INVESTIGATING THE USE OF AFFORDANCES AND FRAMING TECHNIQUES BY SCHOLARS TO MANAGE PERSONAL AND PROFESSIONAL IMPRESSIONS ON TWITTER.

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To my wife Sarah, my father David, my late mother, Marla, Mary, Bill and Andrew, with love and gratitude

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Timothy D. Bowman

INVESTIGATING THE USE OF AFFORDANCES AND FRAMING TECHNIQUES BY SCHOLARS TO MANAGE PERSONAL AND PROFESSIONAL IMPRESSIONS ON TWITTER.

This dissertation explored the ways in which professors utilize affordances to frame interactions in order to manage their personal and professional impressions as they communicate on Twitter. The goal of this work was to use a socio-technical framework to investigate and interpret affordances used in Twitter, patterns of affordances used across personal and professional tweets, and to identify framing behaviours that might allow scholars to manage their impression on Twitter. It was found that prior research had not adequately addressed the question of whether, and how, framing techniques and affordance use affected impression management within this online context. This dissertation employed a socio-technical framework to investigate impression management in computer-mediated environments that combined frame analysis, impression management, and the concept of affordance to explore how scholars used affordances on Twitter, the differences in affordances used between personal and professional tweets, and the differences in framing strategies to manage personal and professional impressions on Twitter. This work was carried out across three phases using a triangulated, mixed-methods approach that included a cross-sectional descriptive survey sent to 16,862 faculty members in eight disciplines at Association of American Universities (AAU) member schools, the categorization of 75,000 of participants' tweets in Amazon's Mechanical Turk (AMT)

as personal or professional, and finally a follow-up survey, which included the categorization of five of their own tweets as personal or professional, of the 95 the most active Twitter users. Results found that when composing tweets, affordances were used to frame tweets as personal or professional suggesting that framing behaviour takes place in Twitter and that affordances play a role in this behaviour.

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1.0. INTRODUCTION

1.1. Problem Statement

The examination of issues related to social interaction (e.g., impression management, privacy, trust, and social capital management) within computer-mediated environments is prevalent both in popular media and in academic discourse. These issues have been scrutinized, critiqued, and dissected by members of the news media, non-profits, governments, corporations, and by lawmakers and academics. The discourse in both popular media and the academy influences our daily lives by placing pressure on scholars, educators, employers, corporations, politicians, parents, and users to consider a variety of behaviors, policies, and regulations related to information production, consumption, disclosure, and dissemination within these dynamic online environments. Because online interaction in computer-mediated environments is a ubiquitous aspect of many people's day-to-day lives in Western culture (Mitzlaff, Atzmueller, Stumme, & Hotho, 2013), it is important to examine online interaction behaviors from varying viewpoints.

These current conversations place pressure on various groups within academia—such as scholars, universities, organizations, and funding agencies—to consider how it is that scholars are using social media to produce, consume, disclose, and disseminate information both personally and professionally. Researchers seek to examine the digital traces (Cronin, 2001; Lazer et al., 2009) left behind by scholars in order to investigate how they can be used to establish and

maintain social capital (Hoffmann, Lutz, & Meckel, 2014), manage impressions (Thelwall, Tsou, Weingart, Holmberg, & Haustein, 2013; Veletsianos, 2012), influence science (Priem, Piwowar, & Hemminger, 2012), consume and disseminate information (Bowman et al., 2013; Schroeder, Power, & Meyer, 2011), and create social media use policies (Lough & Samek, 2014; Sugimoto, Hank, Bowman, & Pomerantz, 2015) as the boundaries between private and public lives continue to blur.

The policies, configurations, and affordances of online social media sites such as Twitter[1], among the most popular microblogging websites according to Alexa.com, are constantly evolving in order to meet the needs of both its users and investors. The frequent updates to Twitter features and use policies, combined with the continued development of third-party applications that live within the ecosystem of the environment, create a unique socio-technical context within which researchers can study social interaction. As the number of academic social media users grows and application environments evolve, it is imperative that researchers study these environments in order to understand how they affect social interaction, given the increasingly important role that that social media plays in academics' personal and professional lives.

In addition, it is important to consider the public and private nature of these communications in a context like Twitter because these communications can be archived, reproduced, searched, and viewed by invisible audiences (boyd, 2011).

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[1] http://www.twitter.com/

Twitter itself is an important venue for researchers as there is a growing area of inquiry, known as altmetrics, that examines scholars' digital traces in terms of their scientific outreach and impact. As scholars continue to use social media platforms as ways to reach out to those inside and outside of academia, they run the risk of having personal communications interpreted in a professional manner, or vice versa, which can have a negative impact on their reputations, the reputations of their departments and universities, or on science in general. Because of this, universities have begun creating social media use policies and to consider more carefully the ways in which they interpret instances of scholars' uses of social media. It is critical that we focus on the use of social media by scholars because of its potential overarching effects on the scientific process and the interpretation of science outside the academy.

In order to examine the differences between personal and professional communications on Twitter, it is important to consider concepts and models—such as those from sociology and psychology—that can provide insight into these behaviors. The model and concepts used in this dissertation are Goffman's (1959) impression management concept, Goffman's (1974) frame analysis model, and Gibson's (1977) concept of affordance. These are considered appropriate for this work for two reasons. First, frame analysis is a social lens that can be used to focus on the subject of an interaction, whose behavior is considered to be guided by the social norms and rules of the context in which the interaction occurs. Second, the concept of affordance can be used to describe the functional attributes of an object,

whether physical or digital, as perceived by the subject in a specific context. These concepts and models, in turn, allow for the examination of impression management within the context of social media use without privileging either the objective or subjective components of the interaction. The combination of these frameworks can help researchers examine subjective and objective aspects of interaction, while still taking into account the social world in which they occur.

This research examines the ways in which scholars utilize affordances (i.e., a quality of a perceived object allowing for some action in a context) and frame interactions (i.e., add meaning to an act in order to aid the understanding of the act in its context) in order to manage the impressions of their personal and professional selves as they communicate on Twitter. In this sense, framing refers to the attempts made by scholars to influence the perceptions of others by controlling the information presented in their online postings. After an extensive literature review, described below, it was found that prior research has not adequately addressed the question of whether, and, if so, how, framing techniques and affordance use by scholars shape impression management within this online context. Therefore, this dissertation investigates impression management, framing, and affordance use in computer-mediated environments by introducing and employing a socio-technical framework that combines Goffman and Gibson's concepts and models, thereby enriching the discourse on socio-technical environments, addressing the question of the efficacy of using a particular type of social theory to investigate online activities, and utilizing a novel method for crowdsourcing the content analyses of tweets. This

framework is useful and was appropriate for investigating the research questions

that motivate this work because it can "describe both social and technical

phenomena, persons and machines, the technization of society and the socialization

of technology" (Ropohl, 1999).

1.2. Research Questions

In order to assess affordance use and framing techniques used by scholars as

they manage the presentation of their personal and professional selves within

Twitter, this work explored the following questions:

1. In what ways do scholars utilize affordances to manage impressions on Twitter?

2. In what ways do scholars frame interactions to manage impressions on Twitter?

3. What are the differences in the use of framing strategies and affordances by scholars for managing the presentation of their professional and personal selves on Twitter?

This research was carried out in three phases using a triangulated

(O'Donoghue & Punch, 2003), mixed-methods (Lieber & Weisner, 2010) approach.

The first phase involved a cross-sectional descriptive survey that was sent to faculty

members in eight disciplines at Association of American Universities (AAU) schools.

The survey contained 19 questions related to social media use, Twitter use,

affordance use in Twitter, framing behaviors in Twitter, and general demographic

information (see Appendix 9.1 for survey). The survey instrument addressed

research questions one and two by establishing a baseline of affordance use and

framing behavior in Twitter; the data from the survey was also used for comparison against data obtained in phases two and three.

The second phase of the study made use of Amazon's Mechanical Turk (AMT) service to analyze the content of tweets collected from the study participants identified in phase one and was accomplished by using a codebook that was developed during a pilot test. The second phase addressed all three of the research questions by making use of AMT workers (i.e. Turkers) to distinguish between personal and professional tweets and by then examining the affordances used in these tweets.

A follow-up survey, which included tweet categorization, was utilized in phase three of the study. This phase involved examining the tweets made by the 95 most active scholars on Twitter (tweeting at least on average once per day) and developing questions about the personal and professional nature of their tweeting behavior; these questions were based on observations of the tweeting behavior of the scholars in the full sample and from data obtained in phases one and two of this study. The information from phase three was used to address the third research question and as a check on data collected in the second phase.

1.3. Significance of this Research

This dissertation is significant because it addresses a pressing problem that has arisen for one particularly important group of social media users, professional academics. As Web 2.0 applications and other technologies utilize digital devices and the Internet to facilitate an assortment of activities such as social interaction,

community building, and communication (Dooley, Jones, & Iverson, 2012), the expansion of the online social environment has led researchers (e.g., Herring & Martinson, 2004; Ekbia, 2007; Hara, 2008; Rosenbaum & Shachaf, 2010; Walther, 2012) to question the ways in which technology mediates these activities. This research is motivated by an issue that is becoming more widely discussed in academic discourse; as more and more scholars begin to incorporate the use of online social media into their personal and professional activities and routines, how is the increasing pervasiveness of online social media use impacting scholarly communication and scientific work? As Ekbia (2007, p. 6) argues, it is imperative that we examine computer-mediated interaction because "a good part of the mediation [of human interactions] happens through computers" in this "era of ubiquitous computer use" and it is becoming clear that for academics, use of these media comes with significant challenges, particularly those surrounding the management of personal and professional selves when engaged in online social interactions. Therefore, this work focuses on examining the ways in which scholars manage personal and professional impressions in Twitter by using affordances to frame their tweets. As such, this is one of the first studies to bring a sociotechnical approach and a rigorous mixed methods approach to this domain.

More specifically, there are three main contributions of this dissertation. The first is theoretical; the development and demonstration of the utility of the sociotechnical framework described below is an important contribution because it provides an empirically grounded conceptual approach for studying people's uses of

social media that focused both on the people using the online tools and the tools themselves without being either socially or technologically deterministic. This socio-technical version of Goffman's frame analysis (1974) and impression management (1959) models in combination with a socio-technical version of Gibson's (1977) concept of affordance, provides a hybrid theoretical framework that can be used in future studies to examine both the subjective and objective components in online interaction.

Insights from Goffman's (1974) conception of frame analysis have been utilized across several disciplines, including but not limited to sociology (e.g., McLean, 1998), psychology (e.g., Tversky & Kahneman, 1981), new media and communication studies (e.g., Vliegenthart & van Zoonen, 2011), management and organizational studies (e.g., Bolman & Deal, 1991), and social movement studies (e.g., Johnston, 1995); however, until now this approach has not been used to investigate impression management and framing behaviors within the computer-mediated context of Twitter. Gibson's (1977) definition of affordance has been used and adapted across a variety of disciplines including human-computer interaction (Norman, 1999), new media and communications studies (Papacharissi, 2011), computer science (Sahin, Cakmak, Dogar, Ugur, & Ucoluk, 2007), design (McGrenere & Ho, 2000), journalism (Bruns & Burgess, 2012), and linguistics (Dayter, 2013). However, while many works have discussed the concept of affordance when analyzing aspects of Twitter activity, none have used the concept to focus on specific affordance use by scholars within this context. This work demonstrates that the use

of this socio-technical framework within the Twitter domain is a valuable way to gain insight into online self-presentation strategies of scholars.

The second contribution is methodological; as is described extensively in the methods chapter below, this work demonstrates that Amazon Mechanical Turk (AMT), a crowdsourced marketplace for analytical work, can be used to analyze data in a rigorous way. In doing so, this dissertation brings a novel approach to information science research, taking advantage of a precedent that has been established in other fields that using AMT in academic research can result in high quality data analysis (Alonso & Mizzaro, 2009; Buhrmester, Kwang, & Gosling, 2011; Sprouse, 2011; Shaw, Hall, Horton, & Chen, 2011). The third is practical; this work can inform the designers and developers of social media platforms with recommendations for improving social media platforms based on empirical data, it can inform universities and academic organizations on employee social media use, and it can assist faculty members as they use social media in their daily routine.

2.0. LITERATURE REVIEW

The following literature review will first clarify the concept of social media, as it frames the entire work. This conceptualization will be followed by a description of Twitter. A sample of the literature examining the use of Twitter by scholars will be described and research relating to the concept of social media metrics—or altmetrics (alternative metrics)—will be examined as it relates to scholarly use of social media. Gibson's (1977) conception of affordance will then be described, and various interpretations of the idea will be reviewed. An examination of the use of affordance in the Twitter literature will then follow.

An introduction to Goffman's (1974) frame analysis model will be followed by a discussion of various interpretations and uses of frame analysis in the literature. Goffman's (1959) impression management framework will be described, followed by a sampling of additional impression management and self-presentation conceptualizations. A review of literature examining aspects of self-presentation within Twitter will follow. The literature review will conclude with a summary of the relevant findings that have been adapted and used in this work.

2.1. Social Media

Twitter, Facebook, LinkedIn, Google+, and similar web applications have been categorized using numerous concepts, which include social media, the social web, and Web 2.0. Kaplan & Haenlein (2010, p. 61) defined social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated

Content." Web 2.0 is a concept popularized by O'Reilly (2007) and is commonly understood as a type of web site that represents a transition from sites displaying static content (Web 1.0) to sites in which there is a collaborative environment featuring user-generated content. Gruber (2008, p. 1) described the social web as "represented by a class of web sites and applications in which user participation is the primary driver of value." In this dissertation, the term "social media" is used to describe interactive, dynamic web applications that support the sharing of user generated content (one of which is Twitter).

Social media applications utilize programming techniques that allow participants to create public profiles, create network connections between their profiles and those of other participants, and to examine the networks of other participants. boyd & Ellison (2008a, p. 1) labeled a subset of these social media sites as online social network sites (SNS). They defined SNSs as "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" (2008b, p. 2). As of this writing, a variety of social media sites exist on the Internet, broadly including Twitter, Facebook, Google+, LinkedIn, Academia.edu, ResearchGate, Mendeley, MySpace, Friendster, Pinterest, YouTube, Goodreads, Tumblr, Reddit, Bebo, aSmallWorld, AsianAvenue, BlackPlanet, CyWorld, Hyves, Orkut, Ryze, Weibo, and StudiVZ. They serve an array of cultures, groups, and purposes and support a variety of languages and functionalities.

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As determined by recent usage statistics (Brenner & Smith, 2013), one of the most popular social media sites is Twitter. Twitter is a microblogging site that is used for various reasons and is described more fully in Section 2.1.1. With regards to use by academics, previous work has established that between 7% and 30% of researchers make use of Twitter (Focus, 2010; Rowlands, Nicholas, Russell, Canty, & Watkinson, 2011) to perform such activities as sharing information, networking with various communities inside and outside of academia, and engaging in impression management (Veletsianos & Kimmons, 2013). Because Twitter is popular worldwide and is used by scholars (the author is one such user), it is considered an interesting context in which to observe framing behaviors, affordance use, and self-presentation of scholars as they present both their personal and professional selves online.

2.1.1. Twitter

Twitter, founded in 2006, has become the foremost microblogging service (Codel, 2006; Glaser, 2007) in the Western world (the Chinese social media site Weibo, a hybrid of Facebook and Twitter, reports over 500 million users[2]), claiming over 200 million active users who create over 400 million tweets each day (Wickre, 2013). As noted on Wikipedia (2013), the term microblog evolved from the term "tumblelogs," a term used to signify a "quick and dirty stream of consciousness." Entries on microblogs are referred to as microposts (Maxwell, 2009).

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[2] http://en.wikipedia.org/wiki/Sina_Weibo

Within the Twitter environment, a micropost is known as a "tweet" and it is

limited to 140 characters or less. Twitter users post their tweets in order to let

others know "what's happening, right now, with the people and organizations you

care about" (Twitter, n.d.-b). boyd, Golder & Lotan (2010, p. 2) wrote that "Twitter

combines elements of social network sites and blogs, but with a few notable

differences." Tweets have been compared to the messages on the walls of Facebook

profiles (Murthy, 2013), but these messages aren't restricted by network

connections and thus are available to all users (unless designated as a private tweet)

of the site. As of this writing, Twitter has become a publicly traded company

(Hennessey, 2013); it is important to note that this has had an impact on the Twitter

environment under study. During the three phases of this work Twitter has

introduced changes including a new profile design and an alteration of its privacy

policies. Because of this constant change in design, the ongoing development of

social norms and rules surrounding Twitter use, its worldwide popularity, and the

vast number of users, it represents a unique environment from which to examine

scholarly communication, interaction, and use. Scholarly communication can be

defined as the ways in which scholars "use and disseminate information through

formal and informal channels" (Borgman, 1989, p. 586).

Twitter provides access to both a constantly updated stream of tweets and to

an archive of tweets spanning over eight years that range along a continuum from

simple messages about one's daily routine to the reporting of breaking news or

emergencies to the sharing of scientific discoveries. The tweets are searchable

within the Twitter environment and through the Twitter application-programming

interface (API). Twitter imposes a directed model of friendship (Marwick & boyd,

2011a) requiring that users choose whom to follow with an understanding that

there is no social or technical guarantee that the person being followed (followee)

will follow the other (follower)
in return. A tweet can be sent
from the main Twitter
application (operating system
application or web-based
application) running on a
desktop computer, tablet, or
smart phone, or it can be sent
through a third-party
application (such as
Tweetdeck, Twitpic, Digsby, or
HootSuite) on a desktop
computer, tablet, or smart phone.
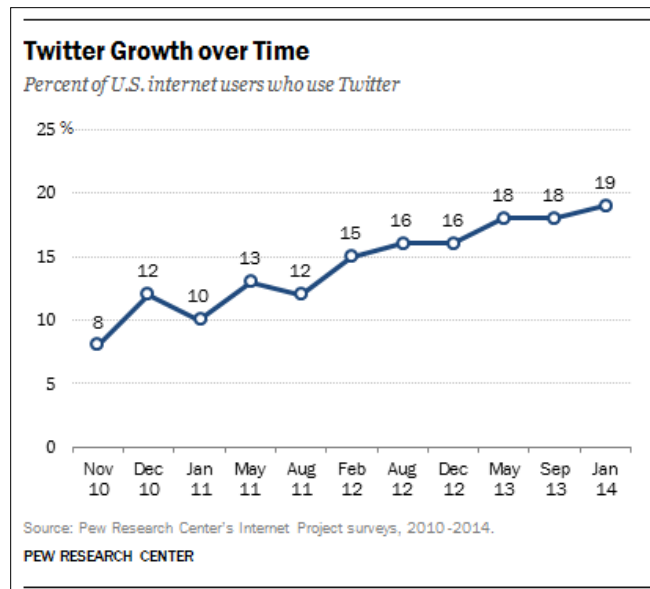
Figure 1 Pew Research Center (Brenner & Smith, 2013) Graph of Twitter Use from http://www.pewinternet.org/fact-sheets/social-networking-fact-sheet/

Additionally, Twitter has been integrated into Apple's iOS mobile operating

system and is automatically installed on all iPhones using iOS v5.0 and up; this

equates to approximately 25% (or approximately 44 million) of cell phone owners

in the U.S. (A Smith, 2013). Tweets can also be linked to blogs and other social

media; for example, a Facebook status update can trigger a tweet, or a tweet can

become a Facebook status update automatically. Twitter records one billion tweets every 2.5 days on a variety of platforms. As of June 2014, Twitter was the 9th most-visited site on the web globally (Alexa, n.d.). The relatively open design and robust online documentation for the API makes Twitter an environment conducive to observation and study.

The Pew Internet Research Center's Internet & American Life Project (Brenner & Smith, 2013) surveyed a sample of Americans and found that as of May 2013, 19% of online adults used Twitter and that Twitter use was increasing over time (see Figure 1). All age groups were showing an increase in usage across time (Brenner & Smith, 2013) . Another Pew project report (Smith & Brenner, 2012) found that the number of adults using Twitter on a daily basis had doubled since May 2011. Another interesting finding was that the increase in the number of smartphone users correlated with the rise of Twitter use, suggesting a connection between the popularity of Twitter and the popularity and ubiquity of smart phones. As Mishaud (2007, p. 4) noted, Twitter's openness allows members to "select the channel(s) of dissemination that best match their needs." The dissemination channels supported by Twitter include, but are not limited to, the official Twitter website and desktop/mobile applications, 3rd party applications that provide interfaces for Twitter functionality such as Tweetbot, HootSuite, and TweetDeck,[3] and programs accessing the Twitter API.

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[3] A list of popular 3rd party apps is maintained on Wikipedia: http://en.wikipedia.org/wiki/List of_Twitter_services_and_applications

Twitter is a popular context of study for a variety of reasons including the fact that tweets are mostly public and the API is relatively easy to use. Williams, Terras, and Warwick (2013, p. 3) found that "[m]uch of the published academic work on microblogging has focused on the Twitter platform." There has been a good deal of research examining Twitter including studies examining its use in the diffusion of information during emergencies (Cassa, Chunara, Mandl, & Brownstein, 2013; Cho, Jung, & Park, 2013; Genes, Chary, & Chason, 2014; Naaman, Becker, & Gravano, 2011), during political activity (Grossman, 2009; Hermida, Lewis, & Zamith, 2014; Small, 2011; Zhou, Bandari, & Kong, 2010), in disseminating health information (Harris, Mueller, Snider, & Haire-Joshu, 2013; Hawn, 2009; Paul & Dredze, 2011), for business, marketing, branding, and commerce (Greer & Ferguson, 2011; Loudon & Hall, 2011; Swani, Brown, & Milne, 2014; M. Zhang, Jansen, & Chowdhury, 2011), in news and information sharing (Armstrong & Gao, 2010; Bruns & Burgess, 2012; Rudat, Buder, & Hesse, 2014), for the spread of fraudulent information (Gupta, Henmank, & Ponnurangam, 2013; Gupta, Lamba, Kumaraguru, & Joshi, 2013), in teaching and learning (Antenos-Conforti, 2009; Dayter, 2013; Gao, Luo, & Zhang, 2012), and in sentiment analysis (Stieglitz & Dang-Xuan, 2012).

In addition to the research areas listed above, there is a growing interest in understanding the ways in which scholars make use of Twitter to communicate about their work, the work of their peers and cohort, and generally discuss academia, science, and other interests. It stands to reason that this increased use of social media by scholars is an important area of study, but as Wouters and Costos

(2012, p. 39) contended "it needs to be better understood how these [activities of scholars] relate to their scientific and scholarly practice as a whole." To address this need for more understanding of how it is that scholars are using online social media for scholarly practice and to promote, discuss, distribute, and consume scientific information, researchers are examining these activities under the guise of alternative metrics.

