



# The effect of unrelated social exchanges on facial attractiveness judgments<sup>☆</sup>

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## ABSTRACT

Whereas the influence of facial attractiveness (FA) on social judgments has been well documented, much less is known about the converse influence of social exchanges on FA judgments. Previous research has shown that social dimensions inherently related to the face judged, such as status, can affect such judgments. However, we found that facial attractiveness ratings were affected by social exchanges unrelated to the face judged. In three experiments, we examined how competitive and cooperative financial exchanges influence subsequent facial aesthetic judgments. Compared to cooperation, competition decreased women's (but not men's) ratings of men's facial attractiveness; this pattern of effects also occurred for ratings of buildings, suggesting that competition suppressed aesthetic appreciation. However, women's responses to women's faces followed an inverse pattern, as competition (rather than cooperation) elevated women faces' attractiveness ratings. Introducing self-affirmation, a psychological mechanism that alleviates the effects of social competition, restored attractiveness ratings. This finding suggests that women's own-gender judgments in a competitive environment are affected by a perception of threat induced by social comparison. Overall, this study suggests that aesthetic judgments are not immune to social conditions. Such moderating effects contribute to our understanding of how sociocultural environments dynamically regulate aesthetic preferences.

The evaluation of faces is a key factor in social life. Indeed, the face is one of the most important visual objects in our environment (Leder & Carbon, 2004). It is an important channel of communication (Liang, Zebrowitz, & Zhang, 2010) and a rich source of information (Engell, Haxby, & Todorov, 2007) that informs humans' social judgments (Franklin & Adams, 2009). Among other factors, facial attractiveness powerfully affects these social judgments (O'Doherty et al., 2003; Tsukiura & Cabeza, 2011). Similar to money or status, attractiveness underlies not only mating behavior (Luxen & Van De Vijver, 2006) but also other social functions, such as professional success and leadership (Hamermesh & Biddle, 1994; Langlois et al., 2000).

## 1. The effect of facial attractiveness on social judgments

Facial attractiveness has an impact on social decisions, such as

mating and friendship choices (Thornhill & Gangestad, 1999), perceptions of goodness (Tsukiura & Cabeza, 2011), trustworthiness (Wilson & Eckel, 2006), intelligence (Zebrowitz, Hall, Murphy, & Rhodes, 2002), self-confidence (Langlois et al., 2000), age stereotypes (Palumbo, Adams, Hess, Kleck, & Zebrowitz, 2017), and even social hierarchy (Belmi & Neale, 2014). Previous research suggests that physically attractive people receive more favorable treatment compared to less attractive people (Langlois et al., 2000). Attractive people are also perceived to be more socially skilled (Langlois et al., 2000), are favored in hiring (Luxen & Van De Vijver, 2006), earn more money (Hamermesh & Biddle, 1994), and receive lesser punishments for misbehavior (Gunnell & Ceci, 2010). The concepts of a “beauty premium” (Hamermesh & Biddle, 1994) and “beautiful is good” (Dion, Berscheid, & Walster, 1972) highlight the privilege and social advantage of being beautiful. Facial beauty is of particular interest, as it is a major determinant of

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judgments of the overall beauty (and, by extension, other aspects such as personality) of a person. Information about “good looks” and overall attractiveness is largely gathered from facial attributes (Furnham, Lavancy, & McClelland, 2001; Thornhill & Grammer, 1999). In addition, neuroscientific evidence confirms that beautiful faces are “rewarding” (Aharon et al., 2001; O’Doherty et al., 2003).

## 2. The role of social exchanges in facial attractiveness judgments

Facial attractiveness is a highly salient social signal that impacts social behavior. Yet, the opposite relationship, regarding how social conditions affect attractiveness judgments, has not been well studied. Given that facial attractiveness conveys social meaning and values, such judgments might depend on the social context in which the judgment is made. Researchers of aesthetics have long sought to determine whether attractiveness is defined by objective parameters (dating back to Plato’s objective view of aesthetic perception (Plato, 1961)) or subjective factors (i.e., beauty perception depends on taste and preferences, the idea that “beauty is in the eye of the beholder”; e.g., Zhang, Kong, Zhong, & Kou, 2014), or both (Di Dio, Macaluso, & Rizzolatti, 2007; for a discussion of the objectivist, subjectivist, and interactionist views/perspectives on beauty, please see Reber, Schwarz, and Winkielman (2004)). Some research suggests that several objective, measurable properties of faces determine their attractiveness. These properties include symmetry, averageness, and sexual dimorphism (Rhodes, Jeffery, Watson, Clifford, & Nakayama, 2003). Facial features are linked to attractiveness, including neonate features (e.g., large eyes, small nose, and small chin), maturity features (e.g., prominent cheekbones, narrow face), and expressive features (e.g., high eyebrows, large pupils, and large smile; Cunningham, Roberts, Barbee, & Wu, 1995). Perceptions of attractive faces seem to be consistent cross-culturally (Cunningham et al., 1995; Etcoff, 2000) and among infants (Langlois et al., 2000). This literature suggests that, at least for some basic aspects, facial attractiveness is shaped by universal parameters (Eisenthal, Dror, & Ruppel, 2006) and is thus disconnected from the context in which they are encountered.

On the other hand, facial attractiveness judgments also depend on information unrelated to physical features (Kniffin & Wilson, 2004; Zhang et al., 2014) and are influenced by a variety of social inferences (Etcoff, 2000). Factors such as situational context, social categorization and culture can modulate the evaluation of facial attractiveness (e.g., Franklin & Adams, 2009; Marcinkowska et al., 2014). For example, faces of unfairly disadvantaged and fairly advantaged job applicants were judged as more attractive compared to fairly disadvantaged and unfairly advantaged ones (Michniewicz & Vandello, 2013). Women tend to integrate information from facial cues (masculine or feminine) with characteristics related to social behavior (e.g., faithfulness) when judging attractiveness in men (Quist, DeBruine, Little, & Jones, 2012). Other factors such as affection, respect, and familiarity (Kniffin & Wilson, 2004), eye contact or smiles (O’Doherty et al., 2003), personality characteristics (Zhang et al., 2014), reputation (Rucas et al., 2006), and attitudes towards the observer (Jones, DeBruine, Little, Conway, & Feinberg, 2006) significantly contribute to the assessment of facial attractiveness. A recent study (Marcinkowska et al., 2014) provides evidence that resources available in the environment affect attractiveness judgments: in harsher environments characterized by worse health, life-span, and mortality rates, men preferred masculinized (more than feminized) women’s faces. This is in accordance with more general theorizations of the how uncertainty of resources available interacts with culture and preferences (Christopoulos & Hong, 2013; Christopoulos & Tobler, 2016). The authors suggested that masculine features mark social dominance, signalling survival skills, whereas high femininity in women is associated with lower success in competition for (natural) resources. In harsher environments, with greater competition over scarce resources, men might prefer resource appropriating, potentially cued by “masculine” women’s faces.

