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Original article

## The effect of red and blue uniforms on competitive anxiety and self-confidence in virtual sports contests



*L'effet des couleurs bleue et rouge sur l'anxiété et la confiance en soi dans un contexte de compétition virtuelle*

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### ABSTRACT

**Introduction.** – The present study aimed to examine the effect of blue and red uniform colors on competitive anxiety and self-confidence in virtual sports competitions.

**Objective.** – We hypothesized that blue is related to higher levels of self-confidence (a feeling related to the approach motivational system), whereas red is related to higher levels of anxiety (a feeling related to the avoidance motivational system).

**Method.** – Participants were confronted with an opponent dressed in either blue or in red.

**Results.** – Results revealed that participants who were exposed to an opponent in blue reported a higher level of self-confidence, while those who were exposed to an opponent in red reported a higher level of cognitive anxiety, supporting the view that blue (red) is related to the approach (avoidance) motivational system.

**Conclusion.** – Our findings incite a pursuit of the examination of the relationship between blue, red, competitive anxiety, and self-confidence in sport competitions.

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### R É S U M É

**Introduction.** – La présente étude cherche à examiner l'effet des couleurs bleue et rouge sur l'anxiété et la confiance en soi dans un contexte de compétition virtuelle.

**Objectif.** – Nous posons l'hypothèse que le bleu est associé à des hauts niveaux de confiance en soi (sentiment lié au système motivationnel d'approche), alors que le rouge est associé à des hauts niveaux d'anxiété (sentiment lié au système motivationnel d'évitement).

**Méthode.** – Les participants ont été confrontés à un adversaire habillé soit de bleu, soit de rouge.

**Résultats.** – Les résultats montrent que les participants qui ont été exposés à un opposant bleu rapportent un plus haut niveau de confiance en soi, alors que ceux qui ont été exposés à un opposant rouge rapportent un plus haut niveau d'anxiété compétitive, ce qui corrobore l'idée que les couleurs bleu et rouge sont liés au système motivationnel d'approche-évitement.

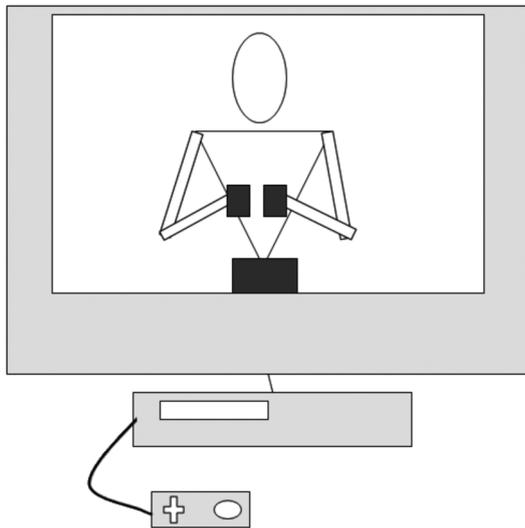
**Conclusion.** – Nos résultats incitent à poursuivre l'examen des relations entre les couleurs bleue et rouge, l'anxiété compétitive et la confiance en soi, dans les sports de compétition.

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Anthropologists revealed that certain animals (e.g. moths, bumblebees, robins, etc.) had a preference for the color blue (Keasar, Bilu, Motro, & Shmida, 1997; Kelber, 1997), whereas others (e.g., chickens, pigeons, mice, etc.) were repulsed by the color red (e.g., Prayitno, Phillips, & Omed, 1997; Sahgal & Iversen, 1975). Psychologists also found that these two colors may be related to different



**Fig. 1.** Schematic representation of the opponent's avatar during the dual. This picture presents a situation in which the participant competes against the dark avatar (corresponding to the blue fighter during the dual).

kinds of motivation: it was shown that blue facilitates creativity (Mehta & Zhu, 2009), whereas red generated avoidance behaviors (Elliot, Maier, Binser, Friedman, & Pekrun, 2009), suggesting the view that blue and red are related to approach and avoidance motivations, respectively (e.g., Smeesters & Liu, 2011). Indeed, in everyday life, blue (red) is often associated with openness (danger) (e.g., Smeesters & Liu, 2011), pleasant (unpleasant) feelings (Moller, Elliot, & Maier, 2009) and sensations (Michael & Rolhion, 2008).

