



Beyond Beauty: Design Symmetry and Brand Personality

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Accepted by Amna Kirmani, Editor; Associate Editor, JoAndrea (Joey) Hoegg

Our research explores connections between a fundamental element of visual design, namely symmetry, and consumer inferences regarding brand personality. In contrast to prior work focused on broad affective responses, we propose that symmetry plays an additional, nuanced role in the communication of brand personality. Results of four experiments reveal that asymmetry in visual brand elements is associated by consumers with brand excitement, and that the effect is driven in part by the experience of subjective arousal. These findings contribute to growing interest in visual design and consumer processing, while extending current understanding regarding the communication of brand personality.

Keywords Esthetics; Sensory marketing; Branding; Advertising; Symmetry

Introduction

Marketers have long recognized that visual brand elements (logos, packaging, promotional material, etc.) play a critical role in effective branding. Firms devote sizeable resources to visual design, and many historically successful brands are instantly recognizable by their distinct visual elements (e.g., Nike's "swoosh," McDonald's "golden arches," Coca Cola's contour bottle). Although consumer research on visual design was historically lacking, the area has been receiving increased attention, due in part to growing interest in sensory marketing (Krishna & Schwarz, 2014). The majority of research has focused on esthetic beauty – i.e., the perceptual attractiveness of a design (Hoegg & Alba, 2008; Kumar & Garg, 2010; Silvera, Josephs, & Giesler, 2002; Veryzer & Hutchinson, 1998). A consistent finding is that positive esthetic responses predict a variety of desirable outcomes, including brand liking and choice (Bloch, 1995).

For marketers, however, the goal of visual branding is not only to engender favorable subjective responses, but also to establish and enhance specific brand associations. Therefore, scholarship in this area must move beyond esthetic beauty to examine effects of visual design on other brand-relevant judgments. The present research examines how the design of visual brand elements influences impressions of brand personality. We focus on visual symmetry, which captures the extent to which an image retains its shape when reflected about a central axis; extremely high symmetry is represented by a mirror image (Wagemans, 1997). Our primary assertion is that exposure to visually asymmetric (vs. symmetric) brand elements will increase perceptions of a brand as exciting (vs. unexciting); therefore, brands positioned as exciting will benefit from identification with asymmetric visual elements.

Our approach builds on existing scholarship in the use of visual design to communicate brand associations (e.g., Henderson, Giese, & Cote, 2004; Jiang, Gorn, Galli, & Chattopadhyay, 2016) or influence specific product attribute judgments (Folkes & Matta, 2004; Page & Herr, 2002; Rahinel & Nelson, 2016). Although it has been suggested that visual elements might impact the personality associated with a brand (Batra, Lehmann, & Singh, 1993), the idea has received little direct investigation (c. f. Orth & Malkewitz, 2008, in the context of package design). Ours is the first research (of which we are aware) to examine the link between design asymmetry and arousal in a consumer setting, or to make a specific prediction regarding its effect on brand perceptions. Specifically, we predict and demonstrate that symmetry in visual brand elements is negatively associated with consumer

Received 6 July 2015; accepted 11 August 2017

Available online 27 October 2017

The authors thank Rebecca Kilimnick for helping with the design and collection of experimental stimuli. The authors also thank participants and organizers of the The Psychology of Design: 2014 SCP Advertising and Consumer Psychology Conference, for their comments on this research.

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perceptions of brand excitement, and that this effect is driven in part by subjective arousal. In doing so, we supplement research in sensory marketing focused on valence and congruency-based effects (e.g., pleasant odors induce positive evaluations, and vice versa). By revealing a nuanced connection between symmetry and brand personality, we document a novel form of spillover effect in visual design (Hagtvedt & Patrick, 2008) which occurs independently of specific visual content. We explore this effect not only in the context of logo design (the focus of most prior research), but also in the design of broader marketing materials.

In the following sections, we briefly review literature on visual symmetry and brand personality. Next, we develop a framework in which the symmetry of visual brand elements influences perceptions of brand excitement through a process based on subjective arousal. We then describe four studies that examine the key hypotheses emerging from our framework. We conclude with implications of our findings and avenues for future research.

Symmetry in Visual Design

The concept of symmetry has fascinated artists and philosophers from the time of ancient Greece (Pollitt & Seaver, 1974), and research on symmetry spans diverse areas including mathematics, biology, psychology, religion, and cultural studies (Enquist & Arak, 1994; Field & Golubitsky, 2009). Typically, visual symmetry is defined as the extent to which an image can be reflected about a central axis. More formally, symmetry represents self-similarity under a specific class of transformations, usually restricted to Euclidean transformations in a plane (Wagemans, 1997). Representative transformations are depicted in Figure 1. Mirror (reflective) symmetry involves the action of "flipping" a figure to produce two halves that are identical across a central axis (patterns a–c). Translational symmetry involves the action of "sliding" a figure in any direction (patterns e, f), and rotational symmetry involves the action of "turning" a figure around a vertex (patterns g, h). Of the three types, mirror symmetry about a vertical axis has been studied the most extensively. We utilize mirror symmetry in the experiments presented later, and we refer to mirror symmetry and symmetry interchangeably.

Preference for Symmetry

Upon exposure to a visual stimulus, observers are capable of detecting its symmetry with little or no effort, across a wide range of viewing conditions (Barlow & Reeves, 1979; Carmody, Nodine, & Locher, 1977). A vast body of visual perception research has examined the association between symmetry and liking or preference. The general conclusion of this research is that symmetric stimuli are evaluated more favorably than asymmetric stimuli (Berlyne, 1971; Birkhoff, 1933; Reber, Schwarz, & Winkielman, 2004; c.f. Jacobsen &



Figure 1. Examples of visual symmetry (adapted from Wagemans, 1997).

A polygon with mirror symmetry about a vertical axis (indicated by the solid line). (b) A polygon with mirror symmetry about a diagonal axis. (c) A dot pattern with mirror symmetry about a vertical axis. (d) A random dot pattern. (e) A dot pattern with translational symmetry; the translation is indicated in (f). (g) A dot pattern with rotational (180°) symmetry; the rotation is indicated in (h).

