

Novel noise? A systems-theoretical approach to Twitter

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ABSTRACT

This paper explores instances where communication using the medium of Twitter is shown to be in tension with communicative codes of the mass media and law, and asks whether the micro-blogging service can be described as a novel system of communication. Utilising Niklas Luhmann's systems-theoretical approach to sociological analysis to analyse specific cases, the paper assesses Twitter's potential stability as a social system based on communication. Evidence regarding the basic conditions of system formation is sought in three cases where Twitter may be identified as a conduit for communication resulting in action or dissent. In asking whether Twitter fulfils the properties required for system formation, this paper suggests that Luhmann's systems theory provides a valuable framework for deeper analysis of social media tools.

KEY WORDS

Twitter, Luhmann, Systems Theory

If media and techniques of communication change, if the facilities and sensitivities of expression change, if codes change from oral to written communication, and, above all, if the capacities of reproduction and storage increase, new structures become possible, and eventually necessary to cope with new complexities.

(Luhmann 1990: 100)

INTRODUCTION

Launched in 2006, the web-based micro-blogging communication tool Twitter is based on the idea of being able to share ‘What’s happening?’ with a group of friends while being simple to use and access.¹ Communication via the service consists of messages with a 140-character limit, designed to fit within the SMS (Short Message Service) protocols that governed the distribution of text-based messages across most mobile communication networks at the time. This restriction of message length has allowed the service to be truly mobile from its inception; both posting and reading can be done on a wide variety of technological platforms including mobile phones.

Over the last four years around 175 million Twitter accounts have been created (numberof.net 2010, Twitter.com 2010). Even though it is estimated that 40% of these accounts have never been used (numberof.net 2010) the sheer scale of the capacity of the system is demonstrated by its global user base, who published an astonishing 25 billion Tweets during 2010 (twitter.com 2010).

The rapid growth and acceptance of Twitter, and indeed micro-blogging itself provides the possibility for highlighting a novel change in the medium, technique, and content of mass-communication. Although SMS messaging, which is equally restrictive in message length, has been available as part of mobile phone functionality for some time,² the publicly open nature of messages communicated through Twitter raises questions regarding its efficacy as a medium for the dissemination of information.

Instances of irritation, although few in number, have notably occurred where Twitter activity has been deemed to be in contravention of accepted mass communication protocols and tested against legal structures that were formulated prior to the service existing. Luhmann defines the concept of irritation, specifically in relation to mass media, as ‘the form with which a system is able to generate resonance to events in the environment’ (Luhmann 2000b: 22). This concept will be used to assess the systemic nature of Twitter by highlighting the communication of environmental events within its operation. The chosen instances of irritation highlighted within this article show the potentially problematic nature of the change in communication that Twitter may demonstrate and its complex relationship with the possible environments in which it operates.

METHODOLOGY

This paper explores the phenomenon of Twitter through utilising elements of the analytical paradigm of social systems theory, specifically as proposed by Niklas Luhmann. By turning to a theoretical model that ‘offers a highly original description of modern social conditions and the possibilities of communication’ (Lee and Broszewski 2009: 5), the growing complexities of Twitter can be simply described and its potential as a stable system of communication assessed.

Although highly abstract, Luhmann’s systems theory of based on the identification of differences, distinctions and boundaries, which he helpfully applied to the mass media system late in his career (2000b). By focussing on such basic systemic operations, this paper aims to introduce systems theory in an accessible manner, whilst providing insight into the potential of Twitter as a case for empirical, systemic investigation.

In addition to issues concerning the systemic classification and interpretation of Twitter-based communication, particularly whether

posting constitutes participation in the mass media or a personal communication channel, there have been instances where Twitter has been utilised as a tool for campaigning, resistance and dissent in political climates as disparate as Iran, the USA and England.³ The utilisation of structures outside of established mass media in such an open, public manner raises further questions about the structural relationship between Twitter and mass media, specifically whether the service is exhibiting systemic autonomy or not.

The analytical approach employed in this paper is of a critical nature, utilising key concepts and the language of Luhmann's systems theory to provide an analysis of systemic traits that are displayed in specific cases, particularly difference and distinction between Twitter and other mass media.