Building on the literature highlighting the role of social conditions in facial attractiveness judgments, we sought to better understand this relationship by focusing on the impact of social exchanges on such judgments. Specifically, we investigated a major dimension of most social exchanges: cooperation versus competition. In our experiments, participants were exposed to a competitive or cooperative partner in a purely monetary task in which facial information or aesthetic judgments were absent. Subsequently, in a seemingly unrelated task, they rated facial images for attractiveness. We focused on how the output of unrelated social exchanges influenced perceptions of facial attractiveness. We demonstrated the malleability of aesthetic judgments and also, importantly, potential mechanisms through which attractiveness judgments might be modulated by social conditions. This knowledge is important from both a theoretical perspective of addressing the yet-unanswered question of how attractiveness preferences change and an applied/marketing perspective (cosmetic and fashion companies are highly interested in understanding how beauty trends and preferences are formed). The present research offers some potential explanations.

## 3. Competition versus cooperation

### 3.1. The effects of competition versus cooperation on attractiveness judgments

Cooperation and competition are cornerstones of social behavior. Smith (1976, chap. X) and Darwin (1871) referred to these two conditions as major forces of economic behavior and biological evolution, respectively. In competition, people predominantly work independently and against others to attain resources (Deutsch, 2011). In cooperation, people tend to work together and for each other to achieve common goals and share resources (Deutsch, 2011), building social capital in the process (Garcia, Tor, & Gonzalez, 2006). Although both cooperation and competition can co-exist, we focused on these two main states as the ones most commonly researched in economics, decision science and psychology.

We hypothesized that competitive and cooperative social exchanges influence facial aesthetic judgments, based on three theoretical perspectives. First, facial attractiveness judgments involve aesthetic processing. Aesthetic processing depends on many factors, one of which is the situation and the overall context in which the aesthetic processing takes place. For instance, an object will most likely be processed differently when it is encountered in a supermarket versus a museum or a theatre (Jacobsen, 2006). The study of aesthetics in arts has demonstrated that aesthetic appreciation is not only influenced by characteristics of the artwork and the viewer, but also by contextual information (Gartus & Leder, 2014; Swami, 2012). For instance, Wiersema, van der Schalk, and van Kleef (2012) found that participants who judged paintings under time pressure showed a stronger preference for figurative than for abstract paintings. In another example, Tousseignant and Bodner (2014) reported that beauty ratings for average-beauty photos of buildings were higher after viewing low-beauty rather than high-beauty photos. In our study, we expected that a competitive or cooperative context would influence aesthetic appreciation of faces. In fact, the aesthetic processing of faces as a social process might be more likely to be influenced by a social context compared to non-social targets such as artwork or objects. As discussed in the previous section, aesthetic judgments of faces in particular have been shown to be influenced by various social inferences.

Second, social judgments are themselves influenced by the context in which they are made (Bless, Schwarz, & Wänke, 2003; Mussweiler, 2003). As a type of social judgment, one would expect that the social conditions in which facial aesthetic judgments are made would shape these judgments. In forming social judgments, individuals make social comparisons (Dunning, 2000). In fact, social judgments could be considered an implicit social comparison with the self being – consciously or not – the frame of reference (Dunning, 2000). We expected that when

making facial aesthetic judgments, especially judgments of a same-sex target, the individuals might experience social comparison, and that a competitive social context with a focus on winning would be more likely to entail a social comparison (across different domains) than a cooperative context.

Third, we built on evidence from previous research suggesting that attractiveness, especially facial attractiveness, can itself represent a resource, in so far as being beautiful or attractive confers advantages. As a resource, facial attractiveness might be perceived differently in a competitive (fight for resources) or cooperative (share resources) state. Specifically, competing for or sharing one type of resource (e.g., monetary) was expected to influence how people perceive another resource (attractiveness).

### 3.2. Gender effects

We further predicted a gender difference in the effect of competition/cooperation on facial attractiveness judgments for three reasons. Firstly, previous research suggests that men and women differ in their attitudes towards competition and cooperation. Specifically, women are typically less competitive and dislike competition (Gneezy, Niederle, & Rustichini, 2003). They are more likely to cooperate than men (Park, Jeong, & Jeong, 2013). Men are drawn to competition (Niederle & Vesterlund, 2007) and often are more confident than women in competitive contexts (Kleinjans, 2009). Hence, in a competitive situation, women might be threatened by competition more than men. Second, as discussed earlier, social judgment could represent an implicit form of social comparison with the self as a frame of reference. Women are more likely to engage in social comparison than men (Gibbons & Buunk, 1999). Third, facial (and overall) attractiveness carry additional significance for women, for either societal or evolutionary reasons (Luxen & Van De Vijver, 2006). Attractiveness appears to be a form of “currency” for women's competition, as women dislike “good looks” in other women more than men dislike attractiveness in other men (Campbell, 2004; Luxen & Van De Vijver, 2006). Hazlett and Hoehn-Saric (2000) found that when women viewed attractive (versus unattractive) same-sex stimuli, they displayed more eyebrow lowering, an indication of a threat-related defensive response. Same-sex attractiveness can evoke a competitive reaction in that it threatens the individual's reproductive success and social status (Hazlett & Hoehn-Saric, 2000).

In intrasexual competition, women mostly compete on attractiveness, while men, on the other hand, compete mostly in status and intelligence (Luxen & Van De Vijver, 2006). These gender differences arise because across many societies a woman's attractiveness is important to men (Li, Balley, Kenrick, & Linsenmeier, 2002; Shackelford, Schmitt, & Buss, 2005) whereas a man's status, intelligence, and resources are crucial to women (Buss & Schmitt, 1993; Sprecher, Sullivan, & Hatfield, 1994). From an evolutionary perspective, these preferred traits have been linked to the production and survival of offspring. A man's reproductive potential is related more to his ability to provide (economic) resources to support his offspring. In contrast, a woman's reproductive potential is associated more closely with health and fertility, signalled by, among other factors, physical attractiveness (Luxen & Van De Vijver, 2006). According to a sociocultural perspective, women seek men with status, power, and resources in order to gain upward mobility because in most societies they have less access to these resources. In contrast, men have better access to resources and therefore are in a better position to place premiums on the quality (i.e., attractiveness) of the exchange target (Li et al., 2002).

Combining the above theories, we hypothesized that:

**H1.** Conditions of a social exchange (cooperative/competitive) affect subsequent facial attractiveness judgments.

**H2.** The effect theorized in **H1** is more pronounced for women than men.

Here, in the absence of previous evidence, the effects of the social conditions could be bi-directional; that is, conditions of a social exchange (cooperative or competitive) could increase or decrease beauty ratings.

## 4. Overview of studies

We tested our hypotheses in Study 1, in which we examined both same-sex and opposite-sex facial aesthetic judgments. In Study 2, we further tested whether the effect of a social exchange on facial attractiveness judgments was specific to faces or generalized to other aesthetic judgments. We did so by comparing the effect on attractiveness judgment of faces versus non-face stimuli, namely buildings. Finally, in Study 3, we explored a potential mechanism underlying the effect.

### 4.1. Control variables

Following procedures used in previous research, across all studies we included control variables thought to influence facial attractiveness ratings that might also be related to competition/cooperation.

First, we measured participants' self-perceived attractiveness. As mentioned earlier, people often judge others using themselves as a frame of reference (Dunning, 2000; Fong & Markus, 1982). How people perceive their own attractiveness might therefore influence how they evaluate the attractiveness of others. Moreover, we were also interested in examining whether the social conditions (competitive or cooperative) would influence one's ratings of his or her own attractiveness. Second, we controlled for positive and negative mood, as competition and cooperation might evoke different moods. Finally, we controlled for individual differences, including vertical/horizontal individualism-collectivism and independent-interdependent self-construals, as these differences could influence competition/cooperation. Specifically, previous research has shown that people primed with independence are less cooperative than people primed with interdependence (Utz, 2004). Similarly, vertical individualism reflects a preference for interpersonal competition, while horizontal collectivism reflects a preference for cooperation and group harmony (Singelis, Triandis, Bhawuk, & Gelfand, 1995).

