

Institution: University of Chichester
Unit of Assessment: Psychology, Psychiatry and Neuroscience
Title of case study: The influence of colour in the appraisal of visual information by professionals and others
<p>1. Summary of the impact Public understanding and debate at the national level have been impacted upon by the research work of psychologists at the University. Furthermore, through bespoke knowledge exchange workshops understanding, intentions and practices of education and care professionals have changed. The impact draws on the work of Burkitt and Greenlees, both chartered psychologists and Readers at the University undertaking applied psychological research in the area of colour. Burkitt has published on the use and meaning of colour in children's drawings and Greenlees on its effect on sporting performance particularly in football.</p>
<p>2. Underpinning research The research of Burkitt and Greenlees form the two strands of research that underpin the impacts described in 4). Dr Esther Burkitt has been employed at the University of Chichester since September 2009 and Dr Iain Greenlees since October 1998.</p> <p>Children's drawings and colour: Children's drawings are used in communicative and educational settings as a way to provide insights to how children feel and think about the topics they draw. The interpretation of children's drawings has been problematic, however. Dr Burkitt's work was the first to explore influences in drawing situations that impact on how, and how reliably, we can interpret children's drawings of emotional information. She varied systematically audience information to examine its influence on children's communication of emotional information through drawings, and has produced a body of research to show how various cues in drawings contexts influence how children draw, thereby providing much needed qualification to the interpretation of emotions on the basis of children's drawings alone (e.g. Burkitt & Sheppard, 2013). A key insight is that children using drawings to convey emotional information about themselves vary their depiction as a function of who they are drawing for (Burkitt & Watling, 2013). For example, they tend to draw themselves in a positive or negative frame of mind very differently depending upon whether they are drawing for an adult or a peer, and whether the adult or peer is familiar. She has also shown that we need to understand the nature of the materials available to children in drawing situations, as these may influence how children represent positive and negative affect (Burkitt & Barrett, 2011). A key insight is that children, their parents/ carers and their teachers often hold different views about the value and use of drawing which can result in gaps in the harmonisation of practice in affording children the expressive and communicative benefits that drawings can confer (Burkitt, Jolley & Rose, 2010).</p> <p>Colour and sport performance: Historically, the use of colour in sporting uniforms has been viewed simply as a means to distinguish between combatants (for ease of officiating and spectating). However, this view was challenged by the emergence of laboratory-based research evidence showing that the presentation of red stimuli may have a deleterious effect on performance (for a review see Elliot & Maier, in press) and by archival research that indicated that martial arts competitors wearing red have a statistical advantage over fellow competitors wearing blue (Hill & Barton, 2005). Dr Greenlees' work occupies a unique place in the literature as it was the first to verify these results experimentally within the sporting domain and to show a potential mechanism for the effects of red uniforms. Dr Greenlees' first study in this area demonstrated that soccer penalty takers wearing red were perceived by goalkeepers to be more confident, competent and relaxed than when they were seen wearing white. The goalkeepers in this study also reported being less confident in their ability to save penalties from red-clad performers than blue-clad performers. This indicated that red uniforms may influence how performers are perceived and the confidence levels of perceivers. The second study by Dr Greenlees established that uniform colour may influence performance success in sport. In this study, penalty takers were asked to take a series of penalties against goalkeepers who wore either red, green, blue or yellow jerseys. The results showed that penalty takers scored significantly fewer penalties (54%) against red-clad keepers than against blue, yellow or green-clad keepers (72%, 69% and 75% respectively). This research has strengthened claims for the impact of uniform colour in sport and stimulated debate amongst the wider population.</p>

3. References to the research

1. Burkitt, E. & Sheppard, L. (2013). Children's colour use to portray themselves and others with happy, sad and mixed emotion, Educational Psychology, DOI:10.1080/01443410.2013.785059
2. Burkitt, E. & Barrett, M. (2011). The effects of different drawing materials on children's drawings of positive and negative human figures, Educational Psychology, 4 (11), 459-479.
3. Burkitt, E. & Watling, D. (2013). The impact of audience age and familiarity on children's drawings of themselves in contrasting affective states. International Journal of Behavioral Development, 37, (3), 222-234.
4. Burkitt, E., Jolley, R. & Rose, S. E. (2010). Art educational issues in the attitudes and practices that shape children's drawing experience at home and at school, International Journal of Design and Art Education, 29, (3), 257-270.
5. Greenlees, Iain A., Leyland, Alex, Thelwell, Richard C. and Filby, William C. D. (2008) Soccer penalty takers' uniform colour and pre-penalty kick gaze affect the impressions formed of them by opposing goalkeepers. Journal of Sports Sciences, 26 (6). pp. 569-576. ISSN 0264-0414
6. Greenlees, Iain A., Eynon, Michael and Thelwell, Richard C. (2013) Color of soccer goalkeepers' uniforms influences the outcome of penalty kicks. Perceptual & Motor Skills. ISSN 0031-5125 (originally presented at a BPS annual conference in April 2010)

4. Details of the impact

The impact consists of two strands:

- Impact on the understanding and intentions of a range of education and care professions;
- Informing public debate and understanding about colour, drawings and behaviour and development.

