Cross-Level Analysis of Social Media: Toward the Construction of an Ecological Framework

Joo-Young Jung *
Munehito Moro **

Social media are currently the fastest growing activities on the Internet. The most popular social networking site (SNS), Facebook, ranks second worldwide in global web traffic according to Alexa Internet Inc. (http://www.alexa.com/). Other social media such as Youtube and Twitter are also rapidly growing around the world. Domestically oriented SNSs are also proliferating in major markets; Korea has developed a service called Cyworld, Japan has mixi, and China has QQ, to name a few. Although most social media started with the aim of providing information sharing and interpersonal connections, their ramifications have gone far beyond individual-based social networking. All sectors of society are paying attention to social media for their operations, including marketers, advertisers, politicians, non-profit organizations, universities and other media.

The diffusion of social media urges researchers to re-examine the newly emerging relationships among new and old media. This paper conceptualizes social media as cross-level media that cover micro-, meso- and macro-level of story flows. How social media function in the broader communication ecology is explicated by proposing a conceptual model. Finally, an analytical framework is proposed to examine the flow of stories running within social media and across different types of media within the broader communication ecology.

I. Defining Social Media

Since the wide diffusion of Web 2.0 technology, users have been able to

* Associate Professor, Department of Media, Communication and Culture, International Christian University. Email: jungjy@icu.ac.jp
** Senior student, International Christian University. Email: c121319i@yamata.icu.ac.jp

engage in interactive activities, content creation, and exchanges between users with greater ease (Kaplan & Haenlein, 2010). It would not be an overstatement to say that social media represent the Web 2.0 era, considering that they allow users to interact with others, to retrieve information easily, and to create and exchange user-generated content (UGC). In the last few years, social media have proven diverse in their types and social functions. A comprehensive list of social media's categories has recently been provided by Kaplan and Haenlein (2009): collaborative projects (e.g., Wikipedia), blogs, content communities (e.g., Flicker, YouTube), virtual game worlds (e.g., World of Warcraft), virtual social worlds (e.g., Second Life) and social networking sites (e.g., Facebook, MySpace) (examples added by the authors).

Social network sites (SNSs), represented by Facebook or MySpace, have received the greatest attention recently. SNSs allow users to share and exchange personal information, simultaneously helping them accumulate social capital (Ellison, Lanpe & Steinfield, 2009). Inter-user connections on SNSs can be homogenous or diverse, sometimes going beyond national or cultural boundaries. In a similar terrain, Twitter, a micro-blogging service, has enjoyed growing popularity in the last few years. Users, either anonymously or on a real-name basis, can upload stories ("tweets") up to 140 letters on the site. Uploaded stories can be organized thematically under a "hashtag (#)." When a user is looking for information related to a specific topic, the hashtag allows easier access to relevant stories. By combining the function of blogging with that of SNSs, Twitter's users are allowed to form networks with greater cross-level flexibility. Users are bridged not only by real-life networks of friends, but also by the topics and shared interests that tie them together loosely. Therefore, the context of communication in which a user has been placed can easily be transcended on the site, a phenomenon called "context collapse" (Marwick and Boyd, 2010). A tweet by an ordinary, non-famous user can sometimes attract millions of other users, which confirms the cross-level dynamism that social media have facilitated in the recent communication ecology.

Social media do not only enable users to form networks, but also serve as

sources of information that are often consulted by mass media. Wikipedia, an online encyclopedia sustained by collaborative efforts of users, offers a good example here. The site invites as many participants as possible to its project, allowing every one of them to become editors. Similarly, users of Youtube are encouraged to add videos to enrich the site. By enabling individuals to actively disseminate stories, those sites challenge the conventional conception of the communication ecology where mass media are portrayed as the only information provider on the one hand, and individuals as passive audiences on the other.

In sum, social media offer a new platform that challenges the old-fashioned patterns of information production and consumption. The asymmetric relationship between the media system and individual in the production process is being re-shaped with the advent of social media (Shirky, 2008). Considering their implication for the entire media system, research into social media should not only focus on how people use social media, but should also examine aspects of production and consumption of information that take place on different levels of the communication ecology, including micro (individual), meso (group) and macro (mass communication) levels. Hence, closer attention should be paid to social media's ascribed functionalities to go across the three levels of communication. In addition, a review of social media should note that social media connect different kinds of media that exist on different levels. By exploring the relationship between social media and other types of media in the communication ecology, we aim to picture the dynamism of the communication ecology.

