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An Innovative Methodological Approach to Analysing Social Media Movements: The Case of #Jesuischarlie

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ABSTRACT

Social media movements take place in an increasingly volatile technological landscape. Researchers who want to analyse their spread must navigate methodological challenges relating to data accessibility, combining qualitative and quantitative data, and remaining attentive to the shifting technological affordances of social media platforms. In response to key challenges, the paper outlines an innovative, three-fold methodological approach to the analysis of social media movements integrating three strands: the Linguistic, Material, and Processual (LMP). Using the hashtag #JeSuisCharlie as a case study, the paper demonstrates how an LMP approach can provide richer insights into social media movements which would be missed by most current methods. Its low-cost design, flexible approach, and technical accessibility equips the researcher in anticipation of further change in the technical landscape. The framework outlined in the paper can be applied to other social media platforms.

KEYWORDS

Charlie Hebdo, Digital, Social, Mixed-Method, Qualitative, Quantitative, Social Media, X

INTRODUCTION

Social media movements or phenomena, such as #JeSuisCharlie, #MeToo, and #BlackLivesMatter, typically engage millions of individuals who collectively express solidarity, share opinions, or engage in activist activity in both online and offline spaces. Analysing social movements, that is, understanding the characteristics of their success, their evolution and movement patterns, and significant contributing actors can be complex because to do so requires a range of both qualitative and quantitative data which must be investigated simultaneously combining a number of different methodological approaches.

Moreover, social media movements take place in an increasingly volatile technological landscape. This presents opportunities for the researcher to gain rich insights into social media phenomena but also comes with many challenges, particularly in terms of the continued accessibility of data, and understanding the material affordances of the platforms on which these phenomena spread. The changeable media ecology highlights the need for a flexible methodological approach to the analysis

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of social media movements which enables the researcher to capitalise on the wealth of data that social media engagement can offer but also equips them in the face of inevitable technological change.

In response to these challenges, the paper sets out an innovative, three-fold methodological approach to the analysis of social media movements on Twitter (now X). The framework approaches the collection and analysis of data through the lens of a) the Linguistic, b) the Material, and c) the Processual and is thus termed an *LMP approach*. These lenses are explicitly outlined later in the paper. An LMP approach highlights the interplay between who is saying what, the material affordances of the platform, and the processes involved in the spread of social media phenomena.

Drawing on established methodological approaches to the collection and analysis of social media data, such as content analysis, discourse analysis, and time-series analysis, as well as theoretical approaches rooted in social movement theory, such as Lefebvre, 2004 (rhythmanalysis), Latour, 2005 (Actor-Network Theory), and Durkheim (collective effervescence, see, for example, Garcia & Rimé, 2019), the paper outlines a novel integrated mixed-methods design which 'bridge[s] the gap' (in the words of Karamshuk et al., 2017, p. 33) between qualitative and quantitative approaches to data.

An LMP approach can be utilized to explore any type of research question. However, it is particularly useful in answering *exploratory* questions, such as 'how' and 'why' a social media movement was successful, as well as *explanatory* questions, such as 'what' and 'who' was influential in its success (see, for example, Lipizzi et al., 2016). The Twittersphere's response to the Charlie Hebdo attack and the success of the hashtag #JeSuisCharlie is used to demonstrate how an LMP approach can provide richer insights into the success of social phenomena, particularly phenomena with a 'contagious complexity'—those whose success 'cannot be captured by quantitative measurement of tweet volume and frequency…' alone (Payne, 2018, p. 279).

PAPER OUTLINE

The paper first outlines the importance of being able to analyse the spread of global social movements. The benefits and challenges of using Twitter/X as a research tool are discussed alongside the limitations of existing methodological approaches to doing so. Using the spread of the hashtag #JeSuisCharlie as a case study, the paper proceeds to demonstrate how the operationalizing of an LMP approach can offer a fresh perspective on the success and spread of social media phenomena that might be missed by other methodological approaches. The final section looks to the future of studies in this field, detailing how the unique flexibility of the LMP framework equips the researcher with an adaptable approach in anticipation of continued change in the technological landscape. Twitter/X is the platform of choice in this paper (established global social movements have centred around the hashtag on this platform) but following an approach from Bruns and Burgess (2012), the central tenet of the approach (i.e. the interplay of these strands) can (and should) be applied to analyses of other social media platforms.

SOCIAL MEDIA MOVEMENTS AND TWITTER/X

Diani (1992, p. 1) defines social movements as 'networks of informal interactions between a plurality of individuals, groups and/or organizations, engaged in political or cultural conflicts, on the basis of shared collective identities'. Although social movements continue to foster large offline gatherings, such as solidarity marches, sharing symbolic gestures, and protesting, social movements in today's technological landscape are also 'more or less digital' events[1]—they either emerge online or have a significant online dimension. This online dimension has attracted interest from many academics (Ray et al., 2017; Tarafdar & Kajal Ray, 2017; Li et al., 2021; Merrill et al., 2020; Mirbabaie et al., 2021). Over the last decade, Twitter/X has become a key platform for facilitating the informal interactions which make up social movements (Floreani, 2022) around a range of topics, such as free speech after terror attacks (#JeSuisCharlie), racism (#BlackLivesMatter), abortion (#ShoutYourAbortion), and sexual harassment (#MeToo). Although no longer unique to Twitter/X, the hashtag is central to the

coordination of these interactions and to the way that the platform functions. It is crucial in allowing 'individuals to search social media discourse, supporting forms of ambient communion that arise out of the ability to find what other people are talking about in quasi-"real-time"' (Zappavigna, 2015, p. 274) and also coordinating online and offline activity.

