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Original Article

Distinguishing Between Perceiver and Wearer Effects in Clothing Color-Associated Attributions

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Abstract: Recent studies have noted positive effects of red clothing on success in competitive sports, perhaps arising from an evolutionary predisposition to associate the color red with dominance status. Red may also enhance judgments of women's attractiveness by men, perhaps through a similar association with fertility. Here we extend these studies by investigating attractiveness judgments of both sexes and by contrasting attributions based on six different colors. Furthermore, by photographing targets repeatedly in different colors, we could investigate whether color effects are due to influences on raters or clothing wearers, by either withholding from raters information about clothing color or holding it constant via digital manipulation, while retaining color-associated variation in wearer's expression and posture. When color cues were available, we found color-attractiveness associations when males were judged by either sex, or when males judged females, but not when females judged female images. Both red and black were associated with higher attractiveness judgments and had approximately equivalent effects. Importantly, we also detected significant clothing color-attractiveness associations even when clothing color was obscured from raters and when color was held constant by digital manipulation. These results suggest that clothing color has a psychological influence on wearers at least as much as on raters, and that this ultimately influences attractiveness judgments by others. Our results lend support for the idea that evolutionarily-derived color associations can bias interpersonal judgments, although these are limited neither to effects on raters nor to the color red.

Keywords: mate choice, beauty, attribution, behavior, evolutionary psychology.

Introduction

Amongst mammals, primates exhibit the most widespread variation in dermal and pelage coloration and particularly in the extent of sexual dichromatism, suggesting that color plays an important role in communication and sexual selection (Caro 2005). For example, elevated levels of ovarian hormones induce increased epidermal vascular blood flow, altering levels of pink-red coloration of exposed skin (reviewed in Dixson 1983). Color changes in the female perineum may indicate fertility state (e.g., Czaja, Robinson, Eisele, Scheffler, and Goy, 1977; Zinner, van Schaik, Nunn, and Kappeler 2004) and, in chacma baboons (*Papio ursinus*), males exposed to an ovariectomised female wearing an artificial model of a swollen female perineum (presented in eight different colors) responded positively only when the model was colored red (Bielert, Girolami, and Jowell 1989). In rhesus macaques (*Macaca mulatta*), increases in gaze duration by both males and females were obtained by digitally reddening images of female hindquarters (Gerald, Waitt, Little, and Kraiselburd 2007; Waitt, Gerald, Little, and Kraiselburd, 2006). Furthermore, redness of rhesus male faces varies during the mating season and is influenced by testosterone levels (Rhodes et al., 1997), and females prefer manipulated images of reddened faces (Waitt et al., 2003).

In humans, skin coloration is also thought to provide cues of underlying mate quality; for example, perceived health of male facial skin is associated with facial attractiveness (Jones, Little, Burt, and Perrett, 2004) and genetic heterozygosity (Roberts et al., 2005). Social judgments, such as estimation of attractiveness, age and health, are influenced by variability in color distribution and contrast in facial skin (Fink et al., 2006, 2008; Jones et al., 2005), and humans associate digitally manipulated redness of skin, cueing relative levels of oxygenated to deoxygenated blood, with perception of health in facial skin (Stephen, Coetzee, Law Smith, and Perrett, 2009; Stephen, Law Smith, Stirrat, and Perrett, 2009).

It has been suggested that such functional responses to color, particularly to the color red, may also influence perception of individuals when they wear different colored clothing (reviewed in Elliot and Maier, 2007; Elliot and Niesta, 2008). For example, wearing red is associated with success in both individual combat (Hill and Barton, 2005) and team sports (Attrill, Gresty, Hill, and Barton, 2008), and in multiplayer computer games (Ilie, Ioan, Zagrean, and Moldovan, 2008). This may be because the color red is associated with aggression and dominance (Hill and Barton, 2005; Little and Hill, 2007), and experimental studies using physiological measures (e.g., galvanic skin response [GSR]) show that red is more arousing than other colors (e.g., Wilson, 1966). Effects of red and other colors may be context-dependent (Elliot and Maier, 2007) and sometimes negative (red may be associated with danger and fear of failure, leading to lower performance in certain situations: Elliot, Maier, Moller, Friedman, and Meinhardt, 2007). However, in mating contexts, red has positive effects on the perception of female attractiveness. In a series of five experiments, Elliot and Niesta (2008) showed that ratings of female images were consistently higher when framed by red than by other colors, where participants saw either the image framed in red or the same image framed by one other color (across experiments, red was compared in pair-wise fashion against white, gray, green and blue). In the final experiment, the color manipulation was achieved by varying the color of the shirt shown in the target image.

