of a product (Kerfoot, Davies, & Ward, 2003). Color associations are not fixed and can be learned. Marketers use that and try to associate their brand with their respective colors. These associations can even persist across cultures (Grimes & Doole, 1998; Madden, Hewett, & Roth, 2000). But marketers also need to be aware about already existing color associations when choosing colors for their brands. In general, it seems that blue green and white are strongly associated with "peaceful", "gentle" and "calming" across countries but colors like gold, orange and yellow appear to have less consistent meanings across countries (Madden et al., 2000). As a practical example, a study found that, on one hand, participants felt physically drawn to warm colors and also chose seats that were placed in a warm-colored (like red colors) area but on the other hand felt more uncomfortable when sitting in a warm-colored environment. Also, when questioned about store environments they perceived red and other warm-colored environments as negative and tense and considered them as less attractive and less pleasant than blue, cool-color environments (Bellizzi, Crowley, & Hasty, 1983). These findings were confirmed by a second laboratory experiment where a blue-colored or red-colored shopping environment was simulated. Participants reported not only more pleasant feelings in the blue-colored environment but also made more simulated purchases and purchased more expensive sets as well (Bellizzi & Hite, 1992). When investigating the link between color and branding, studies suggest that hue and saturation of brand logos and also of package design can strongly affect brand personality. Also the combination of logo shape and color can influence likability and familiarity (Labrecque & Milne, 2012). For products it has been shown that participants mainly preferred colors for

products that matched the attributes known from color theory (for example orange as a
'hot' color for playful and happy) (Hynes, 2009). In another study, participants rated
functional products (like anti-freeze or car tires) which used colors that were defined as
"functional" in a pretest better as when they were colored in sensory-social colors. The
same results were shown for sensory-social products (for example chocolates or perfume) in
sensory-social colors (Bottomley & Doyle, 2006).

These influences can be connected to sales. In 1983 Wienerschnitzel, a hot dog
restaurant in the United States, mixed a little orange to its magenta and red color scheme
to convey to consumers that they offered inexpensive hot dogs. In a prototype store sales
rose 7 percent and after changes were extended to all stores, sales rose up to 5 percent
annually (Lane, 1991). In another example, Ty-D-Bol, a toilet bowl cleanser bottle,
changed its coloration from light blue and green to stark white letters on a dark
background to connote strength and cleanliness. In a 18 month period following this
change, sales jumped 40 percent (Lane, 1991). A study on purchase intent in wine label
designs showed that depending on the color itself, the purchase intent of products were
either increased or reduced by colors. This increase or reduction of purchase intent was in
line with the desirability-rating of the color itself, highlighting the complexity of the effects
of colors on the perception of consumers (Boudreaux & Palmer, 2007). Another study
found that packaging shape, graphics, layout and color were the most important factors for
buying food products (Silayoi & Speece, 2007).

Colors from a legal perspective

Because of its importance for sales and self-portrait, brands need to be protective
about the colors used in their branding. Traditionally, protected trademarks only included
logos, brand names and slogans. Only until recently color has been viewed by courts as
parts of a brand that can or need to be protected. Over the last two decades several
companies have registered colors as trademarks after being able to demonstrate that a

particular color has acquired a second meaning by becoming linked with a specific brand. Changes in trademark law have also simplified the registration of colors and have even enabled the registration of shapes and smells in the United States (Hoek & Gendall, 2010) which recently have also been being considered in the EU (Annette, 2015). In the United States, the first case of color registration occurred in 1995 when Qualitex successfully argued that the green-gold color ("Sun Gold") used on its dry-cleaning press pads was distinctively associated with its brand and that using the same colors by a rival manufacturer was meant to imitate their brand. With that ruling the U.S. Supreme Court found that existing trademarks did not protect brand colors and noted that colors might be used by consumers to identify products (*Qualitex Co. v. Jacobson Products Co.*, 1995). In the EU, the European Court (EuGH) has questioned in the past if colors could be used to separate brand products from each other (Schumacher, Hofmarcher, & Florack, 2016). The EuGH stated that colors were effective for transporting mental connections or feelings but are mainly used for their decorating features without conveying any meaning especially about the origin of a product or service (*EuGH v. Heidelberger Bauchemie*, 2004; *EuGH v. Libertel*, 2003). But the EuGH did state that in principal colors are suitable for distinguishing products of brands (*EuGH v. Heidelberger Bauchemie*, 2004; *EuGH v. Libertel*, 2003; *EuGH v. Oberbank*, 2014).

Another hurdle for the protection of colors is the registration process. In the EU and the United States a brand needs to prove that a color is distinctively associated with a brand (Annette, 2015; Beebe & Fromer, 2018). The problem is that such a brand / color association is not that easy to prove. Also, since the color spectrum is limited, only very specific color codes can be protected. This means that a proven brand / color association needs to be very specific in order to be able to get protected. But there is no standard methodology for establishing such associations and the methodology that has been used so far, has several problems. Usually companies use consumer surveys to prove such a connection. There are two commonly used approaches for these surveys (Hoek & Gendall,

2010). One approach is to ask a representative group of consumers what color they associate with a particular brand name. The second approach is similar just the other way around. A colored card or packaging material is shown to a representative group of consumers who are then asked which brand they associate with that color. Both approaches are problematic. For one, color descriptions can be very subjective and it is very likely that respondents will report a range of color descriptions. This leaves the question which description can or can not considered as evidence of a particular brand / color association and it is not easy to define these kind of cut offs clearly. Second, showing respondents a color first can be problematic too. Colors are used in a range of market categories and just because a respondent thinks about other market categories when they are shown a color, that does not mean that no brand / color association for the target brand exists in their mind. In order to overcome this problem, respondents need to be told a targeted category as well or need to be primed in some way. But then it is difficult to tell if respondents recall a brand because they were shown a color or because this specific brand is well known and is just likely to be remembered. Additionally, both of these methods suffer from the criticism that the question itself implies to respondents that such a brand / color association must exist which can lead to guessed answers even if such a connection never occurred to them before.