This makes Twitter/X 'a noisy environment' (Hermida, 2010, p. 304). Although the conversations which take place on the platform cannot be generalized to entire populations, they offer rich insights into the way that society thinks, acts, and responds to politically charged and controversial topics. The data that are circulated during these interactions are often made up of both qualitative and quantitative elements, travel quickly between online and offline spaces, and require the contextualisation of individual responses within wider networks. This presents methodological challenges which current approaches are struggling to keep pace with. The proposed LMP approach draws together elements of successful methodological approaches to the analysis of social media interactions, making better sense of the interrelatedness of social media and society and the complexity of data that can be harvested from platforms.[2]

Using Twitter/X as a Research Tool

Twitter/X has been subject to controversial changes since Elon Musk's takeover.[3] However, Twitter/X remains an attractive proposition for academic research. Globally, there are approximately 486 million users of the platform,[4] and the volume of interaction on social media platforms generates 'vast amounts of potential qualitative research material' (Karamshuk et al., 2017, p. 33). Researchers can still access data through its Application Programming Interface (API)[5] or by accessing archived data through third parties[6]—even without extensive technological expertise. An API creates a set of protocols which allows for the communication between software. Twitter/X states that theirs is 'a set of programmatic endpoints that can be used…to find and retrieve, engage with, or create a variety of different resources' (Twitter, 2022). Although it is no longer free, developers can access a basic tier of historical or live data using key search terms, hashtags, or users—making it a feasible option for most.

Methodological Approaches to Analysing Twitter/X Data

Methodological approaches to the analysis of interactions on Twitter/X are wide-ranging. They often utilise seminal methodological approaches, such as content analysis (Krippendorf, 2019), reception theory (Hall, 1977), critical discourse analysis (Fairclough, 1995; Wodak & Meyer, 2001), and social theories (Durkheim in Garcia & Rimé, 2019; Latour, 2005; Lefebvre, 2004).

Content analysis is a widespread methodology for the analysis of Twitter/X data (Chew & Eysenbach, 2010; Humphreys et al., 2014; Paschen et al., 2020). It is typically utilised to identify words, themes, and concepts within data sets. The identification of categories—often through measuring frequency or the presence of recurring concepts—can be carried out manually or using automated approaches.

Twitter/X is widely conceptualised as a conversational tool (Zappavigna, 2015; Boyd et al., 2010). Drawing on discursive analysis and employing a digital discourse approach is also a common method for analysis (see, for example, Carvalho, 2008; Bouvier, 2015; Giaxoglou, 2018; Kuteeva & Mauranen, 2018, Bou-Franch & Garcés-Conejos Blitvich, 2019; Erdogan-Ozturk & Isik-Guler, 2020). Discursive analytical approaches focus on the use of language in online contexts. A digital discursive approach is effective in asking 'what' and 'who' questions of a data set, 'such as: what the users are talking about? What matters most to them? What is trending right now? Who is talking about what?...' (Lipizzi et al., 2016, p. 782).

Subfields of discursive approaches are increasingly prevalent and begin to address concerns around the contextualisation of online content and discourse with its computational context (Bruns & Burgess, 2012; Krippendorf, 2019). Brock's (2018) critical technocultural discourse analysis (CTDA) (also employed by Pemberton & Takhar, 2021) combines 'analyses of information technology material and virtual design with an inquiry into the production of meaning through information technology

practice and the articulation of IT uses in situ' (Brock, 2018, p. 1013), enabling an understanding of power relations within digital networked environments. Carvalho's 'time-sensitive' approach (2008, p.164) offers a reframing of discourse analysis for the mediated age, allowing the researcher to analyse the evolution of content over time, and responds to Philo's claim that '[c]ritical discourse analysis would be more powerful if it routinely included a developed account of alternatives' (cited Carvalho, 2008, p. 171).

Because Twitter/X is a networked platform facilitating interactions between users, methodologies drawing on social movement theories are also common. Hellsten and Leydesdorff (2020) use Latour's Actor-Network Theory to analyse connections and interactions between users across the network. Merrill and Lindgren (2020) employ a methodological approach rooted in Lefebvre's *rhythmanalysis* to explore activist remembrance of Silvio Meier, and Garcia and Rimé (2019) draw on Durkheim's *collective effervescence* to explore the ways communities come together after terror attacks. Engaging with communication and reception theory (i.e. the way that a text is interpreted within a socio-cultural context), and accounting for the audience's interpretations and interactions of mediated content, remains a key concern for methodological approaches to analysing social media movements (e.g. Sadler, 2018; Park & Kaye, 2019) which need to keep pace with the shifting roles of social media users. It is widely accepted that the previously passive audience has 'been transformed into shifting and various roles as spectators, viewers, users, consumers, prosumers, fans and now digital creatives who have the tools of media production at their disposal' (Garde-Hansen, 2011, p. 65).

An individual's interaction with the digital environment is a key concern of digital ethnographic approaches (Sumiala et al., 2016; De Cock & Pizzaro Pedraza, 2018). Digital ethnography is usually combined with additional methodological approaches as researchers aim to balance close-level nuanced analysis with insights into larger-scale patterns across networks.

Choosing Qualitative, Quantitative, or Mixed-Methods Approaches

To add to the complexity and choice of these methodological approaches, most can be undertaken using quantitative computational analysis of large-scale data sets, qualitative analysis of small-scale data sets, or mixed-method analysis combining initial large-scale quantitative with subsequent qualitative approaches. Each presents its own opportunities and limitations for the study of social media movements.

Using quantitative methods to study Twitter/X data closely align with the 'computational turn' in the digital humanities (Berry cited Burgess & Bruns, 2012). Quantitative approaches often require access to specialised software and technical knowledge in the form of writing specific codes to extract or manipulate data. Common quantitative methodologies include topic modelling (Morchid et al., 2015; Törnberg & Törnberg, 2016; Lee & Jang, 2021), sentiment analysis (Yu & Wang, 2015; Chong, 2016), or computational methods of discourse analysis, such as machine learning techniques (Rodrigues et al., 2021), or natural language processing (NLP) (Lipizzi et al., 2016).

Qualitative approaches using small-scale data sets are also common (De Cock & Pizzaro Pedraza, 2018; Crilley et al., 2020; Closs Stephens et al., 2020). Often, these data are used not as the main focus of a study, but to support wider theoretical claims. Data may be collected in the same way as larger samples, using the platform's API but can also be harvested manually using the search bar of the Twitter/X application. A close analysis of a smaller sample often involves a form of digital ethnography (Sumiala et al., 2016) or content or discourse analytic approaches (Giaxoglou, 2018), which seek to understand the narratives that emerge through social media platforms. Individual tweets or very small samples can be analysed using guidelines from Rodgers and Moore (2020). Data sets in their hundreds or thousands might also benefit from qualitative analysis software such as NVivo.

