

Simulation of the Colour Blindness in Football

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Background

To date there has been no investigation of the in-play impact of colour vision deficiency in football. The aim of this study was to assess the effects of colour blind simulation on player's self-reported performance level, ease of picking out teammates, mental demand and decision making ability.

Method

24 male athletes played 6-aside football under 4 conditions. There were 2 games played: one in Oxford and one in Iceland. Condition 1 simulated normal vision with players wearing different colour bibs (see Figure 1), condition 2 simulated colour vision deficiency with both teams wearing the same bibs (see Figure 2), condition 3 reverted to normal vision with condition 4 duplicating the colour deficient condition. In each of the conditions, players rated their own performance level (0- very poor to 10- very good), ease of picking out teammates (0- very hard to 10- very easy), mental demand (0- not at all to 10- very demanding). For conditions, 2-4, a comparison was made to the previous condition to rate the level of change in decision making (0- not at all to 10-very much so) and there this has a positive or negative impact on performance (-3 very debilitating to 3 very facilitative).



Figure 1. Normal Colour Vision



Figure 2. Simulated Colour Vision Deficiency

Results

Performance Level

A repeated measures ANOVA identified that there was no significant difference for performance level throughout the four colour vision conditions ($F(2.03,44.64)=0.438$, $p=0.651$). Therefore, there were no significant differences between the conditions, indicating that players did not perceive their performance levels to change for the better or worse when performing in normal or colour blind simulated conditions, see figure 3.

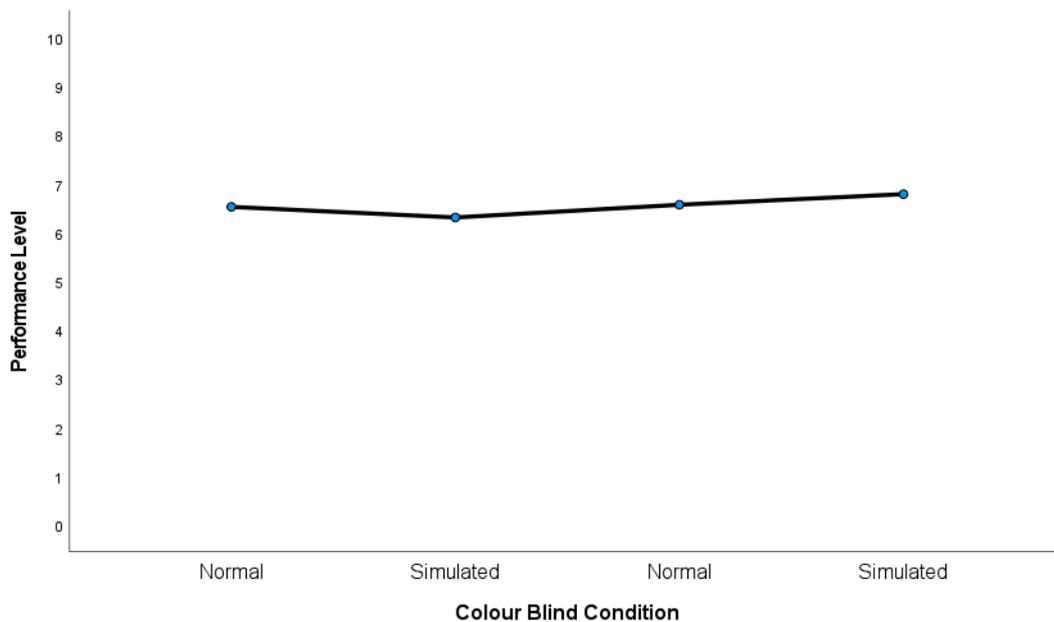


Figure 3. Shows no significant difference between performance levels across conditions.

Picking out Teammates

A repeated measures ANOVA identified that ease of picking out teammates differed significantly throughout the four colour vision conditions ($F(1.87,46.72)=24.37, p<.001$). A post hoc pairwise comparison using Bonferroni correction demonstrated statistically significant differences with ease of picking out teammates from normal condition 1 and colour blind simulated condition 2 ($p<.001$); normal condition 1 and simulated condition 4 ($p=0.002$); simulated condition 2 and normal condition 3 ($p<.001$); and normal condition 3 and simulated condition 4 ($p=.003$). These results indicate that participants found it more difficult to identify their own teammates within colour blind simulated conditions compared to normal colour vision conditions, see figure 4.

