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Is a picture worth a thousand words? Priming effects on brand logo recognition and naming

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Uma imagem vale mais do que mil palavras? Efeitos de prime no reconhecimento e nomeação de marcas

Resumo

Vários estudos revelam que as imagens são processadas de forma preferencial quando comparadas com palavras, um efeito clássico conhecido como superioridade da imagem. Apesar da sua relevância para a publicidade e marketing, poucos estudos experimentais procuraram analisar as condições em que tal superioridade pode ser observada. Além disso, nos estudos conduzidos até ao momento, as características das imagens que se sabe afetarem o processamento não têm sido controlados e nenhum procurou comparar a influência de logotipos de marcas vs. nomes de marcas no reconhecimento e na nomeação das mesmas em etapas iniciais do processamento. Recorrendo a um paradigma de *priming* mascarado e a um controlo estrito das características de marcas familiares e não-familiares que apresentavam simultaneamente logótipo e nome associado (ex., ) pedimos a 30 participantes que reconhecessem (Experiência 1) e a 30 participantes que nomeassem (Experiência 2) marcas que poderiam ser precedidas: (i) apenas pelo seu logótipo (ex.); (ii) apenas pelo seu nome (ex. ); ou (iii) pelo seu logótipo e nome (ex. ). Os resultados falharam em demonstrar o efeito de superioridade da imagem, especialmente em reconhecimento, apesar de terem sido observadas modulações no processamento em função da familiaridade das marcas e requisitos da tarefa.

Palavras-chave: logótipos, marcas, priming, produção, reconhecimento.

Is a picture worth a thousand words? Priming effects on brand logo recognition and naming

Abstract

Several studies show that pictures are preferentially processed compared to words in a classic effect known as the picture superiority effect. Despite its relevance for advertisement and marketing, few experimental studies analyzed the conditions in which this superiority is observed. Indeed, picture characteristics' known to affect processing have not been completely controlled and none study have compared thus far the influence of brand logos vs. brand names on brand recognition and naming at the early stages of processing. With a masked priming procedure and a controlled set of familiar and non-familiar brands that presented simultaneously the brand logo and the brand name (e.g., ), we asked 30 participants to recognize (Experiment 1) and 30 participants to produce the name (Experiment 2) of the brands presented after the masked presentation of: a) only its logo (e.g., ); b) only its name (e.g., Audi) ; or c) its logo with its name (e.g., ). Results failed to show the picture superiority effect, especially in brand recognition, although modulations were observed in brand processing as a function of their familiarity and task requirements.

Keywords: brand logos, brand names, priming, naming, recognition.

Is a picture worth a thousand words? Priming effects on brand logo recognition and naming

Media and publicity occupy a great part of our daily routine. We are constantly confronted with images, sounds and slogans that influence our judgements and the decisions we made in our daily lives, even without consciousness of it. James Vicary was one of the first authors concerned with the power of publicity in behaviour. In 1957 he demonstrated that the use of masked messages related to the consume of Coca-Cola and popcorn increased the selling of these products in a movie theatre. Even though years later the author confessed the manipulation of data, Vicary had at least the merit of drawing the attention of the scientific community to the study of the influence of subliminal advertisement in behaviour (Kerremans, Stroebe, & Claus, 2006). Note that masked stimuli are still used during advertisements or entertainment programs. For instance, on January 26th of 2007, during the program "Iron Chef America", the logo of McDonald's was subliminally presented. According to "The Washington Post", a red flash was presented so quickly that was almost invisible to the naked eye (The Associated Press, 2017).

To examine the effect of masked advertising in peoples' behaviour, Karremans, Stroebe, and Claus (2006) conducted a study where thirsty and non-thirsty individuals were exposed to masked words (presented for 23 ms, preceded and followed by a string of X's for 500 ms) conveying either the name of a drink (e.g. "Lipton Ice") or a neutral non-word containing the same letters (e.g., "Npeic Tol"). Then, participants were asked to choose between "Lipton Ice" or another beverage (e.g. "Spa Rood") and assess their intention to subsequently drink "Lipton Ice" in a Likert scale of 7 points ranging from 1 ("not likely at all") to 7 ("very likely"). Results showed that participants were more likely to consume that drink after being exposed to its name but only if the prime was relevant to persons' actual motivations, i.e. only thirsty participants showed significant effects of brand name exposition on the intention to drink Lipton Ice afterwards. In the same vein, Britazzoli, Soetens, Deroost, and Van den Bussche (2012) used an adaptation of the lexical decision task to understand whether subliminal influencing can be successfully implemented in everyday life and advertising situations. In this task, participants were first presented with a fixation point (+) presented at the centre the computer screen for 480 ms, which was followed by a series of four masks presented for 17 ms each. Then, the brand logo prime was presented for 17 ms (conscious condition) or for 13 ms (unconscious condition), followed by another blank screen for 50 ms. Then, another series of four mask of 17 ms each were presented and another blank screen of 200 ms before the presentation of the target, which remained in the screen until participants' response. The authors opted for this procedure since it was used in previous studies and proved to elicit unconscious priming effects for non-brand stimulus material

(e.g., Dell'Acqua & Grainger, 1999). Participants were asked to decide as soon and accurately as possible whether a given letter string was or not a real word (considering brand names as real words). These word targets could either be related or unrelated to the prime or non-words. Thus, five target conditions were created: a) related brand condition (e.g. - "MCDONALD'S"); b) unrelated brand condition (e.g. - "LACOSTE"); c) related non-brand condition (e.g. - "HAMBURGUER"); d) unrelated non-brand condition (e.g. - "CAR"); or e) non-word condition. Results showed that brand logos primed the brand names to which they are associate with (e.g., - "MCDONALD'S"), and, in addition, words related to those brands (e.g., - "HAMBURGUER"). These effects were stronger for longer than for shorter prime durations. According to these authors, this study fails to acquire effects in the shorter condition because of the stimulus material, which lead them to conclude that maybe using different stimulus material, like words as primes, might lead to stronger subliminal priming effects. However, to the best of our knowledge no previous study has explored the role that words vs. pictures assumed in logo recognition. This dissertation aimed to overcome this gap using a similar procedure with both pictures and words as primes, and as targets.