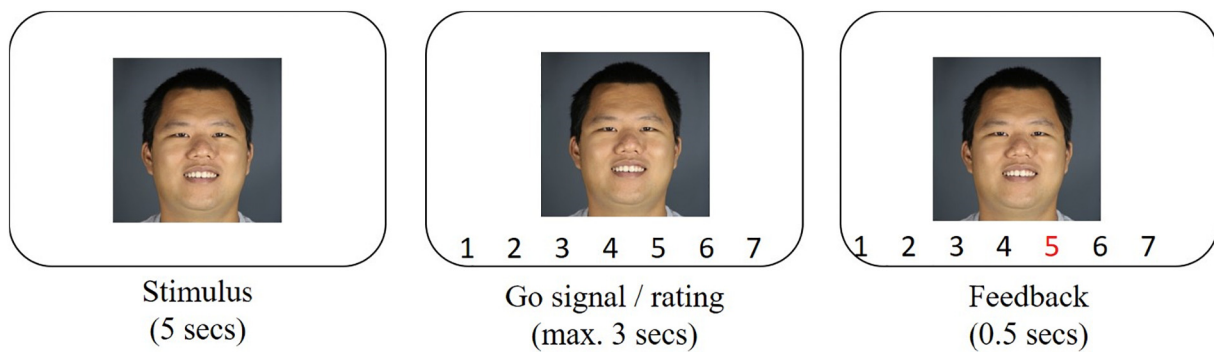
## 5. General methodology

Across three experiments, we manipulated competition versus cooperation, followed by an attractiveness rating task.

### 5.1. Cooperation versus competition manipulation

In this task, participants played an economic (unrelated to beauty) game in which the competitive and cooperative states were manipulated. The game followed the rules of a typical Prisoner's Dilemma game (PD-Game; details explained below; e.g., Wong & Hong, 2005). Participants were told that they would play the game on an online platform with an anonymous participant (gender was not disclosed) present in another room.

The PD-game comprised five trials. In each trial, the participant made a simultaneous decision with another unknown player. Their joint decisions determined their payoffs (Supplementary Material S1 and Fig. S1). Depending on the condition, participants received competitive (or cooperative) feedback from the other player over four trials. We included a manipulation check: (1) “In general, how competitive/cooperative was the person you played with in this game?” and (2) “How competitive/cooperative do you feel right now?” (1 = very cooperative, 7 = very competitive). To strengthen our manipulation, participants also completed a writing task in which they wrote about “a situation where you felt competitive (or cooperative).”



**Fig. 1.** Depiction of a trial of the face rating task. Standardized, same age and culture, and validated men's and women's faces were used (not displayed for privacy reasons).

### 5.2. Attractiveness ratings

Immediately after the competition/cooperation manipulation, participants rated 16 images of men's or women's faces expressing a happy emotion. Each face was displayed on the screen for 5 s, during which participants were instructed to look at the face without pressing any buttons (Fig. 1). Subsequently, a 7-point scale (1: not attractive at all, 7: very attractive) appeared below the image, and participants indicated their ratings by pressing a number (1 to 7) within 3 s, otherwise an 'error' signal was displayed. Faces were presented in a random sequence. The images were extracted from a standardized and validated database of Southeast Asian faces (see Yap, Chan, & Christopoulos, 2016). The attractive and unattractive faces were selected based on the ratings of a different sample, where faces with an average rating of 0.5 standard deviations above (or below) the mean among both women ( $M_{\text{women raters}} = 3.9$ ,  $SD = 0.45$ ) and men raters ( $M_{\text{men raters}} = 3.66$ ,  $SD = 0.64$ ) were categorized as attractive (or unattractive). As is common with studies that inherently rely on post-experimental, subject-specific assessments of the stimuli, the design typically needs to account for the possibility that stimuli are misclassified for some subjects. In this specific case, this means that some participants might be exposed to a lower number of (un-) attractive (as rated by the specific participant) faces. We observed greater disagreement, reflected by higher standard deviation, in attractiveness ratings for attractive faces compared to unattractive faces ( $M_{SD, \text{attractive}} = 1.20$ ,  $M_{SD, \text{unattractive}} = 0.95$ ,  $t(14) = 2.60$ ,  $p = .02$ ), thus suggesting that the design should include more attractive faces. A pilot study confirmed this, and therefore we included four additional pre-classified attractive faces. Overall, we collected 10 attractive and six unattractive faces for each gender.

After all trials, participants answered three additional questions measuring self-evaluations of general and facial attractiveness and appearance confidence: (1) "If you were to rate your own attractiveness, how attractive do you think you are?", (2) "If you were to rate the attractiveness of your face, how attractive do you think your face is?", (3) "How confident are you regarding your look/appearance?" (1 = not at all, 7 = very much). In addition, as mentioned above, we assessed mood using the positive affect and negative affect schedule (PANAS) scale (Watson, Clark, & Tellegen, 1988) and individual differences, including horizontal individualism (HI, 8 items), vertical individualism (VI, 8 items), horizontal collectivism (HC, 8 items), vertical collectivism (VC, 8 items; Singelis et al., 1995), and independence (12 items), interdependence (12 items; Singelis, 1994; Supplementary Material S2). Finally, we captured demographic information such as gender, age, and native language.

All measures, manipulations, and exclusions in all studies were disclosed. Sample size was determined before any data analysis (see Supplementary Material S10 for sample and design considerations), and the protocol was approved by the University Institutional Review

Board. The sample in each study included a different group of participants. We reported a sensitivity power analysis for each sample (i.e., the minimum effect size detectable with 80% power, given the sample size), using G\*Power software, version 3.1.9.2.

## 6. Study 1: ratings of men's faces & women's faces

### 6.1. Method

Study 1 employed a 2 (Competitive vs. cooperative)  $\times$  2 (Participant gender)  $\times$  2 (Face gender) between-subjects design. We used two sets of stimuli, men's faces and women's faces, for two sets of participants. A total of 194 respondents took part in the study (52% women,  $M_{\text{age}} = 21.18$ ,  $SD = 2.15$ ). We calculated the minimum effect size for each gender group. Our sample of women ( $N = 101$ ) allowed us to detect effects as small as  $f = 0.393$  ( $\eta^2 = 0.134$ ) with 80% power. Our male sample ( $N = 90$ ) allowed us to detect a minimum effect of  $f = 0.418$  ( $\eta^2 = 0.149$ ). The procedure of Study 1 followed the general methodology previously outlined.