Measuring Associations

According to memory models, semantic informations are stored in a complex network with several nodes and links. Activation of a node leads to activation or inhibition of other nodes through various links that in turn can activate or inhibit other nodes and their links. The resulting pattern of activation can be interpreted as a representation of knowledge. Strong connections between nodes lead to faster activation times while less strong connections between nodes lead to slower activation times (McClelland, 1988). This means that the response time is connected with the strength of association. A well known test

that is based on that concept is the Implicit Associations Test (IAT)

(Anthony G. Greenwald, McGhee, & Schwartz, 1998). In the IAT, a pair of target concepts

(for example "white" and "black") and an attribute dimension (for example adjectives like

"pleasant", "polite", "ugly" and "rude") are each assigned to a left and right key response.

After these associations have been learned, concepts and attributes are shown together.

Then the response assignments are reversed and after the associations have been relearned,

concepts and attributes are shown together again. By calculating the difference in response

times between both combined tasks the association between concepts and attributes are

inferred. Anthony G. Greenwald et al. (1998) found that the approach with the IAT

correlated with explicit measures. This was confirmed by various Meta analysis

(Anthony G Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Hofmann, Gawronksi,

Gschwendner, Le, & Schmitt, 2005)

Another approach has shown that simply the response time to behavior in evaluating

concept-pairs can depend on whether these concepts are associated or not (Meyer &

Schvaneveldt, 1971). In a study pairs of words were shown to participants. These

word-pairs were either associated with each other, were not associated with each other or

were word-nonword combinations. Participants had then press a "yes"- or "no"-key

depending on if both words were real words. Results showed that the response time for

word combinations that were associated with each other was significantly faster than for

word combinations that were not associated with each other. The same result was

replicated in a second experiment where participants instead had to press keys that were

labled "same" or "different".

Study overview

Current evidence has shown that an object which uses distinct colors has various

advantages in perception (Bundesen, 1990; Duncan & Humphrey, 1989; Treisman &

Gelade, 1980; Wolfe, 1994). One might suspect as well that the chance for a brand to be

associated with its colors should be higher when this brand is the only one that uses prominent colors in a market category, than when every brand uses prominent colors. But to the authors knowledge, there is no evidence if this actually is the case. In this study we try to lay the groundwork for this notion and determine if the use of distinct colors can increase the chance that a brand will be associated with its used color. Research about brand / color associations is especially relevant because legally protecting a brands color still is a big hurdle and the methodology is highly criticized (Hoek & Gendall, 2010).

According to past findings about implicit associations, we expect that the strength of brand / color associations will influence the performance in a task where participants are asked to correctly match brand names to their products. To differ between distinct and non distinct brands participants are divided into two conditions: In one condition, we implement a brand that uses a very prominent color in a market category while other brands only use grayish colors. In our second condition, we implement a brand that exists in a market category where every brand uses different prominent colors. Following distinction theory, distinct brands should be be easier to recognize or stay in memory more prominently. Because of this, we assume that products of the brand with distinct color will be matched to its brand more often (Matching Task) than products from other brands.

Hypothesis H1:.   The number of correct matches for brandnames to its product will be higher for brands that use a distinct color in their market category.

A study by Meyer and Schvaneveldt (1971) showed that response times were increased when participants had to match word combinations that were associated in contrast to word combinations that were not associated. Even though their study was limited to only text, we hope to find similar results in our study and maybe pave the way for another form of methodology in proving brand / color associations. Following the findings of Meyer and Schvaneveldt (1971) we suspect that a brand that uses distinct color will have faster response times in a matching task:

Hypothesis H2:.   The response time of participants in when matching brandnames to its products will be faster for brands that use a distinct color in their market category.

Method

To make sure that our findings would not be influenced by existing knowledge about our used brands or products, we decided to introduce fictional brands with fictional products. Because participants had no prior knowledge about our fictional brands and products, they were first introduced with a series of descriptive texts and images where participants could get to know the products and their brands. To make sure that each brand was comparable we did not combine different market categories or different lines of products and only used washing machines as products. In Austria, where this study was conducted, most brands mostly use gray or white colors on their washing machines. Even the brand logos on washing machines are mostly colored in black or dark blue. Because of this we assumed that it would be easier for participants to associate our introduced colors with new fictional brands and products.