DEFINITIONS

In order to discuss Twitter, it is necessary to briefly pause to clarify and define a small number of terms that will be used throughout this paper. Without becoming too technical or dwelling on a technology that may be employed and appropriated by users, these definitions will focus on common user operations.

The term Tweet will be used refer to a message, within the 140 character limit, posted by a user on Twitter.

'Following' is a term used to describe the relationship between users across the network. Followers are other users that have requested to be kept informed of any new Tweets that are posted by a particular user. The same user is a Followee of other users by request. The two positions do not have to be reciprocal; users can have an imbalance between the number Followees and Followers in their network.

LITERATURE REVIEW

The work of German social theorist Niklas Luhmann provides a somewhat under-explored conceptual framework on which to build an analysis of the potential of Twitter. Introducing systemic thinking has been recently proposed as a ‘dramatic paradigm shift in sociology’ (Lee and Brosziewski 2009: 3), one that seeks to describe society not in terms of human subjects and their action, but in terms of systems that reproduce themselves in the medium of communication (Taekke and Paulsen 2010: 1).

Although Luhmann’s systems theory is comparable, and indeed a significant development of the general systems theory of Talcott Parsons,⁴ this paper, due to considerations of length and focus, does not set out to discuss systems theory as a conceptual framework, but intends to utilise the most accessible and perhaps familiar principles of systemic thinking by way of an introduction.

Based on the communicative feedback models of cybernetics, the basis of Luhmann’s theoretical position, and the distinction between his and earlier Parsonian models is the concept of *autopoiesis* (Sevanen 2001: 76-77). Used to describe self-recursive and regenerative behaviour in cellular biology, autopoiesis in Luhmann’s terms is one of the conditions essential for ‘fulfilling the conditions of systems formation... no matter how complex the emerging structures turn out to be’ (2000a: 2). Systems therefore, using Luhmann’s conceptual framework, exhibit self-referential and reproductive capabilities.

The other condition for systems formation, again a development from earlier systems thinking, is that of *operative closure*. As Sevanen tells us, ‘this does not mean that they have no connections with their environment’, but rather that a system handles the information and energy that it gains from its environment according to its own ‘inner code or operating principle’ (2001: 80).

It is these two conditions for systems formation that are the departure point for the systemic analysis contained within this paper, that of the ‘*difference between system and environment*’. A system exists, Luhmann tells us, by constituting and maintaining a boundary between itself and its environment (Luhmann 1995: 16). It is important to note that boundaries are not points at which connections are broken. Processes that cross system boundaries, that is from system to its environment, have ‘different conditions for continuance after they cross’ (*ibid.*: 17).

Although there are parallels that can be drawn between systemic analysis and web sphere analysis as proposed by Schneider and Foot (2005), namely boundary definition, recursivity and dynamism, the focus of this framework on the ‘analysis of communicative actions between web producers and users’ (Schneider and Foot 2005: 158) encourages the creation of complex models of person-to-person interaction. By negating interpersonal interaction, systemic analysis becomes a more viable proposition than web sphere analysis as it allows for a reduction of elemental complexity that may not be possible with Schneider and Foot’s framework.

It has been suggested that a social networking site ‘is a social system that produces itself by meaningfully organising its own elements’ (Lee *et al.* 2010: 138). If we are to view Twitter as a social networking site,⁵ the point of interest for this paper is not regarding the differentiation between the participants in the systems (users) and the conceptual difference of medium/form as outlined by Lee, Goede and Shryock (2010), but the passage of information between system and environment.

To begin analysing Twitter from a systems-theoretical perspective, it is worth noting the work of both Taekke and Paulson (2010) and Lee *et al.* (2010), which introduces Luhmann’s theory of media in *The Reality of the Mass Media* (2000b). While both papers concentrate on the distinction between medium and form within social network sites, the

readings of Luhmann's media system provides valuable entry points into discussing the relationship between Twitter and its environment.