A mixed-method analysis combining initial large-scale quantitative analysis with subsequent qualitative approaches is the most common approach both to analyses of Twitter/X in general (Rantasila et al., 2018; Eriksson Krutrök & Lindgren, 2018) and specifically to analyses of #JeSuisCharlie (Johanssen et al., 2018; Sumiala, 2017; Giglietto & Lee, 2017). The widespread use of this approach

reaps the benefits of initial computational analysis with a subsequent, more nuanced focus on a smaller sample, providing a more in-depth analysis on a topic.

Limitations of Current Methodological Approaches

The challenge of analysing social media movements such as #JeSuisCharlie is that there is not, on its own, a single methodology which can effectively analyse their spread. Discursive and content analytical approaches, as well as approaches influenced by social theory, allow for insightful observations into *aspects* of social media movements. More holistic insights require asking *exploratory* questions of the data—such as *how* a hashtag evolved and *why* certain actors were more influential than others. Multiple methodological approaches, both qualitative and quantitative, need to be strategically combined in order to fully understand the success of social media movements. Each presents its own set of benefits and limitations.

While the use of large-scale quantitative analysis is an excellent approach to trace the way that content spreads virally between users and to provide insights into patterns and frequencies, its ability to generate nuanced analytical insights is limited (see, for example, Karamshuk et al., 2017, p.33). Large-scale quantitative approaches to analysing #JeSuisCharlie could not fully account for the ways in which the material affordances of the platform—such as the hashtag—and its offline use were imbricated with the success of the movement, despite a clear recognition that it 'cannot be captured by quantitative measurement of tweet volume and frequency' (Payne, 2018, p. 279).

Conversely, while a smaller-scale qualitative approach is excellent at providing rich analysis of content, it '[is] likely to miss crucial insights relating to the volume, patterning, or dynamics' of the findings within a larger data set (Karamshuk et al., 2017, p. 33). The widespread use of a mixed-method approach is a result of its potential to offer the benefits of initial computational analysis with a subsequent focus on a smaller sample, providing a deeper analysis on a topic (Giglietto & Lee, 2017; Sumiala, 2017; Johanssen et al., 2018). However, this approach also has its limitations. Most mixed-methods studies still employ a FIRST [quantitative] THEN [qualitative] approach which is problematic for two reasons.

Firstly, accessing large data sets from Twitter/X is no longer feasible. In February 2023, Elon Musk prohibited access to the Decahose—an academic endpoint which allowed researchers to collect 10% of all tweets in real-time. Access to the Decahose is now part of X's enterprise package, the cost of which is prohibitive to individual researchers. X's renege on accessing this endpoint is a timely reminder that the technological landscape is a fragile one, highlighting the need for a methodological approach which is flexible with regards to sample size and application. In the likely continuation of restrictions on data access, new methods are required which enable the researcher to understand the types of patterns and frequencies within interactions, which might be elucidated through very large data sets on smaller, more cost-effective samples.

The second limitation is that the researcher misses out on an understanding of the interplay between small details revealed by close qualitative analysis and larger-scale patterns identified through quantitative approaches (see Karamshuk et al., 2017). More pressingly, such sequential approaches cannot account for the ways that online behaviour intersects with a wider environment in a 'more or less digital' way (Merrill et al., 2020), which is essential if the success of social media movements is to be fully understood.

Integrating Mixed-Methods Approaches

Researchers are realising that mixed-methods approaches need to be fully *integrated* in order to navigate the complexity of digital data—such as that needed to understand social media movements. Carvalho states that Philo argued 'in favour of an *integrated* analysis of content and processes of production, reception and circulation' (Carvalho, 2008, p. 163) (emphasis mine), and this is beginning to come to light in recent years. Jensen's 'slalom' approach to qualitative research provides guidelines for 'shift[ing] back and forth' between digital methods and traditional ethnography (Jensen, 2022, p. 4).

More specifically, Sumiala et al. use automated content analysis (ACA) and social network analysis (SNA) *'in concert with'* digital ethnography to explore responses to the Charlie Hebdo attacks within the context of liveness (2016, p. 99) (emphasis mine). The necessity of *integrated* rather than *sequential* applications of mixed-methods approaches is demonstrative of the complexity involved in analysing the interaction of large-scale patterns and small-scale nuanced details. An LMP approach provides a clear, innovative framework for accomplishing this.

Outlining an LMP Approach

Given the complexity of analysing social media movements, and the limitations of existing approaches, an LMP approach specifies an integrated hybrid framework that simultaneously focuses on the way(s) in which smaller details shape, and are shaped by, larger-scale patterning. Because the approach is characterized by its three intersecting lenses: the Linguistic, the Material, and the Processual, it reaps the benefits of combining fruitful aspects of existing methodological approaches—such as content analysis, critical technocultural discourse analysis (CTDA), time-series analysis, and social movement theory—into a coherent framework. Its low-cost design, technical accessibility, and flexible application encourages the use of social media as a rich source of data and looks to the future in anticipation of change in the current technological landscape.

The linguistic lens of the framework draws on both discourse and content analytical approaches to the analysis of data. It acknowledges the importance of the content (both verbal and visual) shared on Twitter/X and by whom it is shared—the 'what' and 'who' questions that researchers want to ask of their data (Lipizzi et al., 2016). This includes exploring words, images, and phrases used, the adaptation and evolution of content throughout narrative development, and the interaction of online content with wider societal conversations.

Following digitally discursive and critical technocultural approaches, such as those by Brock (2018) and Bruns and Burgess (2012), an LMP approach enables the contextualisation of what is being said within the technical affordances and materiality of the platform. The material lens of the framework highlights the technical affordances of the platform in facilitating and shaping interactions in a way which aligns with van Dijck, who cautions the 'assumption founded on the idea that online social traffic flows through neutral technological channels' (2014, p. 199).