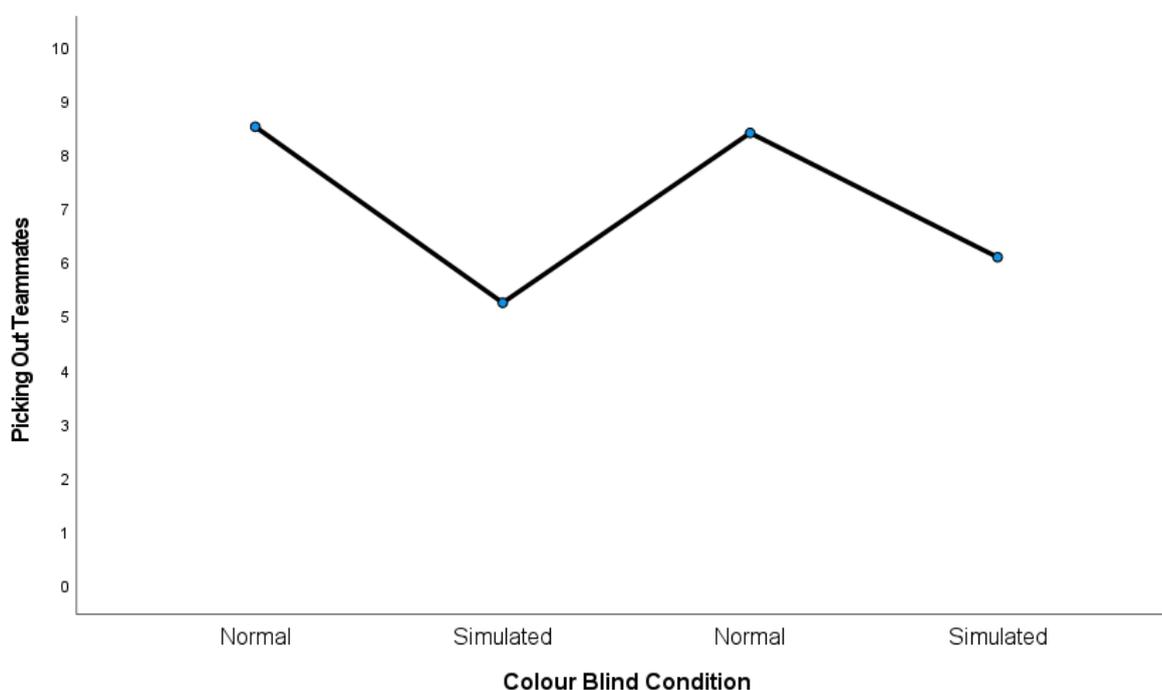


Figure 4. Shows participants found it more difficult to pick out teammates compared to normal colour vision conditions.

Mental Demand

A repeated measures ANOVA indicated that there was a significant difference in terms of mental demand placed on players throughout the four colour vision conditions ($F(3,75)=6.602, p<.001$). A pairwise comparison post hoc test demonstrated significant differences of mental demand from normal colour vision condition 1 and simulated colour vision deficiency condition 2 ($p<.001$). Therefore, these results suggest that more mental demand was placed on players in the first colour blind simulated conditions, which then tapered off for the later conditions, see figure 5.

