Cues of abundance enhance preference for facial femininity

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Research Article

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Abstract

Sexually dimorphic facial features in humans have been proposed to signal genetic quality, but they may also entail trade-offs related to long-term investment. As a result, preferences for these traits may vary across environmental conditions. A recent study found that cues of environmental abundance increased women's preferences for facial masculinity in male faces. The present study tests whether a similar manipulation will increase men's preferences for facial femininity in female faces. Male participants were primed with videos depicting resource-scarce or resource-rich environments and completed a fast preference task before and after exposure to the priming videos. We observed greater preference for facial femininity in female faces following exposure to abundant environmental cues compared to harsh environmental cues. These results suggest that human facial preferences are context-dependent and can shift in response to even transient and short-term signs of environmental richness or poverty across both sexes.

1. Introduction

The complexity and urgency of finding a good mate in a dynamically shifting pool of candidates favours the quick (Todd et al., 2012). One way to be quick in mate choice is to look to faces, a particularly information-rich part of a human body. Sexually dimorphic facial features have been proposed to communicate underlying information about potential mates (Perrett et al., 1994; Johnston et al., 2001; Grammer et al., 2003; Muehlenbein & Bribiescas, 2005). Preferences for more or less sexually dimorphic traits are thought to arise from trade-offs between potential genetic benefits of the offspring and characteristics associated with long-term investment, respectively (Gangestad & Simpson, 2000). These trade-offs appear to be environmentally contingent (e.g., DeBruine et al., 2010; Gangestad & Buss, 1993; Lee & Zietsch, 2011; Little et al., 2011). Exposure to cues of pathogen prevalence or resource availability can change mate preferences towards traits associated with the demands of the environment (Gangestad & Buss, 1993; DeBruine et al., 2010; Lee & Zietsch, 2011).

In a previous study, [redacted] showed that women's preferences for facial masculinity in male faces change after exposure to visual cues of environmental abundance or harshness. Women primed with abundant environments showed increased preference for masculinized male faces, whereas women primed with harsh environments shifted toward feminized male faces.

On analogous grounds, men's mate preferences may also be expected to show sensitivity to environmental context (Dixson et al., 2011; Swami & Tovee, 2013). Feminine features in female faces have been widely associated with perceived youth, and reproductive potential (Perrett et al., 1994; Johnston et al., 2001). Evidence that men's preferences for feminine traits vary with factors such as threat (e.g., presence of a snake; Reeve et al., 2016), temporal context of the relationship (Buss & Schmitt, 1993; Kenrick et al., 1993; Schmitt & Buss, 1996) or environmental harshness (Dixson et al., 2011; Swami & Tovee, 2013) supports the possibility that men's mate preferences might also change following exposure to environmental cues, analogous to how women's preferences changed in our previous study ([redacted]).

The present study tests this possibility by applying the same paradigm previously used to study change in women's mate preferences in accordance with environmental cues ([redacted]). For men, the prediction is the converse of what was expected for women: exposure to abundant environmental cues should lead to a greater increase in preference for feminized female faces than exposure to harsh environmental cues in a male sample.

2. Methods

2.1 Participants

Forty-eight adult men (24 per group; aged 18–28, median age: 21) were recruited via a university-wide mailing list. Participants were compensated either with course credit or a monetary incentive for taking part in the study. A priori power analysis yielded a target sample size of 46 (23 per group; $\alpha = .05$, power = .80), assuming an effect size of Cohen's $d = 0.75$ (after [redacted], which corresponds to a difference of 3.4/40 feminised faces chosen in post-test). All procedures were reviewed and approved by the Institutional Review Board at [redacted] University.

2.2 Procedure

Participants completed a brief questionnaire assessing age, sexual orientation, relationship status, and current relationship goals. They then completed a pre-test consisting of 10 practice trials followed by 40 experimental trials.

Each trial began with a centrally presented fixation cross (250 ms), after which two images appeared simultaneously: a feminized and a masculinized version of the same individual's face. These images remained on screen for 750 ms. After a 100-ms delay, the unaltered version of the same face was displayed in both locations for 750 ms, serving as a perceptual mask. Participants indicated which face they found more attractive by pressing one of two keys on the keyboard (A for the left image, I for the right image). The side on which feminized and masculinized faces appeared was counterbalanced, and trial order was randomized for each participant.