2.1.2. Alternative Metrics (Altmetrics)

The measure of scholarly communication and dissemination within social media contexts has been described as alternative metrics (altmetrics) (Priem, Groth, & Taraborelli, 2012; Priem, Taraborelli, Groth, & Neylon, 2010; Priem, 2010) and was introduced because these social media metrics are considered to be faster and broader alternatives to citations. It is the focus of researchers from such areas as scholarly communication and scientometrics. There have been criticisms of using the term alternative to describe these types of metrics, with some (Rousseau & Ye, 2013) suggesting that "influmetrics" better describes the impact of this activity because these metrics only measures the influence of scholarly output. While scholars are using a variety of social media services including general SNS (e.g. Facebook, YouTube, Twitter, Reddit, LinkedIn, etc.) and those geared toward scholarly activity (e.g. Mendeley, Zotero, ResearchGate, Academia.edu, etc.) to communicate and interact (Bowman et al., 2013; Haustein et al., 2013; Holmberg & Thelwall, 2014), Twitter has been found to be one of the most useful contexts to explore because it has been shown to contain more scientific communications

(Thelwall, Haustein, Larivière, & Sugimoto, 2013) than other general social media environments.

There is a variety of articles analyzing altmetrics including those examining the use of altmetrics data sources (Thelwall et al., 2013), comparing altmetrics with citations (Costas, Zahedi, & Wouters, 2014; Eysenbach, 2011; Haustein, Peters, Sugimoto, Thelwall, & Larivière, 2014), examining the use of hashtags in Twitter by scholars to disseminate scholarly information (Haustein, Bowman, Holmberg, Peters, & Larivière, 2014; Peters, Bowman, Haustein, & Homberg, 2013), studying the impact of publishing behavior and affordance use on conversational connections in Twitter (Holmberg, Bowman, Haustein, & Peters, 2014), and applying citation and social theories to the interpretation of the acts leading to these metrics (Haustein, Costas, & Bowman, 2015), to name just a few. Several articles (Bar-Ilan et al., 2012; Chretien, Azar, & Kind, 2011; Haustein, Peters, et al., 2014; Holmberg & Thelwall, 2014; Mahrt, Weller, & Peters, 2013; Priem & Costello, 2010) have also discussed the usefulness of Twitter for disseminating scholarly information to the general public and communicating with a wider array of scholars. However there were no articles found examining affordance use as framing behaviors used by scholars to manage their impressions in Twitter.

This work addresses this gap in the research by focusing on the affordance use and framing behavior of scholars in the Twitter environment. While altmetrics research has examined many aspects of scholarly communication within social media tools, Veletsianos and Kimmons (2013, p. 1) argued that existing research

"provides little information on faculty experiences and participation in SNS, is inconclusive on what it is about SNS that faculty find to be valuable, and leaves questions about what barriers and issues faculty face when adopting such technologies into their practice." With regards to Twitter, Murthy (2013, p. 41) reported that "[g]iven the importance of mediated communication in modernity, understanding [Twitter] is an important task." This dissertation explores these concerns by providing data and findings that will enhance our understanding of how scholars use Twitter and how it is that they frame interactions and utilize affordances in Twitter to manage personal and professional impressions.

2.2. Scholars and Social Media

Hawthornthwaite and Wellman (1998, p. 1101) wrote in their study of a university research group's new media use that "it is important to understand how social relationships affect what is communicated, between whom, and via which media." It was becoming more apparent to scholars in the late 1990s that academia was being impacted in various ways by emerging technology. Baldwin (1998, p. 19) argued that "there is little doubt that new technologies are facilitating a reexamination and redefinition of academic life."

As technologies advanced and the Internet and web-based applications became a part of day-to-day life in and outside academia, social media sites began to be used in and out of the classroom. Greenhow (2009, p. 43) proposed that "[p]articipatory web-based technologies have the potential to change the way we engage in scholarship" and argued that:

> [a]s educators and students reflect on and re-envision what they do as
> scholars - using web-based social networking tools to enact semi-public
> virtual selves and become intertwined with the work of their peers - their
> use of these tools may, in turn, provide greater insight into their own
> scholarly attitudes and practices.

Hawthorthwaite and Wellman's (1998) article also argued at the time that communities within academia use a variety of media to support their organizational structures, traditions, and social ties between members. This implies that social media has the ability to impact and influence the organizations to which scholars belong.

Organizations both within and outside of higher education presumably also want to know what types of effects social media platforms are having on information exchange, which platforms are used by scholars to disseminate scholarly communication, and how scholars are communicating and managing both personal and professional self-presentation across these platforms. Social media are having an impact on the once invisible backstage activity of scholars, as Priem (2014, p. 264) argued, by bringing "the background of scholarship... out onto the [front] stage." Here Priem seems to make references to Goffman's (1959) dramaturgical framework where he described interaction as taking place both on a front stage and backstage.

With regards to how organizations affiliated with academia are viewing social media communications by scholars, McLemee (2012) stated that a few professional organizations are choosing to classify tweets by scholars as more than simply personal communications, reporting that both the Modern Language

Association (MLA) and the American Medical Association (AMA) introduced a citation format specifically for tweets so that scholars can use and cite them in scientific work. McLemee (2012, para. 2) wrote that the AMA added a citation style for tweets after "deciding that tweets are public discourse rather than private expression." Changes such as these reinforce the notion that social media sites such as Twitter are platforms from which academics can disseminate scholarly information and cite tweets in academic work; as well, tweets have been acknowledged by professional organizations as credible forms of communication.

As the precursor to microblogs, web logs (blogs) constitute a similar environment in which scholars have presented both personal and professional selves, discussed scientific work, and generally engaged with a public audience. Herring et al. (2004, p. 1) defined blogs as "modified web pages in which dated entries are listed in reverse chronological sequence." boyd (2006a, p. 17) wrote that a blog "is one's digital face, showing the traces of past expressions, revealing both what the blogger brings to the front stage and what aspects of the backstage slip through."

Bloggers have been described as using the medium to communicate their feelings, thoughts, and reaction to matters of interest (Blood, 2002). Scholars use blogs (Bonetta, 2007, p. 443) in order to "provide authoritative opinions about pressing issues in science… [and] [b]ecause of their freewheeling nature, these blogs take scientific communication to a different level." Larry Moran (a University of Toronto biochemistry professor) suggested that "[m]ost scientists are not

comfortable with blogging. The training we get is to separate opinion from evidence, but blogs blur the difference" (Bonetta, 2007, para. 18). Blogs, as a precursor to Twitter, have been shown to allow scholars to communicate in such a way that permits them to discuss aspects of both their personal and professional selves; it is important to discover if behavior on Twitter is similar.

In other scholarly communication discourse, research has shown that scientists who have blogs tend to discuss recent publications, socially relevant information, and high-quality science, and that they write in a manner in which the information is useful to both academics and non-academics (Groth & Gurney, 2010). Nisbet (2010, p. 3) argued that "scientists… must strategically 'frame' their communications in a manner that connect with diverse audiences" and that scholars should no longer assume that simply bringing the public updated information about scientific facts is enough; instead, scholars must engage the public's "values, interests, and worldviews." As Nisbet noted above, framing the message is an important component of disseminating scientific information as academic discourse often uses specialized vocabulary and complex statistical or mathematical evaluations. Goffman's (1974) theoretical frame analysis model (as described in Section 2.4) speaks to this phenomena and the ways in which framing is necessary for communication to take place.

Weller (2012, para. 2) wrote that "[i]n terms of intellectual fulfillment, creativity, networking, impact, productivity, and overall benefit to my scholarly life, blogging wins hands down." The author (Weller, ibid, para. 3) went on to state that:

My academic identity—I'm a professor of educational technology at the Open University in the United Kingdom—is strongly allied with my blog. Increasingly we find that our academic identities are distributed. There was a time when you could have pointed to a list of publications as a neat proxy for your academic life, but now you might want to reference not only your publications, but also a set of videos, presentations, blog posts, curated collections, and maybe even your social network. All of these combine to represent the modern academic. My blog sits at the heart of these, the place where I reference the other media and representations.

As this account suggests, the contributions of the contemporary scholar are spread across a variety of media. Because of this, one could argue that these scholars are in positions that can lead to difficulties managing their personal and professional impressions across these various media.

There have been numerous examples of the potential problems of distinguishing between personal and professional communications by scholars in social media environments when communicating. For example, on June 2, 2013, University of New Mexico (UNM) Associate Professor of Evolutionary Psychology Geoffrey Miller tweeted the following message from his @matingmind account (see Figure 2): "Dear obese PhD applicants: if you didn't have the willpower to stop eating carbs, you won't have the willpower to do a dissertation #truth." As one might envision, this tweet triggered an outcry from other faculty, students, university administration, and the general public. In an news article, Ingeno (2013) noted that other scholars, as well as the New York University (NYU) administration where Miller was teaching at the time, and the administration of his home institution at UNM, had all criticized Miller's tweet and called into question a variety of issues surrounding this message.

A Cardiff University psychologist, Chris Chambers, emailed UNM administration the following message: "I would also like to know what assurances you can provide that his previous student appointments were not based upon the body mass index of applicants" (Ingeno, ibid, para. 7). Chambers' message highlights an important element of this unfortunate event, that the tweet sent by Miller not only represented him personally, but also represented him

Figure 2 Geoffrey Miller's Controversial Tweet

professionally (not to mention both NYU and UNM). In addition, some might argue that it represented his fellow scholars in the field of evolutionary psychologists and academics as a whole.

In a related example from Facebook, a sociology professor from East Stroudsburg University in Pennsylvania was placed on administrative leave for posting status updates to Facebook that were considered threats by some of her students (Berrett, 2010). The professor, Gloria Gadsen, wrote two posts that were deemed inappropriate and threatening by university administration: her first post stated, "Does anyone know where I can find a very discrete hitman? Yes, it's been

that kind of day..." and the second read "had a good day today, DIDN'T want to kill even one student :-). Now Friday was a different story."

Berrett (2010, para. 5) reported that Gadsen claimed the messages were simply jokes and that "[f]ive comments followed [Gadsen's first] message, suggesting those to whom she was linked understood the joke." Yet the administrators of her university, and some of the students, did not interpret the statements as jokes, and because of this she was suspended from her position. In fact, East Stroudsburg University considered the matter serious enough to place her on administrative leave. This is another example of the problems faced by scholars as they navigate the use of social media because it highlights the tension they face between representing their personal and their professional selves.

David Guth, an associate professor of journalism at the University of Kansas, tweeted a message (see Figure 3) stating "#NavyYardShooting The blood is on the hands of the #NRA. Next time, let it be YOUR sons and daughters. Shame on you. May God damn you." in response to the Washington D.C. navy yard shootings where 12 were killed by a gunman on September 16, 2013. His tweet sparked outrage from politicians, media, National Rifle Association (NRA) supporters, and other scholars.
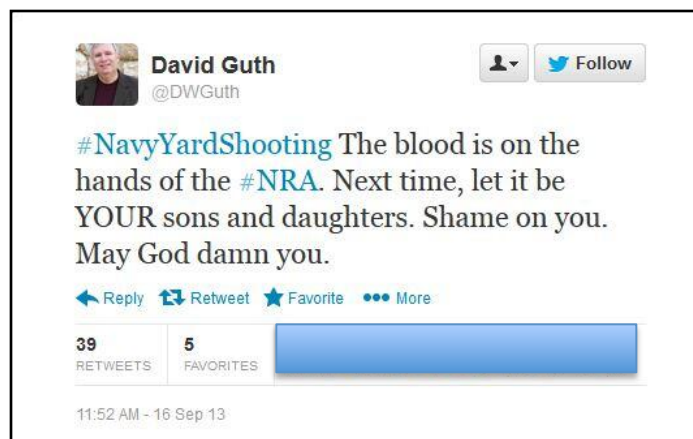
Figure 3 David Guth's Controversial Tweet

Rothschild & Unglesbee (2013) reported that Guth had received death threats from various members of the public, and Unglesbee (2013, para. 6) reported that the vice chancellor for public affairs at Kansas University, Timothy Caboni, had said that "it is truly disgraceful that these views were expressed in such a callous and uncaring way." When asked by the *Lawrence Journal-World* whether Kansas University's funding should be affected by Guth's tweet, Mona Sinkey (Lawrence.com, 2013) stated that "[t]hose are harsh words, but they should not have an effect on the university." This came in response to legislative leaders claiming they would cut funding to the university if Guth was not fired (Rothschild & Unglesbee, 2013).

In another example, Steven Salaita had his tenure-track faculty position offer from the University of Illinois at Urbana-Chapaign (UIUC) rescinded after posting several tweets that were anti-Israel in nature (Jaschik, 2014). When Israel began its invasion in Gaza in July 2014, Salaita tweeted: "By eagerly conflating Jewishness and Israel, Zionists are partly responsible when people say antisemitic [*sic*] shit in response to Israeli terror." (see Figure 4) . According to Herman (2014), this and other tweets he made during this tim e were considered anti-Semitic by some and UIUC terminated

Figure 4 Steven Salaita's controversial tweet

his contract. In response, the American Association of University Professors (Fichtenbaum & Reichman, 2014, para. 5) issued a statement saying that "faculty comments made on social media, including Twitter, are largely extramural statements of personal views that should be protected by academic freedom." As these examples illustrate, scholars must navigate a blurring boundary between personal and professional presentations when tweeting, as they might be considered to be communicating not only personally but as a representative of their colleagues, departments, disciplines, or their universities.

With regards to how universities are utilizing and recommending using social media, Davis III, Deil-Amen, Rios-Aquilar and Canche (2012, p. 2) argued that "[i]t is critical to begin to examine if and how higher education institutions are incorporating the use of SMT [social media technology]." While there are many studies examining the role social media plays in instructional practices in higher education (Deng & Yuen, 2012; Dhir, Buragga, & Boreqqah, 2013; Greenhow, 2009; Loving, Schroeder, Kang, Shimek, & Herbert, 2007; Newgarden, 2009; Ray & Coulter, 2008; Stiler & Philleo, 2003; Williams & Merten, 2009), there seems to be a gap in the discourse regarding how scholars manage aspects of their personal and professional selves within these environments. Veletsianos (Veletsianos, 2012; Veletsianos & Kimmons, 2013) has written at least two articles on the subject and found that scholars tend to share information about their professional practice, students, and classroom, attempt to network with others, offer and request help, call attention to their involvement in other social media environments, engage in

personal discussions, and engage in impression management when tweeting. His work demonstrates that scholars do attempt to manage their personal and professional impressions within the Twitter context and that further investigation is needed to understand this phenomenon.

As discussed previously, Twitter allows for accounts to be both public and private, and this has led some Twitter users to open multiple accounts in order to keep their personal and professional networks separate. Plaut (2012, para. 2), a social media coordinator at Oberlin College, wrote about creating a public account separate from her private account in order to "to speak, as a professional, about things that I cared about."

Based on her own discussions with others in her personal Twitter network, she compiled an informal list of answers to why users create personal or private accounts on Twitter (or why one would switch between the two forms). Regarding private accounts, responses from her informal assessment indicated that some respondents didn't want parents, bosses, or friends reading their tweets, some felt Twitter was an environment to speak only to close friends, some didn't want their tweets archived by the Library of Congress[4], and others felt that their own tweet content wasn't of interest to anyone. With regards to public accounts, answers ranged from those who stated they had no secrets, to those who indicated that they like communicating with famous people and using hashtags, and finally to those who indicated that they secretly wanted their own tweets to go viral. These informal

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[4] The Library of Congress signed an agreement with Twitter in 2010 to archive all American tweets (The Telegraph, 2013)

findings suggest that another area lacking in current Twitter research is the study of scholars with multiple accounts; it is important to understand if, how many, and why, scholars establish different accounts on Twitter.

Newgard (2009, para. 2) stated that her own "personal professional use of Twitter has indeed proven to be a useful source of learning and means of connecting to others in [her] dual fields of interest." In an early article about the use of Twitter in academic settings, Young (2008, para. 4) described a computer-mediated communication course in which the instructor, David Parry, an assistant professor from University of Texas, Dallas, required his students to use Twitter and to follow his own Twitter feed; Parry was cited saying that requiring students to communicate via Twitter was "the single thing that changed the classroom dynamics more than anything I've ever done teaching."

Forte, Humphreys, and Park (2012) surveyed teachers at various academic levels regarding their use of Twitter and discovered that their respondents rarely followed, or were followed by, other teachers in their local communities. Instead, the teachers reported that they primarily followed, and were followed by, students in their communities and teachers outside their communities. The authors (Forte et al., 2012, p. 110) found that "[t]eachers described these networks as sources of resources and inspiration for new practices." These findings shed light on one interpretation of how scholars and students co-exist within these social media contexts. The impact that tweeting can have inside and outside of classrooms

indicates another reason why Twitter is an important medium in which to examine scholarly activity.

Higher education seems to be lagging far behind other industries with regard to social media use policies (Pomerantz, Hank, & Sugimoto, forthcoming). Few universities have developed policies dictating how faculty and staff should use social media. One of the universities that developed a social media policy early on, Ball State University, specifically addressed the difficulty in determining acceptable use stating that "social media sites 'blur the lines between personal voice and institutional voice'" (Stripling, 2010, para. 8). This blurring of the boundaries between personal and professional selves makes it difficult for universities to create social media use policies, even when most of these universities have policies addressing other forms of interactions between faculty and students. The difficulty conveyed by scholars about how to represent both their personal and professional selves is another reason why Twitter is an interesting environment in which to analyze scholarly activity.

It has been found that organizations have been concerned with both the public and private behavior of their members and employees for some time; for example, in the 14th century English guilds were asked to ensure their members adhered to the norms and regulations of the time (Pipes, Holstein, & Aguirre, 2005). Pipes, Holstein, and Aquirre (2005, p. 325) wrote that "[w]hen individuals enter a profession, a question arises as to what behaviors, if any, they agree to modify or give up as a result of becoming a member of the profession." In fact many

organizations and institutions have a code of ethics that constrains their employees'

behaviors as professionals and this code can also be applied, in certain

circumstances, to events considered outside the professional scope. The authors

(Pipes et al., 2005) argued that the distinction between personal and professional is

engrained in our cultural norms and values.

When these boundaries become blurry, character issues, personal problems,

and irresponsible behavior can be observed and judged through a professional lens,

be considered inappropriate by the organization or employer, and can lead to

reprimand or termination of employment. These judgments and behaviors can

introduce doubt and suspicion into the general understanding of what the

professional role entails.

With regards to scholars' use of Twitter, Letierce, Passant, Decker, and

Breslin (2010) surveyed Semantic Web scholars and found that 92% of respondents

had a Twitter account and rated Twitter as their favorite service to spread scientific

information. A survey of over 200 Digital Humanities (DH) scholars (Bowman et al.,

2013) found that 80% of respondents rated Twitter as relevant for the consumption

of DH information, and 73% rated Twitter as relevant for the dissemination of DH

information. According to a 2012 survey of 939 professors from both two- and four-

year colleges on faculty social media use (Moran, Seaman, & Tinti-Kane, 2011)

approximately 66% of the participants reported using social media in the month

prior to taking the survey. The authors also found a correlation between the rate of

personal use and academic discipline as faculty in the arts and humanities had higher rates of personal use than did those in the natural sciences.

A survey of the bibliometric community at the 2012 STI conference in Montreal, Quebec by Haustein, et al., (2013) found that Twitter was among the most popular social media tools used by scholars to communicate both personally and professionally. Academics in the social sciences were found to be more accepting of social media, such as blogs and microblogs, as "legitimate and trustworthy methods for gathering and dissemination of scholarly information" (Gruzd, Goertzen, & Mai, 2012, p. 3). Ten disciplines (Astrophysics, Biochemistry, Digital Humanities, Economics, History of Science, Cheminformatics, Cognitive Science, Drug Discovery, Social Network Analysis, and Sociology) were analyzed (Holmberg & Thelwall, 2014) and it was found that there were clear disciplinary differences in the way that the scholars used Twitter. These previous studies suggest that one factor influencing social media use among scholars is the discipline to which they belong. It is important to continue examining differences among disciplines and to complement this prior data, therefore this dissertation has surveyed faculty from eight different departments: Physics, Biology, Chemistry, Computer Science, Philosophy, English, Sociology, and Anthropology.

While earlier surveys suggest that a portion of faculty are using Twitter, faculty concerns about using social media is still a major barrier to its adoption (Moran et al., 2011; Plew, 2011). Plew (2011, p. 140) found that "instructors' ambient awareness of students was positively related to their self-presentation and

impression management behaviors, whereas their perceptions of students' awareness of them were negatively related to their privacy management." As Golub (2009, para. 2) noted in regard to Facebook, "[w]hat bothers me… is the particular problem it presents for academics, whose professional career and personal goings-on are all rolled up together into one big life of the mind." He (2009, para. 5) argued that:

> …in the physical world professors uneasily navigate the uneasy blurring of their public and private lives, but Facebook doesn't allow for blurring -- you are either friends or not. This extremely 'ungranular' system forces you to choose between two roles, private and public, that the actual, uncoded world allows us to leave ambiguous.

Stripling (2010, p. 1) wrote that "professors often make an extra effort to establish boundaries with their pupils. But social networking sites… are lifting the veil on the private lives of professors in ways they may not have expected." Letierce, Passant, Decker, and Breslin (2010, p. 1) advised that Twitter has the potential to "help the erosion of boundaries between researchers and a broader audience." In related work examining public relations professionals, Gilpin (2011, p. 235) argued that "the more the profession is seen to rely on social media, the more its members will turn to these tools for their own communication purposes." These issues establish scholars as an intriguing population to study because they are faced with managing communicative acts in environments where there is a blurring of boundaries between their personal and professional selves.

It is also important to consider why the investigation of scholars using Twitter is as important as studying other populations, such as professional athletes

or entertainers. Scholars can have a far-reaching impact on the academy, on students, and on the general public. Scholars perform multiple roles as they progress through their careers in academia (Arreola, Theall, & Aleamoni, 2003); these roles can include that of teacher, mentor, adviser, researcher, administrator, facilitator, representative, and communicator. They help shape both trends in research and the lives of their students (Cassidy R. Sugimoto, 2012). As noted previously, scholars not only represent themselves, they also represent, to a certain extent, their institutions and professional and disciplinary affiliations.

Thus as technology becomes more ubiquitous and human interactions are more often mediated by technology, the study of scholars' interactions within social media environments such as Twitter is of interest as these interactions can have an impact on the universities, disciplines, departments, and students of the scholars involved. In addition, in a trend similar to that of the general population of SNS users, scholars continue to use social media applications at increasing rates to consume and disseminate information.