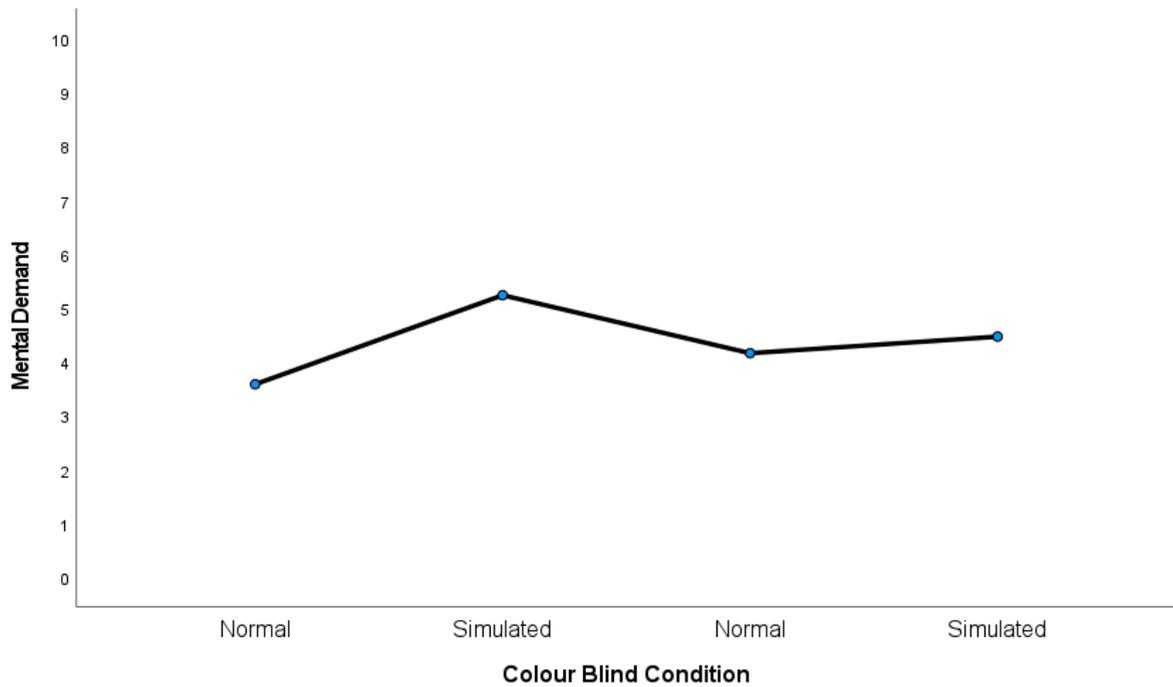


Figure 5. Shows more mental demand on players in simulated conditions compared to normal.

Decision Making

A repeated measures ANOVA indicated that there were no significant differences in the rating of decision making across the four colour vision conditions ($F(2,50)=0.532, p=0.591$). However, the trend of results identified in figure X suggests that players decision-making ability was negatively affected by the colour blind simulated conditions, see figure 6.

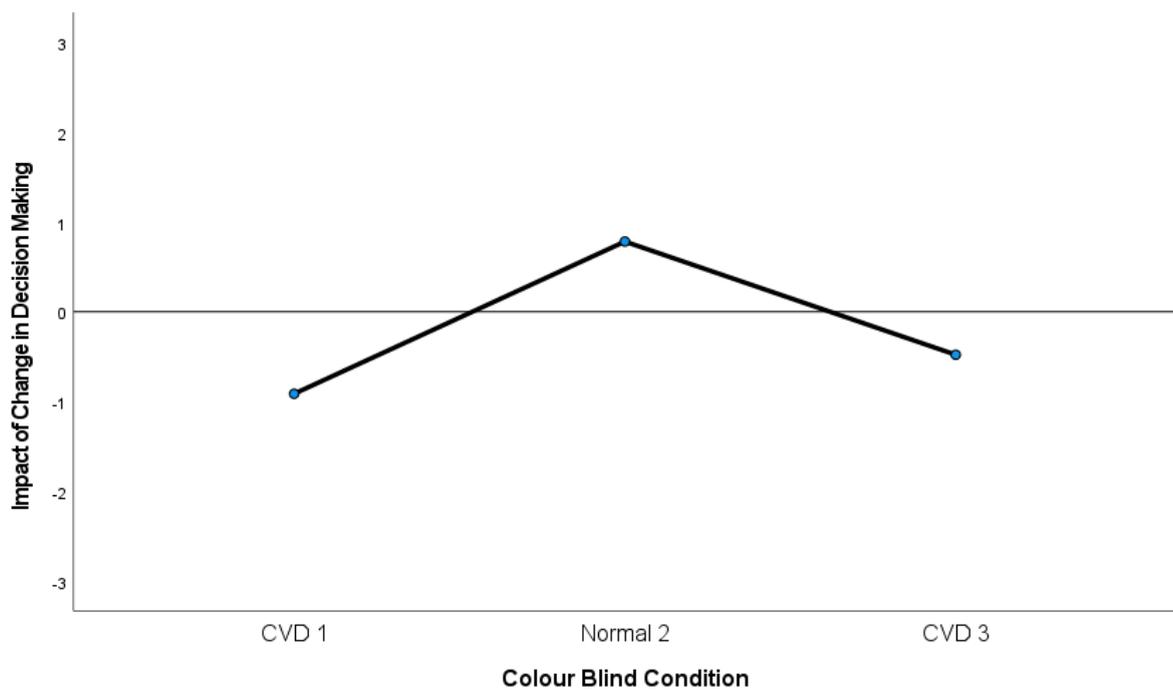


Figure 6. Shows that decision making was more difficult in colour blind simulated conditions.

Conclusion

The present study investigated the impact of colour vision deficient simulated conditions on a range of outcomes (ability of picking out teammates, performance level, mental demand and decision-making) in football. There was no significant difference in terms of self-reported performance levels. However, players found it significantly more difficult to pick-out their own teammates within colour blind simulated conditions compared to normal colour vision conditions. Additionally, there was initially significantly more mental demand placed on players in the first colour blind simulated condition. Lastly, there was no significant difference in decision-making across colour conditions but the trend of results infers that decision-making was detrimentally affected in colour blind simulated conditions. Thus, this study could have practical implications for governing bodies, athletes and coaches in relation to the consideration that should be given to the potential challenges faced by individuals with colour vision deficiency.