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Brand logo symmetry and product design: The spillover effects on consumer inferences

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ABSTRACT

This paper addresses the relationship between brand logo symmetry and product design inferences. By relying on the theoretical concepts of consumer self-congruity and spillover effects, we propose that brand logo associations should be in congruence with the consumer's self-concept to have a positive effect on logo liking and, consequently, on product design inferences. Consumers tend to associate asymmetry, not symmetry, with excitement and compare their own self-concept with these perceived associations. Due to self-congruity effects, consumers have higher preferences for a brand logo if the brand logo's associations match their own self-concept. Based on their logo liking, consumers are able to make attitude-based product design inferences. The impact on product design inferences varies with regard to the dimensions of product design. More specifically, the findings demonstrate that inferred product aesthetics and symbolism are, in fact, more strongly affected in comparison to inferred product functionality.

1. Introduction

Brand logos are key assets in companies' communication efforts (Henderson, Cote, Leong, & Schmitt, 2003) and important tools to differentiate brands from their competition (Melewar & Saunders, 2000). In particular, logos are often the first exposure to a brand or company when they appear on a product, in an advertisement or in another way. Thus, a logo contributes to the process of building consumers' brand image (Cian, Krishna, & Elder, 2014). Firms recognize the importance of brand logos (Phillips, McQuarrie, & Griffin, 2014) and spend large amounts of their marketing budget on brand logo creation (Hagtvedt, 2011). Classically, brand logos can incorporate various elements that designers can use in the creation of a brand logo, such as specific shapes, images, sizes, typographies or colors (Celhay, Boysselle, & Cohen, 2015; Hynes, 2009). However, little is known about how a brand logo's design elements affect consumer perception (Bottomley & Doyle, 2006; Guido, Pichierri, Nataraajan, & Pino, 2016; Salgado-Montejo, Velasco, Olier, Alvarado, & Spence, 2014). Specifically, brand logo symmetry, as an important design factor, has recently gained interest in marketing research (Bajaj & Bond, 2018; Marsden & Thomas, 2013). Symmetry is typically defined as the level of reflection of an image around its vertical axis (Wagemans, 1997). In this context, prior research has focused on the relationship between brand logo symmetry and brand logo perception (Henderson & Cote, 1998; Miceli, Scopelliti, Raimondo, & Donato, 2014). Other empirical studies have found effects of symmetry in brand logo design on perceived brand personality and on brand equity (Bajaj & Bond, 2018; Luffarelli, Stamatogiannakis, & Yang, 2015). However, a brand logo provides information not only about the brand itself but also about the products of a brand. In fact, brand logos can even fuel consumers' expectations about actual product appearances (Henderson & Cote, 1998). Although an appealing product appearance (e.g., a well-perceived product design) may significantly impact consumer behavior and is therefore highly important from a marketing perspective (Bloch, 1995; Kristensen, Gabrielsen, & Zaichkowsky, 2012), prior research has largely neglected the relationship between brand logo design and belonging product perception, but research has recently called for empirical investigations in this context (e.g., Bajaj & Bond, 2018). We take up this call and contribute to this important topic by investigating the effects of brand logo symmetry on product design inferences. In this regard, we also consider consumer self-concept as an important impact factor in the relationship between brand logo symmetry and product design inferences. This approach builds on existing literature linking asymmetry to associations of arousal and excitement (e.g., Berlyne, 1971; Luffarelli et al., 2015). By taking into account the concept of consumer self-congruity, we further propose an impact of brand logo symmetry on logo liking depending on the consumer's self-concept. Our findings demonstrate the relevance of including consumer self-concept

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in this relationship. Importantly, we show that different levels of an exciting self-concept influence the effects of brand logo symmetry on logo liking and, consequently, on product design inferences.

The rest of the paper is structured as follows. First, we provide a theoretical background addressing the underlying assumptions of the effects between brand logo symmetry and product design inferences, leading to the research hypotheses. In the next sections, we present three empirical studies (i.e., a pilot study and two main studies) in succession. For each study, the methodology is first described. Then, a subsequent section presents the results of the study in detail and further provides a discussion of the findings. This paper ends with a general discussion in which the results are put into a wider context and implications for marketing theory and practice as well as future research directions are derived.

