

Tweeting the Olympics: Towards a methodological framework for Big Data analysis of audience engagement during global media events

James Dennis & Ben O'Loughlin,
Royal Holloway, University of London, UK

Marie Gillespie,
The Open University, UK

Abstract:

This article explains the methodological framework created for the 'Tweeting the Olympics' project represented in this Journal issue that can be used and adapted by other researchers in their studies of global media events. This project was a case study in the adoption of and adaptation to social media in a global news organisation. It examined the opportunities and challenges that were faced by the BBC World Service during the 2012 London Olympic Games in developing their Twitter strategy, and how audiences responded. The aim of the project was to assess whether and how the BBC World Service engaged audiences via Twitter and fostered intercultural dialogue (or, in the BBC's terms, a 'global conversation'). We focused on the uses of Twitter by four different Language Services provided by the BBC World Service: the BBC Arabic Service; BBC.com (the English Language Service targeted at overseas audiences); the BBC Persian Service; and the BBC Russian Service. We adopted a 'social life of methods' approach that treats methods as active agents in institutional processes. We argue that social media research and methods, despite their rapid emergence and proliferation, are still at an early stage of development and should be treated as experimental. As we develop methodological designs for our research experiments, sharing our experiences of failure as well as of success is important to advance the field. For although some regard 'big data' as the new gold standard, promising forms of knowledge previously unattainable, it is wise to be cautious. There are risks as well benefits for academics working alongside corporate researchers. The paper offers an honest and

judicious assessment of the framework we created and used, and suggests new fruitful lines of enquiry.

Key words: Twitter, London Olympics 2012, BBC World Service, Multi-Lingual Audience research, Social Life of Methods, Global Media Events,

Introduction

‘Tweeting the Olympics’ was a collaborative research project between the BBC World Service and the Open University (OU). It was part of a 5-year research partnership between the BBC and the OU’s Centre for Research on Socio-Cultural Change.¹ It brought together a distinctive and rather unusual set of research priorities. For the BBCWS, there were two objectives. The first was to understand how overseas audiences engaged with BBCWS via Twitter during a major global media event. The second was to understand what, if anything, was gained during the Games from the BBC’s Twitter Strategy. The BBC’s Twitter strategy involved the creation of a customisable feed that collects tweets in real-time from a range of Twitter users selected by the host organisation. The BBC referred to this as the Twitter Module. The Twitter Module had not been used extensively before so the BBC believed that London Games presented a real opportunity for them to increase their audience numbers and to engage them in cross-border dialogue via social media.

The academic team partnered with the BBC’s Audience Research team in pursuit of the above goals. They were keen to involve academic partners to provide a sense of critical distance and independence in the evaluation of their Twitter strategy. The OU team also identified their own set of analytical and practical questions to ask of the Twitter data that was collected. We were interested in the following questions: how does the BBCWS define and measure engagement? What forms of engagement did the Twitter Module generate? To what extent did the BBCWS influence discussions around the Olympic Games on Twitter? Did social media allow users to shape news agendas? How did the BBCWS and their Twitter users/audiences negotiate the tensions between national and cosmopolitan sensibilities and identities?

Our methodological design was informed by a ‘social life of methods’ approach.² This approach is based on the premise that methods are not socially and culturally neutral techniques and tools for gathering data but must be seen as active and performative shapers, not just of research processes, but also of the very institutions that we study. Elsewhere we have elaborated on the theoretical and empirical features of this approach (Gillespie, Mackay and Webb 2011; Gillespie 2013). Suffice it to say here, we treat methods as active agents that acquire a social life of their own as they are appropriated and put to use by different actors (BBC audience researchers, the market researchers who the BBC commission to undertake research on their behalf, academics). The uses of methods and of the data gathered shape, often profoundly, what is possible to know and say about an organisation. Our social life of methods approach goes beyond constructionist claims to

investigate the many ways in which audience research methods are implicated in knowledge production inside and outside BBCWS.

Audience research data, in particular, plays a very important role in shaping editorial practices, strategic goals and accountability processes, as well as public relations and corporate communications. Audience research methods at the BBCWS have a history and a genealogy. Social media also challenge what organisations like BBCWS do as journalism as well as what they do to know and understand their audiences (Gillespie, Mackay and Webb 2011). Their research practices and the concepts that they use to define and measure the 'reach' and 'engagement' are in flux as a result of changes in technologies, governance and funding regimes. Until 2014 the BBCWS received funding from the Foreign and Commonwealth Office but it now receives funding from the Licence Fee. It must justify its public value to UK citizens who know very little about Foreign Language Services for international audiences. It does so by producing 'facts' about its audiences and whether and how they engage with its services. Its future is at risk so audience research will play a critical role in how it develops as an organisation that is now integrating itself into the BBC Domestic Services. It is in this context that the 'Tweeting the Olympics' methodological framework and its social life of methods approach must be understood.

The London Olympic Games promised a rich empirical case study to understand and assess how the BBCWS is adopting and adapting to social media and integrating it into their practices. Furthermore, this case provided an opportunity to analyse whether and how the conversations facilitated by the BBCWS contributed to intercultural dialogue across borders. In particular, we were interested in the language used and positions adopted by tweeters on controversial issues regarding representations of gender, the nation, religion and Olympic values, such as equality and fairness.

In this article we first outline the overarching methodological approach used across all four case studies on the Arabic, English, Persian and Russian Language Services (see papers in this issue by Aslan, Dennis and O'Loughlin; Aslanyan and Gillespie; Shreim; Voss and Asgari-Targhi). The methodological framework necessarily involved mixed methods, and drew upon qualitative, quantitative and computational techniques. This reflected the interdisciplinary make-up of our research team, with scholars from computer science, cultural studies, media and communication, and political science. Secondly, we describe the different workflows adopted across this project. Due to the challenges of social media research and undertaking multi-lingual research, a number of creative workarounds³ were taken to address and facilitate the cultural specificities of research in each Language Service. Finally, the article reflects on the limitations of our research project, and some of the difficulties of research partnerships between academic and market researchers. But it also highlights what was learnt from this experiment in methods and in research collaborations. It also suggests possible fruitful methodological pathways for future research that were opened up by the Tweeting the Olympics project.

Research Design

Our collaboration with the BBC World Service was based around an interactive Twitter Module that was integrated into the web sites for BBC Arabic, BBC Brasil, BBC Hausa, BBC Hindi, BBC Mundo, BBC Russian and BBC Turkish.⁴ The Twitter Module, developed by the BBCWS and social media analysis firm Tweetminster (<http://tweetminster.co.uk/>), is a visualisation module.⁵ It displays tweets in real-time from a list of Twitter accounts determined by the host organisation. The BBCWS populated the Twitter Module with a range of BBC corporate accounts, BBC staff accounts, pundits affiliated with the BBC and athletes.⁶ These lists were tailored to the interests of specific audiences for particular Language Services and programmes (see **Appendix 1**). The module was active 24/7 between 22 July and 14 August 2012.

Two versions of the Twitter Module were used during the Olympics, as shown in **Figure 1**. Firstly, the wide module displayed the latest live tweets from those accounts pre-approved by the BBC and a list of trends – the most frequently mentioned words by these accounts, the most shared URLs within the group and a list of the most active users (Vissens 2012). Secondly, the narrow module displayed only the custom Twitter feed from the selected accounts.



Twitter Module - narrow module

Twitter Module - wide module

Figure 1: An example of the Twitter Module

Editors were asked to promote the Twitter Module on the websites of the respective Language Services, as well as on individual articles and across social media. The module was used to encourage real-time ‘engagement’ from audience members during the games. However, as Mackay (2012:12) identifies, the term engagement is very slippery and open to multiple interpretations for the BBCWS that may differ from those of academics.

Firstly, engagement can be understood in terms of fostering audience participation. This relates to a key objective of the BBCWS, and one of the underlying themes of our research – facilitating a ‘global conversation’:

An informed and intelligent dialogue which transcends international borders and cultural divides; by giving communities around the world opportunities to create, publish, and share their own views and stories; and, thereby, enabling people to make sense of increasingly complex regional and global events and developments. (BBC Trust 2007)

The definition above embeds a notion of global citizenship and intercultural dialogue, and a prior project evaluated the extent to which BBCWS practices matched their rhetoric on the global conversation.⁷ Evidence of audience engagement depends on how engagement is defined and the methods used to measure or assess engagement (Mackay 2012). Analysis of engagement can be used to inform the editorial agenda, creating a feedback loop between the audience and content producers (Gillespie 2013; Hoskins and O'Loughlin 2010:163).

Secondly, engagement is also used as a synonym for reach – that is, ‘we have to engage more users’ (Mackay 2012:12). Unlike social analytics software, such as Sysomos MAP, that also provides insights on audience engagement, the Twitter Module itself has a very public function that may help the organisation increase audience share online. As Vissens (2012) notes, the Twitter Module had previously been a success for BBC Russian during the 2012 Russian presidential election, as their Twitter audience increased by 2,000 followers. The 2012 London Olympics provided a valuable opportunity to observe its effectiveness across a number of other Language Services.

The BBC World Service wanted an independent assessment and analysis of whether and how the Twitter Module fostered engagement and, in turn, if this benefitted the broadcaster in the long-term in terms of ratings and quality of discourse – although the academic research team was much more focussed on the latter. As we shall see in this article, the selection of accounts for the Twitter Module by the host organisation is of vital importance in determining the outcome and success of the Twitter Module (Shreim 2015). As we found in previous research, engagement is a two-way process (Gillespie 2013). How audiences engage with BBCWS is very much a response to how the journalist and editors manage to incite the interest of and attract the attention of users. For long the BBCWS have been somewhat risk averse in respect of social media, concerned about reputational damage and maintaining professional standards. And those most senior in the organisation are least skilled and adept in using social media. So the Twitter Module has to be understood and assessed in this wider context (Gillespie, Abdel Sattar and Lami 2015).