The increase in multidisciplinary studies by scholars at universities across the world, in combination with the availability of scholarly resources on a global scale, suggest that these people will be spending more of their time engaged with others online. This engagement will be increasingly subjected to measurement as organizations and universities attempt to evaluate scholars on their scholarly output and allocate the ever-shrinking budgets and funding opportunities amongst the increasing pool of researchers and teachers. Because scholars are concerned

with the boundaries between personal and professional activities and are at times

hesitant to make use of social media tools for fear of negative repercussions, it is

important that we examine those who currently make use of tools such as Twitter in

order to understand the difficulties and rewards involved in using these

applications.

To more closely examine the strategies used by scholars to differentiate

personal and professional communications using Twitter, it is important that we

look at the affordances available within the context of the environment. In the next

section, the concept of "affordance" will be defined and literature examining

affordance use in various environments will be described.

2.3. Affordance

The term "affordance" is derived from the verb *afford*, which means "to make

available, give forth, or provide naturally or inevitably" (Merriam-Webster, n.d.).

James Gibson (1977) was an ecological psychologist who first introduced the

concept of affordance as a noun to be used to describe how agents (e.g. animals,

humans) distinguish the functional attributes of an object from its properties. He

proposed that an affordance represents the relationships between an agent and

objects of the world, writing that:

> An important fact about the affordances of the environment is that they are
> in a sense objective, real and physical, unlike values and meanings, which are
> often supposed to be subjective, phenomenal and mental. But, actually, an
> affordance is neither an objective property nor a subjective property; or it is
> both if you like. An affordance cuts across the dichotomy of subjective-
> objective and helps us to understand its inadequacy. It is equally a fact of the
> environment and a fact of behavior. It is both physical and psychical, yet,

neither. An affordance points both ways, to the environment and to the observer (1977, p. 129).

The meaning of the term has been considered to be quite vague and has been used in a variety of disciplines in a variety of ways to describe different phenomenon.

There are various assumptions about what affordances are and how they are perceived, especially when considering affordances within a computer-mediated environment. The theory of affordances was developed from an ecological perspective starting with the premise that agents live in specific niches in the environment. Gibson (1977, p. 128) described the notion of a niche as referring "more to *how* an animal lives than to *where* it lives." An animal species, or agent, occupies a distinct niche in the environment, and it is within these niches that he believed agents make use of affordances. From this perspective there is no requirement that an agent perceive the affordances of an object; in certain circumstances the affordances of an object may, in fact, contribute to its concealment from the agent, while in other circumstances an agent may misread an affordance of an object based on its attributes or the niche in which it is perceived. The perceptual ability of an agent is an important determinant when considering the affordances that are ascertained from the viewing of an object.

There is also assumed to be little difference between affordances of human objects (e.g. mailbox, stairs, hammers, etc.) and affordances of natural objects (trees, rocks, sticks, etc.). Gibson (1977, p. 130) stated that:

> [i]t is also a mistake to separate the cultural environment from the natural environment, as if there were a world of mental products distinct from the world of material products. There is only one world, however diverse, and all

animals live in it, although we human animals have altered it to suit ourselves.

This paragraph implies that there are three important points to Gibson's theory of affordances: first, both natural and human-contrived objects have affordances; second, humans often change their environment in order to increase beneficial objects and to decrease harmful ones; third, the natural world should not be considered separate from either the artificial world or the cultural world, because all of these worlds are filled with manufactured and natural artifacts. These three points imply that Gibson's theory can be used to examine affordance use in computer-mediated environments.

Another important contention of Gibson's (1977) theory is that affordances vary depending both on the niche (or context) in which they are observed and by the agent doing the observing. For example, a tree can afford climbing for a monkey, nesting for a bird, hiding for a squirrel, or to be cut down and used a source of building material for a human (see Figure 5). In this simple example, the affordances of the tree are not changing; instead, the agents are recognizing affordances that allow them to engage with the tree based on the niche in which the tree is observed,
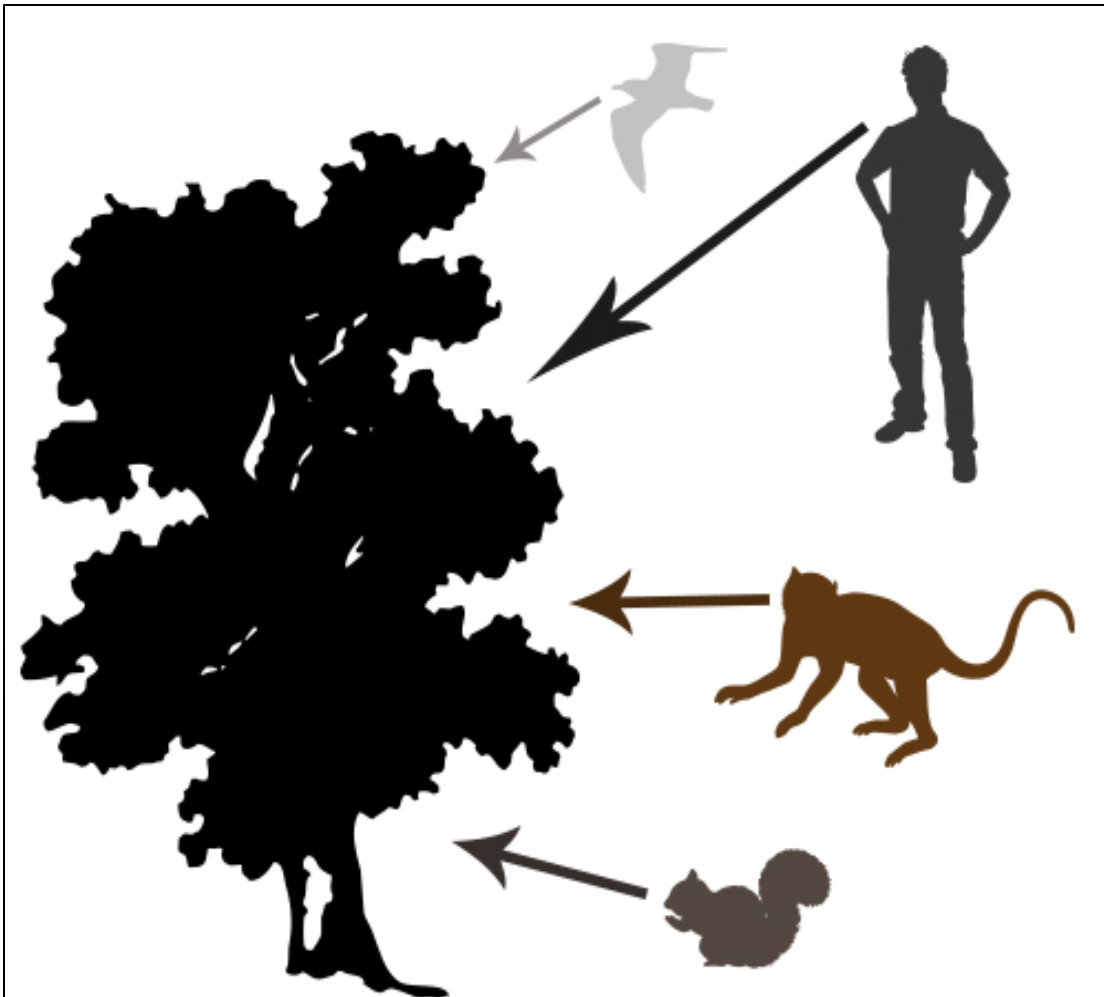
Figure 5 Affordances of tree to bird (nesting), person (cutting down), monkey (climbing), and squirrel (hiding).

the norms and experience with which the agents have engaged similar objects before, and the time of the observation. Gibson claimed that the existence of affordances is independent of experience and norms, but allowed that affordance use also can be impacted by experience and norms.

Gibson's (1977) ideas challenged the more psychological view that humans perceive the qualities that make up the composition of objects (i.e. color, measurements, weight, etc.); instead, he believed that it is the affordances that are perceived and not the qualities, summing up his stance on affordances by succinctly stating that "[y]ou do not have to classify and label things in order to perceive what they afford" (1977, p. 134). As Sanders (1997, p. 99) argued, the existence of affordances should not be controversial because how can one argue that there aren't "opportunities and dangers present in the environments of organisms?" This dissertation will integrate Gibson's notion of affordances in order to explain the ways in which scholars utilize object in the Twitter environment to frame communication and manage impressions.

2.3.1. Other Conceptualizations of Affordance

There are many conceptions of affordance, and this brief review will focus on conceptualizations that have been used to study interaction with technology. As scholars began to study computer-mediated environments, they sought to borrow theories and definitions from other disciplines in order to make sense of these new contexts of interaction. Gaver (1992, p. 23) was one of the first authors to use Gibson's notion of affordance to describe these new environments, and claimed that

"an appreciation of the everyday should not interfere with an understanding of the new affordances offered by audio-video technologies." As the contexts of interaction became more complex, scholars like Dourish (2001, p. 118) seemed to agree with Gibson stating that affordances within these new environments are a "three-way relationship between the environment, the organism, and an activity." Not only did scholars use the concept of affordance to describe these new digital environments, they also sought to expand upon the definition in order to explain what they were finding.

Some scholars sought to explain affordances by looking at the influence of the social, rediscovering an approach implicit in Gibson's work. Bradner, Kellogg, and Erickson (1999, p. 154) introduced the concept of a social affordance (while investigating the BABBLE system) and defined it as "the relationship between the properties of an object and the social characteristics of a group that enable particular kinds of interaction among members of that group." They (Bradner et al., 1999, p. 154) went on to argue that "as a group gains experience with a system, it comes to understand collectively, how to appropriately apply the system to its own ends." In another work, Kreijns and Kirschner (2001, p. 2) used the concept of social affordance to examine a computer-supported cooperative work (CSCW) learning application; they defined a social affordance as the "properties… which act as social-contextual facilitators relevant for the learner's social interactions. When perceptible, they invite learners to act in accordance with the perceived affordances." These works sought to demonstrate a relationship between social and

technological components and the perception of affordances, which was inherent in

Gibson's original conception, but not labeled.

Within the HCI domain, the term affordance has been utilized quite heavily to

discuss aspects of digital tool construction, usability, and online interaction. Norman

(1988) introduced the concept into the HCI literature by using it to describe an

object's potential for actions, functions, and uses. In a follow up article, Norman

(1999, p. 39) indicated that he believed that researchers in HCI were misusing the

concept, and offered a concept of "perceived affordance" as a substitute, arguing that

a designer "cares more about what actions the user perceives to be possible than

what is true." McGrenere and Ho (2000, p. 3) compared Norman and Gibson's

definitions of affordance, asserting that:

> Gibson claims that the existence of affordances is independent of an actor's
> experience and culture. Norman, on the other hand, tightly couples
> affordances with past knowledge and experience. The frame of reference for
> Gibson is the action capabilities of the actor, whereas for Norman it is the
> mental and perceptual capabilities of the actor.

While McGrenere and Ho (2000) distinguished between the two authors'

interpretations of the concept, it is important to note that knowledge and

experience are inherent in Gibson's definition of affordance, yet he seemed to also

want to stipulate that affordances exist outside of a person's interaction with them.

Norman (2008) wrote once more about understanding of affordances in HCI;

he introduced the concept of a social signifier to replace his previous concept of

perceived affordances when speaking about design. Norman (2008, p. 18) defined a

social signifier as some "signal in the physical or social world that can be interpreted

meaningfully." Here Norman is attempting to provide a broader term than affordance, something that can be used by anyone to understand what is happening in various contexts. What Norman is defining is similar to what Goffman (1974, p. 21) identified as a primary framework, which allow the user to "locate, perceive, identify, and label a seemingly infinite number of concrete occurrences."

Chalmers (2004) described how the perception of the affordances of a tool might change during its use in a new context or community of use. Of specific import is the way in which he described agents as being more open to variability and interpretation of norms when appropriating a new technology into a new context. This openness allows agents to make use of the affordances of a new tool, while simultaneously adapting the tool to their own devices. In addition, he (Chalmers, 2004, p. 233) described a social component to the act of tool appropriation in which an agent's interpretation of the tool and its affordances, combined with reaction to others' use and interpretation within the community, create a feedback loop that can engender an "intersubjective consistency of behaviour."

In other work examining affordances in HCI, three types of affordances found in ambient, ubiquitous, and pervasive technologies were identified (Vyas, Chisalita, & Veer, 2007) as functional, interactional, and appearance-based affordances. The authors (2007, p. 4) argued that a system needed to provide "visibility, manipulability, and control to its users" to ensure it was richly interactive. From this vantage, affordances emerge as a user interacts with a system.

Scholars have also used Gibson's definition to identify various affordances in specific contexts. boyd (2006b) examined the concept of friendship in SNS and postulated that although face-to-face friending norms assist with similar behavior in the online context, the environment is quite different from offline environments because SNSs afford replicability, searchability, persistence, and an invisible audience. She (2006b, para. 4) wrote that "friendship helps people write community into being" and argued that this community provides members with "a contextual frame through which they can properly socialize with others." In this work, boyd (2006b, para. 11) contended that participants' abilities to facilitate relationship status within an SNS were "deeply influenced by the technological affordances of a given system and their perception of who might be looking." In addition, she (2006b, para. 42) alleged that technological affordances "affect people's incentives to connect" with others within the SNS environment.

In his work on computer-supported collaboration, Vatrapu (2007) discussed varying concepts of affordance, including technology, social, and socio-technical affordances. Technology affordances are defined as "action possibilities in a technology environment given the technical capabilities of the system and the action capabilities of the user" (2007, pp. 24–25). He (2007, p. 28) further argued that technology affordances are both "emergent properties with reference to each actor-environment system" and connections between "perceptual actors and technological environments," while he defined social affordances as simply "affordances for social interaction" (2007, p. 2). In an attempt to merge

technological and social affordances, Vatrapu defined the concept of socio-technical affordances as "social action possibilities in a socio-technical system relative to an actor" and used the concept of actant from Latour (2005)—a term used to describe something (not necessarily human) that acts or is granted activity by others—to suggest that socio-technical affordances concern both actants and actors. He went on to identify three important components of socio-technical affordances: the social relations of individuals in an interaction, technology, and the properties of individual actors.

Hogan (2008, p. 15) insisted that affordances in new media environments are access points to social structure and one's network, stating that "social life is moving from a focus on space-time social constraints to affordance-based social access." He (Hogan, 2008, p. 14) noted that the shift from interacting directly with social structure to interacting with access points in these new media contexts can "alter our sense of social structure and our capacity to interact with it." Participants in social media platforms utilize affordances to access their network of connections, while those not using these tools will have fewer capabilities of interacting with their social networks.

In a similar vein to Hogan's conception, Rettie (2005) combined concepts

from Goffman's frame analysis, Gibson's affordance, and Merleau-Ponty's idea of

presence to examine embodiment within the context of mobile technologies (see

Figure 6). She (Rettie, 2005, p. 17) defined affordance as a "perceived potential for

action… [that] include located perspectives, action with objects and interaction with

others." In this framework, the agent creates a sense of presence and embodiment

within an environment based on perceived affordances; for example, all agents in a

shared space interacting with the affordances of a mobile phone create these

feelings of embodiment and presence. Rettie brought together the concept of frames

and affordances by stating that: a) perception is shaped by frames, b) presence can

be thought of as an engrossed involvement in a frame, and c) affordances are the

perceived actions allowing an agent to experience presence and embodiment in a

Author	Theory	Theoretical Implications for Presence
Goffman	Frame Theory	Presence as engrossment within a frame. The frame relates to activity or 'what is going on'. Sudden breaks in frames create breaks in presence.
Merleau-Ponty	Corporeal Schema	Subject summoned by the environment. Presence is a response to our perception of ourselves as active within an environment. Sudden change as orientation switches from the physical to the virtual environment.
Gibson	Ecological Psychology	Self-body-environment is a holistic system. Embodiment and presence are created by affordances and agency within the environment.

Table 1: Implications for Presence Theory.

Figure 6 Graphic comparing theories of presence by Goffman, Merleau-Ponty, and Gibson
(Rettie, 2005, p. 30)

frame.

She (Rettie, 2005, p. 23) believed that "[f]rame analysis helps to explain presence in mediated environments; the frame provides the context, it both constructs and makes sense of the experience. A mediated environment may be framed as a space or a place." She found that agents were able to experience embodiment in virtual environments due to their responses to the affordances of the environment. Just as Rettie (2005) integrated frame analysis and affordance to look at mobile phone use, this work will integrate frame analysis and affordance to look at activities of scholars in Twitter.

2.3.2. Affordances in Twitter

At the time of this writing the Twitter homepage (Twitter, n.d.-b) read, "Connect with your friends — and other fascinating people. Get in-the-moment updates on the things that interest you. And watch events unfold, in real time, from every angle." The Twitter *About* page (Twitter, n.d.-a) went on to say that "Twitter is the best way to connect with people, express yourself and discover what's happening." These messages suggest that Twitter is a unique context that affords different modes of social behavior, which in turn makes it an interesting area to study. Papacharissi (2011, p. 306) wrote that "affordances are negotiated and re-deployed, characterizing technology that is both 'socially shaped and socially shaping' (Buckingham, 2008, p. 12; Williams, 1974)." She (Papacharissi, 2011, p. 311) went on to argue that "[t]he architectural affordances of SNSs present a compelling theoretical backdrop, upon which the utility, consequences, and

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everyday ecology of media habits, including online social networking, may be explored."

In a paper making a similar argument to Papacharissi's, boyd et al., (2010, p. 2) found that "[a]s [Twitter] participants embraced the technology and its affordances, a series of conventions emerged that allowed users to add structure to tweets … users developed ways to reference other users, converged on labels to indicate topics, and devised language to propagate messages." boyd, Golder and Lotan's (2010) description is noteworthy in that they explained how agents participate in a context in a digital environment where they perceive affordances based on their experience and the actions of others. Scholars studying Twitter have shown evidence that suggests that the amount of affordance use in Twitter (e.g. hashtags, mentions, URLs, etc.) by individuals is related to the communities to which they belong (Holmberg et al., 2014).

The desire to act for an audience by users of new media has led to "the popularization of tools that afford people the ability to interact with many individuals at once vitalizing the performer/audience relationship" (Litt, 2012, p. 330). " Litt (2012, p. 337) argued that "the features available, or lack thereof,… may impact the actual audience as well as provide or hide clues about the actual audience." In this way, affordances of social media applications (such as curators, algorithms, and/or audience feedback mechanisms) can influence the way in which users envision their audience.

Mabry (2001, p. 324) made the association between software, instrumentalities (or what is being interpreted as affordances in this context), and framing by stating that "[s]ome aspects of expressive style appropriations used by online group members are artifacts of computer-mediated communication systems… It is these types of software-driven instrumentalities that provide the communication resources for enacting textual message framing." In work examining networked publics, boyd (2011, p. 39) wrote that "the ways in which technology structures them introduces distinct affordances that shape how people engage with these environments." She went on to argue that affordances of network publics include storing, reproducing, intensifying, and distributing social acts and information and suggested that the affordances (invisible audiences, collapsed context, and the blurring of public and private) of networked publics "introduce new dynamics with which participants must contend" and that these affordances in turn help shape the networked public. During their investigation of the social media tool *ct.cz*, Shklovski and Valtysson (2012, p. 422) found that "the technical affordances of the discussion forum software… shaped the social interaction within the forum." This shaping of social interaction, the recursive nature of affordance use, and the reinforcement of norms highlight the importance of understanding affordance use in computer-mediated environments.

With regards to Twitter, perceived affordances include the ability to create multiple accounts (including a public or private account), access social reports such as a count of tweets, of Twitter users both following (followers) the account owner

and those whom he or she follows (followees), of tweets using any combination of hashtags, user mentions, URLs, media, symbols, photos, retweets, and to provide a description of oneself (profile), mark tweets as inappropriate, block users, and delete tweets (see Table 1 below).

Table 1. Examples and descriptions of affordances available in Twitter

Type	Functionality
Account creation	Users can create multiple accounts; this can be used for the creation of personal and professional accounts
Report number of tweets	Users can view how many tweets they or someone else have made over time
Report number of followers	Users can view how many users follow tweets they or someone else have made at any specific time
Report number of followees	Users can view how many users the account owner follows at any specific time
Profile	Users can create a profile in Twitter that can be used to describe their presence on Twitter
Profile image	Users can upload images to be shown on their Twitter profile pages
Hashtags	Users can add hashtags (#Obama) to their tweets
User mentions	Users can mention (@obama) other Twitter users in their tweets
URLs	Users can link (http://foo.com) to other material in their tweets
Retweet	Users can retweet (RT:) someone else's tweet
Mark tweet as inappropriate	Users can mark a tweet as inappropriate
Block user	Users can block other users from accessing or responding to their tweets
Delete tweet	Users can delete their own tweets

It is important to examine the various ways these affordances affect interaction in this environment. boyd (2011, p. 55) contended that "[a]s social

network sites and other emergent genres of social media become pervasive, the affordances and dynamics of networked publics can shed light on why people engage the way they do." Much of the literature reviewed above suggests that the affordances of Twitter may assist in impression management by allowing users to frame the communication in specific ways. Baym and boyd (2012, p. 326) wrote that "[s]ites' architectures and the affordances they provide do shape identities, audiences, and publics, but not in simple ways." This dissertation provides evidence to support these ideas by examining the framing behaviors and affordance use of scholars in Twitter in order to understand how tweets can be recognized by others as personal or professional.

It has been demonstrated that agents in a specific niche (or context) use the available affordances of an object they perceive. In Twitter there are several affordances available to users that allow them to communicate with their networks, provide impressions of themselves through public profiles, and interact with the application's content in various ways. While affordance use is an important aspect of Twitter interaction, it does not by itself allow for the recognition and description of patterns used by scholars to communicate in this environment. Goffman's (1974) frame analysis model, as described in the next section, complements the examination of affordance use by allowing for a description of the frames these affordances help reinforce and that are used to make sense of the communicative activity.

2.4. Frame Analysis

A frame, within Goffman's understanding of social interaction, is a concept he first introduced in his book *Frame Analysis: An Essay on the Organization of Experience* (1974). The frame analysis (FA) model is used to describe the rules and definitions of a situation that people employ to understand what it is that is going on during a social interaction. A frame embodies the social norms and rules that underlie social organization, and takes into account the unique circumstances of the context and the affordances in which the interaction occurs. As Mabry (2001, p. 321) explained, "[f]rames are linguistically and semantically rendered inflections in the construction of shared meaning." Goffman's (1974, p. 11) characterization of a frame is as follows:

> I assume that definitions of a situation are built up in accordance with principles of organization which govern events – at least social ones - and our subjective involvement in them; frame is the word I use to refer to such of these basic elements as I am able to identify. That is my definition of frame. My phrase "frame analysis" is a slogan to refer to the examination in these terms of the organization of experience.