2. Theoretical background and hypotheses

2.1. Brand logo symmetry and self-congruity effects

Companies utilize logos to identify their own brands and the products belonging to their brands (Bresciani & Del Ponte, 2017). Generally, a logo is considered a graphic design that may include an icon that is an image, an illustration or a symbol (Melewar & Saunders, 2000; Salgado-Montejo et al., 2014). Moreover, a logo can incorporate other elements, such as the brand's name and a logotype, as in the cursive Coca-Cola logo (Kilic, Miller, & Vollmers, 2011). From a designer perspective, a logo can be created on the basis of various design factors (Henderson & Cote, 1998). In this paper, we specifically focus on logo symmetry. Three basic types of symmetry exist: translational, rotational, and reflectional, also called mirror symmetry (Wagemans, 1995). Translational symmetry describes the coincidence of an object when moved along a vector, whereas rotational symmetry is present when an object coincides with itself when rotated around a vertex. Mirror symmetry is defined as symmetry around a plane that divides a figure into two identical images (Turoman, Velasco, Chen, Huang, & Spence, 2017). The most frequently studied form of symmetry is mirror symmetry, and for people in general, mirror symmetry is the easiest to detect and to evaluate of the three types of symmetry (Bertamini, Friedenberg, & Argyle, 2002; Palmer & Hemenway, 1978). Therefore, we focus on mirror symmetry in our research and use the terms mirror symmetry and symmetry synonymously. Psychological research has shown that symmetric objects are easier for humans to process than asymmetric objects. The reason for this is the smaller number of different elements in symmetric objects and thus the usually lower complexity of the objects (Bertamini & Makin, 2014). Lower processing fluency in the perception of asymmetric objects compared to symmetric objects also leads to higher subjective arousal, which is a psychobiological state of excitement or alertness (Blijlevens, Carbon, Mugge, & Schoormans, 2012). Accordingly, in the literature, symmetry is often linked to specific feelings and associations that relate to the effects of symmetry on perceptual fluency and arousal. Specifically, symmetric forms may lead to the impression of attributes such as structure and calm (Creusen, Veryzer, & Schoormans, 2010), whereas asymmetric forms normally create a higher level of arousal and are related to excitement and uniqueness (Krupinski & Locher, 1988; Schmitt & Simonson, 1997). Transferring these considerations to the perception of symmetry in brand logos and taking into account that certain affective states and associations result in correspondingly consistent judgements (Pham, 2004), consumers should perceive asymmetric brand logos as generally more exciting than symmetric brand logos (Stamatogiannakis et al., 2015). To explain the influence of the associations and images that an object creates on the viewer's liking for the object, the theory of self-congruity may be applied. Self-congruity refers to the congruence between the self-concept of the consumer and the perceived image of a stimulus such as a product or a brand (Sirgy, Lee, Johar, & Tidwell, 2008). In this regard, consumers are assumed to prefer products and brands that create images similar to their own self-concept (Sirgy, 1982). Researchers from the field of marketing and consumer research have provided wide empirical support for this assumption by reporting positive effects on various aspects of consumer perception and behavior if the consumer's self-concept is in congruence with brand- or product-related associations (e.g., Dolich, 1969; Graeff, 1996; Hosany & Martin, 2012; Kressmann et al., 2006; Malhotra, 1988; Sirgy, 1985). Hence, according to the assumptions of self-congruity theory, an object associated with excitement should be preferred by people who perceive themselves as exciting (that is, who have a high exciting self-concept) rather than by people with a low exciting self-concept. In our context of brand logo symmetry, we may formally state this as follows:

H1. A symmetric (asymmetric) brand logo is likely to result in perceptions of higher logo liking than an asymmetric (symmetric) brand logo when consumers have a less (more) exciting self-concept.

2.2. Spillover effects on product design inferences

In general, consumers often draw inferences based on limited information and knowledge of products and brands to make their decisions in the market (Kardes, 1993). Existing research on brand logos indicates that logo-based inferences are made, particularly for the product or brand to which the logo is attached (Rahinel & Nelson, 2016). Moreover, consumers are able to mentally imagine product inferences in terms of specific attributes based on all sorts of product-related information (Elder, Schlosser, Poor, & Xu, 2017). Researchers have investigated the impact of mental imagery in various consumer contexts and have provided evidence for the existence and relevance of such effects (e.g., Jiang, Gorn, Galli, & Chattopadhyay, 2015; Peck, Barger, & Webb, 2013; Underwood, Klein, & Burke, 2001). Through this phenomenon of mental imagery, consumers are able to imagine how a product looks without actually seeing the product and are thus able to make specific product design inferences (Krishna, Morrin, & Sayin, 2013). Product design has been defined in various ways in the marketing literature but is generally considered a three-dimensional construct comprising the dimensions of aesthetics, functionality, and symbolism (Candi, Jae, Makarem, & Mohan, 2017). Aesthetics refers to the general pleasure that a consumer receives from the sensory product attributes (Liu, Li, Chen, & Balachander, 2017) and to the perception of product beauty (Hoegg, Alba, & Dahl, 2010). Functionality indicates the perceived utilitarian value of a product based on its design properties (Bloch, 2011). Symbolism involves the level of identification and meaning the product design conveys to the consumer (Kumar & Noble, 2016). Importantly, all products incorporate characteristics of all three design dimensions, and empirical research has provided evidence for the significant impact of all three dimensions on relevant factors of consumer behavior (Homburg, Schwemmle, & Kuehnl, 2015). When inferring specific attributes such as a product's design dimensions based on a related stimulus, consumers often use their overall liking of the related stimulus and transfer this assessment to the inferences. This phenomenon is also known as attitude-based inference or halo effect (Kardes, Posavac, & Cronley, 2004). Empirical research provides further evidence for this thesis in the context of logo-based inferences because consumers typically transfer feelings evoked by a brand logo design to closely connected aspects, such as the brand itself or the products of the brand (Cian et al., 2014; Van Riel & Van den Ban, 2001). By building on the presumptions of H1 and further applying these considerations to the relationship between brand logo symmetry and product design inferences, the following two hypotheses may be derived:

H2. A symmetric (asymmetric) brand logo is likely to result in perceptions of more positive inferences on product design (i.e., aesthetics, functionality, and symbolism) than an asymmetric (symmetric) brand logo when consumers have a less (more) exciting self-concept.

