BBC use of Twitter during the London Olympics: The role of physical location and language in driving the Cultural Value

Digital Data Analysis Report

This research forms part of the evidence for the Cultural Value Project

Contents

Cover image: 2012 Light Painting by Jimmy – 'Mxing-m'
https://www.flickr.com/photos/mxing-m/7609574004/

Executive Summary of Findings

This report presents the findings from a social network analysis of Twitter data archived during London 2012. The research builds on the previous analysis of Twitter content from BBC corporate accounts, Journalists, and athletes to examine the way information flows about a global news event such as London 2012 in a more socially mediated age of news consumption.[1]

A previous study of the flow of information about the civil war in Syria concluded the "pattern in social media toward clustering into insular like-minded communities is unmistakable and has profound implications".[2] The research on London 2012 investigates whether users sharing information via social media about a global sporting event adopt a similar clustering behaviour and assesses the implications for international broadcasters in delivering cultural value in a socially mediated news environment.

The analysis in this report demonstrates that **users form a number of smaller groups interacting with different combinations of BBC accounts rather than engage in one 'global' conversation**. While large scale 'global' networks certainly exist, and some small networks may be considered 'global', social media users often form smaller groups, or clusters, within the larger networks to allow them to maintain meaningful relationships and access 'relevant / useful' information.[3]

For the members of these small groups within large scale online networks the interplay between language, physical location, and interest creates the focal points around which users coordinate. **The research findings highlight the cultural value of the BBCWS language services and journalists who are able to tailor content to ensure that it is relevant and engaging for specific groups of social media users.**

- **Language matters:** As one might expect, BBCWS language services attract interaction with other users that use Twitter in the same language. In doing so **Language services extend reach.** The importance of the different BBCWS language services in delivering cultural value through greater reach is highlighted, as one may expect, by the ability to engage distinct communities of users. For example, language services such as @BBCBrasil and @BBCTurkce extend the reach of the BBC as they engage communities which do not engage frequently with BBCNews, BBCBreaking or BBCSport.

- **Location matters:** Perhaps more surprising in an era where social media reduces the barriers to cross border communication, the research shows that users interacting with similar combinations of accounts tend to have a similar geographic location or time zone. For

[1] See: Ben O'Loughlin, 'The 2012 Olympics, Twitter and the BBC: Who Benefits from a Globally Engaged Public?', *Global Policy*, 22nd October 2012 http://www.globalpolicyjournal.com/blog/22/10/2012/2012-olympics-twitter-and-bbc-who-benefits-globally-engaged-public
Unpublished research: Tu Anh T. Nguyen, Sentiment Analysis Report (1), 1st October 2013 – copy available from Marie Gillespie – (Marie.Gillespie@open.ac.uk)

[2] Marc Lynch, Deen Freelon and Sean Aday, *Syria's Socially Mediated Civil War*, USIP, January 2014 *http://www.usip.org/sites/default/files/PW91-Syrias%20Socially%20Mediated%20Civil%20War.pdf*

[3] Ellison, N., Steinfield, C. & Lampe, C. (In press). Connection Strategies: Social capital implications of Facebook-enabled communication practices. *New Media & Society*.

example, we identified two distinct groups of users that shared content with each other in Spanish. The data in their user profiles showed that over 70 percent of one group used a European location to identify their time zone, while in the other group over 90 percent used a Latin American location. **Despite the common language, users largely interacted with Twitter accounts that were in a similar physical location**. This finding will not be universally applicable as some issues will be tied to location to a greater extent than others. However, in instances where **location is a factor,** there is great value in language services being aware of the language AND location of the social media users with which they seek to engage. This would enable BBCWS to extend its delivery of cultural value, particularly in terms relevance and engagement by extending the mandate for journalists to tailor language content to groups of users that are in different geographic locations.

- **Interest is a factor:** Within a group defined by language and location, interest was a factor in users forming smaller sub-groups. For example, in a sample of 10,000 tweets in English we identified a range of groups interacting with different BBC accounts and athletes about their specific sport or event of interest. In this sample, different groups of users were discussing Boxing, Swimming and Athletics, along with a distinct group tweeting about the opening ceremony. This emphasises that users will engage with accounts that have particular relevance to them. In situations such as the coverage of the Olympics, where interests are a factor in defining sub-groups within a wider language community, **these findings highlight the opportunity for multilingual journalists to add value by bridging the linguistic boundary between parallel discussions about the same event**.

- **Some social media users bridge between groups**: While many users tend to form distinct groups based on language, location and interest, there are a smaller group of users that bridge between them. This may happen because users have a particular characteristic which causes them to span the boundary between groups. For example, they may cross a language barrier because they are bilingual, bridge between different interest groups because they have eclectic taste or span the divide between locations as they are a member of a diaspora community. **In each case, these users may act as reach multipliers or add other forms of cultural value to BBC coverage of a global event, such as the Olympics, because they are able to facilitate the flow of information between disconnected groups**. At a tactical level, if these users can be identified they could be engaged more directly on Twitter via mentions or direct messages when the BBC produces similar content in future.[4]

[4] The importance of intermediaries is described in, for example; RS Zaharna, *Battles to Bridges: US Strategic Communication and Public Diplomacy since 9/11*, (2010)
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Introduction

The London 2012 Games took place between 27th July and 12th August. The games centred around the Olympic Park in east London, up to 180,000 spectators a day entered the Park to enjoy the Games, making it the principal focus of Olympic activity. Along with viewers that were physically present, "over 21,000 accredited media communicated the Games to a potential worldwide audience of 4 billion people".[5] In addition to the Radio and TV coverage, Broadcasters including the BBC used social media such as Twitter to cover London 2012.

The international nature of the Olympic Games provides the opportunity to assess the way Twitter users derived value from a range of BBC and BBC World Service accounts which produce content in a range of languages. As the authors of a recent study investigating the role of relationships in predicting the location of Facebook users put it, "the Internet and other communication technologies play a potentially disruptive role on the constraints imposed on social networks".[6] However, they also noted that "geography and social relationships are inextricably intertwined; the people we interact with on a daily basis almost always live near us".[7] In this context, it will be increasingly important for broadcasters to be able to recognise the landscape created by the new communications environment and use the tools capable of analysing the complex networks of influence which comprise many hubs, or coordination points, through which influence flows in multiple directions.[8] As a study of news consumption on Twitter concluded, "key curation hubs within networks may now play a gatekeeping role as powerful as that of television producers and newspaper editors".[9]

Research aims

This research complements the research into sentiment and aging factor of tweets around London 2012 and will provide one of the pieces of evidence used to assess the value of the coverage of the Olympic Games through the production of a Cultural Value Constellation.[10]

The aim of the research is to examine the way information flowed on the social media platform Twitter about a global news event such as London 2012. To do so, the research assesses: the information sharing behaviour of Twitter accounts to understand the extent to which social media users tend to cluster in isolated communities; where they do, the research explores the combined roles of

[5] London 2012, Olympic.org Official site of the Olympic movement. http://www.olympic.org/london-2012-summer-olympics

[6] Lars Backstrom, Eric Sun, Cameron Marlow, 'Find me if you can: improving geographical prediction with social and spatial proximity', in WWW '10 Proceedings of the 19th international conference on World wide web, pp. 61-70

[7] Lars Backstrom, Eric Sun, Cameron Marlow, 'Find me if you can: improving geographical prediction with social and spatial proximity', in WWW '10 Proceedings of the 19th international conference on World wide web, pp. 61-70

[8] Ali Fisher, House of Lords Select Committee on Soft Power and the UK's Influence Soft Power and the UK's Influence - Evidence Volume 1 (A-G),pp. 409-418

[9] Marc Lynch, Deen Freelon and Sean Aday, *Syria's Socially Mediated Civil War*, USIP, January 2014 *http://www.usip.org/sites/default/files/PW91-Syrias%20Socially%20Mediated%20Civil%20War.pdf*

[10] This research is currently unpublished: For example; Tu Anh T. Nguyen, Sentiment Analysis Report (1), 1st October 2013 – copy available from Marie Gillespie – (Marie.Gillespie@open.ac.uk)

language, location and interests in forming focal points for these communities; and whether the BBC succeeded in reaching a range of these communities around the world. A review of the research and rationale behind this approach is included in Appendix 1.

The first section uses a small sample of English language tweets to test the extent to which groups of users tend to use particular combination of accounts – or alternatively whether there is little (or no) discernible pattern to the choices users make.

The second section builds on the findings from the first section and seeks to identify groups of users engaging with similar combinations of BBC accounts and athletes via Twitter and assess whether language and geography are influences in making content relevant to those specific groups.

Methods

Data collection for this study focused on interactions with Twitter accounts nominated by the BBC. The data was collected from the Twitter API by Alex Voss at St. Andrews University. All tweets in the data that were identified as either retweeting or mentioning another Twitter user were exported for social network analysis.