The concept of a frame has been used in a variety of academic disciplines including management and organization (Cloutier & Langley, 2007; Downing, 2005; Heimovics, Herman, & Jurkiewicz Coughlin, 1993; Kahneman & Tversky, 1979; Payne, 2001; Stone, Bigelow, & Crittenden, 1999), media studies (Gamson & Modigliani, 1987; Jarlenski & Barry, 2013; Koenig, Mihelj, Downey, & Gencel Bek, 2006; Lin & Sun, 2011; Pan & Kosicki, 1993), and social movements (Anheier & Kendall, 2002; Benford & Snow, 2000; Berger, 2009; Harlow, 2011; Hedley & Clark, 2007; Pyles & Harding, 2011).

To set up parameters for analyzing frames, Goffman (1974, p. 10) used the concept of a strip to identify any "arbitrary slice or cut from the stream of ongoing activity... as seen from the perspective of those subjectively involved in sustaining an interest in them." A strip is not something that distinguishes some natural demarcation made by participants or by the person analyzing the activity; rather, it is simply a starting and ending point for analysis. At the societal level, he (Goffman, 1974, p. 27) argued that primary frames make up an essential element of a social group's culture, suggesting that "understandings emerge concerning principal classes of schemata, the relations of these classes to one another, and the sum total of forces and agents that these interpretive designs acknowledge to be loose in the world."

Goffman (1974, p. 27) believed that "[o]ne must try to form an image of a group's framework of frameworks - its belief system, its 'cosmology.'" During daily life, at the level of the individual, he presumed that actors tend to see situations in terms of primary frames; when at least one frame is applied, it can help distinguish and acknowledge what it is that is going on during a communicative activity. A primary frame is considered to be one in which the actor who is applying it does not need to recall some prior interpretation in order to render the framed activity meaningful. He (1974, p. 21) contended that a primary frame allows the participant to "locate, perceive, identify, and label a seemingly infinite number of concrete occurrences defined in its terms."

At the societal level, Goffman made a distinction between two types of primary frames: natural and social. Natural frames (NF) identify physical occurrences (i.e., events that are caused solely by natural determinants), and they are applied in a situation where no actors control the outcome of the event. Social frames (SF) are considered to be distinct from NFs and are applied in order to understand events in social situations, with the implication that actors *can* control at least part of the outcome. Activities can be (and often are) framed using multiple frames, a process referred to as layering. When an activity is framed with multiple frames, there is an innermost layer and an outermost layer (termed the rim).

An activity that is framed using a SF can include actors at various levels of engagement with the activity and with each other. One type of actor that Goffman identified is termed a constant, describing a participant who is involved in the activity in a small capacity, such as a janitor or waiter. As an actor working in the periphery of the frame, a constant applies different frames to the activity from those that are applied by the primary actors. If one were to consider interaction in Twitter a constant may be considered as someone who follows others and reads tweets, but it not involved in the tweeting behavior. The involvement of an actor in any activity falls along a continuum ranging from boredom to over-involvement. This also has resonance with how users behave in social media environments as they interact at various levels during a day from simply reading tweets to replying to tweets to tweeting themselves.

Goffman suggested that as actors go about their daily routines they are able to apply primary frames to activities only after having had a simple glimpse of any communicative act and/or natural act; this occurs rapidly and allows the actor viewing the activity to come to a general understanding—in most cases—about the basics of what is happening and gauge what the outcome might be. As actors progress through their daily lives and project frames onto activities to understand what it is that is happening and gauge what might occur as the activity proceeds, their confidence in their ability to frame activities increases. This confidence in framing seems to make sense, as adults are better at gauging what is happening in a situation than children.

Goffman argues that SFs are used to describe activities that include guided doings, which are activities where actors are guided by certain standards of social etiquette, including such rules as tactfulness, elegance, safety, economy, honesty, efficiency, and economy. His model suggests that actors are not merely acting, but instead they are acting based on certain assumptions and rules. He goes on to state that SFs include rules and that each frame (and frame combination) has a different set.

One central component of FA is the concept of keying; this involves the transformation of a primary frame into another frame, which inherits the norms and rules of the primary frame but is understood as something different by those employing it. An example might be children playing at war; one or more primary frames is used to establish a situation as war, but the primary frames are keyed in

such a way as to allow the children (actors) within this specific context during this specific time, and those outside who glimpse the situation, to understand the activity as playing at war. When an activity occurs that has been keyed, the primary framework serves as a model that the actors in the context use to guide their activity; the actors transform the primary framework into a keyed frame. During a keying, the actors in an activity can become acclimated to the activity in such a way that they are engrossed in the situation; Goffman described this as actors being confronted with engrossables, which allow actors performing an activity to become absorbed in their own realms, or worlds, until the performance has been completed. An example of becoming engrossed in Twitter through the reading of tweets or communicating with others has been recounted in popular media (Conner, 2013), as employers have complained that social media activity causes a loss of productivity because the workers become engrossed and disregard their own work.

In general, a keyed activity varies depending on how much the key has evolved from the primary frame; distance from a primary frame is more evident as the keying moves farther away from the primary frame. It is important to note that a keyed frame can be keyed in both directions, both closer to the primary frame and farther away from the primary frame. A keyed activity can itself be keyed, with no obvious limit; this is known as rekeying. A rekeying occurs on the keyed activity, not on the primary framework that was initially keyed. Goffman described rekeying as adding a layer or lamination of understanding to the framework imposed upon a strip of activity. During this layering he argues that the innermost layer and the

frame rim are very important as the innermost layer is the place where the

participant interacts with engrossables and the rim acts as both the limit of the

frame and an indication of the significance of the activity to actors outside the frame.

Another central concept of frame analysis is fabrication. Fabrication refers to

a strip of activity in which one or more actors create a false frame in order to keep

one or more other participating actors from knowing what is actually going on. The

orchestrators of a fabrication are sometimes identified as deceivers or operatives,

whereas the duped participants are sometimes known as victims, suckers, etc. When

more than one participant enacts a fabrication, they will communicate using

collusive communication; those whom the fabrication is being run against are said

to be the excolluded. The actors who are enacting the deception understand the

activity as a fabrication, while the actors who are contained in the fabrication

understand the activity as something else; the deceivers are the only actors seeing

the accurate rim of the framed activity. The basic components of a fabrication

include two main elements: any possible outcomes relating to the reputation of the

deceivers, and the misleading of the dupe both in understanding and response.

Goffman described the concepts of fabrication and keying as occurring on a continuum (see Figure 7) with deceptions on one end and keyings and rekeyings on the other. Because fabrications involve deception, the capacity for the deceivers to perform the same deception on the same participants is severely threatened when an unexpected break or termination in the fabrication occurs. If activities are not fabrications, then actors can typically restage the activity at another time with minimal problems.

Goffman (1974) wrote that social structures were affected by fabrications in two general ways, through the introduction of
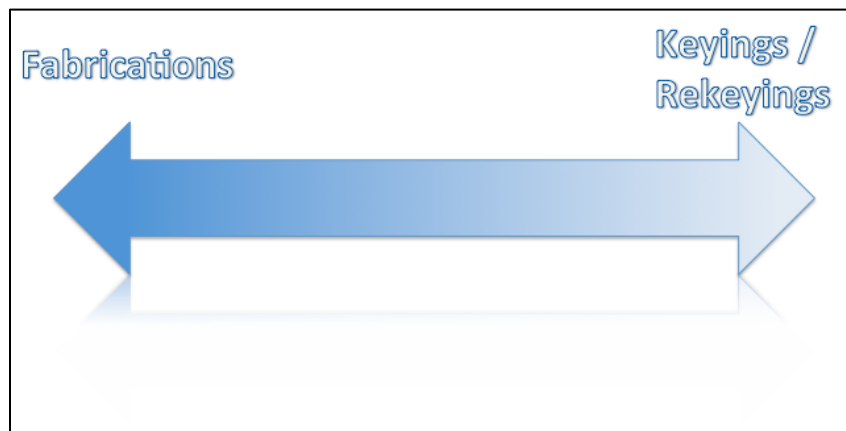
Figure 7 A depiction of the continuum between fabrication and keying

suspicion and through the introduction of doubt. Suspicion is a feeling an actor has in a social activity in which they, rightly or wrongly, believe that a situation has been created in such a way making it difficult for them to fully understand who is framing the situation. Doubt is described as a reluctance to frame a situation because of concerns that the frame or key the actor wants to apply may not actually describe the activity. Fabrications occur in social media environments through numerous activities including bot posting, phishing scams, identify theft, credit card theft, and

many other activities in which a user (or group of users) attempts to fabricate an activity in which the duped participant believes one thing is occurring when something else is occurring. There is an ongoing discussion in the altmetrics field as to the impacts of the doubt and suspicion raised by bots who tweet links to scientific articles (Haustein, Holmberg, Bowman, & Larivière, 2014) and the consequences this has on the overall usefulness of these metrics.

With regards to fabrications and deceit, Goffman (1974, p. 106) argued that falseness is an important component of our "beliefs concerning the nature of persons." In part because of deceit and suspicion, the prior actions of an actor can be reinterpreted by others and used as validation to consider him or her a deceiver in future interactions. He (Goffman, 1974, p. 110) goes on to say that:

> ... the social front that an individual presents to his various associates during his daily round allows them to make some assumptions about his social worth and moral standards, the latter including, importantly, the practice of candor and openness regarding failures in these matters. If it can be demonstrated that one of these premises is false, the individual can be seen as maintaining a false position, allowing, if not encouraging, those around him to live in a false world, at least insofar as their view of him forms a part of their world. Thus, he does not have to fabricate a construction - he does not have to *do* anything - merely fail to embody the attributes and standards of conduct expected of him.

Additional activities can occur in a framed event, but they occur apart from the main storyline; they can occur at the same times as activities inside the main storyline but actors will treat them as something different from the main activity, as something out of frame. It is important to note that actors can act as if they are paying attention to the main narrative while at the same time remaining able to pay attention to an outside activity. In every strip of activity encountered, actors have

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the capacity to pay attention to the proper channel and manage the out-of-frame channels. The ability to overlook out of frame activities, to be able to ignore both in appearance and fact, is a significant behavior available to actors; they are thus able to manage distraction across various contexts and times. This seems to be the case in social media where it's evident that participants are able to communicate with others while at the same time paying attention to the endless new messages streaming in across their Twitter feed or Facebook wall.

Signs play an important role in the framing of an activity and occupy a separate track apart from the main activity track (or main story line). The sign track consists of indicators that are used to bound, regulate, qualify, and articulate the components and phases of activity. Directional signals contain components described as connectives that are used to tie actors with actions. Goffman (1974, p. 211) used a telephone conversation as an example of connectives; a caller who is not recognized by a person answering the phone feels obliged to quickly give their name so that the person answering can socially categorize the caller in order to establish a connective channel from which to proceed. In addition to connectives, temporal sequences (or the directional track) are used to link discourse between participants. He (Goffman, 1974, p. 212) writes that:

> ...[a] spoken or written representation of a strip of interaction strongly encourages the use of temporal sequence and its functional substitutes, a first actor's move being described in full before the disclosure of a second actor's responsive move. In effect, then, transcription practices favor a first actor's finishing before a second actor begins. That finishing is what printed or spoken narration needs. But real interaction does not need that waiting in the same degree.

During any activity, signs and symbols are both communicated directly and indirectly and can contain qualifiers, markers, etc. By using these qualifiers and markers as a back channel a participant can signal inattention, the end of a speech, the passing of a turn, or countless other actions to help facilitate the communication system. Within the online social media environment, a platforms' affordances are used in this way as, for example, tweets in Twitter contain the time in which they occurred, where they came from, the person's network size, and whether they've added additional affordances to the tweets to signify something special such as a hashtag (#altmetrics) or a URL pointing to more information. In this way Goffman's notion of a separate channel of signs and symbols and Gibson's conception of affordance can be brought together to help understand activity in social media environments such as Twitter. Certain affordances in Twitter, such as a hashtag or mention, act as signs or symbols and add context to the message being tweeted that can be used by the audience to frame the tweet.

During a typical framed activity between two actors, the participation status of each actor must also be considered. Each actor typically has the same privileges during an activity, each possessing the capacity and the right to listen or to speak. If an actor is not fully capable of acknowledging these privileges, then he or she might be considered as partially competent. When there is an audience for an activity (such as during game play), then the audience often adopts the role of onlooker; the very act of having an audience turns the event into a performance. The audience has a right to cheer on or peer at the actors, and the actors are able to detach themselves

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from this reaction. When two actors are performing, they use exaggerated patterns to show the audience that they understand each other.

When an activity takes place, there are usually devices used to differentiate this activity from others in the same space. Goffman (1974) identifies these devices as brackets and distinguishes between temporal and spatial, external and internal, and formal and informal types of brackets. Brackets can be used to rekey activities or separate events, and they allow actors to set up a specific role or to introduce new actors to the ongoing activity. External brackets are often used to define the frame of an activity, whereas internal brackets mark a break in the ongoing activity itself. Formal brackets are typically employed to set up an activity, whereas informal brackets are used to define a temporary break in the activity. Twitter developers recognized the need for brackets so that users could follow conversational threads in the user interface, so they introduced a vertical line in the interface to connect tweets together (Kamdar, 2013). In addition, users have also introduced a new affordance—that function as brackets—into the Twitter environment in which they use numbers (e.g. 1/3, 2/3, and 3/3) to distinguish a series of tweets as one, complete thought.

There can be instances in which an activity is incorrectly framed; these instances are defined as misframings, and they can occur when an actor wrongfully frames an activity—without some form of deception by others. There are also instances of miskeyings, and these can occur when activities have been rekeyed too far away (upkeyed) from the primary frame or when activities have been rekeyed

too far back (downkey) toward a primary frame—such as when a Twitter user replies to a thread of tweets much later than the original tweet and it is unclear how the new message fits with the original tweets. In addition, a dispute can occur when multiple actors frame an activity. An activity is considered cleared if it has been framed in a way that allows all actors to "have a clear relation to the frame" (Goffman, 1974, p. 338). As discussed in the introduction, misframings can occur in social media environments such as Twitter and Facebook and present a real challenge to scholars who want to use the medium for both personal and professional communications.

A frame break can occur for various reasons: a break may occur when an actor applies a frame to an activity and the frame is unable to explain everything that occurs in the frame (such as when Twitter users reply quickly to a tweet and the thread changes direction before audience members understand); a break may occur when an actor in some way loses control of his or her body (such as belching) (or in Twitter a mistyped communication); a misframing can cause a break in a frame; body clumsiness (such as tripping) or the facial movements of an actor (such as smiling at inopportune times) can cause a break in a frame (or in Twitter adding an unexpected emoticon to a tweet). In addition to frame breaks, an actor can become disengaged during a framed activity in two ways: by employing internal brackets to signify an official break in the frame when there isn't supposed to be one or by taking a personal break (e.g. for a drink of water) (such as leaving a Twitter

conversation), or by presenting a disrespectful or inappropriate facial expression (or in Twitter adding an unexpected emoticon to a tweet).

An actor can also break frame if they become capsized in such a way that they are no longer available for interaction or the maintenance of any role. This type of frame break can cause other actors to follow suit, thus causing a flooding out of the frame (such as if one person starts laughing and others follow or when Twitter users leave a conversation because of a humorous or inappropriate tweet). The limits of a frame can be revealed if the actors are forced to maintain appropriate roles. Often when this behavior erupts, the actor will change from attempting to maintain a role to attempting to take on a new identity. An actor may also flood out of a situation when the activity has been misframed (such as when a person responds to another in Twitter). Another possibility for the breaking of a frame is when a seemingly uninvolved outsider is shown to be a part of the activity, thus flooding into the frame (see Figure 8 for a graphical representation of these components of frame analysis).
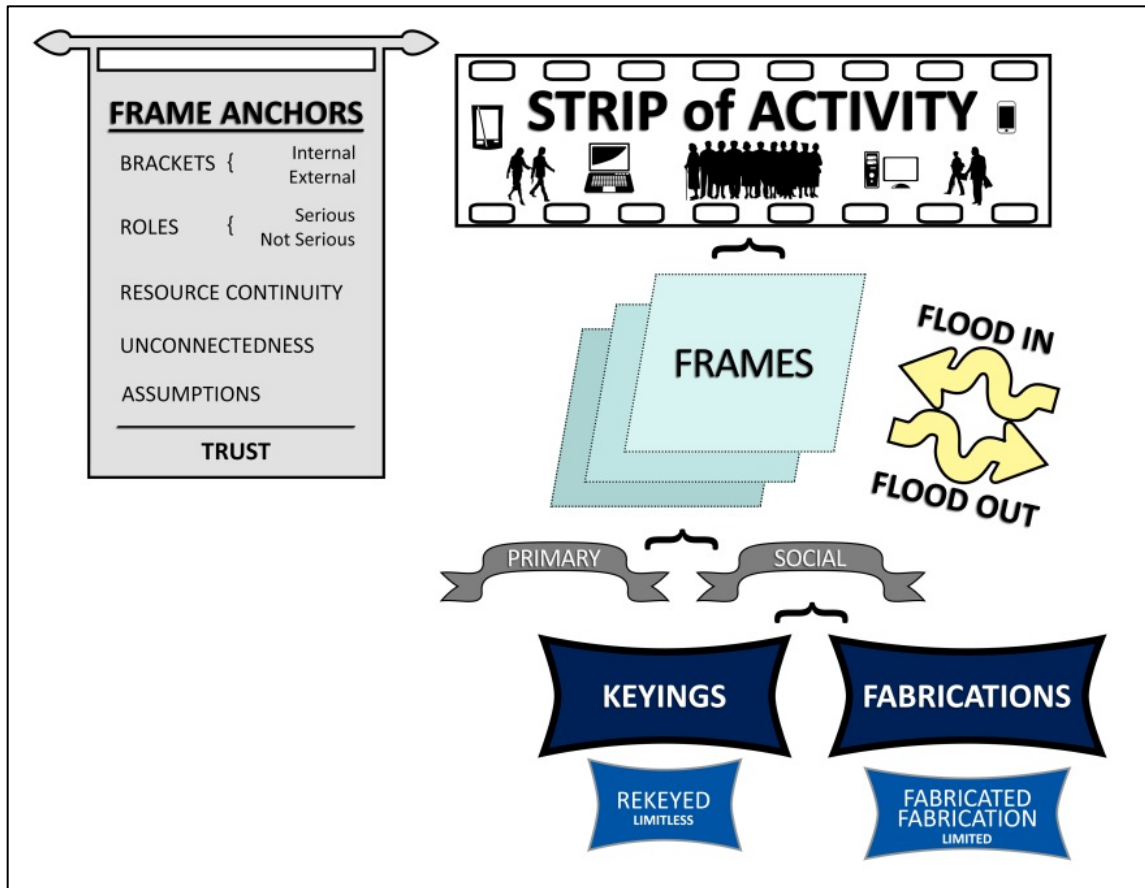
Figure 8 Graphical representation of the main components of Erving Goffman's (1974) Frame Analysis Model

Goffman's final chapter of Frame Analysis (1974, p. 498) extended his framework from strips of activities to strips of spoken statements, i.e., informal conversations, and defines a conversation as the kind of informal talk "that assumes an easy exchange of speaker-hearer role and involves a small number of participants engaged in a consummatory moment or more of enjoyable idling." Informal conversation is seen as a structured collection in which "bits and oddments of all the ways of framing activity in the culture are to be found" (Goffman, 1974, p. 499). He (Goffman, 1974, p. 544) defined this type of talk as "a rapidly shifting

stream of differently framed strips, including short-run fabrications (typically benign) and keyings of various sorts."

When actors are engaged in conversation, Goffman (1974, p. 500) believed that whatever was said would need to "satisfy the rules of a language… there will be required use of 'indexical expressions,' for example, those of time, place, and person, which are responsive to this setting – the one in which the speaking is occurring – as opposed to the setting this is spoken about." In addition, speakers engaged in a conversation are compelled to follow rules of etiquette that include avoiding certain topics, maintaining an appropriate length of turn taking, paying a suitable amount of attention, and keeping references about oneself to a suitable amount. Goffman also believed that social relationships and social rank were considered and accounted for throughout a conversation.

Goffman identified four problems associated with conversation: the first refers to the limit of cast members that the speaker and listener can manage in informal talk; the second involves the issue of embedding, which refers to the number of times that a speaker can indicate that a figure quotes another figure; the third refers to the limit to how much expression of gesture, feeling, accent, etc. can be used when a presenter mimics another person during a presentation; fourth, there is a limit to the amount of taboo language that can be used before it is considered too much when taken in the context of a speaker who is replaying or citing the actions of others.

When reading novels, plays, or tweets from Twitter, it is important to consider who is doing the speaking. Goffman (1974, p. 541) wrote that "[i]t is not the shout of responsive action that talk mostly needs and seeks to get but murmurings - the clucks and tsks and aspirated breaths, the goshes and gollies and wows - which testify that the listener has been stirred, stirred by what is being replayed for him." These might also include the use of affordances in Twitter such as retweets and mentions to accentuate the murmurs—such as a retweet where the original tweet is "Obama is great!" and the person retweeting adds a phrase like "- mmm hmmm" (e.g., RT: Obama is great. – mmm hmmm) in order to murmur a sign of agreement and distinguish that the retweeter is adding something to the discussion.

During informal conversation, speakers may distance themselves from the faults of a current role by acknowledging the role to the listener and maintaining a protective distance from it. Goffman (1974, p. 542) argued that a speaker is seen as "marking the limit to which his current role can hold him" through the use of suppressible diversions, comfort actions, dissociated side involvement, fleeting frame breaks, small bits of business, and other similar acts. He also views the management of apologies and excuses as another way in which the speaker maintains a protective distance from the role being enacted. The speaker may use a difference in voice as a reflexive frame break or may take minor liberties during the conversation, such as breaking frame to provide a quick apology for something that has been said. He (Goffman, 1974, p. 544) believed that this distancing is an

important component of conversation that is often ignored by sociology, and argued that "the social world is built up out of roles sustained by persons, these persons have, and are seen to have a right to have, a wider being than any current role allows." One might conjecture that the notion of distancing would allow for the distinction between personal and professional tweets.