Other than that, it is important to note that, in the field of memory, some studies have been developed to understand the differences between pictures and words. Indeed, several studies have shown that pictures are preferentially processed in comparison to words, giving rise to the so-called picture superiority effect (Paivio, 1971). For instance, Paivio and Csapo (1973) in a pioneering study on this issue showed that free recall is better for pictures than for words, and, specifically, better for concrete than for abstract words. After this pioneer study, other investigators had the same results, also demonstrating the picture superiority effect (Bajo, 1988; Ferrand, Grainger, & Segui, 1994). However, Weldon and Roediger (1987) showed that, it is possible to reverse this effect, depending on the nature of the retrieval task used. Specifically, the authors used free recall and word fragment completion (e.g., _yr_mi_ for pyramid) tasks. Participants were told that they would see 20 slides (10 with pictures and 10 with words) and that they should pay close attention to each item, but they were not told that they would perform a memory test. Results showed that in the free recall task, material studied in picture format was easily remembered, emerging the picture superiority effect. However, in the word fragment completion task, results are reversed, materials studied in word format were better remembered than those studied in picture format, indicating a reverse of the picture superiority effect. Thus, the authors concluded that the type of retrieval query determines whether pictures or words will exhibit superior retention with implicit retrieval tasks (those that not require conscious recollection, but reveal retention indirectly when performance on some task is facilitated by previous exposure to the material), such as a

word fragment completion, being more sensitive to the processing of stimuli surface features and perceptual attributes; while explicit retrieval tasks (those that require conscious recollection of studied material), as free recall, seem to be very sensitive to conceptual properties of the encoding material. Therefore, they concluded that pictures activate semantic (meaning) codes more strongly than words, but no necessarily contact label (name) codes, whereas words activate label codes strongly, but do not necessarily activate semantic codes to the same extend as pictures. Hence, standard tasks for picture and word memory, such as recognition tasks, may favour retrieval of information encoded in pictoral formats because performance on those tasks benefits from conceptually driven processing (Weldon & Roediger, 1987).

Using variants of semantic categorization and naming tasks, Bajo (1988) tried to understand the role of both the processing level and strategic factors in producing picture-word facilitation effects. A first study was conducted using a name verification (e.g., "Does the name belong to the category ...?") and a category verification (e.g. "Does the stimulus name match the name of the concept...?") tasks using primes and targets that could belong either to the same (picture-picture and word-word) vs. different modalities (picture-word and word-picture). Since more traditional naming and categorization tasks have failed to control response factors, the use of these semantic categorization tasks allowed to directly test whether task demands modulated the results observed and permitted the variation of processing levels while holding response requirements constant. Bajo expected that in the name verification task, facilitation should occur only in conditions involving picture targets (p-p and w-p), with little or no facilitation in the word target condition (p-w and w-w) (only the picture targets would be processed to a semantic level); while in the category verification task, since semantic access is necessary for both pictures and word targets, equal facilitation should occur (pictures and words would be processed to a semantic level). Subjects were randomly assigned to either name verification task or category verification task. In the category verification task, participants heard the investigator reading the category name (e.g., "wild animals") followed by presentation of a related (e.g., "bear") or unrelated (e.g., "motorcycle") prime for 1,000 ms, a visual noise mask for 50 ms, and finally a related (e.g., "LION") or unrelated (e.g., "MOTORCYCLE") target. Participants were asked to respond as fast and as accurately as possible if the target belonged or not to the category presented by the investigator by saying "yes" or "no" aloud. In the name verification task, the experimenter read the name of a concept (e.g. "lion"), followed by two related or unrelated items, the prime and the target (e.g. "bear" and "lion"), and participants were asked to respond if the name of the target matched the name of the concept presented earlier. Results showed that when subjects were asked to perform a category

verification task, similar facilitation effects occur both for picture and word targets irrespectively the prime used. However, in the name verification task, facilitation effects were restricted to the picture target conditions (e.g., picture-picture and word-picture), while in the word target condition (e.g., word-word and picture-word), facilitation may or may not be obtained.

To understand if the lack of word-word facilitation effects in the name verification task was due to the task used, Bajo (1988) conducted a second study using the standard naming task. In this, participants were only asked to name or to read each of the stimulus presented that could be either a picture or a word, each preceded by a related or unrelated picture or word as in the study presented before. Additionally, participants performed the naming task under four different instruction conditions: neutral instructions (e.g., pay attention to the stimuli) or being told about the prime-target relation and that the best strategy to a better performance was to concentrate on that relation; in addition, they could also be told about a constant-block (where the prime-target modality would be varied from block to block but constant within each block) or a mixed-block (where each block contained all possible prime-target modality combinations). Results indicate that more facilitation is obtained when the instructions emphasized semantic processing and when pictures and words were blocked, when compared to when they were intermixed. Also, a greater facilitation was obtained when the targets were in the picture modality.

In this second study, Bajo concluded that naming a picture requires access to its semantic representation, so that emphasizing meaning by instructions or by blocking does not change the nature of processing. When the targets were words, despite not reaching the facilitation obtained with pictures, facilitation was only observed when instructions emphasized semantic processing or when primes were presented in a blocked fashion. In conclusion, Bajo argues that the advantages obtained from pictures or words may be related to the differences in processing these stimuli and to task requirements, indicating that naming a picture seems to involve semantic access, while words may or not involve it.