Previous research specifically focussing on Twitter, its operation and function is, as one might expect from such a recently launched service, fragmented and notable by its paucity. One has to question the use of statistical analysis as a basis for analysing how users engage with Twitter (Java *et al.* 2007, Huberman *et al.* 2008, Jansen *et al.* 2009), especially as reliable data appears to be difficult to identify. Indeed problematic data has led Java *et al.* (2007) to analyse user activity and retention over a period of only a week despite basing their wider analysis of user volume on the publicly available Twitter timeline of two months. Huberman *et al.* (2008) have also found that any longitudinal analysis of user's posts and connections is constrained by a limit of 3201 Tweets per user capable of being displayed. Although beyond the scope of this paper, such limitations are justified as being necessary 'to alleviate some of the strain on the behind the scenes part of Twitter, and reduce downtime and error pages' (Twitter.com 2011).⁶ Recently a number of third party archival engines have been developed to store Tweets in perpetuity, although these require individual users to take action to ensure the data is kept available. The storing of every publicly available Tweet ever created by the Library of Congress offers no real solution to these identified problems, as there are heavy restrictions for usage and a six-month delay on Tweets being published.

Huberman, Romero and Wu (2008) provide early analysis of the social networks that underpin users' engagement with Twitter. Differentiating between following someone, being a followee and the reciprocal direct messaging that in their opinion indicates friendship, their analysis concludes that users' most important network connections are well hidden inside a more complex network of loose, expendable connections. Zhao and Rossen (2009) however see these weak ties as being vital to the flow of novel information, which is 'more likely to be gained from people outside of our daily activities'. Indeed, Hughes and

Palen (2009) add further weight to the importance of loose connections in their analysis of Twitter messages during emergencies and mass convergence events where they note that information is disseminated in a less person-specific form.

In the analyses of the cases below, principles concerning both the formation of systems and the differentiation between a system and its environment will be taken into consideration. Although by no means a comprehensive empirically based systems-theoretical analysis, the restrictions will allow for comparison with other suitable analytical frameworks.⁷

OPERATIONAL CLOSURE, AUTOPOIESIS AND TWITTER

On the 24th September 2009 in Pittsburgh, Pennsylvania, state troopers raided a motel room, acting on information received regarding protests surrounding the G20 Summit happening in the city at the time. The police entered the room to find Elliot Madison sitting at his computer with a range of other communication equipment including police radio scanners (eff.org 2009). Madison was arrested for allegedly breaking a federal anti-rioting law by informing protesters of the movements of police during the protests so that they might be avoided (wired.com 2009).⁸ Among the charges that stood against Madison at his trial was criminal use of a communication facility, that facility being Twitter (eff.org 2009).

Less than six months after Madison's arrest, on the 6th January 2010 in England, Paul Chambers, anxious about catching a flight in the face of bad weather, Tweeted 'Crap! Robin Hood Airport is closed, you've got a week and a bit to get your shit together otherwise I'm blowing the airport sky high!' (independent.co.uk 2010). Chambers was arrested a week later, charged under an obscure 1977 law designed to prosecute 'hoaxers who make others believe, beyond reasonable doubt, that bombs or explosives have been set somewhere' (guardian.co.uk 2010).⁹

While both cases are much more complex to describe than the length of this paper allows,¹⁰ what is of concern with regard to analysing Twitter using a systems-theoretical approach is that the prosecutions happened. Turning again to the concept of differentiation, the two cases highlighted clearly show irritation between communication that happens within the (sub)-system of Twitter and the societal sub-system of Law (Sevanen 2001: 79-80).¹¹

A note of particular interest in the Madison case is that when protesters in Iran earlier that year utilised Twitter as a medium to communicate information relating to political protests, such usage appeared to be officially sanctioned as acceptable in America (reuters.com 2009). When Madison, leaving aside his other communication tools, used Twitter in the same manner domestically he was deemed to have used a communication system in contravention of the law.¹² Systemically, this could be seen as the legal system imposing a limitation on the function of Twitter, which Sevanen (2001) highlights as a condition of operational closure.