Informing public debate and understanding

Public understanding and debate about colour and drawings have been influenced and informed by the research work of Burkitt and Greenlees. Burkitt's and Greenlees' has been debated across a range of media platforms across the world as is evidenced below (and supported in the corroborating evidence).

Dr Greenlees work on colour as a cue in football was picked up in 2008 and more widely in April 2010. The latter study also led to the BBC Horizon programme inviting Greenlees (and Russell Hill an anthropologist at Durham University) to extend the research as part of the programme aired August 2011 (viewed by 1.49M viewers; BARB viewing figures.) The Director of this programme describes the impact it had on her and her team in her blog "*The whole thing was a technicolour experience that made us see the world through different eyes*". The programme was reviewed and discussed widely, themes addressed in the programme (including Greenlees work) were picked up and explored or challenged (e.g. Guardian, theartsdesk.com, www.althinking.com, <http://petapixel.com/>, www.mirror.co.uk, Radio Times).

Furthermore, specific evidence of debate is available as a download from national radio broadcasters outside the UK, for example NPR (*National Public Radio*; June 05, 2010; US; 26M listeners per week; website ranked 672 of all websites globally based on alexa.com figures) and Radio New Zealand (1 May 2010; reaches 14% of national population of NZ, 491,000 listeners). In the first example Greenlees research is discussed by an esteemed guest mathematician (Prof Devlin, Stanford University) and in the latter Greenlees was invited to describe his research and then entered into a debate with the presenter around questions such as whether the effect related to the penalty taker or goalkeeper. Greenlees was then invited to give advice to all listening goalkeepers. Furthermore, the backdrop of the England World Cup campaign (South Africa 2010) meant that Greenlees work was also discussed at that time by those with an interest in England's chances of success; it was discussed by Chris Evans and Moira Stuart on Evans Radio 2 show (Audience reach 13-14M), on Talksport (Audience reach of 2.5M listeners).

The public debate informed and influenced by Greenlees' work is evident in many online forums. As indicated above, themes and implications of Greenlees' work are picked up and

Impact case study (REF3b)

commented up by bloggers, commentators, football fans and other members of the public. Sites, some of them hugely popular in global terms, range from www.scienceofsocceronline.com, www.goalkeepersaredifferent.com, <http://www.sbs.com.au/>, <http://bleacherreport.com/>, <http://www.fifetoday.co.uk/>. Example debates which demonstrate that individuals have engaged with research and their thinking has been stimulated: Bleacher report (ranked 275 of all sites globally based on web traffic, alexa.com): “..Two, while we may be culturally conditioned to see red as a danger signal, there’s actually no evidence that wearing red has a negative effect on the penalty taker’s performance during actual football matches”. New Scientist’s Daniel Elkan draws from Greenlees work in his discussion piece on how certain colours have an impact on the way people think and behave, “Clearly the effect of wearing red is strong enough to tip the balance of fights and soccer matches, but where did it originate?”, <http://www.sbs.com.au/> (ranked 9149 of all sites globally based on web traffic, alexa.com).

Dr Burkitt’s work has been picked up and discussed by a range of media platforms across the world although not to such a wide extent as Greenlees’ work. For example, Dr Burkitt was asked by Lloyds Pharmacy (November 2011) to analyse adults drawings of the experiences physical pain and produced an analysis of 500 adults’ drawings as part of this consultancy work. The Lloyds press release was picked up by others e.g. Fibromyalgia Association UK. Her research has also attracted media attention with an interview with The Guardian published online commenting on the childhood drawing of a Felix Baumgartner (when kids’ drawings reveal their ambitions 16/10/13). Burkitt was quoted throughout the article which prompted a number of online comments; the article was commented on in other blogs e.g. <http://02mysoup-aa.soup.io/tag/Children>. Burkitt’s work has been picked up and discussed in the context of literacy <http://mradamhigherenglish.wordpress.com/2012/08/17/reading-and-summarising/>.