The experimental design employed by Elliot and Niesta (2008) aims at testing effects of color on perception of attractiveness in raters, but this and other studies cannot distinguish between color-induced changes in person perception by others and color-induced behavioral or mood shifts in clothing wearers themselves. Hill and Barton (2005) point out, for instance, that the combat advantage associated with wearing red could arise either through an intimidation-like effect on opponents or by boosting confidence in red-wearers (for alternatives, see Hagemann, Strauss, and Leißing, 2008; Rowe, Harris, and Roberts, 2005). Indeed, both mechanisms could play a part, as evidenced by a study on the effects on aggressive behavior of black and non-black uniforms of professional football and hockey teams (Frank and Gilovich, 1988). Black uniforms were associated with greater perceived aggression, leading to a higher number of disciplinary actions from referees, but also (in a laboratory setting) with higher levels of actual aggressive intent.

Here we extend these recent studies on color effects on perception, with specific focus on attributions of attractiveness. Similarly to Elliot and Niesta (2008), in Experiment 1 we compare the effects of the color red versus selected other colors on opposite-sex ratings, but we extend this to include effects on males as well as females, and using images in which the color manipulations are obtained not by digital color alteration but by target participants actually wearing differently-colored clothing (we used a series of images of males and females generated by photographing participants six times, where participants wore a different colored t-shirt in each image). Furthermore, rather than comparing red and other colors using a paired-color design, we compare several colors within one experiment, enabling a more direct comparison of different colors on judgments, and using a within-participants design.

In Experiment 2, we extend this further to include both same-sex and opposite-sex judgments and we also test whether color-modulated attributional differences are driven by rater perceptions alone, or by effects on clothing wearers. Our use of photographs taken while wearing different colors rather than digital color alteration permitted the possibility of subtle changes in facial expression or posture as a result of wearing different colors. We presented these images to two independent sets of raters, where one set viewed images with the shirts visible and the other viewed images with the shirts (and thus their color) obscured. We predicted that if color effects act solely on raters, any color-attractiveness associations would disappear in the color-obscured condition. In contrast, if color-associations persist in the color-obscured condition, this would imply an effect on clothing wearers. Finally, in Experiment 3, we digitally altered the color of images to further investigate wearer versus perceiver effects of clothing color. We predicted that, if color influences wearers, there may be rating differences for images in which targets were photographed while wearing different colors even when color appears constant in the images presented to raters. To take a specific example: if red influences raters' judgments, attractiveness ratings should not differ between images in which the target was actually wearing red and those in which the target appears to be wearing red (to raters) but in fact was wearing another color when the image was taken. In contrast, if there are wearer effects, the former should be rated more attractive than the latter.

Experiment 1: Color and opposite-sex judgments of males and females

Methods

We took digital photographs (using a Canon Powershot camera, 640x480 pixels) of ten male and ten female participants (undergraduate students, age 18-22) under standard light conditions and against a white background while wearing t-shirts of six different colors: red, black, blue, green, yellow and white (six images of each participant; see Figure 1 for an example set). All t-shirts were of the same brand and size. Participants were instructed to adopt a neutral expression and to look directly at the camera with hands at their sides; images captured participants from the chest upwards. The order in which participants wore each color was randomized. Participants were all of Caucasian origin and were not reimbursed for their participation.

The sixty images of each sex were then presented to each of 30 opposite-sex raters (university students aged 18-23) on a LCD screen (on-screen image size 23.5cm wide x 19cm high, resolution 72dpi), in a different randomized order for each rater, using a java applet. Raters were instructed beforehand that they would see images of several individuals of the opposite sex, and that they would see each individual several times. They were asked to provide ratings of attractiveness for each image, via the keyboard, on a 10-point scale anchored by scores of 1 (not very attractive) and 10 (very attractive).

Figure 1. Example set of images from one participant photographed separately in six differently-colored t-shirts.

