



COLOUR BLIND SIMULATION

TACKLING COLOUR BLINDNESS IN SPORT

PRACTITIONERS' GUIDE

NORMAL VISION



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1. INTRODUCTION



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Aims of the Practitioners' Guide

Colour blindness (colour vision deficiency, CVD) is one of the world's most common inherited conditions, affecting an estimated 300+ million people worldwide. **Statistically** speaking, 1 in 12 males (8%) and 1 in 200 females (0.5%) are colour blind to some extent. People with colour blindness see many colours, particularly reds and greens as the same, so many colour combinations such as kits and equipment can be confusing, which may lead to disengagement from sport across all ages.

Colour blindness is a particularly important issue in sport as colour is key to distinguishing between teams and in seeing kit and equipment. Playing sport can be more challenging when the difference between colours is not obvious.

Many people working in sport are unaware of the problems colour blindness can create for affected athletes/players and don't realise there are simple steps which can be taken to ensure they are supported. In team sports such as football and rugby, statistically at least one player will be colour blind in every male squad. Managers, coaches, spectators and others working in sport may also be colour blind.

Some diagnosed colour blind athletes/players choose not to disclose their diagnosis due to the fear they

may be considered to have a defect which could be interpreted as making them being less able than their counterparts with normal colour vision. Children with colour blindness can be put off playing sport if they find it difficult to distinguish kits and equipment because of the colours used, whilst others might struggle to develop a career in sport because inaccessible use of colour can place them at a disadvantage.

The Tackling Colour Blindness In Sport (TACBIS) Project, supported by Erasmus funding, has harnessed the power of football at a European level to raise awareness of colour blindness in sport, highlighting the problems faced by people with colour blindness as a means of combatting inequalities in football and other sports, to encourage social change.

In this way the TACBIS project provides a unique opportunity to improve the lives and sporting experiences of millions of colour blind people across Europe.

The research completed by the TACBIS project partners in partnership with their clubs, leagues and National Associations has enabled resources to be developed to address colour blindness. These resources are the foundation of this TACBIS Practitioners' Guide.

2. COLOUR BLINDNESS - WHAT YOU NEED TO KNOW

Colour blindness is usually an inherited condition which affects 1 in 12 males and 1 in 200 females. Most types of colour blindness involve defects in red or green cones. We see colour through 3 types of cone cells in our eyes which absorb, red, green or blue light. With colour blindness one type of cone does not operate normally. The most common problems arise with the following colour combinations:

- reds/greens/browns and oranges
- red/black
- blues/purples and dark pinks
- bright orange/green and yellow.
- pastel colours

although there are many other combinations that cause problems. For more detailed information refer to Resources.

Colour blindness can also be acquired from some diseases e.g. diabetes and from some drugs and medications.

Who is affected?

Colour blindness can potentially affect anyone working in sport including fans, players, coaches, match officials, sponsors, media, emergency services and employees, including stewards.

At sporting events colour blindness can affect up to 6% of people taking part or attending the event including:

- Other staff and officials
- Media/emergency services

Why is colour blindness an Issue for Sport?

As colour blindness can affect people working in all roles across sport, it can create challenges whenever colour is used to provide information. The most common issues for sport include:

- Kit clashes - with other athletes/players, match officials
- Equipment – training bibs, training cones, classroom training
- Venues – types of lighting, safety signage, facilities, wayfinding

- Information – Purchasing tickets/merchandise, websites and social media
- TV Coverage – invisible graphics and advertisement logos
- Workplace issues – understanding data/charts/spreadsheets/presentations and technical equipment
- External stakeholders – Investors/sponsors, media organisations and emergency services.



Prevalence in athletes/players

- At the present most sporting associations/clubs do not, as a matter of course, screen players at any level for colour blindness or ask players to disclose a diagnosis, therefore they are unaware which of their players are colour blind.
- Athletes/players may recognise they have issues related to some colour combinations but may not realise this is linked to being colour blind because they have never been diagnosed.
- Some diagnosed athletes/players choose not to disclose their diagnosis due to fear they may be considered to be less able than their counterparts with normal colour vision.
- Some younger children with colour blindness can be put off playing sport altogether if they find it difficult to distinguish kits and equipment because of the colours used, whilst others might struggle to develop a career in sport. This can be the result of poor colour selection of equipment by coaches or of team kit colours, which can place them at a disadvantage. Commonly, coloured cones, shirts and bibs are used in training and match situations, which can disadvantage some individuals. As the prevalence of colour blindness is so common, this presents a challenge on a number of levels.