Social media platforms such as Twitter generate vast quantities of qualitatively rich data. Each 140-character post can contain unique insights into micro-level attitudes and opinions. The attraction of this data is that it is generated voluntarily, independently of any research and the biases of their research design. This promises a more accurate or authentic representation of individual and social dynamics in the intersecting Twitterspheres created by large international news organisations like BBCWS. But the sheer volume of Twitter data that it is possible to collect can easily overwhelm and defy effective uses of qualitative and

interpretive methods. This does not mean these methods should be avoided because with a judicious use of sampling techniques and a systematic approach, qualitative analysis of tweets is, as this special section shows, perfectly possible and very revealing. Nevertheless content and discourse analysis is time consuming and expensive in terms of human resources and our limited academic budget had to cut its cloth accordingly (see Hutchings et al this special section for more details of our specific approach to content and discourse analysis). These techniques were important for the project because the BBC does not undertake content or discourse analysis of the social media it generates. Our partners were excited by the potential knowledge gained in extending their usual research repertoire.

While the benefits of computational methods and big data research are intuitively quite simple,⁸ they are not well suited to exploring the complex motivational triggers or meanings behind the flows of interactions or the content of these messages in particular networks (see boyd and Crawford 2012). In order to understand the social context of communication flows, behaviours and interactions, qualitative techniques are much more useful (Anstead and O'Loughlin 2012). Our methodological framework combined computational tools with human expertise in order to analyse the content and discursive features of tweets. This would help us assess whether and how the Twitter Module successfully cultivated 'a global conversation'.

As a first step, each research team used Sysomos MAP: (<http://sysomos.com/products/map>), a commercial text-mining platform (used by BBCWS and to which we were given privileged access and offered training), to identify events of interest for both the BBCWS and the research team. Sysomos MAP is not suitable for rigorous empirical research due to the lack of transparency about the sampling frame used when exporting large amounts of tweets from the service. As of August 2012, the export function was limited to 5,000 randomly selected tweets per search term. There is no clear indication how this process of randomisation is undertaken. This creates validity problems when dealing with larger datasets, as we were in this project. Furthermore, access to these tools can be very costly for academic research if not in partnership with subscribers like BBCWS, with Twitter only providing access to their archive to a handful of data re-sellers. Despite these risks, there are some benefits for researchers (Procter, Voss and Lvov, this issue). Principally, the service grants access to the complete Twitter 'Firehose' archive, which refers to 100% of all public tweets. As such, Sysomos MAP guarantees analyses based on 100% of the tweets that match the user-defined search criteria. This project used the platform as a means of pinpointing trends, peaks and troughs in Twitter flows, which allowed us to generate foci for in depth qualitative investigation using content and discourse analysis.

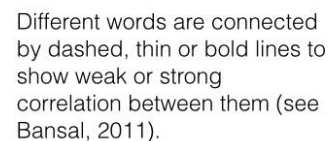
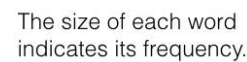
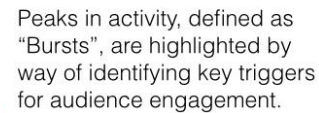
A number of Sysomos MAP features were used to identify those events that triggered conversation on Twitter during the Games. By using Boolean searches and a range of visualisation tools we were able to narrow our focus onto these key events. Boolean searching allows the user to broaden or limit their search criteria by combining search terms with Boolean operators, such as 'AND', 'OR' and 'NOT'. We then used three visualisation

tools, shown in **Figure 2**, to explore the peaks in conversation. We were able to generate data about the volume of Twitter conversations on particular topics over time ('Popularity graphs'), quick conversation snapshots in the form of wordclouds and 'Buzzgraphs' that visualised which words were commonly used together within tweets and the strength of these relationships. In short, the social analytics provided by Sysomos MAP offered a basis to select events for further analysis.

The next step in our workflow was for the research team to choose five accounts that were significant and salient to each Language Service and subject these to further analysis. These were selected from a list of all accounts included within the Twitter Module for each respective Language Service. BBC Persian did not use a Twitter Module for technical reasons (see Section 1.4). Instead, five accounts were selected on the basis of interviews with staff at BBC Persian.

It is important to note that we did not necessarily choose the five accounts for each Language Service in terms of popularity, measured in terms of the volume of interactions with each Twitter account. While popularity was a key determinant for exploring the effectiveness of the Twitter Module, in order to understand engagement in a way that is useful to the BBC it was also important to observe instances where communication failed to generate audience interaction, or perhaps lead to unintended consequences (Aslan, Dennis and O'Loughlin 2, this issue). For example, the BBC.com research team selected both Clare Balding (@clarebalding1), the retired jockey and BBC television presenter, and Matthew Pinsent (@matthewpinsent), Olympic gold medallist rower and broadcaster. Despite similarly high profile roles in the televised coverage of the games, Pinsent was mentioned 9,500 times in comparison to 57,047 mentions of Balding. As such, by selecting a mixture of accounts -- some that were very active and others where we may have expected higher levels of interactions -- we were able to provide the BBCWS with cases to illustrate what did or did not generate effective audience engagement by their journalists and pundits.

While Sysomos MAP has Firehose access, how the service filters tweets is not transparent. As such, the computer scientists involved in this research project (Procter, Voss and Lvov, this issue) designed an analysis workflow in order to generate valid and reliable samples from Twitter. As **Figure 3** shows, this consisted of five key stages: (1) drawing on a range of data collection tools to harvest tweets; (2) undertaking an analysis of how often tweets have been retweeted to identify significant 'information flows'; (3) working collaboratively to design a coding framework suitable for researchers working on each Language Service, followed by each study manually coding roughly 1,800 tweets (specific volumes are detailed below); (4) generating a range of visualisations for presentation back to the BBCWS; (5) using heat-maps to cross-tabulate different sets of codes.



Page 445

hashtags) and/or a list of Twitter accounts. The Streaming API provides all tweets sent by a given account, all tweets retweeted that originate from this account, as well as all tweets containing mentions of this account. Using this tool we generated a collection of tweets based on roughly 1,000 accounts identified by the BBC (Procter, Voss and Lvov, this issue). In total 5,509,928 tweets were collected for the London 2012 Olympic and Paralympic games. The full corpus included 3,906,569 English tweets, 71,251 Russian tweets and 62,872 Arabic tweets. While this data is more limited than Sysomos MAP, since all tweets are collected on the basis of selected time frames, keywords and accounts, the software's operation is fundamentally transparent. This data collection formed the basis of the datasets used in the BBC Arabic, BBC.com and BBC Russian studies.

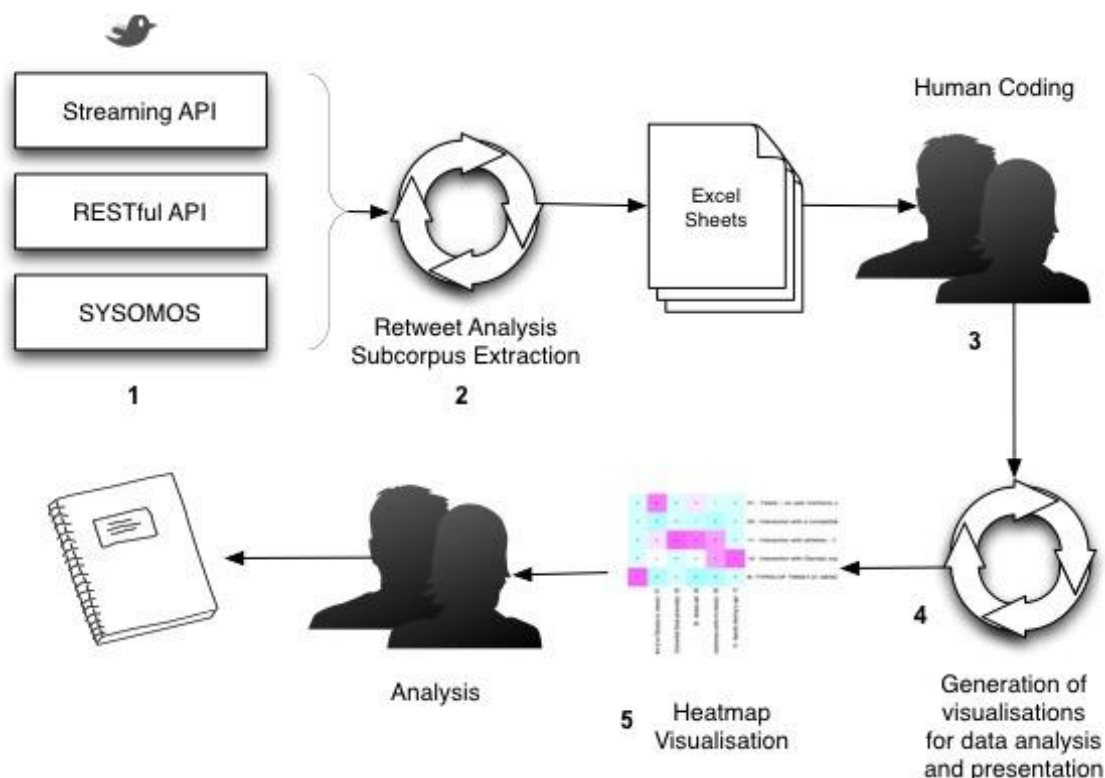


Figure 3: Analysis workflow

BBC Persian did not use the Twitter Module, and therefore no Persian tweeters were included within the BBC's list of 1,000 Twitter accounts. BBC Persian took a different approach. The research team used Sysomos MAP to collect all tweets relating to the five selected accounts. By using the search criteria 'to:' and 'from:' (that is, tweets mentioning the account and posts published by the account), the datasets that were retrospectively exported were similar to those generated in real-time by the Streaming API. The disadvantage of this is that Sysomos MAP is not transparent; we have little understanding of the sampling frame used by the service when sampling from large volumes of tweets. For the BBC Persian case study we were able to export 100 percent of the tweets required for our analyses. Furthermore, the researchers were unable to extract tweets using this method

for the @BBCPersian account. Instead we used the RESTful Twitter API to retrieve the tweets for this account. This allows the user to collect tweets retrospectively.