Following the pre-test, participants were randomly assigned to either an abundant or harsh environmental priming condition. In a dimly lit testing room, they viewed a 5-minute video corresponding to their assigned condition. Participants then completed a brief memory task. In each trial of this task, nine words were displayed in a 3 × 3 grid for 5 seconds, after which participants wrote down as many words as they could remember.

Finally, participants completed a post-test that was identical to the pre-test. Preference choices and reaction times were recorded in both phases. Aside from the change in participant sex and stimulus sex, the procedure followed that described in [redacted].

2.3 Materials

Two 5-minute video clips were used to induce feelings of either environmental abundance or environmental harshness. The “abundance” video depicted natural scenery and visually rich landscapes whereas the “harshness” video depicted desolate environments and scenes of damage following natural disasters (e.g., fire, hurricane). Videos were projected onto a white wall in a dimly lit room to ensure salience.

The memory task consisted of five-word sets, each containing nine words: three abundance-related words (e.g., peace, friend, serenity), three harshness-related words (e.g., fire, disaster, hurricane), and three neutral words (e.g., chair, switch, bus). Across the task, participants were exposed to a total of 45 words. These materials were identical to those used in the original study.

Facial stimuli were obtained from publicly available face databases created by DeBruine and Jones (2017, 2020). Masculinized and feminized versions of each base image were generated using WebMorph (DeBruine, 2018; Tiddeman, Burt, & Perrett, 2001) following established procedures. A female and a male prototype were created by averaging shape, colour, and texture information across faces within the databases. Feminized and masculinized variants were produced by adding or subtracting 50% of the linear shape differences between the two prototypes to each individual image. The people depicted were aged 18–25 years. The final stimulus set consisted of 40 adult female faces. All images were converted to greyscale and placed on a white background to standardize appearance.

2.4 Design

The study tested whether brief exposure to cues of environmental abundance or scarcity alters preferences for sexually dimorphic features in female faces. The main dependent variable was the change, from pre-test to post-test, in the proportion of trials on which the masculinized version of a face was selected. Positive scores reflect increased preference for feminized faces.

Preference change scores were compared between priming conditions using an independent-samples t-test. One-sample t-tests (one-tailed) were also conducted within each condition to determine whether changes differed from zero.

Reaction time differences (post-test minus pre-test) were analysed using linear mixed-effects models (LMM) with priming condition as fixed effect and participant and stimulus as random effects (random slopes were not modelled). Identity covariance structure was used to model covariance among observations. Reaction times exceeding 2000 ms were excluded prior to analysis, lest they distort test results, on the assumption that uncommonly slow reaction times may indicate loss of attention or failure to engage in the implicit nature of the task, which led to the exclusion of 135 observations out of 1920 (%7 of the RT dataset).

To evaluate the effectiveness of the priming manipulation, a repeated-measures ANOVA compared recall of abundance-related, harshness-related, and neutral words across priming conditions. Pearson correlations examined associations between recall performance and preference change scores. These analyses were intended as manipulation checks, as independent indicators that the priming videos influenced participants in line with the intended environmental condition.

3. Results

3.1. Does environmental condition affect mate preferences?

Environmental condition significantly predicted preference change ($t(46) = 5.60$, $p < .001$; Cohen's $d = 1.62$; 95% CI on $d = \{0.96, 2.26\}$; Fig. 1). Men exposed to the abundant condition shifted their preferences toward feminized female faces (mean preference change = 0.11; SD = 0.09) to a greater extent than those exposed to the harsh condition (mean preference change = − 0.05; SD = 0.11). This finding supports the hypothesis that preferences for sexually dimorphic facial traits are context-dependent, such that more sexually dimorphic faces are favoured under conditions of abundance rather than scarcity, consistent with previous findings in female participants evaluating male faces ([redacted]).

Within-condition analyses showed that participants in the abundant condition increased their preference for feminized faces ($t(23) = 5.94$, $p < .001$; Cohen's $d = 1.21$; 95% CI on $d = \{0.67, 1.74\}$), and participants in the harsh condition decreased their preference for facial femininity ($t(23) = -2.28$, $p = .032$; Cohen's $d = -0.47$; 95% CI on $d = \{-0.88, -0.04\}$; Fig. 1).

