

FAMILIARITY ATTRACTS CONSUMER ATTENTION: TWO METHODS TO OBJECTIVELY MEASURE CONSUMER BRAND FAMILIARITY

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Abstract Brand familiarity is an important and frequently used concept in marketing research and practice. Existing measures of brand familiarity typically rely on subjective self-reports and Likert scales. Here we develop and empirically test two implicit measures to quantify brand familiarity. Based on research in visual attention and computer image processing, observers in a first visual search task are incentivized to quickly find a target brand among varying numbers of competitor brands. In the second approach, we measure the speed at which observers can identify a target brand that is gradually revealed. Both approaches are validated in preregistered experiments. Results show that reaction times predict brand familiarity on an individual level beyond conventional self-reports, even when controlling for “bottom-up” visual features of the brand logo. Our findings offer an innovative way to objectively measure brand familiarity and contribute to the understanding of consumer attention.

Keywords:

brand
familiarity,
objective
measure,
visual
attention,
top-down
features

1 Introduction and theoretical background

Marketing practitioners and academics have long recognized the importance of brand familiarity – a consumer’s prior direct or indirect experiences with the brand (Kent & Allen, 1994). Past research showed that brand familiarity impacts advertisement, evaluation, and consumer choice. Consequently, brand familiarity became a key element in models of brand strength and brand equity (e.g. Aaker, 1997; Erdem, 1998; Keller, 2013). For companies, measures of brand familiarity provide managerial insights on how their brand compares to competitors' brands, which allows for more effective marketing campaigns and hence sustain brand growth and sales (Nielsen Marketing Report, 2020). In marketing research, a substantial body of empirical work has focused on correlations between brand familiarity and other marketing constructs. Findings show that brand familiarity influences brand memory, explicit attitudes toward the brand, and advertising effectiveness in both, traditional advertising (Pieters, Warlop, & Wedel, 2002) and newer formats, such as movies (Brennan & Babin, 2004). Despite this importance of brand familiarity, an overview of recent academic and industry work reveals that brand familiarity has (almost) always been assessed using subjective self-reports, typically based on the Likert Scale where respondents indicate how familiar they are with a given brand with verbal anchors that range from not at all familiar/extremely unfamiliar to very familiar/extremely familiar (Zhou & Nakamoto, 2007).

While such self-reports are cost and time-efficient, they come with a number of disadvantages that limit their validity (De Houwer, 2006). Firstly, they rely on language and are thus not culture-free and can be prone to different interpretations and translations. This makes it hard to compare and aggregate answers in an increasingly globalized market where global brands need to assess and compare their familiarity across different languages, countries, and cultures. Secondly, subjective scales are also hard to incentivize and therefore are more prone to response-order effect (increasing the tendency for respondents to select the first response available to them on the answer scale), donkey vote effect (selecting the same response for all questions), demand effects (the tendency of respondents to respond positively), and dishonesty. However, even when consumers want to answer honestly, there is a mismatch between the way consumers experience and think about the world and the methods marketers use to collect this information (Zaltman, 2003). As such, subjective scales require introspective ability and the psychometric properties of data

from Likert-scales are debated (Li, 2013). For example, there is an ongoing debate about whether a Likert scale is ordinal or interval. A typical ordinal scale can measure the orders of the ratings, but it cannot tell us about the intervals between responses and thus results in information lost during measurement. On the other hand, a typical interval scale implies that the difference between any two consecutive scales reflects equal differences in the variable measured, which leads to information lost during measurement (Wu & Leung, 2017).

Building on recent findings and models of visual attention in marketing (Sample, Hagtvedt, & Brasel, 2020), and in cognitive science (Wolfe & Horowitz, 2017), we empirically test whether and how brand familiarity impacts visual attention, and bridge the gap by proposing an innovative way to objectively measure brand familiarity. Thus the current paper has two objectives. The first is to transfer knowledge from cognitive science and computer visual processing literature to a consumer behavior setting and test whether we can distill top-down effects from bottom-up factors with more ecologically familiar stimuli, brand logos. If this is possible, this will naturally lead to the establishment and proof of concept for an implicit measure of real-world personal brand familiarity. The second is to bring into the spotlight the construct of brand familiarity on visual attention.