'Network Analysis' allowed us to investigate the scale of discussions on Twitter around London 2012 and identify the patterns of interaction between users - information sharing networks. This type of analysis seeks to understand how information flows between users and has been recommended in previous studies of the BBC World Service.[11]

To conduct ''Network Analysis' a network representation was constructed of the interactions which occurred between the Twitter users included in our data set. This was done by producing an edgelist, from the Twitter data. An 'edge' or connection, was created each time a user was retweeted or mentioned in the data. The edge linked the author of the original tweet and the user that retweeted it. These edges are shown on the resulting graph as a line between the node which represents the user that created the original tweet and the node representing the user that retweeted that content.

To understand further who interacted with whom and whether this was one single large scale conversation or a series of largely isolated clusters, we calculated whether the network could be broken down statistically into smaller sub-networks or 'clusters'. Where clusters were identified, nodes in the same 'cluster' were given the same colour to allow the clusters to be observed within the visual representation of the network.

This process enables us to see who is interacting with whom in the network. Most elements of the network analysis and visualization were conducted using Gephi, with additional analysis conducted using igraph in R and Networkx in Python, to check the calculations of network metrics.

[11] Hugh Mackay, 'Understanding Impact', The Open University, May 2012

Results and Analysis

The first section focuses on a small sample of English language Tweets to assess the extent to which groups of users tended to interact with particular combinations of accounts in – or alternatively whether there is little (or no) discernable pattern to the choices users make. This demonstrates whether users adopt patterns of behaviour based on shared or similar interests.

The second section builds on the findings of the first section and applies the same analysis to the full corpus of data archived during the Olympics. Aggregating all the information sharing, in the form of retweets and @mentions, around BBC coverage of the Olympic Games we can reconstruct the news and information sharing network relating to the Olympics across multiple languages. This allows us to assess the role of language and location in shaping the patterns of information sharing adopted by Twitter users.

Section one: Identifying communities of interest in English language tweets

The initial analysis focused on an annotated corpus of 10,000 tweets in English.[12] The analysis of this data sought to establish whether the interaction between users form a number of smaller groups rather than engage in one 'global' conversation.

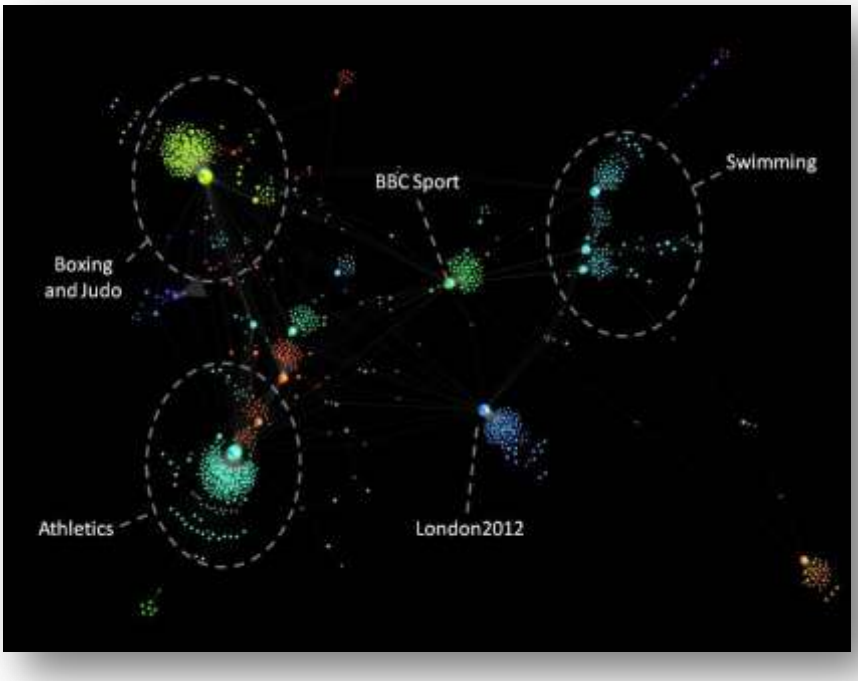

Figure 1. Network representation identifying the shared interests of the different clusters

A layout of the retweet network is shown above (figure 1). Nodes which share the same colour indicate they are part of the same group which has a statistically greater connection to that group

[12] Tu Anh T. Nguyen, Sentiment Analysis Report (1), 1st October 2013

than the rest of the network.[13] This analysis shows that users do form small groups around specific issues. Having established that there are statistically distinct clusters, the clusters were analysed to provide insight into the factors around which these clusters coordinate. By identifying the sport in which Athletes competed that were mentioned or retweeted by separate groups it was possible to show the interests of each group. In this case the main interest of each group was Boxing, Swimming and Athletics. This point is also emphasised by the date of tweets as the interactions coincide with the dates when specific competitions, took place during the Olympics. This is shown in the list below, along with the dates and the athletes that were retweeted or mentioned frequently in the annotated sample.

27 - 31 July:

- 'London 2012'
  Opening ceremony
- Swimmers:
  Michael Phelps, Ryan Lochte, Natalie Coughlin

First week in August:

- Athletes:
  Mo Farah, Jessica Ennis-Hill, Greg Rutherford.

8-10th August

- Boxers:
  Female boxers Nicola Adams and Tasha Jonas
- Judo:
  Gemma Gibbons

This analysis shows that in a small sample of Tweets archived during the Olympic Games users tend to form small groups, which, in this case coordinate around specific interests. The subsequent section extends this analysis to all the tweets created in twenty days during the Olympics, from 26th July to 14th August 2012, including 1,719,313 tweets written in English.[14]

Section two: Identifying communities in a multilingual Twitter environment

The second section builds on the findings of the first section and applies the same analysis to the full corpus of data archived during the Olympics. Using the same method as used in the first section to aggregate all the information sharing, in the form of retweets and @mentions, around BBC coverage of the Olympic Games we can reconstruct the news and information sharing network relating to the

[13] This calculation is known as 'modularity', described in; Vincent D. Blondel, Jean-Loup Guillaume, Renaud Lambiotte, Etienne Lefebvre - Fast unfolding of communities in large networks (2008)
[14] Tu Anh T. Nguyen, Sentiment Analysis Report (2), 15th October 2013

Olympics across multiple languages. This allows us to assess the role of language and location in shaping the patterns of information sharing adopted by Twitter users.

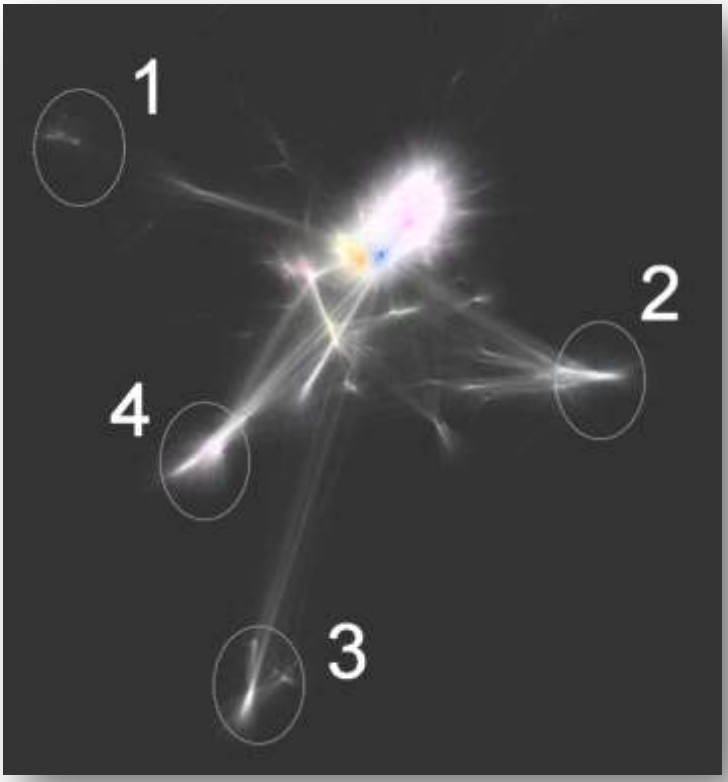

Figure 2. Network Representation of information sharing across multiple languages

The network representation, above (figure 2), is a visualisation of the network formed by the retweets and mentions in the full corpus of data archived from Twitter. It shows that while there is broadly speaking one large scale network, there are also smaller interconnected groups, or clusters that are largely isolated from the rest of the network. In these isolated clusters, users are connected to other members of the group to a greater extent than they connect with the rest of the network.[15]

This repeats the finding of the first section that clusters existed in the information sharing networks around London 2012. Four groups, highlighted in the image above, are analysed below in greater detail to assess the relationship between language, location and interest and their influence on the information sharing behaviours of Twitter users.