Goffman (1974, p. 552) believed that framing in talk is a "social function" that serves to "provide each of us with sympathizers who will stand by while we recycle remains of our old experience." This framework makes two important assumptions about individuals in our culture: first, people are characterized by their development over long periods of time, and second, social situations allow people to strengthen these characterizations. When a person recounts their own past actions and discusses their future possibilities, they present an abstracted version of themselves.

This is very intriguing because of Goffman's insistence that any small portion of text can portray the cultural norms and structures inherent in frames, so one might argue that tweets (made up of 140 characters) are not too small to be analyzed using frame analysis. While this is a promising aspect of Goffman's model, this work will not be focusing on the linguistic components of tweets. Instead, Goffman's framework will be used in combination with Gibson's notion of affordance to examine the ways in which the affordances of Twitter assist scholars with framing tweets as either personal or professional. This issue of conversational analysis will be something considered in future work.

A frame is a useful academic concept to describe changes in our perceptions of activities during day-to-day life for many reasons, perhaps a main one being that it stems from a common term used in the English language (Merriam-Webster, n.d.) to describe either the construction of something, the design of something, the enclosure of something, or the purposeful adjustment of something. Actors apply frames to activities in order to separate one activity from another in day-to-day interactions. The act of applying a frame to slices of an activity allows actors to mentally and temporally distinguish each activity slice into a beginning and ending, while also allowing actors to distinguish the spatial and temporal conditions in a slice of activity that has already occurred. In addition, frames represent an important social function in that they allow individuals to define activities in certain ways based on the available information, their previous experiences, and the context in which the activity is occurring.

As people navigate their surroundings, they are constantly shifting their focus from one slice of activity to another in order to be able to understand what it is that is happening; people frame each slice so that they can make sense of it and so that others with whom they are interacting with can make sense of it in a similar way. Manning (1992, p. 118) wrote that Goffman "believed that our observations are understandable only in terms of the frame we put around them." Applying a frame to understand what it is that is going on allows actors to define an activity using their own understanding of norms and rules for interaction in combination with societal norms and rules of interaction within unique contexts.

In Goffman's interaction order, the importance of a frame is not in the slice of activity that is being framed, but rather in the way in which the application of frames transforms the meaning of the content for the actors involved. A frame allows actors to distinguish between what is important at a given time and space and what is not; drawing a boundary around an activity allows participants to disregard all that falls outside the frame.

For example, an actor interacting with other participants on Twitter tends to temporarily ignore the construction of the website or 3rd party application they are using, how the technology is powered, the tools (e.g. mouse, keyboard, etc.) they are using to interact with the website or application, and how the data transmission occurs online or through a smart phone—until something breaks or they are unsure how to accomplish some act. These factors are considered to be irrelevant in regard to the current activity of interacting with others, and thus anything outside the temporal and spatial frame can be ignored. In fact a Twitter conversation can be presented in different forms, using different technologies (e.g. mobile phone, tablet computer, and desktop computer), and this difference typically does not disrupt one's frame when interacting with other participants; these different technologies may also allow for different affordances. Based on observations by the author made during Twitter use, it seems that the changes in the interface recede into the background unless the change is so drastic as to change the meaning of the content within the frame.

Actors interacting in an activity apply frames to understand what is happening, but Goffman argued that they usually do not have to openly discuss the frame that is being applied. He wrote that each person would try to adjust their own interpretation of what is happening so that their understanding is aligned with the frames of others within the activity; this suggests that if an activity seems to be proceeding in a way that is understandable by all, then a tacit agreement amongst participants is reached. Only when there is a failure by an individual to maintain the suitable designation is a frame explicitly defined.

As an example, when Twitter was new and participants were not sure how to utilize the tool and the Twitter designers were not sure what affordances would be used in the environment, early adopters utilized special symbols such as the '@' symbol to designate a communication targeted at another user (Java, Song, Finin, & Tseng, 2007). These types of behaviors became commonplace and in some cases were adopted by the Twitter developers to designate rules and norms for the environment, thus introducing new affordances that allowed Twitter users to interact in the environment in novel ways. Once comfortable communicating within the Twitter environment, participants seem to no longer have concerns when applying a frame to understand activities in this context. This example supports the argument that FA can be used to study and interpret the ways in which participants are successfully interacting within this context.

2.4.1. Other Interpretations of Frame Analysis

The publication of *Frame Analysis: An Essay on the Organization of Experience*

(Goffman, 1974) prompted responses from members of the sociological community

(Craib, 1978; Davis, 1975; Gonos, 1977; Jameson, 1976; Schmitt, 1985) and

provoked both praise and critique. Jameson (1976, p. 119) wrote that FA allows one

to recognize that "meanings, in everyday life, are the projection of the structure or

form of the experiences in which they are embodied, and that they may most

adequately be dealt with in terms of the ways in which such experiences are

framed." Gonos (1977, p. 858) claimed that Goffman's work allows one to "become

cognizant of the rules for cognition and communication that are bound up with the

production of any world."

As scholars have looked back at Goffman's work, they have begun to once

again see value in FA. While some critics argued that Goffman's FA work consisted of

too many anecdotal examples, Schmitt (1985, p. 384) surmised that "FA does not

demonstrate the significance of transformations in lives of ordinary people but the

observations of Goffman's critics do not prove they are unimportant." With regards

to social structures, Jacobsen and Kristiansen (2010, p. 79) wrote that "[e]vidently,

one can regard 'the situation' as well as 'the interaction order' and perhaps

especially 'the frame'—Goffman's basic units of analysis—as social structures, albeit

on the micro-level, which may impose situational-structural constraints on human

action." Pinch (2010, p. 419) added that:

> Goffman does not analyze the doors and architecture of rooms as part of an
> explicit sociology of technology, but he does note that the different

technological and material options are crucial to the sorts of social interaction they permit to be staged... The inspiration for the sociology of technology to be found in Goffman's work is that the material form of technologies, although never explicitly analyzed, really does matter. The "interaction order" studied by Goffman is embedded within, mediated by, and staged by material circumstances and mundane technologies.

In the above paragraph Pinch (2010, p. 419) makes an interesting statement saying that "the different technological and material options are crucial to the sorts of social interaction they permit to be staged," suggesting that the functional attributes of technologies and material within the context of interaction (or as Gibson (1977) calls the niche or context) are important for the staging of the interaction. This is similar to the argument in this dissertation that suggests that affordances in Twitter help frame the communication.

With regards to using various components of the FA framework, the concept of keying has been used by scholars to examine law enforcement (P. K. Manning & Hawkins, 1990), fantasy role-playing games (Fine, 1983), pets as quasi-family members (Huang & Schmitt, 1982), pornography (Deegan & Stein, 1977), and news making (Tuchman, 1978). David Snow and Robert Benford were among the first to use and interpret FA in social movement studies. In a more recent book chapter, Snow (2004, p. 384) defined framing within social movements as "the signifying work or meaning construction engaged in by movement adherents (e.g., leaders, activists, and rank-and-file participants) and other actors (e.g., adversaries, institutional elites, media, social control agents, counter-movements) relevant to the interests of movements and the challenges they mount in pursuit of those movements." Applied to social movements, the idea of framing problematizes the

meanings associated with relevant events, activities, places, and actors, suggesting

that those meanings are typically contestable and negotiable, and thus opens to

debate and differential interpretation.

A popular adaptation of Goffman's FA was put forth by Entman (1993) and is

one of the most cited versions within media studies discourse. He (Entman, 1993,

pp. 51–52) wrote that the notion of framing reliably suggests a way of illustrating

the power imbued in text used for communication and defined framing as involving

"selection and salience," while defining the act of framing as:

> select[ing] some aspects of a perceived reality and mak[ing] them more
> salient in a communicating text, in such a way as to promote a particular
> problem definition, causal interpretation, moral evaluation, and/or
> treatment recommendation for the item described.

He went on to argue that frames allow participants to define problems, diagnose

causes, make moral judgments, and suggest remedies, while comprising (at

minimum) four components of the communication process (the culture, the

receiver, the communicator, and the text). His framework has been applied to a

variety of issues including gay rights in Chinese media (L. Zhang & Min, 2013), the

representation of organizations in business media (Schultz, Suddaby, & Cornelissen,

2014), and no-till farming practices(Andrews, Clawson, Gramig, & Raymond, 2013).

One focus of new media studies is on the effects of norms in journalism on

media. For example, versions of frame analysis have been used to examine ways in

which the news media frame issues such as childhood obesity and the shaping of

U.S. perceptions about trans-fat in one's diet (Jarlenski & Barry, 2013) and the U.S.

obesity epidemic (Kersh & Morone, 2002). A meta-analysis of the use of FA in

scholarly work conducted by D'Angleo (2002), identified three disparate categories: critical, cognitive, and constructionist. Another interpretation of FA comes from Cloutier and Langley (2007) who defined frames as sets of ideas comprising a coherent story that justify social action. They argued that while FA is used extensively in social movement studies, it would be valuable in management and organizational studies because social movements themselves cut across business, public, and third sector organizations. Ananiadou et al. (2009, para. 5) contended that FA "can be thought of a multi-method approach and one that relies and lends itself to making use of a variety of data sources." Others have also praised FA, including Niset (2010, p. 59), who stated:

> For researchers, framing offers a powerful theoretical tool for understanding the communication dynamics of science debates and the relationship to public opinion, media coverage, and policy decisions. Perhaps more importantly, this body of work is catalyzing new approaches to public engagement.

This is a sample of the literature making use of FA. Regarding the examination of framing in the social media environment, it was found that there are few (if any) works attempting to adopt FA for use in this area, and there were none found that examined the use of frames by scholars in Twitter.

2.5. Impression Management

Research investigating impression management and self-presentation has proliferated in the field of sociology since the late 50's, when Goffman (1959) published his influential book *Presentation of Self in Everyday Life*. Definitions of impression management and self-presentation can be traced back to Cooley (1902,

p. 87), who argued that "the imaginations which people have of one another are the solid facts of society." According to Tedeschi and Riess (1981) there were other authors who wrote about impression management before Goffman, but it was Goffman's work that created new interest in the phenomenon, spawning multiple investigations into self-presentation and impression management across multiple disciplines (for extensive reviews, see Baumeister, 1982; Leary & Kowalski, 1990; Schlenker, 1980).

According to Leary (1995), research examining impression management and self-presentation can be assigned to one of four broad topics: (1) tactics people use to express impressions of themselves to others, (2) factors that motivate self-presentation behavior, (3) factors affecting impressions made on others, and (4) emotional and behavioral consequences people attain by fretting over the impressions people have of them. This paper will address Leary's first three impression management topics by examining: (1) the affordances and framing techniques that are used by scholars to present impressions of themselves in Twitter, (2) how scholars maintain personal and professional impressions within these environments, and (3) how affordance use and framing affect the impressions that others may form.

Goffman (1959) provided a framework for examining social interactions in everyday experience, dissecting the common details of face-to-face (f2f) interaction so as to discuss the self and identity, cooperation, context, information flow and meaning, and impression management. He utilized "dramaturgical" concepts to

interpret roles performed by individuals during f2f interactions and to understand the social meanings recognized by the participants through these various roles. Within this framework, Goffman described impression management as the process of expressing certain information in order to impress certain ideas upon an audience during social interaction.

In order to present a consistent self, the performer must consistently express reliable information and at the same time must prevent the occurrence of incidents that might lead the audience to reject the presentation (rejection will cause embarrassment and shame for the performer). In Goffman's interaction order, the avoidance of embarrassment and shame is extremely important to individuals, and impression management is done in order to help guard against having to experience these feelings.

Goffman (1959, p. 8) described the communication process as an "information game – a potentially infinite cycle of concealment, discovery, false revelation, and rediscovery," and argued that interaction occurs when participants maintain a "veneer of consensus." This consensus suggests that the performer and audience members each project a definition of the situation that maintains an agreement about the claims that will be honored in the context of a particular interaction. This notion of a "single definition of the situation" was important to Goffman (1959, p. 254), and he repeatedly returns to this idea throughout the aforementioned work. This notion forms the basis for his discussions in *Frame Analysis*, as discussed in section 2.3 of this paper.

Goffman (1959) used dramaturgical terms such as "actors," "teams," and "audience" to describe social interaction. According to Goffman, an actor performs for an audience as an individual or as part of a team during any interaction. During this performance the actor both gives (e.g. verbal communication) and gives off (e.g. body language, gestures, movement, use of props, etc.) expressions through signs and signals, and also uses language, mannerisms, and props to facilitate impressions of the self for others to interpret. A person engaged in impression management can present a self that is true to the nature of the presentation or present a self that is embellished in some way as to accommodate the presentation goal. The belief in a performance by an audience is dependent upon the ability of the performers to maintain a consistent self (e.g., remaining consistent to a portrayed role) and to sustain control of the presented information.

In Goffman's social world, there are three bounded regions of performance: front stage, back-stage, and outside. Goffman (1959) described the front stage as the region in which actors give a performance to an audience with the purpose of conveying certain impressions. The back-stage is the region where performers are separated from the audience and can act in a relaxed way. It is the place where performers no longer need to maintain the impressions that were projected to the audience. Goffman (1959) considered this region to be typically located at a physical distance from the front region and to be either separated by a physical barrier or guarded by a member of the performing team. It is normal for the passage of audience members between front and back regions to be prohibited. According to

Goffman (1959), the existence of the back region might be kept hidden from the audience in certain circumstances. Actors, audience members, and others monitor access between the front and back regions while the performance is occurring.

The outside region is an area that is separate from the front and back; it contains individuals who neither belongs to the current performing teams or to the audience. Goffman (1959) believed that interference in the front or back regions by outsiders disrupted a performance. He argued that audience members and outsiders tend to consciously choose not to enter a back region in order to maintain the integrity of a performance. If outsiders are about to enter a backstage area, they will tend to provide a warning to the actors that they are about to enter. If outsiders witness a performance that isn't meant for them, they tend to throw off the balance of the actor–audience relationship. Outsiders also may present future problems for actors if they are to be included in any future performances of the same undertaking. When an actor or team fails to keep outsiders from viewing a
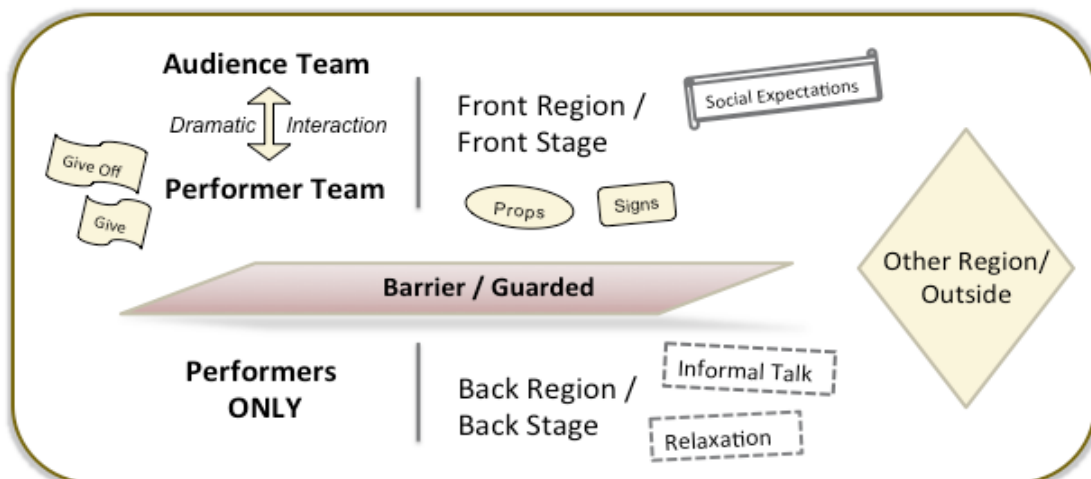

Figure 9 Graphical representation of components of Erving Goffman's (1959) Impression Management Model

performance, impression management problems can occur because the outsiders

are an unexpected addition to the performance and will disrupt the information

flow of the interaction (see Figure 9 for a graphical representation of Goffman's

dramaturgical model).

Regarding technology, Goffman (1959, p. 226) used examples from radio and

television to discuss mediated impression management, stating that:

> ...those who work in the field of radio broadcasting and, especially, television
> keenly appreciate that the momentary impression they give will have an
> effect on the view a massive audience takes of them, and it is in this part of
> the communication industry that great care is taken to give the right
> impression and great anxiety is felt that the impression given might not be
> right.

He (Goffman, 1959, p. 238) went on to write that any social establishment, defined

as "any place surrounded by fixed barriers to perception in which a particular kind

of activity regularly takes place," may be studied using an impression management

lens. As others have done before (Baym & boyd, 2012; boyd, 2008; Buffardi &

Campbell, 2008; Meyrowitz, 1990; Murthy, 2013; Papacharissi, 2011), this work will

extend Goffman's impression management framework to the new media

environment, and it will examine the impression management strategies of scholars

in Twitter.

2.5.1. Other Impression Management Frameworks

The concept of impression management has been discussed in the literature

many ways, with most either using or building upon Goffman's framework. Many

psychologists and social psychologists have used or built upon Goffman's framework in order to discuss the concept of impression management.

According to Schlenker (1980), we all attempt to regulate the ways in which we appear to others and ourselves through our day-to-day routines or by conscious choice. He (Schlenker, 1980, p. 6) made a specific distinction between impression management and self-presentation, defining the former as the "attempt to control images that are projected in real or imagined social interactions" and the latter as situations in which the projected impressions are "self-relevant." Others focused on impression management and defined it differently. Schneider (1981, p. 2) defined impression management as "an attempt by one person (actor) to affect the perceptions of her or him by another person (target)." He (Schneider, 1981) noted that self-presentations were not the only means with which we manage impressions, and argued that the management of impressions was a much broader concept than self-presentation.

Tedeschi and Riess (1981, p. 3) described impression management as "any behavior by a person that has the purpose of controlling or manipulating the attributions and impressions formed of that person by others." Leary (1995, p. 2) took a different approach removing the distinction between impression management and self-presentation, defining both as "[t]he process of controlling how one is perceived by other people." In another work Leary & Kowalksi (1990, p. 34) used "fostering" instead of "controlling," stating that impression management is the process of "fostering impressions in others' eyes." With regards to power, E.E.

Jones (1990) wrote that the primary motive of impression management is to augment or maintain social power. While all of these definitions have merit, this work stays true to Goffman's original description of impression management, namely, that impression management is the process of managing the expressions that people give and give off, which influence the impressions that others have of them during any interaction. While other interpretations of Goffman's framework have merit, they tend to change the verb "managing" to another verb such as "fostering", "controlling", or "manipulating" and this has implications on the way impression management is understood. Goffman used the term "manage" because it reflects the ability of people to succeed in doing something difficult. He noted that impression management is a daily aspect that one is faced with during any interaction, thus it is a process one must work at to achieve in order to avoid embarrassment of shame. While there may be instances of controlling or manipulation, management seems the better choice of terminology.

Impression management has been used to examine online phenomena in the forms of websites (Dominick, 1999; Zizi Papacharissi, 2002; Walker, 2000), blogs (Bortree, 2005; Kendall, 2007; A. Lenhart, 2006; Lövheim, 2011; Robinson, 2007), online chat (Gaitán Moya & Arcila, 2009), online dating sites (Ellison, Heino, & Gibbs, 2006; Kalinowski & Matei, 2011), and other social media sites such as MySpace (van Doorn, 2009) and YouTube (Bowman, 2010; McGowan, Prapavessis, & Wesch, 2008). As Brake (2012, p. 1058) wrote, "Goffman's work presents the separation of different communicative contexts and the self-conscious control of one's self-

presentation as tools to enable the preservation of 'face' and the relevant control over one's informational preserve." This dissertation brings the research focus to Twitter.

2.5.2. Impression Management and Twitter

This work examines impression management in Twitter, following Murthy's (2013, p. 42) argument that Goffman's framework "can also be extended to better understanding Twitter." Tweets are comprised of only 140 characters, but that does not mean that impression management is not occurring in this context. As Mishaud (2007, p. 4) wrote, "to Twitter [sic] is to engage in short intervals of communication," and these short bursts of communication may have, as Murthy (2012, p. 1062) concludes, "everything to do with self-presentation." Gilpin (2011, p. 234) wrote that tweeting plays an important role in impression formation, "as followers will primarily draw conclusions based on the contents of tweet messages as well as indications of the intended recipients of those messages." Marwick and boyd (2011b, p. 140) examined celebrities on Twitter and found that "celebrity practice involves presenting a seemingly authentic, intimate image of self while meeting fan expectations and maintaining important relationships," and that celebrity is most successfully practiced when an individual "provides the illusion of 'backstage', giving the impression of uncensored glimpses into the lives of the very famous."

Papacharissi (2011, p. 315) wrote that Twitter is "both an impression management and network management tool, which could be manipulated and

readjust to fit the personal professional imperatives of individual users." She

(Papacharissi, 2011, p. 304) echoed Goffman when she described self-presentation

as "an ever-evolving cycle through which individual identity is presented, compared,

adjusted or defended against a constellation of social, cultural, economic, or political

realities." Twitter users post tweets at various intervals and these posts are as

representative of their identities (Boon & Sinclair, 2009; Murthy, 2012; Nosko,

Wood, & Molema, 2010) as status updates have been shown to be in Facebook

(Donath & boyd, 2004; Dwyer, Hiltz, & Passerini, 2007; Evans, Gosling, & Caroll,

2008; Haferkamp & Krämer, 2008). In fact, Marwick and boyd (2011b, p. 3) argued

that:

> The microblogging site Twitter affords dynamic, interactive identity
> presentation to unknown audiences. Self-presentation on Twitter takes place
> through ongoing 'tweets' and conversations with others, rather than static
> profiles. It is primarily textual, not visual.

As these statements suggest, researchers investigating Twitter have considered the

social media application to be an important context in which to study impression

management strategies.

Williams, Terras, and Warwick (2013, para. 52) examined 575 articles

published between 2007 and 2011 that looked at some aspect of Twitter, and found

that "the majority of papers (some 80%) concentrate their research around the

Message and the User, considering the content of tweets and the people

communicating." The authors were also able to categorize the research into four

methodological categories: knowledge discovery, examination, design and

development, and analytic. This dissertation examines both the Message and the

User, as described by Williams, Terras, and Warwick (2013), and the research itself can be categorized methodologically into both the examination and analytic classes. The analytic class is defined as a paper that performed "some type of analysis… with a quantitative or qualitative approach," whereas the examination class was defined as having "undertaken review and survey type works." (Williams et al., 2013, p. 11)

In related work, Gilpin (2011, p. 247) examined the use of Twitter by public relations professionals and found that users "constructed their own professional identity, and influence the larger identity of the public relations profession." She found that these public relations professionals were discussed in a positive way on Twitter, and wrote that these overly positive messages "highlight the performative nature of professional conversations that take place in public channels such as Twitter." Aharony (2009) examined Twitter use across public and academic library settings, finding that people in both settings utilized Twitter in similar ways, the main difference being that there was more use of informal language from public librarians. He (Aharony et al., 2009, p. 345) argued that academic librarians rarely use informal language because "they are part of an educational, respectable environment, and it is neither appropriate nor adequate to use informal language in their tweets." This sorting of tweets into categories by the use of formal and informal language is similar to the way in which this dissertation will sort personal and professional tweets by scholars.