In the same vein, Ferrand, Grainger and Segui (1994) conducted a series of naming experiments to examine the influence of pictures vs. words in the naming performance of French participants. In their first study, the authors presented participants with either pictures that were preceded by related or unrelated prime words for 29 ms (e.g., TABLE-  vs TIRER- ) (Experiment 1A) or with words that were preceded by the same or an unrelated prime word (e.g., TABLE-TABLE vs TIRER-TABLE) (Experiment 1B). Results showed faster responses when targets (both pictures and words) were preceded by related than by unrelated word primes, being the effect similar for both targets. Interestingly, the fact that naming a picture has been facilitated by the previous exposure to the

corresponding word suggested that the brief presentation of a prime word activates lexical representations that underlie picture naming. To further explore if this effect was orthographic or phonological in nature they conducted a second experiment with primes that could be either non-word homophonic primes (pseudo-homophones) (e.g., piez-PIED), non-word primes orthographically but not homophonic related (e.g., pien-PIED), and non-word primes orthographically and phonologically unrelated to the target but that shared the first phoneme (e.g., peul-PIED). Results showed faster responses for pictures preceded by pseudo-homophone primes than by orthographic similar primes and by the unrelated prime, thus showing a pseudo-homophone priming effect. In the word target condition, both pseudo-homophone prime and orthographically related prime facilitated word naming, with higher naming latencies in the unrelated condition. These results allowed the authors to conclude that the representation underlying the masked repetition priming effect in picture naming is phonological, that is, both the word or its corresponding pseudo-homophone would activate that representation (Ferrand et al., 1994).

To accommodate these results, they developed an extended version of the Activation Model (Ferrand et al., 1994) of picture and word naming (see Figure 1). According to this, when word targets are presented in a naming task, activation will spread out from sublexical orthographic units onto sublexical phonological units and to the whole-word representation in the orthographic and phonological lexicons. The articulatory output is thus presumed to rely both on the whole-word units and sublexical units. Nevertheless, when targets are pictures, the articulatory output is assumed to receive the first activation from whole-word phonological representations. Hereupon, speeded word naming will be mediated by sublexical orthography, while picture naming will be largely influenced by activity in the phonological lexicon. According to this model, the pseudo-homophone priming effect in picture naming is a result of the preactivation of the phonological representation corresponding to the picture name (Ferrand, et al., 1994).

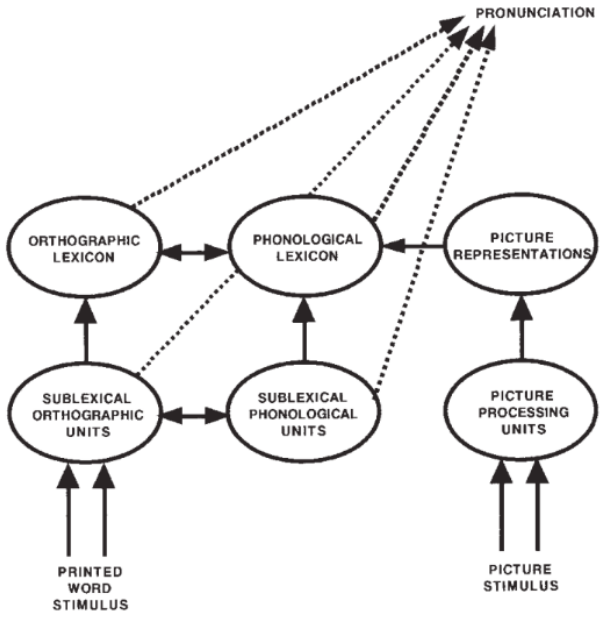

Figure 1. Extended Activation Model (Ferrand et al., 1994).

Besides, it is also worth mentioning that accordingly to the model, naming a picture is assumed to be semantically mediated, while naming a word may be not. Hence, while a picture seems to automatically activate semantic information, a word does not necessarily activate meaning in a word naming task. For instance, Dell'Acqua and Grainger (1999) conducted three experiments to understand the effects of unconscious picture primes (in three different prime conditions: identity, same category, different category) on semantic categorization of word targets, word naming and picture naming. Results in the semantic categorization task showed faster responses for both identity and same category (living things or artefacts) primes, in comparison to different category primes. Results were similar in picture naming task (faster responses for identity and same category primes in comparison with different category). Conversely, in the word naming task, results were not influence by picture primes, that is, no differences were found across the three priming conditions (identity, same category, and different category). These results led the authors to conclude that picture naming is semantically mediated, while word naming is not necessarily semantically mediated. Thus, a picture prime can produce semantic information that will not be used in a word naming task, but that is used in picture naming. These findings highlight the idea that the differential processing of pictures and targets is modulated by task requirements.

Given the inconsistencies found in literature, the research presented so far aimed to further examine the differential processing of words and pictures (specifically logo pictures and the word names that depict them) using a more controlled experimental design than that used in previous studies. To

the best of our knowledge, no studies have been developed to understand the differences of brand logos and brand names, which is very surprising attending to the influence of publicity in our daily lives. Do they behave like common words and common pictures, or are these particular cases? Is one of them more powerful in the brand recognition? Are we better naming a brand logo than naming a brand name? The above reviewed studies did not respond to these questions. Thus, it becomes important to examine how these stimuli are processed, and, specifically, explore what type of advertisement brands are more likely to influence our behaviour (logos vs. words representing the brands).

Moreover, it is worth noting that previous studies did not controlled variables known to affect the processing of stimuli. For instance, familiarity has been shown to affect processing in several tasks such as reading (e.g., Carlisle & Katz, 2006), word naming (e.g., Regan, 1981), picture naming (e.g., Alario, et al., 2004; Cycowicz, Friedman, Snodgrass, & Rothstein, 1997), recognition (e.g., Shepard, 1967), among others. Indeed, despite familiar stimulus elicited greater facilitation in these tasks (e.g., Carlisle & Katz, 2006; Cycowicz et al., 1997; Regan, 1981), none of the previous studies controlled neither the familiarity of the brands used nor the differences between the processing of familiar vs. non-familiar brands that could be observed both for brand recognition and brand naming tasks.