The datasets for BBC Arabic, BBC.com and BBC Russian were initially based on the five accounts selected. Each corpus contained their tweets, together with those mentioning or addressed to them, and these were then filtered by keywords to identify the most popular conversations relating to the five chosen events. This approach was taken as the next stage of the research design was discourse analysis and it was important that researchers had a manageable dataset to code and analyse the themes emerging on Twitter within the conversations that took place. Without narrowing the scope of our accounts, it would be difficult to track the rich thematic conversations that formed the basis of our qualitative analysis.

Given our datasets for manual coding were limited to a maximum of 2,000 tweets, it was important to use a reliable sampling frame. Any collection of tweets can be divided into tweets that are 'original' and retweets – a repost of a message posted by another user. We used a simple computational tool to group a tweet and its retweets into information flows. Ranking information flows by size provides a way to determine the relative significance of each tweet, narrowing our focus on significant information flows, key influencers and trajectory shifts.

A coding framework was then designed to analyse these collections of tweets (see **Appendix 2**). The schema was designed collaboratively to accommodate the research priorities of all four language case studies. The first iteration of the framework was based loosely on the schema used in the *Reading the Riots* project (Procter, Vis and Voss 2013). This framework was then refined after each researcher coded a small number of tweets from their respective sample. **Figure 4** (below) illustrates an example of our coding schema applied to a tweet, included as part of our analysis of Nicola Adams' boxing gold in the Women's flyweight.

As shown in **Figure 4**, the coding framework enabled researchers to code the type of actor publishing the tweet, the type of tweet (if the tweet was a reply to another user, for example), and identify any expressive comments on gender, nationalism, religion, and/or Olympic values. We coded using these themes to gain analytical purchase on the nature of 'the global conversation': Who was reacting to whom? When was communication linear or projection and when was it more dialogic or conversational? How did users react to the BBC coverage and its social media output?

Content and discourse analysis allowed us to observe and evaluate audience engagement across each Language Service. For example, content analysis of BBC Arabic suggested that their audience members expressed a great deal of national pride in the sporting efforts of a wide range of athletes, irrespective of their performance. However, sport was not the only focus for the BBC Russian or the BBC Persian audiences; for them, discussion around the Olympics often became politicised. We could then use discourse analysis to interpret how meanings emerged from the particular context of the Russian public sphere. In terms of audience reaction to BBC content, the research team analysing

BBC.com found that controversy drives engagement with the BBC on Twitter and then used discourse analysis to explore the ways users brought gender and nationality into debates. These findings are explored in further detail in this special issue.



It's gold for Adams! She beats Ren Cancan
in the 1st ever women's Olympic boxing final.
Adam's deserves every carat of that medal
[#bbc2012](#)



- **(A) Actors** - (1) BBC commercial accounts
- **(B) Types of Tweet** - (1) Tweet – no user mentions and not a RT
- **(C) Reactions** - (4) Offering link to BBC hashtag; (14) Praising an athlete's performance; (19) Adding information to discussion of a sport / event
- **(D) Gender** - (1) Experience (their first time at an Olympics vs. veteran)

Figure 4: An example of a tweet annotated using the coding framework

A total of 6,888 tweets were manually coded across the four Language Services. While all researchers met and coded a small sample of tweets together, they clearly had different coding experiences. This is not to say that the content analysis was entirely subjective. Without the resources to conduct a coding verification check we simply note these limitations, while acknowledging the vital importance of the discourse analysis in helping to explain who influenced conversation trajectories and the relationship of particular tweets to broader thematic discussions.

In preparing the research for dissemination back to the BBCWS, the research team collaboratively designed a range of visualisations (see **Figure 5**). Creating these was an important part of the research design. Given our interdisciplinary research team, we held a number of weekly meetings over Skype to try and find the most effective way to visualize the results given our multi-faceted coding schema. Initially, visualisations took the form of bar charts and pie charts. These proved to be an effective way of exploring a single set of codes, such as the actor type or tweets relating to the nation.

As part of the BBC.com case study the researchers examined the audience reaction to Mo Farah's gold medal performance in the 5000m. **Figure 5** shows how the majority of

tweets in relation to conceptions of the nation were celebrating Mo Farah's victory as a British athlete. While this explains the content of audience engagement, our aim to observe the 'global conversation' – one that transcends national, ethnic and religious boundaries – meant that we needed visual representations of the intersection of different sets of codes.

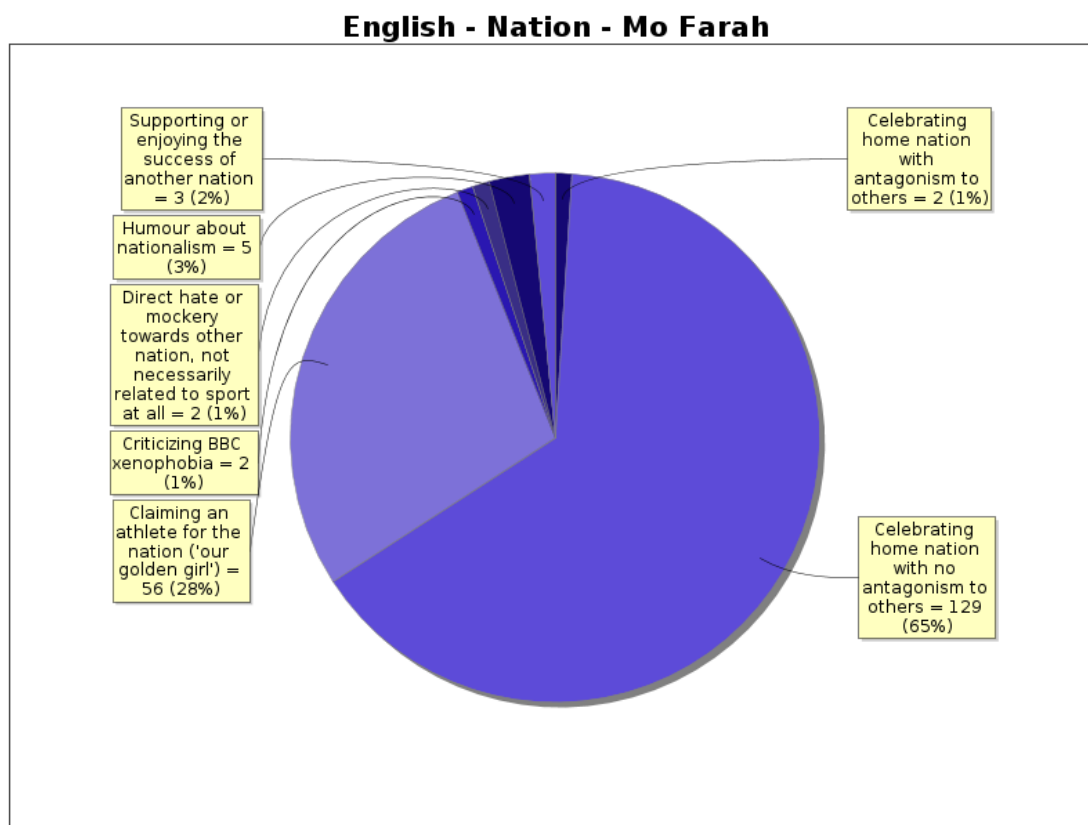


Figure 5: An example pie chart illustrating the frequency of codes relating to the nation in our analysis of Mo Farah's gold medal performance in the men's 5000m

In order to visualise the relationships between different codes we produced heat maps, graphical representations of the coded data in which codes were assigned a colour dependent on their overall frequency. To produce the visualisations we implemented a custom Java program to pre-process the Excel sheets containing our coded data and then fed the data into *R* (<http://www.r-project.org/>), a statistical package. These visualisations came in two forms: absolute heat maps, and relative heat maps.

Figure 6 shows an absolute heat map from our analysis of Mo Farah's victory. This is a heat map of the type of tweet posted (x-axis and section B of the coding framework – see **Appendix 2**) and codes relating to the 'Nation' (y-axis and section E of the coding framework). After cross-tabulating these codes we assigned each field a colour - those codes with a higher frequency were more strongly coloured blue. In doing so it becomes immediately clear that the vast majority of tweets are coded at (11, 1) – tweets that interact with an athlete and also celebrate the performance of the home nation. This further explains the finding from the initial pie chart shown in **Figure 5**, showing that the majority of

these tweets were directed to Mo Farah himself, wishing him good luck or later congratulating him on his victory.



Figure 6: An example of an absolute heat map, illustrating the type of tweet (x-axis) and codes relating to the nation (y-axis) in the analysis of Mo Farah's gold medal performance in the men's 5000m.

We also produced relative heat maps, which visualised the frequency of codes relatively by either columns or rows. The absolute heat maps focus attention on the distinctive blue fields, ignoring other fields that may have a low frequency but also may still be qualitatively interesting. By plotting relative heat maps it was possible to visualise the more nuanced differences in coding patterns. This was evident in the analysis of the Chinese swimmer Ye Shiwen, in which Aslan, Dennis and O'Loughlin (this issue) identified that the majority of conversation with BBC accounts related to issues of fairness. As **Figure 7** (below) shows, 28 tweets criticised BBC accounts directly in light of the line of questioning pursued by Clare Balding following Ye Shiwen's performance.

In this way, heat maps were a meaningful way of visualising and contextualising the findings from the manual coding.

Each of the different strands of this project followed this methodology to some degree. However, our research design had to remain adaptable in order to account for limitations in our data as well as, simply, what happened during the Olympics. While our ability to compare across the Language Services was hampered by our fragmenting (or

blossoming) research design, this organic process allowed the researchers to engage with the emerging themes and questions in their respective dataset.