Participants and Design

A web application introduced participants to different, fictional washing machines which belonged to one of four different, fictional brands. The study implemented a between subject design (illustrated in Figure 1) where each participant was randomly assigned to one of two conditions: In Condition High (with high distinctiveness), only the target brand used a prominent color and all other distractor brands used grayish colors. In Condition Low (with low distinctiveness), all brands used a different prominent color. Each brand had a randomly assigned product name and logo and its products were colored in its brand color. The selections out of the gray or prominent color-pool (either magenta, yellow, orange or green) were randomized for every participant.
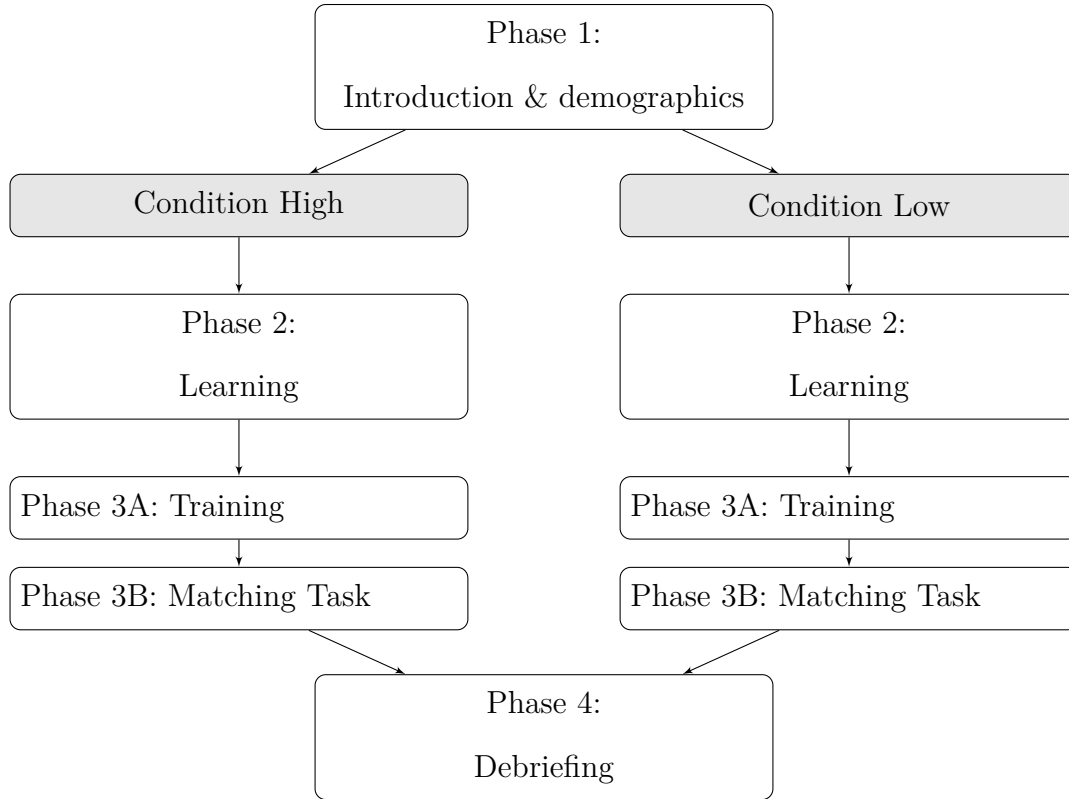
Participants ($N = 90$, 72 female, 18 male) were recruited by the *Laboratory*

Administration for Behavorial Science of the University of Vienna. For their participation, they received course credit and it took them on average 9.99 minutes ($SD = 2.085$, $Min = 6.41$, $Max = 15.86$) to complete the study. After participants had been debriefed they had to participate in another study which was not connected to this one and took about 15 minutes additionally. The mean age of participants was 20.96 ($SD = 3.108$) ranging from 17 to 37 and all except one participants were psychology students. 52 participants were randomly assigned to Condition High and 38 were assigned to Condition Low .

Procedere

Participants were greeted and asked to take a seat in front of one of the computers. They were asked to fill out the "Informed Consent" and then to proceed with the web application on the computer. The web application was split into 4 phases (illustrated in Figure 1): In Phase 1 participants were introduced to the study and asked to fill out a short questionnaire about demographical data, in Phase 2 they were introduced to different washing machines and their brands, in Phase 3 they had to match brandnames to their products and in Phase 4 they were debriefed and thanked for their participation. Each phase is described in detail below:

Figure 1. Experimental design of the study; In Condition High only the target brand used a prominent color and others used gray colors; In Condition Low all brands used different prominent colors.

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                          │       Phase 1:          │
                          │ Introduction & demographics │
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                  ┌───────────────┴───────────────┐
        ┌───────────────────┐           ┌───────────────────┐
        │  Condition High   │           │   Condition Low   │
        └───────────────────┘           └───────────────────┘
                  │                               │
        ┌───────────────────┐           ┌───────────────────┐
        │     Phase 2:      │           │     Phase 2:      │
        │     Learning      │           │     Learning      │
        └───────────────────┘           └───────────────────┘
                  │                               │
        ┌───────────────────┐           ┌───────────────────┐
        │ Phase 3A: Training│           │ Phase 3A: Training│
        └───────────────────┘           └───────────────────┘
                  │                               │
        ┌───────────────────┐           ┌───────────────────┐
        │Phase 3B: Matching Task│       │Phase 3B: Matching Task│
        └───────────────────┘           └───────────────────┘
                  └───────────────┬───────────────┘
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                          │       Phase 4:          │
                          │      Debriefing         │
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Phase 1: Introduction and demographics.   Participants were introduced to the study. They were informed that they would be shown some fictional products and fictional brands. They were also instructed to remember the brand names and told that they would have to match these products in the end of the study (see Figure A1). Then, participants had to provide some basic demographic data like age, sex and which university program they are applied to (see Figure A2).

Phase 2: Learning.   In this phase participants got to know our fictional brands and get a change to associate them with their respective color and logo. Participants were shown a series of fake profiles for washing machines. These fake profiles included a product image, name and description and the brand name and icon. The product descriptions were

written by us but inspired by existing descriptions from various products off the Internet. Each profile was presented only once and there were three profiles per brand (meaning that participants saw 12 profiles in total). To make sure, participants would focus on the brand name, participants had to enter the brand name of the currently shown brand to proceed (see Figure A3 and Figure A4).

Phase 3: Matching Task.   This was the main part of our study where participants were tested about their color / brand associations.

Participants were first shown a slightly altered version (as explained below) of one of the product images that have been shown to them before. After four seconds, the product image was replaced with a brand name that was either the brand name of that product or it was another, "wrong" brand name (Figure A8). Participants then had to either press "e" on their keyboard if they thought that the brand name did belong to the product image or "i" if they thought that the brand name did not belong the the product image. Then a white screen was shown for one second and the next product image / brand name pair was shown.