We calculated mean scores awarded by each rater to the ten images seen in red and each of the other five colors. Mean scores for all color and sex combinations were approximately normally distributed (Kolmogorov-Smirnov tests, all ps > .2). The data were analyzed in SPSS version 16 using repeated-measures analysis of variance (ANOVA) with color as the within-subject variable. Variances of the between-condition differences were unequal (Mauchly's test for sphericity) and we thus used corrected numerator and denominator degrees of freedom using Greenhouse-Geisser correction (see Field, 2005), which is a conservative correction and minimizes risk of Type I error. When results of ANOVA were significant we used planned contrasts to compare effects of red and other colors, and post-hoc least significant difference tests to compare differences amongst other colors.

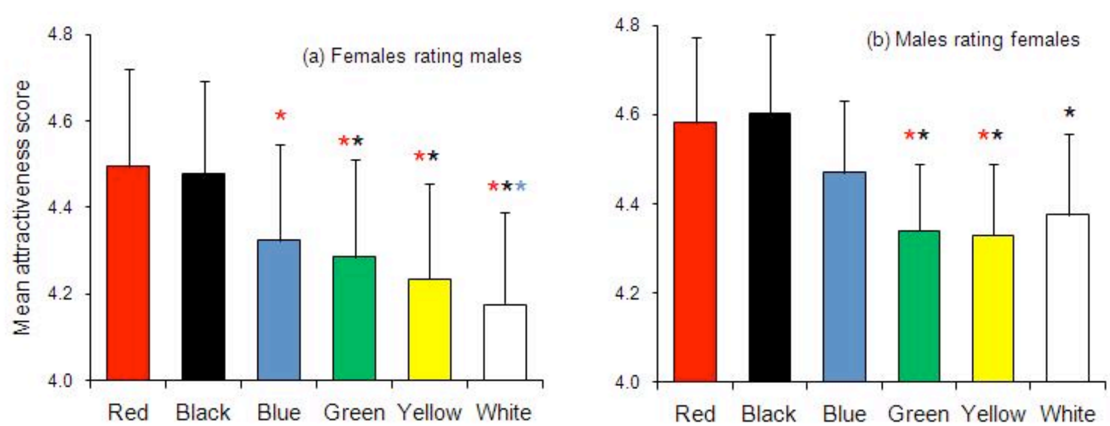
Results

Analyses confirmed significant effects of color in both comparisons (males rating females: $F\ (2.6, 102.2) = 3.28$, $p = .031$; females rating males: $F\ (3.5, 102.2) = 6.09$, $p < .001$). Regardless of sex, raters awarded highest scores to images in which targets wore red or black (Figure 2).

For females rating male images (Figure 2a), planned contrasts showed that ratings in red were not different from those in black [$F\ (1, 29) = .048$, $p = .828$] but were significantly higher than all other colors [blue: $F\ (1, 29) = 7.88$, $p = .009$; green: $F\ (1, 29) = 8.75$, $p = .006$; yellow: $F\ (1, 29) = 8.92$, $p = .006$; white: $F\ (1, 29) = 24.42$, $p = .00003$]. However, color differences were not restricted to comparisons between red and other colors: post-hoc paired comparisons showed that ratings in black were also higher than blue ($p = .070$), green ($p = .020$), yellow ($p = .026$) and white ($p < .001$), while ratings in blue were higher than those in white ($p = .012$).

A similar pattern was found for males rating female images (Figure 2b). Planned contrasts showed that ratings in red were not different from those in either black [$F\ (1, 29) = .064$, $p = .802$] or blue [$F\ (1, 29) = .804$, $p = .377$] but were significantly higher than green and yellow [green: $F\ (1, 29) = 4.91$, $p = .035$; yellow: $F\ (1, 29) = 4.34$, $p = .046$; white: $F\ (1, 29) = .260$, $p = .118$]. Again, ratings in black were also higher than green ($p = .007$), yellow ($p = .017$) and white ($p = .049$).

Figure 2. Mean scores (+ standard error) of (a) female and (b) male raters judging ten opposite-sex targets in six different shirt colors. Asterisks denote significant differences ($p < .05$; in either planned contrasts [red] or post-hoc comparisons [black, blue]) between the relevant color and the color of the asterisk.



Experiment 2: Color effects on wearers and raters

Methods

Using the same images and methodology as for Experiment 1, we presented these to two further groups of 30 raters (in each, 15 male and 15 female raters). To the first rater set, we presented the images of the opposite-sex, as in Experiment 1, but also the same-sex images. We did the same to the second rater set, but withheld clothing color cues by digitally masking shirts with a rectangle (solid grey shading) placed across their body so that only the neck and head were visible. Raters were recruited from among the student population and via personal contacts, and were aged between 18 and 35. No rater took part in both of these tests (with or without color cues) and no rater had taken part in Experiment 1.