Stephen Graham argued;

> Only by maintaining linked, relational conceptions of both new information and communications technologies and space and place will we ever approach a full understanding of the inter-relationships between them.[16]

[15] Vincent D. Blondel, Jean-Loup Guillaume, Renaud Lambiotte, Etienne Lefebvre - Fast unfolding of communities in large networks (2008)

[16] S. Graham. The end of geography or the explosion of place? Conceptualizing space, place and information technology. Progress in human geography, 22(2):165, 1998

Following this logic we analysed the profile data of the users in the groups shown in figure 2 to test whether users in each cluster shared characteristics with other members of the cluster that were distinct from the members of the other clusters. The research focused on two categories the language users set as their default when creating a Twitter account and the location they used to identify which time zone they were in. As Twitter can theoretically be used almost anywhere on earth, setting the time zone of an account is important for users as it ensures the time stamps of tweets are displayed relative to the time and location where the user is viewing the Tweet not the time where the user tweeted.[17] This avoids, for example, Tweets appearing to come from the future if tweeted by a user in a more easterly time zone than the viewer or accounts appearing to tweet the news of an event before it occurred, if the tweet were created in a more westerly time zone than the viewer.

Analysis of the profile data found English was used by a proportion of each group.[18] In addition, each group had at least one other prominent language. For each group that language makes logical sense given the commonly stated locations in the user profiles of members of that group. For example, in cluster two Portuguese was the most prominent language, and Brasilia the most common location for setting the time zone, associating the largest group of users with the country with a large Portuguese speaking population. Not only do the members of each cluster have characteristics in common, the language and location profile of each cluster is markedly different from the other clusters. The finding indicates that language and location are important coordination points for the users that make up specific clusters. This emphasises the importance of BBCWS being able to tailor content to the different groups. The full data for these clusters is included in Appendix 2.

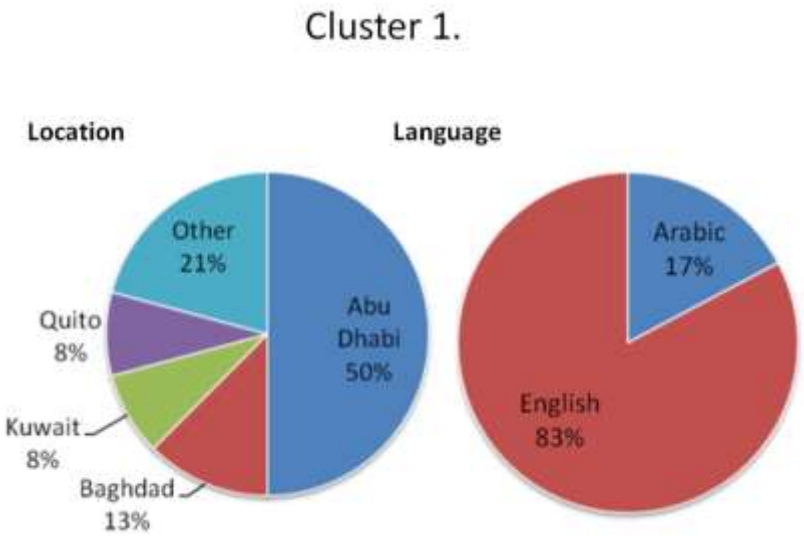

Figure 3. Location and language data for users in cluster 1

[17] In the absence of State sponsored blocking of social media sites, Twitter could work anywhere with an internet connection, and has even been used by Astronauts, including Chris Hadfield, to tweet from the International Space Station. http://www.telegraph.co.uk/science/picture-galleries/9837530/Astronaut-Chris-Hadfield-tweets-pictures-of-Earth-from-space.html

[18] English is the default language for Twitter if the user does not choose an alternative when creating an account.

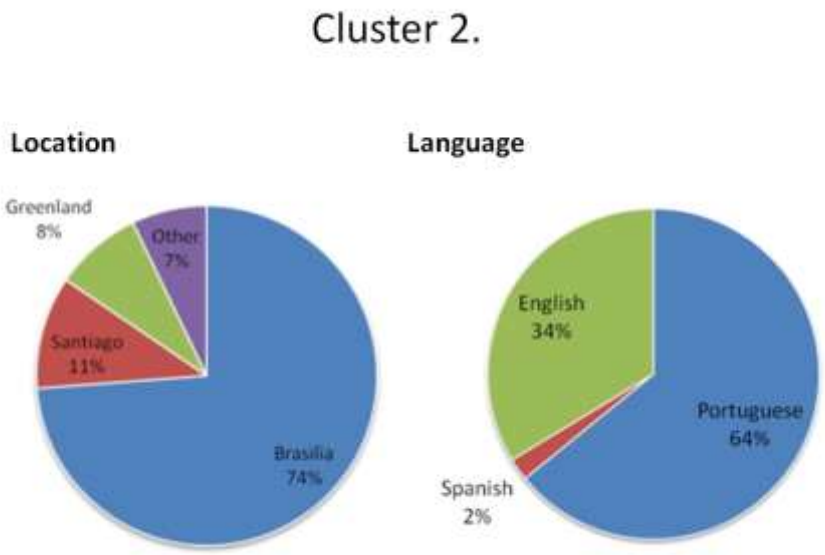

Figure 4. Location and language data for users in cluster 2

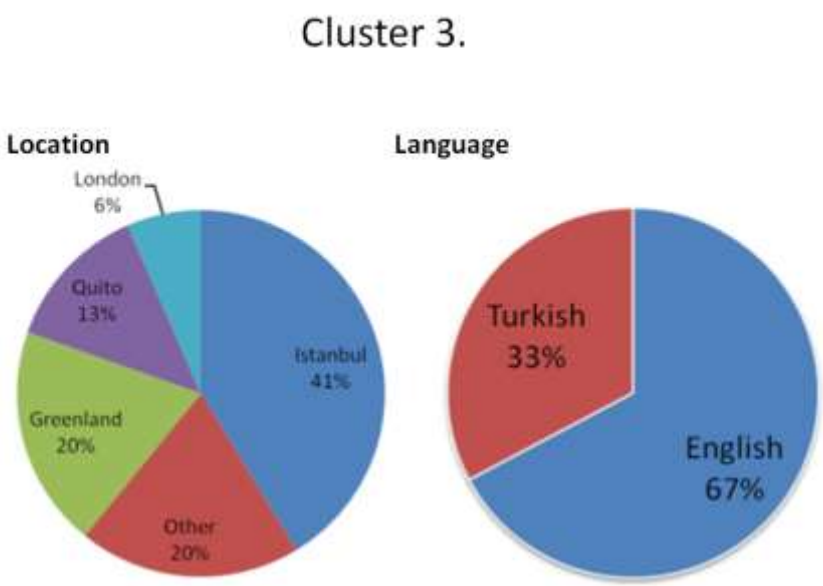

Figure 5. Location and language data for users in cluster 3

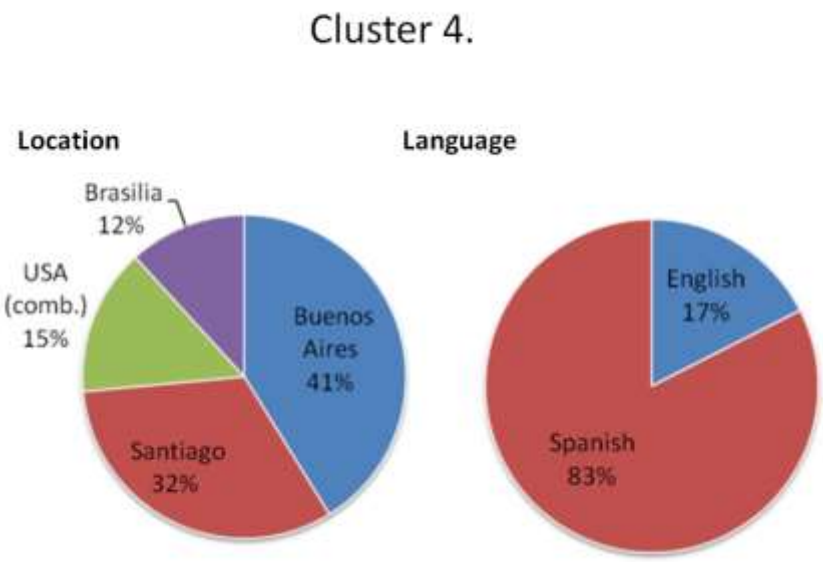

Figure 6. Location and language data for users in cluster 4

As each group contains at least two prominent languages, it is likely that some users are bilingual, although others may not have changed the setting from the default, English. That each group has a prominent language fits with the intuitive logic that information sharing is easiest if users can speak the same language.[19] However, these are not global language communities uninfluenced by location.[20]

The groups which are sharing (retweeting) information and news tend to have a region as well as language in common. The important inter-relationship between language, location and the interest of users is examined in greater detail using the two large clusters in which Spanish is the most common language.

The image below, figure 7, is a visual representation of the connections between two groups of users in which Spanish is the dominant language. Of these groups, one contains 12,967 users and the other 9,830. 92% and 84% of users respectively set their user interface language to Spanish. The remainder of users in these groups have chosen to set their language to, for example, English, Italian, French, or Russian. These smaller groups of users operate Twitter in one language, but engage with a community of predominantly Spanish speakers are likely to be bilingual and may be members of a diaspora community.

