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**‘Pop-out footballers’, pop concerts and popular films: The past, present and future of
3D TV**

Keith M. Johnston

We are very positive about 3D at Sky... the growth of the sector is very pleasing...

Britain is really driving this 3D television space. (Cassy 2012)

In October 2010, the British commercial pay-TV operator British Sky Broadcasting (BSkyB) launched the first British stereoscopic 3D television channel, Sky 3D.¹ The launch came eight months after BSkyB showed the first ever live digital 3D television broadcast, of an Arsenal-Manchester United match in the English Premier League. By the time of the Sky 3D launch, up to 1500 pubs around Britain and Ireland had broadcast its stereoscopic sports coverage, to an estimated one million viewers. (*Daily Variety* 2010, 32) The opening months of Sky 3D’s programming relied heavily on such sports coverage (the Ryder Cup, darts, Premier League matches), which ran alongside existing Hollywood 3D films (*Monsters vs. Aliens*, USA, Rob Letterman and Conrad Vernon, 2009; *Avatar*, USA, James Cameron, 2009) and occasional factual/live broadcasts (Keane in concert, Swan Lake from the Royal Albert Hall). While this content featured occasional flourishes, such as the Sir David Attenborough-fronted *Flying Monsters 3D* (Sky 2010) and the final of talent show *Got to Dance* (Sky 2011), it became clear that the limited range of 3D TV programming was almost as big a stumbling block to the technology’s long term success as the perennial stereoscopic issue of 3D glasses.

This article will explore the current state of 3D television by focusing on BSkyB as a key player in the global push towards domestic stereoscopic broadcasting. While other broadcasters have experimented with this technology (Discovery 3D, Penthouse 3D, ESPN 3D, Nintendo, Canal Plus et al.), BSkyB's multi-million pound investment in production, distribution, and promotion of this technology makes it an ideal focus to think about where 3D TV has been, where it might be going, and the barriers that exist to its mainstream adoption. To do this, the article will focus briefly on the history and early aesthetics of 3D TV and analyse the public discourse that exists around stereoscopic television; a discourse that appears (in part) to fuel the fluctuating appeal of 3D TV in the consumer marketplace. Taking a reception-based approach to both 3D TV as a concept and BSkyB's attempts to control the format and content of British stereoscopic television, the article will assess how 3D TV has been discussed, and whether it can break free from its 2D roots. Given BSkyB's insistence on only commissioning 3D programming that can be transferred to 2D channels, the article will consider if this model of production has stifled 3D experimentation, or if the barriers for technological expansion exist at the level of domestic equipment as much as broadcast content.

A Brief History of 3D TV

As emerging work on stereoscopic 3D cinema is making clear, the history and content of three-dimensional media is necessarily more complex than the popular discourse around these inter-linked technologies. In the case of 3D TV, discussions and experiments with stereoscopy date back almost to the beginning of television broadcasts. As early as 1941, inventor John Logie Baird's continued attempts to add colour and stereoscopic effect to the television picture were described as an attempt to create 'the complete illusion of reality...

[where] the original scene is reproduced with depth and has the appearance of solidity – as though it were being watched through a window.’ (*The Times* 1941, 2) This reference to stereoscopic television offering a solidity of image and acting as a window was an echo of popular discourse around the Victorian stereoscope, which had described itself as offering images that presented ‘the world... in all its solidity and reality, as if we were looking out of a window.’ (quoted in Schiavo 2003, 129)

That potent link to assumptions and attitudes gained from other stereoscopic media (notably film) continued in later reports on different systems in Britain and the United States. The centrality of the debate around wearing special viewing glasses for 3D TV can be seen as early as 1944: ‘coloured glasses... corresponding to the left and right eye images’ was a crucial element of Baird’s invention (*The Times* 1944, 2) and a ‘not very successful’ American 1950s experiment linked its badly defined images to ‘the audience wearing glasses.’ (Lewin 1953, 8) While the latter article discussed how 3D TV ‘made the cinema owners shiver’, it actually points to a recurring issue across both media, which is the alleged unpopularity of viewing glasses. When 3D television returned in the 1980s, the addition of colour added more problems: analogue television systems would not work with the polarised glasses used in cinemas, with many processes relying on a ‘pale blue and dark red colour combination... which gives an almost full colour view from one eye and a monochrome image from the other.’ (Harden 1983: 140) The 1980s experiments occurred across multiple countries, but the glasses issue frustrated most of them, particularly the need to produce and distribute millions of pairs of glasses to the potential audience. One alternative option, for an ‘electronic glasses system that you would plug into the back of the set’, was dismissed as too expensive and ‘hardly a commercial proposition’ (Volk Mol, quoted in Harden 1983, 142). Given the debate that continues to rage around passive and active 3D television systems in 2012 (see below), this 1980s argument has yet to be settled.