As in Experiment 1, we calculated the mean scores of each rater for the ten images in each color, for either the same-sex or opposite-sex target images. For male and female raters, we used doubly-multivariate repeated-measures ANOVA (Tabachnick and Fidell, 1996; Roberts, Gosling, Carter, and Petrie, 2008), with color (six levels) and rating type (same-sex, opposite-sex) as within-subject measures. As in Experiment 1, data were normally distributed and we used Greenhouse-Geisser correction to the degrees of freedom where the assumption of sphericity was violated.

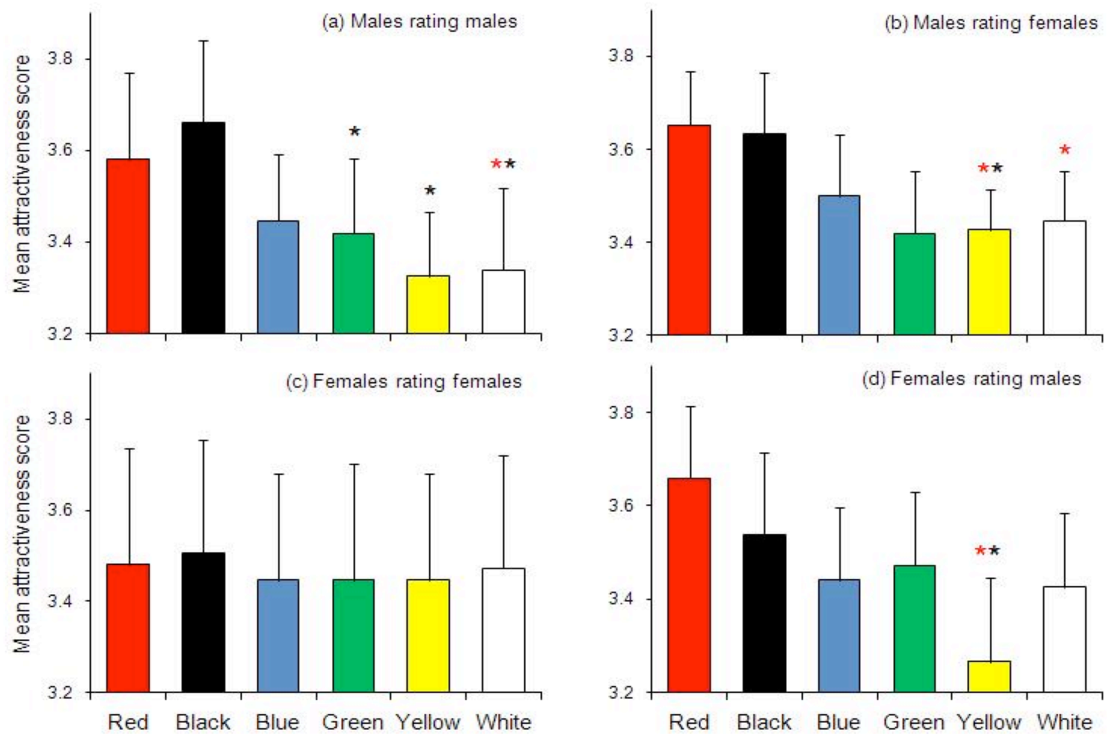
Results

Color effects on same and opposite-sex ratings

We again found significant effects of color on attractiveness ratings (Figure 3). For male raters, clothing color influenced judgments of both same-sex [F (5, 70) = 3.73, p = .005] and opposite-sex targets [F (5, 70) = 2.50, p = .039]. For female raters, color only influenced judgments of opposite-sex targets [F (5, 70) = 3.62, p = .006; same-sex: F (2.39, 33.4) = .21, p = .849]. Planned contrasts between ratings when images wore red and other colors showed several significant or near-significant effects. For male raters, higher scores were awarded to same-sex targets in red than yellow and white [respectively, F (1, 14) = 4.09 and 5.27, p = .063 and .038], and to opposite-sex targets in green, yellow and white [respectively, F (1, 14) = 3.28, 8.50 and 6.46, p = .092, .011 and .024]. Similarly in female raters, ratings tended to be higher when viewing opposite-sex individuals in red compared with green, yellow and white [respectively, F (1, 14) = 3.63, 9.26 and 3.65, p = .078, .009 and .077], but there was no difference between ratings in red and any other color in same-sex judgments.