[19] That individuals with similar characteristics tend to form networks, is discussed further in: Miller McPherson, Lynn Smith-Lovin, and James M Cook, 'Birds of a Feather: Homophily in Social Networks', *Annual Review of Sociology*, Vol. 27: 415-444 (August 2001)

[20] Historic data on geographic distribution of different language users on Twitter can be explored here: https://www.mapbox.com/labs/twitter-gnip/languages/#2/38.7/-14.4

Figure 7, Network representation of information sharing between users in Spanish.

As in previous images, users are represented by coloured dots, connections are shown by lines between the user and retweeter. In the network image users are positioned closest together when they retweet news and information from the same users. The image demonstrates that while there are a few users that bridge between the two communities, most users only retweet information from users in one cluster. **This shows that while there is a shared language, there are factors beyond shared language influencing the behaviour of users.**

The factor considered was location as the teams competing in the Olympic Games represent specific countries and the data collected focuses on the accounts of BBCWS, which tends to focus language content on specific regions, discussed in greater detail in appendix 1. The profile data for all 22,000 users which comprise the two predominantly Spanish speaking groups was analysed for their stated location and location used to set time zone.

44% of users in the red cluster set their time zone using Madrid, followed by Greenland 13%, Athens 11% and Amsterdam 9% showing a clear tendency toward European locations. In contrast, 54% of users in the blue cluster set their time zone to Buenos Aires followed by Santiago 19% and Brasilia 14% emphasising that they likely live in South America. This tendency for the clusters to have a different regional focus is shown further in the figures 8 and 9 below.

Blue cluster:

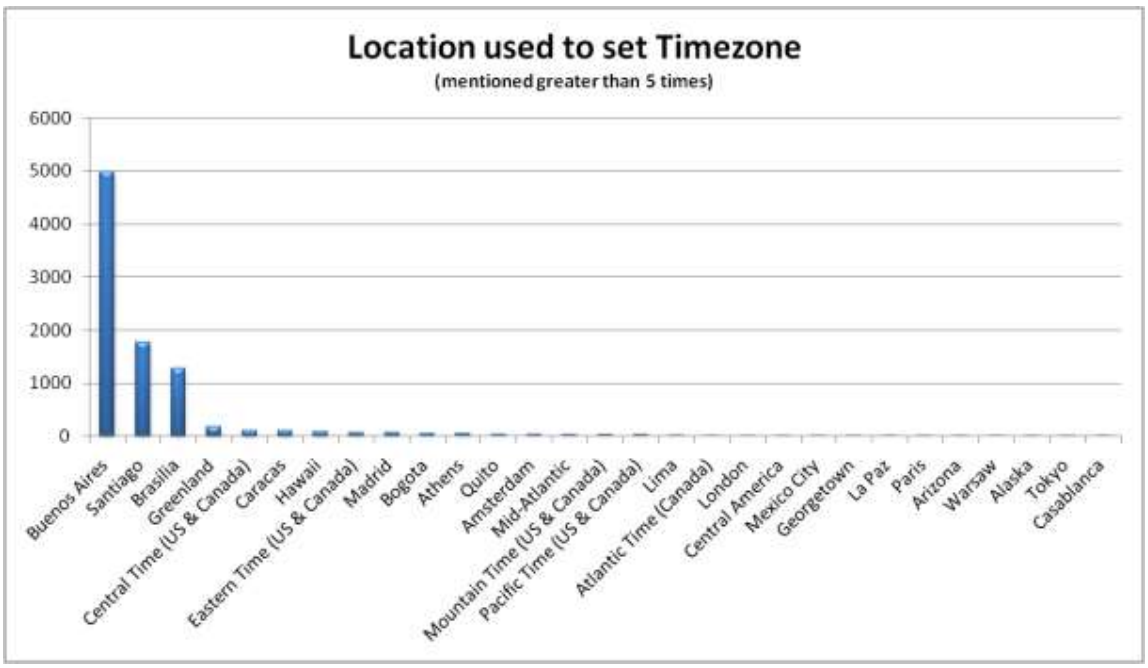

Figure 8. Location used to set time zone for blue Spanish speaking cluster

Red cluster:

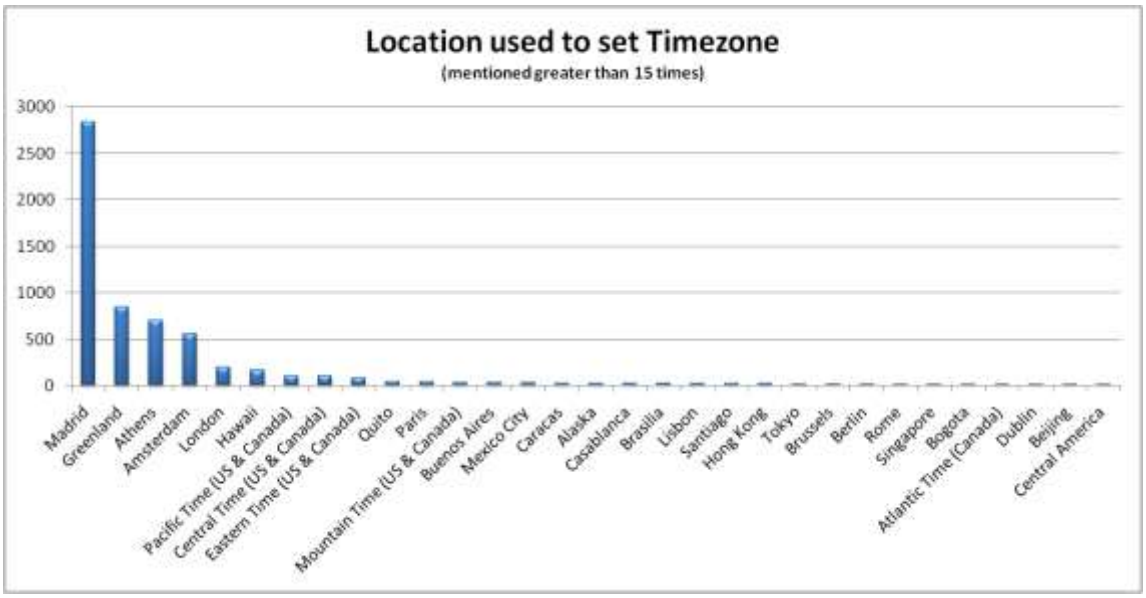

Figure 9. Location used to set time zone for red Spanish speaking cluster

Note that a small number of users in the Red, predominantly European cluster, are using a Latin American time zone, and equally some users in the Blue, predominantly Latin American cluster, use a European time zone.

To assess whether the users that fall between the two main communities tend to have different characteristics (for example time zone) than those dominant in the main clusters, the profiles of the 500 users that appear in between the two main clusters were analysed.

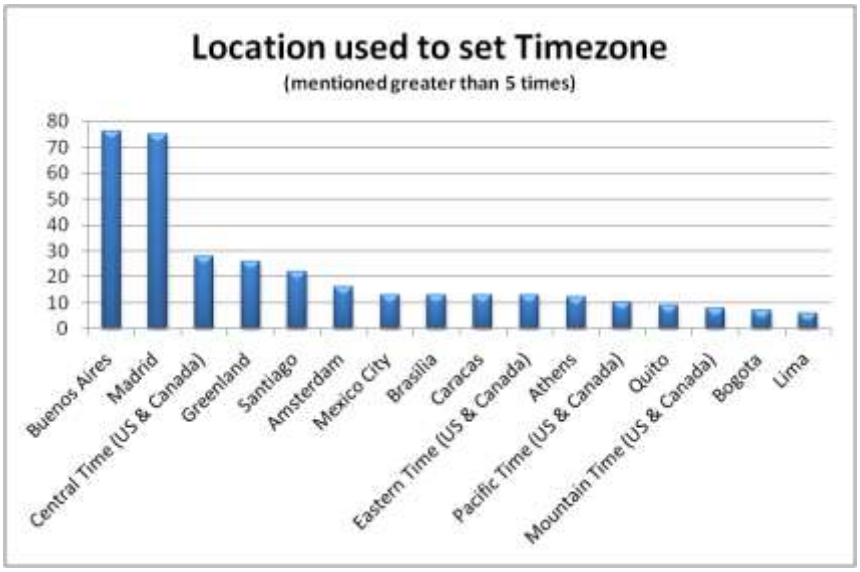

Figure 10. Location used to set time zone by 500 users bridging between Spanish speaking clusters