3. PURPOSE OF THE PRACTITIONERS' GUIDE



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This Practitioners' Guide has three main aims:

1. To raise awareness of the challenges colour blindness creates for sport.
2. To provide resources which can easily be disseminated in the form of factsheets, videos, links to webinars.
3. To encourage everyone working in sport to make small changes to help support colour blind people they interact with in their own roles in sport, for example coaches could review their training practices, plans and equipment.

Our resources aim to provide guidance on how to ensure sport is inclusive for people with colour blindness, whether players, officials, fans, or media/commercial enterprises.

Individual factsheets have been created as listed in the box on the right. Each of these factsheets can be downloaded at this link www.tacbis.eu/resources or via this QR code.



- The Implications of Colour Blindness for Sport (generic factsheet)
- Advice Sheet for Coaches
- Supporting Colour Blind Fans
- Guidance for Match Officials
- An Introductory Guide For Clubs
- Implications of Colour Blindness for Venues
- Advice When Selecting Kit Colours
- Ticketing Guidance Note
- Marketing, Communications and Commercial Implications
- Organising a Colour Blind Friendly Tournament

4. TACBIS RESEARCH - KEY FINDINGS

Introduction

Oxford Brookes University has conducted research into colour blindness in sport. This included screening athletes for colour blindness and holding colour blind simulated football matches to investigate how this affected players mental demand and decision making performance. Questionnaire data was gathered.

Prevalence

Colour Spot (University of Sussex), a digital application to screen for colour blindness, was utilised in 2 professional football clubs competing in national and international European competition. The results revealed 5 professional players with colour blindness. The screening process is ongoing. This indicates that there are players at the highest level who face the challenges of colour blindness.

Playing in Colour blind Simulated Matches

Football players competed in 4 different conditions:

- 1- Normal colour vision.
- 2- Colour blind simulated (both teams wearing the same colour training bibs).
- 3- Normal colour vision.
- 4- Colour blind simulated condition.

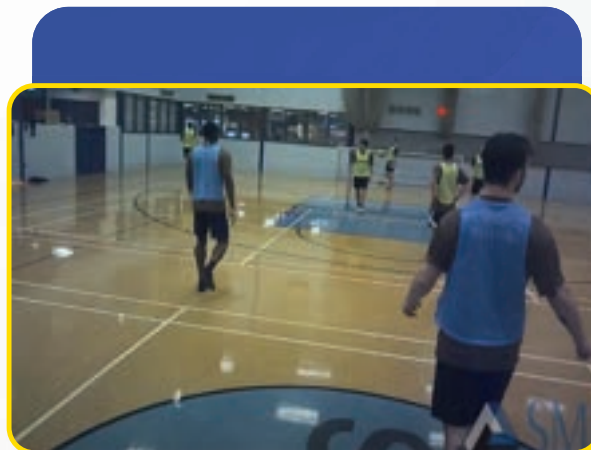
The colour deficient conditions were perceived as significantly more difficult to pick out teammates, more mentally demanding, and negatively affecting decision-making. This highlights the practical challenges for Colour blind individuals.

Results of the Research:

Players

Impact:

All individuals with colour blindness indicated this affected them negatively in sport due to a range of factors including equipment, environment and pitch marking.



Normal vision match conditions.



Colour blind simulated match conditions.



UK youth level male footballer

“Problem to see teammates, opponents, referee. Passed to the linesman!”



Icelandic domestic male footballer

“Gave to an opponent in football when the person was wearing an orange vest, but I was in green.”

Support:

The majority of colour blind individuals reported that they were not provided with any specific support in sport. They suggested that an increased awareness would be beneficial alongside ensuring that equipment (cones/balls) and kit are colour blind friendly.



Danish Jutland Series male footballer:
“Create collaboration between clubs and organisations that can help”



Icelandic domestic male footballer:
“Have clear rules for the choice of kits (dark vs light) and shorts. This applies both in games but also during training (have yellow and blue vests, but not green/orange)”

Coaches

The vast majority of coaches have identified that they are unaware if they have been coaching players with colour blindness. Some indicate that they have some understanding of what colour blindness is but are unsure of how to support players with colour blindness.



Portuguese national football coach:
“The coach needs to have more information on this topic, because many of them do not know how to deal with colour blind athletes”

Many coaches also indicated that they need more information (through coach education and qualifications) on how to support players with colour blindness.



Portuguese national football coach:
“Create a space within the annual medical tests and a way to help in the event of being diagnosed with colour blindness”



UK national football coach:
“A guide to know how to work with people with this situation”



Portuguese national level coach:
who has coached an athlete with colour blindness identified the simple but effective changes they have made to help their athlete:

“In my case, the team’s playing, and training equipment has changed. Going on to have a pattern of its own (detectable by the athlete) mainly in the socks, rather than just being smooth.”