As in Experiment 1, the differences were not confined to comparisons involving red, with post-hoc paired comparisons also showing differences between black and other colors. For males, higher scores were awarded to same-sex images in black than green, yellow and white (respectively, p = .006, .002 and .003; for opposite-sex ratings the same comparisons were .078, .039 and .092). In females, there were no differences between black and other colors in same-sex ratings, but in opposite-sex ratings, individuals in black received higher scores than they did in yellow (p = .001).

Figure 3. Mean scores (+ standard error) of (a) male and (c) female judges rating targets of the same sex, and (b) male and (d) female judges rating opposite-sex targets wearing different colors. Asterisks denote significant differences ($p < .05$; in either planned contrasts [red] or post-hoc comparisons [black]) between the relevant color and the color of the asterisk.



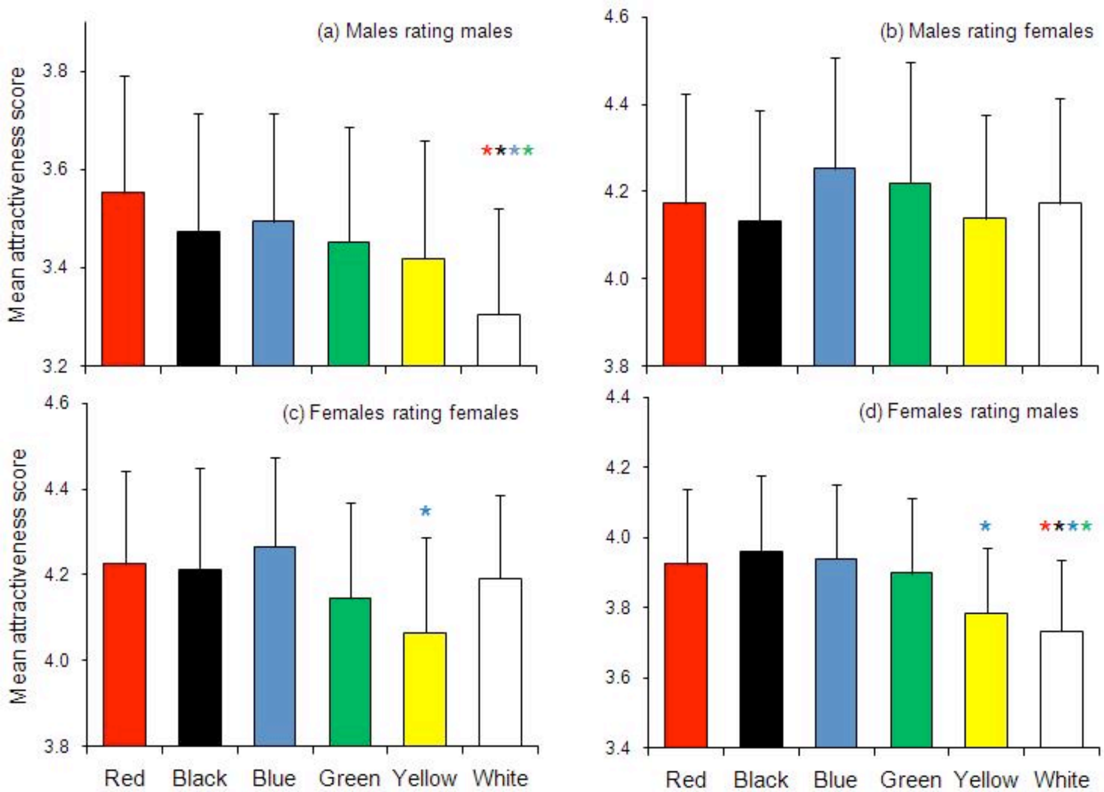
Ratings with color cues withheld

Unexpectedly, we also found some significant effects of wearing color when clothing color was obscured from raters (Figure 4). These were for judgments of male targets, whether by male raters [F (5, 70) = 3.32, p = .010] or female raters [F (2.78, 38.9) = 2.93, p = .049). In contrast, there were no significant effects on female targets [same-sex raters: F (5, 70) = 1.32, p = .267; opposite-sex raters: F (2.87, 47.1) = .73, p = .537].