In providing information for protestors in Pittsburgh, Madison's Tweets exhibit characteristics of self-referential, operational closure (Luhmann 1995: 9) in that they were intended to be part of the communication that happens within the system of Twitter. Madison was communicating within a system using information that was intended to be received and understood from within that system. While Twitter as a system understood and accepted the information, once it was judged outside the boundary of Twitter and was regarded as communication within the system of mass media – from where the law judged the information – it was no longer deemed as acceptable.¹³

The Chambers case in England echoes the issues surrounding self-referential, operational closure that are apparent in the Madison case, but it also allows questions concerning the autopoiesis of Twitter to be addressed. Chambers' original Tweet was posted on his personal account, one that at the time had 690 followers (guardian.co.uk 2010),

which would appear to be rather a large number, marking Chambers as a very active user.¹⁴ Although it is no longer possible to assess the Tweets surrounding his original posting (due to the previously cited limitations on the number of publicly viewable Tweets per user), it would seem safe to assume that Chambers' intention was to make a joke.¹⁵

The trail of Chambers calls into question the meaning of the Tweet, where meaning is something that participants, in this case of Twitter, are able to construct in the knowledge that its literal interpretation is only one actuality of a 'horizon of possibilities' (Lee *et al.* 2010: 143). Chambers' Tweet merely demonstrates the autopoietic nature of Twitter as a system, in that it is referential towards the codes and functions of Twitter alone and once taken as information in another system produces irritation. Indeed using the contextual system of Chambers' Twitter followers and his followees, one might be able to use systemic analysis to place the Tweet within the system of his Twitter network, or virtual community, distinct from the environment of Twitter, although in this case Chambers' Twitter network would be more accurately described as a differentiated subsystem of Twitter. Conceptually this further demonstrates the autopoietic nature of the virtual community of individual users, although it would suffice to call such a community a differentiated sub-system of Twitter.¹⁶

The two cases outlined above provide compelling evidence that Twitter fulfils the conditions of systemic formation in that it is operationally closed and is autopoietic in nature. This evidence is based on the analysis of two cases of Twitter users and their Tweets, although the people and the Tweets themselves are not critical to claiming that Twitter can be viewed as a system, or as a subsystem.

What is important in these cases is the flow of information and the self-referential nature of it. If we can view Twitter as a system and further analyse it as a system, where does it sit within society? In other words where are the system boundaries and what is the environment that it is differentiating itself from?

TWITTER, SYSTEMIC DIFFERENTIATION AND BOUNDARIES

During the aftermath of the disputed Iranian elections of June 2009, American literary magazine *The Atlantic* published on their website a series of blog posts by Andrew Sullivan titled *The Revolution Will Be Twittered* (Sullivan 2009). Although hyperbolic in title, only one post on the 13th June included a hesitant question mark, Sullivan was largely acting as a filter representing information from Twitter and to a lesser extent video hosting service YouTube. Content aside, the titles of the blog posts present an interesting circularity, where new media (blogging), supported by old media (a print magazine) is presenting newer media (Twitter) in an aggregated form for consumption through a mixed-media format (a website of a print magazine).

In the days immediately after the results of the election were announced, Twitter postponed – allegedly at the urging of the US government (reuters.com 2009) – scheduled maintenance ‘because events in Iran were tied directly to the growing significance of Twitter as an important communication and information network’ (Twitter 2009). Despite the impetus behind the change in schedule being contested, delaying the upgrading was alleged to ensure that access in Iran was not blocked during daytime in the country (reuters.com 2009). But, analysis of tweets from June 11 to June 19 shows that the percentage of postings relating to ‘Iran Election’ originating from the country itself fell from 51.3% to 23.8% (sysmos.com 2009). Indeed Twitter was at times ‘rendered...almost useless as a source of information’ (economist.com 2009) due to the volume of supportive tweets from British and American users.

While it is not within the scope of this paper to discuss Twitter as a tool for galvanising political action and disseminating information in defiance of alleged state censorship (reuters.com 2009; Sullivan 2009), what is salient is the tension between Twitter and other established mass media in reporting the situation in Iran at the time. One could

indeed see the reporting in the West of the elections and the proceeding demonstrations as a period where Twitter profoundly irritates mass media systems, so much so that the most comprehensive coverage has been identified as a hybrid of old and new media (economist.com 2009).

