Psychology: Red enhances human performance in contests

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Red enhances human performance in contests

Signals biologically attributed to red coloration in males may operate in the arena of competitive sports.

Red coloration is a sexually selected, testosterone-dependent signal of male quality in a variety of animals1-3, and in some non-human species a male’s dominance can be experimentally increased by attaching artificial red stimuli4. Here we show that a similar effect can influence the outcome of physical contests in humans — across a range of sports, we find that wearing red is consistently associated with a higher probability of winning. These results indicate not only that sexual selection may have influenced the evolution of human response to colours, but also that the colour of sportswear needs to be taken into account to ensure a level playing field in sport.

Although other colours are also present in animal displays, it is specifically the presence and intensity of red coloration that correlates with male dominance and testosterone levels1-3. In humans, anger is associated with a reddening of the skin due to increased blood flow4, whereas fear is associated with increased pallor in similarly threatening situations5. Hence, increased redness during aggressive interactions may reflect relative dominance. Because artificial stimuli can exploit innate responses to natural stimuli6,7,8, we tested whether wearing red might influence the outcome of physical contests in humans.

In the 2004 Olympic Games, contestants in four combat sports (boxing, tae kwon do, Greco–Roman wrestling and freestyle wrestling) were randomly assigned red or blue outfits (or body protectors). If colour has no influence, we predicted that the number of red and blue winners should be statistically indistinguishable from the number of winners wearing red or blue given different degrees of relative ability (asymmetry) in the two competitors in each bout. No significant differences exist between the number of red and blue wins for contests with small (x2 = 2.21, d.f. = 1, P = 0.14), medium (x2 = 0.47, d.f. = 1, P = 0.50) or large asymmetries (x2 = 0.21, d.f. = 1, P = 0.64) in competitive ability. Black lines at 0.5 indicate the expected proportion of wins by red or blue under the null hypothesis that colour has no effect on contest outcomes. For details of data collection and analyses, see supplementary information.

These results indicate that artificial colours may influence the outcome of physical contests in humans. A preliminary analysis of the results of the Euro 2004 international soccer tournament, in which teams wore shirts of different colours in different matches, suggests that wearing red may also bestow an advantage in team sports and when opponents wear colours other than blue. We compared the performance of five teams that wore a predominately red shirt against their performance when wearing a different shirt colour (four played their other matches in white, one in blue). We found that all five had better results when playing in red (paired t-test, t = 3.15, d.f. = 4, P = 0.034), largely as a result of scoring more goals (t = 2.60, d.f. = 4, P = 0.041) (further details are available from the authors).

Hence, colour of sportswear may also be important.

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