5. PRACTICAL IMPLICATIONS

The following section of this Practitioners' Guide is broadly divided into three sections

- For those who participate in sport - as players/coaches/match officials
- For those who watch sport including - fans/broadcasters/sponsors

- For those who host or organise sport – venue operators, tournament organisers, including information specific to clubs.

For each of the following sections please refer to relevant factsheets for your individual role/interests.

5.1. PARTICIPATING IN SPORT

This section is aimed primarily around people who participate directly in sport including players/athletes, coaches and match officials.

Players

Colour blind players/athletes can be difficult to identify as many won't know they are colour blind or won't want to admit to having the condition. Distinguishing between kit colours to identify teammates can create challenges for colour blind players/athletes as can distinguishing equipment such as balls, cones, line marking and corner flags. Tactical training sessions can also create difficulties when certain team colours are used on magnetic boards. This can impact the players/athlete's performance, safety, and welfare.

For team sports statistically there will be a colour blind player in every squad of more than 12 men. For example, in rugby 2-3 in every squad.

Female teams will be far less likely to include a colour blind player but decisions on kits and equipment should always assume a female colour blind player.

Players will be concerned about negative impacts on their performance due to poor colour choices of kit and equipment.

For more information refer to the factsheets for Players, Coaches, Kit selection and Match Officials and information in Resources especially The Colourful Game video.



The shirts on the top row are shown in normal colour vision. Those in the bottom row are a colour blind simulation of the top row

Coaches

One of the main issues for coaches is identifying colour blind players because most hide their condition, and many are unaware of it. However, if coaches employ inclusive practices in training, there should be no need to identify individual colour blind players.

Coaches may need training to better understand the challenges faced by their colour blind players. Experiencing simulated 'colour blind' matches and training situations themselves can be an invaluable learning experience.

Some effective strategies when coaching players with colour blindness include

- Ensuring kits colours for matches are not 'colour blind' kit clashes
- In training using blue vs yellow or white bibs as first choice
- Avoiding red, orange and green training equipment against grass
- Ensuring line markings are white or yellow as first choice - avoid red
- In tactical training/post-match analysis using blue vs white or yellow magnets for outfield players, or using different shapes to represent different teams

More detailed information can be found in the factsheets for Coaches, Players, Advice When Selecting Kit Colours and in the Resources section, especially The Colourful Game video.

Match Officials

From statistical evidence every game or event is likely to have some spectators who are colour blind. For every male team where there are more than 12 players in a squad there will also be at least one colour blind player, match official or coach - probably more. For example, in the Premier League there is usually at least one colour blind manager at any given time. In some years there are maybe more e.g. two managers from the 2021/22 season are on the record as being colour blind.

The greatest problem for referees and match officials is ensuring that everyone, including the players, can distinguish

- between the kit colours of opposing teams, goalkeeper kits and match officials' kits
- follow the ball against the pitch/spectators
- equipment e.g., balls, line markings etc from the pitch/playing surface

Match officials may have the autonomy to select their own kits from a range of colours or may have only one kit colour they can wear, stipulated by League regulations, whatever the colour of the outfield team kits. A particularly difficult colour for match officials' kits is all-black kit because so many teams wear all-red kits.

To colour blind players and fans the black match official kit can easily be confused with team kits. Colour blind football players commonly relate stories of passing the ball to the referee by mistake.

Refer to the Guidance for Match Officials and Advice When Selecting Kit Colours factsheets for more detailed information.

Kit selection

Colour blind kit 'clashes', where opposing kit colours appear to blend together (see simulation on page 6), are the greatest challenge to players, coaches, spectators, match officials and broadcasters.

The more colour combinations there are in a kit the greater the risk of a kit clash occurring. In addition to challenges in distinguishing between team kit colours, all-red, all-green and all-orange kit can be difficult to distinguish from the colour of the pitch. Some sock colours can seem to 'disappear' against the colour of the pitch which can affect the ability of colour blind players and match officials to judge the movement of the ball.

However, addressing colour blindness simply means applying some basic principles, it doesn't necessarily mean changing team's colours - it simply means thinking about how certain kit combinations will look to those with colour blindness.

For more information refer to the Advice When Selecting Kit Colour factsheet.

Equipment

Equipment such as training colour bibs, training cones/pancakes, flags, line markings, posts, padding, and the colour of the ball can all be difficult to distinguish against from each other and the pitch and stands. This means some planning will be necessary when choosing equipment for use in competitions and training sessions to ensure colour blind participants are not excluded.