### 6.2. Results

#### 6.2.1. Manipulation check results

Our social exchange manipulation was successful: participants in the competitive (vs. cooperative) condition perceived the other player to be more competitive ( $M_{\text{competitive}} = 5.33$ ,  $SD = 1.45$  vs.  $M_{\text{cooperative}} = 3.06$ ,  $SD = 1.49$ ,  $t(189) = -10.65$ ,  $p < .001$ ) and also felt more competitive ( $M_{\text{competitive}} = 4.86$ ,  $SD = 1.61$  vs.  $M_{\text{cooperative}} = 3.59$ ,  $SD = 1.80$ ,  $t(188) = 5.09$ ,  $p < .001$ ). These manipulations were consistently successful throughout all studies (Supplementary Material S4, Figs. S3 and S4). Moreover, faces that were preselected (based on a separate sample) as attractive were indeed rated as more attractive than the unattractive faces (men's faces:  $M_{\text{attractive}} = 3.72$ ,  $SD = 0.91$  vs.  $M_{\text{unattractive}} = 2.29$ ,  $SD = 0.81$ ,  $t(102) = 19.11$ ,  $p < .001$ ; women's faces:  $M_{\text{attractive}} = 3.94$ ,  $SD = 0.81$  vs.  $M_{\text{unattractive}} = 2.72$ ,  $SD = 0.82$ ,  $t(89) = 18.16$ ,  $p < .001$ ). This pattern of results was consistent across all subsequent studies. Thus, we will not report them in this paper again (see Supplementary Material S5, Fig. S5).

#### 6.2.2. Attractiveness ratings

We removed three respondents who made errors (i.e., late responses or pressed a key other than 1–7) in more than five trials, leaving 191 subjects in our final analysis. We conducted a 2(competitive vs. cooperative)  $\times$  2(participant gender) between-subjects ANOVA using ratings of men's and women's faces as the dependent variables (refer to Supplementary Material S6, Table S1 for Descriptive results). For the ratings of men's faces, a significant main effect of competition/cooperation emerged ( $F(1, 97) = 5.96$ ,  $p = .016$ ,  $\eta^2 = 0.058$ ), along with

a marginally significant interaction effect of competition/cooperation and participant gender ( $F(1, 97) = 3.68, p = .058, \eta^2 = 0.037$ ). A closer examination of the results indicated that the competition/cooperation manipulation affected women's (but not men's) aesthetic judgments: women in the cooperative condition reported higher attractiveness ratings for men's faces ( $F(1, 51) = 9.30, p = .004, \eta^2 = 0.154$ ). The cooperation/competition conditions had no significant effect on men's aesthetic judgments for men's faces ( $F(1, 46) = 0.14, p = .71, \eta^2 = 0.003$ ).

Similarly, results for ratings of women's faces as the dependent variable revealed a significant main effect of competition/cooperation ( $F(1, 86) = 4.64, p = .034, \eta^2 = 0.051$ ) and a significant main effect of gender ( $F(1, 86) = 8.34, p = .005, \eta^2 = 0.088$ ), both qualified by a significant interaction effect ( $F(1, 86) = 6.20, p = .015, \eta^2 = 0.067$ ). Only women were affected by the competition/cooperation manipulation. However, competition/cooperation affected women's ratings of other women's faces in the opposite direction from women's ratings of men's faces. Specifically, women in a competitive state reported higher attractiveness ratings for women's faces ( $F(1, 46) = 14.2, p < .001, \eta^2 = 0.236$ ). There was no difference in attractiveness ratings of women's faces by men in a competitive or cooperative state ( $F(1, 40) = 0.04, p = .835, \eta^2 = 0.001$ ).

Fig. 2 displays attractiveness ratings of men's and women's faces by men and women in competitive versus cooperative conditions. Similar patterns emerged for attractive and unattractive faces (Supplementary Materials S9, Figs. S6 and S7).

Further, a  $2(\text{competitive vs. cooperative}) \times 2(\text{participant gender}) \times 2(\text{face gender})$  between-subject ANOVA revealed a significant main effect of face gender ( $F(1, 183) = 9.57, p = .002, \eta^2 = 0.05$ ), a marginally significant effect of participant gender ( $F(1, 183) = 3.55, p = .06, \eta^2 = 0.019$ ), a significant interaction of competition/cooperation and face gender ( $F(1, 183) = 10.48, p = .001, \eta^2 = 0.019$ ), a significant interaction effect of face gender and participant gender ( $F(1, 183) = 4.87, p = .029, \eta^2 = 0.026$ ), and importantly, a significant three-way interaction ( $F(1, 183) = 9.67, p = .002, \eta^2 = 0.05$ ) on attractiveness ratings. The same patterns were shown for attractive faces and unattractive faces (see Supplementary Material S7, Table S6).

### 6.2.3. Control variables

We controlled for mood (positive and negative) and individual differences (vertical/horizontal individualism, vertical/horizontal collectivism, independence/interdependence). ANCOVA analyses with

control variables as covariates revealed results similar to those of the ANOVA analyses. We reported results of the ANCOVA analyses in Supplementary Material S8.1 (also see Tables S8 and S9). Further, we used bootstrapping analysis to test for potential moderation effects of these variables using the Hayes Process macro. Results showed no significant interaction effects (Supplementary Materials S8.1), suggesting that these variables did not moderate the effect of competition/cooperation on attractiveness ratings. Interestingly, the main effect of women reporting higher attractiveness ratings of other women's faces in the competitive mode than in the cooperative mode held regardless of how attractive women participants perceived themselves to be (refer to Supplementary Materials S8.1). Moreover, there was no difference between the competitive and cooperative state in any of the three self-evaluation measures for both the men and women groups ( $ps > .2$ ; Supplementary Material S6, Table S3). The results of the self-evaluation measures were consistent across all studies; therefore, we will not report them again.

### 6.3. Discussion

Results from Study 1 provide initial evidence for the effect of social exchanges on facial attractiveness judgments. Notably, the social exchange affected facial judgment only for women and occurred in opposite directions depending on whether the target face was a man or a woman. Women in a competitive state, compared to women in a cooperative state, rated the same women's faces as more attractive. The opposite was true when women rated men's faces: in the cooperative state, men's faces were rated as more attractive than in the competitive state. The social exchange condition did not affect either the ratings by men or self-attractiveness evaluations. The absence of effects for men was in line with our hypothesis (H2). We identify two potential reasons. First, attractiveness is a form of “currency” for women's competition and thus might carry additional significance for women than for men. Therefore, attractiveness judgments are more likely to reflect women's reactions following a competitive context. Second, men have been found to be drawn to competition and more confident in competitive situations than women (Kleinjans, 2009; Niederle & Vesterlund, 2007). Hence, women might experience greater threat from competition compared to men, making them more sensitive and susceptible to the effects of competition. Within women participants, we found opposite effects for ratings of women's faces and men's faces. Given the complex, yet intriguing, results specific to women's facial judgments, we chose to focus on women in the subsequent studies.

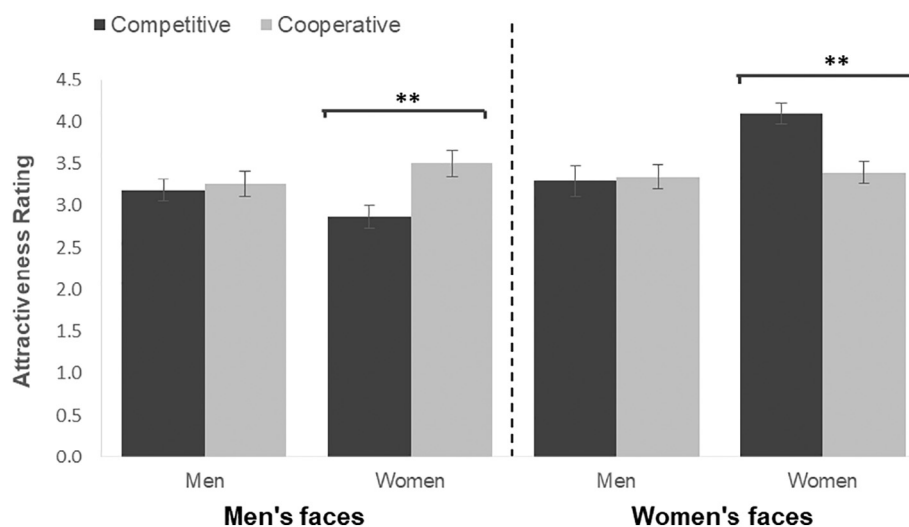


Fig. 2. Study 1 Results – Effect of competition versus cooperation on attractiveness ratings of men's faces and women's faces across rater gender. Error bars represent Standard Errors.