II. Ecological Framework for Studying Social Media
1. New and Old Media Symbiosis

The phenomenon that Nicholas Negroponte called "Being Digital" (Negroponte, 1995) has rapidly gained momentum in the last two decades, especially following the incessant introductions of new media devices into everyday communications. His prediction, proposed two decades ago, has more or less been proven true; the amount of content delivered through digital

platforms is rapidly increasing. However, digital technologies have not taken over the communication environment completely. Many digital new media come into people's everyday lives but at the same time older media still occupy important positions. Rather than becoming uniformly digitalized, diversity within the communication ecology will remain as long as individual, social, economic, and other complexities continue to exist. Each medium evolves to find its social niche, sometimes in a way unforeseen in a previous era.

In our everyday life, we engage in different communication interactions including face-to-face or phone conversations, text-based communications on the Internet and mobile phones and access to television, radio or newspapers. We tend to connect to a larger number of communication media to fulfill our daily goals. At the same time, content is increasingly detached from any single medium and is easily transferred to another medium (Jenkins, 2006). In the current communication ecology, the interconnectedness of different media should be considered when analyzing use of each medium. The term "communication ecology" signals the formation of mutual reliance and coexistence of various media: inter-medium connectedness being formed among such media as newspaper, TV, and online websites. The relationship between media and individuals does not exist in isolation. Rather, dynamic interactions between individuals and media can be grasped when communication ecology is considered as an organic system.

Social media belong to the new group of mediation that has emerged after the advent of Web 2.0. Social media do not necessarily follow macro-level patterns of story flows by mass media, or the patterns occurring on the micro level (interpersonal communication). Instead, they forge new paths of communication in which information runs through all three levels: macro, meso and micro. Micro-level activities take place within familiar interpersonal relationships (face-to-face and mediated), whereas macro-level activities assume greater degrees of anonymity (such as television broadcasting, by which information is disseminated over anonymous audiences). Meso-level media, such as local or ethnic media, organizational communication or online group

communications, might have audiences that are either relatively familiar or anonymous.

Where are the social media positioned in a multi-level communication ecology? We propose that the social media are positioned across micro-, meso- and macro-levels (Figure 1). First, a social medium can function as a platform for interpersonal communication. Second, social media are widely used for organizing group activities or for exchanging information at the group or organizational level. And finally, they are increasingly providing an important platform for disseminating stories to anonymous users in a way similar to mass media. The prevalence of social media is important not only as an introduction of a new delivery technology to the media system. Rather, social media should be recognized as having formed an ecological field in which sources and flows of information become structurally rearranged through the growing interdependency of "mainstream media, corporately owned new media, and autonomous Internet sites" (Castells, 2007, p. 253). Social media create cross-level informational paths through which old and new media become entangled, the three levels of communication bridged, and finally, mass- and self-communication become unified through the rise of the "creative audience" (Castells, 2009, p.132). By focusing on the cross-level functionalities that social media demonstrate, we can grasp the newly emerging ecological symbiosis.

Figure 1. Cross-Level Functionality of Social Media
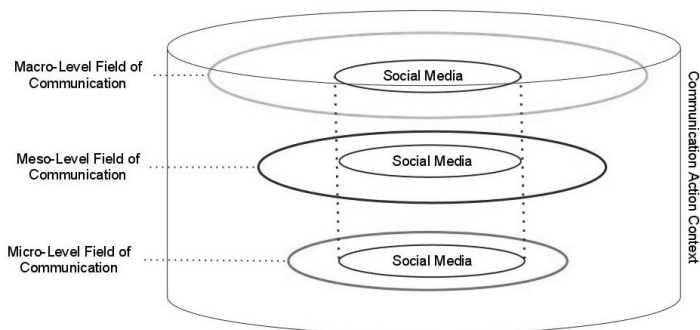
2. Theoretical Basis

Our approach is based on media system dependency theory (Ball-Rokeach, 1985, 1998; DeFleur & Ball-Rokeach, 1976) and its recent development, communication infrastructure theory (Ball-Rokeach, Kim & Matei, 2001). Media system dependency (MSD) theory was first proposed in 1976 to provide a framework that goes beyond micro-level individual or psychological factors to explain how individuals, the media system and social systems interact. Rather than resorting to one of the dichotomies of powerful media effects/passive individuals or powerful individuals/weak media effects, MSD questions when and under which conditions media increase or decrease power. The relationship between media and individual is not determined exclusively by individual agencies or the media's power, but by the dynamic relationship of individual and media in the social context. Hence, "media system" is defined not as a persuasion but as an information system which individuals access in order to get information that is necessary to achieve their goals. MSD theory provides an ecological framework because first, it characterizes the interdependencies between individuals, media and other social systems as essential in a society, and second, it characterizes the relationship between individuals and media from multiple levels of analysis. Interdependency and multiple-levels are taken as the essential characteristics of the media system.