Noting the spatial nature of Goffman's dramaturgical frameworks, Cetina (2009, p. 63) argued that Goffman's "notion of the situation was, in its core, a spatial

idea. The situation was a physical setting or place with a physical coming together, a human encounter." She went on to argue that there are three assumptions in Goffman's work that need to be abandoned for his interactional model to be used at a global scale. These are: 1) an interaction occurs in a physical setting with physically present participants, 2) the theory is based on interaction in a physical setting rather than interaction in time, and 3) there is a strong difference between microsocial interaction and macrosocial interaction. With regards to the first assumption, Cetina (2009, p. 63) wrote that f2f interaction "no longer has the structural importance it once had." This dissertation takes a similar stance with regards to physicality in Goffman's original work and extends the framework to include interaction in computer-mediated environments.

2.6. Summary

This literature review has demonstrated that Twitter is one of the most popular social media services, and that scholars use it to communicate both personally and professionally. It represents a unique context in which to observe impression management strategies through the use of affordances and framing practices. As of the writing of this work, there are only a few studies that investigate the way in which scholars use Twitter, manage impressions, and navigate the blurring of personal and professional communication. This work examines the role that the Twitter environment plays in facilitating impression management, and investigates how scholars make use of the affordances in this context in order to help frame their communications.

Because tweets are a resource that scholars can cite, academics are being held accountable for personal tweets in their profession, and because academic associations like the MLA view tweets as a form of public discourse, it is imperative that impression management be understood within this context from multiple perspectives. Just as blogs have been shown to allow scholars to present both personal and professional communication, the microblogging service of Twitter represents a context in which scholars can present themselves both personally and professionally.

Examples taken from recent controversies such as controversial tweets by Geffrey Miller, David Gruth, and Steven Salaita, and provocative Facebook status updates by Gloria Gadsen, point to the inherent concerns involved when scholars express personal opinions or humor in a public setting such as social media. The boundaries between personal and professional selves are challenged when communications are taken to represent more than just the presentation of the scholars' personal selves. In addition, universities and other organizations are at odds with scholars with regards to the acceptable utilization of social media and how to incorporate and utilize social media in and outside the classroom. Scholars and students are also expressing concerns with the incorporation of social media in the academic setting, as both groups now have access to a channel of information that may contain both personal and professional information.

Studies have shown differences in the use of social media between departments, with scholars from the Humanities and Arts using social media at

higher rates than those in the Natural Sciences. In a more positive light, Twitter has

been found to be helpful in breaking down the boundaries between the general

public and academia by allowing scholars to report research findings in ways that

be easily consumed by those outside academia. In addition, organizations and

universities seeking to evaluate the production of scholars have turned to social

media environments like Twitter to trace the dissemination, consumption, and

engagement with scholarly work. In summary, the literature presents a strong case

for studying the impression management strategies of scholars who use Twitter,

because for each tweet they must navigate the continually evolving boundary

between personal and professional communication and representation.

According to Gibson (1977), affordances are defined as functional attributes

of a natural or human-contrived object that are perceived (or not) within a specific

context. Gibson developed this concept because he was interested in understanding

how agents live in particular environments. This theory went against the more

traditional psychological view that humans directly perceive the qualities of an

object. Gibson noted that the affordances of an object change based on the context in

which the object is observed and by the ability of the agent when observing the

object. Others have made use of Gibson's theory to study computer-mediated

environments, and they have distinguished between various types of affordances

including social affordances, technological affordances, socio-technical affordances,

and perceived affordances. Although the theory of affordances has evolved

differently in new media studies, human-computer interaction, psychology,

sociology, and other disciplines, it has uniformly been used to examine social interaction and impression management in online environments.

Within the context of social media applications like Twitter, scholars have discussed the theory of affordances as it pertains to online habits and networking, relates to the establishment of norms and behaviors, shapes social behavior, allows users to engage with the media, and allows users to interact and imagine the audience with whom they are interacting. The reviewed literature on the theory of affordances indicates that affordances in Twitter have an impact on the way in which users communicate and interact; this work adds to the literature by examining how scholars manage impressions of their personal and professional selves through the use of perceived affordances in Twitter.

A frame is a concept that is used to describe how actors understand what it is that is going on at any time. A frame (or multiple frames) is applied by actors to a strip of activity in order for the actors to understand what is happening and what can be reasonably expected. A primary frame that is considered a social frame dictates certain standards, norms, and rules, such as rules of social etiquette, which are applied and adapted to the specific context in which the activity is occurring. Social frames are utilized in combination with natural frames, allowing the actors to understand the natural world in which the activity is taking place.

Keying is a central concept used to describe the way in which actors frame activities by transforming a primary frame into a copy that inherits the structure, norms and rules of the parent frame, while at the same time acknowledging and

incorporating the uniqueness of the current context and actors being framed. When a keying occurs, actors can become engrossed in the activity by attending to engrossables such that they are absorbed in their own realm, or world, until the activity is complete. In addition, time plays an important role in framing, as actors become attentive to the physical world and affordances contained within the framed activity. A keyed frame can vary depending on how much of the original frame is considered to be important to the current situation; frames can be keyed both away from the primary frame and back toward the primary frame.

Goffman (1974) described situations in which the keyed frames themselves can be keyed and identified this as rekeying. This has been described as adding or removing laminations from primary frames used to describe an activity. Another central concept to frame analysis is fabrication. Fabrication describes an activity that has had a false frame applied to it by some actors such that other actors are unable to accurately understand what is truly happening; for example, deceivers who hope to trick victims into misunderstanding an activity will create a fabrication. These three concepts (keying, rekeying, and fabrication) are understood to occur along a continuum of framing behaviors.

In addition, signs influence the ability of actors to frame activities. Signs can be used as directional signals to bound, qualify, regulate, and articulate affordances and phases of activities. Connectives are considered types of signs used to connect actors to specific acts. In addition to connectives, sequences of time are used to link discourse between actors. Goffman (1974) argued that these signs occupy a distinct

track that is removed from the main activity track. During any activity there can also be an overlay channel that contains information that is unrelated to the main activity. Furthermore, he described actors applying brackets in order to distinguish the activity they are concerned with from other activities in the world. There are three kinds of brackets available: temporal and spatial, external and internal, and formal and informal. Brackets can be used to rekey activities, separate acts, introduce new actors to the activity, or used by a particular actor to switch roles.

Of particular relevance to this work, Goffman applied his entire FA model to describe strips of spoken statements such as formal and informal conversation. Like actors engaged in an activity, actors engaged in conversation are required to satisfy certain rules of language and rules of etiquette. As actors converse and manage self-presentations, they take up self-saving alignment with what is happening around them. Because conversations are more loosely tied to their surroundings than activities, they are more susceptible to both keying and fabrications. Goffman believed that actors in conversation typically voice their inner state via statements that require little evidence and have little effect on the world outside the framed conversation. These conversations are considered to mostly contain some element of suspense such that the actors use ritualistic hedges to signify when their turn for speaking has finished.

Informal conversations are considered to contain replayings of past experiences. Goffman argued that replayings could occur within one turn or across multiple turns. He also identified various connectives and figures that describe

various tools used by actors to frame the conversation. Because this FA model can be used to describe small strips of conversation, then it seems reasonable to use FA to identify framing behaviors of scholars as they manage personal and professional impressions within the context of Twitter.

In theoretical contributions similar to those made by this dissertation, Rettie (2004) combined the concept of affordance and Goffman's (1974) frame analysis to examine mobile phone use. She theorized that: a) frames shape perceptions, b) presence can be thought of as an engrossed involvement in a frame, and c) affordances are the perceived actions allowing an agent to experience presence and embodiment in a frame. She (Rettie, 2004, p. 23) went on to state that "[f]rame analysis helps to explain presence in mediated environments; the frame provides the context, it both constructs and makes sense of the experience. A mediated environment may be framed as a space or a place."

Following Rettie's lead, this dissertation work combines Goffman's (1974) frame analysis model with Gibson's (1977) affordance concept to better understand how people utilize the affordances found in Twitter to frame tweets as personal and/or professional. Like Rettie (2004), this research looks at affordances as allowing Twitter users to add meaning to their tweets.

3.0. METHODS

This research was carried out in three distinct phases from January 2014 through October 2014. This study utilized multiple methods to examine the following research questions through various lenses: 1) In what ways do scholars utilize affordances to manage impressions on Twitter? 2) In what ways do scholars frame interactions to manage impressions on Twitter? 3) What are the differences in the use of framing strategies and affordances by scholars for managing the presentation of their professional and personal selves on Twitter?

The first phase included a survey of full-time faculty members working (at the time of data collection) within one or more of the following eight departments: Physics, Biology, Chemistry, Computer Science, Philosophy, English, Sociology, and Anthropology; these departments were located within the Association of American Universities member institutions. The second phase included hiring workers (or Turkers as they're known in the application environment) from Amazon's Mechanical Turk to examine 75,000 scholars' tweets and assign them to one of four categories: personal, professional, non-English, and, unknown. The third and final phase included a follow-up survey of 95 scholars who were found to have tweeted an average of one or more tweets per day; in the survey each scholar was also asked to categorize a sample of five of their own tweets as either personal or professional.

3.1. Phase One: Web-based Survey

In general, surveys are a method used to collect data for describing characteristics of large populations and are excellent for measuring attitudes.

Creswell (2009, p. 145) defined a survey as "a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population." Surveys can be used for exploration, explanation, and description (Babbie, 2009). There are a variety of ways of administering surveys including face-to-face, self-report, and computer-assisted. They make sampling large populations feasible and are flexible in the sense that they allow a researcher to ask many questions about a single topic. Gable (1994, p. 116) noted that "[t]he survey approach refers to a group of methods which emphasize quantitative analysis... [and whose] data are analyzed using statistical techniques." In addition, by standardizing the questions across all participants, the researcher has more power when generalizing results. Survey data are typically turned into "totals, medians, percents, comparisons, and correlations" (Stake, 2010, p. 99), in other words frequency statistics and measures of central tendency and dispersion.

It is important to note that surveys do have biases, including non-response bias, sampling bias, social desirability bias, recall bias, and common method bias (Bhattacherjee, 2012). Surveys are often considered to be artificial because they can't measure current behaviors and rely on a participant's memories of past actions or predictions about future hypothetical actions. Also, Gable (1994, p. 117) reminds us that "[s]urvey research is inflexible to discoveries (relatively poorer 'discoverability') made during data collection."

Despite these shortcomings it was determined that this method would be the most useful for collecting data for this phase of the study because the unit of analysis is individual people (i.e. professors).

3.1.1. Survey Instrument

The questions for the survey were informed by previous research and were guided by the research questions. The final version of the survey instrument consisted of 19 questions (see Appendix 9.7 for mapping of survey questions to research questions). Four versions of the survey were created before the final version was decided upon. The original survey design contained 79 individual questions, but this turned out to be much too large for a web-based survey. In consecutive pilot tests it took one faculty member and two graduate students from Information and Library Science approximately 6 minutes to answer all of the 19 questions as if the participant had one Twitter account, and approximately 10 minutes when the participant had three or more accounts. The first three questions in section one established whether or not the participant was a Twitter user by enquiring (#1) if they have an account, and if they do then (#2) how many accounts do they currently have, and finally (#3) asks for up to five of their Twitter handles (e.g. @PresidentObama). These questions helped to determine whether or not the participant would be included in the next phases of this research.

The second section of the survey contained two questions that asked (#4) how long they have had their Twitter account (for up to five accounts) and (#5) how they classified the type(s) of account(s) they had as either personal only, personal

and professional, or professional only. The first question in this section (#4) allowed

for the establishment of basic Twitter usage, while the second question (#5)

provided insight into how the participants viewed their accounts and helped answer

all three of the research questions by establishing a distinction between personal

and professional Twitter accounts. It was useful to compare the data from the two

questions in this section with data from phase two of this work to determine if the

participants' responses matched the data retrieved from the Twitter API and

whether the answers reflected the Turkers' categorizations of the tweets.

Two questions relating to detailed Twitter use made up section three and

both utilized a Likert scale (Boone & Boone, 2012)—composed of the following

options: Never, Rarely, Sometimes, Most of the time, and Always—for their possible

answers. The first question (#6) asked the participant to estimate how often they

(a) embedded URLs, (b) used hashtags, (c) mentioned someone, (d) addressed a

tweet at someone, (e) added their location to a tweet, and (f) added a photo to a

tweet for each of their accounts. This question set a baseline for comparison to data

retrieved in phase two of this work and helped to answer all three of the research

questions. The second question in this section (#7) enquired about the ways in

which the participants responded to their own and others' Twitter use by asking

how often they (a) deleted a tweet, (b) favorited a tweet, (c) replied to a tweet, and

(d) retweeted a tweet. These questions enquired about the basic affordances that

are commonly associated with Twitter use and results addressed all three of the

research questions.

Section four of the survey addressed the affordances available when setting up or editing the account on Twitter. The first question in this section (#10) asked participants to recall which of the following features they have added or changed on their Twitter accounts: (a) allowing Twitter to send email messages related to tweeting behavior, (b) allowing Twitter to send text messages related to tweeting behavior, (c) providing bio information, (d) connecting Twitter with Facebook, (e) specifying their country, (f) enabling geo tagging, (g) uploading a header picture, (h) specifying their language, (i) adding their phone number, (j) changing privacy settings, (k) uploading a profile picture, (l) enabling sleep settings, (m) choosing a theme, (n) specifying their time zone, and (o) creating widget(s). The second question in this section (#11) asked participants to choose an answer from a Likert scale (Never , < Once per year, Once per year, > Once per year, Monthly) explaining how often they changed the following: (a) privacy settings, (b) profile picture, and (c) header picture. There are affordances that allow users to receive information from Twitter and the third and fourth questions in this section (#12 and #13) addressed this by asking the user to choose any of the following events that triggered Twitter to both send an email and send a text message: (a) about top tweets and stories, (b) when your tweet is marked as favorite, (c) when someone retweets your tweet, (d) when someone new follows you. The final question in this section (#14) was open-ended and asked participants if there was anything else that they do when using Twitter that they would like to share. These questions, in combination with the other questions relating to affordance use, helped establish a

baseline of perceived Twitter and Twitter affordance use to compare with data from the other two phases, and helped answer all three of the research questions.

In the final section of the survey, participants were asked about their social media use and to fill in basic demographic information. The question regarding social media use (#15) provided a list of 19 tools[5] and an "other" option and asked the scholars to indicate with which services they had accounts. The demographic questions asked how long they'd been a faculty member at a university (#16), their gender (#17), age (#18) and ethnicity (#19). A final option was given to the participants asking them if they wanted to participate in an Amazon $50 gift certificate drawing.

3.1.2. Online Survey Creation

The online survey was created using the Qualtrics® survey software available from the Center for Survey Research[6], Indiana University Bloomington. Qualtrics is a web-based tool allowing for the creation and distribution of digital, online surveys and the collection, storage, and analysis of response data. The tool provides a secure interface in which survey designers can create, edit, and delete statements, questions, and notes using a web interface. In addition, the software offers the ability to create skip-logic allowing the survey designer to show or hide various questions based on the respondent's answers to previous questions, data validation, and other customized options. The interface itself can be customized to

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[5] Academia.edu, BioMedExperts.com, Blogger, Epernicus, Facebook, Google+, Instagram, LinkedIn, Mendeley, MySpace, Pinterest, ResearchGate, Scilink, Scribd, Tumblr, Wikipedia, Wordpress, YouTube, and Other
[6] http://csr.indiana.edu/contact-us/staff-directory/

adhere to branding standards; the Indiana University account has a generic design that utilizes the branding standards of the university; this default design was used for this survey.

As mentioned in the previous section, four versions of the survey were created before the final version was decided upon. Questions were combined and consolidated at each interval of the survey design in order to provide a concise format that would allow respondents to read and answer the questions in an expedited manner; many questions were combined into matrix-type questions (Couper, Traugott, & Lamias, 2001) allowing respondents to select answers for multiple objects in one question (see Figure 10). Because respondents are more likely to respond to a survey when told that it takes a short amount of time (Cartwright, Thompson, Poole, & Kester, 1999), an attempt was made to ensure this survey was designed in a way that ensured the most concise, clear, and engaging flow of questions.

The survey instrument (as described above in detail in Section 3.1.1.) was sent to the sample population (as described below in detail in Section 3.1.3.) using email functionality built into the Qualtrics software. Qualtrics provides a mechanism for survey designers to upload a comma-separated value (CSV) file of tabular data referencing the sample population; once uploaded, the software maps this data to the column headers allowing survey designers to include this data in email messages, in other notes, or in the survey itself.

Figure 10 Example of web-based matrix-style question in Qualtrics Survey Software

The Qualtrics software is not without limitations with regards to the built-in email option; two current limitations in the version available through Indiana University that affected this study included a limit on the default number of emails allowed and a maximum number of emails allowed per distribution. The distribution of the survey was undertaken in two groups because of these limitations, with each containing a maximum of 10,000 persons, and created a delay of two weeks between the times the survey was sent to the two groups. The sample of scholars was divided by university affiliation to create the two groups.

There are many articles discussing survey research and survey design across a variety of disciplines (Cook, Heath, & Thompson, 2000; Fan & Yan, 2010; Hayslett & Wildemuth, 2004; Perkins, 2011; Sauermann & Roach, 2013; Tenforde, Sainani, & Fredericson, 2010). A portion of these articles focused on best practices and identifying ways of increasing response rates to web-based surveys, one of which is to follow up with sample members who've been notified of the survey, but have not

yet responded. This technique is valuable because it reminds participants of the survey and reminds them of the importance of the survey to both the researcher and the community (Sauermann & Roach, 2013). For this work, a follow-up message was sent to each sample of participants; the first sample received a reminder email 16 days after the initial invitation and the second sample received a reminder email 13 days after the initial invitation.

3.1.3. Survey Sample

The sample in this first phase was gathered by first harvesting the university, name, department, email address, and title of all assistant, associate, and full professors from the departmental websites of eight disciplines (Physics, Biology, Chemistry, Computer Science, Philosophy, English, Sociology, and Anthropology) at 62 Association of American Universities (AAU) member schools (Association of American Universities, n.d.) between September 2013 and January 2014 (see Appendix 9.2 for complete list of AAU schools). Adjunct professors, doctoral students, professional staff, and other members of the departments who were listed as something other than full-time were not included.

The Association of American Universities was created in 1900 with a goal of "advanc[ing] the international standing of U.S. research universities" (Association of American Universities, n.d.). According to the 2014 CWTS Leiden Ranking website that lists universities by scholarly impact,[7] 60 of the 62 universities included in this sample rank in the top 125 in terms of scholarly impact; Brandeis University and

[7] http://www.leidenranking.com/ranking/2014

California Institute of Technology were the only universities not included in the

2014 CWTS Leiden Ranking list. Seven of the universities (MIT, Harvard, UC Berkley,

Stanford, Princeton, UC Santa Barbara, and Yale) were ranked in the top 10 for

scholarly impact.

It is important to note that there were inconsistencies between university

websites; the 62 AAU-member universities did not contain uniform department

names leading to decisions that were made by the author regarding which faculty to

include in the sample. The first problematic department was biology because not all

universities had a single, overarching department labeled "Biology." For example,

Brown University has a Biology Faculty Directory webpage[8] that listed 605 faculty

members from six different biology-related departments (i.e. "Ecology &

Evolutionary Biology," "Molecular Biology, Cell Biology and Biochemistry,"

"Molecular Microbiology & Immunology," "Molecular Pharmacology, Physiology and

Biotechnology," "Neuroscience" and "Pathology and Laboratory Medicine"); for

Brown University the information about faculty listed under the "Molecular Biology,

Cell Biology and Biochemistry" heading were harvested. The California Institute of

Technology's department is titled "Biology and Biological Engineering" and their

chemistry department is titled "Chemistry and Chemical Engineering," both of these

departments were included in the study as scholars from the biology and chemistry

department respectively.

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[8] http://biology.brown.edu/faculty/

Carnegie Mellon University and Columbia University's biology departments are titled "Biological Sciences." Cornell University has two biology departments, "Ecology and Evolutionary Biology" and "Molecular Biology and Genetics," and the faculty members who were listed under the "Ecology and Evolutionary Biology" were included. Iowa State also has two biology departments, "Ecology, Evolution, and Organismal Biology" and "Genetics, Development, and Cellular Biology," and faculty listed under the former department were included. Michigan State University has "Cell and Molecular Biology," "Plant Biology," and "Biochemistry and Molecular Biology," and the faculty from the "Biochemistry and Molecular Biology" were included. The Georgia Institute of Technology lists no anthropology, English or sociology departments, thus there were no scholars representing these departments from this university.

While these differences presented challenges when developing the sample, the purpose of this work was to explore whether Gibson's affordance concept and Goffman's frame analysis and impression management frameworks can provide insight into the ways in which scholars help their audience distinguish between personal and professional tweets. Therefore a sample of scholars from different specialties across universities should have had little to no effect on the outcome of this work. The sample was a purposive sample in that only members of AAU institutions from select departments were included, it was a cluster sample in that institutional websites were used to gather groups (i.e. individual professors) for the

unit of analysis, and it was a convenience sample in that only the information of persons found on these departmental websites were gathered.

The complete sample of 16,862 scholars was split into two groups due to limitations of the Qualtrics survey software (as described in Section 3.1.2.). The first sample consisted of 9,677 scholars from 39 of the 62 universities.[9] The survey was sent to members of this group on Sunday, January 26, 2014 at 4:10 a.m. and a reminder email was sent February 11, 2014 at 10:05 a.m. to the 8,896 scholars (91%) who had not yet started the survey. Of the initial 9,677 emails sent, 114 emails were identified as bouncing by the Qualtrics software and 22 emails failed delivery leaving a final total of 9,541 delivered emails. Regarding the reminder email, 22 messages failed to be delivered. An email that has bounced is one in which a mail system informs a sender that their message was not delivered to the recipient (Wikipedia, n.d.), whereas a failed email signifies that the email address was incorrect or no longer existed. Of the total emails delivered, 1,066 respondents started the survey for a response rate of approximately 9.0% for group one.