These historical examples do not feature the level of financial investment that BSkyB has committed since 2010 but they do point to a continued interest in applying the technology to television: in America, for example, 1950s 3D movies *Miss Sadie Thompson* (USA, Curtis Bernhardt, 1953) and *Kiss Me Kate* (USA, George Sidney, 1953) were shown in 3D via Select TV and Free TV in the early 1980s, an episode of *Mork and Mindy* (ABC 1978-82) was the first 3D production for mainstream broadcast television in 1982, and the 1989 Rose Bowl was broadcast in partial 3D (Hayes 1989, 120-21). In Britain, the BBC broadcast segments of ‘old 3-D horror movies’ on its popular science show *Tomorrow’s World* (BBC, 1965-2003), and regional commercial broadcaster TVS (South of England) showed a thirty minute episode of *The Real World* (ITV, 1982-85) filmed in stereoscopic 3D, featuring clips from short 3D film *Royal Review* (UK, Robert Angell, 1953), and requiring red and green tinted viewing spectacles. (Salem 1982, 18) The aesthetic choices of these British examples is largely unrecorded, although *The Real World* reportedly featured ‘presenter Sue Jay shaking a duster in front of the screen... as if she reached right into our living room to tickle our noses’ (Salem 1982, 18) Notably, reports from these British 3D experiments suggest that monochrome 3D was used in both cases, because of the problems of showing effective colour in 3D television given the bandwidth of broadcasting systems.

The issue of aesthetics is key in many of the discussions being summarised here, and is directly related to the revival of 3D television in 2010, given BSkyB’s decision to adopt a conservative policy around the use of negative and positive parallax within their 3D broadcasts. *The Real World* example suggests that negative parallax (where images come ‘out’ of the screen) was a particular highlight of the show, an unusual claim given that (in the film industry at least), negative parallax is seen as a gimmick and a disturbance of the immersive nature of narrative. (Johnston 2012) A later BBC experiment in television stereoscopy featured during the annual Children in Need charity telethon. A special short

episode of *Doctor Who* (BBC, 1963-) entitled *Dimensions in Time* (BBC, 1993), was described as visually ‘very disappointing and... off putting to the lay viewer... it cannot reproduce a scene in its original depth.’ (Smith 1994, 19) Here, the claim is that positive parallax (imagery that appears to retreat into the screen, providing the illusion of depth) should be the main aim of 3D TV, not the ‘coming at you’ gimmicks. This 1990s experiment was also an attempt to broadcast a 3D image that 2D viewers (those without glasses) would be able to watch at the same time: while not successful, it does point to a continual desire within the television industry to produce imagery that could be viewed in both 2D and 3D formats, rather than embracing the possibilities of ‘full’ 3D image-making and storytelling.

The impact of 3D TV on the domestic viewer was key to many historic discussions of the technology: from a sense of ‘intense viewer involvement’ that prevented low attention span (Harden 1983, 143) to concerns that 3D might make the domestic viewing experience more solitary because ‘a small movement from the dead centre produced disagreeable results.’ (*The Times* 1941, 2) Recurring issues around 3D systems causing illness or eyestrain appear in many articles from the 1940s through the 1990s, with each new process (whether on film or television) regularly linked to such claims. These concerns over the audience, the viewing glasses, the technology and the content of 3D television would be repeated with the introduction of digital 3D television in the late 2000s.