Besides familiarity, other variables known to affect picture (see Soares, Costa, Machado, Comesaña, & Oliveira, 2016; and Soares, Pureza, & Comesaña, 2018) and word processing (see Hudson & Bergman, 1985; and O'Regan & Jacobs, 1992), such as subjective frequency (SF), name agreement (NA), visual complexity (VC), word length and the phoneme articulatory properties of words, were also not controlled for in previous studies (Brintazzoli, Soetens, Deroost, & Van den Bussche, 2012; Paivio & Csapo, 1973). Indeed, these variables seem to have an impact on subjects' performances, hence the importance of being controlled. SF measures have been shown to predict a greater facilitation in the recognition and production of words in a given language (Balota, Pilotti, & Cortese, 2001). On the other hand, NA scores are negatively correlated with the amount of time it takes to name the object depicted by the picture (Alario, et al., 2004; Boukadi, Zouaidi, & Wilson, 2015), that is, the more names a picture elicited (i.e., with low NA scores), the longer time it takes to elicit a single name. VC measures also have an impact on performance, with some studies indicating that it affects the time it takes to name a picture, particularly when these pictures are in coloured form (Bonin, Chalard, Méot, & Fayol, 2002). Additionally, other studies indicate that worth length and phoneme articulatory features of words have also an impact on word processing, with more extended words (O'Regan & Jacobs, 1992) and words with more complex articulatory features (Roberts, 2005) producing greater inhibitory effects on lexical decision and naming tasks.

In this work we conducted two experiments (a brand recognition study and a brand naming study) to analyze whether the picture superiority effect reported in the literature can be also observed at early stages of brand processing and to what extent task requirements could modulate the effects. Targets were characterized by a logo and its name such as  , whereas primes were brand logos (e.g., ), or brand names (e.g., AUDI). Identity primes were also used as a baseline to derivate the effect of priming (e.g., ). The results from both studies have important implications, not only in the field of psycholinguistics by contributing for instance to the development of models of visual word recognition as the extended Activation Model presented earlier, but also on the field of advertising and marketing. Based on the previous literature, we expect that familiar brands would elicit faster recognition (brand recognition experiment) and shorter naming latencies (brand naming experiment) than non-familiar brands. In addition, in the brand recognition experiment we hypothesized that besides the expected advantage of the identity prime condition over all the other prime conditions, brands preceded by only logo primes will be faster recognized than brands preceded by only name primes. This because brand logos would activate its semantic representation quickly, while the brand name may not necessarily activate it. We also expect that the logo advantage in the brand recognition task will be restricted to the familiar brands since non-familiar brands have not a stable representation in memory. However, in the brand naming task, since no semantic access is necessary to produce the name of the brand (word naming is not necessarily semantic mediated), we expect that brands preceded by only name primes will be named faster than brands preceded by only logo primes both for familiar and non-familiar brands.

General Method

Materials

132 stimuli (brands) were selected from a previous pilot study conducted to control for several characteristics that could affect the results, and that were not controlled for in previous studies. Specifically, in this pilot study, we collected norms of subjective frequency (SF) - i.e., how often a given brand logo is encountered in daily lives; visual complexity (VC) -i.e., personal judgement about the number of lines and details a given brand logo presents; and name agreement (NA) - i.e., the name that participants firstly assigned to a given brand logo, using a similar procedure as Soares et al. (2017, 2018), for 239 brands. These brands were selected from the "Vector.me" database - an online database that depicts free brands from global companies (http://pt.vector.me/) – because they include both a logo and a name in the brand (e.g., "  "), which allowed for the prime manipulation (i.e., besides the identity condition, primes containing only the logo or only the name) in the current study.

This methodological option was made to avoid possible effects of congruence between the primes and the targets. Additionally, these brands were also intentionally selected to include brands that were frequently seen and/or used in Portugal (e.g., "  "), as well as others that were rarely seen and/or used in Portugal (e.g.,"  "), to allow for the manipulation of brand familiarity in the experiments.

Three different online data collection procedures were constructed in the Qualtrics software (Qualtrics, 2005). In the first procedure (brand name + SF procedure), only the name of the 239 brands were presented (e.g., "AUDI") and participants were asked to rate how often they encounter each of them in their daily lives using a 7-point Likert scale ranging from 1 ("never encountered") to 7 ("encountered several times a day"). In the second procedure (brand logo + SF + VC + NA procedure), only the logos of the 239 brands were presented in its normal colour and size (e.g., "  "), and participants were asked to rate: i.) how often they encounter each of them in their daily lives (SF) using the same Likert scale as in the previous procedure; ii.) how complex each brand logo was (VC) from 1 ("extremely simple") to 5 ("extremely complex"); and iii.) to write down the first name that came to their minds to designate the brand depicted by the picture (NA). In the case of unknowing the logo or the name by which it is known, subjects were instructed to indicate it by choosing a specific keyboard key. Finally, in the third procedure (brand logo with the name + SF + VC procedure), both the logo and the name of the 239 brands were presented in its normal form (e.g., "  "), and participants were asked to rate how often they encounter each of them in their daily lives (SF) and also to rate its visual complexity by using the same above presented Likert scales. Participants were assigned randomly to one of the three procedures by the Qualtrics software, with the guarantee that all three procedures had the same number of participants (n = 42). From the ratings collected on these three procedures we were able to select the targets and primes to be used in the experimental study. Specifically, from the ratings obtained from the first (brand name + SF procedure), and second (brand logo + SF + VC + NA procedure) procedures we were able to select the brands whose only name and only logo ratings on SF were similar, ($M_{\text{only logo}}$ = 3.1, SD = 1.9; $M_{\text{only names}}$ = 3.0, SD = 2.0, p = .81), thus ensuring that this factor could not contaminate the results. In addition, from these two procedures we have also compute NA scores (i.e., H[1] statistics), from which we were able to differentiate between familiar and non-familiar brands to be used in the experiments ($H_{\text{Familiar Brands}}$ = .27). The description of the characteristics of the 132

[1] $H = \sum_{i=1}^{k} Pi \log_2(1/Pi)$, where k represents the number of possible answers given and Pi the proportion of participants who assigned each name. This formula is used to achieve the number of alternative names provided by the participants for each picture (Soares et al., 2018).

selected stimuli (66 familiar brands and 66 non-familiar brands) in each of these variables, as well as the significance values of the differences obtained (*p* values from t-tests for independent samples) are presented in table 1.