\*\* $p < .01$ .

## 7. Study 2: ratings of non-face stimuli (buildings)

In order to further understand this phenomenon, we tested whether the observed effect of cooperation and competition on facial attractiveness judgments is face-specific or a generalized effect on aesthetic judgments. Thus, in Study 2, in addition to faces, we tested the effect of competition/cooperation on the aesthetic judgment of a non-face stimulus. Architectural spaces are often encountered in our everyday experience and are thus good candidates for testing this specific hypothesis. Comparing judgments of faces and houses/buildings is common in neuroscience, as the human brain seems to have relatively specific and dedicated areas for these types of stimuli (Heekeren, Marrett, Bandettini, & Ungerleider, 2004). As we did not find any effect for men (Study 1), we focused on women in order to understand the phenomenon in greater depth. Of course, men's behaviour related to these variables remains inconclusive and would need to be further explored in other research.

### 7.1. Method

In all, 109 women ( $M_{\text{age}} = 21$ ,  $SD = 1.61$ ) participated in a series of seemingly unrelated tasks. This sample size allowed us to detect effects as small as  $f = 0.275$  ( $\eta^2 = 0.07$ ) with 80% power.

We randomly assigned participants to one of four conditions, in a 2(competitive vs. cooperative)  $\times$  2(faces vs. buildings) between-subjects design. The procedure followed the general methodology, with two exceptions. First, to further reduce unwanted variability, in this study (and all remaining studies) we explicitly disclosed the gender of the partner as a woman. Second, participants rated either faces or buildings, with the building judgment task including 16 buildings as stimuli and following the same design as the face judgment task. Images of buildings were obtained from the Internet and categorized by architectural/design experts. Aesthetic categorization was further confirmed based on pre-test results (see Supplementary Material S3, Fig. S2).

### 7.2. Results

Three participants who had more than five trials with errors were removed from the analysis. We then ran a 2(competitive vs. cooperative)  $\times$  2(faces vs. buildings) between-subjects ANOVA with attractiveness ratings as the dependent variable. Results revealed no main effect of competitiveness/cooperation ( $F(1, 102) = 0.03$ ,  $p = .85$ ) or of faces versus buildings ( $F(1, 102) = 2.69$ ,  $p = .1$ ), but there was a significant interaction ( $F(1, 102) = 15.17$ ,  $p < .001$ ,  $\eta^2 = 0.13$ ). Women in a competitive state evaluated women's faces as more attractive than those in a cooperative state ( $F(1, 52) = 7.40$ ,  $p = .009$ ,  $\eta^2 = 0.125$ ). Participants evaluating buildings did the opposite; those in a cooperative condition evaluated buildings to be more attractive ( $F(1, 50) = 7.97$ ,  $p = .007$ ,  $\eta^2 = 0.137$ ; Fig. 3; see Supplementary S6, Table S4 for descriptive results).

Separate ANOVA analyses of ratings of attractive and unattractive women's faces/buildings revealed similar patterns (see Supplementary Material S9, Figs. S8 and S9). As in Study 1, further results from ANCOVA analyses on attractiveness ratings with mood and individual differences as covariates showed similar results. No significant effect of mood and individual differences emerged (Supplementary Material S8.2, Table S10).

### 7.3. Discussion

Results from Study 2 provide evidence that the dampening effect of competition on women's aesthetic appreciation was not specific to faces, but rather a more general effect. Women in a competitive mode rated buildings as less attractive. A possible explanation for this is that competition-induced psychological stress (Fletcher, Major, & Davis,

2008; Sassenberg, Moskowitz, Jacoby, & Hansen, 2007) suppresses aesthetic appreciation; thus, aesthetic judgments were made in a negative light. Previous research has shown that competitive others are perceived as a potential threat, evoking caution, careful information processing, and conservative judgments (Vonk, 1998). This could explain why attractiveness ratings decreased in a competitive environment.

In addition, we replicated Study 1's results: women in a competitive state reported women's faces as more attractive than when in a cooperative state. The question remained as to what motivated women in a competitive mode to enhance their ratings of other women. We examined a potential underlying process of this effect in Study 3.

## 8. Study 3: self-affirmation and attractiveness ratings

We theorized that the enhanced attractiveness ratings by women of women's faces in the competitive state reflected an experience of threat produced by social comparison, which was heightened by the stress of competition. In evaluating the attractiveness of a same-sex target, a woman is likely to make a social comparison with herself as a reference. The stress induced by the competitive, hence threatening, situation (Sassenberg et al., 2007) leads the individual to perceive others as more attractive than themselves. On the other hand, the same mechanism would not apply to judgments of men, since no social comparison with the self is being made.

We tested this hypothesis that the underlying mechanism of our observations is threat perception by examining whether protecting participants from threat would restore ratings of women's faces to a non-competitive condition. Specifically, we relied on self-affirmation, a process in which an individual focuses on valued, positive attributes about themselves (Steele & Liu, 1983). Self-affirmation theory (Sherman & Cohen, 2006; Steele & Liu, 1983) suggests that bolstering the self in one important domain buffers the impact of threats in another. Self-affirmation counteracts the effects of social competition (Essees, Dovidio, Danso, Jackson, & Semanya, 2005), restores self-confidence (Briñol, Petty, Gallardo, & DeMarree, 2007) and relieves self-threat (Critcher & Dunning, 2015; Stinson, Logel, Shepherd, & Zanna, 2011). We note that physical attractiveness itself can be a source of self-affirmation (Wan, Xu, & Ding, 2014). Thus, affirming a favorable aspect of one's self would mitigate a reliance on resources provided by attractiveness. In other words, if facial attractiveness ratings of others were amplified as a consequence of experiencing threat, then offering a way to limit the threat (self-affirmation in this case) would mitigate the effect of competition on attractiveness judgments, making the higher attractiveness ratings no longer necessary. In other words, women in competition protected by self-affirmation would report lower ratings of attractiveness in other women compared to when self-affirmation is not provided.

An additional test could further examine this logic. Self-affirmation should have no effect in the cooperative mode, as cooperation is not threatening and thus does not generate additional need for self-affirmation. Formally, we hypothesized that.

**H3a.** Self-affirmation exercises reduce the effects of competition on women's facial attractiveness judgments of other women.

**H3b.** Self-affirmation exercises have no effect on women's facial attractiveness judgments of other women in a cooperative mode.