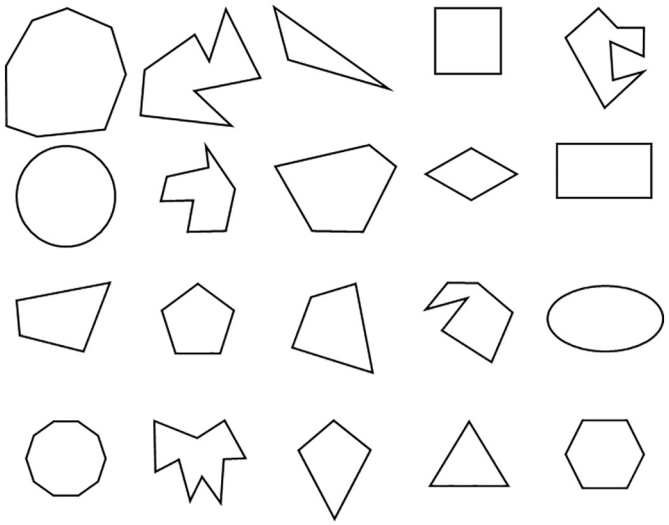


Fig. 1. Stimuli (pilot study).

H3. The effects proposed in H2 are mediated by the perceptions of logo liking.

3. Pilot study

In deriving our hypotheses, we assume that asymmetric objects are more difficult to process and cause increased arousal, while symmetric objects are easier to process and are more relaxing and therefore less arousing. These effects should lead to the perception of asymmetric objects as more exciting than symmetric objects. We investigated this theoretical claim with the help of a pilot study.

3.1. Materials and methods

For the pilot study, we relied on an online questionnaire and created 20 abstract shapes, 10 perfectly symmetric and 10 asymmetric. Sixty-five undergraduates from a major German university (M_{age} = 22.3 years, 52.3% females) participated in the pilot study in exchange for course credit. For every question, participants were shown all objects at once in randomized order (see Fig. 1 for an example). Then, participants were asked in succession to choose the five objects they perceived as (1) most fluently, (2) most arousing, and (3) most exciting.

3.2. Results and discussion

In line with our theoretical considerations, participants significantly chose more symmetric objects when asked about perceptual fluency ($M_{symmetry}$ = 4.85 vs. $M_{asymmetry}$ = 0.15; t = 33.45, $p < .01$) and more asymmetric objects when asked about perceived arousal ($M_{symmetry}$ = 0.14 vs. $M_{asymmetry}$ = 4.86; t = −28.91, $p < .01$) and excitement ($M_{symmetry}$ = 1.14 vs. $M_{asymmetry}$ = 3.86; t = −6.41, $p < .01$). The results of this pilot study support our basic assumption of the conceptual argument that asymmetry (symmetry) in objects leads to lower (higher) processing fluency and increased (lower) arousal and thus to stronger (weaker) associations with excitement. Next, we test our hypotheses and examine the effects of symmetry in brand logos on product design inferences.

4. Study 1

Since one of the main theoretical rationales for our hypotheses could be empirically supported by the pilot study, study 1 investigated whether initial empirical support for the hypotheses can be found.

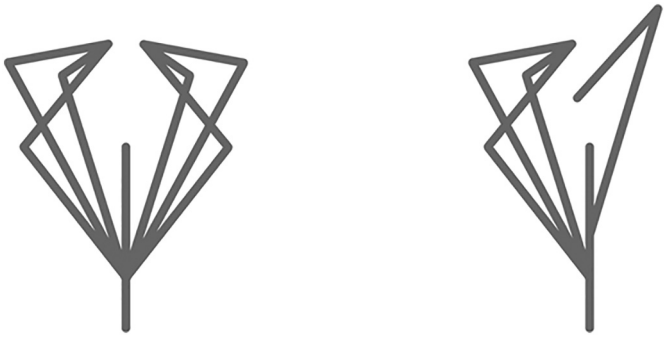


Fig. 2. Stimuli (study 1).

4.1. Materials and methods

To test the proposed hypotheses, an online experiment with two treatment conditions was conducted. As target stimuli, two brand logos (symmetric vs. asymmetric) for a new fictitious brand of sunglasses were designed (Fig. 2). We decided on sunglasses as the target product because this product has been previously used in studies in a similar context (e.g., Bajaj & Bond, 2014). Moreover, sunglasses belong to the group of durable goods, for which the importance of all product design dimensions has been empirically proven (Homburg et al., 2015). The logos were created based on different requirements according to our research objectives. First, we relied on mirror symmetry; thus, the symmetric logo was a perfect mirror image in relation to the vertical axis. Second, only simple and mostly similar elements were included in the logo design to ensure the same logo style. Third, the stimuli were created in black and white, as suggested by previous studies (Bajaj & Bond, 2014; Salgado-Montejo et al., 2015), to avoid possible interferences of color associations. Fourth, we created fictitious brand logos to eliminate any possible brand associations with existing brands (Machado, de Carvalho, Torres, & Costa, 2015) because we focused on the pure effect of brand logo symmetry.

Before proceeding with the study, we conducted a pre-test to check the suitability of the created stimuli for our research purposes. In total, 38 undergraduate students participated in the pre-test in exchange for course credit. The participants were randomly shown either one of the logos and were asked to rate perceived symmetry ("perfectly asymmetric/perfectly symmetric") and liking ("do not like/do like") on two nine-point scales. Furthermore, the participants were asked to state whether they were familiar with and had seen the logo anywhere before. Importantly, familiarity with an object can affect participants' arousal and may therefore influence associations with the object (Berlyne, 1960; Paasovaara, Luomala, Pohjanheimo, & Sandell, 2012). Therefore, we included this question to avoid biased results due to the participants' familiarity with the logo. Group comparison tests revealed adequate results with regard to the intended manipulation. More precisely, participants perceived a significant difference in the level of symmetry ($M_{symmetry}$ = 8.05 vs. $M_{asymmetry}$ = 1.84; $F_{1, 36}$ = 371.86, $p < .01$) and no difference in terms of liking ($M_{symmetry}$ = 5.32 vs. $M_{asymmetry}$ = 5.05; $F_{1, 36}$ = 0.21, $p > .1$). Additionally, none of the participants was familiar with either of the two logos. As a result, the two brand logos fulfilled all the requirements and were considered for the study.