Table 1

Means and standard deviations (in brackets) of SF, VC and brand name length (in number of letters) for the familiar and non-familiar brands used in the experimental study.

	Familiar brands	Non-familiar brands	t	*p*
$M_{\text{Subjective Frequency}}$ (1-7)	4.98 (0.80)	1.21 (0.27)	35.900	.000***
$M_{\text{Visual Complexity}}$ (1-5)	3.19 (0.80)	2.96 (0.77)	0.964	.34
$M_{\text{Brand Name Length}}$	6.89 (3.20)	7.65 (3.43)	-1.313	.19

Note. *** $p < .001$

As can be seen in table 1, familiar and non-familiar brands present similar ratings, except for SF, as expected. Also, the familiar and the non-familiar brands selected present similar word length and equivalent characteristics concerning the articulatory features of the first phoneme of each brand name considering the traditional classification of the European Portuguese[2] (A Pronúncia do Português Europeu, 2018) ($\chi^2(21) = 24.37$, $p = .28$).

Three lists of materials were constructed to counterbalance items across prime conditions in a Latin Square design. In addition, 6 items were used as practice, in the practice trials, to familiarize participants with each of the tasks of experiment 1 (brand recognition) and experiment 2 (brand naming).

Procedure

Data was collected individually in the soundproof booths of the Human Cognition Laboratory (School of Psychology, University of Minho) in both experiments. Participants were assigned randomly to one of each list, though assuring the same number of participants per list ($n = 10$) in each experiment. The first experiment (brand recognition task) took around 15 minutes to be completed, whereas the second experiment (brand naming task) took about 20 minutes to be completed, because the target was presented to the participant for 2500 ms to ensure sufficient time no name the complete

[2] The traditional classification of European Portuguese vowels is done attending to three parameters (height [high, medium or low], articulation point [anterior, central, or posterior] and the position of the lips [rounded or non-rounded], whereas for the consonants four parameters are considered (point of articulation [bilabial, dental-lip, apico-dental, alveolar, palatal or velar], mode of articulation [occlusive, fricative, lateral and vibrating], nasality vs. orality and voicing [the action of the vocal chords – occlusive, fricatives, and all the nasal and fluid]) (see A Pronúncia do Português Europeu, 2018).

brand name. At the end, subjects were asked if they were aware of the presence of the primes, if so they would be excluded from the sample, although this was not the case for any participant.

Presentation of the stimuli and recording of responses were controlled by the use of the DMDX software (Forster & Forster, 2003). In Experiment 2 naming latencies were recorded by the use of the voice key from the presentation of the target to the onset of the naming response. Accuracy and response times of the recorded vocal responses were checked offline by using the CheckVocal software (Protopapas, 2007). In each experiment, participants responded to 132 experimental trials. Each trial entailed 13 subsequent events as in Britazzoli et al. (2012) study (conscious condition of their experiment): a fixation point (+) presented at the centre of the computer screen for 500 ms, followed by a series of four masks presented for 17 ms each. Then, the prime (only name, only logo, or identity) was presented for 17 ms, and followed by a blank screen for 50 ms. Then, another series of four mask of 17 ms each were presented and another blank screen of 200 ms before the presentation of the target, which remained in the screen until participants' response or until 1,500 ms (Experiment 1) or 2,500 ms (Experiment 2) had elapsed (see Fig. 2 for an illustration of the experimental procedure used both in Experiment 1 (brand recognition task) and Experiment 2 (brand naming task)). The use of the same procedure as Britazzoli et al. (2012) allow us a direct comparison of the results obtained. Primes were presented in a 160 x 120 pixels dimension in black and white colours to reduce their visibility. The mask that preceded and followed the prime had the same characteristics, that is, same dimensions and black and white colours. The order of the trials was randomized per participant. One pause was presented after sixty-six stimuli. To continue, participants were instructed to press the "space key" of the keyboard. Prior to the 132 experimental trials, participants received six practice trials in each experiment to familiarize them with the task.

In Experiment 1, participants were asked to decide as soon and accurately as possible if they recognized the brands presented at the centre of the computer screen (brand recognition task) and were instructed to press the "M" key of the keyboard if they recognized a given brand logo, or to press the "Z" key if they did not recognize it (see Fig. 2). In Experiment 2 participants were asked to say aloud the name of each of the brand logos presented at the centre of the computer screen as soon and as accurately as possible (brand naming task, see Fig. 2). Data were treated using the IBM SPSS Statistics 24 (IBM Corp., 2016). The experiments were conducted with the approval of the ethic committee of University of Minho (SECSH 038/2017).

