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SHORT AND SWEET

Preference for symmetry: Only on Mars?

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Abstract. Preference for symmetry is a robust bias found throughout the animal kingdom. In humans, the bias for symmetry has been documented in numerous domains, including faces and visual patterns. The function of this potent aesthetic bias still eludes us, but prominent accounts focus on its role in mate selection and perceptual fluency. Previous studies have shown that both males and females find symmetrical faces to be more attractive, but here we show that the preference for symmetry in neutral stimuli (ie everyday and meaningless visual objects) is, on the other hand, unique to male participants. Our findings indicate that symmetry preference cannot be explained exclusively by perceptual or computational efficiency, because such an account is domain-independent yet females did not show any bias for the objects tested here. Further studies are needed to elucidate the utility of the male preference for visual object symmetry.

It has been established that humans prefer symmetrical patterns in numerous domains (Little et al 2007; Reber et al 2004), and preference for symmetrical visual features has been observed in creatures as simple as the bumblebee (Moller and Thornhill 1998; Rodriguez et al 2004). The widespread and robust influence of symmetry on aesthetic preference has resulted in several theories of its biological significance. One prominent account is that human preference for symmetric visual patterns emerged as a byproduct of an adaptive mechanism for mate selection, whereby physical symmetry is hypothesized to signal 'better' genes (Thornhill and Gangestad 1999). A second account pertains to the computational ease of encoding and processing of symmetric information, whereby symmetrical regularities are detected faster and discriminated more efficiently by the visual system (for discussion of representation and processing theories of visual 'goodness', see van der Helm and Leeuwenberg 1996, 1999; Wagemans 1999). Indeed, greater perceptual fluency has been linked to more positive evaluations of stimuli (Winkielman et al 2006). Though both accounts have received support, the origins of this potent aesthetic and functional preference bias remain elusive.

Here we sought to test the generalizability of symmetry preference to real-world and abstract objects (figure 1), and to compare preferences between females and males. The use of both real and abstract objects allowed us to further examine the influence of meaning on preference that is otherwise based on a relatively primitive shape property. Stimuli consisted of 120 object pairs (60 real object pairs and 60 abstract object pairs). Within each pair, the difference between items was their level of bilateral symmetry (symmetric versus asymmetric). Symmetric objects were symmetric about the *Y*-axis and asymmetric objects had no apparent symmetry (figure 1).

Eighty participants (forty males, forty females; aged 18 – 49 years) viewed pairs of object images and made forced-choice decisions about which item in each pair they liked better based on their immediate 'gut' reactions. Two-thirds of the trials consisted of symmetric versus asymmetric pairs. The remaining third of trials was comprised of symmetric versus symmetric or asymmetric versus asymmetric pairs, to conceal the purpose of the experiment; these 'foil' trials were excluded from the analyses. The three trial types alternated randomly, symmetric and asymmetric object pairing was randomized

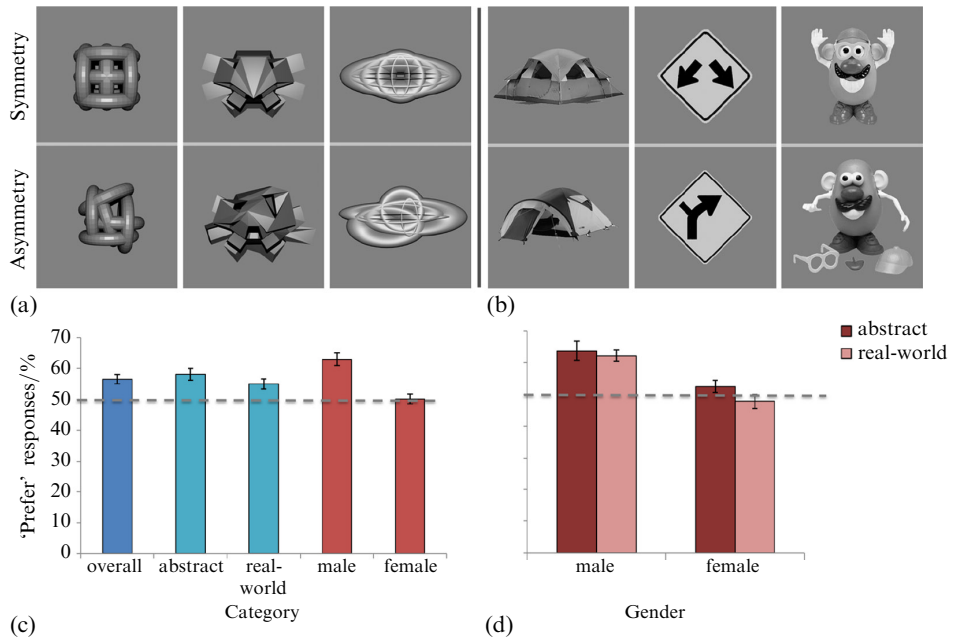

Figure 1. [In color online, see http://dx.doi.org/10.1068/p7057] Examples of symmetric versus asymmetric stimulus pairs for both abstract objects (a) and real-world objects (b). (c) Percentage of 'prefer' responses for the symmetric over asymmetric objects in the different conditions and across gender. (d) Percentage of 'prefer' responses for symmetric objects in abstract and real-world objects as a function of gender. Values above the dotted 50% line indicate preference for symmetry.

and thus different across participants, and real-world object trials were randomly intermixed with abstract object trials. Trial pairs always consisted of objects of the same type (two abstract objects or two real objects). Each participant saw only one version of each real object (eg only one version of the tent shown in figure 1) and of each abstract object (60 trials per subject: 40 experimental pairs and 20 foil pairs). In half of trials, the symmetric object appeared on the right of the trial pair, and in the other half the symmetric object of the pair appeared on the left.