Hofel, 2002; Palmer & Griscom, 2013). Several theories have been advanced to explain this general preference. Evolutionary approaches argue that preference for symmetry often carries reproductive advantages; e.g., physical symmetry is a reliable indicator of genetic quality in potential mates (Thornhill & Gangestad, 1993). Developmental psychologists suggest that a consistent preference for symmetry arises in early childhood, and may be related to the abundance of vertical symmetries in the natural visual environment (Bornstein, Ferdinandsen, & Gross, 1981). A prominent information processing account is based on the fluency principle: symmetric patterns are easier to process than asymmetric patterns because they contain less information (Attneave, 1954; Garner, 1974), and this subjective ease of processing evokes a more positive evaluative response (Reber et al., 2004).

Symmetry in Consumer Perception

Within recent consumer research on visual design, a prominent topic has been the connection between design properties and esthetic beauty (Hoegg, Alba, & Dahl, 2010). Typically, esthetic beauty is defined as an inherent, stable property of an object that produces a pleasurable experience in perceivers (e.g., Arnheim, 1974; Gombrich, 1984). Researchers have associated esthetic beauty with a range of desirable outcomes, including an immediate desire to own (Norman, 2004) and increased inclination to display or care for a product (Bloch, 1995). Reimann, Zaichkowsky, Neuhaus, Bender, & Weber, (2010) show that reward pathways in the brain become stimulated during processing of esthetic package designs. Other research demonstrates that esthetics can guide consumer choice when performance information is absent or ambiguous (Yamamoto & Lambert, 1994), and that esthetics can even alter evaluations for which design is logically irrelevant (Madzharov & Block, 2010; Townsend & Shu, 2010).

Consumer researchers investigating antecedents to esthetic beauty and liking have identified various stimulus factors, including physical size, prototypicality, unity, complexity, and repetition (Cox & Cox, 2002; Kumar & Garg, 2010; Silvera et al., 2002; Veryzer & Hutchinson, 1998). Other scholars have examined symmetry directly, observing clear benefits of design symmetry for consumer esthetic response. In research on brand logos, Henderson and Cote (1998) identified a consistent positive relationship between visual harmony (comprised of symmetry and balance), subjective ratings of those logos, and later recognition. Subsequent research revealed that visually harmonious typefaces were perceived as more "pleasing" and "reassuring" (Henderson et al., 2004).

Although we take as a starting point the established, positive effects of symmetry on aesthetic beauty and liking, we note that these effects do not inherently justify its broad use in visual branding, because symmetry is likely to influence other important consumer perceptions. Our approach is consistent with a growing stream of research on design-based associations. Among other examples, Fajardo, Zhang, and Tsiros (2016) revealed that a logo "frame" may be perceived as either "protecting" or "confining" (depending on the perceived level of purchase risk), and Hagtvedt (2011) demonstrated that consumers exposed to visually incomplete (vs. complete) brand logos form lower perceptions of brand trustworthiness but higher perceptions of brand innovativeness. At the attribute level, Jiang et al. (2016) revealed that circular and angular logos can activate "softness" or "hardness" associations, resulting in perceptions of product comfort or durability. Rahinel and Nelson (2016) demonstrated that logo-based product inferences are less likely when they contradict salient product knowledge (e.g., unstable logos for safety products do not evoke inferences of danger.)

Conveying Excitement Through Symmetry

Brand Personality

The brand personality concept provides an important tool for categorizing brands according to generalizable impressions and responses (Aaker, 1997; Aaker, Fournier, & Brasel, 2004; Keller, 1993). Strong brand personalities are conducive to deeper consumer-brand relationships, which help to maintain brand attitudes and act as a buffer in the face of negative information (Ahluwalia, Burnkrant, & Unnava, 2000; Fournier, 1998). As a conceptual framework, we adopt Aaker's (1997) seminal fivefactor model, which includes trait dimensions of sincerity, competence, excitement, ruggedness, and sophistication. The five-factor model has been broadly validated and generalized (Aaker, Benet-Martinez, & Garolera, 2001; Sung & Tinkham, 2005), and despite certain criticisms (e.g., Azoulay & Kapferer, 2003), it represents the most widely recognized brand personality measure in research and applied settings.

Our theoretical model highlights the trait of *excitement*, which captures the extent to which

consumers characterize a brand with adjectives such as "daring," "fun," "youthful" and "imagina-tive" (Aaker et al., 2004). Firms often target exciting personalities when pursuing a younger demographic, repositioning for increased cultural vitality, or seeking differentiation against incumbents; contemporary exemplars of exciting brands include BMW, GoPro, Red Bull, and Vice News. Brand excitement has been shown to capture a substantial amount of between-brand variance in customer perceptions (Aaker, 1997). Moreover, a small body of research has begun to consider the interplay of design elements, brand excitement, and consumer response. For example, Sundar and Noseworthy (2016) demonstrate that exciting brands benefit from sensory violations of expectations (such as when the tactile feel of a product is incongruent with its packaging).

The Role of Arousal

We begin by assuming that a consumer is exposed to communications for an unfamiliar brand, that these communications include prominent visual brand elements (logo, packaging, etc.), and that the consumer is actively engaged in forming an initial impression of the brand. Under these assumptions, our primary argument is that asymmetry in visual brand elements will enhance perceptions of brand excitement. As the psychological mechanism driving this effect, we focus on the role of stimulus-evoked subjective arousal.

Arousal is traditionally defined as a measurable increment to a physiological or behavioral response (e.g., galvanic skin response or locomotor activity) resulting from a change in sensory input (Pribram & McGuinness, 1975). Our model focuses on the related concept of subjective arousal, defined as the perceptual experience of energy mobilization in response to an environmental stimulus (Mehrabian & Russell, 1974; Russell & Barrett, 1999). Subjective arousal measures ask respondents to rate an experience using anchors such as "calm," "relaxed," "agitated," or "stimulated" (e.g., Greenwald, Cook, & Lang, 1989). Such measures are popular in sensory research due to their non-invasiveness and ease of administration, and abundant evidence demonstrates that they serve as a useful proxy for physiological measures (Chartrand, van Baaren, & Bargh, 2006; Juslin & Västfjäll, 2008; Lang, Bradley, & Cuthbert, 1999).