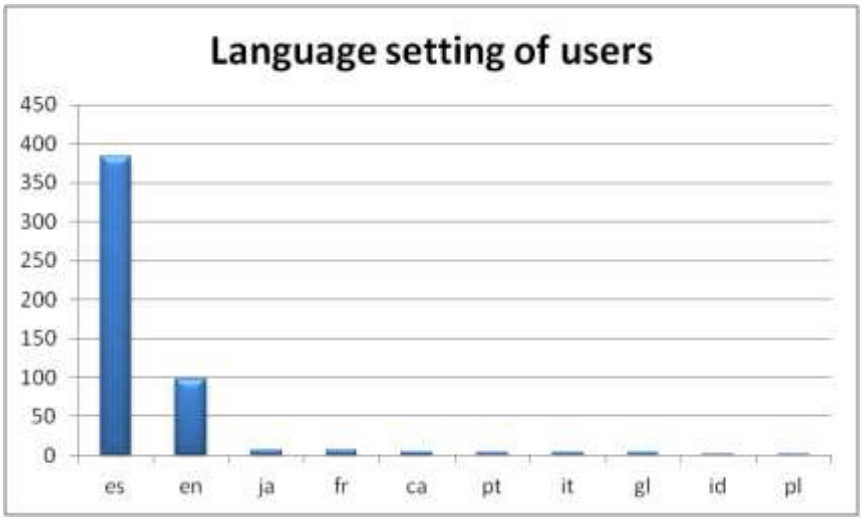

Figure 11. Language set by 500 users bridging between Spanish speaking clusters

As the graph shows, the users were predominantly using Buenos Aires and Madrid as the location through which to set their time zone. These are the same prominent locations as were found within the red and blue groups overall. Similarly the dominant language is Spanish. This indicates **that these users may have a slightly more diverse interest than the majority of users, but they are essentially similar in terms of language and location.**

Conclusions and Recommendations

The research findings highlight that the "pattern in social media toward clustering into insular like-minded communities" previously observed in conflict zones also appears in other types of global media event such as the coverage of the Olympic Games.[21]

As a result, this research emphasises the potential cultural value of the BBCWS language services and journalists who are able to tailor content to ensure that it is relevant and engaging for specific groups of social media users.

This is based on a combination of two specific findings. First, the analysis of Twitter users engaging with BBC social media coverage of London 2012 demonstrate that **users formed a number of smaller groups interacting with different combinations of BBC accounts rather than engage in one 'global' conversation**. While broadly speaking large scale 'global' networks certainly exist, and some small networks may be considered 'global', this research has sown social media users formed smaller groups, or clusters, within the larger networks to allow them to maintain meaningful relationships and access 'relevant / useful' information.[22]

Second, when focusing on London 2012, groups of users who retweet similar combinations of BBCWS Twitter accounts (e.g. Turkish, Portuguese, and Spanish) tend to have common locations as well as a shared language. In this specific example, the behaviour of those studied does not indicate a dramatic reconfiguration of broadcast patterns would be needed as BBCWS already focuses language service social media content on a specific region.

This finding is unlikely to be universally applicable – some issues may well attract a community of users from a diverse range of locations and time zones. It would be necessary to conduct further research across a range of global news events to ascertain whether a typology could be developed to identify events in which location is a greater or lesser factor in the information sharing behaviour of Twitter users. However, it is clear that the interplay between language, physical location, and interest creates the focal points around which users coordinate, with the influence of each factor varying depending on the specific news event or issue. In the case of London 2012:

- **Language matters:** As one might expect, BBCWS language services attract interaction with other users that use Twitter in the same language. In doing so **Language services extend reach.** The importance of the different BBCWS language services in delivering cultural value through greater reach is highlighted, as one may expect, by the ability to engage distinct communities of users. For example, language services such as @BBCBrasil and @BBCTurkce extend the reach of the BBC as they engage communities which do not engage frequently with BBCNews, BBCBreaking or BBCSport.

[21] Marc Lynch, Deen Freelon and Sean Aday, *Syria's Socially Mediated Civil War*, USIP, January 2014 http://www.usip.org/sites/default/files/PW91-Syrias%20Socially%20Mediated%20Civil%20War.pdf

[22] Ellison, N., Steinfield, C. & Lampe, C. (In press). Connection Strategies: Social capital implications of Facebook-enabled communication practices. *New Media & Society*.

- **Location matters:** Perhaps more surprising in an era where social media reduces the barriers to cross border communication, the research shows that users interacting with similar combinations of accounts tend to have a similar geographic location or time zone. For example, we identified two distinct groups of users that shared content with each other in Spanish. The data in their user profiles showed that over 70 percent of one group used a European location to identify their time zone, while in the other group over 90 percent used a Latin American location. **Despite the common language, users largely interacted with Twitter accounts that were in a similar physical location**. This finding will not be universally applicable as some issues will be tied to location to a greater extent than others. However, in instances where **location is a factor,** there is great value in language services being aware of the language AND location of the social media users with which they seek to engage. This would enable BBCWS to extend its delivery of cultural value, particularly in terms relevance and engagement by extending the mandate for journalists to tailor language content to groups of users that are in different geographic locations.

- **Interest is a factor:** Within a group defined by language and location, interest was a factor in users forming smaller sub-groups. For example, in a sample of 10,000 tweets in English we identified a range of groups interacting with different BBC accounts and athletes about their specific sport or event of interest. In this sample, different groups of users were discussing Boxing, Swimming and Athletics, along with a distinct group tweeting about the opening ceremony. This emphasises that users will engage with accounts that have particular relevance to them. In situations such as the coverage of the Olympics, where interests are a factor in defining sub-groups within a wider language community, **these findings highlight the opportunity for multilingual journalists to add value by bridging the linguistic boundary between parallel discussions about the same event**.

- **Some social media users bridge between groups**: While many users tend to form distinct groups based on language, location and interest, there are a smaller group of users that bridge between them. This may happen because users have a particular characteristic which causes them to span the boundary between groups. For example, they may cross a language barrier because they are bilingual, bridge between different interest groups because they have eclectic taste or span the divide between locations as they are a member of a diaspora community. **In each case, these users may act as reach multipliers or add other forms of cultural value to BBC coverage of a global event, such as the Olympics, because they are able to facilitate the flow of information between disconnected groups**. At a tactical level, if these users can be identified they could be engaged more directly on Twitter via mentions or direct messages when the BBC produces similar content in future.[23]

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Appendix 1

Review of research exploring the link between online behaviour and physical geography

The way an international broadcaster structures their service is likely to influence the way users experience them. For example, BBCWS language services focus the news content of specific language services on particular geographic regions. The BBCWS website provides an indication of those to whom they seek to broadcast when they list the services which are available. For example, Spanish and Portuguese are both listed as being "Latin America" services.[24]

In addition, the emphasis of the news pages associated with these different news 'language' services also highlights a regional focus rather than a global language community. The news site in Portuguese has a clear focus on Brazil and the Spanish service has a focus on Latin America.

News in Portuguese:

News in Spanish:

[24] Source: http://www.bbc.co.uk/worldservice/languages/index.shtml

Although these are 'language' services, from the BBCWS perspective they are also geographically focuses services. For example, this is reflected in the tabs promoting specific content below the header of the page. Assessing whether groups of social media users, unencumbered by the traditional constraints such as proximity to a radio transmitter, still gather information from sources linked to specific geographies informs the drivers of cultural value such as reach, utility and relevance.

(re)configuring patters of international broadcasting online:

The rationale and analysis in this report follows the logic of previous research which has identified the link between online behaviour and physical geography. This section of the rationale briefly reviews some of that research.

Although there is potential for users to read almost anything online, they rarely do.[25] Equally, humans are unable to read, let alone understand, all the information available.[26] Instead, users adopt patterns of behaviour and use relationships to access news and information.[27] Researchers have also observed humans tend to be limited in the number of meaningful relationships they can maintain and from which they can benefit online and offline.[28] This means for a user to make sense

[25] Q. Mei, C. Liu, H. Su, and C. Zhai. A probabilistic approach to spatiotemporal theme pattern mining on weblogs. In WWW, pages 533–542, 2006

K. S. McCurley. Geospatial mapping and navigation of the Web. In WWW, pages 221–229, 2001

J. Ding, L. Gravano, N. Shivakumar. Computing geographical scopes of Web resources. In VLDB, pages 545–556, 2000.

[26] For information seeking and sharing behaviour during a crisis event:

Fisher, "Bullets with Butterfly Wings," in Yahya R. Kamalipour (Ed.), Media, Power, and Politics in the Digital Age: The 2009 Presidential Election Uprising in Iran (Rowman & Littlefield Publishers, 2010)

[27] Everett M. Rogers, Diffusion of Innovations (Simon and Schuster, 1995)

Franco Malerba and Nicholas S. Vonortas, Innovation Networks in Industries (Edward Elgar Publishing, Cheltenham, UK, 2009)

Granovetter, Mark, "The Strength of Weak Ties," American Journal of Sociology 78, no. 6 (1973): 1360–13.

Joel Levine, "The Sphere of Influence," American Sociological Review 37, no. 1 (1972): 14–27

[28] R. Hill and R. Dunbar, "Social Network Size in Humans," Human Nature 14, no. 1 (March 01, 2003): 53–72

W. X. Zhou, D. Sornette, R. A. Hill, and R. I. M. Dunbar, "Discrete Hierarchical Organization of Social Group Sizes," Proceedings of the Royal Society B: Biological Sciences 272, no. 1561 (February 22, 2005): 439–44.

Caplan, S. (2005). A social skill account of problematic Internet use. J. Communication, 55(4), 721.