Further information can be found within the factsheets for Players, Coaches etc, and in addition to The UEFA and World Rugby guidance and other documents in Resources.

Issues to be aware of include

- Bibs - choose the right combination of bib colours to maximise the colour contrast between the opposing sides. The better combinations are blue vs yellow or white.

5.2. WATCHING SPORT

Watching sport can be a huge challenge at times for colour blind spectators, coaching staff, commentators and broadcasting pundits.

The most common problem for colour blind fans are distinguishing between kit colours of players and officials and distinguishing equipment and line-markings on the field of play. However, enjoyment for spectators can also be affected by poorly designed TV graphics, such as red and green dots used for missed and scored penalties, or information on teams/players such as pack weight statistics or possession information if shown by colour only on-screen charts. VAR lines are a particular problem if marked in red or orange against grass.

Colour blind fans attending live events are usually faced by a range of challenges before they even reach their seat. Problems can start simply by visiting club or event websites where poor colour contrast can hinder understanding of website information, ticketing platforms and maps for getting to the venue.

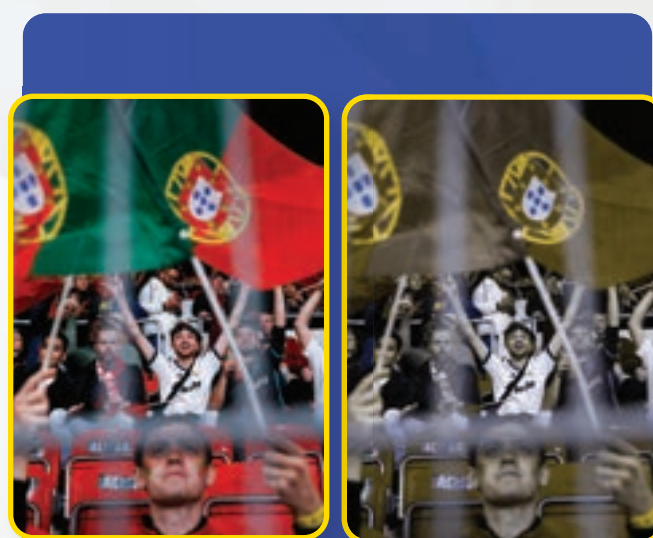
On the journey to the venue itself public transport and local area maps and car parking signage can cause confusion, result in arrival at an incorrect entry gate or sometimes in getting completely lost.

- Balls – avoid single colour balls or other essential that can become difficult to see against grass or the stands behind them.
- Training cones - orange, green or red cones should be avoided against grass. Blue, white or yellow cones contrast better against green surfaces but may not be appropriate against light surfaces such as wood or blue pitches e.g. Futsal.
- Line markings – white lines give the best contrast against grass or artificial green pitches. Lighting can also affect the contrast between the line markings and the pitch.
- Tactics boards and classroom training. Refer to the Coaches factsheet for more information.

Maximising contrast is essential – refer to the Selecting Kit Colours factsheet for simple tips on using mobile phone functionality to review colour contrast between equipment and background colours.

On arrival at a stadium/venue, further challenges can await such as illegible directional signage, colour coded stadium plans and entrance gates, VIP and accessible entrances which may not stand out.

For more information refer to the Factsheets for Supporting Colour Blind Fans, Venues and Marketing and Communications.



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Implications for broadcasters/media/advertisers/sponsors

Broadcasters are beginning to realise that there will be a negative impact upon the sports they broadcast where fans switch off coverage of matches/events they can't follow due to poor colour combinations e.g. kit 'clashes'. In recent years there has been a lot of media coverage of inaccessible football and rugby games, which not only result in fans turning off coverage but can have a negative commercial impact upon broadcasters (because they rely upon advertising revenue to win contracts to host major events/leagues). Indirectly this could impact the value of broadcasting rights if not addressed.

There can be implications for event hosts because if fans are switching off then they won't see their

sponsors' logos or pitch-side advertising, in turn leading to their event/club/kits being less valuable commercial assets, especially those linked to repeated issues such as red v green kit clashes e.g. rugby's Six Nations competition.

With proper training, broadcasters can easily address problematic graphics which can also be extremely frustrating for colour blind viewers, especially in high profile events such as a penalty shoot-out at the FIFA World Cup. Clubs, Governing Bodies and Leagues can work with broadcasters and other commercial partners to minimise such impacts for the benefit of all stakeholders involved with broadcasting of sporting events. See also Hosting Sporting Events below.