Despite its ecological approach, MSD theory contains inevitable limitations (Ball-Rokeach & Jung, 2009). One of the limitations is the mass media centered framework. Because MSD theory was proposed in 1970s when there were only three television networks and a few national-level newspapers in the United States, the mass media system occupies the central position in the theoretical framework. However, the communication environment has changed, and people have many more choices in terms of achieving their goals of understanding, orientation and play (Ball-Rokeach, 1985). The second limitation is its theoretical assumption of asymmetry between mass media and individuals. Even in the current media environment, the mass media take superior position to individuals as an information system. However, the dynamics of the relationship

is undergoing rapid change. Individuals in the current communication environment can not only choose information from hundreds of satellite and cable channels, but can also go online and actively select information from a website or from sources generated by other people.

In order to overcome the limitations and to broaden the scope of examination beyond media effects, communication infrastructure theory (CIT) was proposed by Ball-Rokeach and her colleagues (Ball-Rokeach et al., 2001; Kim & Ball-Rokeach, 2006). CIT defines the media in a much broader term than MSD theory. The media not only includes mainstream television and newspapers at the macro-level, but also include meso-level local or ethnic media and new communication technologies. The communication infrastructure is defined as a storytelling system set in a communication action context (Ball-Rokeach et al., 2001). The storytelling system covers multiple levels, including macro-, meso- and micro-level actors. Each level is not defined by technological features but by the stories that are told by each actor. If a television station broadcasts stories that cover a nation, it is considered a macro-level media. On the other hand, if another television station mostly tells stories about a local area, it is considered a meso-level one. The communication action context is an extension of the social environment concept in MSD theory, but it is more firmly grounded in its conceptualization. It not only includes macro factors, but also local conditions such as the existence of public facilities, schools and technological infrastructures that influence individuals and meso-level communications. Communication infrastructure theory brings MSD theory to a more integrated ecological framework by actively incorporating meso-level aspects of communication.

Media system dependency theory and communication infrastructure theory provides the groundwork for conceptualizing the position of social media in the larger communication ecology. As proposed in figure 1, we argue that the uniqueness of the social media lies in their cross-level functionality. Rather than functioning within one level of analysis, social media span different levels.

3. Ascribed Functionalities of Media

We define the levels of communication not in terms of technical capabilities, but according to the levels of functionality socially ascribed to a specific medium. In agreement with scholars who advocate the social shaping of technologies (Williams & Edge, 1996; Dutton, 1996) and heuristic interaction between the technology and society (Fisher, 1992), we believe that the functionality and usage of specific technologies are shaped through various non-technological factors. Based on media system dependency theory, we propose a conceptual model that describes the ascribed functionalities of a medium and the factors that shape the process (Figure 2). Three factors that shape the functionality of social media are derived from Ball-Rokeach's media system dependency model (1985). The three factors – individual characteristics, social environment, and media system activity – define which functionality is to be ascribed to a particular medium. "Individual characteristics" indicate socioeconomic and demographic factors and variations in personal interests and goals of individuals. "Social Environment" signifies the social context where different levels of ambiguity and unpredictability exist (incidents, natural disasters, etc). "Media system activity" refers to the functioning of the media system as an information system in a society. When the information that the media provide is exclusive, the media are likely to have stronger effects on the audience. The three factors, derived from both micro (individual characteristics) and macro (social environment and media system activity) levels in a society, form structurally dependent relations out of which specific functionality of a medium is shaped and ascribed.