Coleman, J. S. (1988). Social Capital in the Creation of Human Capital. The American Journal of Sociology, 94, 95-120

Ellison, N. B., Steinfield, C. and Lampe, C. (2007), The Benefits of Facebook "Friends:" Social Capital and College Students' Use of Online Social Network Sites. Journal of Computer-Mediated Communication, 12: 1143–1168. doi: 10.1111/j.1083-6101.2007.00367.x

of Twitter, they will need to follow only a very small proportion of the active users on Twitter. As Robin Dunbar observed when commenting on the idea of thousands of Facebook friends, 'the developers at Facebook overlooked one of the crucial components in the complicated business of how we create relationships: *our minds*'.[29]

He continues;

> Put simply, our minds are not designed to allow us to have more than a very limited number of people in our social world. The emotional and psychological investments that a close relationship requires are considerable, and the emotional capital we have available is limited.[30]

Equally, even in a technologically mediated communication environment, physical location can still impact on human thought, behaviours and their relationships. For example, in discussing the connection between physical location and Facebook relationships, researchers argued;

> The Internet and other communication technologies play a potentially disruptive role on the constraints imposed on social networks. These technologies reduce the overhead and cost for being introduced to new people regardless of geography, and help us stay in touch with those we know. Some have even gone so far as to call this "the end of geography" where the process of relationship formation becomes disentangled from distance altogether.[31] As people conduct more and more of their lives online data about location and social relationships become increasingly precise. While geography is certainly playing a smaller role in our lives than it once did, we see in this work that geography is far from over.[32]

Connecting the discussion of communications technologies with space and place particularly in relation to news about sport, a study of search engine query logs identified clusters of searches for particular sports teams in specific geographic locations. [33] Backstrom et. al, conclude their work on the Spatial Variation in Search Engine Queries:

> Ultimately, as the local applications of search continue to broaden, we can expect to see questions of this sort arise increasingly from the rich interaction between Web information, user interests, and the geographic and spatial frames of reference in which they are embedded.[34]

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[29] Robin Dunbar, You've Got to Have (150) Friends, New York Times, 25th December 2010 http://www.nytimes.com/2010/12/26/opinion/26dunbar.html (emphasis added).

30 Robin Dunbar, You've Got to Have (150) Friends,

31 S. Graham. The end of geography or the explosion of place? Conceptualizing space, place and information technology. Progress in human geography, 22(2):165, 1998

32 Backstrom, L.; Sun, E. & Marlow, C. (2010), Find me if you can: improving geographical prediction with social and spatial proximity, in 'Proceedings of the 19th international conference on World wide web' , pp. 61--70.

[33] Lars Backstrom, Jon Kleinberg, Ravi Kumar, Jasmine Novak, 'Spatial variation in search engine queries' In Proceeding of the 17th international conference on World Wide Web (2008), pp. 357-366, doi:10.1145/1367497.1367546

[34] Lars Backstrom, Jon Kleinberg, Ravi Kumar, Jasmine Novak, 'Spatial variation in search engine queries' In Proceeding of the 17th international conference on World Wide Web (2008), pp. 357-366, doi:10.1145/1367497.1367546

As Stephen Graham concluding in his discussion of an 'end of geography' in a technological mediated communication environment:

> Only by maintaining linked, relational conceptions of both new information and communications technologies and space and place will we ever approach a full understanding of the inter-relationships between them.[35]

In summary the research indicates that users can maintain a relatively small range of meaningful relationships and tend to access a narrow range of information sources (compared to the breadth of sources available). Equally, while location is not a factor in all online communities, there is evidence that it can be a factor in human behaviour online.

One study on the geography of Twitter discussion concluded "users actively communicate with those near them, but also actively communicate with those far from them, including on other continents".[36] However, as this study did not differentiate between the topic of the tweets being shared it is possible some discussions were local, while others were international. As such, this research examines the connection between location, language and information sharing behaviours as it relates to the cultural value of BBC coverage of London 2012.

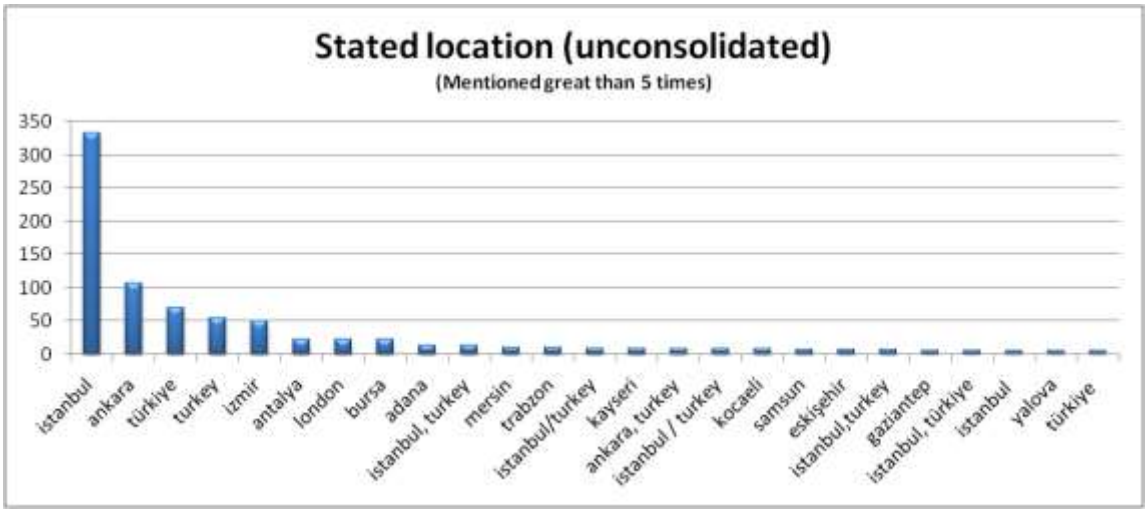
[35] S. Graham. The end of geography or the explosion of place? Conceptualizing space, place and information technology. Progress in human geography, 22(2):165, 1998

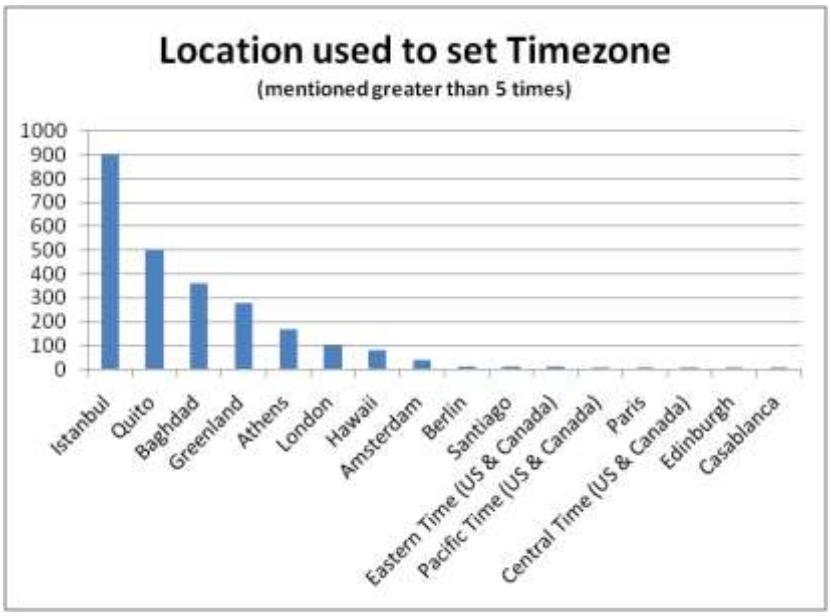
[36] Leetaru, Kalev, Shaowen Wang, Guofeng Cao, Anand Padmanabhan, & Eric Shook. "Mapping the global Twitter heartbeat: The geography of Twitter." *First Monday* [Online], 18.5 (2013)