Within the vast literature on visual perception, a recurring principle is that specific, identifiable stimulus properties consistently and predictably induce arousal in perceivers (Berlyne, 1957, 1960; Schachter & Singer, 1962). Psychophysical stimulus properties including intensity, pitch, and brightness are directly and positively associated with arousal (Berlyne, 1971). More relevant to our framework, arousal is also influenced by "collative" stimulus properties, which involve the comparison of different informational characteristics (Berlyne, 1960, 1971; Silvia, 2005). For example, the collative variables "novelty" and "uncertainty" involve a comparison between the information provided by a stimulus and the information that was expected; the collative variables "complexity" and "conflict" involve a comparison between distinct elements within the perceptual field.

Linking Asymmetry to Arousal

To predict the consequences of visual symmetry for brand perceptions, we rely on a key principle of "complexity" under the collative approach: specifically, an irregular arrangement of perceptual elements creates uncertainty regarding other stimulus properties, which in turn causes arousal as perceivers attempt to resolve that uncertainty (Berlyne, 1960, 1971). By definition (see discussion above), a symmetric stimulus will contain a more regular arrangement of elements than its asymmetric counterpart, reducing complexity. As a result, symmetric stimuli should receive less perceptual exploration and generate less arousal. In the words of Osborne (1986, p. 81): "... the symmetry of repeating patterns provides a very elementary aesthetic stimulus. It may serve to arouse attention. . . But it cannot hold or enhance perceptual attention."

These arguments have been largely supported by experimental investigation. In a notable example, Krupinski and Locher (1988) manipulated symmetry in a range of non-representational compositions, and then asked respondents to judge each composition while their physiological arousal was measured (via skin conductance); findings revealed that asymmetric compositions induced substantially greater arousal. In another, Locher and Nodine (1989) asked participants to evaluate a series of paintings while recording their fixation patterns. Findings revealed that visual exploration was markedly greater for asymmetric than symmetric paintings.

Attributing Arousal to the Brand

To the extent that asymmetry evokes subjective arousal (i.e., the perception of energy mobilization), a wide range of cognitive, emotional, and behavioral responses may result. The final proposition in our framework is that subjective responses to visual design will tend to be attributed by consumers to the brand itself. Therefore, the brand itself will be identified as the cause of the evoked arousal, and will be perceived as more exciting (i.e., possessing the trait-like characteristics of "fun," "daring," etc.). This proposition is consistent with the well-established principle that arousal is attributed and labeled based on salient environmental cues (Cooper, Zanna, & Taves, 1978; Schachter & Singer, 1962).

Our proposition is also consistent with evidence for consumer "spillover effects," in which perceptions evoked by sensory elements are assimilated into attribute-level evaluations. For example, Hagtvedt and Patrick (2008) demonstrated an "art infusion" phenomenon, whereby perceptions of luxury evoked by artwork on product packaging, advertising, etc., are incorporated into assessments of the underlying product. Recent research has documented that such spillover effects are most likely when: (a) consumers are motivated and capable of processing mental imagery, and (b) salient information does not contradict the evoked associations (Rahinel & Nelson, 2016).

Combining the ideas above, we predict the following:

H1: Symmetry in visual brand elements is negatively associated with consumer perceptions of brand excitement.

H2: The effect of symmetry described in H1 is driven in part by subjective arousal.

Our third hypothesis concerns the "fit" of a brand's positioning with its representative visual elements. Brand positioning and personality are inherently intertwined, as the personality ascribed to a brand directly influences consumer perceptions of its most important attributes (Aaker, 1997). Our framework suggests that visual design offers a useful means of conveying personality traits, and, in particular, that design asymmetry can be a powerful signal of brand excitement. Therefore, although consumers may exhibit a general preference for symmetry in visual branding (see earlier discussion), this preference should be reduced or eliminated for brands positioned as exciting. Stated formally:

H3: Consumers will respond more favorably to the use of asymmetric brand imagery when a brand is positioned as exciting.

Below, we report four laboratory experiments that examined the relationship between symmetry in visual design and perceptions of brand excitement. Study 1 (pilot) investigated our first hypothesis by collecting brand personality assessments for a range of logos that varied in visual design. Studies 2 and 3 provided additional evidence and examined our proposed process variable, subjective arousal (H2). Study 4 investigated our third hypothesis, by requiring participants to choose between products based on their positioning and brand imagery.

Study 1 (Pilot): Logo Evaluation

The objective of our first study was to measure the impact of logo design elements (including symmetry) on perceptions of brand personality (including excitement). Participants observed a collection of logos and provided their impressions regarding the personality of the underlying brands.

In keeping with others, we use the term "logo" to refer to a graphic design, with or without an attached brand name, which is used by a firm to identify itself or its products (e.g., Henderson & Cote, 1998). Across our studies, logos were black-and-white and contained only graphical (non-verbal) elements. To avoid pre-existing associations, we chose logos that were either not currently in use or used by small, regional brands. In addition, we restricted all studies to participants with no formal artistic training (Bezruczko & Schroeder, 1994; Silvia, 2006).

Method

The survey was administered online to 147 undergraduates, who received course credit for participation. The study utilized a repeated-measures design in which eight design variables were varied at three levels (high, medium, low; see below). Target stimuli consisted of 50 logos created by a professional designer (see Appendix A). The collection represented a diverse range of styles, content, and design. Prior to the study, two independent design professionals (blind to the hypotheses) classified each logo on eight design characteristics identified by Henderson and Cote (1998): organic, parallel, golden ratio, round, symmetric, elaborate, representative, and repetitive. For each characteristic, coders applied a three-point scale (1 = low, 2 = medium, 3 = high). After initial review, 53% of characteristics were rated by both coders as either "low" or "high"; the remaining characteristics were either disagreed upon or rated "medium." Differences were resolved through a second review and discussion. Figure 2 provides an explanation of each characteristic and example logos.

Prior to the study, the collection was divided into two sets of 25 logos, and participants were assigned randomly to one of the two sets. Participants were told that the purpose of the study was to understand how consumers perceive logos of different brands and companies (Appendix S1 provides instructions, stimuli, and measures for all four studies). To facilitate the process, participants were provided a general definition of brand personality traits as "human characteristics that are used to describe brands and logos".

Next, participants were presented with the 25 logos, one at a time and in random order. As they viewed each logo, participants were asked to rate their perceptions of the associated brand, based on

its logo alone: "Assume that this logo represents a real brand. How well would you expect each of the following characteristics to describe that brand?" Participants rated each of Aaker's (1997) five personality dimensions, one at a time. Each dimension was measured with two items; excitement was measured with the items "exciting" and "daring". All items utilized nine-point scales (1 = "not at all [X]"; 9 = "extremely [X]"). "See Figure 2."