Two hundred fourteen participants (M_{age} = 36.8 years, 58.4% females) participated in this study (Table 1). The experiment consisted of two treatment conditions (symmetric logo vs. asymmetric logo) to which participants were randomly assigned. Before the stimulus contact, subjects rated their own self-concept with regard to the attribution of an exciting personality. To measure the attribution of the personality factor of excitement, we used four items ("exciting", "young", "unique", "up-to-date"; α = 0.79) adapted to the context of human personality from the brand personality scale of Aaker (1997). Participants indicated

Table 1
Demographic profile of the sample (study 1).

Variable	Characteristics	n	%
Age	16–20 years	14	6.5
	21–30 years	107	50.0
	31–40 years	20	9.4
	41–50 years	14	6.5
	51–60 years	34	15.9
	61–70 years	22	10.3
	> 70 years	3	1.4
Gender	Female	125	58.4
	Male	89	41.6
Education	None	5	2.4
	Junior high school diploma	24	11.2
	Senior high school diploma	79	36.9
	University degree	106	49.5
Occupation	Pupil	6	2.8
	Trainee	2	0.9
	Student	72	33.6
	Full-time employee	81	37.9
	Part-time employee	29	13.6
	Housewife/househusband	7	3.3
	Retired	15	7.0
	Unemployed	2	0.9
Total sample size		214	100.0

the fit of the traits to their own self-concept on a five-point scale (1 = “not at all”, 5 = “to a great extent”). Although this scale was originally intended to measure brand personality, the scale builds on general human characteristics, and the personality traits of the dimension of excitement are found to be an innate part of human personality (Buss & Barnes, 1986; Eisend & Stokburger-Sauer, 2013; Lin, 2010). In addition, this scale has been used previously to capture consumer personality in terms of self-concept (Branaghan & Hildebrand, 2011), and researchers have provided evidence for the application of the same personality scale to a consumer and brand context (Huang, Mitchell, & Rosenaum-Elliott, 2012). Therefore, we relied on one item from each personality facet of excitement to best capture this personality factor (Aaker, 1997). Then, one of the two brand logos was presented. The brand logo was introduced to the participants as a brand logo of a new brand of sunglasses. Subsequently, participants were asked to visually imagine a product of the brand and to indicate the vividness of the product image on a scale ranging from 1 = “no image present at all” to 7 = “perfectly clear and vivid”, adapted from Sheehan (1967). Participants then rated their inferences of the product's design based on the three belonging dimensions of aesthetics ($\alpha = 0.88$), functionality ($\alpha = 0.84$), and symbolism ($\alpha = 0.88$). For this measurement, we adapted the scale of Homburg et al. (2015) to the context of product design inferences (Table 2). All items of the product design dimensions were assessed on five-point scales ranging from 1 = “strongly disagree” to 5 = “strongly agree”. At the end, subjects were asked the same three questions from the pre-test about perceived symmetry, general liking, and familiarity of the logo, were asked to guess the purpose of the study, and reported socio-demographic information.

Table 2
Measurement items of product design inferences (study 1).

Product design inferences	
Aesthetics	I expect a product from this brand to be good looking.
	I expect a product from this brand to be visually striking.
	I expect a product from this brand to look appealing.
Functionality	I expect a product from this brand to perform well.
	I expect a product from this brand to be capable of doing its job.
	I expect a product from this brand to be functional.
Symbolism	I expect a product from this brand to help me in establishing a distinctive image.
	I expect a product from this brand to be helpful to distinguish myself from the mass.
	I expect a product from this brand to accurately symbolize or express my achievements.