Figure 2. Ascription of Functionalities in a Communication Ecology

[Derived from Ball-Rokeach, 1985, p. 499]
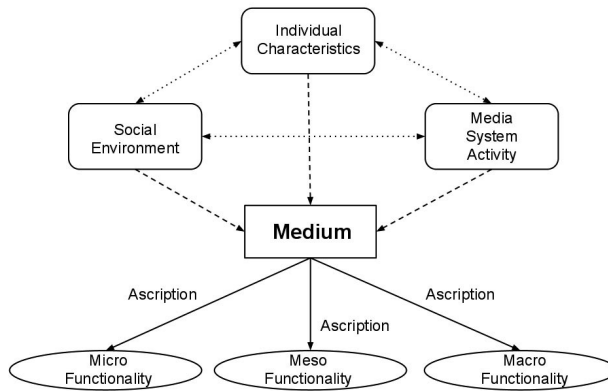
Before the emergence of social media, media in general remained on a single level. Television and newspapers, for example, were mostly consumed as mass media, existing on the macro-level. Telephone, on the other hand, was mostly used within the micro-level. In addition, the majority of studies either focused on micro, individual-level analysis of human interaction and media use, or on macro, societal-level functioning of media. Our proposed conceptualization of social media (Figure 1) suggests that the functionality of social media leads to the cross-level analysis of media phenomena. The cross-level analysis has faced conceptual difficulties in explaining multi-level linkages in media system. Specifically, there have been controversies as to whether levels in the media system are ontological or epistemological. Pan and McLeod (1991) argued that the epistemological view of defining the levels is more suitable for the current communication environment than the ontological view. The epistemological view theorizes levels in a continuum rather than as discreet dimensions (Pan & McLeod, 1991). If levels exist in a continuum, researchers can more easily explain the flows of stories taking place across levels. Our conceptualization of the ascribed functionality of social media that crosses different levels aligns with Pan and McLeod's epistemological view.

In order to clarify what the functionality ascription in Figure 2 means, we hypothetically observe how a macro-level functionality is ascribed to a particular social medium (in this case, Twitter) that is placed in a specific social context (in this case, a natural disaster) by an act of an ordinary user (the uploading of a "tweet" on the disaster). First, the term "individual characteristics" demands that the user has to be urged to release the information related to the disaster; it is the individual user's characteristics and intentions that create the story first on the micro level. The story can be either intentionally aimed at the macro-level audience or not; the user's intention alone does not suffice for bringing the story to the macro level. Second, "social environment" must be the one that allows the "tweet" to become a macro-level story. A natural disaster, in this hypothetical case, creates the social need for information potentially useful for others whose goal is to dissolve ambiguity ("when will the public transportation return to normal?", etc.). And third, "media system activity" has to remain favorable for the story to go beyond levels, that is, for the occurrence of the "context collapse." When mass media cannot fully cover latest development relating to a disaster, the individual user's story is more likely to go onto the macro level. When the above three terms are met, the social medium begins to function as a mass medium, with its story consumed on the macro level. This hypothetical observation claims that there are times when social situations ascribe macro-level functionality to social media. When that happens, micro-or meso-level stories will move to the macro level with greater ease and frequency.

III. Micro-, Meso- and Macro-Level Production and Consumption Processes

As social media gain the ability to move across levels and empower individual users to create and spread their content, cross-level connectedness is strengthened. This newly emerging pattern of information circulation shows a vast difference from the pattern that existed prior to the rise of social media. In order to examine how stories circulate within social media as well as to other media, we propose an analytical model (Figure 3). The model illustrates a cross-

level flow of stories in communication ecology where stories flow from one level to another. Production and consumption activities are identified for each level for analytic clarity. In reality, one activity can belong to more than one category.

Figure 3. Cross-Level Flows of Stories within Social Media
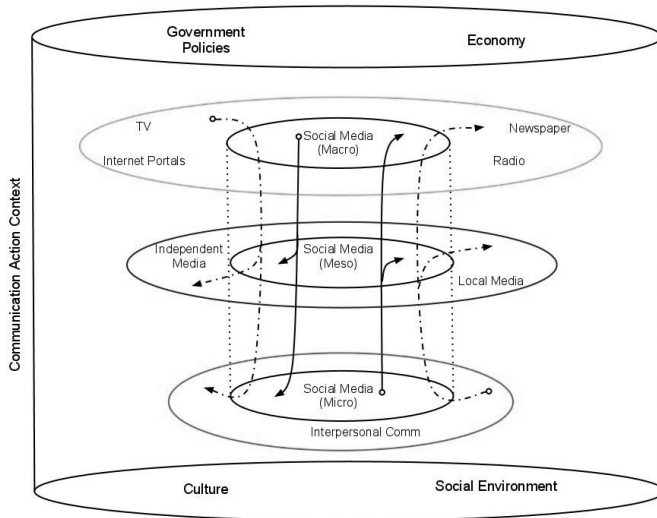
Micro-level production. Micro-level production consists of producing stories aimed at friends, colleagues, and family members. Activities such as sending or uploading messages, photos, and statements on social media are examples in this category. Users who have access to those stories tend to be the least anonymous. Producers of stories on this level know in general by whom their stories are to be consumed. Examples of micro-level production include uploading a video from a family's gathering on Youtube or leaving a message on a friend's Wall on Facebook.