Results

Consistent with prior research, preliminary analyses revealed modest correlations among the five personality dimensions; with the highest correlation between competence and sincerity (r < .47). To measure the influence of specific logo design characteristics on each personality dimension, we ran a series of five regressions, in which the eight characteristics were entered simultaneously as predictors of each

Design Factor	High	Low
<i>Representativeness</i> captures the degree of realism in a design.	Capyra	
<i>Organic</i> designs are those that are made up of natural shapes such as irregular curves.	Correction and Constant	
Symmetry appears in designs as reflections along one or more axis. That is, the elements on one side of the axis are identical to the elements on the other side.		
<i>Elaborate</i> captures the concept of design richness and the ability of the design elements to capture the essence of something.		
Parallelism can be seen in designs contain multiple lines or elements that appear adjacent to each other.	***	
<i>Repetition</i> of elements occurs when the parts of the design are similar or identical to one another.	1 JA	
<i>Proportion/Golden Ratio</i> captures the relationship between the horizontal and vertical dimensions.		Conference Harris
<i>Roundness</i> appears in designs that are made of primarily curved lines and circular elements.		

Figure 2. Definitions of design factors and representative examples (study 1).

dimension. Separate analyses were performed at the aggregate level (across brands) and the individual level (including a brand fixed-effect), and results of the two analyses were highly consistent. The individual level results are presented in Table 1.

Results indicated that for all five personality dimensions, specific design characteristics were consistently associated with brand perceptions. For example, brands were perceived to be more sincere when their logos were more representative, elaborate and parallel, and brands were perceived to be

Table 1

Personality Perceptions as a Function of Design Characteristics (Study 1)

Personality	Design factor	В	SE(B)	t	p Value
Sincere	Representative	0.40	0.12	3.32	.01
	Organic	0.66	0.16	4.20	.01
	Symmetry	0.07	0.15	0.69	.49
	Elaborate	-0.34	0.14	-2.95	.01
	Parallel	0.43	0.12	3.67	.01
	Repetition	0.07	0.10	0.67	.50
	Golden ratio	-0.37	0.10	-3.69	.01
	Round	-0.50	0.14	-3.60	.01
Exciting	Representative	-0.15	0.12	-1.30	.20
	Organic	0.08	0.16	0.53	.60
	Symmetry	-0.32	0.11	-3.05	.01
	Elaborate	0.73	0.13	5.46	.01
	Parallel	-0.44	0.12	-3.81	.01
	Repetition	-0.01	0.10	-0.10	.92
	Golden ratio	0.32	0.10	3.23	.01
	Round	-0.02	0.14	-0.17	.87
Competent	Representative	0.49	0.12	4.11	.01
-	Organic	-0.09	0.16	-0.57	.57
	Symmetry	0.13	0.11	1.19	.24
	Elaborate	-0.32	0.14	-2.36	.02
	Parallel	0.44	0.12	3.75	.01
	Repetition	07	0.10	-0.69	.49
	Golden ratio	-0.09	0.10	-0.92	.36
	Round	0.08	0.14	0.55	.58
Sophisticated	Representative	0.11	0.11	0.95	.34
	Organic	0.51	0.15	3.37	.01
	Symmetry	0.63	0.10	6.19	.01
	Elaborate	-0.04	0.13	-0.28	.78
	Parallel	0.26	0.11	2.32	.02
	Repetition	0.30	0.10	3.05	.01
	Golden ratio	0.51	0.10	5.23	.01
	Round	0.71	0.13	5.38	.01
Rugged	Representative	-0.01	0.16	-0.04	.97
	Organic	0.01	0.15	0.07	.95
	Symmetry	0.12	0.10	1.13	.26
	Elaborate	0.73	0.13	5.67	.01
	Parallel	-0.32	0.11	-2.86	.01
	Repetition	0.04	0.10	0.41	.68
	Golden ratio	0.43	0.10	4.39	.01

more sophisticated when their logos were more symmetric and round (see Table 1). Most important for our purposes, results indicated that perceptions of brand excitement were substantially (and significantly) related to the level of symmetry in their logos, such that brands were perceived to be more exciting when their logos were less symmetric ($\beta = -0.06$, p < .002). Brands were also perceived to be more exciting when their logos were more elaborate, less parallel, or made greater use of the golden ratio (all ps < .01).

Discussion

Study 1 provided initial evidence of a relationship between asymmetry in visual brand elements and perceptions of the underlying brand. When presented with a collection of diverse and realistic logos, participants judged brands with more asymmetric logos to be more exciting. However, the correlational nature of the study constrained our ability to draw causal inferences, and the design did not permit examination of our key process variable, subjective arousal. Our next studies addressed these limitations.

Study 2: Subjective Arousal

The primary objectives of study 2 were to investigate the link between symmetry and perceived brand excitement in a controlled environment and to examine our proposed mediator, subjective arousal. Participants viewed a series of logos that were high or low in visual symmetry, but were largely similar on other design characteristics. Participants shared their impressions regarding the excitement of each underlying brand, as well as their reactions to the logos themselves.

Method

One-hundred and fifty-two Mechanical Turk participants completed the study in exchange for payment. The study utilized a repeated-measures design, in which symmetry was varied at two levels (symmetric vs. asymmetric). Target stimuli consisted of 12 black-and-white logos taken from the collection used in study 1. Based on coder ratings obtained in that study, we utilized a matching process to identify six pairs of logos, such that members in each pair differed in symmetry but were largely similar on other design characteristics. The stimuli are depicted in Appendix B.

Participants received the same cover story that was used in study 1. Next, they were presented with all 12 logos, one at a time and in random order. As they viewed each logo, participants were asked to provide either their perceptions of excitement for the associated brand, or their subjective arousal in response to the logo (counterbalanced), and the process was then repeated for the other measures. Brand excitement was measured with the question: "How would you perceive a brand with this logo, on each of the following characteristics?" Items included "exciting" and "daring" (1 = not atall, 9 = extremely). Subjective arousal was measured with four nine-point semantic differential items adapted from Mehrabian and Russell (1974): "How do you feel while viewing this logo?" (relaxed/stimulated; frenzied/sluggish; dull/jittery; unaroused/ aroused). The Mehrabian and Russell (1974) scale has been validated and used widely in perception research (Bellizzi & Hite, 1992; Mattila & Wirtz, 2001).