2 Experiments

2.1 Experiment 1: Using Visual Search Task to study how brand familiarity impacts visual attention

Up to date, it remains an open question whether consumers would show advantages for familiar or on contrary, novel stimuli. In line with these inconsistent results, a recent review in the area of vision research called for more contribution to the understanding of how familiarity influences visual attention (Wolfe, 2020). Study 1 was designed to provide a first test of the hypothesis that brand familiarity as opposed to brand novelty impacts consumers' attention in a visual search task. Study 1 was preregistered prior to data collection on OSF (OSF link to preregistration).

Design and measurement

A total of 100 participants were recruited on the Mechanical Turk website and preselected based on not having color-blindness, owning a mobile phone, and having no extensive connection with China (MAge=35.9, SDAge=10.5, 37% females). Participants were instructed to find different smartphone app logos (“targets”) among either 7 or 23 distractor logos. Half of the targets consisted of familiar app logos from the Google Play store, the other half consisted of unfamiliar logos from apps that were primarily used in China. Each participant completed 200 trials that were split into 4 blocks. At the beginning of each trial, the target logo was displayed in the center of the screen for 1 second. Then, a new screen appeared with a 5x5 grid that contained the target among the distractor logos at random positions. Figure 1 shows an example of this setup. As soon as participants identified the target brand on this grid they had to press a button on the keyboard. Once they pressed the button, all app logos disappeared from the grid and participants had to click on the grid position where the target had been displayed. For this last task, there was no time pressure. Participants received feedback after each trial in terms of points, which were exchanged into the monetary bonus at the end of the experiment. Familiar and unfamiliar logos were visually matched according to color, shape and number of characters and were pretested on a similar sample for familiarity. All logos were resized to 160x160 pixels to ensure the equivalent image size.



Figure 3: Screenshots of the visual search task in the first experiment

Procedure

The experiment started with color-blindness, the Ishihara test (Ishihara, 1994), and a screen resolution check. Next, participants read an instruction of the visual search task and completed a training block with 10 trials. After training, participants finished 200 experimental trials, separated into 50-trial blocks that corresponded to

each of four conditions. Besides the main experimental manipulation of target familiarity, we also manipulated distractor familiarity. These yield four experimental conditions in a 2x2 design: finding a familiar target among unfamiliar distractors (FU), familiar target among familiar distractors (FF), and vice versa (i.e. UF and UU). The order of the four blocks was counterbalanced between participants. All conditions were pseudorandomized among participants and randomized on the trial level. As a manipulation check at the end of the experiment, participants rated their familiarity with the app logos on a 4-point (1=unfamiliar to 4=familiar) scale.

Results and discussion

The familiarity ratings at the end of the experiment were significantly higher for the familiar app icons (mean=3.7, SD = 0.7) than the unfamiliar app icons (mean=1.2, SD=0.6), suggesting our manipulation of familiarity was successful.

In line with our prediction, familiar targets (median = 568ms) were found slightly faster than unfamiliar targets (median = 585ms). The average difference of 17 milliseconds and the corresponding effect size was very small though (Cohen's $d = 0.08$). To test which variables systematically influenced the reaction times, and to avoid the pitfalls of null-hypothesis testing (Baker, 2016) we estimated a linear mixed effect model using `lme4` package in R (version 1.1-26, Bates et al., 2015). The regression model assumes random intercepts for individuals and accounts for possible dependencies due to the repeated measurement design. The baseline model includes intercept as a single fixed effect, location of the target, and set size (denoted as m_0). Next, we added predicted variables of target familiarity rating as a fixed effect (denoted m_1). A tested variable has a credible influence on prediction accuracy if adding it to the regression equation improves model fit. To select the best-fitting model we used Bayesian information criteria (BIC), which takes model complexity into account by introducing a penalty term for the number of parameters in the model. While absolute values of BIC are difficult for interpretation, BIC differences (Δ BIC) between models can be transformed into Bayes factors, which offer more intuitive explanations.

A regression model that contained familiarity as a categorical predictor of reaction times explained the observed data better than a baseline model that did not include the predictor. Table 1 (Exp 1) shows a comparing of both regression models. As can be seen from the table, the Bayesian Information Criteria (BIC) of the difference between a null model (m0) and model that included target familiarity (m1) was 18 (Δ BIC), which translates into a Bayes factor (BF) of 7104 (Wagenmakers, 2007). A BF of 7104 indicates that based on the observed data, the model including the target familiarity rating is 7104 times more probable.