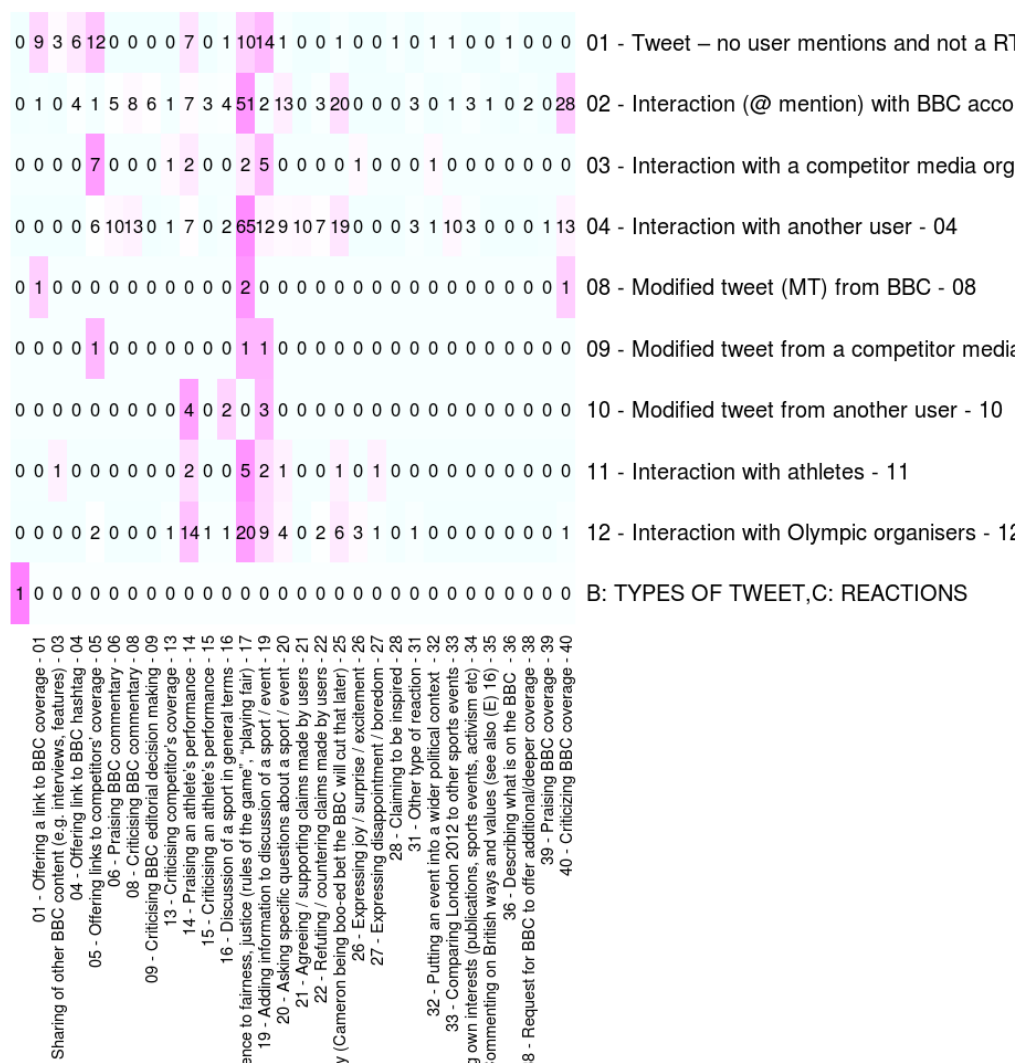


Figure 7: An example of a relative 'row' heat map, illustrating the type of reaction (x-axis) with the type of tweet (y-axis) in the analysis of Ye Shiwen's world record time in the women's swimming 400 metre individual medley.

1. Language Services in Focus

1.1 BBC Arabic

Shreim (2015) in this special section drew upon a mixed-method research design to explore whether the social media strategy used by BBC Arabic resulted in a 'global conversation'. Prior to conducting a discourse analysis of data collected from COSMOS, the researcher conducted an online participation observation of BBC Arabic's online coverage, with a particular focus on issues around gender, religion, national and cosmopolitan sensibilities

and identities. The observation was conducted four hours per day for three days in the early stages of the games. This was staggered, with data collected between the hours of 9-10am, 1-2pm, 5-6pm, and 9-10pm. This design was used in order to be close to breaking news, and to track the development of stories over time. The researcher also monitored the Al-Jazeera Arabic website and BBC.com as a means of comparison. The findings helped the research team understand the emerging themes within the output of BBC Arabic.

Alongside the results from exploratory keyword searches on Sysomos MAP, the data gathered during the observation period was used to identify five events for discourse analysis: (1) the Opening Ceremony; (2) the Closing Ceremony; (3) the participation of Arab women during the Olympics; (4) the weak performance of Arab athletes; and (5) celebrations of Arab performance. Participant-observation proved to be a valuable way of recognising those events that closely matched the research aims of the researchers. They were also of clear interest to the objectives of BBC Arabic. For example, the audience response to the Opening and Closing Ceremonies allowed the researcher to pay special attention to issues of cultural diplomacy. Likewise, the unprecedented representation of female athletes from the Middle East provided an opportunity to explore how issues of gender were framed and debated by those accounts interacting with the Twitter Module.

In comparison to the other Language Services, the sample of events selected for our study of BBC Arabic was not based on specific competitions and incidents but was often spread over longer periods of time. This was a result of the lack of engagement with the BBC Arabic Twitter Module during the Olympic Games. In the initial Sysomos MAP search there were only 284 tweets mentioning BBC Arabic. This was because there were only three BBC Arabic journalists covering the Olympic Games on Twitter, all of whom had low numbers of followers. As such, the five accounts selected from the Twitter Module to generate the corpus did not feature BBC journalists: Qatar Olympic Team (@qatar_olympic); *ال عمر محمد* (@alomar26); *ال ذق بي سلام* (@SALIM_ALNAQBI); an unofficial account for the Egyptian national team (@Olympic_Egypt); and Reem Abulleil (@ReemAbulleil). Furthermore, as a result of the lack of interaction with BBC Arabic Twitter accounts, the search criteria were broadened to include some accounts from outside the Twitter Module list. In total, the sample consisted of 6,634 tweets from 577 Twitter accounts. The researcher coded 1,686 tweets. This total was in line with the number of tweets coded by researchers analysing the other Language Services.

1.2 **BBC.com**

The BBC.com research team followed a similar research design to the general workflow described earlier in this article. Following an initial analysis of trends over the course of the Olympic Games using Sysomos MAP, the researchers identified five events for further analysis: (1) the representation of the National Health Service (NHS) during the Opening Ceremony; (2) the performance of the American swimmer Michael Phelps throughout the games; (3) the false accusations of doping following Chinese swimmer Ye Shiwen's gold medal in the women's 400m individual medley; (4) Mo Farah's gold medal performance in

the men's 5,000m; and (5) Britain's Nicola Adams winning the first gold medal in women's boxing.

A total of ten accounts were selected from the BBC.com Twitter Module. This included an additional five accounts in comparison to the five selected by the other Language Services. This was due to the greater volume and variety of accounts included within the Twitter Module, with 43 journalists and pundits, 412 Team GB athletes, and 55 accounts the BBC had identified as having the potential to create buzz and wider audience engagement. The researchers selected five BBC pundits: Gary Lineker (@garylineker); Jake Humphrey (@mrjakehumphrey); Clare Balding (@clarebalding1); Matthew Pincet (@matthewcpincet); and Jonathan Edwards (@JDE66). Five additional accounts were selected, including both members of Team GB and influential athletes taking part during the games: British cyclist Bradley Wiggins (@bradwiggins); British diver Tom Daley (@TomDaley1994); Jamaican sprinter Usain Bolt (@usainbolt); American swimmer Ryan Lochte (@ryanlochte); and Australian cyclist Anna Meares (@AnnaMeares).

It is important to note that domestic, UK-based BBC Twitter accounts feature heavily in both the findings provided to the BBC and in the article included in this special issue (Aslan, Dennis and O'Loughlin, this issue). This is because these accounts, such as @BBCSport, were included in the original lists provided to us by the organisation; the social media strategy for BBC.com had clear overlap with the output of the BBC UK.

After keyword searches yielded total samples for each event, the team's computer scientists filtered these samples to provide the researchers with final samples based on the output of accounts linked to the Twitter Module. These datasets contained the most retweeted tweets in each total sample. In total 1,824 tweets were analysed using the coding schema. There were some discrepancies in the overall volume of tweets coded for each event. The final samples for the NHS and Ye Shiwen events were small, at 81 and 243 each. We therefore coded larger samples for the other events, with 600 tweets analysed on Mo Farah's and Nicola Adam's respective victories.

As one may expect given the adoption rates of Twitter in the UK and the prominence of the BBC, these volumes are vastly reduced when compared to the total population of tweets mentioning the BBC more generally in relation to the five events. The researchers extracted 3,404 tweets on Mo Farah and 1,588 posts on Ye Shiwen using keyword searches on Sysomos MAP. These searches produced higher overall volumes of tweets than those collected using COSMOS. This is because a keyword search over all Twitter data has more matches than an equivalent search over a pre-selected dataset, such as the one used for our analysis which was restricted to the list of accounts included within the Twitter Module.

After delivering these findings to the BBC, the researchers turned their focus to the Ye Shiwen case study and the reaction from Twitter users to an offhand comment from BBC Sport presenter Clare Balding immediately following the live broadcast of the women's 400m individual medley on 28 July, 2012. This was the most interesting event given the thematic overlap with the research priorities. The initial coding of 243 tweets included examples of cross-cultural discourse, discussions relating to the athlete's gender and

confrontation driven by nationalist sentiments. The article in this issue, 'Balding Goes Trolling? Cross-Media Amplification of Controversy at the 2012 Olympics', offers a cross-medium analysis of the case study, tracing the controversy as it moved between different social networks and media platforms over a period of five days. The trajectory of the controversy moved beyond the parameters of our current dataset of tweets collected using COSMOS, which was restricted to interactions with accounts included in the Twitter Module. As such, the researchers ran a series of new queries using keyword searches in Sysomos (Aslan, Dennis and O'Loughlin, this issue). This generated new sets of Twitter data, with a random sample of 5,000 tweets about Ye Shiwen, from a total population of 30,735, and 8,058 tweets mentioning Clare Balding's account handle (@clarebalding1). These tweets were collected between 28 July and 1 August, 2012. The researchers also analysed a range of national and international media through which this controversy unfolded. Our sampling strategy began with a systematic search using Lexis Nexis; we added further emerging stories once we began tracing the interactions. These datasets provided the basis for the qualitative study.