Meso-level production. Meso-level production is done by agents belonging to communities or organizations, such as schools, cities, companies, and other

meso-level institutions. The content of this category is mainly about topics in which members of those communities or organizations are interested. Residents' participation in local issues via a social medium offers an appropriate example of the meso-level production of stories. Another example is a user uploading a video on Youtube that is aimed at audiences that are more anonymous than those at the micro level, but less so compared to the macro level. Similarly, maintaining fan communities on Facebook also shows an example that has been widely practiced on the SNS.

Macro-level production. Situations in which social media are used for macro-level production are limited but easily conceivable. In general, producers on this level are aware that their information will be consumed mostly by an anonymous audience. As social media have been recognized as powerful tools for disseminating information, they have been used as online PR devices. An example includes a well-known celebrity uploading his or her videos on Youtube or uploading a message on Twitter. The celebrity intends the message to be watched or read by a broad anonymous audience, as if the person were making a statement on television programs or sending out press release to media outlets (Marwick & Boyd, 2011). The magnitude of readership of those messages would be incomparable to ones made by a non-celebrity ordinary user. While many of the content producers on this level are likely to be influential celebrities, ordinary users can also play the role of macro-level producers. An example of ordinary users functioning as macro producers is the participation in editing Wikipedia articles. Although an editor might remain unknown, the content is exposed to macro-level consumption. In addition, most major newspapers or television channels created accounts on social media and have used the platform to connect to their audience. The mass media outlets have recently expanded their production and dissemination functions on social media.

Corresponding to the three levels of production, consumption activities take place on each level.

Micro-level consumption. Consuming information on a micro-level consists of activities such as reading messages from friends or looking at uploaded photos. The distinction between micro-level production and consumption often becomes unclear, because in many cases production and consumption take place simultaneously. Information-providing agents and consuming agents are in a symmetrical relationship in most cases, and constantly change their roles. Contrary to the asymmetry that individuals usually have when they consume mass media, micro-level consumers are able to function symmetrically to producers on the same level. Online chatting offers a clear example of the production-consumption symmetry. When two people are involved in an online conversation, the two of them simultaneously produce and consume shared stories. In other words, producers and consumers of stories tend to converge; both production and consumption constitute the common ground for communications.

Meso-level consumption. Consuming stories on a meso-level often takes place in an organizational or communal context. Anonymity among audiences consuming the information is relatively high, but the members of the audience are still related. Relations that form the meso-level communication field include shared interests, a shared geographical place, or a shared organization (Ball-Rokeach et al., 2001). One example would be a posting of a university spirit cheering video on YouTube, which would mostly be viewed by students and alumni of the university. Meso-level consumption assumes an organizational context that binds consumers into a certain social category. Anonymity among consumers is higher than the micro-level, but lower compared to the macro-level.

Macro-level consumption. Macro-level consumption is first and foremost characterized by the highest level of anonymity among consumers. The same information can be consumed at a national, or possibly, at a global scale. There exists no logical necessity that those consumers share social contexts. Their

consumption behaviors derive mainly from individual goals (Ball-Rokeach, 1985), not from interpersonal or organizational connections. Examples of macro-level consumption can include, watching music videos of a popular singer or fragments of movies on Youtube uploaded by anonymous users, reading news feed from news agencies, reading a "tweet" written by a celebrity on Twitter, and finding information on Wikipedia. In most cases, macro-level consumption of social media is similar to the mass media in terms of behavioral or intentional basis.

IV. Cross-Level and Cross-Medium Story Flow: Applications of the Model

In pre-social media communication, a story produced on one level was occasionally brought to another level. For example, a news story on television may be retold by individuals to their interpersonal contacts, the story moving from the macro to micro level. On social media, due to the digitalization of content and the multi-level nature of social media as discussed in the earlier section of this paper, cross-level story flows are much more common and feasible compared to pre-social media communication. Whether it be reposting a news article to one's Facebook page (macro to micro) or uploading a self-produced short film to Youtube thereby reaching a larger audience (micro to meso or macro), social media create a communication environment where stories are less likely to be bound by micro, meso and macro levels. In order to clarify the process of cross-level and cross-media story flows, we demonstrate below different routes of story flows within and across social media. There can be many different paths as suggested by Figure 3, but we demonstrate the three most common paths of story flow across different levels.