Color effects on affect (Elliot, Maier, Moller, Friedman, & Meinhardt, 2007), cognition (Smeesters & Liu, 2011), social judgment (Krenn, 2014), motivation (Elliot et al., 2007), physiology (Elliot, Payen, Brisswalter, Cury, & Thayer, 2011), and performance (e.g., Elliot & Aarts, 2011; Elliot et al., 2007, 2009, 2011; Hill & Barton, 2005) have recently elicited scientists' interest. However, most of the studies were focused on the stressful effect of red (e.g., see Elliot et al., 2007, 2009, 2011), while the effect of blue received little attention (Smeesters & Liu, 2011). In addition, the relationships between colors and feelings of competitive anxiety and self-confidence have also received little attention in achievement contexts, while these affects are important performance-related

constructs (e.g., Woodman & Hardy, 2003). Accordingly, the present study aimed to examine the effect of blue and red on these affects in virtual sports contexts.

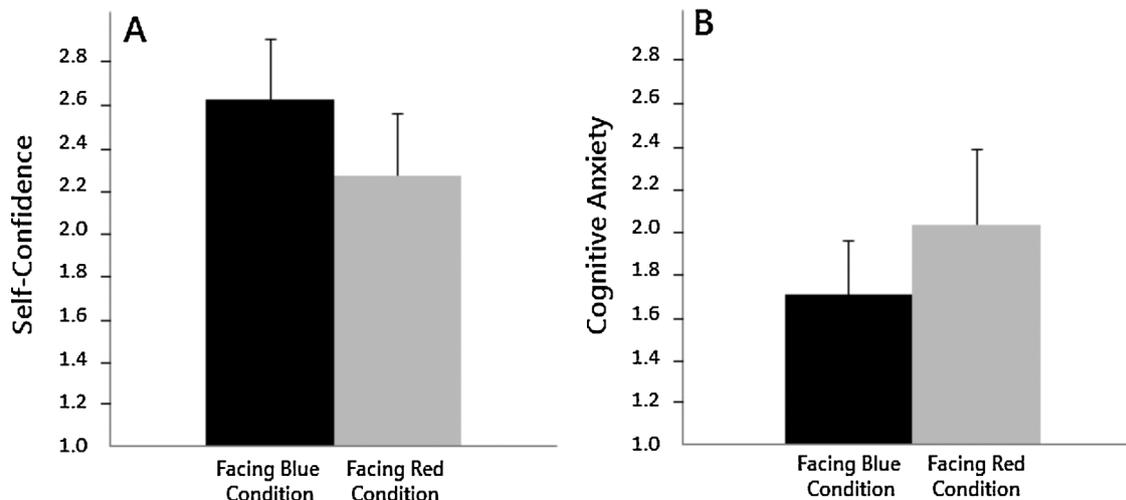
## 1. Study overview

This study attempted to examine the influence of the colors blue and red of the opponent's uniform on competitive anxiety and self-confidence in virtual sports competitions. To do so, we used fighting simulations through video games. Self-confidence and anxiety are feelings that are supposedly related to approach and avoidance motivational processes, respectively (e.g., Carver & Scheier, 1998). Therefore, because blue would be associated with approach motivation while red would be related to avoidance motivation (e.g., Elliot et al., 2011; Smeesters & Liu, 2011), we hypothesized that competing with an opponent dressed in blue should generate more self-confidence than when competing with an opponent dressed in red in pre-competitive periods, whereas competing with an opponent dressed in red should generate more competitive anxiety than when competing with an opponent dressed in blue.

## 2. Method

### 2.1. Participants and experimental design

Sixty undergraduate students in exercise science (100% male) who were not red-blue color-blind volunteered to participate in the study. They were 22.0 years old ( $SD = 2.4$ ) with a range of 18 to 25. The participants played a boxing video game called "Fight Night Round 4" on the "Playstation 3" processor developed by Sony. The experiment included only one experimental session where each participant competed in a head-to-head fight against the console's artificial intelligence. The virtual fighters were identical in height (1.90 m), weight (90 kg), face, and skin color (white). In the "Facing Red" (FR) condition, the participants were confronted with an opponent who wore red gloves and shorts, whereas in the "Facing Blue" (FB) condition ( $n = 30$ ), they were opposed to an opponent who wore blue gloves and shorts ( $n = 30$ ). The participants fought from the point of view of a real actor (internal view) so that they were confronted with the opponent-related information only (see Fig. 1); participants were randomly assigned to one of two conditions. The experiment was run in a dark room where the images of the fight were projected on a white wall 1.80 m  $\times$  1.30 m.



**Fig. 2.** A. Self-confidence and B. cognitive anxiety according to experimental conditions.

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