While the scope of this paper doesn't extend to an exhaustive discussion on the complex algorithms which shape interactions on Twitter/X, the material lens of an LMP approach advocates for this view—even in uncomplicated terms. For example, in the context of Twitter/X, it includes the way(s) in which the platform organises its users, how the hashtag might structure content and allow specific content to be readily visible to others, and why some users are more visible than others. While the framework does not involve a direct application of Actor-Network Theory, it is implicitly concerned with the extent to which social media movements are not driven purely by human actions but through *inter*actions with the technological affordances of social media platforms.

The final lens of the framework is the processual. Drawing on the success of time-series analysis of data sets (Bruns & Burgess, 2012), particularly within discourse analysis (Carvalho, 2008), a focus on process foregrounds the 'more or less digital' (Merrill et al., 2020) evolution of content as it emerges and develops (or not) into established narratives. In the context of #JeSuisCharlie, the processual foregrounds the hashtag's evolution over time, its adaptation into other languages, and its interplay with mass gatherings that took place in cities around the world. Moreover, because time-series data are a lens onto the shifts, movements, and trends in data sets, a processual methodological strand allows the identification of specific critical turning points or 'critical discourse moments' (Carvalho, 2008, p. 166. See also Chilton, 1988) important to the overall spread of the movement.

An LMP approach is unique here because time-series and evolutionary analysis are usually carried out with larger data sets and using qualitative computational methodologies. However, the application of a similar approach to smaller data sets provides rich and innovative insights into viral spread without the need for costly data or additional tools.

Applying the LMP Framework

The LMP framework formalizes these three lenses into a coherent approach and crucially does so with an emphasis on the concurrent analysis of all three. Rather than strict rules, it sets out guidelines for application guided by recent conceptualisations of the digital—namely, that analysis of the content on Twitter/X must be contextualized within its social, technical/material, and temporal environment. Like many frameworks for social media analysis, it requires a reflexive approach (Biri, 2021; Pousti et al., 2021) that should be tailored by the researcher as it is put into practice.

Using an empirical focus of the Charlie Hebdo attack, the next section demonstrates how the operationalizing of the LMP approach allows the researcher to ask more complex, exploratory questions of their data and understand the spread of social media movements.

The Case of #JeSuisCharlie

The Charlie Hebdo attack was targeted against the French satirical publication 'Charlie Hebdo'. On January 7th, 2015, two brothers, Saïd and Chérif Kouachi, opened fire in the central Parisian offices of Charlie Hebdo and killed 12 members of staff. More were killed in the following days[7]. In the aftermath, the hashtag #JeSuisCharlie first appeared on Twitter. It started as simple white and grey writing against a black background with the words 'Je Suis Charlie', which translates into English as 'I am Charlie'. While the creator of the hashtag, Joachim Roncin, says that 'it was something that I wrote just for me' (cited Devichand, 2016), it was retweeted 1.5 million times that day and, to this date, remains one of the 'biggest hashtag[s] of solidarity in history' (Devichand, 2016). It was also used offline and helped to bring people together 'not only on social media but also in the urban spaces of the French capital and other cities' (Merrill & Lindgren, 2021, pp. 2406–2407. See also Eroukhmanoff, 2019).

DATA COLLECTION

The flexible application of the LMP approach commences at the point of data collection. I used Twitter/X as a platform of choice because it has been central to social media movements thus far. However, the researcher could collect data from any platform. Facebook, TikTok, and Instagram all offer varying levels of access to their API, although Twitter/X remains the most straightforward for a researcher from a nontechnical background. Practically, there are a number of official and unofficial documentation sources to help with setting up access to the API. Twitter/X offers extensive documentation on its developer platform (https://developer.twitter.com).

The process of accessing the API is straightforward. The researcher is required to set up a developer account for which they will need to provide a rationale for the collection of data. Once approved, the API grants access to various endpoints through an API Key and a bearer token, which authorizes user credentials. At the time of data collection, Twitter/X offered access to its Streaming API (the collection of data in real-time) or its REST or SEARCH API (the retrieval of historical tweets from the Twitter archive).

I accessed the SEARCH API and adapted a script in Python (a widely used programming language) to harvest the data. The script was available from GitHub—an open-source developer platform. The script required the insertion of the API Key and bearer token plus a setting of the parameters of the search. I used the search term 'JeSuisCharlie', which returned a sample of tweets—both tweets and retweets (RTs)[8]—containing the phrase 'JeSuisCharlie' in either the content of the tweet or the hashtag (this was significant because the initial tweet was of the phrase 'JeSuisCharlie', not the hashtag).[9]

Drawing on time-series methods, and unlike most existing analyses which collect data at a single point, I collected six samples ($n = 10{,}000$ tweets) at intervals of between 1 and 2 hours over a period of 8 hours. There is a notable lack of literature on setting time parameters for the interval collection of social media data. Hendrickson et al. (2015) identify both hourly intervals (which they used to

map the use of the hashtag #SCOTUS) and three hourly intervals (#SteveJobs around the time of his death) as useful temporal parameters for the identification of short-term trends. Bruns and Burgess (2012, p. 806) collected 'minute-by-minute' data for the hashtag #royalwedding in 2012 with a retrospective graphing of two-hour intervals throughout a 24-hour period. This is a useful starting point to guide data collection. But, as Smith and Copland (2022, pp. 33–34) have pointed out, the viral pattern which social movements follow is a rapid initial explosion, followed by a slowing down and another burst a few hours later to account for the differentiation across time zones. This needs to be replicated in the data collection. Thus, an initial 30-minute and 1-hour interval collection was implemented to account for the initial shock, and then two-hourly intervals were implemented as the narrative began to take shape. At around 8 hours, there was a clear shift of the narrative on social media. #JeSuisCharlie was established and in use in mainstream media reporting across the globe, signalling an organic endpoint for data collection.

An additional methodological consideration relates to the peculiarities of collecting data using the API—particularly for events with a high volume of engagement. When accessing the API, the data set is built in reverse chronological order from the <END DATE>. The researcher should, therefore, consider that a data set composed of 100,000 tweets collected after 8 hours will look significantly different to a data set composed of snapshots of smaller samples at regular intervals. A high volume of tweets (as with 'JeSuisCharlie') may all have been posted in the final few seconds of the set time parameters, which does not provide a true reflection of the usage of a key word or hashtag over the period in question. A sequential collection of data snapshots is an effective way to account for this and enables the researcher to analyse the evolution and viral spread of content over time without the need for a very large data set.