After responding to the excitement and arousal measures, participants were asked to provide ratings of liking for the logo (*do not like it at all/like it very much*) and logo complexity (*simple/complex*), each using a nine-point scale. The complexity measure addressed possible confounds resulting from the tendency for symmetric images to be simpler than asymmetric images (Attneave, 1954; see discussion above). Participants provided assessments for all 12 logos, one logo at a time. Finally, participants completed an open-ended suspicion probe asking them to guess the purpose of the study.

Results and Discussion

Examination of the suspicion probe for this and subsequent studies revealed no evidence that participants were aware of the manipulation or hypotheses. Figure 3 depicts average ratings of the logos on liking, arousal, and brand excitement. Results of a



Figure 3. Brand and logo perceptions (study 2).

paired *t*-test indicated that on average, the symmetric logos were evaluated more favorably than the asymmetric logos (M = 5.05 vs. 4.07, t(151) = 4.87, p < .01). Consistent with prior research, therefore, symmetry appeared to evoke a more positive esthetic response.

To examine our primary hypothesis, we conducted a paired t-test comparing average ratings of brand excitement for the two sets of logos. As predicted by H1 results revealed that brands with asymmetric logos were perceived to be more exciting than brands with symmetric logos (M = 4.69 vs. 4.13, t(151) = 6.29, p < .01). Not surprisingly, asymmetric logos were perceived as somewhat more complex than symmetric logos (M = 4.58 vs. 5, t (149) = 4.33, p < .01). Therefore, we also computed the average difference in complexity for symmetric and asymmetric logos for each subject, and included it as a continuous predictor. Results revealed that the effect of symmetry remained significant (p < .05) and did not interact with complexity (p > .15).

Next, we investigated our process model, in which effects of logo symmetry on perceptions of brand excitement are mediated by subjective arousal. To do so, we followed the three-step procedure recommended by Judd, Kenny, and McClelland (2001) which is widely regarded as the standard for assessing mediation in repeated-measures designs (e.g., Durante & Arsena, 2015; Warren & Campbell, 2014). In the first step, we tested the relationship between the independent variable (symmetry) and the dependent variable (brand excitement). As shown above, this relationship was significant and in the expected direction. In the second step, we tested the relationship between symmetry and the proposed mediator (arousal). Findings revealed a significant difference in the expected direction, such that arousal was higher for asymmetric logos than for symmetric logos (M = 5.41 vs.)4.92, t (151) = 6.36, p < .01). In the third step, we regressed the difference in the dependent variable (excitement) across asymmetric and symmetric logos on both the difference in arousal (A_d) and sum of arousal (A_s). Results indicated that A_d was a significant predictor of the difference in excitement (t (150) = 5.71, p < .01), but A_s was not (p > .2). Consistent with H2, these results suggest that the association of symmetry and perceptions of brand excitement was driven in part by subjective arousal.

Replicating our first study, findings of study 2 revealed that asymmetry in the design of visual brand elements can evoke perceptions of brand excitement. Moreover, findings revealed evidence for a direct role of subjective arousal in the process, such that the arousal induced by visual asymmetry appeared to "spill over" to perceptions of the brand itself. Having identified a relationship between symmetry and brand personality perceptions in Studies 1–2, our next two studies addressed implications of this relationship for brand positioning and consumer choice.

Study 3: Artwork

Study 3 was designed to extend our investigation in two ways. First, to demonstrate the robustness of our main finding, brand imagery was manipulated using artwork rather than logos. Marketers often utilize artistic imagery to capture attention and communicate brand meaning (Hagtvedt & Patrick, 2008; Hetsroni & Tukachinsky, 2005). Compared to black-and-white logos, artistic imagery tends to be more diverse and complex. Nonetheless, exposure times of 50-100 ms are sufficient for perception of symmetry in abstract art (Locher & Nodine, 1989), and the neurological processing of artistic symmetry appears similar to that of basic visual patterns (Vartanian & Goel, 2004). Second, to explore the notion of design-personality "fit" and investigate our third hypothesis subjects were asked to assess the suitability of different artwork for brands positioned as exciting or unexciting.

Method

One-hundred and two participants completed the study on Mechanical Turk in exchange for payment. The study incorporated a mixed design with two factors: symmetry and brand positioning. As before, symmetry was varied within-subjects at two levels (asymmetric vs. symmetric). Brand positioning was varied between-subjects at two levels (exciting vs. calming, described below). The focal product category was perfumes/fragrances; an informal survey of real-world brands revealed that both types of positioning are common in the category.

Target stimuli consisted of 14 real-world artwork images. The images were collected by a research assistant (blind to the hypothesis) by searching online repositories of paintings by western artists. The images were collected in pairs, such that each pair consisted of one symmetric and one asymmetric image. To ensure consistency and mitigate potential confounds, collection was constrained so that images in each pair were created by the same artist, represented the same style, and included the same predominant colors. After collection, the 14 images were coded by the researchers for symmetry, using a three-point scale (1 = low, 2 = medium, 3 = high). Ratings were identical for 86% of images, and disagreements were settled through discussion. Examination confirmed that for all seven pairs, symmetry differed in the intended direction. The complete set of images is shown in Appendix C.

The cover story asked participants to imagine that they were employed by the marketing division of a prominent fragrance company. Participants were told that the company would soon be introducing a new brand of fragrances, and that they had been asked to help select appropriate visual imagery for the new brand. They were informed that the chosen imagery would be utilized in advertising, branding, packaging, and other marketing materials.

At the end of the introduction, participants read a positioning statement for the brand. In the exciting condition, participants read:

"These exciting fragrances are designed to create a playful and intriguing aroma. Formulated with the essences of uplifting jasmine, crisp cedar and spicy peppermint, these fragrances help to invigorate the mind and the body."

In the calming condition, participants read:

"These calming fragrances are designed to create a relaxing and soothing aroma. Formulated with the essences of gentle lavender, warm pine and mild vanilla, these fragrances help to soothe tensions of the mind and the body."

Next, participants were presented with the 14 images, one at a time and in random order. After each image, participants answered a series of questions. The first questions requested ratings of liking and prior familiarity with the artwork. Liking was measured with two nine-point scale items (*strongly dislike/strongly like; unpleasant/pleasant*), and prior familiarity was measured with a single seven-point scale item (*not at all familiar/extremely familiar*).