The case of Twitter in the aftermath of the Iranian elections in 2009 provides a useful example of identifying a system through the differentiation between the system and its environment. At least one of the two conditions for systems formation is also contained in the example.

Despite Twitter being highlighted as becoming useless at times by a mass media conduit (economist.com 2009), such uselessness is a sign that self-referential, or autopoietic, behaviour is evident. Supportive Tweets, responding to the information contained within the system are nothing if not self-referential.

However, describing the system as disintegrating to uselessness, or displaying entropy, is not evidence of instability within a social system. It is not the general efficacy of Twitter that is being questioned by *The Economist*. What is being challenged is the system's usefulness as a source of information that *The Economist* has previously relied upon to report as information within the magazine's coding. With Luhmann identifying that systems possess 'dynamic stability' where they may not return to a previous equilibrium after a disturbance (1995: 10, 45), such a claim of uselessness can be considered a dynamic evolution of the systemic function of Twitter where information or communication is no longer able to be processed by the system of the mass media (or in this case, *The Economist*).

It is in the hybridity of the reporting of the situation in Iran that Twitter, providing the mass media with novel information, that allows us to ask questions regarding the environment in which Twitter may be exhibiting systemic properties. The first question, particularly in light of the re-publishing of Tweets by journalists and aggregators such as Sullivan, is whether in this instance Twitter is differentiating itself as

a sub-system of the environment of social network sites, the web, the environment of the mass media or whether it is differentiating itself from society as a whole.

If Twitter is to be positioned as a social networking site, as Ellison and Boyd imply (2007), it could be proposed that Twitter is a component, or sub-system of the system of web 2.0 in the same way that the social networking sites Facebook and Myspace are (Lee *et al.* 2010: 139-141).¹⁷ However, by following users and being a followee of other users within Twitter exhibits all three characteristics of a social network site as outlined by Ellison and Boyd (2007: 2).¹⁸ The case of Iran in 2009 displays Twitter interaction not so much between the internal networks of users, but between Twitter and the environment. This environment could be said to be either the web or the mass media. In both cases, individual Twitter users do not have to have a declared network connection, providing a boundary of differentiation.

Whether the boundary of differentiation could be seen between Twitter and the web, or between Twitter and the mass media, the tension or irritation between the system and environment is highlighted by the aggregation of the information that flows between the two. By filtering content to be re-published on the web, Sullivan fulfils the role of a 'gatekeeper', presenting, or 'exploiting' information contained in Tweets in an opaque, unaccountable manner (Kirby 2009: 101-105).¹⁹ This selective highlighting of information presents a tangible example of one of the founding principles of Luhmann's theory of the system of mass media, that of the 'doubling of reality'. A doubling of reality is key to differentiating the mass media system from other systems of communication, where 'first reality' is what happens and 'second reality' is the communicated observations of the mass media. Second, or the double of, reality is notable for its rather tenuous relationship with truth (Luhmann 2000b: 1-9).

By representing selected Tweets within an environment of a blog, Sullivan is presenting a trebling of reality, where Tweets relating to the

real events in Iran are the second reality, and through the process of aggregation, Sullivan presents a selected, self-referential third reality. This overt complexity implies that Twitter is a system that differentiates itself from its environment, where its environment can be either the mass media or the web, by successfully taking 'the media's chronic need for information into account' and providing 'new information for the necessary continuation' of its very existence (*ibid.*: 9).

CONCLUSION

This paper set out to assess the stability of Twitter as a communication-based social system, specifically by employing Luhmann's system-theoretical approach to sociological enquiry. By introducing the base concepts and conditions for system formation, then using focussed enquiry to test them in relation to Twitter, it is hoped that both systemic thinking and Twitter have been presented in novel ways.

The relative novelty of Twitter as a communication system and its rapid growth as a repository of information makes situating the service within a specific environment difficult. Although short-form messages have been part of the medium of personal communication for some time as part of SMS communication, Twitter builds on the familiarity of the private one-to-one or one-to-few technique, but places the ensuing messages in the publicly accessible forum of the web. The interaction between the service and more established communication media further blurs the position Twitter holds within both the web and other media systems.