Recall that competition affects women's judgments of women's faces in a pattern opposite to women's judgments of men's faces and of buildings. A potential explanation for this effect is that evaluating buildings and men's faces does not involve social comparison. Thus, the effect of competition or cooperation on women's ratings of men's faces is a generalized effect on aesthetic appreciation, similar to aesthetic judgments of buildings, rather than a product of threat perception. If these inferences are true, then the addition of self-affirmation before

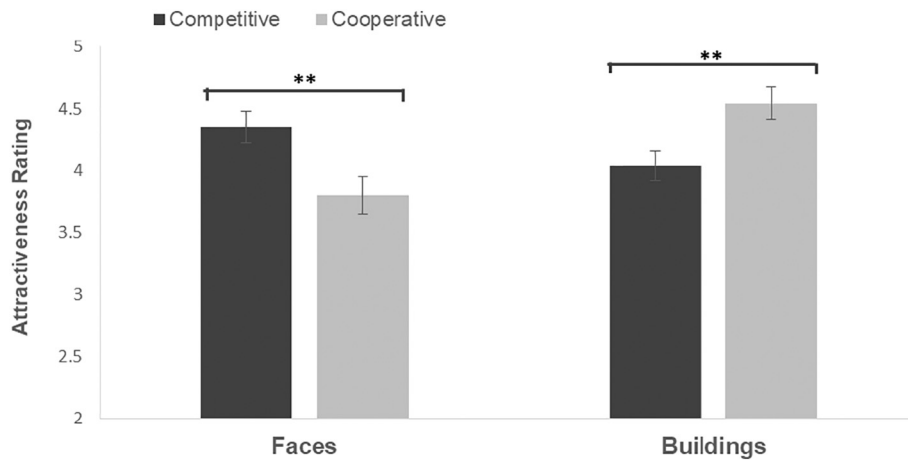


Fig. 3. Study 2 Results - Effect of competition versus cooperation on women's attractiveness ratings of women's faces and buildings. Error bars represent Standard Errors. \*\* $p < .01$ .

women rate men's faces would nullify or even reverse the patterns. Adding self-affirmation should increase women's attractiveness ratings of men's faces in the competitive state, as self-affirmation should recover the suppressed aesthetic appreciation. Moreover, as aesthetic appreciation should be heightened when the individuals feel positive about themselves, we predicted that under a cooperative mode, women's judgments of men's faces would also increase. Thus, providing self-affirmation simply adds another positive element and boosts ratings independent of state (competitive or cooperative). If the prediction regarding women's judgments of men's faces is true, it would provide further evidence that women's judgments of women's faces is a special case and one significantly modified by threat perception.

### 8.1. Method

Overall, 251 women ( $M_{\text{age}} = 21.26$ ,  $SD = 1.6$ ) participated in the study. We employed a 2(competitive vs. cooperative)  $\times$  2(self-affirmation vs. control)  $\times$  2(face gender) between-subjects design. Because of the sample size, we could detect effects as small as  $f = 0.246$  ( $\eta^2 = 0.06$ ) with 80% power.

The procedure was similar to the previous experiments, with one exception. The competition/cooperation manipulation was followed by an 'essay writing' task, an established self-affirmation manipulation adapted from previous research (e.g., Wan et al., 2014). In the self-affirmation condition, participants ranked 12 characteristics unrelated to physical attractiveness (creativity, sense of humor, etc.) in terms of how much they themselves possessed those characteristics. Participants then wrote about the characteristic that they considered themselves to embody most. In the control condition, participants described what they did the previous day between 5:00 pm and 7:00 pm.

### 8.2. Results

#### 8.2.1. Attractiveness ratings

Six participants who had more than five trials with errors were removed, leaving 245 participants in our analysis. Using attractiveness ratings of women's and men's faces as dependent variables, we conducted a 2 (competitive vs. cooperative)  $\times$  2 (self-affirmation vs. control) ANOVA. Results for ratings of women's faces as an dependent variable revealed a significant main effect of competition/cooperation ( $F(1, 120) = 36.61$ ,  $p < .001$ ,  $\eta^2 = 0.234$ ) and of self-affirmation/control ( $F(1, 120) = 6.02$ ,  $p = .016$ ,  $\eta^2 = 0.048$ ), both qualified by a significant interaction ( $F(1, 120) = 5.70$ ,  $p = .019$ ,  $\eta^2 = 0.045$ ; means and standard deviations in Supplementary Materials S6, Table S5). In the control condition, women in the competitive mode rated women's faces as more attractive than those in the cooperative mode ( $F(1,$

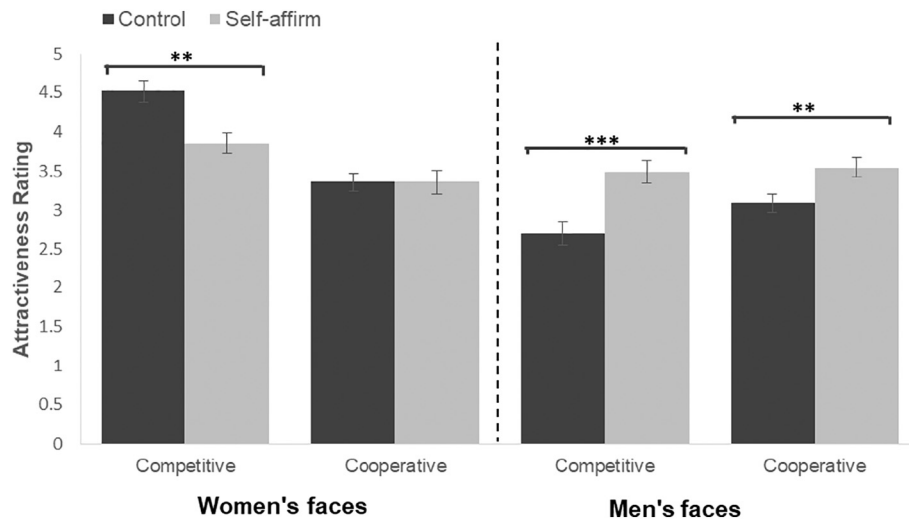
59) = 40.35,  $p < .001$ ,  $\eta^2 = 0.406$ ), replicating the Study 1 results. Yet, introducing self-affirmation lowered attractiveness ratings (as compared to the control condition) but only in the competitive condition ( $F(1, 62) = 12.06$ ,  $p = .001$ ,  $\eta^2 = 0.163$ ; confirming H3a); there was no effect in the cooperative condition ( $F(1, 50) = 0.32$ ,  $p = .96$ ,  $\eta^2 < 0.001$ ; confirming H3b).

ANOVA results with ratings of men's faces as the dependent variable revealed a significant effect of self-affirmation/control ( $F(1, 117) = 22.69$ ,  $p < .001$ ,  $\eta^2 = 0.162$ ) and a marginally significant main effect of competition/cooperation ( $F(1, 117) = 2.93$ ,  $p = .09$ ,  $\eta^2 = 0.024$ ). Importantly, the interaction effect of competition/cooperation and self-affirmation/control was not significant ( $p = .2$ ). Self-affirmation inflated women's ratings of men's faces in both competitive ( $F(1, 56) = 13.74$ ,  $p < .001$ ,  $\eta^2 = 0.197$ ) and cooperative ( $F(1, 61) = 8.47$ ,  $p = .005$ ,  $\eta^2 = 0.112$ ) states (see Fig. 4). Moreover, we replicated the effects found in Study 1: women in a cooperative condition reported higher attractiveness ratings of men's faces compared to women in a competitive condition ( $F(1, 56) = 4.41$ ,  $p = .04$ ,  $\eta^2 = 0.073$ ). Responses to attractive and unattractive faces followed similar patterns for both categories (see Supplementary Material S9, Figs. S10 and S11).