We evaluated preference by calculating the proportion of 'prefer' responses for the symmetric object in the pair, to the total number of responses. Therefore, a preference score greater than 50% indicated a preference for the symmetric object in the pair, and vice versa.

Consistent with previous findings, there was an overall preference for symmetry (mean liking of 56.55%, $p < 0.001$). The magnitude of symmetry preference was statistically similar for abstract and real objects (58.10% versus 55.00%; $p = 0.22$), supporting the idea that bias toward an object is elicited not only by its semantic meaning and association (ie food, animal), but also by a low-level perceptual property such as symmetry. [Curvature, another low-level visual attribute, has also been shown to affect preference independent of semantic meaning (Bar and Neta 2006).]

Surprisingly, our results demonstrate a clear gender difference in preference for symmetric features of visual objects. Males consistently preferred symmetry (63.69%, $p < 0.001$ for abstract objects, and 62.21%, $p < 0.001$ for everyday real objects), while females did not show such preference bias (52.5%, $p = 0.18$ for abstract and 47.81%, $p = 0.33$ for real objects). Females were faster to respond than males (average reaction time of 1.56 s versus 2.04 s, $p = 0.025$), although reaction time was not correlated with preference for symmetry in either females ($p = 0.95$) or males ($p = 0.93$).

To test the possibility that male biases might have been related to utilizing symmetry as a cue for selection, rather than sheer preference, we tested whether preferences increased during the course of the experiment. We split the experiment into four successive intervals and averaged preference for each. A mixed-design ANOVA with interval (1 – 4) as a within-subjects factor and gender (male, female) as a between-subjects factor, revealed a clear effect of gender on symmetry preference ($F_{1,78} = 26.54$, $p < 0.001$), but showed no effect of interval ($F_{2.85,222.53} = 0.94$, $p = 0.42$). That symmetry preference did not increase over the course of our experiment in either males or females indicates that preferences were not linked to subjects' gradual discovery of symmetry as a salient cue.

While this study was not designed to directly test the mate-selection account of symmetry bias, these novel findings demonstrate unequivocally that the preference for symmetry generalizes to mate-irrelevant stimuli, but exclusively in males. This result suggest that symmetry preference cannot simply be a byproduct of enhanced perceptual fluency, because such an enhanced fluency is not specific to a certain type of stimuli (eg stimuli related to mate selection, everyday objects, meaningless patterns) and therefore would be expected to generalize to females as well. We showed that males relied on salient symmetry cues when choosing a preferred stimulus, but females may have based their judgments on other stimulus features, such as degree of curvature, luminance, contrast, color, and complexity. Future studies will be able to characterize the factors that influenced females' preferences, as well as provide a supported account for why males prefer symmetry in everyday objects and meaningless patterns.

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References

Bar M, Neta M, 2006 "Humans prefer curved visual objects" *Psychological Sciences* **103** 449 – 454

Helm P A van der, Leeuwenberg E L J, 1996 "Goodness of visual regularities: A nontransformational approach" *Psychological Review* **103** 429 – 456

Helm P A van der, Leeuwenberg E L J, 1999 "A better approach to goodness: Reply to Wagemans (1999)" *Psychological Review* **106** 622 – 630

Little A, Apicella C L, Marlowe F W, 2007 "Preferences for symmetry in human faces in two cultures: data from the UK and the Hadza, an isolated group of hunter-gatherers" *Proceedings of the Royal Society of London, Series B* **274** 3113 – 3117

Moller P A, Thornhill R, 1998 *Bilateral Symmetry and Sexual Selection: A Meta-Analysis* (Chicago, IL: University of Chicago Press)

Reber R, Schwarz N, Winkielman P, 2004 "Processing fluency and aesthetic pleasure: is beauty in the perceiver's processing experience?" *Personality and Social Psychology Review* **8** 364 – 382

Rodriguez I, Gumbert A, Hempel de Ibarra N, Kunze J, Giurfa M, 2004 "Symmetry is in the eye of the 'beeholder': innate preference for bilateral symmetry in flower-naïve bumblebees" *Naturwissenschaften* **91** 374 – 377

Thornhill R, Gangestad S W, 1999 "Facial attractiveness" *Trends in Cognitive Sciences* **3** 452 – 460

Wagemans J, 1999 "Toward a better approach to goodness: Comments on Van der Helm and Leeuwenberg (1996)" *Psychological Review* **106** 610 – 621

Winkielman P, Halberstadt J, Fazendeiro T, Catty S, 2006 "Prototypes are attractive because they are easy on the mind" *Psychological Science* **17** 799 – 806

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