To rule out the possibility that the priming groups differed prior to the manipulation (e.g., as a result of sampling variability), we conducted a post hoc independent-samples t-test on participants' initial preferences. This analysis indicated no reliable difference between the abundant and harsh groups at pre-test ($t(46) = -1.78$, $p = .082$). In addition, a one-sample t-test collapsing across both groups revealed a strong baseline preference for feminized female faces (i.e., the feminized morph was selected on average 62% of trials; mean = 0.62; SD = 0.21; $t(47) = 20.77$, $p < .001$; Cohen's $d = 3.00$).

3.2. Was reaction time affected?

Across both conditions, participants exhibited shorter reaction times at post-test relative to pre-test (abundant condition: $z = 6.93$, $p < .001$; harsh condition: $z = 8.16$, $p < .001$), a pattern that is frequently observed in pretest–posttest paradigms (e.g., Del Rossi et al., 2014). Importantly, the extent of this reduction did not differ between priming conditions ($F(1, 45.82) = 0.159$, $p = .692$): abundant condition (mean change: 96.71 ms, 95% CI: 66.46, 127.0), harsh condition (mean change: 113.1 ms, 95% CI: 85.89, 140.3). Thus, priming did not appear to influence response speed.

3.3. Memory for related words

No reliable differences in word recall were observed between priming conditions ($F(1, 46) = 0.01$, $p = .943$), nor was there evidence for an interaction between priming condition and word category ($F(2, 92) = 0.02$, $p = .976$). Thus, exposure to abundance- or harshness-related cues did not differentially affect participants' memory for the various word types. Recall performance also did not vary significantly across word categories ($F(2, 92) = 1.09$, $p = .341$) and post hoc comparisons confirmed that recall rates for abundance-related, harshness-related, and neutral words did not differ from one another (all $ps \geq .48$).

To examine whether memory for environmental cues was associated with shifts in mate preferences, we conducted Pearson correlation analyses between participants' recall of abundance-related, harshness-related, and neutral words and their preference change scores. Although none of these associations reached statistical significance, the estimate of the degree of association between recall of abundance-related words and preference change was suggestive ($r = -.26$, $p = .070$, 95% CI {−.51, .02}). Recall of harshness-related words showed no signs of association with preference change ($r = .01$, $p = .959$, 95% CI {−.28, .29}), nor did recall of neutral words ($r = -.08$, $p = .599$, 95% CI {−.35, .21}).

4. Discussion

Across two studies, we find converging evidence that preferences for sexually dimorphic facial traits are sensitive to environmental cues. In the present study, men exposed to cues of environmental abundance showed an increase in preference for feminized female faces relative to men exposed to harsh environmental cues. This finding parallels our earlier findings in female participants evaluating male faces ([redacted]), where abundance increased preferences for masculine male faces. Finding a corresponding effect with men evaluating female faces indicates that abundant environmental cues increase preferences for sexually dimorphic facial traits in both male and female faces.

These findings add to earlier work showing that ecological stressors shape mate preferences, which has mostly emphasized pathogen prevalence as a key influence (e.g., Gangestad & Simpson, 2000; DeBruine et al., 2010). While pathogen-related cues are often theorized to increase preferences for traits associated with genetic quality, our results across both studies suggest that other dimensions of the environment such as resource availability and safety can also shape preferences for sexually dimorphic traits. Moreover, these effects appear to be symmetrical across sexes such that abundance increases attraction to masculinity in male faces and femininity in female faces. This strengthens the evidential support for our findings, and points to a more general mechanism through which positive ecological conditions amplify attraction to sexually dimorphic features.

Declarations

Author Contributions

(redacted) conceived and designed the study, collected the data, performed the analyses, drafted the manuscript, and contributed to the revisions. (redacted) provided supervision throughout the project, verified the analyses, and critically revised the manuscript. All authors approved the final version of the manuscript.

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Data Availability

Data are available upon request. Please address such requests to (redacted).

Ethical Approval and Consent

This study was conducted in line with the principle of the Declarations of Helsinki. All procedures were reviewed and approved by the Institutional Review Board at Bilkent University (redacted). Informed consent was obtained from everyone who participated in this study.