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Colour blind Simulation

5.3. HOSTING SPORTING EVENTS

In addition to the challenges for colour blind players, officials, coaches and spectators caused by poor kit colour combinations or poor choices of equipment colours which are covered in more detail in the Participating in Sport and Watching Sport sections there are a many other implications for organisations and clubs which directly host events.

Colour blindness can affect between 4.5 and 6% of people attending a sporting event (depending upon the ratio of male spectators at any one time), and not just spectators but also management, stadium staff (including stewards), media, players and emergency services personnel. At an average Premier League

match, for example, there could be as many as 80 colour-blind stewards at an individual game/event, and many will be undiagnosed

Implications for spectators can range from not being able to read menu information at concessions to inability to follow emergency evacuation procedures and spot emergency signage. For venue employees, colour-coded training materials, stadium maps or emergency routes are often confusing or indistinguishable to people with colour blindness, which can impact their ability to evacuate a venue, or follow instructions, or conduct a role effectively e.g. stewarding.



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Colour blind Simulation

Venues

For spectators, apart from kit and equipment clashes, colour blind people can be excluded from significant amounts of information simply due to poor colour combinations and lack of contrast. Venue hosts need to be aware of the following common challenges for colour blind visitors

- Entrance gates, VIP and accessible entrances may not stand out due to lack of contrast with background surface colours. Colour-coded stadium sections/plans can be particularly problematic.
- Colour-coded turnstile access systems, directional signage to stands, blocks, seats amenities may be difficult to see and/or to understand.
- Safety notices (e.g. prohibited items) can be partially illegible whilst allergen information provided by colour only or in text with insufficient colour contrast with background colours can **even create a significant risk to life!**
- Emergency evacuation signs and equipment can be difficult to spot against some background surfaces meaning the sign simply won't stand out in an emergency.
- Emergency evacuation plans can be impossible to interpret, especially where information in red (fire) and green (emergency evacuation) information is provided on a single plan since both these colours can appear to be the same.

There are further points to note regarding colour blind employees as colour blind staff may also face challenges with

- Training materials
- Architects' and other technical plans e.g. colour coded services runs
- Operations software e.g. gate monitoring/CCTV
- Operations equipment e.g. fire and other control panels
- Interpretation of colour coded accreditation

For more information refer to the Venues factsheet and to Resources, in particular

- European Convention on an Integrated Safety, Security and Service Approach at Football Matches and Other Sporting Events (Annexures A and C-St Denis Convention)
- The Sports Ground Safety Authority 'Green' Guide to Safety at Sports Grounds (6th Edition) throughout and Appendix C: Guidance on Colour vision Deficiency.



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Commercial implications

Most sporting events often generate revenue streams from the sale of tickets, merchandise, sponsorship deals, advertising and broadcasting revenues. If fans cannot watch the broadcast of an event due to a kit clash, they are likely to switch off and vent their anger through social media means which attracts bad publicity. If fans are unable to understand the colours of merchandise items either online or in a club shop, they are unlikely to make a purchases. The same applies for food concessions where branding, menu information and importantly allergen information cannot be understood. For sponsors there can be an impact on their brand particularly if people are unable to read information on kits, digital pitch side hoardings or big screens.

Websites/Marketing/Communication

No colour scheme can be completely accessible, but your chosen colour scheme e.g. Club colours or

tournament brand colours can be made more accessible by ensuring that you:

- Don't use colour only to highlight information.
- Label stadium plans etc, rather than relying on a colour-only key.
- Consider shapes, patterns, symbols etc. instead where labelling is inappropriate.
- Clearly define boundaries between different sections by outlining with a strongly contrasting colour such as white or black.
- Use effects such as italics, bold, different font sizes or underlining when using colour to emphasise important information in text.
- Check links and hover effects have good contrast.
- Calculate colour contrast ratios and use colour-blindness simulation software to check designs are accessible
- Check software doesn't rely on colour only to convey information.

Ticketing

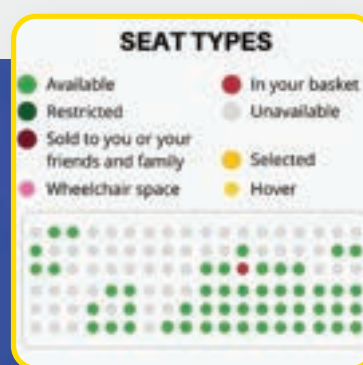
Colour blind people often have problems when attempting to buy tickets and frequently report they are unable to do this independently. Information presented using colour alone may not be accessible because even mild colour blindness can make it tricky to differentiate between categories or items where no text or symbols are provided.