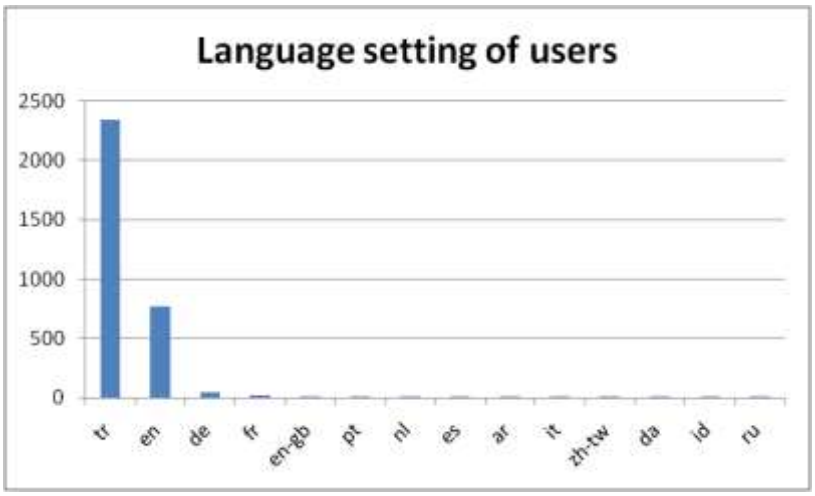
Appendix 2

Data for individual clusters

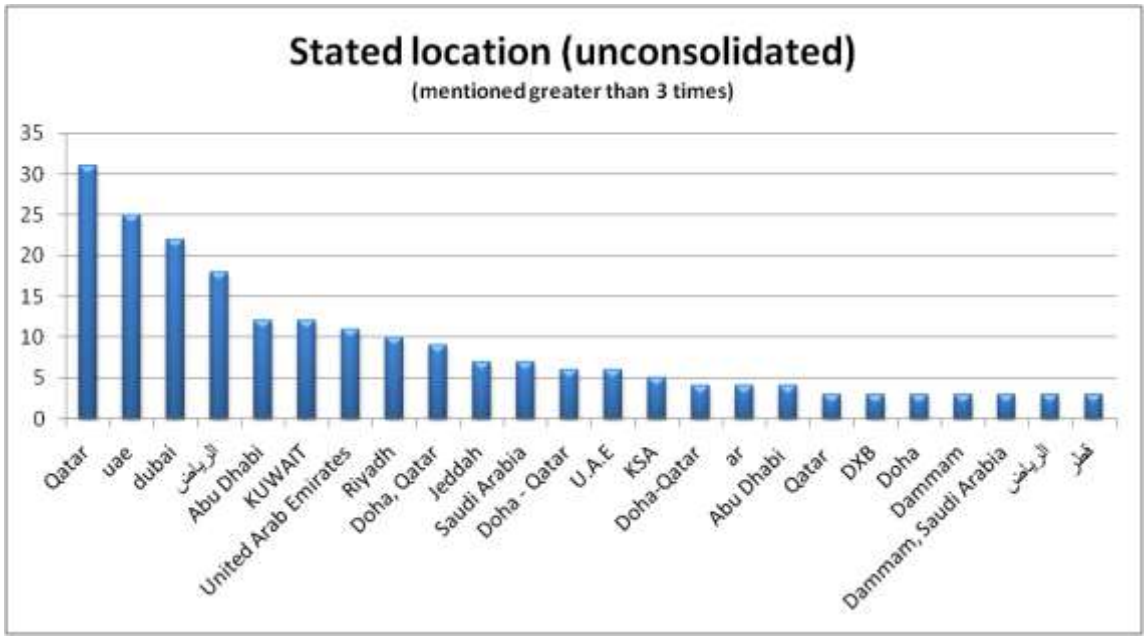
All 4317 users in the 'Turkish' cluster

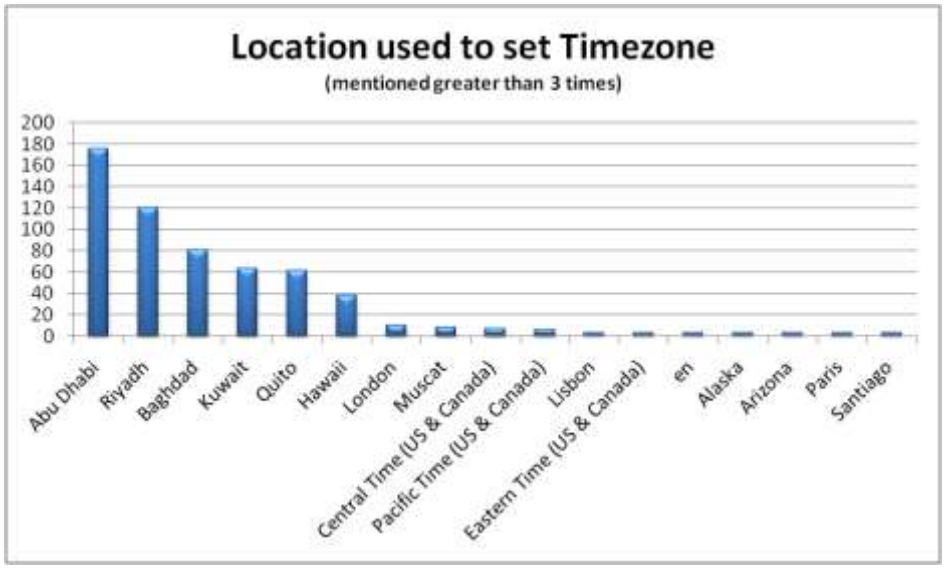


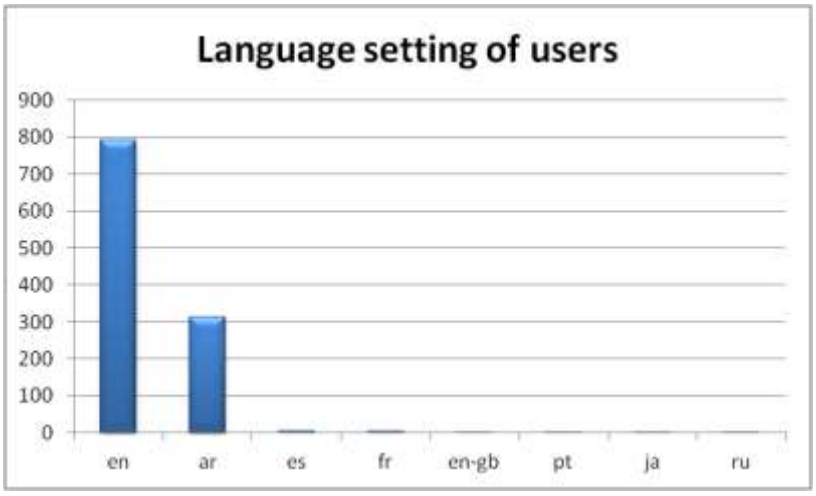




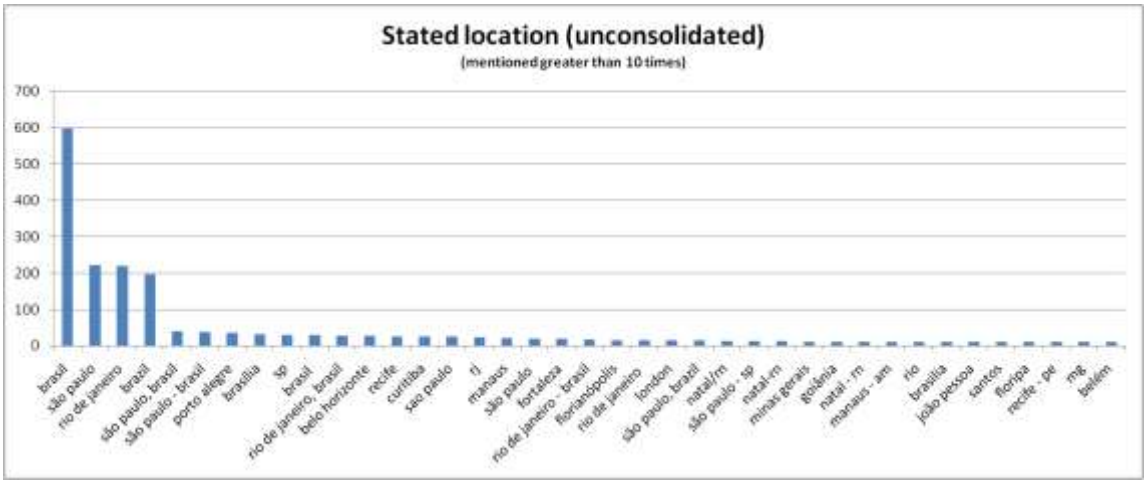
All 1384 users in 'pan-Arab' cluster

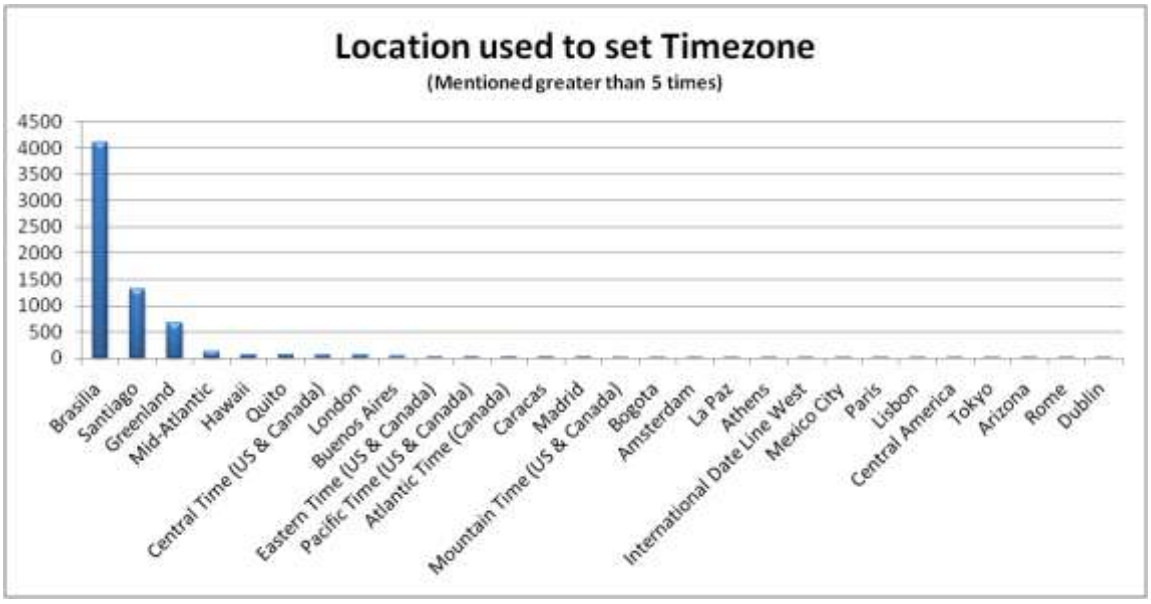