In order to be able to make sure that our findings would not be based on guessing strategies, the shown product images were one of three different product image variants that were slightly altered in our Matching Task:

1. One where all brand related features (brand color and brand logo) had been removed (see Figure A7). We expected that most participants would have difficulties recognizing them because most washing machines we used in our study looked very similar. This was meant as a baseline to which we compared the other variants to.

2. One with only the brand color meaning that brand logo has been removed (see Figure A5). Findings for that variant were important for both of our hypotheses,

3. and one with only a brand logo where the brand color has been removed (see Figure A6). Because logos play a very important part in brand personality and past research has found them to be the best cue for recognizing brands (Gabay, Moskowitz,

Beckley, & Ashman, 2013; Pittard, Ewing, & Jevons, 2007) we found it would be important to test how and if logos would be recognized differently to brand colors.

Phase 3A: Training Task.   Before the actual Matching Task, a Training Task was conducted so that participants could get accustomed. The Training Task was the same as the actual Matching Task but responses were not recorded and participants received feedback if their answer was correct by displaying a green check-mark or a red "x" after their response. They also had six instead of three seconds to answer after the brand name was shown. Before the Training Task was started, participants received instructions about the task on the screen.

To prevent learning effects, only product images of one of the distractor brands were shown in the Training Task (this was not told to the participants). This brand was not used in the actual Matching Task. Each of the three product image variants was shown two times combined with the correct brand name and two times combined with the wrong brand name. In total 12 image-brand pairs were shown.

Phase 3B: Actual Matching Task.   After the Training Task, participants were again shown the instructions for the Matching Task and then started the actual Matching Task. The answering time was measured and participants were told beforehand that they had to answer as quick as possible. If they reacted too slow the response was counted as missed and the next image-name pair was shown. Participants only had three seconds for their answer after the brand name was shown. Also they did not receive feedback if their answer was correct or not.

Only the product images of two brands were shown in this task: Product images from the target brand and from one randomly chosen distractor brand (but not the brand from the training phase). For the target brand and also the distractor brand, each product image variant was shown three times combined with the correct brand name and three times combined with the wrong brand name. Meaning that in total 36 image-brand pairs were shown.

Phase 4: Debriefing. After participants finished the Matching Task, all data was uploaded to the server. After the upload was successful, they had the opportunity to leave a comment on the study and were then debriefed. Afterwards participants were redirected to another study that was not connected to this study.

Technical Details

The web-application used in this study was developed and programmed by ourselves. It consisted of a client that was executed on the computer used by participants and a server which received and stored all collected data. The study was conducted at four different days at the University of Vienna in a laboratory with eight computers with identical hard- and software (from which only five where used at the same time). The computers were placed separately and with screening walls in between.

Client. The client was programmed using JavaScript and HTML and was executed in the Web-Browser Google Chrome (version 67) in Incognito Mode on computers using Microsoft Windows 10. Time measurement was done by comparing UNIX timestamps (in milliseconds) that were produced by the Date.now() function in JavaScript. To make sure that all product images in the Matching Task were displayed for the same amount of time, all images were preloaded at the start of each session and cached using JavaScript. Additionally, to reduce the possibility of lag spikes interfering with time measurement, we made sure beforehand that all computers had no apparent visible background programs running and the Chrome application had no additional tabs opened.

Except for the demographics-screen and the debriefing-screen, no mouse was used for navigating the application. Participants had to use the SPACE-key on their keyboard to proceed.

Server. The server was located at the University of Vienna and used PHP for handling incoming data. The client-application stored all collected data in the Browser until the study was completed and then sent them via AJAX calls from JavaScript to the

server over a secured connection trough HTTP over TLS.

Images.   The images of real washing machines were taken from various sources in the Internet and slightly altered for our purposes (see Figure B2). All pictures used in this study were displayed in the same angle, had a similar size and similar outward features. Their original brand name and logo were removed from the image and replaced with our own brand name and logo. Additionally, if a product name was displayed on the washing machine it was removed as well or made sure that it was not readable. The coloration that was used in our conditions were placed on top of the drawer for washing agent at the top left of the washing machines (see Figure B3 and Figure B3).

Our brand names were fabricated by us and their logos were copied from a free logo generation site, had their coloration removed and were slightly altered using the graphics program Gimp (see Figure B1).

Results

Hypothesis H1: Number of correct responses between conditions

We expected in Hypothesis H1 that the number of correct matches for brandnames to its product will be higher for brands that use a distinct color in their market category. In our Matching Task there were three product image variants that had to be matched to a brand name: Either with a brand logo, with a brand color or no specific brand feature at all. Participants were assigned to one of two conditions: In Condition High only the target brand used a prominent color while distractor brands only used similar, grayish colors. In Condition Low all brands (target brand including distractor brands) used different prominent colors.

For our analysis we calculated *d'* according to Signal Detection Theory (SDT), which includes *hit rate* (the probability of participants responding "does match" when product image and brand name did belong to the same brand) and *false-alarm rate* (the probability of participants responding "does match" when product image and brand name did not

belong to the same brand) (Stanislaw & Todorov, 1999).

When both the product image and the brand name belonged to the target brand and the product picture had no brand specific feature, participants recognized that combination as correct (hit rate) only 30 percent of occurrences ($M = 0.303$, $SD = 0.269$). This was expected since most washing machines looked very similar. Recognition was much higher when the product image had a brand color ($M = 0.573$, $SD = 0.370$) and the highest when the product image had a brand logo ($M = 0.649$, $SD = 0.357$).

First, to get general differences between conditions, we compared d' for the target brand between both conditions using an independent t-test. Our results, split between product image variants, are listed in Table 1.

Table 1

Comparison of d' (according to SDT) for the target brand between Condition High (only target brand used a distinct color) and Condition Low (all brands used different prominent colors).