Common problems include

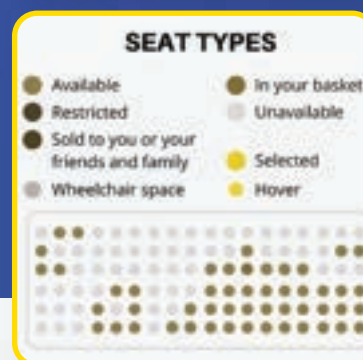
- distinguishing between different coloured sections of stadium plans for seating and pricing
- distinguishing 'available', 'low availability' and 'unavailable' seats provided in colour only, e.g. using green, orange and red dots
- distinguishing between dots and shapes from background colours e.g. to know which seats are sold out
- reading coloured text against background colours, e.g. black against red, pink against blue
- spotting hyperlinks which rely on colour only
- distinguishing 'important' text highlighted by colour e.g. distinguishing red text from black text.

Even matchday tickets themselves can cause confusion.

For further information refer to the factsheets on Ticketing and further information in Resources (e.g. CAFÉ Accessible Ticketing guide).



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6. CREATING A COLOUR BLIND FRIENDLY ENVIRONMENT FOR EVERYONE

In addition to reading the information and factsheets in this Practitioners' Guide and visiting the Colour Blind Awareness (CBA) www.colourblindawareness.org and TACBIS www.tacbis.eu websites, consider whether the following suggestions are relevant for your club or organisation

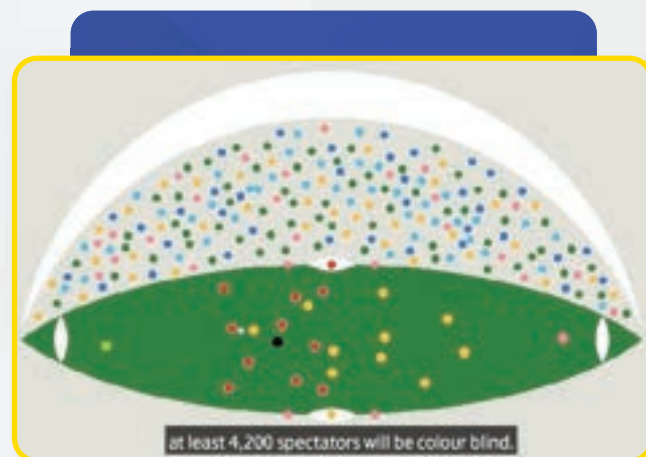
- Using the TACBIS and CBA resources, host an intro session for your club
- Training
- Disseminate relevant factsheets/links to videos to key personnel in each of the departments of your organisation
- Arrange for an audit of your equipment / venues / website etc
- Educate your stakeholders e.g. players / parents / sponsors / kit Suppliers / coaches / marketing – invite them to your training sessions!
- Help raise awareness of colour blindness – social media / hosting articles/blogs on your website/ Press Releases
- Deliver activities for Colour Blind Awareness Day which is held on 6th September every year and could easily be linked to your Community projects. Refer to TACBIS website for ideas.
- Create a set of checklists/action points for your club/organisation to ensure training is not forgotten when staff leave and are replaced.

Supporting Colour blind Fans

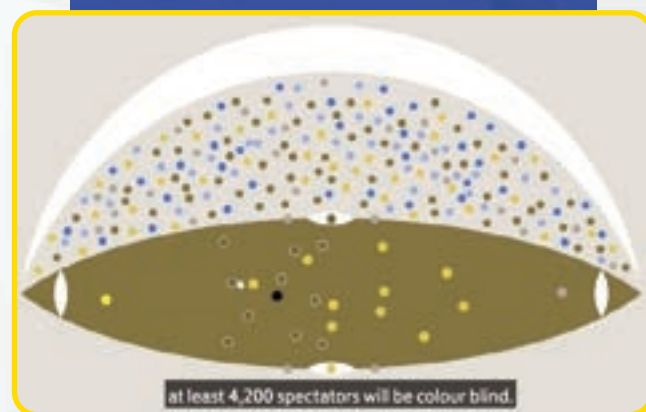
Supporter Liaison and Disability Access Officers (SLOs and DAOs) can work with fans and clubs to raise awareness of CVD to ensure colour blind fans' matchday experiences are not compromised. Addressing colour blindness effectively simply means applying some basic principles to the way information is designed and presented and being aware that information given in colour alone may not be accessible for up to 6% of fans (depending upon the ratio of male supporters in the venue).