Overall, results from a 2(competitive vs. cooperative)  $\times$  2(self-affirmation vs. control)  $\times$  2 (face gender) ANOVA revealed a significant main effect of competition/cooperation ( $F(1, 237) = 10.08$ ,  $p = .002$ ,  $\eta^2 = 0.04$ ) and of face gender ( $F(1, 237) = 35.51$ ,  $p < .001$ ,  $\eta^2 = 0.13$ ) along with a significant interaction effect of competition/cooperation and face gender ( $F(1, 237) = 30.73$ ,  $p < .001$ ,  $\eta^2 = 0.12$ ), of affirm/control and face gender ( $F(1, 237) = 25.67$ ,  $p < .001$ ,  $\eta^2 = 0.10$ ), and importantly, a significant three-way interaction of competition/cooperation, affirm/control, and face gender ( $F(1, 237) = 6.82$ ,  $p = .01$ ,  $\eta^2 = 0.03$ ).

#### 8.2.2. Control variables

The observed effects persisted when we incorporated control variables, including mood and individual differences, as covariates (Supplementary Material S8.3, Tables S11 and S12). Results from ANCOVA analyses and moderation analyses using Hayes Process macro showed that these variables did not affect attractiveness ratings and did not moderate the effect of competition/cooperation on attractiveness ratings (with the exception of Independence on ratings of men's faces, see Supplementary Material S8.3, Table S12). Given that how attractive a woman thinks herself to be could affect this self-affirmation mechanism, we examined how self-rated attractiveness ratings affected judgments of other women's attractiveness. We found that in the competitive mode, self-affirmation reduced ratings only for those with high perceived attractiveness of themselves (Supplementary Material S8.3),



**Fig. 4.** Study 3 Results - Effect of self-affirmation on women's ratings of women's and men's faces in competitive versus cooperative condition. Error bars represent Standard Errors.

\*\* $p < .01$ , \*\*\* $p < .001$ .

suggesting that positive perceptions of one's attractiveness acted as an affirmation mechanism only if coupled with self-affirmation in another self-aspect or attribute unrelated to attractiveness. One's favorable perceptions of one's own attractiveness were not sufficient to protect against the experience of threat. On the other hand, in the cooperative condition, attractiveness ratings did not differ between the affirmation and control condition, regardless of the rater's self-perceived attractiveness, ( $p$ s  $> .7$  for both high and low own attractiveness). In contrast, the effect of self-perceived attractiveness did not hold for women's ratings of men's faces. Affirmation increased ratings of men's faces as compared to the control condition irrespective of women's self-perceived attractiveness (Supplementary Material S8.3).

### 8.3. Discussion

Findings from Study 3 confirmed the results from previous studies. Women in a competitive mode evaluated the faces of other women as more beautiful compared to their counterparts in a cooperative mode. Importantly, in accordance with our hypothesis, this study showed that self-affirmation attenuated the effect of social competition on facial beauty judgments. Specifically, when given the opportunity to affirm themselves, women in the competitive state evaluated women's faces as less attractive compared to when the self-affirmation opportunity was not provided. In contrast, in the cooperative mode there was no difference in evaluations regardless of whether or not explicit self-affirmation occurred. We concluded that the effect of competition on women's facial beauty judgments of other women was related to the experience of threat. In other words, results from Study 3 support the idea that women's enhanced attractiveness ratings of women's faces under a competitive state were driven by the experience of threat.

Our findings of men's faces ratings further support our hypotheses. Self-affirmation improved women's ratings of men's faces, irrespective of the social condition (competitive or cooperative) or women's self-perceived attractiveness. Self-affirmation seemed to simply add a positive element and boost general aesthetic ratings. In women's ratings of women's faces, we found no effect of affirmation (vs. control) in a cooperative mode. This lack of a "boosting" effect of self-affirmation for women's ratings of other women in the absence of competition in fact further suggests that women's facial judgment of women is a special case that follows mechanisms different from women's ratings of men's faces, and possibly overall aesthetic judgments. Women might be more cautious when judging same-sex others, as their judgments of other women may reflect more about themselves as compared to judgments

of men.

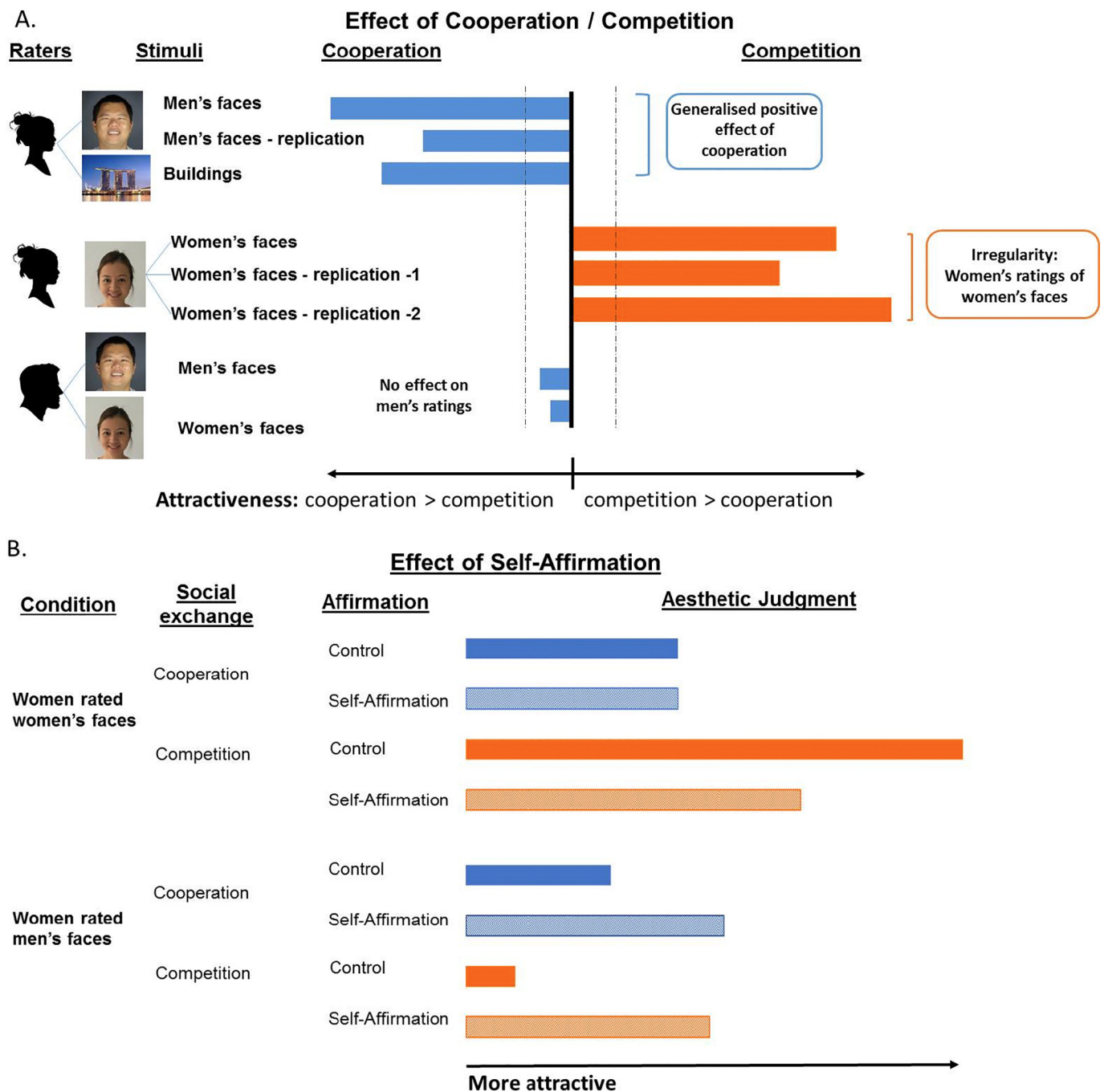
We conducted a series of experiments to test our initial findings from multiple angles. An overview of the results is needed here to clarify these complex results. We summarized the main findings in Fig. 5.