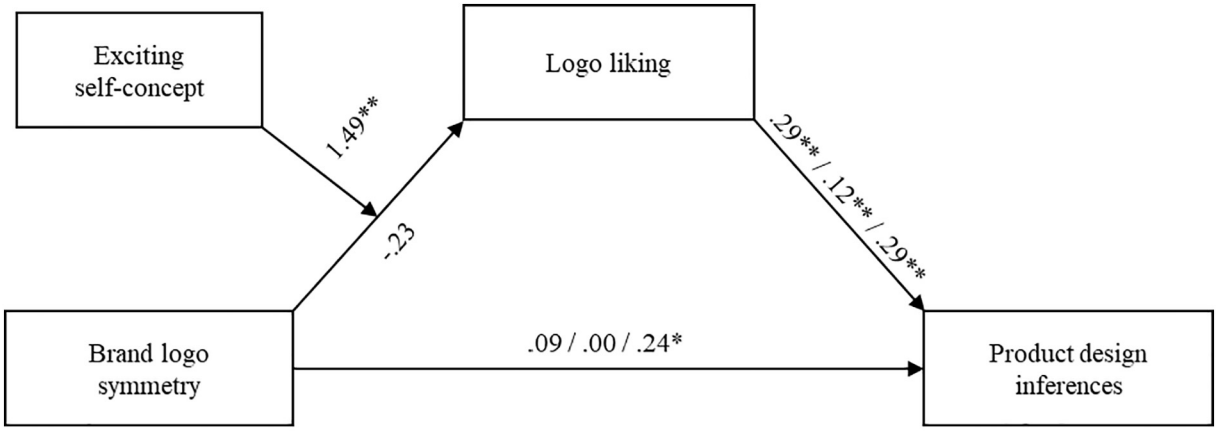
4.2. Results and discussion

First, a manipulation check was applied to ensure the intended perception of brand logo symmetry, liking and familiarity. The results were in line with the findings of the pre-test and again showed a significant difference in symmetry perception ($M_{symmetry} = 7.60$ vs. $M_{asymmetry} = 3.44$; $F_{1,\ 212} = 186.82$, $p < .01$) but no significant difference in general liking ($M_{symmetry} = 5.28$ vs. $M_{asymmetry} = 5.07$; $F_{1,\ 212} = 0.41$, $p > .1$). Moreover, none of the participants stated that they were familiar with any of the logos, and no participant correctly guessed the purpose of the study. Next, we performed one-way between-subjects ANOVAs with brand logo symmetry (symmetric vs. asymmetric) as an independent variable and inferred product aesthetics, functionality, and symbolism as dependent variables. We found no significant differences with regard to any of the dependent variables (ps > .1). In addition, both logos evoked very similar levels of imagery, and a group comparison test indicated no significant difference in this regard ($M_{symmetry} = 4.37$ vs. $M_{asymmetry} = 4.00$; $F_{1,\ 212} = 2.39$, $p > .1$). In sum, the manipulation check provided very satisfactory results. Thus, we proceeded to test for the presumed hypotheses.

For the main analysis, we conducted PROCESS moderated mediation analysis with SPSS 24 according to Hayes (2018) to test for the proposed effects of brand logo symmetry on logo liking (H1) and product design inferences (H2) as well as for the mediating role of logo liking in this regard (H3). Three separate moderated mediation analyses were conducted to examine the effects on each of the product design dimensions. For this purpose, we used PROCESS model 7 with a 5000 bootstrap method and bias-corrected confidence intervals of 95%. In each case, brand logo symmetry was used as the independent variable (symmetric coded as 0, asymmetric coded as 1), logo liking as the mediator, and exciting self-concept as the moderator. Additionally, one of the product design dimensions (inferred product aesthetics, functionality, or symbolism) was used as the dependent variable.

In support of H1, we found a significant interaction effect of brand logo symmetry and exciting self-concept on logo liking ($B = 1.49$, $t = 3.84$, $p < .01$). Specifically, a spotlight analysis focusing on the values one standard deviation below and above the mean of the moderator revealed that participants with a lower exciting self-concept preferred the symmetric logo ($B_{-1SD} = -1.46$, CI: −2.34; −0.57), whereas a higher exciting self-concept led to a stronger preference for the asymmetric logo ($B_{+1SD} = 0.99$, CI: 0.10; 1.88). The findings revealed no effect at mean levels of exciting self-concept ($B_{mean} = -0.23$, CI: −0.86; 0.40). Moreover, the results provide empirical evidence for H2 and H3. All three inferred product design dimensions were affected by brand logo symmetry. However, the direct effect was significant only in the case of inferred symbolism, whereas the indirect effects through logo liking were all significant according to our hypothesized assumptions (please see Fig. 3 for exact details). Interestingly, the index of moderated mediation was significant for all three inferred product design dimensions, and the index of inferred product functionality (index: 0.18, CI: 0.08; 0.31) was clearly smaller than the indices of inferred product aesthetics (index: 0.44, CI: 0.19; 0.69) and product symbolism (index: 0.43, CI: 0.19; 0.67).

In sum, the data analysis provides initial evidence for the assumed effects of brand logo symmetry on product design inferences. However, the effect on inferred product functionality was considerably weaker in relation to the other two product design dimensions. In fact, study 1 leaves open the possibility that the two specific logos or the selected product category had a decisive influence on the findings. Therefore, study 2 examines the hypotheses in a broader context using various realistic brand logos while considering different product categories.



Note. All coefficients reported are unstandardized effects. The order of effect sizes on product design inferences shown is: Aesthetics, Functionality, Symbolism. * = p < .05, ** = p < .01.

Fig. 3. Moderated mediation results (study 1).

5. Study 2

Based on the initial evidence for the assumed relationship between brand logo symmetry and product design inferences provided by study 1, we conducted a second study to attempt to replicate the findings of study 1 and to increase the generalizability of the results.

5.1. Materials and methods

As stimulus material, we used six symmetric and six asymmetric professionally designed brand logos. Moreover, experts from a major brand management agency evaluated the brand logos to ensure the authentic design of the logos. In line with former research on brand logos, we relied on fictitious brand logos, as a study with real brand logos would contain the risk of many possible interference factors such as brand awareness (e.g., Cian et al., 2014; Fajardo, Zhang, & Tsiros, 2016; Hagtvedt, 2011; Rahinel & Nelson, 2016). In fact, study 2 should further validate the generally assumed effects and test in a next step whether the effects from study 1 can be found for different product categories and realistic brand logos. The suitability of the brand logos for the study was first checked by a pre-test. Twenty-four undergraduates participated in this pre-test in exchange for course credit. Each logo was shown to each participant. For each logo, the participants indicated whether the logo was symmetric or asymmetric in their perception and how exciting the respective logo appeared to them on a seven-point scale (1 = "not exciting at all" to 7 = "very exciting"). In addition, the test persons indicated whether they associated the logos with an existing brand or logo. As a result, each logo was titled with the intended symmetry characteristic (i.e., either symmetric or asymmetric). Furthermore, the asymmetric logos were rated as significantly more exciting than the symmetric logos ($M_{symmetry}$ = 2.83 vs. $M_{asymmetry}$ = 4.47; $t = -8.92$, $p < .01$). Finally, two logos from each category were removed for further use in the main study due to frequently mentioned associations with existing brands. The four symmetric and four asymmetric logos that were ultimately used in study 2 are shown in Fig. 4.