From micro-to meso-or macro-level. Before the wide diffusion of the internet and social media, production and distribution of information was mostly conducted by the mass media (Ball-Rokeach, 1985). Individuals' stories were selected and edited before they were put into mass circulation. With the

prevalence of social media, the process of producing and distributing stories has become diversified. Particularly, individuals are now able to create and distribute their stories on social media, and the stories can flow not only to meso and macro levels but also to another form of media. The cross-level story flow from micro to meso or macro can be intentional or unintentional. In case of the intentional cross-level and cross-media story flow, the producer acknowledges the possibility of his or her story flowing to meso- or macro-level and uploads a text or video that is intended for a larger audience. For example, a protester in a social movement may upload a message on social media, hoping that the story will be viewed by a large group of people and eventually reported by the mass media. In this case, the cross-level story flow is intentionally caused. Many celebrities use Twitter or Facebook to make their views public, knowing that their stories will be picked up by the mass media and brought to the wider audience. For example, when a negative incident takes place, a celebrity may upload his or her own opinion about the situation first on social media in order to influence public opinion. The opinion is often picked up by the mass media, but the nature of the story is considered more private and genuine than the ones told by reporters because the stories supposedly come directly from the celebrity (micro to macro).

On the other hand, a story initially targeted to micro-level ties may end up in mass media. A Youtube video of a child initially intended for family members, for example, sometimes are viewed by thousands of people. In a recent case in Japan (IT Media News, 2010), a sophomore college student had cheated on a school exam and wrote about it afterward on Twitter. His professor accidentally discovered the student's tweet. Obviously upset, he "retweeted" the student's message, writing: "This is obviously an act of cheating, isn't it? What on earth were you thinking when you tweeted about your act?" The well-known professor had more than 50,000 followers on Twitter, and the story was distributed to a large number of people. Learning the professor's discovery, the student subsequently deleted his Twitter account. However, the story had already gone to the meso-level by being retweeted by many users. The story

was eventually reported on several news sites (IT Media News, 2010). In this example, the student initially thought that his story would only be read by his friends on a micro-level, but it eventually ended up on the macro-level.

From meso- to macro- or micro-level. On social media sites, the basic unit of users is not only individuals but also groups and organizations. There are two types of organizations on social media – there are groups organized within social media, and there are groups that already existed outside of social media. The former includes online groups or forums that are initially formed on social media without having offline organizations. The latter case includes existing organizations such as NGOs, NPOs, associations of activists or political parties. These groups and organizations often use social media to advocate their opinions and arguments.

In *The Facebook Effect* (2010) David Kirkpatrick tells an example of a meso-level story on social media being picked up by macro-level media, resulting in a large-scale collective action. A Facebook group called One Million Voices Against FARC (the Spanish acronym for the Revolutionary Armed Force of Columbia, a guerrilla organization that kidnapped seven hundred hostages in Columbia) was formed among people who shared a common opposition to FARC. About one month after the Facebook group was formed, a National March against FACR was planned and 10 million people in Columbia participated and an additional 2 million people abroad. As the group was planning the march, all major television, newspapers and radio in the country came to cover the agenda.

Non-profit organizations are in many cases not given wide coverage by the mass media, but they can use social media to attain visibility. Not only are they visible, but many of them are also able to actively promote their cause and draw attention and participation. Stories of certain organization raising funds on social media can be picked up by the mass media to further promote the activity. At the same time, the fund raising stories can be disseminated by individuals through their interpersonal network on the social media, bringing the meso-level story to

the micro-level. For example, *Democracy Now!*, an independent news program, circulated a video on Youtube about the arrest of the program host, Amy Goodman. She had been arrested while reporting on the anti-war protest at the 2008 Republican Convention. Not only was the video widely circulated among Youtube users, but it was also disseminated to the wider public by blogs, portal sites and the mass media (Kilkenny, 2008). When Goodman was released she credited the decentralized power of her supporters in the social media (Goodman, 2009). In this example, the meso-level story of an independent news agency was successfully disseminated to both macro and micro levels via social media.