Solutions are usually simple and common sense, such as adding text, symbols, shapes and patterns. For example, Club colours don't need to change because being accessible is about how colours are used. SLOs and DAOs can help to support all colour blind stakeholders who will interact with their club by arranging for training for different departments such as for their commercial, marketing and communications and coaching teams in addition to those involved in kit selection.

For more information refer to the factsheets for Clubs and Supporting Colour Blind Fans.



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Safeguarding

Clubs not only need to maximise revenue but also need to ensure their staff and players are properly supported.

In addition to the sections Participating in Sport (for players and coaches), Watching Sport (for spectators) and Hosting Sporting Events (for venues and commercial implications) Clubs will be keen to ensure their players are adequately safeguarded, especially minors.

Clubs will want to ensure that players can perform to their best by putting in place policies to ensure that players are not at risk of injury from poorly selected equipment/kit colours and will want to ensure other players are also protected.

If colour blind players/athletes are undiagnosed/ unsupported they could be playing in games or training sessions where they are unsure of their teammates. This can put them and their fellow players/athletes at risk of injury.

- However, players/athletes should not be obliged to disclose their condition unless asked

as part a recruitment/registration process. Before seeking this information Clubs and Governing bodies should provide details of their policies on CVD to all players and parents. Screening must not be undertaken unless adequate support is in place for those diagnosed players.

- Children and Youth players (U18's) may need additional educational resources to support them.
- The working environment for all colour blind players/athletes all players/athletes should be empathetic, where everyone can communicate freely to anticipate and address potential issues, to listen and to action concerns promptly, creating a balanced atmosphere/ environment for the benefit of all participants whether with CVD or not.
- Clubs should always anticipate the needs of colour blind players/athletes and not wait for those with the condition to identify themselves.



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7. CASE STUDIES

The purpose of the case studies was to raise awareness of colour blindness amongst football players. Evidence was gathered from two events. In Iceland young players were invited to play football matches in a normal kit and colour blind simulated kit conditions. In Portugal national squad elite players were invited to view kit colours using colour blind simulation glasses that highlighted the impact kit clashes can have on colour blind players. Players also attempted simple training exercises in normal vision and colour blind simulated conditions which gave them a better understanding of the importance of colour blind players being properly supported across all aspects of the game.

ICELAND - REYKJAVIK - COLOUR BLIND SIMULATED TRAINING SESSION

As part of the TACBIS Partners International project meeting held in Reykjavik, the Football Association of Iceland (Knattspyrnusamband Íslands; KSÍ) arranged for Club Stjarnan Under 15's training session to participate in our TACBIS research.

The session involved four, seven aside football matches. Players were selected to form new teams for each of the matches that lasted 5 minutes each. Two of the matches were played in normal training conditions (i.e. each team wearing different colour training bibs) and the remaining two matches played under a colour blind simulated scenario where both teams wore the same coloured training bibs.

The session was managed by Oxford Brookes University and KSÍ who selected the team players randomly and played the normal training match condition followed by the colour blind simulated matches that were repeated twice.

For each of the matches the players rated their own performance level for ease of picking out teammates, mental demand, for comparison to the non-colour blind simulated game, and to rate the level of change in decision making and if this had a positive or negative impact on performance.

PITCH SIDE OBSERVATIONS

In comparison to the normal colour vision matches, the football matches that were colour blind simulated involved participants seemingly paying more attention to who was on their team before and during matches

so were playing less confidently. There was a significant increase in verbal communication between the players during the colour blind simulated matches. The flow of the colour blind simulation matches was also effected with players opting to dribble the ball more rather than passing the ball to teammates, particularly long passes across the width of the pitch. Because of this the matches looked 'congested' rather than locational play that the normal colour vision matches encouraged. Throw in challenges were also observed due to confusion about which team the ball had come off.



Normal vision match conditions.



Colour blind simulated match conditions.



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Colour blind Simulation

QUANTATIVE RESULTS

After the session the players performance ratings were reviewed, and findings put into the following categories:

1. Performance level

The players reported that there were no significant differences between the normal and colour blind simulated matches. This suggests that the players did not perceive their performance levels to change, however this could be due to players becoming used to/ adapting their playing style to the different conditions and drawing on other visual information available than just bib colour.

2. Identifying teammates

Initially the players reported that there were significant difficulties in identifying teammates in the first colour blind simulated match, though it was easier to identify teammates in the second match. This infers that the players had adapted the way in how they identified their teammates.

3. Mental demand

The players felt that their mental demand increased when performing in the colour blind simulated matches and that their mental demand was greater for the second 'normal vision' match compared to the first one.