## 9. General discussion

An important question in aesthetics is whether attractiveness judgments are determined by objective parameters or are modified by context. Our results suggest that facial attractiveness judgments are malleable and dynamic, particularly when made by women. They are shaped by even unrelated social exchanges of resources. Across three studies, we consistently found that women in a competitive versus a cooperative environment rated other women as more attractive, while rating men as less attractive. We demonstrated that the effect of competition, as compared to cooperation, lowered attractiveness judgments for men and generalized to other aesthetic judgments (buildings). This pattern suggests that, overall, competition dampens aesthetic appreciation and reduces the experience of attractiveness of stimuli.

However, women's facial attractiveness judgments of other women seem to be a special case that does not follow this general pattern. Specifically, women in a competitive state evaluated other women's faces as more attractive compared to when they were in a cooperative state. We replicated this finding and provide evidence that self-affirmation is a potential mechanism that mediates this behavior. Self-affirmation reduced the effect of social competition on women's attractiveness judgment of women's faces, suggesting that such appraisals are significantly affected by the experience of threat, and reduced the experience of threat, meaning other women no longer seemed more attractive.

Prior research has shown that in the service of intrasexual competition, men and women employ two strategies for relative self-enhancement: making oneself more appealing and rendering the competition less appealing (Buss & Dedden, 1990; Schmitt & Buss, 1996). Thus, one might predict that women in a competitive context would decrease their ratings of other women as a way to derogate potential competitors. Yet our results showed the opposite pattern, that following a competitive situation, women rated other women's faces as more attractive. There are several possible reasons for this finding. First, in our study we did not mention intrasexual competition or the context of mating explicitly. Second, our findings might reflect women's reactions before they engage in potential derogation strategies. That is, before



**Fig. 5.** Schematic summary of findings.

A. Schematic summary of the effects of social exchanges (competition/cooperation) on aesthetic judgments. Cooperation increased women's aesthetic ratings of men's faces as well as buildings (first three blue bars). Yet, when women judged women's faces the effect was reversed with competition consistently increasing aesthetic ratings (orange bars). No effect of social exchanges was observed on men's ratings (bottom).

B. Schematic summary of the effects of self-affirmation as a potential mechanism. When women rated women's faces, self-affirmation – a process that counteracts the effects of social competition – decreased ratings in competition, whereas it had no effect on ratings under cooperation. Self-affirmation increased women's ratings of men's faces irrespective of the type of social exchange. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

employing any tactic to derogate intrasexual competitors, women first experience threat induced by competition, and, as shown in our studies, their inflated ratings of other women reflected this threat. Moreover, past research has also shown that there are other competitor derogation strategies that are more effective than derogating appearance. For example, Buss and Dedden (1990) and Schmitt and Buss (1996) found that the acts that were judged to be most effective at derogating competitors for both men and women are those suggesting prior

commitment, exploitation, sexual infidelity, sexual orientation and social disease. These strategies might be prioritized above derogating appearance.

One might question the effect of women's perception of their own attractiveness and self-confidence on how they rate other people. Specifically, higher self-ratings of attractiveness and confidence in one's own appearance might provide a source of affirmation and thus attenuate the effect of competition on women's facial ratings of other

women. However, we did not find moderating effect of self-ratings and confidence on the effects of competition on women's ratings of women's faces. In other words, the effect held irrespective of women's self-assessment. Both women who "felt beautiful" and women who felt less confident about their appearance were sensitive to this effect. Self-perceived attractiveness did seem to be an important qualifier, with women who had higher ratings of their own attractiveness being more sensitive to self-affirmation manipulations.

Another important question remains as to whether the social exchange changes the original ratings of attractiveness over and above individual differences in attractiveness. According to our results, whereas social contexts had an influence on facial attractiveness judgments, the ranking of facial attractiveness was relatively stable. Specifically, we found that the pre-categorized attractive faces were still rated as more attractive than the unattractive faces (Supplementary S5, Fig. S5). The ranking of the faces was unaffected, indicating that the social context did not affect differences in individual rankings. Taking women's ratings of women's faces as an example, the favorable social environment for attractiveness (competition) increased ratings of unattractive faces by one standard deviation (SD). Similarly, for attractive faces, the unfavourable social environment for attractiveness (cooperation) decreased ratings of attractive faces by approximately one SD. Yet, even after these adjustments, ratings of attractive faces, even in the worst scenario (cooperation), were one SD higher than ratings of unattractive faces in the best scenario (competition; refer to Table S2 in Supplementary Material S6 for detailed calculations). This means that individual differences in attractiveness are stronger than the effect of context.

Our findings demonstrated that the social exchange did not have any impact on facial attractiveness judgments made by men on faces of either gender. After the social exchange, men in the competitive condition perceived the other player as more competitive and felt more competitive as well. Thus the absence of an effect on men is not likely to be an artifact of the experiment. A competitive mindset did not influence the way men responded to others' faces. In other words, the competitive state did not transfer to subsequent aesthetic judgments. We identify two potential reasons for these observed gender differences. Firstly, as discussed earlier, since attractiveness is one of the primary criteria used by men when selecting mates, women are more likely to be concerned about their own attractiveness (Fisher, 2004). In fact, women tend to more readily consider other women, especially attractive ones, as competitors (Maner et al., 2003). For women, but not (or less so) for men, attention is captured strongly by same-sex attractive faces (Maner et al., 2003). Second, prior research has revealed significant gender differences in taste for competition (Kleinjans, 2009); men are drawn to competition, while women shy away from it (Niederle & Vesterlund, 2007). Women may not like to compete and underperform in competitive lab-based environments relative to men who often are more confident in those contexts (Kleinjans, 2009). Thus, in our study women might have been more sensitive and susceptible to the effect of competition than men. It would be worthwhile to examine whether the phenomenon also holds for men judging other types of stimuli, such as status symbols (e.g., expensive cars). Alternatively or additionally, this might be because men have been found to be more competitive and more likely to enjoy competitive situations (Gneezy et al., 2003). Further studies are needed to understand how men's judgments of other men are influenced by social exchanges.

Overall, the present research reveals the malleability of beauty judgments. We show that beauty judgments vary not only across individuals, but also within an individual. Not only do such judgments vary, they can shift as a function of irrelevant social exchanges. This suggests that beauty judgments are not immune to social conditions. Understanding these mechanisms can help us understand the complex relationship between socio-economic dynamics and aesthetic preferences.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jesp.2018.08.010>.

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