From macro-to micro-levels: social media as a channel for mass distribution of stories by other media. Social media have become important channels for mass media to disseminate their stories and also draw audiences to their media. Most major television networks and newspaper companies send out news feeds or advertising for their programs on social network sites and video-sharing sites. For instance, NBC launched its channel on Youtube in 2006, and Youtube users are free to watch the stories trickling down from their TV programs. Major newspaper companies, such as The New York Times, The Washington Post and others, have created accounts on Facebook and Twitter and send out several message feeds a day to widen their readership. Also on most news websites, each article has a link to major social media so that people can recommend the article to their networks of people. The links allow easy flow of stories from macro-level to micro- and meso-levels. A popular or controversial news story or television program is likely to have "long tail" (Anderson, 2004) surviving on social media and flowing from one level to another and from one medium to another (Wu, Hofman, Mason & Watts, 2011).

Conclusion

In January 2011, the world witnessed the sudden surge of political protests by citizens against the dictatorial regimes in the Arab world. Many journalists wrote about the pivotal role of social media in the uprising, often framing the

story as the political triumph of Facebook or Twitter. In that context, social media were claimed to be "responsible for the uprisings" (Smith, 2011). An article in Time magazine, for example, coined the term "Facebook revolution" (Houslohner, 2011). A *Newsweek* article titled "The Facebook Freedom Fighter" characterized Facebook as an "ideal revolutionary tool" (Gilglio, 2011).

All of the above-referred claims imply that social media serve as a powerful lubricant for changing oppressive regimes. However, those claims are biased in terms of two aspects. First, social media are seen as essentially revolutionary devices. This argument tacitly assumes that society's growing connectedness to social media will automatically trigger revolutionary movements, leading to the collapses of any non-democratic institutions. Second, this line of thinking focuses exclusively on social media, isolating people's use of the social media from their social and communication contexts. The use of social media takes place in the context of other media activities, and the goals that they have for using social media are likely to stem from various social factors. Therefore, social media's political impact should be assessed in relation to other factors.

The ecological perspective proposed in this paper serves as a framework that avoids these two biases. The ecological view assumes that a medium's function is dependent upon variables (individual characteristics, social environment, and media system activity), not upon its inherent or intrinsic traits. The ecological perspective does not accept the idea that social media can inherently be democratic or revolutionary due to their technological features. Rather than being mesmerized by the power of new online platforms, researchers should investigate the process in which social media served important functions in such a specific context as the 2011 protests in the Arab world.

This paper proposed heuristic models to define social media's position and functions in the larger context of communication ecology. Today's media environments increasingly assume ecological qualities, questioning such long-established demarcations as "mass," "meso," or "micro" media. However, as articulated in the section on media symbiosis, those demarcations are not simply vanishing. Contrary to many predictions, digital media have not

eradicated traditional delivery technologies. Instead, the formation of cross-level storytelling systems is taking place across both old and new media. Stories provided by one medium are recounted by other medium. It is this repeatability of stories that characterizes the communication ecology of today (Jenkins, 2006).

Our models can be applied to compare different roles of social media in different contexts. Each communication ecology consists of different relationships between various media. The communication ecology is also shaped by social, cultural and economic factors. The framework of the current study can be applied to analyze the functionality of social media in a specific communication ecology. In addition, the framework can be applied to a specific event, such as large political event or natural disaster. The ways in which stories flow across different levels in social media and across different media can be manifested.

References

Anderson, C. (October 2004). 'The Long Tail'. *Wired, 12*(10). Retrieved from http://www.wired.com/

Ball-Rokeach, S. J. (1985). The Origins of Individual Media-system Dependency: A Sociological Framework. *Communication Research, 12,* 485-510. doi: 10.1177/009365085012004003

Ball-Rokeach, S. J. (1998). A Theory of Media Power and a Theory of Media Use: Different Stories, Questions, and Ways of Thinking. *Mass Communication and Society, 1*(1/2), 5-40. doi: 10.1207 /s15327825mcs0101&2_2

Ball-Rokeach, S. J., & DeFleur, M. L. (1976). A Dependency Model of Mass Media Effects. *Communication Research, 3*(1), 3-21. doi: 10.1177/009365027600300101

Ball-Rokeach, S. J., & Jung, J. Y. (2009). The Evolution of Media System Dependency Theory. In Nabi, R. L., & Oliver, M. B. (Eds). *The Sage Handbook of media processes and effects* (pp.531-544). Thousand Oaks, CA: Sage.

Ball-Rokeach, S. J., Kim, Y. C., & Matei, S. (2001) Storytelling Neighborhood: Paths to Belonging in Diverse Urban Environments. *Communication Research, 28,* 392-428. doi: 10.1177/0093650 01028004003

Castells, M. (2007). Communication, Power and Counter-power in the Network Society. *International Journal of Communication, 1,* 237-266. Retrieved from http://ijoc.org/ojs/index.php/ijoc

Castells, M. (2009). *Communication Power.* Oxford: Oxford University Press.