After the initial data collection, I ran another Python script to convert the .json files into .csv. Each data set was split into 'non-text-based data' and 'text-based' data before being imported into NVivo, a qualitative analysis tool. Each case (an NVivo term for data set) was converted into a word cloud, enabling a visualisation of key content at each point in time. Figure 1 was created using this method and charts the sequence of visual snapshots of 'JeSuisCharlie' over a period of 8 hours.

CONDUCTING THE INITIAL ANALYSIS

Using NVivo, an initial frequency analysis was executed to reveal the most common words across all cases (see Table 1). A manual coding of each case was subsequently carried out, assigning each tweet in the case to a category. Following guidelines proposed by Erlingsson and Brysiewicz, the process of manually coding data sets was a 'flexible reflective' process. This approach requires the researcher to 'mould the clay of the data' (Erlingsson & Brysiewicz, 2017, p. 95)—going back and forth between the cases and categories to reflect on the analysis and adapt as required. The categories used for the coding of the tweets were expressing emotion, referring to the victims, directly contacting or engaging with other accounts, commenting on the type of event, expressing a political or social point, or sharing facts and information. The categories were not mutually exclusive, and many tweets were assigned to more than one category. The initial analysis enabled the identification of frequently occurring linguistic content, the most engaged with accounts, and trends, shifts, and patterns in the data over the 8-hour time frame.

FINDINGS

Collecting and analysing the data using an LMP approach highlighted three important findings that may have been missed by existing methodological approaches but enrichen understandings of #JeSuisCharlie as a successful social media movement. The first relates to formation of narratives as they emerge in the Twittersphere. The second explores the polylinguistic adaptation of the phrase

Figure 1. Word Clouds Created Using NVivo—Visualising Snapshots of Engagement With the Phrase 'JeSuisCharlie' Over 8 Hours—Commencing at Around 12 p.m. (Central European Time)

#JeSuisCharlie. The third finding highlights the types of voices which were made visible on the platform.

Finding 1: Narrative Formation

Payne argues that the success of #JeSuisCharlie was in part due to its activity, which 'merged with a celebration of Frenchness' (2018, p. 278), and the data in Figure 1 and Table 1 support this idea. *Solidarité* and *liberté* were identified as key words which shaped the evolution of the narrative in the initial stages. Over the duration of the next 8 hours, they are among the most frequently tweeted words within the sample.

Table 1. Word Frequency of the Most Common Phrases Over a Period of 8 Hours (Data Analysed Through NVivo)

Word/phrase	Rank	Count	Weighted Percentage (%)
#jesuischarlie	1	32,125	7.08
#charliehebdo	2	12,266	2.70
Charlie	3	2,738	0.60
Hebdo	4	2,520	0.56
Nous	5	2,199	0.48
Liberté	6	2,103	0.46
Solidarité	13	1,102	0.24

S*olidarité* and *liberté* echo the French motto *liberté, egalite, fraternité*, which was first used in the French Revolution. Notably, *liberté* is tweeted at almost twice the frequency of *solidarité*, perhaps giving early indications of why the hashtag *#freedomofspeech* would become so popular later on. A sense of French culture and history is also embedded within the authorial inspiration behind the phrase, with the author himself hinting that the idea of Charlie draws from a French cartoon, 'Ou est Charlie?' (the French equivalent of Where's Wally?[10] The use of a cartoon as inspiration is important because political cartooning has a significant history in France when the satirical and politicised use of cartoons became prevalent during the French Revolution (Lahikainen, 2015). In fact, some argue that the content of the publication itself echoes back to a brand of Revolutionary politics, 'combining left-wing radicalism with provocative vulgarity that can border on the obscene' (Csonka, 2021). Thus, the cultural significance of *solidarité* and *liberté* was key in driving the #JeSuisCharlie narrative because they positioned Charlie as being about more than just the attack on its offices.

Simple quantitative analysis allows for the identification of word frequency associated with the spread of #JeSuisCharlie. However, the processual element of an LMP approach additionally enables the identification of significant periods or 'waves' of activity which are intense but short-lived.

Figure 2 shows a commemorative wave building between 2–4 hours after the attack around the names of some of the more high-profile victims—*Tignous*, *Charb*, and *Cabu*—as people use the hashtag to pay respect to those who have lost their lives. This abates quite quickly, with commemorative responses becoming focused more on the profession of these victims, centring the commemoration not on individuals but on what they (and Charlie Hebdo) stood for.

Figure 3 demonstrates the replacement of individual names by the terms *cartoonists* or *dessinateurs*. The intensity builds up to 6–8 hours with the emergence of another hashtag used concurrently with #JeSuisCharlie and seemed to accompany this sentiment: *#freedomofspeech*. The

Figure 2. Word Clouds Demonstrating a Commemorative Wave Building Around Names of Some of the More High-Profile Victims—Tignous, Charb, and Cabu

Figure 3. Word Clouds Demonstrating the Shift Away From Individual Victim Names Towards the Terms Cartoonists, or Dessinateurs (Designers or Cartoonists), Which Were the Professions of the Victims

emergence of this hashtag shifts the concept of Charlie from functional to ideological, creating what Sumiala et al. (2019, p. 211) call a 'mythology of Western civilisation that unites to defend its shared values of freedom of speech and expression against a cruel enemy'.

Initially then, to be Charlie appeared to resonate symbolically with specifically French values (*solidarité* and *liberté*). However, the waves of activity identified in Figures 2 and 3 suggest that Charlie briefly takes on a more practical function to commemorate individual victims as their names become known. There is a later subtle shift to a more conceptual, globalized notion linking Charlie to the defending of Western ideals, even taking on a mythological significance (Sumiala et al., 2019, p. 211). Within the space of a few hours in these early stages of narrative development, there are several reconfigurations of what Charlie is or represents, offering new insights into the success of the hashtag and the movement.