1.3 *BBC Russian*

The final Language Service that our project analysed that used the Twitter Module was BBC Russian. While the BBC were interested in how effective the Twitter Module was in facilitating engagement, our project also sought to explore the perception of Britain amongst Russian-speaking Twitter users.

Initially, five accounts were selected on the basis of those included in the Twitter Module by the producers at BBC Russian. However, this was later increased to seven accounts in order to provide a total number of tweets in line with other Language Services. They consisted of two BBC Russian journalists (Скороходов Никанор, @RSaanti; Nastya Uspenskaya, @AnastasiaBim), two editors of Russian sports publications (Василий Конов, @VasilyKonov; Георгий Черданцев, @cherdantsev), a former Russian Olympic champion turned politician (Светлана Журова, @szhurova), a sports official representing the Russian Federation (Дмитрий Чернышенко, @ChernyshenkoRu) and a Russian blogger living in London (Konstantin Pinaev, @moscowlondon). These accounts were selected on the basis that they were among the most active on the Twitter Module.

Given that the dataset was drawn from a number of Twitter accounts selected by the BBC World Service, the researcher noted that this sample was not representative of the Russian audience on Twitter. In total, tweets from 494 accounts were coded. When coding for actor type, that is, the type of user who published the tweet, it became apparent that the sample was overrepresented by users affiliated to Russian media outlets. These constituted 87 accounts, or 17.6 per cent of the sample. Consequently, tweets were often factual rather than expressive. A plurality of the accounts analysed – 188 accounts, or 38 per cent of the sample – belonged to members of the public. However, their tweets were far less opinionated and open than one may expect.

On the basis of the trends identified from exploratory searches on Sysomos MAP, five events were chosen for further analysis: (1) the Opening Ceremony; (2) the Closing Ceremony; (3) the women's Singles Tennis final between Maria Sharapova and Serena Williams; (4) the men's Volleyball final; and (5) Vladimir Putin's appearance at the games on 2 August 2012.

In total, 1,874 tweets were coded across the five events. As with the BBC.com corpus, these tweets were not spread evenly across the five events. As such, the research team had to adapt the search criteria by relaxing the time constraints for most events. The researcher also manually picked a small number of additional tweets from the seven accounts; these tweets did not contain any keywords but did relate to the events - a problem we reflect upon in the conclusion.

1.4 *BBC Persian*

BBC Persian was the only Language Service included in our project that did not feature a Twitter Module on their website during the games. This decision was made for technical reasons (Voss and Asgari-Targhi, this issue). This provided an important point of comparison that allowed the research team to compare levels of audience engagement with those Language Services that did use the Twitter Module.

In order to make these comparisons it was important to analyse the performance of BBC Persian Twitter accounts over the course of the games. As there was no pre-determined list of accounts, the researcher selected those accounts that would offer insights into the performance of the BBC Persian social media strategy. Five accounts were chosen. Three were corporate accounts: BBC Persian (@bbcpersian); BBC Persian Sport (@bbcpersiansport); and BBC Nowbat-e Shoma (Your Turn) (@bbcshoma). The other two accounts were from prominent Twitter users who were also BBC Persian employees: Nima Akbarpour (@nima) and Sanam Dolatshahi (@khorshid). These BBC journalists were selected given their high follower count, with 61,200 followers and 24,200 followers respectively (as of April 2015).

Following the approach used in the other Language Services, five events were selected on the basis of the trends observed using Sysomos MAP: (1) The Opening Ceremony, and the reaction of the Persian speaking world to representations of Britain; (2) the disqualification of the Iranian heavyweight boxer Ali Mazaheri; (3) 'Golden Tuesday' on 7 August 2012, when Iran won four gold medals; (4) the questions raised over the standard of refereeing during the quarter-final of the men's Greco-Roman wrestling event between Iranian wrestler Saeed Abdevali and his French counterpart Steeve Guenot; and (5) the Closing Ceremony, which included the reaction of the Persian speaking world to the performance of the Iranian, Afghan and Tajik Olympic teams over the course of the games.

Extracting the tweets for the five accounts around these events proved a challenge. The collection extracted using COSMOS was based around Twitter accounts identified by the BBCWS. Instead the research team used Sysomos MAP and the RESTful Twitter API to

retrospectively collect all tweets to (@mentions) and from the five accounts. In total 1,504 tweets were manually coded.

To explore the strategic differences in the use of social media by BBC Persian, and given the absence of the Twitter Module, the researcher also observed the production of two episodes of the interactive programme *Nobat-e Shoma* (Your Turn), in which audience contributions play an important role in shaping the content of each episode. The programme is broadcast for 50 minutes, five days a week (Saturday-Wednesday) to Persian-speaking audiences from around the world. The programme specifically targets Iran, Tajikistan and Afghanistan. The series began at the same time as the launch of BBC Persian TV in January 2009. Their major competitors are Radio Farda, VOA Persian and Deutsche Welle Persian.

During the Olympics, *Nobat-e Shoma* featured three dedicated 30-minute programmes on the Olympics. The researcher observed the creation and filming of two of these episodes. Informal interviews were also conducted with members of the production team regarding the nature of their work.

2. Conclusion: Limitations, Opportunities and Suggestions for Future Research

Social media research methods, despite their rapid emergence and proliferation, are still in an early stage of development. Therefore, all social media research is, to a greater or lesser extent, experimental. 'Big data' can be regarded as the new gold standard – promising forms of knowledge production previously unattainable. But it is wise to be cautious, as Karpf points out:

The new media environment demands new techniques. Those techniques carry risks – they have not undergone the years of seasoning and sophistication that dominant methods have. But they also carry the promise of expanding the scope of our inquiry and applying intellectual rigor to topics of broad social significance. (Karpf 2012:641)

While academic researchers may seek to take the intellectual high ground and proclaim the superiority of their conceptual and methodological tools, corporations, market researchers and commercial social media monitoring businesses pose a threat to empirical social science research, as others have argued (Procter, Voss and Lvov, this issue). Research partnerships are therefore vital if social science audience research is to access data and keep abreast of the latest developments in methods but they come with risks and costs – not so much to the independence of the research but more because data collected by market audience research are framed primarily by commercial imperatives – more concerned with using data to increasing market competitiveness than to enhance the quality of intercultural dialogue. Therefore there are difficult tensions and trade-offs that must be negotiated.

The inter-related articles in this special section combine to offer rich empirical evidence and analyses of how an international news organisation like the BBCWS is adapting to social media and how and why they are integrating it into their practices. However, just as we show the challenges that the BBC faces as it refines its use of Twitter to foster audience engagement, we must also detail the methodological obstacles that we faced in trying to conduct research on Twitter. In this relatively early stage of social media research we have as much to gain from failure as from success.

Accessing the data required for research purposes is difficult enough (see boyd and Crawford 2012), but doing so in a valid and reliable way across a number of different languages produced an array of hurdles. These drawbacks were at times amplified by the requirement to manage an interdisciplinary team who instinctively follow the assumptions and procedures of very different research traditions. The different Language Services were very different resourced, had diverse experience and expertise in using social media, and unexpected factors intervened in the uses of Twitter. For example, in the relatively well-resourced BBC Arabic Service, staff resources for administering the Twitter Module were at an all-time low due to the coincidence of the London Games with Ramadan – a time when staff take annual leave. This kind of ethnographic insight is vital in understanding the very low number of tweets generated by BBC Arabic staff during the Games (Shreim 2015). The BBC Persian Service did not use the Twitter Module but fared better than the other Language Services in terms of the quantity and the quality of their engagement with the users (Voss and Asgari-Targhi, this issue). Big data requires contextualising with human analysis via ethnographic, content, discourse and other forms of qualitative analysis.

The methodological framework that was developed involved workarounds, or what David Karpf (2012:654) calls a 'kludge'; a creative, but problematic, fix used to achieve a certain solution. Methodological design to investigate Twitter use is both an art and a science – a creative and challenging intellectual problem to solve that straddles Humanities, Computer and Social Sciences. But the social life of methods approach pays due recognition to the fact that the enactment of methods is a messy, iterative, flawed human social process. As such our methodological tactics constantly evolved to circumvent problems during the data collection and sampling stages - as well as during the collaborative analyses that endured long after the empirical research ended and up to the production of this special section.

The challenges and the opportunities of undertaking dual-purpose research – research that, in this case, had to meet the objectives of a highly competitive news industry and academia should not be underestimated. On the one hand, we had to align our research with the BBC's aims, independently assessing the value of the Twitter Module on audience engagement. Our initial research design was tailored to deliver findings for the BBCWS. However, we also had priorities, planning to investigate the dynamics of national and cosmopolitan imagination in new media representations of the London Olympics. The sampling frame and coding framework were not designed to produce ready-made answers to these questions. Instead, the analyses evolved from the data and from a multi-staged

process – from the initial findings we delivered to the BBCWS in a series of ‘data workshops’ to presentations in academic and policy circles. Therefore our methodology evolved reflexively and iteratively, adapting to address evolving issues and the interests of the research team. In this sense, this article is a post-hoc rationale of the methodological framework for the study – one which we hope can be flexibly adapted by others given its transparency.

A key component of David Karpf’s (2012) methodological approach is transparency: so the flaws of our methodology should be made explicit. This final section will illustrate the limitations of our research design and the scope that exists for future multi-lingual audience research on Twitter.