Digital 3D TV and Sky 3D

3D TV is going to be event TV. It can be an international football match or it can also be an important programme. But I don’t think 3D is going to be much good on trivia. It’s for programmes that really mean something. It does require your attention (David Attenborough, quoted in Singh 2010, 7)

Sir David Attenborough's 3D documentary, *Flying Monsters 3D*, which featured the famous broadcaster alongside computer generated dinosaurs, was broadcast on Sky 3D on 25 December 2010. As the first of several Attenborough-fronted shows for Sky, it helped develop the 'factual' and 'natural history' strands that the company identified as key genres within 3D TV (after movies and sports). (Cassy 2012) Yet while such format and genre experiments (including entertainment show *Got To Dance* and documentary *Trevor MacDonald's Queen and Country*, Sky 2012) remain an essential step in the development of 3D television, they still make up a small proportion of BSkyB's 3D output and are commissioned as programmes that can be shown in both 2D and 3D versions, thus restricting any creative usage of stereoscopic composition and narrative. As the quotation from David Attenborough suggests, 3D television is currently in a situation where particular events (such as the summer 2012 Olympics, filmed in 3D by the BBC and Eurosport) dominate the stereoscopic TV landscape, rather than the bulk of mainstream television. This establishes a sense of what is currently dominant – and acceptable – within the global stereoscopic television industry, and excludes many popular television genres. (reality television, soap operas, comedy etc.)

Sky's own website offers a strong flavour of the current place of 3D within global television industries. (BSkyB 2012) Although Sky 3D is British-focused, it remains one of very few international 3D channels to broadcast a range of programming, rather than being limited to one genre/format, as the 3D channels for Discovery, ESPN or Penthouse have been.

Mirroring John Cassy's description of Sky 3D's generic focus, the Sky 3D website breaks its content into 'Sports', 'Entertainment', 'Movies' and 'Documentaries'. Of the twelve programmes listed during July 2012 when the site was visited, eleven were BSkyB co-productions, with the Olympics 3D on Eurosport the only non-Sky element. Given the main

Sky 3D page pre-loaded with the 'Sports' element highlighted, with the promise of 'at least three live sporting events in 3D each week', and with the Entertainment listing dominated by recordings of live concerts/arts events (a Kylie concert, a production of Swan Lake) the channel's aesthetic emphasis on sports-led and live programming content seems clear.

The dominance of live events within 3D programming (whether sports, live events or special 3D broadcasts) has relied on an aesthetic approach that was developed for 3D sporting events (a set number of camera positions, limited editing possibilities, slower editing pace) and which restricts the sense of composition in depth that 3D television might be capable of. The broadcasting (and recording) of concerts or live art shows (such as ballet and opera) mimic existing approaches to sports events, particularly those that take place in stadia or arena, where camera positions can be established and tested in advance. Three-dimensional aspects of liveness can, therefore, be contained within existing production frameworks; this still includes certain limitations, however, as the uncertainty of the live event means 'the amount of depth you get from 3D TV will be wasted on live shots' that cannot be planned or directed in advance to make best use of the stereoscopic effect. (Mike Reddy, quoted in Misstear 2010, 17)

The limitations of the current 3D aesthetic led some commentators to reject 3D content as 'limited at the moment.' (Brown 2011). This tends to reaffirm Attenborough's belief that only certain 'event' television programmes will be necessary or relevant in the new technology. Expansion of the 3D aesthetic and 3D content beyond its current offering will be an essential step in converting more of BSkyB's 10 million strong subscriber base to the 3D channels than the 'tens of thousands' who had signed up in the first year. (Brown 2011)

Given that Sky 3D is currently only offered as part of the BSkyB top tier package (£63 a month, which includes all sports and movie channels, where new 3D content has coalesced), and has not yet achieved mainstream success, it is not clear whether BSkyB will prioritise the

expansion of new content or demonstrate a willingness to move out from its current (arguably restrictive) 3D filming practices. While BSkyB has been eager to link 3D to the (ultimately successful) introduction of HD, that comparison necessarily elides the different technological challenges facing stereoscopic television, not least the need for viewers to upgrade to a new television set, engage with the ongoing debates around active and passive systems, and deal with the perennial glasses issue.

Although BSkyB insists that it is ‘very positive about 3D... the growth of the sector is very pleasing... [with] a real uptake in sales’ (Cassy 2012), the sale of 3D television sets has been described as ‘slow, despite heavy marketing’ with ‘considerable consumer resistant to the... glasses’ (Brown 2011), with 3D increasingly ‘marketed as just one of the [television] set’s benefits along with features such as internet-connection capability and LED backlighting.’ (Adam Thomas, quoted in Sweney 2011) If 3D is not regarded as a necessary or essential part of the future of television, then the need for future experimentation is reduced. The current uncertainty, and the ‘patchy future for 3D TV’ (Sweney 2011), has not been helped by a decrease in box office figures (and apparent demand) for Hollywood 3D films (a key component of Sky 3D), or a 2012 survey that suggested only 6% of UK households had invested in 3D television, with 60% of consumers regarding the technology as ‘mere hype’ and only 15% seeing it as ‘must-have.’ (Knapman 2012, 1) While that 15% would be an increase on current numbers, it may not be enough for BSkyB to continue to invest as it has in the first two years of Sky 3D.