Competing Interests

The authors declare no competing interests.

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Figures

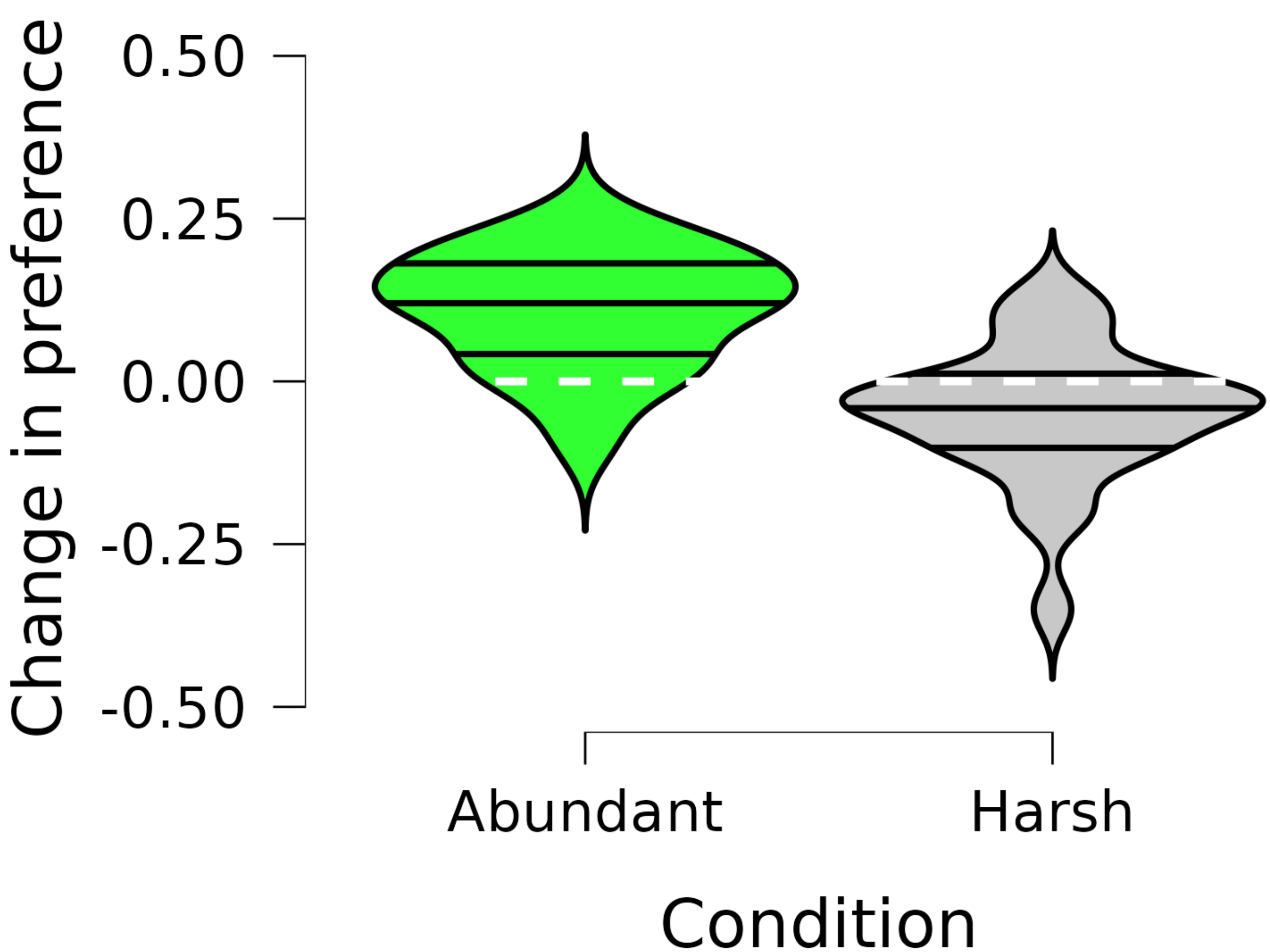

Figure 1

Violin plot of preference change scores by condition. Horizontal lines delineate the quartiles. Dotted white line shows zero. Positive change indicates change in favour of the masculinised face.