During these intense periods of activity, #JeSuisCharlie was tweeted simultaneously by a large number of users. Given the rapid viral spread of the hashtag #JeSuisCharlie and the shock and confusion characterizing the hours after the event, it should be considered that synchronicity of action does not necessarily correlate with synchronicity of thought. Thus, how can it be certain that *my* Charlie is *exactly* the same as *your* Charlie, which is exactly the same as *someone else's* Charlie? The operationalizing of an LMP approach here intersects with reception theories (e.g. Hall, 1977), highlighting that both the meaning and function of Charlie was negotiated by a global audience—but crucially, this worked to its advantage. Papacharissi (2016, p. 308) argues that 'hashtags can serve as empty signifiers that invite ideological identification of a polysemic orientation', and in the case of Charlie, this certainly seems to hold true. The evolution of meaning and function in these early stages was subtle enough for Charlie to appear both universal and unifying while also widening its reach to a larger audience.

Moreover, the use of an LMP approach offers the researcher a way of contextualising the synchronicity of this online thought with offline social action. Two hours after the phrase was shared, the French word *rassemblement* (gathering) emerges and is consistent throughout the next 6 hours. The word *rassemblement* is used both as a hashtag, encouraging people to gather in public spaces, and to comment upon gatherings accompanied by images of people holding physical copies of the original tweeted message (see Figure 4).

The use of the term *rassemblement* effectively demonstrates #JeSuisCharlie's 'more or less digital' (Merrill et al., 2020) evolution. As a further example, the hashtag '#IAmCharlie emerges much later in the narrative—around 6 hours after the attack. The timing of #IAmCharlie coincides with the expression of solidarity in Trafalgar Square, London. As @SWLondoner (2015) pointed out, by 6.30 p.m. (7.30 CET), Trafalgar Square had become a key gathering place for people expressing solidarity. The crowd held signs printed with 'JeSuisCharlie' but also symbols of freedom of expression, such as pens, books, and notebooks. At this stage, offline and online activity was bound together in a

Figure 4. Members of the Public Hold Signs With 'Je Suis Charlie' at a Berlin Rally in Support of the Victims of the 2015 Charlie Hebdo Shooting (Note: By Dirk Ingo Franke - Own work, CC BY-SA 4.0, Berlin rally in support of the victims of the 2015 Charlie Hebdo shooting. https://en.wikipedia.org/wiki/Charlie_Hebdo_shooting#/media/File:JeSuisCharlie_Berlin_07.01.2015_19-43-49.jpg)

cross-referential nexus, where it became difficult to say which one had influenced the other, driving engagement with the phrase from geographically diverse groups and creating opportunity for offline grass-roots activity.

More broadly, an LMP approach, which can account for this ongoing mediation of content across online and offline spaces, might offer some insight into the significance of small, synchronized concentrations of activity which bubble up and then fade again, providing new insights into the spread of social media movements. Social movement theory can be drawn on here to highlight the growing importance of the synchronization of 'thoughts and actions through shared slogans, gestures and movements' in a particular moment (Garcia & Rimé, 2019, p. 618). Garcia and Rimé draw on Durkheim to refer to the reciprocal participation in online engagement as a 'collective effervescence' (2019, p. 618). The use of the term 'effervescence' suitably captures the notion of 'waves' as an emerging point of focus in the spread of social media movements, demonstrating the way that 'technology has altered the rhythms of life' (Smith & Copland, 2022, p. 27). Studying the 'nuanced temporal patterns of activity' (Merrill & Lindgren, 2020, p. 660) within social media movement is a burgeoning field in current literature. An LMP approach highlights the sometimes unpredictable and intricate pattern(s) of social media movements which can move like 'wildfire' across online and offline spaces (Jenkins cited Smith & Copland, 2022, p. 28).

Finding 2: Polylinguistic Adaptation of Hashtags

This section elucidates the way(s) in which an LMP approach can be used to give richer insights into an analysis of a hashtag through a focus on its adaptations. Although not unique to Twitter, the hashtag has become emblematic of the platform (Sumiala et al., 2019, p. 211). This brief discussion focuses on the importance of the LMP methodology for analysing the 'Polylanguaging' (Giaxoglou, 2018) of the hashtag—in this case, its evolution from French to Spanish to English.

The data collected in time intervals (Figure 1) visualises a gradual anglicization of the hashtag #JeSuisCharlie to #Iamcharlie, along with key words. *Solidarité* and *liberté* evolve into *solidarity* and *liberty*. There is also an almost instant shift to the Spanish #YoSoyCharlie, *solidaridad,* and *libertad* in the immediate aftermath of the event which suggests a globalizing of commemorative responses in the early stages. Giaxoglou argues that the translation of the hashtag or slogan into other languages can be seen as 'visual projections of the global reach of the hashtag' (2018, p. 18). In particular, she states that this global reach is amplified by its translation into 'big' languages, which she defines as 'languages with large numbers of speakers' (Giaxoglou, 2018, p. 18), for example, English and

Spanish. From the data, it is evident that #JeSuisCharlie follows this pattern, amplifying its reach to a more global audience.

Moreover, the application of an LMP approach highlights a key individual driving the Hispanicization of the phrase #JeSuisCharlie into #YoSoyCharlie. A journalist and a blue tick user[11] 'Principe Marsupia' (@pmarsupia), tweets the phrase #YoSoyCharlie along with #JeSuisCharlie and the phrase *Periodistas franceses comienzan esta cadena* (French journalists start this chain).

By referencing the starting of a chain, and including the #YoSoyCharlie hashtag, @pmarsupia, journalist and a blue tick user, demonstrates an implicit understanding of the hashtag as a key material affordance of the platform and the viral potential of the phrase—even in another language. Perhaps this is through a recognition that the *I am* construction used in the hashtag is a discursive precedent with 'a long history in expressing solidarity and support' (Sumiala et al., 2019, p. 210). Perhaps, more likely, because it fulfils the qualities of a 'pithy' phrase 'that serves as a "mini statement" in its own right' (Giglietto & Lee, 2017, p. 12). Giglietto and Lee (2017) argue that this is key to hashtag success.