Next, participants reported their subjective arousal in response to each image. As in study 2, subjective arousal was measured with four nine-point, semantic differential items, adapted from Mehrabian and Russell (1974): "How do you feel while viewing this artwork?" (*relaxed/stimulated; frenzied/ sluggish; dull/jittery; unaroused/aroused*).

After responding to the arousal measure, participants provided assessments regarding the appropriateness of the artwork for the brand: "To what

extent do you think this artwork is appropriate for an exciting (playful and intriguing) [calming (relaxing and soothing)] perfume brand?" The response measure consisted of three seven-point items (*not at all appropriate/very appropriate; does not fit at all/fits very well; not at all effective/very effective*). After rating all the images, participants completed an attention check, in which they identified the positioning of the brand ("exciting and calming", "exciting only", "calming only", "none of the above").

Results and Discussion

Preliminary examination indicated that 28% of subjects failed the attention check. The full sample was retained for analysis (however, all significant results reported below remain significant when failures are excluded). Participants were not familiar, on average, with any of the artwork stimuli (maximum M = 2.39/7). In contrast to studies 1 and 2, reported liking was similar across symmetric and asymmetric images ($M_{\text{symmetric}} = 5.70$, $M_{\text{asymmetric}} = 5.69$, p = .92).

Examination of the appropriateness and subjective arousal measures revealed adequate internal consistency (Cronbach's $\alpha = 0.97$ and 0.77, respectively). Figure 4 depicts mean appropriateness ratings by condition. To examine our primary hypothesis, we conducted a mixed ANOVA including symmetry as a within-subjects factor and positioning as a between-subjects factor. Results revealed no main effect for symmetry (F(1, 101) = 0.33), p > .57) but did reveal a significant main effect for positioning (F(1, 101) = 6.13, p < .03), such that images were considered more appropriate overall for the calming positioning. Most important, results revealed a significant interaction effect of symmetry and positioning, (F(2, 100) = 16.49, p < .01), and follow-up comparisons consistent were with



Figure 4. Perceived appropriateness of imagery to the brand (study 3).

predictions. When choosing imagery for the exciting fragrance brand, participants rated symmetric images significantly less appropriate than asymmetric images (M = 3.34 vs. 3.62, p < .01). When selecting imagery for the calming brand, however, participants rated symmetric artwork significantly more appropriate than asymmetric artwork (M = 4.06 vs. 3.85, p < .02).

Next, we investigated whether the effects of symmetry on perceived appropriateness could be explained by subjective arousal. Figure 5 depicts arousal means by condition. We first collapsed appropriateness ratings across the positioning variable, by reverse-coding ratings in the calming condition; therefore, higher values on the recoded appropriateness variable reflected stronger perceived fit with an exciting positioning. Next, we conducted a test of within-subjects mediation by applying the Judd et al. (2001) procedure described in study 2. Results of the first step revealed that asymmetric images were perceived to be more appropriate than symmetric images for an exciting positioning $(M_c = 3.87 \text{ vs. } 3.62; t(101) = 4.12,$ p < .01). Results of the second step revealed that average arousal was greater for asymmetric images than for symmetric images (M = 4.89 vs. 4.63, t (101) = 4.17, p < .01). Results of the third step indicated that differences in subjective arousal (A_d) predicted differences in perceived appropriateness (t (99) = 2.31, p < .03), but the sum of arousal (A_s) did not (p > .86). Taken together, these results support H2 and our process model, suggesting that the perceived appropriateness of asymmetric vs. symmetric imagery was mediated by subjective arousal.

Extending our prior studies to a different visual stimulus and a different judgment task, study 3 obtained findings consistent with our conceptual framework. When determining the appropriateness



Figure 5. Arousal means by condition (study 3).

of visual imagery for a brand, participants appeared to consider the "fit" of design elements with the intended brand personality: symmetry was negatively associated with brand excitement, and this association was driven in part by subjective arousal. Study 4 investigated implications of this phenomenon for consumer choice.

Study 4: Product Choice

In our final study, we explored the consequences of design-personality "fit" for downstream behavioral responses, in the form of choices between brands. Based on the arguments underlying H3, we predicted that participants would be more likely to choose a brand whose imagery (asymmetric or symmetric) matches its positioning than a brand for which this is not the case.

In addition, we explored our model more rigorously by considering a theoretically relevant moderator: the presence of positioning-related text. Often, consumers are not exposed to brand imagery in isolation, but rather in conjunction with accompanying text describing the firm, brand, or product (e.g., advertising copy, package information). When pursuing a brand learning objective, consumers selectively attend to and elaborate on the message elements that they deem most diagnostic (Grunert, 1996; Pieters & Wedel, 2007). Therefore, to the extent that accompanying text contains cues that are salient, relevant, and easy to process, reliance on imagery for making brand-related inferences should be reduced (for discussion, see Jiang et al., 2016).

Method

One hundred and ninety-three undergraduates participated in the study in exchange for course credit. The study utilized a two-factor, betweensubjects design that crossed positioning (exciting vs. control) with accompanying text (present vs. absent). As in study 3, perfumes were utilized as the target category; this category was deemed appropriate because: (a) performance-related attributes of perfumes are difficult to evaluate before purchase, (b) packaging is a prominent component of visual branding in the category, and (c) perfume users commonly own multiple brands (so that a repeated-choice task would be reasonable).

To enhance involvement and realism in the cover story, female participants (49%) were told that the study involved choosing perfume for themselves, whereas male participants (51%) were told that the study involved choosing perfume "as a gift for a woman in your life". Participants were randomly assigned to either the control (no-positioning) condition or the exciting condition. In the control condition, participants read:

"One afternoon you are shopping in a local department store, and find yourself in the cosmetics section. You have been planning to buy a new perfume for some time, so you visit the fragrance counter to examine the selection. You spend a few minutes at the counter, talking with the salesperson and trying out a number of different perfumes".

In the exciting condition, participants were also informed that they were looking for "playful and exciting" perfumes, described as follows: "These perfumes are designed to give an instant impression of vitality from the very first scent. They do not attempt to be calm or boring, but rather to be surprising and exciting". The control condition contained no extra information.