One hundred forty-nine participants (M_{age} = 27.6 years, 55.7% females) participated in the main study (Table 3). We used a within-participant experimental design for study 2. In detail, participants were randomly presented with two of the eight brand logos in the context of a specific product category. For each product category, one symmetric and one asymmetric logo were always shown. In addition to the product category "sunglasses", categories of other durable goods were examined in study 2 (i.e., wristwatch, backpack, and sneakers) to test whether the hypotheses could also be confirmed for a range of different product categories. Before the first brand logos were presented to the participants, the participants were asked to rate the level to which their self-concept was exciting. Here, we used the same four items (α = 0.77) as in study 1. Next, two of the brand logos were shown, and we asked for perceived excitement and liking of the logos. The participants were told that both logos were new brand logos for one of the specific product categories. Participants were then asked about their product design inferences based on the three dimensions of aesthetics, functionality, and symbolism. All participants answered the questions about all four product categories according to this procedure in succession, but the order of the product categories was randomized. Perceived logo excitement, logo liking, and product design inferences were all measured on single-item scales ranging from 0 to 100, where the minimum and maximum rating was anchored at the respective ends of the scale (e.g., "not exciting at all" and "very exciting" in the case of perceived logo excitement). This type of single-item scale has been successfully used and recommended for research examining various stimuli and using within-participant experimental designs (e.g., Simmonds, Woods, & Spence, 2018; Van Doorn et al., 2017; Velasco, Woods, Deroy, & Spence, 2015). Once the participants had completed all trials, they were asked to indicate their familiarity with any of the logos and to guess the purpose of the study. Finally, the participants reported socio-demographic data.

5.2. Results and discussion

Before hypotheses testing, a manipulation check was applied. In line with our expectations, asymmetric brand logos were perceived as more exciting compared to symmetric brand logos ($M_{symmetry}$ = 43.90 vs. $M_{asymmetry}$ = 51.47; $t = -4.16$, $p < .01$). Moreover, none of the participants was familiar with any of the logos, and no participant guessed the purpose of the study correctly. Notably, we found a significant difference in logo liking independent of the self-concept of the participants. In this regard, asymmetric brand logos were preferred to symmetric brand logos ($M_{symmetry}$ = 47.13 vs. $M_{asymmetry}$ = 54.52; $t = -3.96$, $p < .01$). This general preference for asymmetric logos must therefore be taken into account when interpreting the results of the hypothesis tests that follow.

Similar to study 1, we relied on moderated mediation analysis to test the hypotheses (H1 − H3). However, the PROCESS macro we used in study 1 was exclusively programmed for between-participant research designs. Comparable tools for conducting moderation and mediation analyses for within-participant designs are still in the

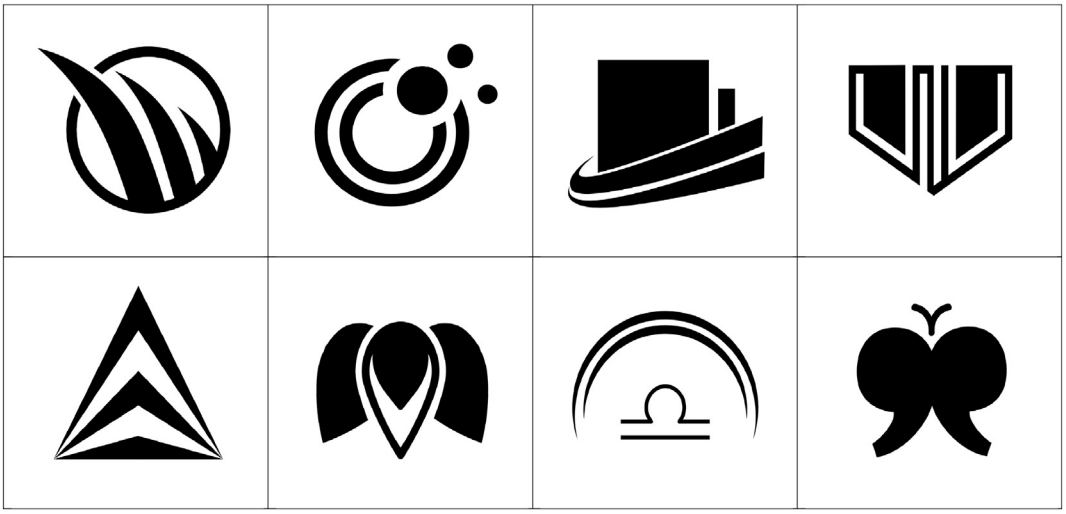


Fig. 4. Stimuli (study 2).

Table 3
Demographic profile of the sample (study 2).