Because the Spanish #YoSoyCharlie was also tweeted alongside the French #JeSuisCharlie, it helped to drive the widespread use of the latter. An LMP approach thus demonstrates that the success of #JeSuisCharlie can be partially attributed to the ease at which it could be translated into other languages without losing its catchy, 'pithy' appeal (Giglietto & Lee, 2017, p. 12). Responding to Philo (cited Carvalho, 2008, p. 171), a discursive or content analytical approach is strengthened here by understanding how alternative discourses and phrases emerge simultaneously. In the case of the spread of #JeSuisCharlie, the immediate and simultaneous sharing of the hashtag in other languages offers a more nuanced insight into its global success. From an individual user perspective, the LMP approach also demonstrates the importance of understanding how individual user behaviour (@pmarsupia's tweet) both shapes and is shaped by the technology of the platform.

Finding 3: The Emergence and Visibility of Voices

On the subjects of users, the final section elucidates the ability of an LMP approach to extend current thinking on key actors in social movements. Operationalizing an LMP approach elucidates that the success of #JeSuisCharlie was partly due to the 'multiple voices [which] contribute to the memory narrative' (Hollis-Toure, 2016, p. 295)—and also the way that these voices were afforded visibility through the functionality of the platform. Drawing on Brock's (2018) CTDA and following concerns from van Dijck (2014) and Bruns and Burges (2012) that social media use is never neutral, the #JeSuisCharlie data suggest there are no *set* characteristics of official or elite actors who can act in a digital space. Instead, key actors are contextually fluid and are partially shaped by their knowledge of and interactions with the platform's technical affordances.

#JeSuisCharlie was a commemorative response, and traditionally, commemoration is done by the state or in opposition to it (in the form of counter-commemoration). State leaders, key political figures, or leaders of grass-roots opposition groups have thus been considered as official or elite actors in establishing dominant narratives. It is also widely accepted that 'online media afford visibility to voices frequently marginalized by the societal mainstream' (Papacharissi, 2014, p. 8). Through operationalizing an LMP approach, it is possible to nuance our understanding of the defining characteristics (or lack thereof) of key actors in a given context by contextualising who is saying what, and at what stage, and within the technical affordances of the platform. Figure 5 tabulates the demographic data and user metrics of the most engaged-with accounts in the 30 minutes after the first tweet of #JeSuisCharlie. User metrics included: the number of followers, blue tick account, location, and profession.

In the immediate aftermath of the attacks, not one of the accounts driving the commemorative narrative was a state actor or key political figure. Many, however, were 'official' Twitter users with a blue tick account in professions such as journalism or sports. The prevalence of 'blue tick' accounts suggests in part, as one might expect, the importance of the visibility of the user or the size of their

Figure 5. A Tabulation of User Metrics for the 15 Most Engaged-With Accounts in the First 30 Minutes After the Charlie Hebdo Attack

No. of followers	No. following	Location	Blue tick account?	Profession
6181	1679	Paris	Y	Journalist
22.9K	698	London	N	Journalist
212K	10.2K	UK	Y	Journalist
13.5K	5487	New Orleans	Y	Journalist
231	1104	Unknown	N	Unknown
329K	3476	Kiev	Y	Academic
41.5K	924	Brussels	N	Former MP
124K	10.1k	Brussels	Y	NGO
5.9M	5821	Paris	Y	Radio and TV Presenter
5.9M	1596	France	Y	News
1.1M	566	Unknown	Y	Writer
51.6K	2873	London	N	Arts
3.6M	400	London	Y	News
2.9M	226	Brussels	Y	Sports
970K	3422	Unknown	Y	Actor

following in their ability to shape a narrative. That being said, however, there are also some interesting individual cases that the methodological framework allows us to identify.

The user data from the 30 minutes highlight one of the key actors in the early stages. With only 231 followers (compared to other actors with thousands or millions), the visibility of this actor gives us new insights into who has the power to act in this space. The prominence of this user is likely to have emerged because Twitter at the time (and X currently) allows the sharing of content through the hashtag 'without needing to establish mutual follower/followee relationships with any of the participants' (Bruns & Burgess, 2012, p. 804). This is a material affordance that differentiates Twitter from most other social media platforms. The dynamic places emphasis on the importance of the hashtag as a sharing mechanism as opposed to the visibility or popularity of the user. This specific case suggests a clear possibility that Twitter/X can facilitate the emergence of voices that other analytical approaches render inaudible but which, in fact, play a significant role in shaping the narrative of an event.

As a further example, approximately 4 hours into the event, Salman Rushdie became one of the key drivers of the hashtag #freedomofspeech, calling for the others to 'defend the art of satire, which has always been a force for liberty and against tyranny, dishonesty and stupidity' (Rushdie, 2015). The account @EnglishPen shared this tweet shortly after, making it one of the most frequently shared during this moment. Although Rushdie is a notable figure with a blue tick account, he isn't among the most frequently Retweeted over the first 12 hours as a whole. Nevertheless, his activity is a 'critical discourse moment' (Carvalho, 2008, p. 166. See also Chilton, 1988) around 4 hours in, shaping the narrative at that specific point.

Thus, an LMP approach demonstrated that it is crucial to rethink key actors driving the virality of a movement in a given context. Key actors are not just those who are most visible across the whole movement (these are still likely to be mainstream media and media personalities) but also those whose contributions are significant at shaping the narrative along its trajectory.

The findings elucidate that there are no set characteristics or formulae for who the dominant actors might be in the shaping of successful narratives. Not all of the details of the user with 231 followers are known, but it can be reasonably surmised that key actors in this space are not just defined by visibility or popularity metrics. Instead, they might also include those who know how to capitalise on the material affordances of the platform (in the case of the user @pmarsupia) or are contextually fluid (in the case of the user @salmanrushdie).

An LMP approach enhances approaches such as CTDA by drawing attention specifically to the power dynamics which are woven through technical interactions. Understanding the way that power is enmeshed within the materiality of the platform and the wider technological landscape is now more important than ever. Changing user metrics such as account or tick status are examples of some of the adaptations that makes X a different platform from Twitter, as it was when the data was initially collected. However, with a focus on the *interplay* of materiality, an LMP approach equips the researcher to embrace the rapidly evolving technological landscape both as it stands currently and in anticipation of future change.