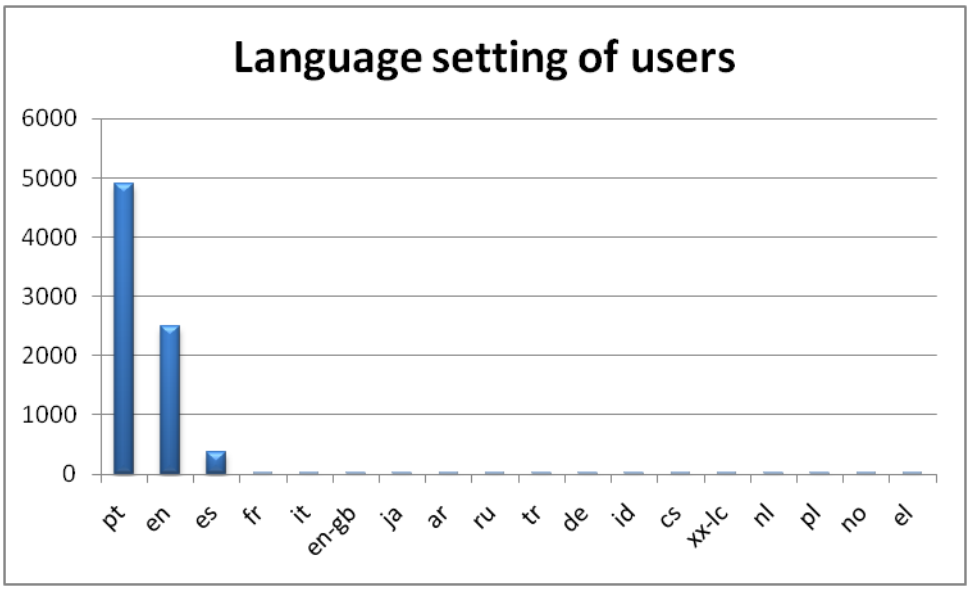




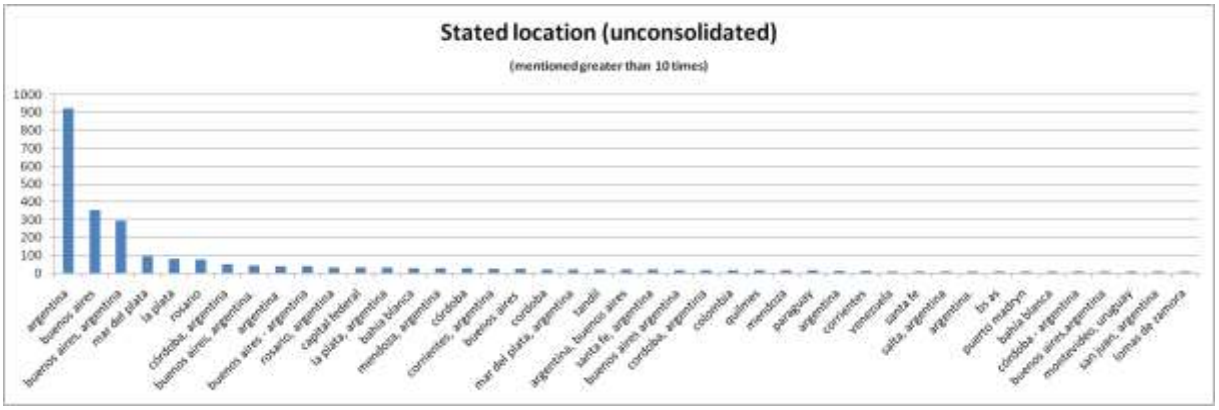
All 9443 users in 'Portuguese speaking Latin American' cluster

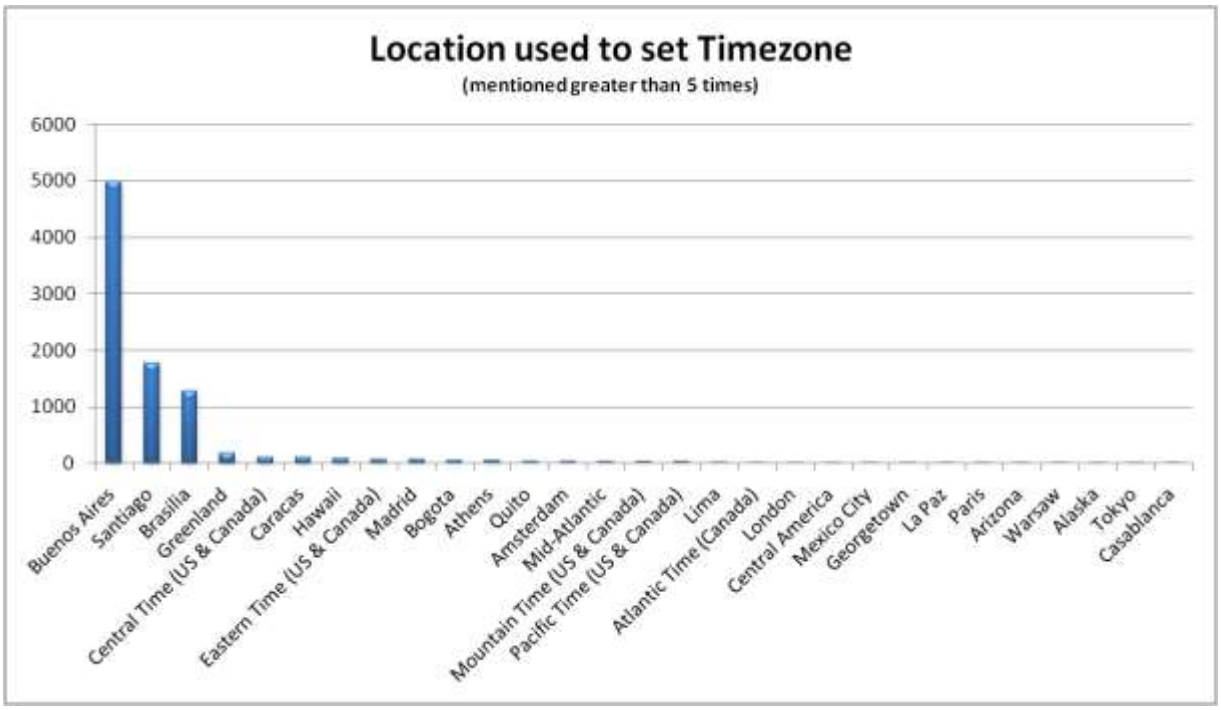


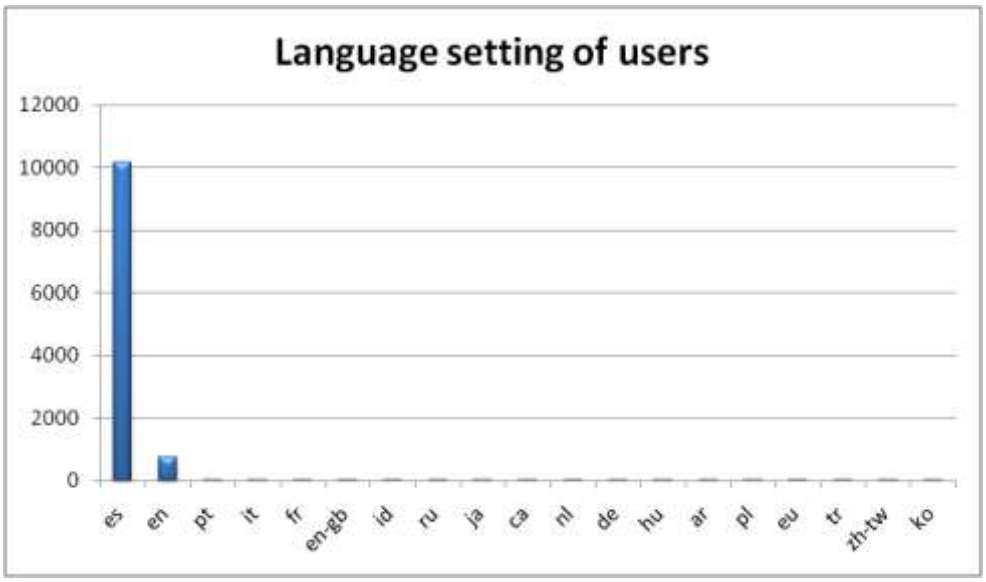




All 12976 users in 'Spanish speaking Latin American' cluster







Spanish Speaking European cluster