Even in the absence of color cues, male targets photographed while wearing red received higher scores than when wearing white from male raters [F (1, 14) = 21.39, p = <.001; yellow: F (1, 14) = 4.28, p = .058], and also when judged by females [F (1, 14) = 11.07, p = .005].

Post-hoc analysis revealed only one significant difference between ratings of black and other colors (white, in same-sex and opposite-sex ratings for male targets, p = .027 and .005, respectively). However other color differences were also found. For male targets judged by male raters, both blue and green outscored white (p = .005 and .045, respectively), while when judged by female raters, male targets in blue outscored yellow and white (p = .036 and .043), and green outscored white (p = .030).

Figure 4. Mean scores (+ standard error) of (a) male and (c) female judges rating targets of the same sex, and (b) male and (d) female judges rating opposite-sex targets. Images were the same as in Figure 3 but here clothing color was obscured from raters. Asterisks denote significant differences (*p* < .05; in either planned contrasts [red] or post-hoc comparisons [black, blue, green]) between the relevant color and the color of the asterisk.

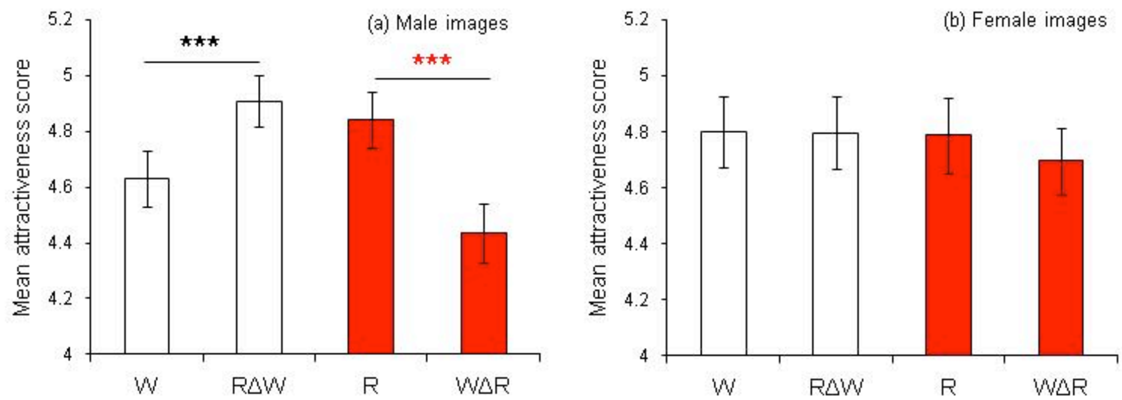


Experiment 3: Distinguishing between wearer and perceiver effects

Methods

To further investigate the effects of clothing color on wearers and perceivers, we compared ratings of images where clothing color, this time, was digitally manipulated. We selected for this experiment the previously-used images of males and females while wearing red and white only, representing opposite extremes of clothing color effects. Using Corel Photo-Paint, we created two new images for each target, changing the hue of the t-shirt from red to white, and from white to red. We then presented these (as always, in randomized order), along with the original images taken in red and white (4 images for each target, thus 40 male and 40 female images), to another independent group of 48 raters (25 male, 23 female university students aged 19-24). We analyzed the data using repeated-measures ANOVA separately for male and female targets, with color condition as the within-subjects variable (with 4 levels) and rater sex as a between-subjects factor.

Figure 5. Mean (± standard error) attractiveness scores of (a) male and (b) female images presented in either white shirts (white bars) or red shirts (red bars). Target images were of participants photographed while wearing white (W) or red (R), or where clothing color had been digitally changed from red to white (RΔW) or from white to red (WΔR). Asterisks denote significant differences, $p < .00001$.



Results

For judgments of male images, we found a significant main effect of color condition [F (3, 106.3) = 21.92, $p < .001$], but no effect of rater sex (Figure 5). Among the unmanipulated images, raters judged targets wearing red as more attractive than when wearing white, as expected from Experiments 1 and 2 ($p = .004$, Bonferroni-adjusted post-hoc pair-wise comparison). Comparison of images presented in the same color, however, reveals an intriguing pattern. When raters judged targets wearing white, they gave higher scores to images in which shirt color had been altered from red to white than they did to those in which white was the original color ($p = .000014$). In contrast, among images in which targets appeared to wear red, those in which shirt color had been altered from white to red received lower scores than those for which red was the original color ($p = .0000002$). These results suggest that, even when controlling for perceived clothing color, targets wearing red when photographed appear more attractive than when wearing white; in other words, there is a strong effect of clothing color on the wearer.