Firstly, by basing our samples around the accounts in the Twitter Module, or those of affiliated corporate accounts in the case of BBC Persian, we missed a wide range of pertinent discussion in the Twittersphere. For example, those researchers analysing the BBC.com dataset found representations of the NHS in the Opening Ceremony proved to be somewhat of an outlier, producing just 81 tweets. However, the impression from an earlier reading of tweets collected using Sysomos MAP suggested that there was evidence of the BBC fostering intercultural dialogue. These tweets were not captured by the Streaming API as they did not mention any of the 1000 accounts included in the Twitter Module; often these tweets did not mention any account but discussed the BBC more generally. Similarly, the BBC Russian dataset highlighted that working with the list of BBC-approved accounts affected the language and tone of the tweets that were gathered – rendering an image of a sanitised, politically correct Twittersphere in contrast to the more uninhibited Twitterverse available (Aslanyan and Gillespie, this issue). This uncharacteristically subdued BBC Russian Twittersphere – perhaps in line with its public diplomacy goal not to tell people what to debate but how to debate in a BBC style – was inclusive, fact-based and moving towards informed conclusions (Gillespie 2013). Given that many of the accounts selected for inclusion in the Twitter Module belonged to institutions or individuals acting in an official capacity, the majority of conversation exhibited a degree of civility that is not conventional in the wider Twittersphere. Thus, our aims to explore conversation on topics such as gender, nationalism or religion were at times restrained by our sampling frame.

Secondly, by focusing on Twitter, attention was not given to the intercultural dialogue that was fostered by the BBC’s output on other online platforms (for more details see Gill, Abdel Sattar and Lami 2015). The BBC’s large portfolio of television channels, websites, radio stations and mobile applications would have undoubtedly led to conversation in other digital spaces, on other social media platforms, on forums and in private forms of mediated communication. Twitter only provides a small snapshot of social media use. These conversations may shed a different light on the nature of cross-border conversations that emerged throughout the Olympics.

Thirdly, using keywords to refine large collections of social data can compromise the data collected because the sampling frame may systematically exclude other relevant tweets (see Jungherr 2014). Throughout the project we systematically used keyword

searches, firstly to identify trends over time in Sysomos MAP and then to produce manageable datasets for coding using COSMOS. In the process of comparing the data from both platforms it became evident that keywords sometimes miss discussion as users discuss topics while omitting our specific search criteria. As Jungherr (2014:18) notes, researchers may also find false positives in their dataset, 'using the keyword without referring to the topic under discussion.'

Fourthly, our comparison between different Language Services of the BBC World Service would have been improved had there been a shared event to analyse. Originally we intended to study the Opening and Closing Ceremonies in respect to each Language Service as a means of comparison. This would have created comparable observations of engagement on Twitter by the BBCWS during the same event. However, we were unable to harvest enough tweets to do this analysis. This was not directly due to the research design per se, but a result of the parameters imposed on our dataset by our collaboration with the BBCWS, who mandated a focus on Twitter Module accounts. This highlights a disjuncture between the research design and the realities of research. Despite the lack of congruency in the events studied, it is important to note that all the events selected were done so on the basis of observable peaks in audience activity using Sysomos MAP and that all events also shared the same research themes and questions. The value of salience trumped comparability. We had to be sensitive to the fact that different events and key words were salient in each Language Service and that straightforward comparisons were rendered difficult.

Fifthly, given the resource restraints imposed by our commitments to the BBCWS, the research lacked coding reliability. Prior to commencing discourse analysis the whole research team did meet in person in order to code the same sample of tweets. However, despite our attempts to improve inter-coder reliability, the difficulties of language specialism made inter-coding large quantities of the same tweets difficult.

Finally, focusing on communication occurring in specific languages, rather than within the territories of nation-states, may obfuscate the vast differences in internet adoption and social media use across the world. Different countries often have distinctive political cultures and media systems. Thought is needed about how future research should address, accommodate and explore these political and cultural differences.

There are a number of opportunities for future research analysing how broadcasters harness social media users' conversations. A comparison between other comparable international media organisations would potentially highlight differences in engagement strategies. Some subtle differences did emerge within our research and it would be interesting to delve deeper into these and analyse how different media organisation approach audience engagement on social media.

Secondly, future research should analyse ambiguous cases, those that don't explicitly fit the case selection criteria. This study based case selection either on the volume of tweets over time measured using Sysomos MAP, or on the basis of identifiable symbolic moments, such as the representation of Saudi women during the games. However, it may be that such

obvious moments generate predictable conversations as users follow 'scripts' or expectations about what is say-able or should be said. It may be that ambiguous objects, where there are some points of reference but no single, obvious point of reference or precedent, could result in differentiated and more ambivalent or even creative perspectives.

Finally, it goes without saying that circular analysis must be avoided. Did we achieve this? This project explored the role of the BBC in an event the BBC covered, so it was perhaps predictable we would find some BBC influence. Ultimately, our questions concerned what kind of influence and engagement the BBC was cultivating. However, if we were to reach a greater understanding of the BBC's role within 'the global conversation' *per se*, not just the BBC's constructed global conversation, it would be essential to study an event that is not organised and covered by the BBC. This would offer a more valid diagnosis of the BBC's actual role. For instance, identifying the BBC's role during the 2012 Paralympics, which was broadcast in the UK on Channel 4, would have been a useful way to see how the BBC and its Twitter Module can foster or harness existing conversation and drive users to BBC content. Given there is only a limited set of events the BBC can possibly cover, it would be invaluable to understand how the BBC can engage users in events when it does not provide the platform, focus and framing.

Despite the difficulties that we encountered in our experimental, multi-lingual research design, we feel our project provides significant empirical findings on how international news organisations like the BBCWS are using Twitter in their journalistic output. We were also able to offer an in-depth, cross-platform case study in which we explore the complex tensions that emerge between international news organisations and Twitter users as they compete to control an event's framing.

Our project also offers a valuable methodological case study in the burgeoning field of Twitter research. Firstly, it exemplifies the value, but also the challenges, of undertaking multi-language research. Comparative perspectives of social media use are increasingly important given that perspectives from Anglo-American academia dominate the field. Our research reflects on the similarities and differences in audience behavior on Twitter from around the globe.

Secondly, we offer a distinctive methodology for researching Twitter during real-time global events. In doing so we see our research design complementing the qualitative (e.g. Chadwick 2011), quantitative (e.g. Vaccari et al. 2015) and computational (e.g. Freelon and Karpf 2015) approaches used to analyse other events on Twitter in real-time (see Jungherr 2014).

Thirdly, the interdisciplinary nature of our research design exemplifies the importance of mixed methods in Twitter research. In this study we attempted to combine both qualitative methods and computational traditions in ways that draw on their respective strengths. Computational tools help discover the more salient or un-typical content, while qualitative methods make sense of their meaning. Undoubtedly this collaboration brought challenges given the epistemological and ontological differences between computer science and social science, but it was in these exchanges where we

found real value, as researchers learnt from one another. This and the other two methodological papers in this special section (Procter, Voss and Lvov, this issue; Willis, Fisher and Lvov, this issue), are indicative of this interdisciplinary exchange between social and computer scientists. Given the formative stages of Twitter research and the unique affordances required for both access to tweets *and* analysis of their content and the international social and communications networks forged, it is imperative researches embrace inter-disciplinarity. The methodological framework designed for this study was recreated and developed in the study on the Sochi 2014 Winter Olympics in this special issue (Hutchings et al., this issue). It is also being used in further projects – testimony to the social life of methods approach not just in academia.

Finally, the ethical implications of Twitter research brought challenges. The questions surrounding the ethics of online data collection have been written about at great length (boyd and Crawford, 2012). However, the variety of standards and norms across different disciplines about how to use and cite tweets indicates that we have yet to reach definitive conclusions as to what constitutes best practice. For some, informed consent is sacrosanct and therefore no information that directly identifies an individual Twitter user should be used within research outputs. For others, especially those coming from a qualitative tradition, it is often necessary to refer to specific tweets as an illustration of a case, context, or culture. In doing so, even if no user information is provided, a simple search on Twitter using this text will still identify the user responsible.

From a purely legal standpoint, the privacy policy for Twitter clearly states the risks posed to the user when sharing tweets publicly:

Your public user profile information and public Tweets are immediately delivered via SMS and our APIs to our partners and other third parties, including search engines, developers, and publishers that integrate Twitter content into their services, and institutions such as universities and public health agencies that analyze the information for trends and insights. When you share information or content like photos, videos, and links via the Services, you should think carefully about what you are making public (Twitter 2015).

However, taking this privacy policy at face value is problematic, as ‘just because content is publicly accessible does not mean that it was meant to be consumed by just anyone’ (boyd and Crawford 2012:672). Given that much of the advice provided by professional associations is either unclear or contradictory, we, as researchers, have a responsibility to consider the potential privacy risks to subjects. As such, the authors of each paper in this special issue were given the option to choose how they wished to reference the data collected from Twitter. For some, this meant anonymising tweets to protect the anonymity of individual Twitter users in the highly politically sensitive Persian social media sphere (Voss and Asgari-Targhi, this issue). The authors of the Russian article (Aslanyan and Gillespie, this

issue) in contrast used Twitter names many of which, in the case of the Russian corpus, were already pseudonyms. Moreover, it was considered that the Russian authorities constantly monitor social networks using far more sophisticated methods than those available to us as academic researchers. Also given the time elapsed between the tweet and this publication it was deemed highly unlikely the Russian authorities would pay any attention to an academic English-language publication that has cited a few tweets about the London Olympics.

Such ethical issues are likely to continue to challenge researchers for the foreseeable future given that different political and linguistic contexts raise different kinds of ethical issues that require different kinds of solutions. What is also certain is that Twitter will also continue to transgress public and private boundaries in ways that are unforeseeable.

Acknowledgements:

The main author of this article was James Dennis but conceived, developed and co-authored by Marie Gillespie and Ben O'Loughlin who led the project. The article is based on a thorough excavation of our meeting notes, email trails, conversations and the research reports and articles that form the basis of the London Olympics study. We are indebted to Dr Alex Voss for his constructive comments on the article and for his help in clarifying some aspects of the data collection, selection and analysis process. Prof. Rob Proctor and Dr Alex Voss led on the computer science dimensions of the research. They also produced the workflow visualisation and collaborated closely on the analysis. Please refer to their article in this special issue (Procter, Voss and Lvov) for more details of their approach.