4. Decision making

The decision making process within the normal colour vision matches was considered more favourable for performance compared to the decision making within colour blind simulated matches

CONCLUSION

The session demonstrated that participants own opinions of their performance levels did not change but observers believed that patterns of play, levels of performance, ability of picking out teammates, amount of mental demand and players decision-making ability declined in colour blind simulated matches compared to normal vision matches, which was supported by the quantitative results. These findings have implications for how players colour blind players can be supported, such as through high contrasting kit colours to benefit individual and overall team performance.

Dr. Adam Bibbey of Oxford Brookes University commented, "the results clearly indicate that conditions which replicate the experiences of colour blind individuals have a wide range of negative outcomes such as reduced ability to identify teammates and increased mental demand. This can lead to decreased performance, enjoyment and potential increased injury risk for colour blind players. The selection of kit and training equipment should be considered to reduce this impact"

PORTUGAL – LISBON - CIDADE DO FUTEBOL; NATIONAL TEAM PLAYER AWARENESS SESSION

At the May 2022 TACBIS Partners project meeting held in Lisbon at the headquarters of the Portuguese Football Federation (FPF), the FPF arranged for three Portuguese National players to learn about the impacts of colour blindness in football via practical activities.

The TACBIS Partners were represented by Colour Blind Awareness, Oxford Brookes University and the FPF. The activities were filmed by the FPF to create a video for use at the TACBIS conference, to promote the conference on Colour Blind Awareness Day 2022 and as a future resource to be hosted on the TACBIS website (link).

The first activity was held in the National Squad changing room which was dressed with the Portuguese national team kit. Eleven different coloured football socks were laid out on the Physio table. The players were asked to wear colour blind simulation glasses prior to entering the changing room and were invited to name each of the colours of the socks in turn. They were then asked if they were able to read the inspirational words painted on the changing room walls (in red letters on a black background) and to consider how the colours of the National team kits appeared through the glasses.

The players were shocked to discover how differently the sock colours appeared through the glasses, to discover that it was also very difficult to read

the text on the walls of the changing room and were particularly horrified to realise that there are many professional players who could easily confuse outfield team kit colours with goalkeeper and match officials' kits due to their colour blindness.

The second activity involved the players dribbling around orange cones laid out on the training pitch firstly, as they would normally do in a training session then again wearing the colour blind simulation glasses. Both players manoeuvred the ball with ease and confidence without the glasses. The layout of the cones was then changed and the players repeated the exercise wearing the colour blind simulation glasses. On the second attempt it was clear the players were more hesitant and concentrating more (looking down at the ground) as they struggled to see the orange cones against the grass because through the glasses they appear to be the same colour as the grass. The players were then interviewed by Oxford Brookes about their experiences. Both strongly felt that a simple dribbling activity was much more difficult when wearing the glasses.

At the end of the session the players were able to appreciate that simple training tasks and playing in colour blind 'kit clash' matches can be difficult for colour blind players (and coaches), placing them at a disadvantage compared to players with normal colour vision.



Normal Vision



Colour blind Simulation

8. RESOURCES

- The FA/UEFA guidance document – Colour Blindness in Football https://www.colourblindawareness.org/wp-content/uploads/2018/07/FA_COLOUR_BLINDNESS_IN_FOOTBALL_ENG.pdf
- World Rugby – Colour Blindness in Rugby guidelines <https://www.world.rugby/organisation/accessibility/colour-blind/intro>
- The FA/UEFA – The Colourful Game video <https://www.youtube.com/watch?v=RRs9gBSyDaM>
- TACBIS infographic video https://www.youtube.com/watch?v=zhtRKB_1FcQ&t=6s
- Centre for Access to Football in Europe (CAFE) document – Creating Accessible and Inclusive Ticketing Processes <https://www.cafefootball.eu/creating-accessible-and-inclusive-ticketing-processes>
- The Sports Ground Safety Authority – Guide to Safety at Sports Grounds (Green Guide 6th Edition) <https://sgsa.org.uk/greenguide/> in particular Annex C Guidance on Colour Vision Deficiency <https://sgsa.org.uk/wp-content/uploads/2019/02/Annex-C-Guidance-on-colour-vision-deficiency.pdf>
- St Denis European Convention – The Council of Europe Convention on an Integrated Safety, Security and Service Approach at Football Matches and Other Sports Events in particular Annexures A and C <https://www.coe.int/en/web/sport/safety-security-and-service-approach-convention>
- SD Europe/CAFE factsheet – Colour Blindness – Guidance for Supporter Liaison Officers and Disability Access Officers https://www.sdeurope.eu/_files/ugd/64b1f8_5d8b-3217bc434e57a1527791abdcb059.pdf



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