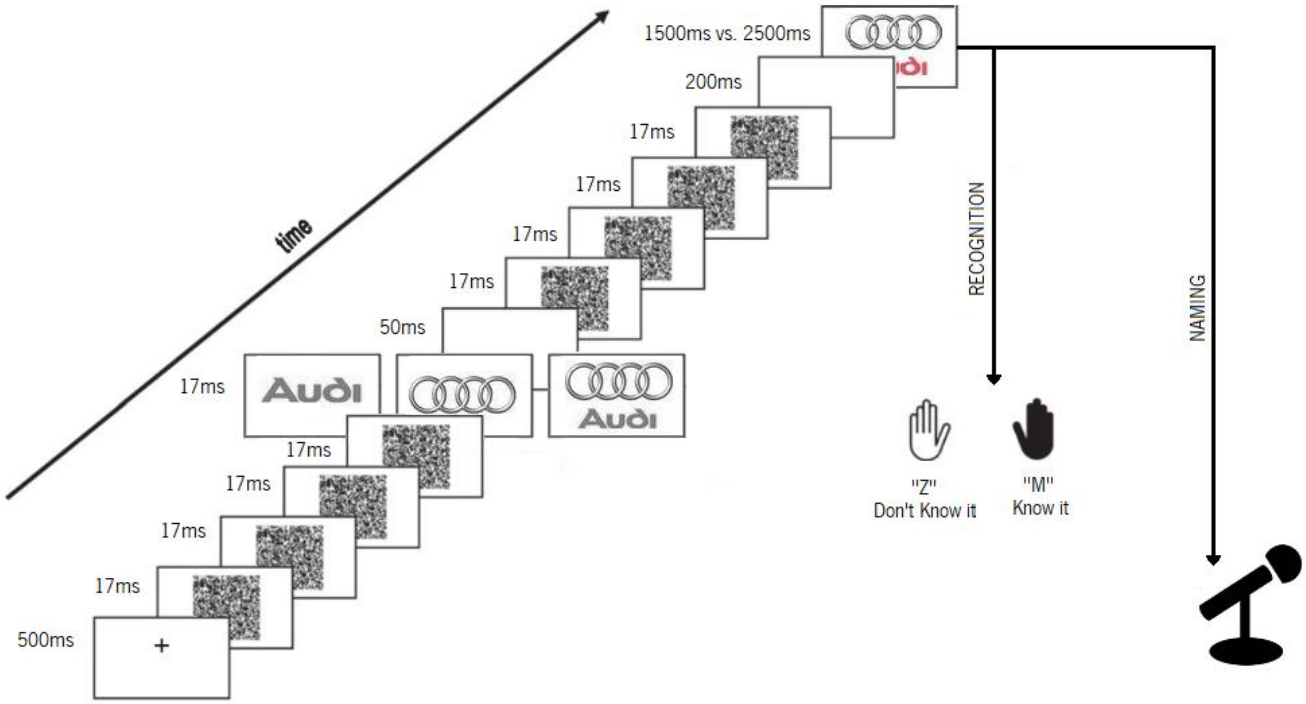

Figure 2. Experimental procedure for the recognition and naming tasks.

Experiment 1. Brand Recognition Task

Participants

Thirty undergraduate students from University of Minho participated in this experiment (M_{age} = 20.57; SD_{age} = 2.13, min. = 18.00, max. = 26.00, 26 women). All of them presented Portuguese (European) as their native language and had normal or corrected-to-normal vision. Participants received academic credits for their participation. Before performing the task, written informed consent was obtained from each participant. Participants also filled out a brief questionnaire aimed to collect some socio-demographic and linguistic background data such as age, sex, nationality, and native language.

Materials and procedure: see General method section.

Results and discussion

Repeated measures ANOVAs were performed on participants ($F1$) and item ($F2$) data based on a 2 (Type of target: familiar vs. non-familiar brands) x 3 (Type of prime: only logo prime, only name prime, identity prime) x 3 (List: list 1, list 2, list 3) design. On the $F1$ analysis, all factors entered as within-subject factors, except for the List, which entered as a between-subject factor. On $F2$ analysis, all factors were considered as between-subject factors, except type of prime, which was considered as a within-subject factor. The factor list was used to capture the error variance (Pollatsek & Well, 1995). The latencies were trimmed by excluding firstly all RTs below 200 ms and above 1,500 ms, and then all

that were 2.5 Standard deviations above and below the mean of each participant in each condition. Note that only familiar brands evaluated as "known" and non-familiar brands evaluated as "not known" were considered correct answers (6.99% of the responses were excluded from the analyses). Table 2 presents the latencies of the correct responses obtained in each of the experimental conditions.

Table 2

Means and standard deviations (in brackets) of the reaction times for the correct responses in each experimental condition.

	Type of prime		
Type of target	Only Logo Prime	Only Name Prime	Identity Prime
Familiar brands	681.9 (74.7)	683.5 (72.5)	668.5 (62.4)
Non-familiar brands	811.7 (116.4)	800.1 (127.2)	783.7 (108.8)

Results showed a significant main effect of type of target, $F_1(1, 27) = 48.42$, $MSE = 13503.044$, $p < .001$, $\eta^2p = .64$; $F_2(1, 126) = 261.55$, $MSE = 5510.481$, $p < .001$, $\eta^2p = .68$, indicating that familiar brands ($M = 677.99$ ms) were recognized faster than non-familiar brands ($M = 798.6$ ms). A main effect of type of prime was also observed in the by-subjects analysis, $F_1(2, 54) = 5.58$, $MSE = 1255.897$, $p = .006$, $\eta^2p = .17$; $F_2(2, 252) = .319$, $MSE = 4674.699$, $p = .727$, $\eta^2p = .003$. Pairwise comparisons reveal that subjects recognized faster brands when preceded by an identity prime ($M = 726.1$ ms), than when preceded by either an only logo ($M = 746.8$) or an only name prime ($M = 741.8$ ms). The differences between these last prime conditions did not reach statistical significance.

As expected, familiar brands were faster recognized than non-familiar brands, especially when preceded by identity primes. However, contrary to our predictions, no differences were observed between only logo or only name prime-target conditions either for familiar or non-familiar brands. Thus, the only logo prime did not present an advantage on the brand processing in comparison to the only brand name prime, contrary to what was expected and observed in previous studies (Ferrand et al., 1994; Weldon et al., 1987). These results may be related, as we will see in the general discussion, both with the type of target used (brands with a logo and a name) and also with the type of control imposed to the stimuli selected (note that only brands which logo and name had similar values of subjective frequency were included in the experiments – see methodological section).