While BSkyB has other broadcast and production partners in 3D production (such as History and Discovery), the company is also reliant on the expansion of 3D televisions led by consumer electronics companies such as Sony, Panasonic, Samsung, Toshiba, and LG. Yet these companies see 3D TV as simply one arm of a burgeoning stereoscopic media business, covering 3D film, 3D television, 3D Blu-Ray, 3D computer technologies, 3D video games,

and 3D camera equipment. A channel such as Sky 3D, therefore, is simply one part of the spectrum of stereoscopic imagery that 3D equipped televisions could carry in the future. Those television sets are still encountering consumer resistance, partly due to economic recession, but largely because of people unwilling to wear the viewing glasses in a domestic situation: particularly given there remains some confusion and uncertainty around passive and active systems. Active shutter systems (used predominantly by Sony, Samsung, and Panasonic) display two images on the television screen; electronic shutters within the glasses then open and close in time with those images, ensuring the correct picture is transmitted to the correct eye, and delivering the illusion of depth. Although described as providing a more effective picture (brighter and more colourful, with less ghosting), active shutter systems are more expensive, feature restricted cross-manufacturer compatibility and require batteries to operate. The passive system (favoured by LG but also used by some Panasonic sets) is similar to the cinematic polaroid glasses-based system used since the 1950s; superimposed images on screen are filtered by the lenses so the correct eye is sent the correct information. Passive systems are cheaper, don't require a separate power source, but are seen as providing a lesser 3D image.

While Toshiba announced a glasses-free TV set in 2011 with technology that delivered 'nine sets of 3D images to overlapping zones and uses an embedded camera to determine the position of the audience in front of the TV' (Nuttall 2011), this 55 inch set is unlikely to be a major contender until it reduces in both size and price. However, it does suggest a television equivalent to Nintendo's handheld 3DS console, which also used a lenticular glasses-free screen since 2010. While the major electronics companies remain invested in 3D, the future of 3D TV within the consumer electronics landscape remains unclear: while the addition of 'glasses free' television sets might go some way to offset consumer reluctance, the time lag

before such sets come into the mainstream may again mean that a channel like Sky 3D has no reason to innovate or expand the 3D content options.

Conclusion

3-D is not an end in itself: depth reproduction must be used to reinforce the programme content; to give our dramas characters who look more like human beings, less like flat shadows; to bring extra information content to every factual programme; to present sports such as football and cricket with more vivid display of physical skills within the three-dimensional sports arena.' (Smith 1996, 10)

3D TV exists in an uncertain technological and broadcast situation, and is still far removed from the stereoscopic future imagined by Charles W. Smith in the mid-1990s. As a key player in the global 3D production and broadcast industry, BSkyB has produced hundreds of hours of unique 3D television content, and continues to invest in new 3D programming: by the end of 2012, another two Attenborough-fronted series (*Kingdom of Plants*, Sky 2012 and *Galapagos*, Sky 2012) will have aired, along with factual commission *Storm City* (Sky 2012), more sports programming, and the regular diet of Hollywood 3D movies. Yet 3D is not simply another additive technology, like digital and HD, which increased the picture and audio quality of television; it is also a creative tool that needs to push beyond reinforcing programme content, or simply providing more information. 3D as currently envisaged by BSkyB is additive: programmes need to be viewable in 3D and 2D versions, to be a show 'that can run on Sky One as well as Sky 3D.' (Cassy 2012) However, if 3D can be viewed in 2D, then what is the advantage or value of the 3D image in the first place? Unless the creative

and aesthetic aims of 3D television are embraced, unless audiences appreciate what they gain from 3D TV (and that the 3D experience is worth watching), then it may struggle to succeed.