If color influences raters, on the other hand, we would expect from Experiments 1 and 2 that altering target clothing color from white to red would tend to increase attractiveness ratings, while altering color from red to white would decrease ratings. The results do not support this prediction. There was no difference between scores given to images of targets wearing red and images in which shirt color was altered from red to white, while altering color from white to red unexpectedly caused a reduction in rating, although the difference appeared slightly less marked than for the other comparisons ($p = .004$).

Finally, in contrast to male images, ratings for female images were unaltered by manipulation of clothing color [F (3, 138) = 1.71, $p = .169$].

General Discussion

Our results confirm and extend previous studies showing influences of clothing color on perception and behavior. Like Elliot and Niesta (2008), we found that clothing color affects ratings of attractiveness, but we show that this extends to judgments of males (by either males or females) as well as males' perception of females. For the first time, we also show that these effects are not restricted to differences between red and other colors, and that these effects may arise through color-associated influences on the clothing wearers at least as much as on the perceiver.

While most other studies compare the effects of the color red against another color (in a paired design with respect to color) and with a between-subjects design, we tested the effects of six different colors on attractiveness judgments and using a within-subjects design. This has the advantage of enabling direct comparison between colors and thus to explore effects of other color combinations. One disadvantage is that it may cue participants about the purpose of the experiment. Elliot and Niesta (2008) asked participants whether they could guess the purpose of their experiment (almost all did not) and probed the awareness of the effect of color, demonstrating that their participants were unaware of the color manipulation. Although we did not do this, we randomized the order of color and image presentation across raters, minimizing the possibility of a systematic effect of growing awareness on ratings, and cueing effects cannot have produced the differences in ratings in the color-obscured condition. Furthermore, collection of images, and ratings for Experiment 1, were carried out prior to publication of Elliott and Niesta's paper, and during debriefing no participants expressed awareness of any research into color effects on attractiveness; indeed, most appeared amused and surprised about the nature of the experiment.

One interesting result to emerge from our experiments is that clothing color effects are not limited to the positive influence of red. Although much attention has focused on red because of its societal associations (Elliot and Niesta, 2008) and those with mating and dominance (Elliot and Niesta, 2008; Hill and Barton, 2005; Little and Hill, 2007), there is need to compare effects of other color combinations before functional interpretations can be conclusive (Rowe et al., 2005). Clothing effects on person perception which involve other colors also exist, such as the association between black clothing and perceived aggression (Frank and Gilovich, 1988; Vrij, 1997). Here, wearing red, but also black, was associated with higher attractiveness scores. The two colors were approximately equivalent in their effects on attractiveness, in the sense that both black and red scores were not significantly different from each other in any of our comparisons, and both were associated with higher scores than several other colors. At the other end of the scale, there was a comparatively deleterious effect of wearing white and yellow in some comparisons, even when compared to blue or green.

Effects of color on attractiveness judgments were also somewhat context-dependent, varying with the sex of the targets and raters. Our results are the first to show that females are influenced by clothing color in judgments of male attractiveness, and that they are thus sensitive to color cues in social contexts. However, we found no detectable effect when females in different colors were rated by other females, contrary to a consistent intrasexual effect in males. It has been argued that males are generally more reliant on visual cues than females in mate choice contexts (e.g., Havlicek et al., 2008), but females can clearly see the colors and are sensitive to them in their judgments of males; thus they simply appear not to use these cues in intrasexual judgments. This is also consistent with Elliot and Niesta's (2008) Experiment 2, the only one of their five experiments that tested intrasexual judgments of female targets.

Context-dependent color effects have been previously noted and discussed (e.g., Elliot and Maier, 2007; Elliot and Niesta, 2008). Although red can have positive attributional effects and is associated with athletic success, it can also lead to lower performance (Elliot et al., 2007). Similarly, while black is associated with aggression in athletes and criminals (Frank and Gilovich, 1988; Vrij, 1997) it can be positively perceived in law enforcers (Nickels, 2008), and similarly, darkness of jacket affects perceived competence of female job applicants (Damhorst and Reed, 1986). In this regard, it is perhaps also worthy of note that, in Experiment 2, same-sex judgments by male or female raters attributed higher mean scores to targets in black than red, while in opposite-sex judgments, scores were higher in red than black; however, neither of these differences approached statistical significance and we merely mention it here as a point of possible further enquiry. A final possible context-dependent effect that needs to be investigated in future is whether these color associations are independent of skin color; it would be interesting to test whether these effects extend beyond participants of Caucasian origin.