Variable	Characteristics	n	%
Age	18–20 years	8	5.4
	21–30 years	105	70.5
	31–40 years	24	16.0
	41–50 years	7	4.7
	51–60 years	4	2.7
	> 60 years	1	0.7
Gender	Female	83	55.7
	Male	66	44.3
Education	Junior high school diploma	24	16.1
	Senior high school diploma	82	55.0
	University degree	43	28.9
Occupation	Trainee	9	6.0
	Student	77	51.7
	Full-time employee	49	32.9
	Part-time employee	7	4.7
	Housewife/househusband	2	1.3
	Retired	4	2.7
	Unemployed	1	0.7
Total sample size		149	100.0

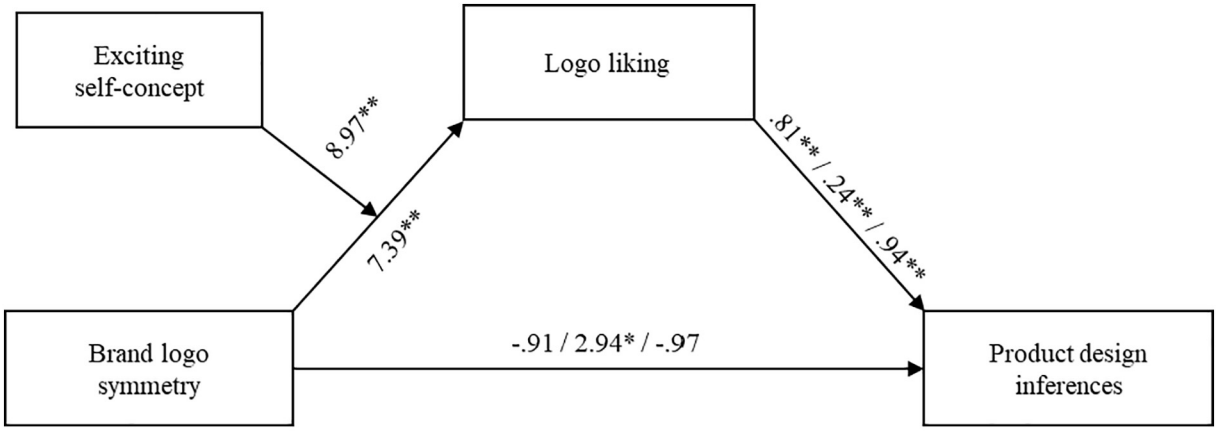
development phase. Although an analog tool exists to PROCESS for within-participant designs, which is called MEMORE, a moderated mediation analysis cannot be performed with this macro (Montoya & Hayes, 2017). For this reason, an Mplus code was created following the suggestions of Montoya (2018) that allowed us to conduct a moderated mediation analysis specifically for our research purposes. To examine the assumed general effects according to the hypotheses, the following analyses were conducted independently of a respective product category or a specific logo, which represents an established procedure for such a case (Cheema & Patrick, 2008). As in study 1, we used a 5000 bootstrap method and relied on confidence intervals of 95%. Moreover, we considered the same structural relationships between the variables.

Consistent with the assumptions of H1, the results yielded a significant impact of exciting self-concept on the effect of brand logo symmetry on logo liking ($B = 8.97$, $t = 3.52$, $p < .01$). Because a general preference was found for the asymmetric logos in our sample ($B_{mean} = 7.39$, CI: 4.64; 10.26), we expected the subsequent spotlight analysis to reveal an even higher impact in the case of participants with high exciting self-concepts and a very weak or even no impact in the case of participants with low exciting self-concepts. Indeed, the spotlight analysis showed that the impact became stronger when considering participants with a high exciting self-concept ($B_{+1SD} = 16.46$, CI: 11.49; 21.23) and much weaker, in fact insignificant, for participants with a low exciting self-concept ($B_{-1SD} = -1.67$, CI: -6.76; 3.75). In addition, we found empirical support for H2 and H3. In the case of inferred product aesthetics and symbolism, the direct effect was insignificant, whereas we found a significant direct effect on inferred product functionality. However, the indirect effect through logo liking for each design dimension was in accordance with our assumed hypotheses of a stronger significant effect for participants with a high exciting self-concept (compared to the effect of participants with an average exciting self-concept) and an insignificant effect when considering participants with a low exciting self-concept. For specific details, please see Fig. 5. In line with these results, the index of moderated mediation was significant for each inferred product design dimension. However, the results again presented a similar pattern to the results of study 1 because the index was clearly higher in the case of inferred aesthetics (index: 7.30, CI: 3.37; 11.20) and symbolism (index: 8.47, CI: 3.92; 12.94) relative to the index of inferred functionality (index: 2.11, CI: 0.93; 3.28).

Study 2 replicated the findings of study 1 and therefore provided additional empirical evidence for our theorizing. Specifically, while study 1 considered only one pair of brand logos for one specific product category, study 2 tested our theoretical claims, taking into account several less standardized and realistic brand logos for different product categories. Thus, study 2 supports the robustness of the assumed effects between brand logo symmetry and product design inferences.

6. General discussion

In accordance with our assumptions, the results of the two main studies provide evidence for the effect of brand logo symmetry through logo liking on product design inferences when exciting self-concept is included as a moderator. In the course of our research, we found empirical support for our theoretical claim that asymmetry in logos is associated with excitement, whereas symmetry is not. Based on the theory of consumer self-congruity, our research shows a positive effect on logo liking when consumers' self-concept is in congruence with brand logo associations. As a result, consumers transfer positive spillover effects from their perception of logo liking to their inferences of product design if the associations related to the brand logo's symmetry match their own self-concept. Interestingly, we found varying degrees of the effect of brand logo symmetry in relation to the three different product design dimensions. In particular, the effects on inferences of product aesthetics and product symbolism were generally stronger than the effect on product functionality. These findings may be interpreted and explained in light of former marketing and consumer research.



Note. All coefficients reported are unstandardized effects. The order of effect sizes on product design inferences shown is: Aesthetics, Functionality, Symbolism. * = p < .05, ** = p < .01.

Fig. 5. Moderated mediation results (study 2).