Experiment 2. Brand Naming Task

Participants

Thirty undergraduate students from University of Minho participated in this experiment (M_{age} = 20.90; SD_{age} = 3.20, min. = 18.00, max. = 31.00, 26 women). All of them presented Portuguese

(European) as their native language and had normal or corrected-to-normal vision. Participants received academic credits for their participation. Before performing the task, written informed consent was obtained from each participant. Participants also filled out a brief questionnaire aimed to collect some socio-demographic and linguistic background data such as age, sex, nationality, and native language.

Materials and procedure: see General method section.

Results and discussion

Repeated measures ANOVAs were performed on naming latencies based on the same factorial design as used in Experiment 1. The latencies were trimmed by using the same procedures as in the previous experiment (1500 ms) and, additionally, the mispronunciations of brand names were also eliminated, leading to a higher value of eliminated responses (14.47%). Table 3 presents the results obtained in each of the experimental conditions.

Table 3

Means and standard deviations (in brackets) of the reaction times for the correct responses in each experimental condition.

	Type of prime		
Type of target	Only Logo Prime	Only Name Prime	Identity Prime
Familiar brands	843.8 (119.3)	828.7 (108.4)	841.4 (109.6)
Non-familiar brands	1048.9 (116.1)	1055.6 (105.1)	1030.7 (117.0)

Results showed a significant main effect of type of target, $F_1(1, 27) = 571.51$, $MSE = 3377.541$, $p < .001$, $\eta^2p = .96$; $F_2(1, 124) = 265.15$, $MSE = 18675.954$, $p < .001$, $\eta^2p = .68$, as non-familiar brands ($M = 1045.1$ ms) were named slower than familiar brands ($M = 838.0$ ms).

The analyses also revealed a significant type of target x type of prime interaction effect, although only in the analysis by participants, $F_1(2, 54) = 3.91$, $MSE = 1372.039$, $p = .026$, $\eta^2p = .126$; $F_2(1, 124) = .018$, $MSE = 12232.708$, $p = .894$, $\eta^2p = .52$. Figure 3 depicts the effect.

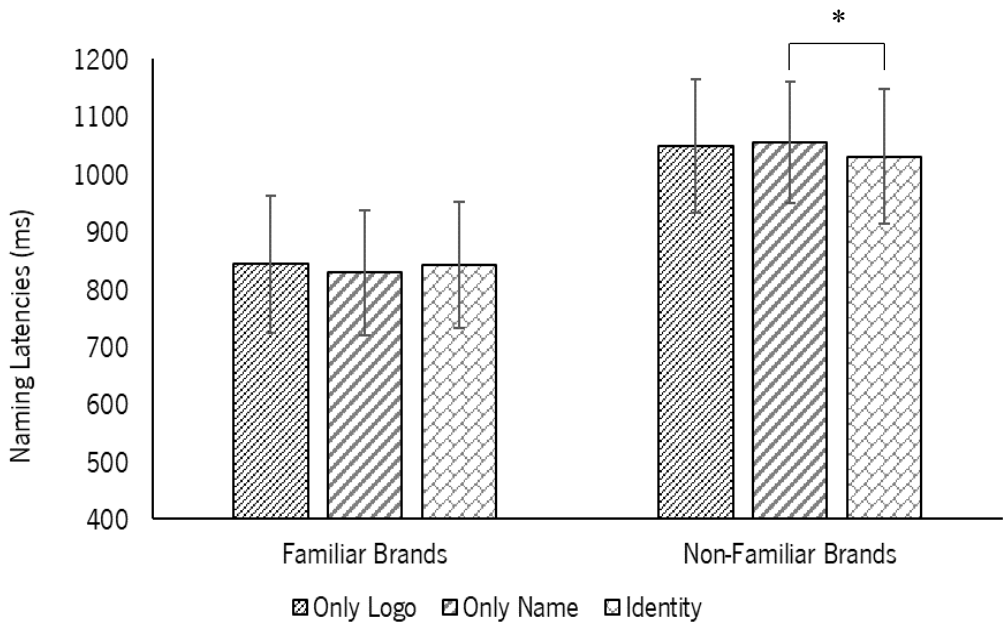

Figure 3. Naming latencies for familiar and non-familiar brands by type of prime.

This interaction showed no differences across priming conditions with familiar brands. For non-familiar brands however, differences tended to be named faster when preceded by identity primes (M = 1030.7 ms) than when preceded by only name primes (M = 1055.6 ms) (p = .054). Identity primes did not differentiate from only logo primes (M = 1048.9 ms; p = .15). Also, no differences were found in the naming latencies of targets when these were preceded by the only name or the only logo primes (p = .25).

As expected, familiar brands were named faster than non-familiar brands, which is also in line with the results observed in Experiment 1. However, in this second experiment, the impact of the prime on brand naming was affected by brand familiarity as indexed by the interaction effect observed, what was not anticipated. Indeed, although familiar brands were not affected by prime conditions (the three different types of primes produced similar facilitation priming effects), non-familiar brands were named faster when preceded by identity than only name primes. The absence of statistical differences between identity and the only logo prime conditions, also suggest that the only brand logo prime was as effective as the identity prime in easing naming performance for non-familiar brands. However, we cannot talk about a genuine logo advantage in naming non-familiar brands because of the absence of statistical significant differences between the only logo and the only name prime conditions. These findings are not in accordance with the hypotheses advanced and could be related again with the characteristics of the target brands selected as we will further discuss in the General Discussion.