	Condition High		Condition Low					
	M	SE	M	SE	t	df	p	d
brand color	1.319	0.327	1.415	0.392	-0.189	88	0.851	-0.040
brand logo	2.124	0.268	2.589	0.355	-1.066	88	0.290	0.227
no features	0.143	0.256	-0.132	0.210	0.827	87.87	0.410	0.167

We expected to find that the target brand would have had more correct responses in Condition High (where all brands except the target brand used a grayish color) than in Condition Low but found no significant difference between both conditions suggesting that the number of correct responses did not differ when our target brand used a distinct color. Instead the correct response rate for colored product image variants were very similar in

both conditions.

Product images variants with a brand logo had more correct responses in Condition High than Condition Low. But again, these results were not significant.

The only difference in our both conditions were the brand colors of our distractor brands. To make sure that responses regarding distractor brands differed in between conditions we again computed an independent t-test between both conditions but this time only using d' for the distractor brands. Results are listed in Table 2.

As we expected, the difference for colored product image variants between Condition Low ($M = 0.073$, $SE = 0.240$) and Condition High ($M = 1.080$, $SE = 0.416$) was significant $t(60.771) = -2.094$, $p = 0.04$; with a small to medium effect size, $d = -0.474$. This means that the number of correct responses were much lower when our distractor brands had similar gray colors than when they each used different prominent colors. The difference in d' for distractor brands between both conditions were not significant for product image variants with logo or no brand specific features. This makes sense since both brand logos and product images were identical in both conditions.

Table 2

Comparison of d' (according to SDT) for the distractor brand between Condition High (only target brand used a distinct color) and Condition Low (all brands used different prominent colors).

	Condition High		Condition Low					
	M	*SE*	*M*	*SE*	*t*	*df*	*p*	*d*
brand color	0.073	0.240	1.080	0.416	-2.094	60.771	0.040	-0.474
brand logo	2.227	0.305	2.168	0.326	-1.131	88	0.900	0.028
no features	0.196	0.188	0.345	0.283	0.456	88	0.649	-0.097

Next, we tested if product image variants with brand logo or brand color lead to a different number of correct responses than product image variants without brand specific features. We compared d' from all three product image variants (colored, with logo or with no brand specific feature) for the target brand with a paired t-test (listed in Table 3). Product images with brand color ($M = 1.359$, $SE = 0.027$) were recognized better than product images without a brand specific feature. This difference was significant $t(89) = 4.937$, $p = 0.001$; with a medium-sized effect, $d = 0.46$. Also, product images with a brand logo ($M = 2.321$, $SE = 0.216$) were recognized better than when the product image had no brand specific feature ($M = 0.027$, $SE = 0.172$). This difference was also significant $t(89) = 8.300$, $p = 0.006$; with even a high-sized effect, $d = 1.238$. The difference between product images with brand color and product images with a brand logo was significant as well $t(89) = -2.834$, $p = 0.001$; with a small-sized effect, $d = 0.29$. Product images with a logo were recognized best especially compared to product images without brand specific features. While color did indeed help participants in recognizing a brand, the brand logo still was the best indicator for them.

Table 3

Influence of brand related features on the average number of correct responses from participants

	M	SE	t	df	p	d
brand color vs	1.359	0.250	4.937	89	<0.001	0.655
no features	0.027	0.172				
brand logo vs	2.321	0.216	8.300	89	0.006	1.238
no features	0.027	0.172				
brand color vs	1.359	0.250	-2.834	89	<0.001	-0.434
brand logo	2.321	0.216				

Finally, for testing our Hypothesis H1, we examined if the difference in correct answers between product image variants were also significant between conditions. We calculated a repeated measure MANOVA, with the response time for the different image variants as dependent variables and the condition as between subject factor. The results showed that the difference in d' depending on product image variants between both conditions was not significant, $F(2, 87) = 0.94$, $p = 0.393$. This falls in line with our first result which suggested that there was no difference in correct responses for our target brand between both conditions.

To summarize, our findings suggest that our Hypothesis H1 has to be discarded: The number of correct responses did not differ if the target brand used a distinct color, contrary to what we expected.

Hypothesis 2: Response times between conditions

Hypothesis H2 states that the response time of participants will be faster in Condition High where only our target brand used a distinct color than in Condition Low were all brands used distinct colors. To test this hypothesis we conducted the same analysis as we did for our Hypothesis H1 except that each time we compared the reaction times for correct responses instead of d'. This meant that in each analysis participants who had no correct responses (out of three occurrences) had to be excluded. In some analysis we had to exclude more participants than anticipated which could mean, though unlikely, that some results may not be significant because its calculation did not have enough power.

Again as a first step we generally compared both conditions with an independent t-test for the response time between both conditions. Our results, listed in Table 4, were not significant with small effect sizes at best, meaning that response times did not differ between conditions.

Similar to before, we compared the response times from correct responses for the distractor brand between both conditions (listed in Table 5). Unexpectedly when the

Table 4

Comparison between Condition High (target brand used a distinctive color) and Condition Low (all brands used different prominent colors) of reaction times on correct responses when the product and brand name of the target brand was shown in the matching task.

	Condition High			Condition Low						
	n	*M*	*SE*	*n*	*M*	*SE*	*t*	*df*	*p*	*d*
brand color	42	730.559	39.822	30	842.783	71.870	-1.461	70	0.148	-0.349
brand logo	42	880.142	64.478	35	859.309	65.388	0.225	75	0.822	0.051
no features	34	847.348	50.308	23	957.826	103.549	-0.960	32	0.344	-0.285

product image was colored or had a logo, correct response times did not significantly differ between conditions. But product images without any brand specific feature had significantly faster response times in Condition High with a medium effect size.