First, the functional value of a product mainly refers to problem solving, whereas product aesthetics and symbolism are strongly connected to emotions and affective perception (Bloch, 1995; Holbrook, 1980). Although certain design principles evoke a more aesthetic perception, the beauty of an object often varies in the eye of the beholder (Kumar & Garg, 2010). Additionally, the symbolic design dimension involves the degree of self-identification with a product and further indicates the fit of the consumer's self-expression with the product's design (Brunner, Ullrich, Jungen, & Esch, 2016; Mittal, 2006). Preferences for functional product features are thus less heterogeneous because they are more objective and cognitively driven (Holbrook, 1986; Holbrook & Hirschman, 1982). Second, research findings suggest that functionality judgements of a product are in large part driven by real product experiences (Homburg et al., 2015). Third, functional product features are more difficult to imagine than, for example, the aesthetic properties of a product and should thus be less influential on mentally imagined product inferences (Schnurr & Scholl-Grissemann, 2015). Fourth, research has shown that the perception of social identity-based attributes (e.g., symbolic value) of products may be more strongly influenced by positive spillover effects than is the case for functionally based product attributes (Rahinel & Nelson, 2016; Schlosser, 1998). Taking these considerations into account, the findings of our research showing that effects on logo-based inferred product functionality are not as strong as on inferred product aesthetics and product symbolism seem reasonable.

6.1. Theoretical implications

The need for new insights into the impact of brand logos has been emphasized by various researchers (e.g., Cian et al., 2014; Hagtvedt, 2011; Henderson, Giese, & Cote, 2004; Park, Eisingerich, Pol, & Park, 2013). Thus, the aim of this paper was to investigate the effects of brand logo symmetry on product design inferences. The results of our work provide empirical evidence for the relationship between brand logo symmetry and inferences of product design. Therefore, this study provides an important contribution to the research stream of brand logo design (e.g., Henderson & Cote, 1998; Jiang et al., 2015) and, more generally, to the literature on the influences of visual cues on consumer responses (e.g., Deng & Kahn, 2009; Hagtvedt & Patrick, 2008). Our findings extend the existing literature by systematically investigating the effects of visual symmetry on consumer response in terms of product design inferences. In addition, the findings demonstrate the importance of consumer self-concept and logo liking with regard to the effects of brand logo symmetry. These results add significant insights to the literature on self-congruity and spillover effects in consumer research (e.g., Jiang et al., 2015; Peck et al., 2013; Underwood et al., 2001) by showing that if the associations related to a brand logo's symmetry match the consumer's self-concept, logo liking can be enhanced and, consequently, inferences of product design can be positively influenced. The occurrence of this effect can also be partly explained by the underlying mechanism of mental imagery because consumers are able to mentally imagine the product's design based on all types of related information and cues, such as a brand logo. Moreover, the results indicate that the effects of brand logo symmetry vary in relation to the three dimensions of product design. These findings further support the relevance of the approach of considering product design along the three dimensions of aesthetics, functionality, and symbolism (Candi et al., 2017; Homburg et al., 2015).

6.2. Managerial implications

At a more practical level, the findings provide several implications for brand and product management. First, consumers are able to make inferences about a product's design based on the brand logo design. Consequently, managers should keep this in mind when making brand- or product-related changes. Brand positioning and the design of a brand logo should be well thought out because they have a significant impact on the perception of the brand's products. Second, the effects of brand logo symmetry on product design inferences highly depend on the consumer's self-concept. Therefore, managers should recognize the importance of their target group's self-concept when planning the creation of a brand logo. Extending this line of reasoning, a vital implication for brand logo design could be to match design properties in terms of congruency. Attention to the associated meanings of a brand logo and the selection of a design that corresponds well with the target group enables marketers to avoid logos with unintended conveyed meanings. Third, our results provide reasons to at least question popular opinions, for example, that symmetry always leads to higher aesthetics and preferences. In fact, managers must truly understand consumers' inferences of their brands and products rather than relying on such general assumptions. Our research contributes more specific guidance by differentiating the effectiveness of visual symmetry in brand logos with regard to dependence on consumer self-concept. Ultimately, only those firms that have accurate knowledge of the impact of various brand logo design factors can use them optimally and create a brand logo that can offer the company essential added value.

6.3. Limitations and future research

This paper makes several theoretical and practical contributions. Nevertheless, our findings may be used as a starting point for future research because several unexplored topics remain in this area. In this study, we focused on brand logo symmetry, whereas other design elements such as complexity (Van Grinsven & Das, 2016) and angularity (Jiang et al., 2015) also offer broad research potential. Additionally, we solely included an exciting self-concept as a personality factor grounded in prior research linking asymmetry with associations of excitement. However, other relationships between consumer self-concept and brand logo design associations may be worth investigating. Future work might also consider investigating more realistic and less controlled scenarios. For instance, the environmental context of brand logo presentation can vary greatly (e.g., advertisement, packaging). On a further note, more information could be provided on the brand, and the respective logo or familiar brand logos may be used. By relying on such research variations, effects on important variables of consumer behavior, such as purchase intention and word of mouth, could be detected because all product design dimensions have been previously shown to significantly influence these variables (Candi et al., 2017; Homburg et al., 2015). Furthermore, by using real brand logos in future studies, the effects of potential impact variables, such as existing brand associations or brand awareness, could be investigated in order to gain further insights regarding causal relationships in this context (Cian et al., 2014). In addition, the application of measurement instruments from neuroscience, such as fMRI, could provide further interesting insights into the relationships and potential underlying interaction effects between inferences of the three product design dimensions (Chattaraman, Deshpande, Kim, & Sreenivasan, 2016; Stoll, Baecke, & Kenning, 2008).

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