Impact on the understanding and intentions of a range of education and care professions

Dr Esther Burkitt designed and ran a programme of knowledge exchange workshops in Spring 2013. These workshops were designed to raise awareness of two key issues identified through Dr Burkitt’s research, namely that: different perspectives on interpretation can be taken by different stakeholders in understanding children’s communication via drawing; and that cues in the drawing situation influence the emotional basis of what and how children draw. The criteria for the workshops were professions with involvement with child development and drawing, educational and early years and parent groups. Workshops and attendees are as follows:

- Parental group (attendees = 6) (April 2013);
 - Preparatory school teachers (June 2013) (attendees = 10) & July 2013 (attendees = 8);
 - Primary and secondary school teachers who became teacher trainers (May 2013) (attendees = 8);
 - Early Years trainees with placement roles participated in two workshops (April 2013) (attendees = 20);
 - SENCO practitioners engaged in two workshops in June 2013 (attendees = 25)
- (total of 77 participants, 51 of whom were professionals, 20 trainees and 6 parents).

The groups reported during and after the workshops that insights about colour use and audience types would inform their comments to children, would assist in framing feedback about drawing and would give them food for thought for integration into future lessons. Post-workshop feedback from educational and early years professionals yielded a range of comments demonstrating changes in perspective and actual and planned behaviour. For example, the knowledge that children will draw important figures differently depending on who they are drawing for yielded such quotes as “We will be observing the pictures children create for others and those which they do for themselves to see if there are differences” and “If I want children to do their best work I tell them that someone important to them would like to see it! They take more care and attention and I ask them to show their pictures to another adult who gives them praise”, and “we will be observing the pictures children create for others and those which they do for themselves to see if there are differences”. The follow up included asking about any changes that have arisen on the basis of findings about colour use, wellbeing and emotion and such responses included “I have definitively changed the easel and resources: added more colours and made the area more private” and “I think in the future I will be more

Impact case study (REF3b)

aware of children's use of colour and I would be interested in finding out more about possible links between colour and emotion". The parent group participants also reported, through post-workshop feedback, that they had gained an understanding of how some features in children's drawings and elements in the drawing situation can be understood to enable more accurate interpretation of emotion and communication in children's drawings thus facilitating better communication with the child. Follow up exchanges indicated that family members asked more questions about the child's drawing and encouraged the behaviour more at home and at work. The latter outcomes were also reflected in a small online survey of parents and family members (N=40) conducted in April 2013 designed to gather information about views and practices and feedback about key findings regarding colour use. 94% of the respondents reported that they would talk more children about the colour use, preferences and features they draw in order to better understand how they feel about the topics they draw.

5. Sources to corroborate the impact

Available on request:

- Participant list for children's drawings workshops;
- Emails from children's drawings workshop participants;
- Raw survey data from follow up survey around children's drawings;
- Contact details of consultant who contracted Dr Esther Burkitt on behalf of Lloyds Pharmacy to undertake work on pain and drawings.

Various online sources, Greenlees:

http://www.bbc.co.uk/blogs/blogbbctv/posts/horizon?comments_page=2
<http://www.telegraph.co.uk/news/newstoppers/howaboutthat/1998079/How-to-score-a-penalty-outstare-the-goalkeeper.html>
<http://www.npr.org/templates/story/story.php?storyId=127495657>
<http://www.radionz.co.nz/national/programmes/thiswayup/audio/2281997/goalkeepers'-shirt-colours>
<http://www.theguardian.com/tv-and-radio/2011/aug/08/tv-review-horizon-see>
<http://www.radiotimes.com/episode/i9bnc/horizon-do-you-see-what-i-see>
<http://www.dailymail.co.uk/news/article-1266309/Finally-secret-winning-penalties-Dress-goalie-red-reading-Fabio.html>
<http://www.fifetoday.co.uk/news/goalkeepers-wearing-red-more-likely-to-save-penalties-1-800006>
http://www.thestar.com/sports/soccer/2010/04/17/woolsey_why_goalies_should_wear_red.html
<http://alevelpsychology.co.uk/news/interesting/why-england-s-goalkeeper-should-wear-red-in-the-world-cup.html>
<http://www.11v11.com/forum/meaningless-stats/2155-red-colour-keepers.html>
<http://phys.org/news192676124.html#nRlv> (Football penalties: science is on the spot)
<http://www.goalkeepersaredifferent.com/keeper/shirtframe.htm>
<http://www.sbs.com.au/news/article/2009/09/08/colour-me-surprised-how-hues-affect-you>
<http://www.nigoalkeeping.com/home/bootroom.htm#boot23>
<http://pgiw.wordpress.com/2010/04/17/how-to-win-the-world-cup-pick-a-red-goalkeeper-2/>

Various online sources, Burkitt:

<http://www.theguardian.com/artanddesign/shortcuts/2012/oct/16/felix-baumgartner-kids-drawings>
<http://02mysoup-aa.soup.io/tag/Children>
<http://mradamhigherenglish.wordpress.com/2012/08/17/reading-and-summarising/>
<http://www.fibromyalgia-associationuk.org/general-articles-highlights-208/688-pictures-that-tell-a-thousand-painful-words>