Table 5

Comparison of reaction times for the distractor brand between Condition High (only target brand used a distinct color) and Condition Low (all brands used different prominent colors).

	Condition High			Condition Low						
	n	*M*	*SE*	*n*	*M*	*SE*	*t*	*df*	*p*	*d*
brand color	40	884.954	52.798	32	877.646	67.334	0.087	70	0.931	0.021
brand logo	48	734.712	40.787	37	785.158	57.018	-0.739	83	0.462	-0.162
no features	40	849.575	62.822	31	1077.732	66.270	-2.475	69	0.016	-0.592

Then, we tested if product images without brand specific features compared to product images with brand color or logo lead to different correct response times. We

compared the correct response times from all three product image variants for the target brand with a paired t-test. As listed in Table 6) none of these differences were significant and had very small effect sizes.

Table 6

Influence of brand related features on the average reaction times of participants

	n	M	SE	t	df	p	d
brand color vs	47	793.78	43.94	-0.82	46	0.42	0.12
no features	47	833.86	51.09				
brand color vs	60	793.78	43.94	-1.60	59	0.11	0.20
brand logo	60	885.39	54.27				
brand logo vs	51	906.18	61.26	0.11	50	0.91	0.02
no features	51	898.11	57.00				

Finally, to test our Hypothesis H2 we again used a repeated measure MANOVA to examine if the the correct response times between product image variants were significant between conditions. As dependent variables we used the number of correct responses for the different image variants and as between subject factor, again, the condition. Since our t-test from before showed no significant difference between product image variants we did not expect to have a significant outcome for this measure as well. And as expected our MANOVA showed no significant difference, $F(2, 38) = 0.34$, $p = 0.51$.

Hypothesis H2 had to be discarded as well.

Discussion

This study aimed to explore if distinct brand colors in a market category can lead to an advantage in forming an association between a brand and its color. While the legal protection of colors is slowly pushing forward to trademark law, the methodology for

measuring brand / color associations is still highly criticized (Hoek & Gendall, 2010). We tried to implement a new approach that is not reliant on directly asking participants but instead presents participants with combinations that needed to be rated as matching or not. An advantage of this approach is not only that the color / brand associations can be inferred from participants behavior but also the reaction to incorrect combinations can be measured.

Distinct colors

To measure color distinction, participants were assigned to one of two conditions were either the usage of a prominent color was a distinct feature for the target brand or all brands used different prominent colors. Interestingly there were no significant differences for the target brand between both conditions. Our results did show that participants had more correct responses if a brand logo or brand color were present on the product and also that brands with prominent colors generated more correct responses than brands with similar greyish colors. But it made no difference if the usage of a brand color was a distinct feature for a brand. This finding was unexpected because we reckoned that when a brand is the only one in a market category that uses colors, that the chance of associating that brand with its color would be increased. Though surprising to us, these results may somewhat confirm past research. Most studies found that distinction increases recall but not recognition (McLaughin, 1968; van Dam et al., 1974) and our Matching Task was based on recognizing product images and brand names. But there are also studies in which distinction also increased recognition Karis et al. (1984) and also increase associations especially for faces (Watier & Collin, 2012) but also for names (Meyer & Schvaneveldt, 1971).

One possible explanation for the absence of a distinction effect in our measures could be that we overestimated its effect and introduced too few brands. In our study there were only four competing brands which meant that there were only four different brand / colors

associations to remember. Maybe the range of similar brands was just too small that participants did not perceive our colored brand as distinct. However the number of used brands needs to be chosen carefully. In a similar study-design participants had troubles remembering which color was used for which brand. In this study 16 brands each used one of 3 different colors in a learning task. In surprise matching-task, similar to the one used in this study, most participants reported that the task was too difficult for them and that they had to use a guessing strategy (Tavassoli, 2001). Also, some of our participants reported that they had troubles distinguishing between washing machines. We expected that washing machines without brand related features would feel very similar to participants but it is possible that they felt too similar for participants and it may be possible that in the Matching Task some of them have resorted to a guessing strategy for all different image variants because of it. Interestingly, almost all participants that reported that washing machines were too similar, were from Condition High (six out of seven) and our results regarding response times indicate that participants may in fact have resorted to a guessing strategy.

We also found that brand logos generated the most correct responses in both conditions suggesting that participants focused more on the brand logo than on brand color. These findings were not surprising. Logos are found to be a very important part of brand personality (Gabay et al., 2013; Pittard et al., 2007). Other studies had similar results when asking participants about their preference between brand logos and colors (Boudreaux & Palmer, 2007).

Response times

Our goal was to add to the existing methodology for measuring associations between brands. Other studies have successfully used response times as indication for associations (Anthony G. Greenwald et al., 1998; Meyer & Schvaneveldt, 1971). By measuring the response times in our Matching Task we tried to infer to the strength of color / brand

associations. Unfortunately almost all our findings regarding response times were not significant. We did however find that product images without any brand specific features had significantly faster response times in Condition High than in Condition Low. Since most washing machines looked very similar and both conditions used the same washing machines, these results did not really make sense to us. One explanation could be that because most brand colors were gray in Condition High the matching task was a lot harder for participants which is why they may have been less motivated and resorted to a guessing strategy much earlier.

Limitations

When considering the findings of this study a few limitations need to be considered: First and foremost this study was conducted under laboratory conditions. All brands and its products were only fictional which meant that participants remembered all products under different circumstances than when they would see them in in a store or in an advertisement. Instead, participants were told to consciously learn brand names. Real brands spend a lot of money to create a brand personality that consumers can relate and bond to. The relationship that consumers have to a real brand may differ from our fictional brands in that they may have formed and emotional attachment to a brand or have personal experience with their products.