Biographical notes:

James Dennis is a PhD candidate and research assistant in the New Political Communication Unit in the Department of Politics and International Relations at Royal Holloway, University of London. James' research focuses on the effect of social media on political engagement. For more information on James' research please visit <http://www.jameswilldennis.com>.

Marie Gillespie is Professor of Sociology at The Open University and Co-Director of the Centre for Research on Socio-Cultural Change. Publications: http://www.open.ac.uk/socialsciences/staff/people-profile.php?name=marie_gillespie. Contact: marie.gillespie@open.ac.uk.

Ben O'Loughlin is Professor of International Relations and Co-director of the New Political Communication Unit at Royal Holloway, University of London. He is Co-editor of the journal *Media, War & Conflict*. He was Specialist Advisor to the House of Lords Select Committee on Soft Power and UK Influence.

References:

- Anstead, Nick and Ben O'Loughlin (2012) 'Semantic polling: the ethics of online public opinion', 23 October 2012. [WWW document] URL <http://eprints.lse.ac.uk/46944/> [visited 15/04/2015]
- Bansal, Niles (2011) 'Sysomos Text Analytics Roundup: Making Sense of Data', 18 April 2011. [WWW document] URL <http://blog.sysomos.com/2011/04/18/sysomos-text-analytics-roundup-making-sense-of-data/> [visited 15/04/2015]
- boyd, danah and Kate Crawford, 'Critical questions for big data', *Information, Communication & Society*, 15(5), 2012, pp. 662-679.
- BBC Sport (@BBCSport). "It's gold for Adams! She beats Ren Cancan in the 1st ever women's Olympic boxing final. Adam's deserves every carat of that medal #bbc2012". 9 August 2012, 8:43 a.m. Tweet.
- BBC Trust (2007) 'Operating Agreement: BBC World Service' [WWW document] URL http://downloads.bbc.co.uk/bbctrust/assets/files/pdf/regulatory_framework/other_activities/world_service_op_agreement.pdf [visited 29/04/2015]
- Chadwick, Andrew, 'The Political Information Cycle in a Hybrid News System: The British Prime Minister and the "Bullygate" Affair', *The International Journal of Press/Politics*, 16(1), 2011, pp. 3-29.
- Freelon, Deen and David Karpf, 'Of big birds and bayonets: hybrid Twitter interactivity in the 2012 Presidential debates', *Information, Communication and Society*, 18(4), 2015, pp. 390-406.
- Gillespie, Marie, Nesrine Abdel-Sattar and Mina Lami, 'Social media and political participation: BBC World Service and the Arabic Spring', in N. Manning (eds.), *Political (dis)engagement: The Changing Nature of the 'Political'*, Bristol: Policy Press, 2015.
- Gillespie, Marie, 'Social Media and Citizen Production: An Experiment in Digital Democracy before the Arab Spring', *Theory, Culture and Society*, 29(3), 2013, pp. 92-131.
- Gillespie, Marie and Alban Webb, *Diasporas and Diplomacy: Cosmopolitan Contact Zones at the BBC World Service (1932-2012)*, Abingdon: Routledge, 2012.
- Gillespie, Marie and Alban Webb (2014) 'House of Lords Soft Power and The UK's Influence Committee Oral and Written Evidence - Volume 1', 28 March 2014. [WWW document] URL <http://www.parliament.uk/documents/lords-committees/soft-power-uk-influence/soft-power-ev-vol1-a-g.pdf> [visited 12/05/2015]
- Gillespie, Marie, Alban Webb and Hugh Mackay, 'Designs & devices: Towards a genealogy of audience research methods at the BBC World Service, 1932-2011', *Participations: International Journal of Audience Research*, 8(1), 2011.
- Hoskins, Andrew and Ben O'Loughlin, *War and Media: The Emergence of Diffused War*, Cambridge: Polity, 2010.
- Jungherr, Andreas (2014) 'Twitter in Politics: A Comprehensive Literature Review' 27 February 2014. [WWW document] URL http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2402443 [visited 15/04/2015]
- Karpf, David, 'Social Science Research Methods in Internet Time', *Information, Communication and Society*, 15(5), 2012, pp. 639-661.
- Mackay, Hugh (2012) 'Understanding Impact', May 2012. [WWW document] URL <http://www8.open.ac.uk/researchprojects/diasporas/news/public-policy-fellowship-at-the-bbc-world-service> [visited 04/11/2012]

Procter, Rob, Farida Vis and Alex Voss, 'Reading the riots on Twitter: methodological innovation for the analysis of big data', *International Journal of Social Research Methodology*, 16(3), 2013, pp. 197-214.

Twitter 'Twitter Privacy Policy' [WWW document] URL <http://twitter.com/privacy> [visited 14/05/2015]

Vaccari, Cristian, Augusto Valeriani, Pablo Barbera, Rich Bonneau, John T. Jost, Jonathan Nagler and Joshua A. Tucker, 'Political Expression and Action on Social Media: Exploring the Relationship Between Lower- and Higher-Threshold Political Activities Among Twitter Users in Italy', *Journal of Computer-Mediated Communication*, 20(2), 2015, pp. 221-239.

Vissens, Anna (2012) 'BBC tips for curating Twitter feeds - from the Russian election', 12 March 2012. [WWW document] URL http://www.bbc.co.uk/blogs/collegeofjournalism/posts/During_the_recent_presidentia [visited 15/04/2015]

Appendix 1: Example accounts from the Twitter Module

The following offers an example of the Twitter accounts included within the Twitter Module. These lists are not complete but offer an example of the type of accounts included. All account information correct as of August, 2012:

BBC Arabic:

- [@uaenoc](#)
- [@Maitha_MRM](#)
- [@shaimaaelgammal](#)
- [@BBCAhmedMaher](#)
- [@HanaaAwny](#)
- [@memo_tkd](#)
- [@RamdanDarwish](#)
- [@omarnour](#)
- [@HusseinHafeez](#)
- [@Amr_Ezzeldin](#)
- [@Hadiaelsaid](#)
- [@islamramadan33](#)
- [@WajdiBouallegu1](#)
- [@ElloumiWassim](#)
- [@lilianetannoury](#)
- [@rimaftaha](#)
- [@MethqalMarathon](#)
- [@darweeshehab](#)
- [@TalitaBaqlah](#)
- [@kareemennab](#)
- [@karenschammas](#)
- [@katyabachrouche](#)
- [@alattiyahnasser](#)
- [@Ali_Garni](#)
- [@islamissa](#)
- [@MarianneBassil](#)
- [@3aliAhmad](#)
- [@AlAttiahN](#)
- [@DaliaGebaly](#)
- [@YomnaKhallaf](#)
- [@hanna_khaled8](#)
- [@mazenaziz](#)
- [@mustafaweeza](#)
- [@reembossaty](#)
- [@MaryemYehia](#)
- [@maimosaad](#)
- [@Samar_Hassounah](#)
- [@NourElAfandi](#)
- [@shazayahia](#)
- [@ismaeilmatar10](#)
- [@HamdanAlkamali](#)
- [@YousifAlbairaq](#)
- [@Chawali1970](#)
- [@ReemAbulleil](#)
- [@nasry](#)
- [@HaithamADSPORTS](#)
- [@OsAmiri](#)
- [@soqar](#)
- [@KefahAlKabi](#)
- [@olympic_egypt](#)
- [@qatar_olympic](#)
- [@almohamedi1971](#)
- [@qatarathletics](#)
- [@JordanOlympic](#)
- [@YallaUAE](#)
- [@UAENOC](#)
- [@UAEOLympicteam](#)
- [@farisf9](#)
- [@salim_alnaqbi](#)
- [@RogerGaspar1](#)
- [@AymanAlaaFayez](#)
- [@Shico0oElZeiny](#)
- [@salmosa44](#)
- [@ahmedzaher89](#)
- [@AO_Sports](#)
- [@SprtNationalUAE](#)
- [@KHALILALFAHAD](#)
- [@shaimaaelgammal](#)
- [@Wael_Kobrosly](#)

- [@EGY_2012OG](#)
- [@AlaaElDinElSay1](#)
- [@xoxofencer](#)
- [@Tvine7](#)
- [@azadalbarazi](#)
- [@HamzaDriouch](#)
- [@SaoudAlthani7](#)
- [@iBahya](#)
- [@qatarathletics](#)
- [@fsultan9](#)
- [@AzRabah](#)
- [@alomar26](#)
- [@paralympicly](#)
- [@absily](#)
- [@AJSARABIC](#)
- [@Chaouali1970](#)
- [@OsAmiri](#)
- [@raoufbenkhelef](#)
- [@MR_ALARFAJ](#)
- [@AlkaabiAs](#)
- [@omarsport](#)
- [@hamad_jassim](#)
- [@EurosportCom_AR](#)
- [@abdullah18000](#)
- [@SkyNewsArabia_S](#)
- [@yasser_thabet](#)
- [@OnsJabeur](#)
- [@MjsTunisie](#)
- [@SelimaSfar](#)
- [@MathMidou](#)
- [@jaziri_malek](#)
- [@MSaharty](#)
- [@ahmadelnemr](#)
- [@fayedolphin](#)

BBC.com:

- [@GaryLineker](#)
- [@mrjakehumphrey](#)
- [@BBCSport](#)
- [@Gabby_Logan](#)
- [@Aggerscricket](#)
- @danwalkerbbc (no longer active)
- @clarebalding1 (no longer active)
- [@bbc5live](#)
- @anroan (no longer active)
- [@Pearcesport](#)
- [@markpougatch](#)
- [@Chris_Boardman](#)
- [@legardj](#)
- [@BBC2012](#)
- [@Iandennisbbc](#)
- [@bbcspot_david](#)
- @fletch5live (no longer active)
- [@iaincartergolf](#)
- [@tomfordyce](#)
- [@MrAndrewCotter](#)
- [@mattslaterbbc](#)
- @DavidBondBBC (no longer active)
- [@AlisonMitchell](#)
- [@matthewcpinsent](#)
- @bbc_manish (no longer active)
- [@bendirs1](#)
- @5LiveRugby (no longer active)
- @BBCSport_Ollie (no longer active)
- [@AndrewCastle63](#)
- [@EllyOldroyd](#)
- [@JillADouglas](#)
- [@Leon_Mann](#)
- @bbc_rishi (no longer active)
- [@jpearcefootball](#)
- [@SonaliShah](#)
- [@SimonBrotherton](#)
- [@JDE66](#)
- [@RobHodgetts](#)
- @NickHopeBBC (no longer active)
- @Jess_BBCSport (no longer active)
- [@BBCTimFranks](#)
- [@chrismbbcspot](#)
- [@bradwiggins](#)
- [@TomDaley1994](#)
- [@usainbolt](#)
- [@ryanlochte](#)
- [@AnnaMeares](#)

BBC Russian:

- [@Sport_Exp](#)
- [@ChernyshenkoRu](#)
- [@championat_ru](#)
- [@yelenaisinbaeva](#)
- [@VasilyKonov](#)
- [@SuperOlejo](#)
- [@EurosportCom_RU](#)
- [@MaSharapova](#)
- [@velolive](#)
- [@eki_ekimov](#)
- [@olegtinkov](#)
- [@Olympic](#)
- [@szhurova](#)
- [@IgorRabiner](#)
- [@BulaBavarskiy](#)
- [@kurdyukov_espru](#)
- [@renatkhamidulin](#)
- [@pro_sports](#)
- [@RSaanti](#)
- [@akleybanova](#)
- [@sochi2014news](#)

- [@OlympSochiadm](#)
- [@OdemwingieP](#)
- [@misha_aloyan](#)
- [@GazetaRu_Sport](#)
- [@sovsportru](#)
- [@volleyrus_news](#)
- [@cherdantsev](#)
- [@KanaevaEvgeniya](#)
- [@wrestrus_online](#)
- [@RussiaFootball](#)
- [@NataliaIschenko](#)
- [@SvetlanaK27](#)
- [@AndrArshavin23](#)
- [@verazvonareva](#)
- [@EVesnina001](#)
- [@Dinarik27](#)
- [@moscowlondon](#)
- [@TursunovTales](#)
- [@zvetlanka](#)
- [@AnnaChak](#)
- [@daria_lit](#)
- [@RusAllo4ka](#)
- [@Sanch4e](#)
- [@APIuschin](#)
- [@A_Kolobnev](#)
- [@renatkhamidulin](#)
- [@EFediakov](#)
- [@VladasLasitskas](#)
- [@mkirilenko](#)
- [@vika7](#)
- [@ElenaBaltacha](#)
- [@SlavaSays](#)
- [@zangalis_k](#)
- [@yelenaleu](#)
- [@Elena_Baranova](#)
- [@IvanSkobrev](#)
- [@EvgeniPlushenko](#)
- [@Trankov_jr](#)
- [@malafeev16](#)
- [@Timo_44](#)
- [@shirokovr15](#)
- [@AnastasiaBim](#)

Appendix 2: Coding Framework

(A) ACTORS

1. BBC commercial accounts (e.g. @bbcpersiansport, @bbcsport)
2. Competitor (mainstream and local media organisations)
3. BBC News employees
4. BBC sports pundits/commentators
5. Competitor media journalists or pundits
6. Bloggers
7. Olympic athletes
8. Other sports stars
9. Sports clubs or companies
10. Charitable organisations
11. Politicians and political groups
12. Celebrities and royalty
13. Members of the public
14. Olympic organiser/champion/volunteer
15. Unclear
16. Account no longer available
17. Other
18. Citizen activists

(B) TYPES OF TWEET

1. Tweet – no user mentions and not a RT
2. Interaction (@ mention) with BBC account
3. Interaction with a competitor media organization
4. Interaction with another user
5. Retweet of a BBC Tweet – done in new style or traditionally

6. Retweet of a competitor media organisation's tweet
7. Retweet of another user
8. Modified tweet (MT) from BBC
9. Modified tweet from a competitor media organization
10. Modified tweet from another user
11. Interaction with athletes

(C) REACTIONS

1. Offering a link to BBC coverage
2. Informing of details about how to access BBC coverage
3. Sharing of other BBC content (e.g. interviews, features)
4. Offering link to BBC hashtag
5. Offering links to competitors' coverage
6. Praising BBC commentary
7. Praising BBC editorial decision-making (choice of events covered)
8. Criticising BBC commentary
9. Criticising BBC editorial decision-making
10. Praising the extent of the BBC's political objectivity
11. Criticising the extent of the BBC's political objectivity
12. Praising competitor's coverage
13. Criticising competitor's coverage
14. Praising an athlete's performance
15. Criticising an athlete's performance
16. Discussion of a sport in general terms
17. Reference to fairness, justice ('rules of the game', 'playing fair')
18. Status update of Twitter use ('I switched to BBC to see Nicola')
19. Adding information to discussion of a sport / event
20. Asking specific questions about a sport / event
21. Agreeing / supporting claims made by users
22. Refuting / countering claims made by users
23. Comparing the BBC to other channels
24. Second-guessing audiences ('people will love this', 'no one will understand this')
25. Speculation / conspiracy ('Cameron being boo-ed ... bet the BBC will cut that later')
26. Expressing joy / surprise / excitement
27. Expressing disappointment / boredom
28. Claiming to be inspired
29. Claiming the Olympics has led the user to action (to vote, campaign, start exercising)
30. Discussing Twitter and the Twittersphere itself
31. Other type of reaction
32. Putting an event into a wider political context
33. Comparing London 2012 to other sports events
34. Promoting own interests (publications, sports events, activism etc.)
35. Commenting on British ways and values (see also (E) 16)
36. Describing what is on the BBC

37. Commenting on iPlayer performance
38. Request for BBC to offer additional/deeper coverage
39. Praising BBC coverage
40. Criticizing BBC coverage
41. Using a BBC hashtag

(D) GENDER (from gendered comments about personality to overt sexism)

The following codes relate to statements about the athlete.

1. Experience (their first time at an Olympics vs. veteran)
2. Extroverted ('great personality')
3. Courage / bravery
4. Commitment / determination
5. Athletic skill
6. Attractiveness ('smile of a beauty')
7. Size/part of body ('Nicola Adams is so tiny!')
8. Criticising BBC for gender issues
9. Support for a gender
10. Humour about gender
11. Discrimination against a gender in sport
12. Sexist tweets not connected to sport
13. Specific referring to age

(E) NATION (from benign patriotism to xenophobic nationalism)

1. Celebrating home nation with no antagonism to others
2. Celebrating home nation with antagonism to others
3. Claiming an athlete for the nation ('our golden girl')
4. Supporting or enjoying the success of another nation
5. Demeaning the success of another nation
6. Direct hate or mockery towards other nation, not necessarily related to sport at all
7. Using success of your nation's athlete to point to a positive attribute of your nation
8. Using failure of your nation's athlete to point to a negative attribute of your nation
9. Using success of another nation's athlete to point to a positive attribute of that other nation
10. Using failure of another nation's athlete to point to a negative attribute of that nation
11. Happy that the BBC is focused on GB athletes
12. Unhappy that the BBC is focused on GB athletes
13. Happy that the BBC is focused on non-GB athletes
14. Unhappy that the BBC is focused on non-GB athletes
15. Humour about nationalism
16. Reference to national characteristics (e.g. British 'stiff upper lip')
17. Reference to national symbols – flags, features of nature, buildings or other icons
18. Unhappy that non-GB athletes lack support from the crowds
19. Reference to the multicultural nature of the Games
20. Criticizing BBC xenophobia
21. Criticizing the national bias of other media channels



(F) RELIGION AND THE SACRED

1. Reference to athlete's religion
2. Reference to the religion of an athlete's country
3. Religion as a positive force for an athlete ('their source of strength')
4. Religion as a negative force for an athlete
5. Religion as a positive force for a nation or society
6. Religion as a negative force for a nation or society
7. Outright derogatory or hate speech against a religion or religious person
8. Providing information about a religion (its history, principles etc)
9. Reference to a religion's symbols (crosses, hijabs)
10. Reference to religious behaviour (looking to heaven, making sign of cross before or after competing)
11. References to religious practices (fasting at Ramadan)
12. Reference to values or rules of game that are held as sacrosanct or sacred (not cheating, fairplay, no drug use)
13. References to abuses of rules or values

(G) OLYMPIC VALUES AND PROMISES

1. Reference to Olympic symbols and meanings (rings as symbol of 5 continents, torch/flame, stadium)
2. Olympics as a positive force (Olympic values: respect, excellence, friendship, courage, determination, inspiration, equality)
3. Olympics as a negative force ('it's all just commercialism')
4. Olympics are living up to (5) Promises
5. Olympics are not living up to (5) Promises

Notes:

¹ <http://www.open.ac.uk/researchprojects/diasporas/> Accessed 29.4.2105

² <http://www.cresc.ac.uk/our-research/social-life-of-methods/> Accessed 29.4.2105

³ A term typically used in computer science and internet studies, a workaround refers to a creative, but problematic, fix used to achieve a solution.

⁴ BBC Persian did not use the Twitter Module during the games. This provided an interesting point of comparison with the other Language Services.

⁵ For a practitioners perspective on using the Twitter Module see Vissens 2012.

⁶ All account information included in this article was correct as of August 2012.

⁷ For project details see: <http://www.open.ac.uk/researchprojects/diasporas/news/public-policy-fellowship-at-the-bbc-world-service> Accessed 29.4.2105

⁸ 'Big data' refers to low density, high volume information. Datasets collected from social platforms offer large amounts of rich data that is not prone to issues of researcher bias.

⁹ For simplicity, this development tool is labelled as 'COSMOS' throughout this article.

¹⁰ API (Application Programming Interface) is a set of instructions and procedures that allow the creation of software applications that access the features or data of another technology, application, system or service.