Next, participants learned that their consideration set included 14 different brands. To create consistency on important product attributes, participants were informed: "Although each of the brands that you are considering has a somewhat different scent, you find them all very appealing. Moreover, the brands are similar in price and within your budget." Participants were told that they would view the options in pairs, and select one brand from each pair.

The following screens presented the seven choice pairs, in random order. Each pair contained pictures of two perfume bottles and their packaging, along with brand names and product volumes. All brand names were fictional. Brand imagery took the form of artwork superimposed onto both the bottles themselves, as well as their packaging (due to a programming error, package images were missing for three of the pairs). Each pair contained one brand represented by symmetric imagery and one brand represented by asymmetric imagery. For four of the seven pairs, symmetric and asymmetric artwork were taken directly from the stimuli of study 3; for the remaining three pairs, symmetric and asymmetric artwork were selected by the same process described in that study. As a result, the brand imagery in each pair was similar in color, realism, etc., but differed in bilateral symmetry. Appendix D illustrates all choice pairs. To control for presentation order, two versions of each pair were created, with symmetric imagery on the left or the right; participants were randomly assigned to one of the two versions.

In the text-present conditions (but not the textabsent conditions), choice pairs included brief verbal descriptions underneath the pictures of each brand (see Appendix D). The content of these text descriptions varied by positioning: descriptions in the exciting condition used syntax connoting excitement ("adventurous," "vibrant," etc.), while descriptions in the control condition simply connoted the sensory nature of perfumes.

Participants were asked to select one of the two brands in each pair: "Based on the information above, which brand of perfume would you choose?" In the exciting conditions, the question included a reminder of positioning: "Remember, these perfumes are designed to give an instant impression of vitality from the very first scent. . ..". After completing their choices, participants were again presented with all 14 of the artwork images, one at a time, and asked to provide ratings of liking and prior familiarity (similar to Study 3). Finally, two multiple-choice attention checks asked participants to recall the stated positioning of the perfumes and to identify brands that were presented during the choice task.

Results and Discussion

Preliminary examination revealed that seven percent of participants failed both attention checks. The full sample was retained for analysis (all significant results below remain significant when these participants are excluded.) Participants were unfamiliar with all target images (maximum M = 1.96/7). Consistent with Studies 1–2, liking was directionally higher for symmetric images than asymmetric images (M = 3.87 vs. 3.75, p = .15). Participant gender did not interact with any variables in the main analysis, so data was pooled across this factor.

For the main analysis, we created the dependent variable *symmetric choices*, by summing the number of pairs for which the brand with symmetric imagery was chosen (range = [0,7]). Figure 6 depicts symmetric choices by condition. An analysis-of-variance (ANOVA) was conducted in which positioning, text, and their interaction were entered as predictors of symmetric choices. Results revealed a marginally significant effect of text (F(1, 189) = 2.92, p < .10), such that participants chose symmetric brands more often when no text was provided. Results also revealed a significant effect of positioning (F(1, 189) = 10.90, p < .01): consistent with a



Figure 6. Average number of symmetric choices by condition (study 4).

general preference for symmetry, participants chose symmetric brands more often when no positioning was provided. Most important, these effects were qualified by a significant interaction (F(2, $(189) = 8.88 \ p < .01)$, and follow-up comparisons yielded a pattern consistent with predictions. When no text descriptions were provided, participants in the exciting condition chose fewer symmetric brands than participants in the control condition (M = 2.71 vs. 4.00; F(1, 189) = 19.85, p < .01). When text descriptions were provided, however, the difference became non-significant ($M_{\text{exciting}} = 3.67$ vs. $M_{\text{control}} = 3.74; F(1, 189) = 0.05, p > .5).$ "See Figure 6."

Findings of our fourth study revealed downstream behavioral consequences of the imagerybased inferences captured in studies 1–3. Consistent with the idea that consumers respond favorably to fit between brand personality and visual design, participants choosing among "exciting" brands tended to prefer options represented by asymmetric imagery. However, the effects of perceived fit were greatly reduced in the presence of positioning-relevant text information. Consistent with our arguments, this finding suggests that consumers use imagery-based inferences as a source of information about the underlying brand, and are more likely to do so when other relevant cues are unavailable.

General Discussion

The present research is part of a small but growing scholarship on sensory marketing and brand personality (Labrecque & Milne, 2012; Orth & Malkewitz, 2008; Sundar & Noseworthy, 2016). It is widely acknowledged that logos, packaging, and other visual brand elements can serve an important representational function, helping brands to communicate the benefits of their offerings (Park,

Eisingerich, Pol, & Park, 2013). Expanding on this idea, we suggest that visual brand elements serve an additional function by influencing consumer perceptions of brand personality. Our central assertion is that asymmetry in brand elements evokes arousal in observers, which spills over to impressions of the brand itself. Using different stimuli, methodologies, and response tasks, four studies supported this assertion: symmetry was negatively associated with perceptions of brand excitement (study 1), the influence of symmetry was traced to subjective arousal (studies 2 and 3), and the consequences of symmetry for brand perceptions influenced downstream choices (study 4).

Among the limited academic research on visual design in consumer settings, a common finding has been the broad benefits of symmetry for perceptions of beauty, perfection, etc. In contrast, our work is among a growing body of research moving "beyond" esthetic responses and toward a more nuanced understanding of specific meanings conveyed by specific design properties. Combining both perspectives, an important implication is that design elements which influence esthetic response may also influence impressions of the brand itself, with potentially countervailing effects. In particular, our findings suggest that for brands whose positioning relies on excitement, the direct, positive effect of symmetry through esthetic pleasure may be offset by its indirect, negative effect through inferences regarding brand personality.

Research on "spillover effects" has demonstrated that perceptions evoked by visual marketing elements can be assimilated into product evaluations (e.g., Hagtvedt & Patrick, 2008). Extending this line of reasoning, our findings indicate that salient design characteristics induce predictable spillovers that are not limited to general connotations such as quality, but extend to specific connotations regarding the brand. At the same time, study 4 findings suggest limits to such spillovers: the benefit of asymmetric imagery for exciting brands was negligible when it was accompanied by text that explicitly conveyed excitement. This result is consistent with the notion that consumers decrease reliance on visual brand cues when more diagnostic information is available, and it suggests that employing both imagery and text to convey excitement may be redundant. However, an alternative possibility is that the text created a "visual load" which exhausted visual working memory (Jiang et al., 2016) and limited the ability of participants to make design-based inferences. Given the simplicity of the text utilized in study 4, as well as the consensus

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that verbal tasks do not rely heavily on visual working memory (Logie, Zucco, & Baddeley, 1990), we deem this possibility unlikely but acknowledge that it cannot be ruled out.