Limitations

As with any methodological framework, an LMP approach has several limitations—principally relating to the replicability and generalizability of the study. Kim et al. (2013), Pfeffer et al. (2023), and Vicente (2023) point out that Twitter/X does not maintain transparency around its sampling process. Thus, while the samples of tweets used were not exhaustive, the researcher cannot make any certain claims about the sampling process. However, while Pfeffer et al. (2023) and Zubiaga (2018) both found some variation in data samples collected from Twitter/X via different methods, Zubiaga's study concluded that 'datasets were still representative in terms of textual content' (Pfeffer et al., 2023, p. 722). The lack of sampling transparency also limits the researcher in drawing conclusions about bias. The Twittersphere is not representative of whole populations—nor does the researcher claim it to be. Through a material focus, an LMP approach enables the researcher to remain attentive to the technological forces which shape user interactions rather than ignore them—but this can only be done to the extent to which information is made transparent by the platform.

In the interests of replicability, it is worth noting that at the time of writing, X's basic tier still provides access to the streaming and REST and SEARCH APIs—but historical data are only archived for 7 days. Looking to the future, it would be necessary to collect data relating to social media movements either in real-time or within a week of the event. Data collection remains a challenge within the context of a rapidly changing technological landscape. X's monthly subscription model for non-academic or industry users has created a revenue stream, and it seems, for the moment, content for this access to continue despite its current volatility.

Looking to the Future

An LMP approach is accessible in terms of cost and expertise—both key concerns for the researcher when deciding to use social media as a data source. Although access to the Twitter/X API remains the most intuitive for researchers without specific technical expertise, other platforms such as Facebook and Instagram also permit access to their APIs.

As the technological landscape continues to shift, the uniqueness of an LMP approach is that it can be operationalized for any social media platform. Many social media users have migrated to emergent platforms, such as Mastodon, and younger users, in particular, are more likely to use Instagram or TikTok rather than Facebook or X (Vogels et al., 2022). In anticipation of an increasingly fragmented social media userbase, an LMP approach can be implemented to track cross-platform movements of social media phenomena. Using a processual approach to data collection, data can be harvested from any platform offering access through their API. Movements of content or a hashtag (which is no longer unique to Twitter/X) can be tracked across platforms using visualisations or word clouds. Employing this approach on cross-platform data would also enable to the researcher to follow the

nuanced movements of content or a hashtag and identify 'critical discourse moments' (Carvalho, 2008, p. 166. See also Chilton, 1988), which triggered the spread on each platform. Additionally, an LMP framework could be fruitfully utilised in undertaking a comparative approach—either between hashtags or platforms.

As Bruns and Burgess (2012, p. 812) highlight with their methodology, the nuances and specificities of the data collection are contingent on X maintaining some accessibility to its API or to its historical data via a third party. However, even this is flexible. Should X place further restrictions on the quantity of data which can be harvested from the platform, an LMP approach can be operationalized on smaller data sets, or other platforms, embracing the shifting technological landscape and remaining economically viable. Thus, (similar to Bruns and Burgess, 2012) the strength of an LMP approach lies in the broader application to data interrogation and its transferability to any social media platform from which data can be obtained—rather than the technical aspects of it which can be amended if circumstances require.

CONCLUSION

This paper has proposed an innovative methodology which approaches the collection and analysis of Twitter data through three lenses: LMP. Together, these lenses of Twitter/X analysis can provide new insights into social media phenomena by broadening the scope of questions that can be asked from the explanatory 'who' and 'what' (e.g. Lipizzi et al., 2016) towards the exploratory 'how' and 'why'.

By applying the methodology to the Charlie Hebdo case, it has been demonstrated that understanding the success of social media phenomena such as #JeSuisCharlie is a complex task. An LMP approach can provide richer insights than existing approaches by understanding the 'more or less digital' (Merrill et al., 2020) interplay between small-scale and large-scale patterning (Karamshuk et al., 2017). It elucidated the ways in which the narrative was formed across 'mutually constitutive' (Merrill et al., 2020, p. 547) online and offline spaces, the ease at which it translated into other languages, and the multiple voices who were able to contribute to the narrative (Hollis-Toure, 2016, p. 295).

Although viral social media movements may become more fragmented and spread across diverse platforms, there is no doubt that they are here to stay. Within a rapidly shifting technological landscape, an LMP approach addresses an urgent need to approach viral spread from a fresh perspective and encourages researchers to harness the power of social media in an accessible and cost-effective way.

CONFLICTS OF INTEREST

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ENDNOTES

1 Merrill et al. use the term to refer to refer to the way that 'commemorative events emerge in a mutually constitutive fashion across the spaces of the city and those of digital technology and media' (2020, p. 547).

2 Ahmed (2017) notes that 'it provides almost 100% of its data through its APIs'.

3 Examples of the changes include the purchasing of official status via the blue checkmark and the changes in API access levels for academic researchers.

4 Twitter has not released 'official' user statistics in recent years. At the time of writing, market research data suggest that 'the company's self-service advertising tools indicate that marketers could reach 486.0 million users on Twitter in early July 2022' https://datareportal.com/essential-twitter-stats.

5 API stands for Application Programming Interface and refers to a service which allows communication between two or more pieces of software.

6 For example, should Twitter prevent access to its API through the Developer Portal, data can be bought from third parties such as Tweet Binder, or data for smaller-scale studies can be collected manually through the interface.

7 The British Broadcasting Company (BBC) (2015) reported on 'Three Days of Terror'. https://www.bbc.co.uk/news/world-europe-30708237

[8] See the Limitations section for a discussion on sampling methods on Twitter. The Pew Research Centre suggests that up to 35% of tweets are RTs (Chapekis & Smith, 2023)

[9] Approval from the university ethics committee was secured prior to commencing data collection.

[10] Joachim Roncin (2015) stated, 'I read a lot with my son the book *Where is Charlie*, it came to me quite naturally' (cited Agence France-Press (AFP), 2015).

[11] At the time of writing, a 'blue tick' account indicated a source 'verified' by Twitter to ensure accounts were not being impersonated and that information came from reliable sources. This has changed since Musk's takeover and, again at the time of writing, users can buy blue tick registration for X Premium for an $8 subscription. They can also hide their blue tick status.

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