We also detected significant effects of color even when clothing color was obscured. In Experiment 2, we were able to detect these effects through our experimental design in which separate images were captured when targets wore different colors, rather than digitally manipulating clothing color of the same image. While the difference in results between the color-visible and color-obscured tests is indicative of at least some effect on raters, the differences in scores according to clothing color in the latter test suggests also some additional effect of color on wearers. This effect appeared to be limited to when men wear the different colors, although raters of either sex are sensitive to it.

These conclusions were confirmed in Experiment 3, in which we controlled for clothing color in images seen by raters but retaining the design whereby targets were photographed while wearing different colors. We compared images in which targets actually wore red or white with those in which they merely appeared to be wearing red or white. The results demonstrate a positive effect of being photographed in red that is independent of the presented (perceived) clothing color: targets wearing red receive higher ratings than those wearing white but made to appear as though they were wearing red, and receive higher ratings when shirt color was digitally altered to white than targets photographed actually wearing white. Again, these effects are limited to male targets. In contrast, we did not find the pattern of change in ratings that would be predicted if color-biased attractiveness judgments are attributable to perceiver effects and the results therefore suggest that wearer effects may even be stronger than perceiver effects. By altering perceived clothing color from white to red, while holding constant other aspects of the image (e.g., expression) resulted in no change in ratings. Furthermore, the change in shirt color from white to red, which would have been expected to cause an increase in positive attributions if color affects raters, resulted in somewhat lower attractiveness scores. We do not know the reason for this unexpected result, and it deserves further investigation, but so far as the aims of the experiment are concerned, it is not consistent with a solely perceiver-driven positive association between attribution and the color red.

What could give rise to a color effect on clothing wearers? We suggest this could most likely be attributed to subtle and subconscious effects of color on kinesic cues such as facial expression, posture and head-tilt. Although all images were collected under the same conditions and with the instruction to look straight at the camera with a neutral expression, slight differences are inevitable between images; some of these differences are likely to be incidental and non-color related (experimental noise), but at least some appear to be influenced by clothing color. The nature of these kinesic cues, and whether they are underpinned by functional attributes such as self-confidence, dominance or attractiveness (see Roberts et al. 2009 for similar discussion in relation to effects on perfume wearers), is an interesting question for further research with a larger sample of targets.

It is also possible that these patterns of color effects can be explained by induced emotional states. However, previously-documented color-emotion associations do not adequately explain the differences reported here. For example, Valdez and Mehrabian (1994) found that among chromatic colors, red was more pleasurable to rate than yellow, which is consistent with the effects we describe, but conversely, red was less pleasurable than blue. Furthermore, raters reported feeling more dominant following exposure to green-yellow and yellow compared with red-purple. Although at first sight this is inconsistent with the idea that red signals dominance, one possible interpretation is that the dominance signal (red) elicits a self-impression of relative submissiveness in perceivers. If so, this is a conceivable explanation for a positive red effect on wearers. Unfortunately, the same logic breaks down when applied to achromatic colors. Valdez and Mehrabian (1994) show that white induces lower dominance scores in raters compared to black. If we applied to this comparison the same argument as we have just made for red, we would expect high ratings for men wearing white, but in fact the opposite was the case. We are thus unable, at present, to find a satisfactory and encompassing framework to explain these association patterns. Although we agree with other researchers (e.g., Elliot et al., 2007) that they are likely to originate in evolutionary predispositions that produce competitive or reproductive benefits, this conclusion requires cross-cultural testing since many color associations are cross-culturally variable (e.g., Hupka, Zaleski, Otto, Reidl, and Tarabrina, 1997; Madden, Hewett, and Roth, 2000).

In summary, our results have shown that clothing color affects perceived attractiveness of males as well as females, and that these color-associated effects are partly dependent on the gender of the perceiver and the wearer. Positive color-association in this context is not limited to the color red, but also to black, and still other colors may have additional positive or negative influences. For the first time, we show that these color effects on attractiveness are at least to some extent determined by induced psychological effects on clothing wearers rather than simply on those perceiving them. However, further research is needed to understand the mechanisms underlying these associations.

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