The importance of discrete design characteristics is already recognized by marketers engaged in visual communications, product design, etc., but best-practice guidelines are generally lacking. We propose that when developing such guidelines, a key consideration should be the personality of the brand involved, both as it currently exists and as it is intended. More broadly, laypersons and practitioners often view design as an inherently subjective process that benefits little from frameworks or evidence-based principles. Our research represents a broader opportunity to collect rigorous empirical evidence regarding consumer response to visual design characteristics (complexity, realism, etc.), which can in turn be drawn upon to explain design choices.

The scope of our research precluded examination of design characteristics other than symmetry (elaborateness, parallelism, etc.). Future work might consider not only how other design characteristics affect brand perceptions, but also the potential interaction of these effects with symmetry. In the same vein, it would be interesting and useful to examine the influence of design variables on other brand personality perceptions (e.g., sincerity, competence). Results of our first study provide promising avenues for exploration. For example, results suggested a strong association between visual symmetry and brand sophistication; indeed, luxury brands often adopt a classical style characterized by calmness, order, and idealism, in which symmetry is a fundamental characteristic (Messaris, 1997). More broadly, given the wide array of tools for conveying a brand's visual identity (see above), future research might examine the consequences of symmetry in packaging, product design, etc. As such, our research offers a potential first step toward a broader research program mapping visual design elements onto brand personality.

The focal product category of studies 3-4 (fragrances) is defined by highly subjective attributes. Arguably, design-based brand inferences will be magnified in such categories, as the interpretation of attribute information is assimilated with other contextual cues. Future research might examine the impact of design symmetry in categories defined by more concrete or measurable attributes.

Theoretical progress in the field would benefit from research exploring individual difference variables that relate to visual branding and consumer inference-making. For example, an intriguing line of research has suggested that high-self monitors react more favorably to image-oriented appeals (Snyder & DeBono, 1985); if so, then it is reasonable to expect that the effects observed in our research will be magnified among consumers high in self-monitoring. Another variable of potential interest is chronic processing style: i.e., the extent to which consumers tend to utilize an abstract mindset, characterized by conceptual processing, or a concrete mindset, characterized by detail-oriented processing (Peterman, 1997; Trope, Liberman, & Wakslak, 2007). As symmetry is determined by the relative position of components in a composition, it is an essential holistic property (Pomerantz & Kubovy, 1986). Therefore, it is reasonable to expect that effects of symmetry on subjective arousal and brand inference will be strongest among consumers with an abstract mindset. More directly, prior evidence has identified individual differences in preference for symmetry itself (Palmer & Griscom, 2013). Future work might examine implications of this preference for the perceptual effects revealed in our studies.

In an era of declining product differentiation, design has become increasingly important as a tool for brand development, and it is ever more vital for researchers to understand the multifaceted influence of design characteristics on brand perceptions. Our findings provide one step towards such understanding, and we encourage further exploration.

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Appendix A Logo stimuli (study 1)

Symmetric	\$	X			
Asymmetric	0	47	ſ	D	

Appendix B Logo stimuli (study 2)

Appendix C Artwork stimuli (study 3)



Appendix D Artwork stimuli (study 4)

PAIR 1



Ajmer® 3.4 oz Eau de Parfum Ajmer perfumes: Conjure the adventure and vitality of being a woman.

Sanganer® 3.4 oz Eau de Parfum Leave the world behind and discover your vibrant spirit with Sanganer.

Text for no-positioning condition:

Ajmer: Crafted by expert perfumers, Ajmer evokes the essence of a spring garden. Sanganer: Sanganer is an aromatic bouquet, created with the vision of flowering blooms

PAIR 2



Barelli® 3.4 oz Eau de Parfum

A sparkling fragrance, Barelli is a contemporary blend of lively ingredients from nature. Manali® 3.4 oz Eau de Parfum

Manali embodies exuberance and vigor with its earthly essences. An inspiring scent.

Text for no-positioning condition:

Barelli: Barelli fragrances carry you away to the aromatic riverside. Manali: Bask in a private sanctuary on the shore with Manali perfumes.

PAIR 3





Campani®

3.5 oz Eau de Parfum

Composed of natural cedar notes, Campani offers a bold and invigorating scent.

Amaru® 3.5 oz Eau de Parfum Amaru is a stimulating and woodsy fragrance, evoking the mystery of the forest.

Text for no-positioning condition:

Campani: Composed of natural woody notes, Campani lingers in the mind like the tree-lined path. Amaru: Amaru embodies the scent of the forest, conjuring lasting images of tall cedars.

PAIR 4





Sikar® 2.5 oz Eau de Parfum

Provocatively crafted, Sikar's floral notes bring to mind the excitement of new blooms. Boondi® 2.5 oz Eau de Parfum Boondi evokes the playfulness and temptation of fresh flowers. A truly thrilling fragrance.

Text for no-positioning condition:

Sikar: Sikar is a unique olfactory experience, evoking the essence of a breeze redolent of earth and flowers

Boondi: Boondi is a sensory experience suffused with the wafting fragrance of the forest and the flowers.



Amroha® 3.4 oz Eau de Parfum

Break the rules with Amroha. Enriched with amber accents for those who dare to be different.



Hapur® 3.4 oz Eau de Parfum

A distinctive scent infused by lemon and wood, Hapur leaves a trail that is unique and provocative.

Text for no-positioning condition: Amroha: Amroha is pure instinct, the power of an emotion that is freely expressed. Hapur: Hapur is an experience that will envelop the senses and linger long after the moment has passed.

<u>PAIR 6</u>



Jansu® 3.4 oz Eau de Parfum With equal measures of mystery, enthusiasm, and modernity, Jansu will reinvigorate your senses.



Umrau® 3.4 oz Eau de Parfum Always contemporary, Umrau is at once lively and enigmatic. Create your own path.

Text for no-positioning condition: Jansu: Jansu is meant to be seen, celebrated and adored. Just like you.

Umrau: Umrau deserves to be the center of attention, just like the one who wears it.



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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Methodological Details Appendix (MDA).