The second sample consisted of 7,185 scholars from the remaining 23 of the 62 AAU member schools.[10] This group was first emailed on Monday, February 3,

[9] Boston University, Brandeis University, Brown University, California Institute of Technology, Carnegie Mellon University, Case Western Reserve University, Columbia University, Cornell, Duke University, Emory University, Georgia Institute of Technology, Harvard, Indiana University, Iowa State, Johns Hopkins, McGill, Michigan State University, MIT, New York University, Northwestern, Princeton University, Purdue University, Rice University, Rutgers, The State University of New Jersey, Stanford University, Stony Brook University-State University of New York, Texas A&M University, The Ohio State University, The Pennsylvania State University, The University of Chicago, Tulane University, University at Buffalo, The State University of New York, University of Arizona, University of California, Berkeley, University of California, Davis, University of California, Irvine, University of California, Los Angeles, University of California, San Diego, and University of California, Santa Barbara
[10] The University of Iowa, The University of Kansas, The University of North Carolina at Chapel Hill, The University of Texas at Austin, The University of Wisconsin-Madison, University of Colorado Boulder, University of Florida, University of Illinois at Urbana-Champaign, University of Maryland, University of Michigan, University

2014 at 9:33 a.m. and a reminder email was sent February 16, 2014 at 9:35 p.m. to

6,562 scholars who had yet to respond to the call for participation. Of the 7,185

emails sent, 61 emails were identified as bouncing by the Qualtrics software and

zero emails failed resulting in a total of 7,124 emails delivered. For the second

group, 894 respondents started the survey for a response rate of approximately

8.0%. The combined survey invitations sent and delivered by email totaled 16,665

and the total number of surveys started was 1,960 for a combined response rate of

8.5%. As Sauermann and Roach (2013, p. 273) noted, "more detailed online surveys

often exhibit lower response rates of around 10-25%", therefore it was expected

that with this large of a population that the response rate would be between 10 and

25 percent.

3.1.4. Survey Data Analysis

The survey data from 1,910 completed responses was exported to SPSS and

Excel for further analysis.

3.2. Phase Two: Categorization in Amazon's Mechanical Turk (AMT)

3.2.1. Amazon's Mechanical Turk Sample

Of the 1,910 respondents to the survey in phase one, 613 respondents

answered "Yes" to the question asking them if they had at least one Twitter account.

The AMT sample was derived from searching for valid Twitter account handles

belonging to these 613 scholars. It was necessary to search for these account

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of Minnesota, University of Missouri-Columbia, University of Oregon, University of Pennsylvania, University of
Pittsburgh, University of Rochester, University of Southern California, University of Toronto, University of
Virginia, University of Washington, Vanderbilt University, Washington University in St. Louis, Yale University

handles because scholars were allowed to enter fake Twitter account handles as answers to the survey questions.

Of the initial group of 613 scholars, 445 account handles were verified for 391 scholars. Verification occurred by first searching Twitter for the scholar's name (first and last) and then scrolling through the result list looking for a mention of the term 'professor' or 'scholar', the location and/or university, or by matching the Twitter profile image with an image from the scholar's departmental web site profile. When this was unsuccessful a search was performed using the Google search engine by querying the scholar's name, email address, university, university location, and/or Twitter handle(s) used in the survey to locate a Twitter handle— only the first page of Google results was used. If they could be identified by some combination of photo, Twitter description, place of residence, or email, then the Twitter account was associated with the scholar. Regarding lab accounts—as argued in a similar manner by Hemphill, Culotta and Heston (2013) when discussing political tweets—it does not matter who actually sends the tweets, the tweet is being sent on the scholar's behalf, thus lab accounts were included in this study.

Once the 445 scholar accounts were identified, the Twitter profile information and a sample of tweets from each account were collected on May 19, 2014. A PHP[11] program was written employing the Twitter API to query and retrieve the tweets from each of the 445 accounts and save the data as JSON (ECMA International, 2013) files (see Appendix 9.1). As mentioned in Section 2.1.1, the

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[11] http://www.php.net/

Twitter API is robust and allows a programmer to establish a secure connection

with the Twitter application using oAuth (Hardt, 2012) standards in order to

request specific data. For this phase of the data collection, up to 3,200 tweets were

retrieved from each of the scholar's accounts. If a scholar had created private tweets

or private messages, the Twitter API did not allow the retrieval of these tweets. In

addition, the Twitter API places a limit on the tweets retrieved such that the most

recent 3,200 tweets will be collected for any account where the number of tweets

exceed 3,200.

The Twitter API method 'GET statuses/user_timeline' was used to retrieve

the tweet content. The data returned for each tweet contained a large amount of

information about both the tweet and the account holder. Each retrieved JSON

record contained information that the account holder had added to his or her

Twitter profile (e.g., link to photo, name, location, website, language, etc.) at the time

of retrieval and information about the tweets themselves (e.g., if a tweet was

retweeted, how many mentions, hashtags, URLs it contained, etc.). For a complete

example of the data retrieved, see Appendix 9.1. The JSON files were then parsed

using a second PHP script and the data was added to multiple MySQL database

tables following a relational database model (Garcia-Molina, Ullman, & Widom,

2008). The database schema included a table for the tweets, user profile

information, hashtags (#), user_mentions (@), urls (long and shortened), media

(photo or video files), symbols (financial symbols), and a bridge table associating
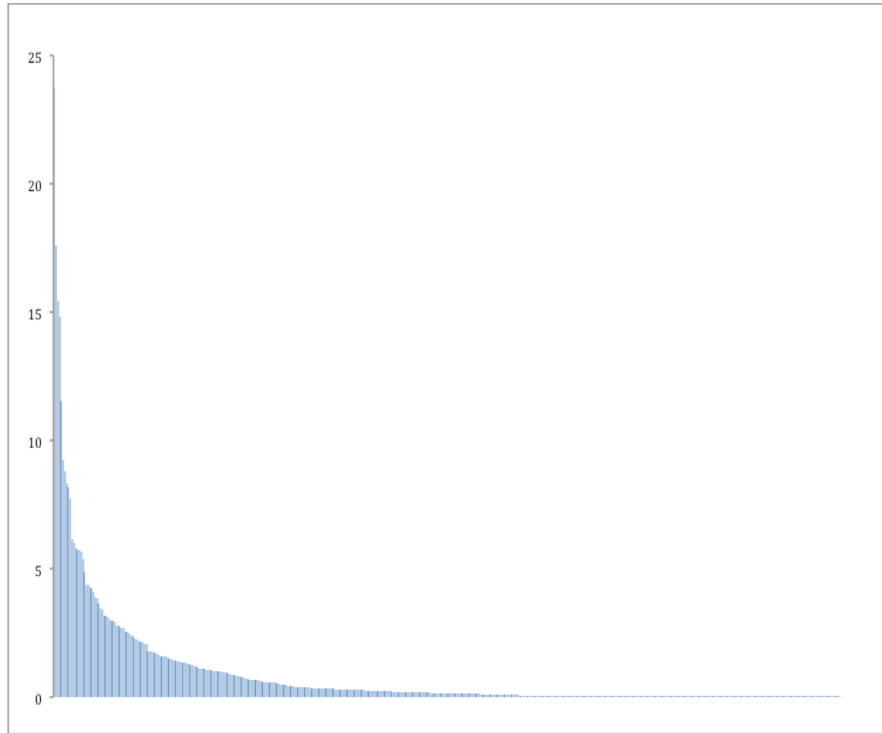
the tweets and users.

Figure 11 A long tail distribution of average of tweets per day per Twitter account.

A total of 289,934 tweets were collected from the 445 Twitter accounts. When examining the number of tweets by account, the graph (as shown in Figure 11) demonstrates a long tail distribution, as there are many accounts that have a far fewer average tweets per day (TPD Average=Total tweets/Days account open) than the mean of 0.88 TPD (median of 0.16 TPD, no mode). Because of the positive skew and the fact that there are no clearly identifiable groupings in the data (see Figure 11), another technique was needed to break up the scholars into sample groups.

Because of the variation in the data, a stratified proportionate sampling technique was utilized to obtain 75,000 tweets for a final sample. A stratified sample can ensure improved analysis of the population as compared to simple random sampling, especially when populations vary considerably (Hunt & Tyrrell, 2001). A

proportionate stratified sampling is a subtype of stratified sampling where "the

number of elements allocated to the various strata is proportional to the

representation of the strata in the target population" (Daniel, 2011, p. 132). The

stratified sample for this work was created by first determining each scholar's

average number of TPD. Once this average was calculated and the result was

examined, a total of 10 groups of scholars were created with each group containing

6.6% to 15.9% of the total tweets (see Figure 12). The group distinctions were

made based on the average tweets per day calculation, with the groups being

broken up at 0.5 TPD intervals for the lowest six groups (<0.5, 0.5<1, 1<1.5, 1.5<2,

2<2.5, 2.5<3), followed by two groups representing one TPD intervals (3<4, 4<5),

one group representing three TPD interval (5<8), and the final group containing

everything above a specific threshold (> 8).

A random sample was generated from these groups using SQL queries and MySQL. The main dataset was separated into 10 tables based on the TPD average. A new database column was then added (titled 'random') to each of the 10 newly created database tables and was populated with a random float number between zero and one. Finally the dataset in each of the tables was sorted on this 'random' column in an ascending order. A sample from each table was then obtained using
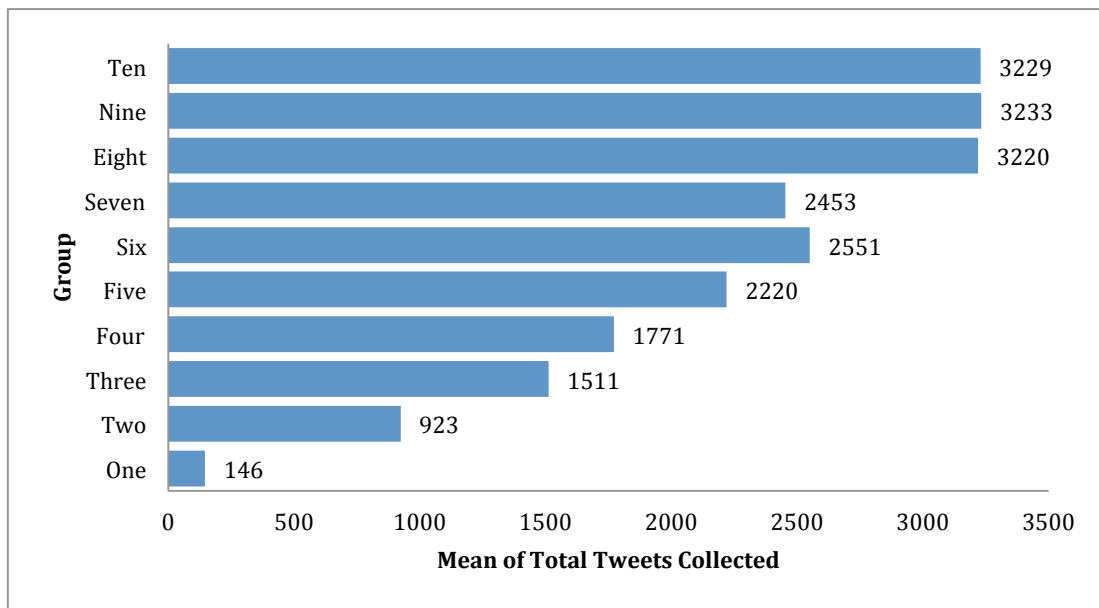

Figure 12 Mean of total tweets collected by groups of Twitter users.

the percentages of total tweets per group as the sample size (represented in the 'Percentage of Total Tweets' column in Table 2) to obtain a final sample of 75,000 tweets (e.g. in group ten (intense users) there were 29,064 tweets, which was approximately 10% of the 289,934 total tweets collected; therefore, there were 7,515 tweets (10.02%) collected from this group and used in the AMT HITs).

Table 2 Grouping of professors by tweets per day averages. **BOLD** indicates those scholars included in phase three.

Group	Average Tweets/Day	Total Scholar Accounts	Total Tweets	Percentage of Total Tweets	Tweets Used in AMT
(Intense users)					
TEN	**8 to 24**	**9**	**29,064**	**10.02%**	**7,518**
NINE	**5 to 8**	**8**	**25,863**	**8.92%**	**6,690**
EIGHT	**4 to 5**	**6**	**19,321**	**6.66%**	**4,998**
SEVEN	**3 to 4**	**10**	**24,532**	**8.46%**	**6,346**
SIX	**2.5 to 3**	**10**	**25,508**	**8.80%**	**6,598**
FIVE	**2 to 2.5**	**10**	**22,195**	**7.66%**	**5,741**
FOUR	**1.5 to 2**	**13**	**23,018**	**7.94%**	**5,954**
THREE	**1 to 1.5**	**29**	**43,831**	**15.12%**	**11,338**
TWO	0.5 to 1	33	30,463	10.51%	7,880
ONE	< 0.5	317	46,139	15.91%	11,935
(Infrequent users)					
		445	*289,934*	*100.00%*	*75,000*

3.2.2. Amazon's Mechanical Turk Human Intelligence Tasks (HITs)

Amazon's Mechanical Turk (AMT) is a marketplace that can be used to crowd source tasks relating to a variety of concepts including marketing, opinion, and research; a person (or company) known as a *requestor* can create tasks and pay *Turkers* (Amazon calls them *providers*, but they are commonly known as *Turkers*) to perform a set number of these tasks. Requestors can ask that the Turkers meet some qualification before they are allowed to undertake the tasks, and requestors can also create test questions to verify that the Turkers are performing the task. AMT is a part of Amazon's Web Services system[12].

Taking a critical view of AMT, Ross et al. (2010) suggested that this type of crowdsourcing of cognitive labor is taking advantage of lower-income persons. In

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[12] www.mturk.com

another critique, Crump, McDonnell, and Gureckis (2013) pointed to four main concerns for researchers using AMT: Turkers are kept anonymous as part of Amazon's terms of service, the systems the Turkers use to complete the analysis can be assumed to vary quite a bit, researchers are unable to control the environment in which the Turkers work, and there could be bots posing as Turkers. In addition, Ekbia and Nardi (2014) criticized AMT by arguing that it is an "objectification of the human subject."

Despite these concerns, others have demonstrated that high-quality and rigorous research is possible using AMT (Alonso & Mizzaro, 2009; Buhrmester, et al., 2011; Sprouse, 2011). Shaw, Horton, and Chen (2011) identified certain strategies for achieving reliable results. Alonso and Mizzaro (2009; p. 16) found that Turkers were more precise in their data analysis tasks than experts and argued that "it is extremely important to carefully design the experiment and collect feedback from Turkers." Crump, McDonnell, and Gureckis (2013, p. 16) tested results obtained through AMT versus results obtained in face-to-face settings and "recommend that reviewers and editors should consider accepting behavioral experiments done on AMT as a valid methodology." Many of the recommendations from these articles were followed while conducting this phase of research including creating a pilot test Human Intelligence Tasks (HIT), checking turker blogs for comments on others' work, and considering the input of Turkers when designing the final version of the task for this study (see Appendix 9.5. for samples of Turker feedback).

A total of 75,000 tweets were taken from the 10 groups and added to 12,056 AMT HITs within the AMT application environment using a template created in HTML. HITs are tasks for the AMT workers (Turkers) to accomplish; with each HIT accomplished the turker earns a wage as specified in the HIT description. The HITs for this work contained 7 tweets (except for a few tasks at the end) that the turker, who was paid $.10 per HIT, categorized as either PERSONAL, PROFESSIONAL, UNKNOWN, or NON-ENGLISH; the actual description for this work (as seen by the turker) can be found in Appendix 9.3. The HTML template was created using standard HTML5 tags combined with JavaScript functionality using the jQuery[13] library. The template was based on an AMT sample template and on the interface of the Twitter feed (as it appeared in April 2014). The template can be found in Appendix 9.4.

Each HIT was performed by three Turkers. The Turkers are self-assigned to the HIT and must meet any criteria specified in the description to be allowed to complete the job. To be qualified to perform the HITs for this work, the turker was required to have previously completed at least 10,000 HITs and have an average HIT approval rate of 99%. These criteria were based on another study (Tsou, Bowman, Sugimoto, Larivière, & Sugimoto, n.d.) in which using such rules increased the quality of the results. Because of AMT constraints on the number of HITs uploaded for each request and because of the time required to check each batch to approve the HIT, the batches were completed in 12 requests (see Table 3 for dates

and number of HITs). The Turkers were paid an average of $5.00 per hour and took

an average of 1 minute and 28 seconds to complete each HIT (categorize seven

tweets (as described above)).

The Turkers fully agreed (3 out of 3) on the categorization of 34,969 tweets

(47% of all tweets) across four categories: personal (n=27,264), professional

(n=6,810), non-english (n=766), and
unknown (n=129). Turkers partially agreed
(2 out of 3) on the categorization of 37,355
tweets (49% of all tweets) across the four
categories: personal (n=19,403),
professional (n=15,692), non-english
(n=262), and unknown (n=1993). Finally,
Turkers disagreed (0 out of 3) on 2,674
tweets (4% of total). These AMT tweet
categorization results reveal that at least
two of three Turkers agreed on the
categorization of 96% of all tweets
categorized.

Table 3 Date AMT HIT added to application and total number of HITs delivered

DATE ADDED	TOTAL HITs
July 03, 2014	3,344
July 08, 2014	3,344
July 18, 2014	5,967
July 18, 2014	3,942
July 21, 2014	5,671
July 22, 2014	2,979
July 22, 2014	2,874
July 22, 2014	3,300
July 22, 2014	3,174
July 22, 2014	2,499
July 22, 2014	3,345
July 22, 2014	3,759

3.2.3. Amazon's Mechanical Turk Data Analysis

The data from the responses was exported to SPSS and Excel for further

analysis.

3.3. Follow-up Survey and Tweet Categorization by Scholars

A sample of 95 scholars from 25 of the 62 universities who averaged at least one tweet per day when the initial data set was collected were included in this phase of work. These respondents were invited to participate in the survey on Wednesday, October 22, 2014 at 12:44 p.m.; a reminder email was sent on October 27, 2014 at 10:56 a.m. to the remaining 28 scholars who had not started the survey. All emails were delivered for the initial invitation and for the reminder message. Of the total emails delivered, 66 respondents started the survey and 57 completed the survey for a response rate of approximately 63%.

A follow-up survey was created using the Qualtrics software and consisted of a maximum of six questions relating to affordance use and the personal/professional categorization of tweets (see Appendix 9.8 for mapping of survey questions with research questions). In three subsequent pilot tests it took one professor and two Ph.D. students from Information and Library Science less than 5 minutes to complete the survey when answering all of the questions. The first question asked respondents to identify affordances that helped them with framing a tweet as personal or professional; the choices included a) hashtags, b) mentions, c) URLs, d) media, e) retweets, f) emoticons, g) directed messages, h) linguistic affordances such as punctuation, capitalization, quotes, etc., and i) other. The respondent could choose an affordance for personal, professional, or both. The second question asked if they'd ever had any tweets misinterpreted as personal when they were meant to be professional or vice versa, and if the respondent

answered yes, they were given two follow-up questions asking for an example of a misinterpreted tweet and how they might change the tweet so that it would be interpreted as intended.

In the fourth question, respondents were asked how they changed their profiles on Twitter so that they would be interpreted as personal or professional. They could choose from the following affordances: a) profile image, b) description, c) theme, d) header (banner) image, e) colors, f) location, and g) other. Just as in question one, the participants were able to choose any of the affordances for either personal, professional, or both.

In the fifth question, scholars were presented with five of their own publically available tweets and asked to categorize them as either personal or professional. These tweets were selected from the sample of tweets that were categorized by Turkers with full agreement (3 out of 3 agreements). All tweets for each of the 95 scholars were sampled, with two personal and three professional tweets randomly selected, ordered and presented (see Appendix 9.4 for presentation of tweets in survey). In two cases there were only two professional tweets available in the full agreement sample, therefore a tweet was randomly selected from the partial agreement sample (2 out of 3) and presented to the scholar.

3.3.1. Follow-Up Survey Data Analysis

The data from the survey was exported to SPSS and Excel for further analysis.

3.4. Methods Summary

The methods section has described the data collection strategies used in this work. The methods were chosen based on previous research on the topic and on other related work across several disciplines. While the online survey and categorization methods have been used in other research, to the author's knowledge the use of Amazon's Mechanical Turk had not been done before in this way, using this type of social media data. This data collection and analysis strategy represents a unique approach for scholars working with big data and who want to perform qualitative analysis (as discussed in Section 5). Of course this type of strategy is not without its limitations and ethical concerns; see Section 6.

4.0. RESULTS

The results presented in the following sections are organized by the three

phases of this work. As mentioned in Section 3, the purpose of the three phases was

to implement a triangulated approach so as to validate results received at each

stage. The results will be presented in chronological order with phase one (survey)

first, phase two (tweet categorizations) second, and then phase three (follow-up

survey and tweet categorization) third.

4.1. Phase One: Web-based Survey

4.1.1. Respondents

This section will focus on the data gathered from the online survey. As stated

in the methods section, 16,665 invitations (i.e., the emails did not bounce) to

participate in the survey were delivered to professors in the sample. Out of the

16,665 invitations, 1,960 started the survey and 1,912 answered at least one

question for a response rate of 8.5%. There were 1,910 who answered the first

question asking respondents if they had at least one Twitter account; it is these

1,910 respondents who were included in the first phase of the analysis, as it was

important to understand who was using Twitter and to determine an initial estimate

of affordance use in order to answer the research questions. If the individual

answered "NO" to this first question, they were presented with one follow-up

question asking about engagement with other social media tools and four questions

asking for basic demographic information. Because the research questions

pertained to scholarly framing behaviors and affordance use within Twitter, those

who answered "NO" to the first question were not included in the subsequent phases (phases two and three) of this work.

It is, however, important to present a clear picture of all of scholars who responded to this survey so that a broader picture of scholarly social media involvement can be ascertained for future work. In addition, both Goffman (as the stage or frame) and Gibson (as a context or niche) discuss the significance of the environment in which the activity is taking place; thus, it is important to consider what types of scholars are using or not using Twitter.

4.1.1.1. Results from 1,912 Respondents to the Survey

As mentioned above, the respondents were asked: "Do you have one or more Twitter accounts?" In order to qualify for inclusion in phases two (tweet categorization in Amazon's Mechanical Turk) and three (survey and tweet categorization), respondents were required to have at least one Twitter account. Approximately 32% (n=613) of the respondents reported having at least one account on Twitter. The percentage indicating that they had at least one Twitter account is at the top range as compared to other studies (Ponte & Simon, 2011; Rowlands et al., 2011), which suggests that between 7% and 30% of academics have accounts. In addition to answering the main research questions, these results can be compared to other studies examining Twitter use by scholars (e.g., Bowman et al., 2013; Haustein, Bowman, et al., 2014; Holmberg & Thelwall, 2014), so it is relevant to examine the differences in discipline, academic age, actual age, and gender between those with and without an account.