Also, real brands often sell many products in different market categories. Our brands were only presented with three different products each which were very similar in design and functionality. Furthermore, in most market categories there are a lot of competing brands that are not always perceived as equal. Depending on revenue and marketing strategy there may be brands that stand out because of extensive advertisement and others which are unknown to consumers. Our fictional brands were not presented as different which may have underlined the feeling of an artificial setting.

Additionally, some restrictions of our used sample need to be considered as well.

Because many participants had no correct responses for some product image variants, they had to be excluded when calculating their response times. It might be possible that we overlooked very small effects because we did not have enough participants and therefore not enough power. Also, most of our participants were psychology students in their twenties. Most of them were in their first term of the psychology program and though it is unlikely that they differed to the general public in how they perceive and learned new brands, their interests and values concerning brands may have differed. Another restriction may be our method in general. To make sure participants stayed motivated for the whole Matching Task, we had to reduce the number of trials. Each variant (brand name and the correct incorrect product image with brand logo, color or no brand specific feature) was only repeated three times (which totaled to 18 combinations for the target brand and 18 combinations for the distractor brand). Especially for the measurement of the overall response times, these may have been too few repetitions for a reliable outcome.

Relevance and future research

There needs to be done more research to confirm our findings but these results may have some positive implications for brands. In order to gain an advantage over competitors, brands are inclined to use every available advantage. Distinctive colors not having a strong effect on consumers would mean that brands can concentrate their efforts on colors that fit their brand personality and have the desired emotional effect. Brands would not need to worry on their difference to competing brands but only need to focus on being recognizable. It also weakens the problem about scarcity in the range of colors. One reason why the protection of colors as trademarks is a sensitive topic, is the fact that the number of colors is only finite. This means that in a a big and established market, most color combinations may already be protected. In contrast to the believe that such a situation may lead to disadvantages for new brands, our findings could suggest that brands which use colors that are similar to other existing brands can have the same impact as long

as their brand personality is defined well enough.

Even though we did not find any noteworthy results when comparing the response times of our participants, that does not mean that measuring the response time does not have the potential for being a suitable approach for measuring color / brand associations. Our study design concerning response times was very simple and only a first step in a direction that yet needs to be explored. It seems likely that our approach was just too simple and need to be investigated further. Future studies with a design that is more closely related to the Implicit Associations Test (Anthony G. Greenwald et al., 1998) may generate more viable results. Another approach could take advantage of the Stroop paradigm (Musen & Squire, 1993; Stroop, 1935). In the Stroop Test participants had to name the color that a word was printed in as quickly and accurately as possible. The printed words used in this test were the names of colors as well. When the color of the printed word did not correspond with the printed word itself (like the word "red" colored in blue), response time increased significantly. A similar design could use brandnames as printed words and examine if the response time increases when the word coloration does not match with the brand color of the printed brandname.

Some of our results were not as expected, but they may lead the way for future studies that confirm and build upon our findings. The advantages of distinction have been widely researched but their usefulness for brands has been overlooked by the scientific community. What was confirmed in this study is that products with a brand logo or brand colors are recognized more easily and that logos had a higher recognition rate than brand colors. Additionally colors are very important for brands to set them apart from competitors, convey associations or connect with consumers. But the judicial system concerning trademarked colors is still developing and giving companies the scientific evidence on how colors can be appropriated for their gain can help to decide on how to move forward. Financially, legally and psychologically.

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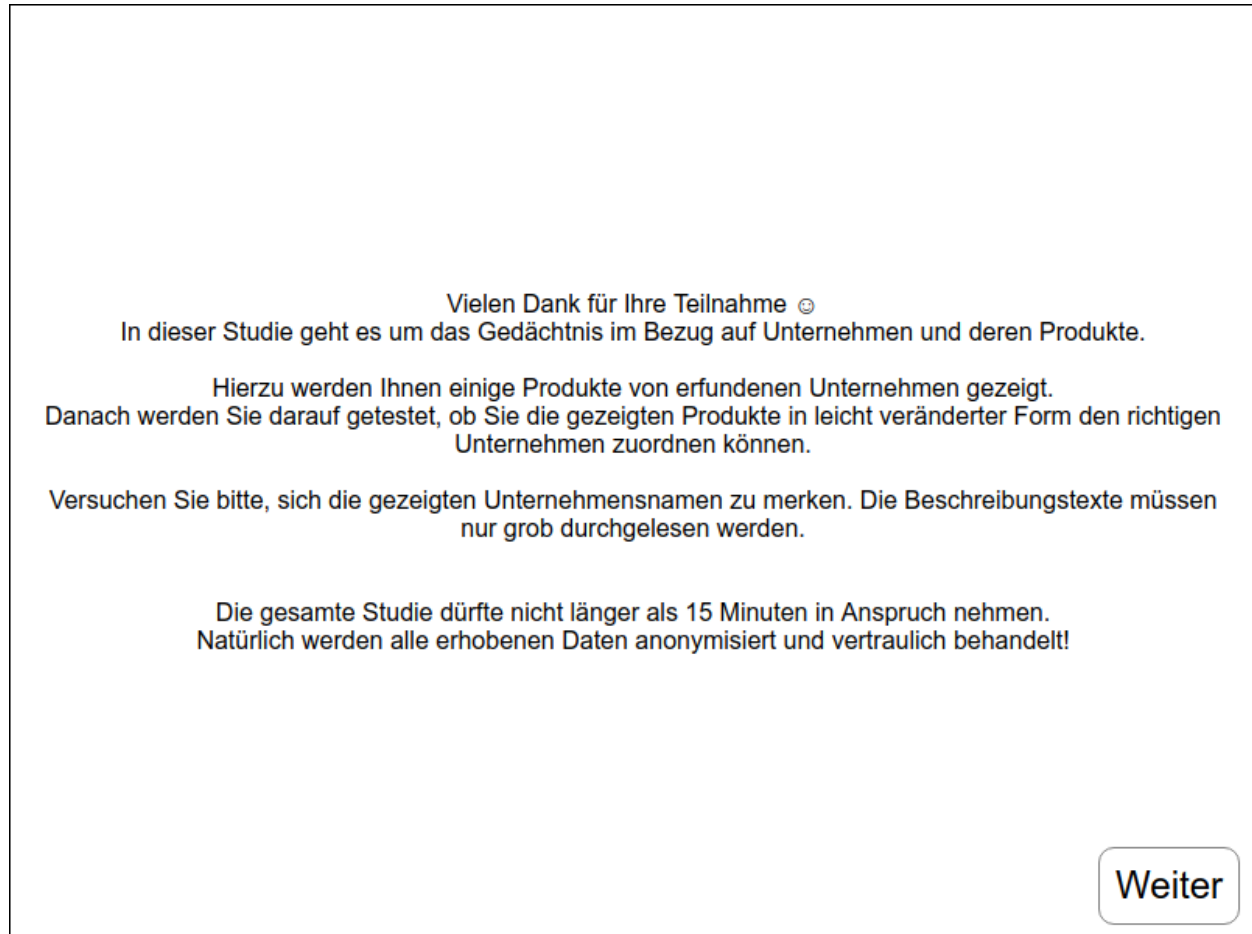   doi:10.1177/074391568600500114