Results from additional exploratory (i.e. not pre-registered) analyses suggest that distractor familiarity also impacts visual search. In particular, search efficiency was higher when the target and distractor familiarity do not match (FTUD and UTFD), than when they do match (FTFD and UTUD). Using a similar model comparison approach as above yields a Bayes factor (BF) of 602 in favor of the model that includes distractor familiarity as a predictor.

To summarize, Study 1 demonstrated that brand familiarity as opposed to brand novelty enhances visual attention. Thus, the results provide initial evidence that visual search tasks provide an implicit measure of brand familiarity.

Table 1: Regression coefficients of the best fitting mixed-effects models

Exp 1: Online study (US vs PCR brands)			
	m0	m1	m2
Fixed effects			
(Intercept)	18.556	18.741	18.646
Target Location	0.884	0.885	0.887
Set Size	0.266	0.266	0.266

Target Rating		-0.075	-0.075
Distractor Condition			0.190
Model fit			
log(likelihood)	-23182	-23168	-23157
AIC	46374	46349	46329
BIC	46410	46392	46380
<i>Note.</i> Best fitting models were chosen using BIC which punishes for model complexity and number of parameters. Corresponding Bayesian Factors (BF) for nested models were calculated as $BF = \exp(\Delta BIC/2)$ (Wagenmakers, 2007).			

2.1.1 Experiment 2: Developing a video recognition task

The findings of the first experiment provide converging evidence for the influence of brand familiarity on visual search efficiency. As such, it indicates that the experimental search paradigm that we used can be implemented as an implicit measure of brand familiarity. However, given the relatively small effect size, the task at hand requires relatively many repetitions within subjects. This limits its practical value, for example in the context of quick marketing surveys. To overcome these limitations, this second study at hand proposes an alternative implicit measure that is based on qualitative differences between the perception of familiar and unfamiliar stimuli (OSF link to preregistration). Previous research on face familiarity explored different manipulations of image stimuli, such as Gaussian blur, and contrast negation (Balas, Cox, & Conwell, 2007). While such image manipulation impaired perception for face familiarity studies, neither Gaussian blurring, linear stretching, nor contrast negation did not challenge the perception of brands (Sandford, Sarker, & Bernier, 2018). Therefore, we developed a perceptual decision task in which participants watch a video that gradually changes from a noisy mask to a given target

brand. Participants are instructed to press a button as soon as participants recognize the brand. The main dependent variables are reaction time and recognition accuracy.

Design and measurement

A total of 73 students from Swiss University, participated in the lab study (MAge=22.2, SDAge=1.99, 57% females). As preregistered, all participants who did have an extensive connection to another country (Switzerland for Slovene participants, and Slovenia for Swiss participants) or preferred that their data would not be included were excluded from further analysis.

Stimuli and Procedure

To test whether a video task could be used to distinguish the different levels of brand familiarities, we manipulated brand familiarity by using national brands from two countries, Switzerland and Slovenia. A pre-selected set of brand logos from both countries from the second study was presented to participants from Switzerland.

Participants in the experiment were instructed to detect a logo in a video, which went from pure noise to the target brand image. The noisy starting point was generated by drawing a random RGB value for each pixel of the video. As the video progressed, random sets of noisy pixels were gradually replaced with pixels from the target image. The number of “flipped” pixels was determined based on an inversely s-shaped function (we used a scaled beta function) such that at the beginning of the video many pixels were flipped while in the middle part the flip rate was decreased. Each participant saw 20 video sequences. The logos in the videos were randomly drawn from the set of 20 videos; representing 10 unfamiliar logos and 10 familiar logos.

To incentivize participants, they received trial-to-trial feedback in terms of points on their speed and accuracy after each round. More precisely, each video lasted for 20 seconds and participants started with 200 points, and for each millisecond participant took, we deducted 1 point from their score. If the participant didn't correctly identify the brand logo, or if the video was played for more than one time, the participant would receive 0 points. At the end of the experiment, the average of all points was exchanged for lottery tickets. Among all lottery tickets from all

participants, we selected one winning number, and participant holding that number received 100 CHF of bonus.