Analysis of specific Tweets, and by extension of Twitter itself, provides evidence that the service fulfils the conditions of system formation through its display of autopoiesis and operative closure. With these conditions met, Twitter clearly exhibits systemic properties. If we are to assign systemic status to the service, new avenues for analysis concerning Twitter's functions and operations are opened using Luhmann's theoretical framework.

Utilising the basic systemic properties of differentiation between the system and its environment, the boundaries therein allow for positioning Twitter as a sub-system of a number of societal systems and sub-systems. This paper has been able to identify a number of possible systems within which Twitter could be said to exist, although its constant growth and development denies fixity, reflecting a core aspect of social systems, that of evolution.

What the above analysis contained shows is that as a system, Twitter has value for further analysis and investigation. Deeper systemic analysis, particularly employing concepts such as medium and form, coding, function and evolution would provide a more complete understanding of the role Twitter can, and speculatively will, play within society.

NOTES

1. The story of the beginnings of Twitter is told at <http://en.wikipedia.org/wiki/Twitter>, and replicated across the internet on many sites, with an engaging account by an employee involved in its development posted on <http://www.140characters.com/2009/01/30/how-twitter-was-born>.
2. The protocols for the Global System for Mobile Communication were standardised in 1985 with SMS length set at 160 characters
3. An ever-changing overview of a range of Twitter usage techniques is available at http://en.wikipedia.org/wiki/Twitter_usage.
4. Although it is not within the scope of this paper to provide a historical overview of systems theory *Sociology and Modern Systems Theory* by Walter Buckley (1967) provides an introduction to Parsonian systems theory as well as a comprehensive overview of other cybernetics-based theorists.
5. Twitter is included on the timeline of social networking sites proposed by Boyd and Ellison (2007) although at the time their influential article on social networking was written Twitter was very much in its embryonic stage and is not referred to or analysed otherwise.
6. Limits for data access and account activity are regularly reviewed, with the limits often set at round numbers such as 1000 messages per day.

7. Lee and Brosziewski have explored systems theory and empirical research in chapter 8 of *Observing Society* (2009: 205-217).
8. The motion and supporting lawyer's declaration are available through the Electronic Frontier Foundation at <http://www.eff.org/deeplinks/2009/10/man-arrested-twittering-goes-court-eff-has-documen>. These offer the most non-partisan account of the charges brought against Elliot Madison.
9. Further, deeper discussion of state sanctioned censorship and surveillance on the internet can be found in Rønning's (2010) *Tools for Democracy or for Surveillance?*.
10. Media reporting of both cases appears to be generally supportive of the defendants, although in the case of Elliot Madison reporting of the case post-arrest is difficult to find. The Chambers case has been extensively reported by the *Guardian* newspaper, if in a somewhat partisan manner.
11. As no conclusions have been reached within this article concerning the environment in which Twitter differentiates itself it is appropriate to acknowledge that it may be a subsystem of another societal system (or indeed sub-system) rather than a system that differentiates itself from society.
12. Manuel Castells provides a comprehensive overview of the role of the internet in accelerating social change and the potential for tension with the state in chapter 5 of *The Internet Galaxy* (2001: 137-168).
13. A more conceptual discussion of dissent in the mass media system occurs in chapter 13 of *The Reality of the Mass Media* (Luhmann 2000b).
14. Indeed Chambers was a very active user and an early adopter of the service. The destination of his flight was to see his girlfriend who he met through Twitter.
15. Across the media the case is referred to as the Twitter Joke Trial.
16. Virtual/imagined communities in cyberspace are elegantly addressed by Leila Green in *Communication, Technology and Society* (2001: 116-133).
17. An overview of web 2.0 by Leadbeater, including social networking sites, place within O'Reilly's web 2.0 hierarchy. Available at www.charlesleadbeater.net/cms/xstandard/Web2.0_OVERview.pdf.
18. The characteristics of social networking sites are: web-based services that allow individuals to (1) construct a public or semi-public

profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system.

19. Alan Kirby (2009) outlines a skeptical view toward web 2.0's democratic capabilities. See Kidd (this volume).

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