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Appendix A

Web-application screenshots

Figure A1. Study introduction screen.

Vielen Dank für Ihre Teilnahme ☺
In dieser Studie geht es um das Gedächtnis im Bezug auf Unternehmen und deren Produkte.

Hierzu werden Ihnen einige Produkte von erfundenen Unternehmen gezeigt.
Danach werden Sie darauf getestet, ob Sie die gezeigten Produkte in leicht veränderter Form den richtigen Unternehmen zuordnen können.

Versuchen Sie bitte, sich die gezeigten Unternehmensnamen zu merken. Die Beschreibungstexte müssen nur grob durchgelesen werden.

Die gesamte Studie dürfte nicht länger als 15 Minuten in Anspruch nehmen.
Natürlich werden alle erhobenen Daten anonymisiert und vertraulich behandelt!

Weiter

Figure A2. Demographics screen.

Figure A3. Introduction for the Learning Phase.

Sie werden von nun an nur noch die Tastatur benötigen.

Jetzt werden Ihnen ein paar Produkte und deren Marke gezeigt.
Bitte versuchen Sie sich die gezeigten Produkte und dessen Unternehmen zu merken. Sie werden die gezeigten Produkte später den Unternehmen zuordnen müssen.

Um jeweils das nächste Produkt anzuzeigen, geben Sie den Namen der gezeigten Marke in das erscheinende Textfeld ein und drücken Sie dann die Leertaste.

[Die Leertaste drücken um fortzufahren]

Figure A4. Example of the Learning Phase.

Figure A5. Matching Task: Stimuli 1b, product image with brand color (brand logo is removed).

Figure A6. Matching Task: Stimuli 1a, product image with brand logo (brand color is removed).

Figure A7. Matching Task: Stimuli 1c, product image with no brand related features (brand logo and color are removed).

Figure A8. Matching Task: Stimuli 2, brandname.

Appendix B

Web-application examples

Figure B1. All four brand logos used in this study.

Figure B2. The variant of all products (with gray color) that was used in the learning phase of this study.

Figure B3. Examples of products with prominent colors (either magenta, yellow, orange or green was used as a prominent color).

Figure B4. Examples of products with gray colors(In Condition High, distractor brands were colored in either one of these shades of gray).

Appendix C

Zusammenfassung

Der rechtliche Schutz von Farben für Marken findet erst langsam Einzug in das Markenrecht, obwohl die Auswirkungen von Farben weitgehend erforscht sind. Insbesondere fehlt die Methodik zur Messung von Farb- / Markenzuordnungen. Aus Marketingsicht wurden die Vor- oder Nachteile wenn eine Marke sehr unterschiedliche Farben als anderen Marken verwendet, von der wissenschaftlichen Gemeinschaft weithin übersehen. In dieser Studie wurden gefälschte Marken in einem Between-Subject-Design eingeführt. In unserer ersten Bedingung war die Verwendung von Farbe für unsere Zielmarke ein sehr besonderes Merkmal. In unserem zweiten Bedingung verwendeten alle Marken unterschiedliche auffällige Farben. Nachdem die Teilnehmer mit unseren Marken und ihren Produkten vertraut waren, mussten sie die Markennamen den Produktbildern zuzuordnen, während deren Reaktionszeiten gemessen wurde.

Interessanterweise hatten unsere beiden Bedingungen keinen Einfluss auf die Anzahl der richtigen Antworten oder Antwortzeiten. Für die Teilnehmer machte es also scheinbar keinen Unterschied, ob eine Marke die Einzige war die Farben verwendete oder nicht. Aber Produktbilder mit Markenlogos oder Markenfarben wurden siginifikant öfters erkannt als Produktbilder ohne markenspezifische Eigenschaften.

Durch die Messung der Antwortzeiten untersuchten wir auch einen anderen Ansatz zur Messung von Farb- / Markenzuordnungen durch die Verwendung eines impliziten Assoziationsparadigmas. Unsere Ergebnisse haben gezeigt, dass das einfache Messen der Antwortzeiten in einem „Matching Task" ein zu einfacher Ansatz sein dürfte. Zukünftige Forschung könnte unser Studiendesign erweitern, um realisierbare Ergebnisse zu erzielen.

Schlüsselwörter: Farben, Marken, Distinktheit, Assoziationen, Gedächtnis