Ellison, N., Lampe, C., & Steinfield, C. (2009). Social Network Sites and Society: Current Trends and Future Possibilities. *Interactions Magazine*, *16*, 1. doi:10.1145/1456202.1456204

Fischer, C. (1992). *America Calling: A Social History of the Telephone to 1940.* Berkeley, CA: University of California Press.

Gilglio, M. (2011, February 21). The Facebook Freedom Fighter. *Newsweek.* Retrieved from http://www.newsweek.com/

Goodman, A. (2009, December 1). Social Media Frees 'Democracy Now!' from Arrest-Amy Goodman [Video file]. Retrieved from http://www.youtube.com/watch?v=RLgetO_BL70

Hauslohner, A. (2011, January 24). Is Egypt About to Have a Facebook Revolution? *Time.* Retrieved from http://www.time.com/time/

Hardt, M., & Negri, A. (2009). *Commonwealth.* Cambridge, MA: The Belknap Press of Harvard University Press.

Jenkins, H. (2006). *Convergence Culture: Where Old and New Media Collide.* New York: New York University Press.

Kaplan, Andreas M., & Haenlein, M. (2010). Users of the World, Unite! The Challenges and Opportunities of Social Media. *Business Horizons, 53*(1), 59-68. doi:10.1016/j.bushor.2009.09.003

Kilkenny, A. (2008, September 1). Amy Goodman Arrested at RNC: Reports of Tear-gassing. *Huffington Post.* Retrieved from http://www.huffingtonpost.com

Kim, Y. C., & Ball-Rokeach, S. J. (2006). Civic Engagement from a Communication Infrastructure

Perspective. *Communication Theory, 16,* 173-197. doi:10.1111/j.1468-2885.2006.00267.x

Marwick, A. E. & Boyd, D. (2011). I Tweet Honestly, I Tweet Passionately: Twitter Users, Context Collapse, and the Imagined Audience. *New Media & Society, 13*, 114-133. doi:10.1177/1461444810365313

McLeod, J. M., & Pan, Z. (1991). Multilevel Analysis in Mass Communication Research. *Communication Research, 18,* 140-173. doi:10.1177/009365091018002002

Negroponte, N. (1995). *Being Digital.* New York: Vintage Books.

Putnum, R. (2000). *Bowling Alone: The Collapse and Revival of American Community.* New York: Simon & Schuster.

Searle, J. R. (1995). *The Construction of Social Reality.* New York: Free Press.

Shirkey, C. (2009). *Here Comes Everybody: The Power of Organizing without Organizations.* New York: Penguin Books.

Smith, C. (2011, February 11). Egypt's Facebook Revolution: Wael Ghonim Thanks the Social Network. *Huffington Post.* Retrieved from http://www.huffingtonpost.com

Sohdai-sei? Twitter De Kan'ningu Kokuhaku, Kyouju no Azuma Hiroki Shi Ga Hakken. (2010, September 3). *IT Media News.* Retrieved from http://www.itmedia.co.jp/

Williams, R. & Edge, D. (1996). The Social Shaping of Technology. In W. H. Dutton (Ed.), *Information and Communication Technologies: Visions and Realities* (pp.53-68). Oxford and New York: Oxford University Press.

Wu, S., Hofman, J. M., Mason, W. A. & Watts, D. J. (2011). *Who Says What to Whom on Twitter.* A paper presented at International World Wide Web Conference Committee, March 28-April 1, Hyderabad, India.

Zittrain, J. (2008). *The Future of the Internet and How to Stop It.* New Haven & London: Yale University Press.

Cross-Level Analysis of Social Media:
Toward the Construction of an Ecological Framework

<Summary>

Joo-Young Jung
Munehito Moro

The media environment has undergone significant changes with the advent of the Internet. In the recent years, the prevalence and popularity of "social media" is re-shaping the ways in which people communicate and obtain information. This paper proposes a framework that conceptualizes a cross-level functionality of social media. We conceptualize social media as an information system functioning at micro-(interpersonal), meso-(group or organizational), and macro-(mass media) levels. Based on media system dependency theory, we present a cross-level functionality of social media ascribed by individual user characteristics, social environment and media system activities. We apply the cross-level framework to investigate how stories in social media are produced and consumed, and how the information paths are formed within social media as well as across different types of media.

Keywords: social media, media system dependency theory, communication infrastructure theory, communication ecology, cross-level analysis, social network services