General Discussion

The present studies analyzed whether the picture superiority effect reported in the literature can also be observed at early stages of brand processing (recognition vs. naming) and to what extent task requirements modulated the effect of masked priming observed. Although several studies have been conducted to understand the impact of words and images on visual recognition and pronunciation of words, few studies tested the same questions using brand as stimuli. Also, in the field of advertising and marketing, no studies have tried to understand differences between brand logos and brand names in the recognition and naming of brands, and none has controlled the familiarity of the brands used. Furthermore, stimuli used in previous studies were also not controlled in other variables known to affect picture and word processing such as subjective frequency, name agreement, visual complexity, name length and phoneme articulatory features. The experiments reported in the present work aimed to overcome these shortcomings. Two experiments were conducted using a masked priming paradigm to tap into the early stages of brand processing. Experiment 1 involved a brand recognition task, while experiment 2 involved a brand naming task to further explore how task requirements could modulated the effects. In both experiments, familiar and non-familiar brands containing both a logo and a name were used as targets, which could be preceded by three types of primes: i) only the brand logo; ii) only the brand name; or iii) the combination of the brand logo with the brand name (identity condition).

The results obtained clearly demonstrate that familiarity plays an important role in brand processing. Familiar brands were recognized and named faster than non-familiar brands, as expected. This finding is in accordance with previous studies conducted with words and pictures, showing that familiar stimuli elicited shorter latencies than non-familiar stimuli (e.g., Carlisle & Katz, 2006; Cycowicz et al., 1997; Regan, 1981). As previous studies suggest, we acquire knowledge about stimuli, such as words and pictures, through experiences with written and oral uses of them over time. With continuous exposure to these stimuli, their features (e.g., phonological, orthographic, and semantic) become more completely represented in our memory, facilitating the connections among these features and, as consequence, their recognition becomes faster and more accurate (e.g., Appelman & Mayzer, 1981; Carlisle & Katz, 2006; Shepard, 1967). Thus, the findings obtained extend previous familiarity effects both to brand recognition and brand naming.

Nevertheless, contrary to what we expected, the results obtained do not support the other formulated hypotheses. Thus, when it comes to the hypotheses raised regarding the brand recognition task (Experiment 1) and besides the expected advantage for identity prime-target conditions, we failed to observe a facilitation effect for brands preceded by only logo primes in comparison to brands

preceded by its name (especially with familiar brands since it would activate its semantic representation faster than the only name primes). In fact, only a preferential processing for identity prime-target conditions were observed for both familiar and non-familiar brands. Furthermore, in the brand naming task, instead of the expected facilitation of the only name prime, a slight advantage was observed for only logo primes relative to only name primes, though restricted to non-familiar brands. For familiar brands all the prime conditions produced similar results thus not allowing any kind of advantage to emerge. This may lead us to consider that the only logo prime, was as powerful as the identity prime, but, since no statistical differences were obtained between the only logo and the only name prime, further studies will be needed to verify this hypothesis. However, a brief explanation can be elicited regarding the lack of facilitation of the only name prime. Pronunciation seems to be determinate by searching in long-term memory for information about how to pronounce a familiar sequence of letters (Forster & Chambers, 1973). Obviously, this would work for familiar words, however, since non-familiar brands have not a stable representation in memory, pronunciation is somehow impaired. Future studies are needed to further explore this issue.

Overall, results from both studies are not in accordance with previous research, which indicates that in standard tasks such as recognition, information encoded in pictoral formats facilitated picture or word retrieval, mainly because performance on those tasks benefits from conceptually driven processing (e.g., Weldon & Roediger, 1987). In other words, pictures seem to activate semantic (meaning) codes more strongly than words. In addition, according to the Extended Activation Model (Ferrand et al., 1994), in a naming task, activation spreads from sublexical orthographic units onto sublexical phonological units and to the whole-word representation in the orthographic and phonological lexicons. The articulatory output is presumed to rely both on the whole-word units and sublexical units, indicating that word naming is mediated by sublexical orthography instead of semantically mediated (Ferrand et al., 1994).

In these studies (e.g., Ferrand et al., 1994; Weldon & Roediger, 1987), the impact of pictures and words was explained relying on the fact that pictures activate its semantic representation more efficiently than do words. However, since these studies lack a strict control of the stimuli used, as mentioned, it is possible that other variables might explain the results. To overcome these limitations, the brand logos and the brand names used in our study were matched on variables known to affect their processing. In fact, we guaranteed that no differences existed in the SF of the brand logos and the brand names of all the stimuli used in both experiments. Attending to this, it is possible that both the brand logo and the brand name primes lead to similar facilitative effects on the recognition and naming

of familiar brands. This extends previous findings which indicate that equally familiar stimuli (despite their modality, for instance, words, pictures, or sentences) produce equal facilitation on subjects' performances (e.g., Shepard, 1967).

Moreover, it is important to note that the fact that the targets used contained simultaneously the two types of information (brand names and brand logos), could have also contributed to mitigate potential differences across prime conditions. We used the combination of the brand logo with the brand name to avoid possible effects of congruence between primes and targets, however, this option seems to have also contributed to these results. Since the combination of both brand logos and brand names has been presented, it is not possible to know clearly what type of information is mostly being used by our participants during brand recognition.

Beyond that, it remains to explain why no differences were observed between brand logo primes and brand name primes during the recognition of both familiar and non-familiar brands. It is possible that familiarity has an impact in the masked priming effect only at later stages of processing. With 17ms of exposition to the prime, it is possible that only perceptive aspects of the prime were processed. Increasing the duration of the prime, for instance to 32 ms or 50 ms, like in previous studies (e.g., Taylor & Henson, 2012), may lead to the emergence of a greater impact of familiarity. Another plausible explanation lies in the strict control imposed to the stimuli used.

In sum, the present results presented in this dissertation, elucidated some of the properties that influence the processing of brands, highlighting the role of familiarity. Therefore, the well-known principle that equally familiar stimuli produce similar facilitations (e.g., Carlisle & Katz, 2006; Cycowicz et al., 1997; Regan, 1981) is also applied to brand material, explaining the absence of the preferential processing of images over words observed in literature.

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