In the end, BSkyB might not have the final say in the future of 3D TV. That may come down to the television set manufacturers, the debate over passive and active viewing systems, the economic viability of lenticular (or similar) non-glasses televisions, or the desire of viewers to multi-task using other computer-based screens while watching TV (something that current 3D TV sets, with the need to wear glasses, make difficult). While some commentators believe that 3D will be a component of all new television sets, in the hope consumers will eventually embrace it (Marsden 2011, 6), the current move towards on-demand television, downloadable programming, and mobile platforms (media players, tablet devices, games controllers) might reduce the desire for stereoscopic television entirely. Or, as David Attenborough has argued, the primary focus of 3D might remain the live broadcast and the occasional event. The future of Sky 3D is safe for now, with co-production deals that continue to stress those key areas of movies, sport, factual, and natural history. However, unless 3D television is ready to expand its aesthetic horizons, to move away from the primacy of the live broadcast approach to content, it seems likely that 3D will remain within that restricted set of genres and formats, unlikely to grow beyond a niche technological event.

¹ For flow and clarity, and because almost all forms of 3D media use stereoscopic technology to create a 3D image, the terms ‘stereoscopic television’ and ‘3D television’ will be used interchangeably throughout the article.

Works Cited

Barnett., Emma (2010) 'Another dimension – but 3D TV has yet to score with consumers', *Daily Telegraph* 26 August: 33.

Brown, Maggie (2011) 'I love TV innovations – so why am I a 3D refusenik?' *Guardian Unlimited* 19 January (consulted July 2012)

<http://www.guardian.co.uk/media/organgrinder/2011/jan/19/3d-tv-sky-refusenik>

BSkyB (2012) 'Sky 3D' (consulted July 2012)

<http://www.sky.com/shop/tv/3d/?DCMP=KNC->

Casey, John (2012) '3D TV - Britain as a world leader', paper presented at 3DStorytelling conference, London, 22 March.

Daily Variety (2010) '3D Blooms in Europe; Europe pioneers 3D TV content', 15 September: 32.

Harden, Fred (1983) 'Stereoscopic Cinema' *Cinema Papers* 43: 134-45.

Hayes, R.M. (1989) *3-D Movies: A History and Filmography of Stereoscopic Cinema*.

Jefferson, NC: McFarland & Company.

Johnston, Keith M. (2012) "'A Technician's Dream?'" The Critical Reception of 3D Films in Britain', *Historical Journal of Film, Radio and Television* 32 (2): 245-65.

Knapman, Stuart (2012) 'Consuming the digital Olympics', *Brand Republic News Releases* June 4: 1.

Lewin, David (1953) 'FEAR comes in with the focals', *Daily Express* 22 May: 8.

Marsden, Rhodri (2011) 'To 3D or not to 3D – that is the question', *The Independent* 21 June: 6.

Misstear, Rachael (2010) 'Ryder Cup golfing action to be highlight of Sky 3D TV launch', *The Western Mail* 30 July: 17.

Nuttall, Chris (2011) 'Toshiba leaps ahead of 3D TV rivals', *Financial Express* 2 September

Salem, Charles (1982) '3-D TV', *Starburst* 4 (12): 18.

Schiavo, Laura Burd (2003) 'From Phantom Image to Perfect Vision: Physiological Optics, Commercial Photography, and the Popularisation of the Stereograph', in Lisa Gitelman and Geoffrey B. Pingree (eds) *New Media, 1740-1915*, pp. 113-37. London: MIT Press.

Singh, Anita (2010) '3D? It'll never take off, says Sir David', *Daily Telegraph* 16 December: 7.

Smith, Charles W. (1994) 'Out of its Depth', *The Journal of the Royal Television Society* December-January: 18-19.

Smith, Charles W. (1996) '100 Years of 3-D Movies... And the Second 100 Years', *Cinema Technology* April: pp. 8-10.

Sweney, Mark (2011) '3D TV "set to struggle in UK"', *Guardian Unlimited* 20 June (consulted July 2012) <http://www.guardian.co.uk/media/2011/jun/20/3d-tv-set-to-struggle-in-uk?INTCMP=SRCH>

The Times (1941) 'New Progress in Television: Mr. Baird's Invention', 19 December: 2.

The Times (1944) 'Progress in Colour Television: Mr. J.L. Baird's Latest Invention', 12 August: 2.

The Times (1954) 'Television Set Developments: 3-D Novelty at Radio Show', 25 August: 3.