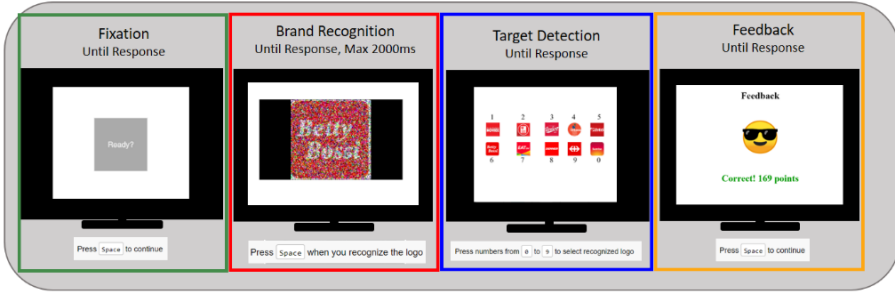


Figure 2: Screenshots of the video task.

Results and Discussion

In line with our prediction, Swiss participants were faster at finding swiss logos than Slovene logos in a video task. Using uninformative priors (Raftery, 1995) the difference between the Bayesian Information Criteria the baseline model (m0) and the extended model (m1) which included familiarity rating was 128, which translates into a Bayes factor (BF) of $4.4e+21$ (Wagenmakers, 2007). In other words, familiar brands (swiss) were recognized more than 2 seconds faster ($MRT = 11.64$, $CIRT = 0.25$) than unfamiliar (Slovene) brands ($MRT = 13.87$, $CIRT = 0.25$)

In summary, Study 2 provides evidence that also video task can predict brand familiarity. It demonstrates that visual attention is driven by brand familiarity and that the video task at hand provides an implicit measure of brand familiarity

3 Final Discussion and implications

Our research sheds light on a prevalent, yet understudied research question of how brand familiarity affects visual attention. Across studies, we find converging empirical evidence that familiarity affects visual search efficiency. As a methodological contribution, we introduced two implicit measures of brand familiarity that rely on reaction times and thus avoid the pitfalls of subjective self-reports based on Likert scales. These paradigms can be used as a blueprint for researchers and practitioners alike. Moreover, all studies implemented incentive

alignment in which participants are rewarded for correct responses. Together with the use of real-world stimuli, this enhances the external validity of our findings. To the best of our knowledge, this is the first work that explores the effect of brand familiarity on search efficiency while controlling for distractor familiarity and bottom-up effects.

We hope that our work inspires future research in several notable ways. First, it would be interesting to find out if visual search tasks can be designed to quantify both, bottom-up and top-down effects. We see a variety of interesting and unanswered questions in the marketing and branding domain such as whether and how bottom-up features, such as previous location and other design features interacts with top-down features, such as familiarity and goals. Recent research on brand logo design sheds light on the effectiveness of many bottom-up features; however, it is only studied with unfamiliar brands (Lieven, Grohmann, Herrmann, Landwehr, & van Tilburg, 2015; Luffarelli, Stamatogiannakis, & Yang, 2019). With recent changes in logos of global brands (Google, Messenger from Facebook), empirical research on how these visual elements (bottom-up effects) interact with brand familiarity, is needed.

Second, we see the potential for the refinement and further development of objective measures based on implicit response times. Here, a nearby goal would be to further refine the proposed methods to achieve larger effect sizes and hence fewer repetitions within subjects. The current work further hints at the possibility of future research at the intersection between marketing and cognitive (neuro)science. For example, in visual attention, recent research by Sample, Hagtvedt, and Brasel (2019) could provide worthwhile theoretical foundations. In the long run, this work may also inform the effective design of new logos. In addition, future work may also test the observed top-down effects on visual attention with neuroscientific methods, and thus further strengthen the link between marketing and basic research on (visual) cognition and cognitive neuroscience.

To conclude, observations that familiar brands are detected faster than unfamiliar brands improve our understanding of effective marketing and brand positioning, especially in attention bottleneck settings (i.e. mobile phones, online shops, crowded shelves), where attention is a scarce resource. Current research also presents a new look at fundamental studies on how to objectively measure brand familiarity. The

methods presented here may help brand managers to monitor brand familiarity, give insights about visual attention attributes of their logos, and determine how their brands can stand out to consumers during the very short exposures they have in online settings and even more on mobile screens.

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