As shown in Figure 13, there were differences in Twitter use based on academic age. Survey respondents were asked to identify how long they'd been in their current faculty position using the following scale: a) less than one year, b) one to three years, c) four to six years, d) seven to nine years, or e) ten years or more. Of the 1,910 respondents, 1,826 (96%) answered this question. When grouping scholars into three age groups, there was a strong association found between academic age—calculated in groups of six years or less, seven to nine years, and 10 years or more—and having a Twitter account, χ^2 (2, n=1,910) = 0.217, p = .0005, Cramér's V = 0.217). The graph indicates that 41% of professors who had been in their current faculty position for seven to nine years (n=196) had the highest proportion of Twitter accounts, 39% of those six years or less (n=363) had accounts, and only 25% who've been in their faculty position for ten years or more (n=1,262) had accounts.
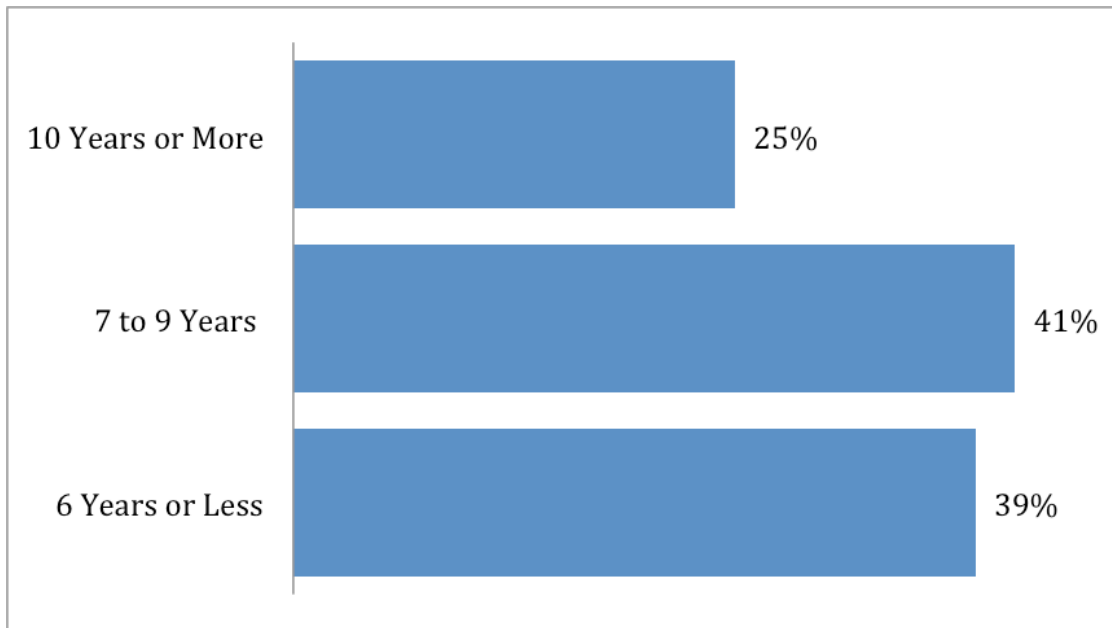
Figure 13 The percentage of respondents by academic age having one or more Twitter accounts.

When examining Twitter accounts by the actual age of scholars (as shown in Figure 14), it was observed that Twitter accounts declined as the age of professors increased[14]. When grouping scholars into four age groups (35 and under, 36 to 45, 46 to 60, and 61 and over), it was found that there was a moderate association between the age of scholars and having a Twitter account, χ^2 (3, n=1,823) = 0.125, p = .0005, Cramér's V = 0.125. Similar other work (Lenhart, Purcell, Smith, & Zickuhr, 2010) that has shown that age is a factor in the adoption of social media, this research showed that both academic age and age have an influence on Twitter use.

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[14] Respondents were asked to identify their age in spans of five years.
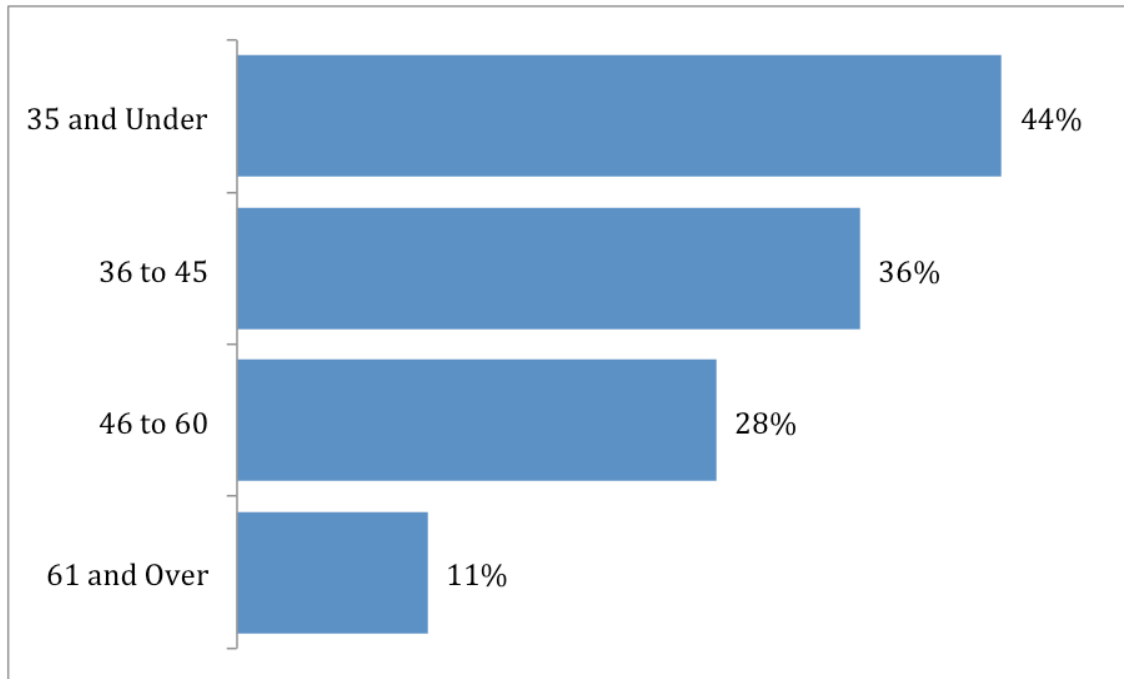
Figure 14 The percentage of respondents by age (n=1,823) having one or more Twitter accounts.

Results examining those professors with Twitter accounts by department (as determined when gathering the sample data) indicated that computer science professors reported having a higher proportion of Twitter accounts than any other department (see Figure 15). Performing a chi-square test by department showed a strong association between academic department and having a Twitter account, χ^2 (7, n=1,910) = 0.182, p = .0005, Cramer's V = 0.182. The higher proportion of computer scientists using Twitter could simply be due to their being more comfortable with technology and may reflect a higher proportion of early adopters (Rowlands et al., 2011).
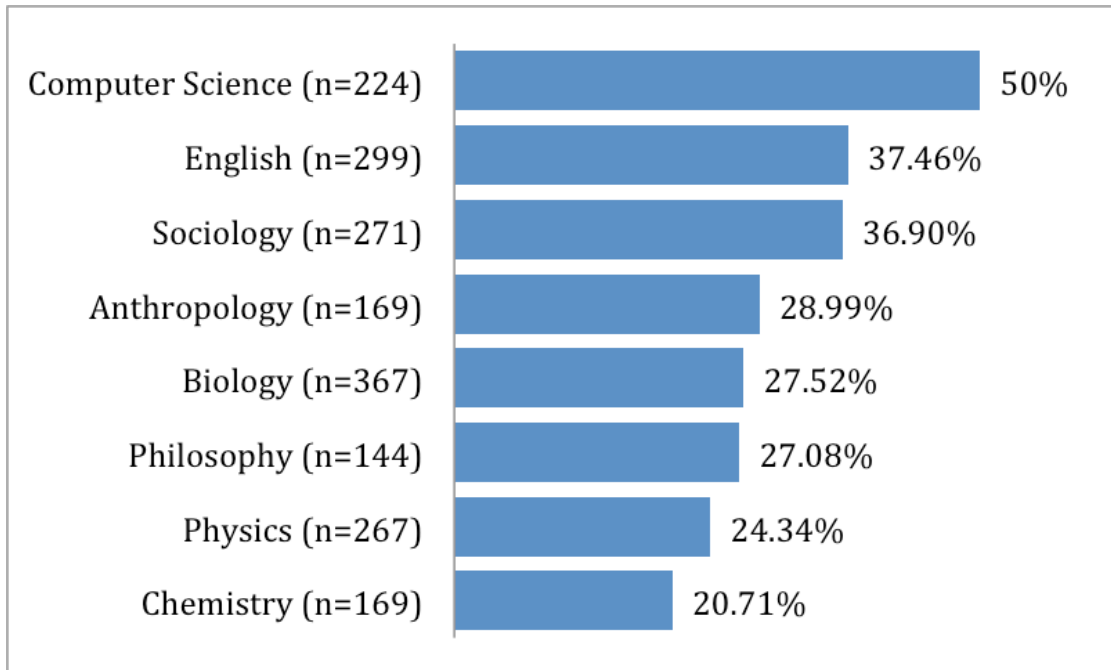
Figure 15 The percentage of respondents (n=1,190) by department having one or more Twitter accounts.

There were also differences between genders[15] with female professors reporting Twitter accounts at a higher percentage than males (see Figure 16). A chi-squared test revealed that while significant, the result was a weak relationship between gender and having a Twitter account— χ^2 (2, n=1,824) = 0.066, p = .018, Cramer's V = 0.18.

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[15] Respondents were asked to identify their gender as a) female, b) male, or c) other.
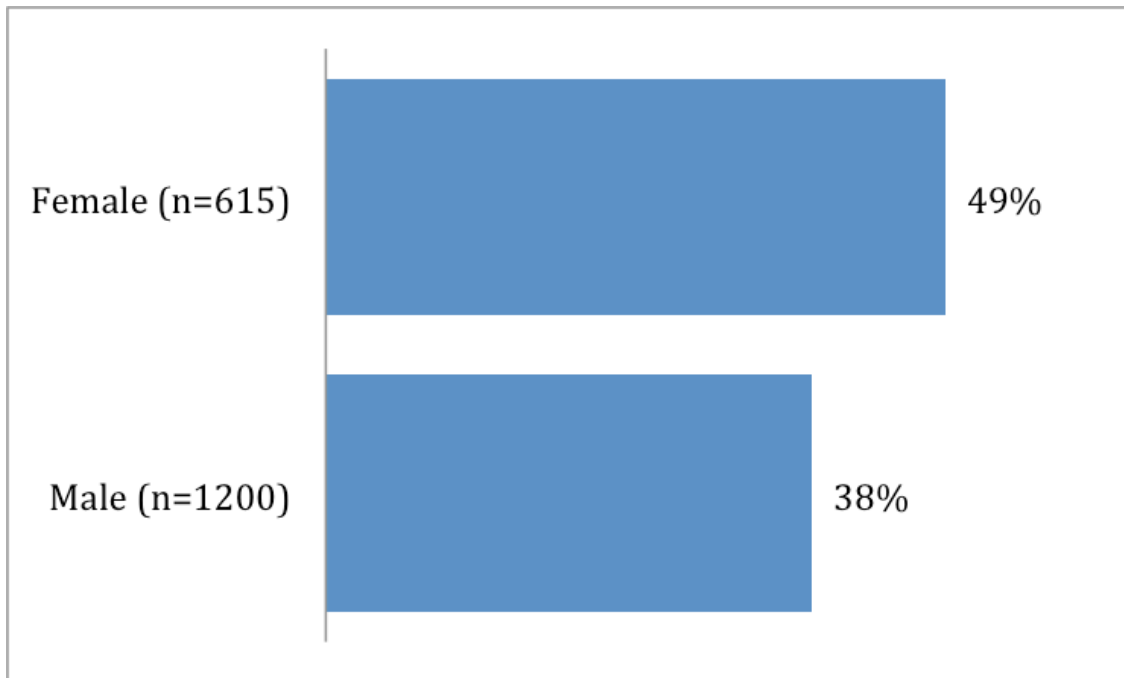
Figure 16 The percentage of respondents by gender having one or more Twitter accounts.

Finally, ethnicity was also examined to determine if there was an association between ethnicity and professors' Twitter usage. When reporting ethnicity (see Figure 17), respondents were asked to choose between a) American Indian/Native American, b) Asian, c) Black/African American, d) Hispanic/Latino, e) White/Caucasian, f) Pacific Islander, or g) Other. When grouping ethnicity by white and non-white, there was a strong relationship between ethnicity and having a Twitter account, χ^2 (1, n=1,910) = -0.140, p = .0005, Cramer's V = 0.140.
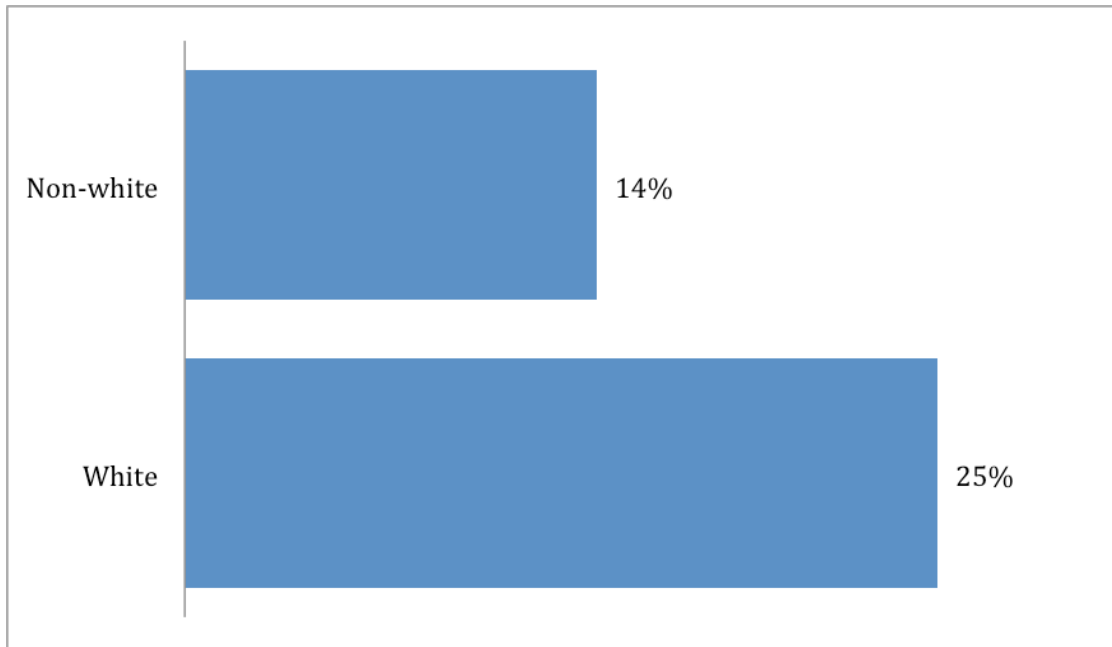
Figure 17 The percentage of respondents by ethnicity having one or more Twitter accounts.

In the next section, only the results of those professors reporting having at least one Twitter account is analyzed further.

4.1.2. Examination of 613 Respondents with Twitter Accounts

This section focuses on the subset of the sample population who answered "YES" to having at least one Twitter account (n=613). When examining proportions of Twitter account holders between departments (see Figure 18), it was found that just over half of the professors with Twitter accounts were associated with the natural sciences (52%)—Biology, Chemistry, Computer Science, and Physics—while just under half were from the social sciences (48%)—Anthropology, English, Philosophy, and Sociology—for a relatively equal distribution of Twitter users across the surveyed departments. The computer science (n=112) and English (n=112) departments had the highest number of Twitter accounts, while the

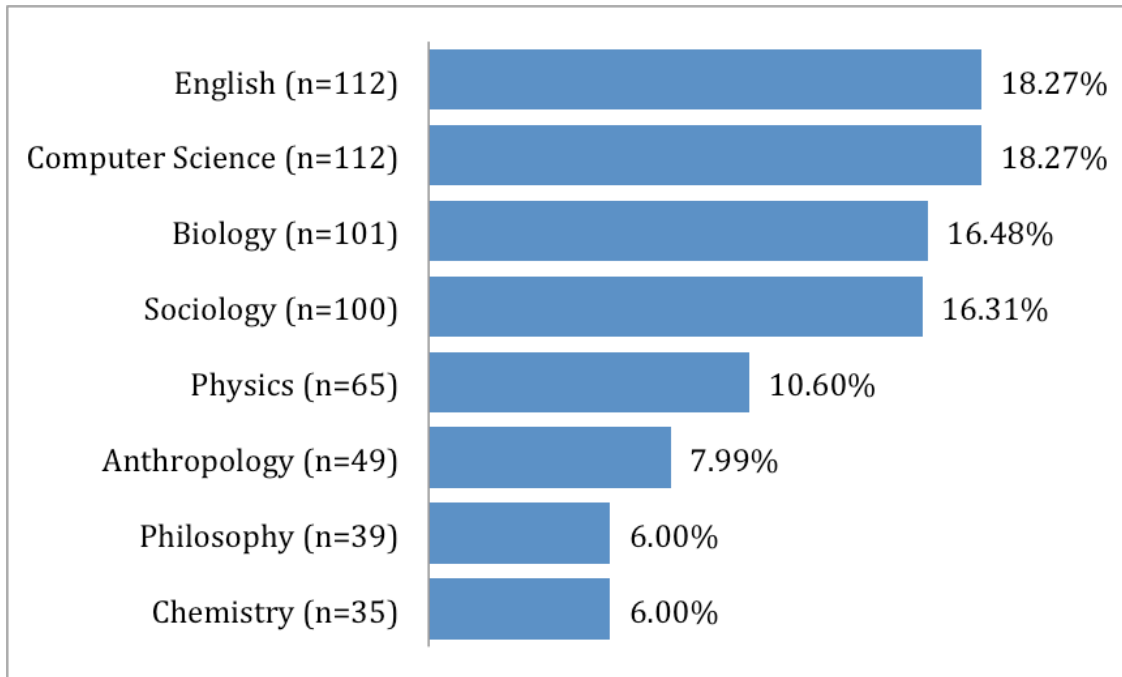chemistry (n=35) and philosophy (n=39) departments had the lowest number of accounts.

Figure 18 Twitter account holders (n=613) by department

In addition to having at least one scholar from all departments in the sample, there was also at least one scholar from each of the 62 universities (see Appendix 9.2 for complete university list) who indicated that he or she had at least one Twitter account. After examining the results, it was found that the largest proportion of respondents with Twitter accounts were from three Big Ten schools[16]: University of Wisconsin-Madison (n=19), Indiana University Bloomington (n=16), and Maryland University at College Park (n=13). At the other end of the spectrum were Brandeis University, California Institute of Technology, Case Western University and University of California, Davis, each with only one respondent

[16] http://www.bigten.org/school-bio/big10-school-bio.html

reporting at least one Twitter account. Differences in Twitter account holders by department could be a reflection of disciplinary differences in attitudes towards social media, the size of universities, scholarly access to technologies, or the encouragement or discouragement from university administration on the use of social media by professors.

Those individuals with Twitter accounts were also compared by their academic ranks (see Figure 19) and the results show that while more respondents with the title of full professor are in the final sample, a greater proportion of assistant (42%) and associate (38%) professors have accounts as compared to full professors (26%). These results may be a reflection of age and comfort with technology as assistant and associate professors may be younger and more willing to adopt social media earlier than full professors, although without the pressures of tenure promotion full professors could experiment with such services with fewer potential repercussions.
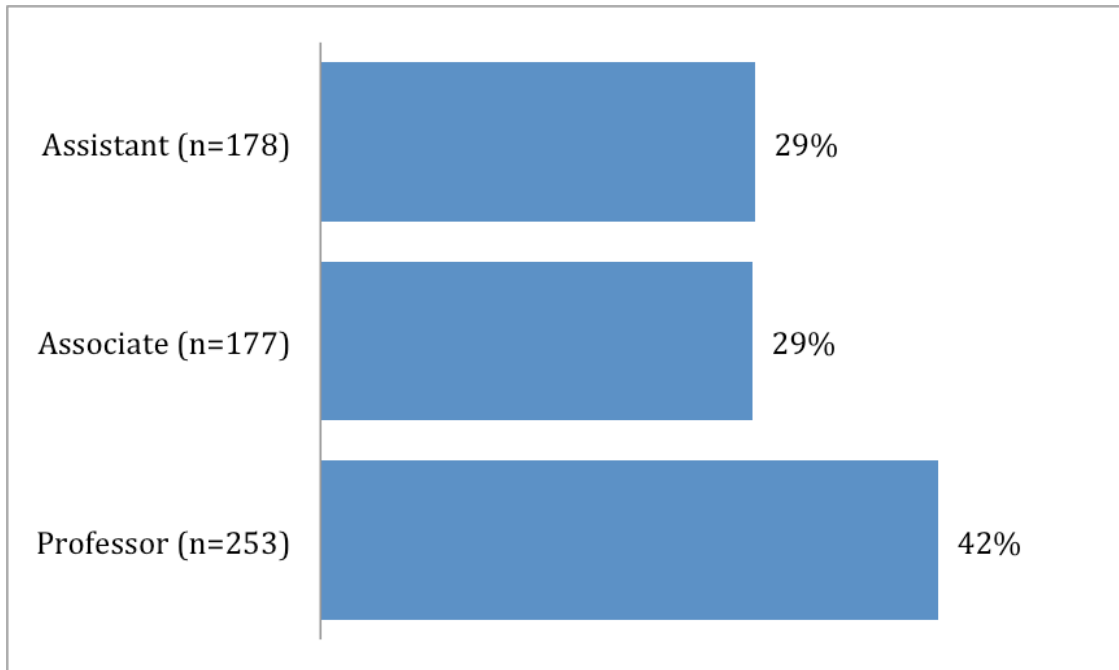
Figure 19 Twitter account holders by academic rank.

The respondents also reported the length of time they had had their Twitter account(s) (see Figure 20); 28% had had their account only one to two years, 22% less than one year, and 21% two to three years. These results show that most respondents have joined Twitter in the past three years, as more than 70% have been on Twitter for three years or less.
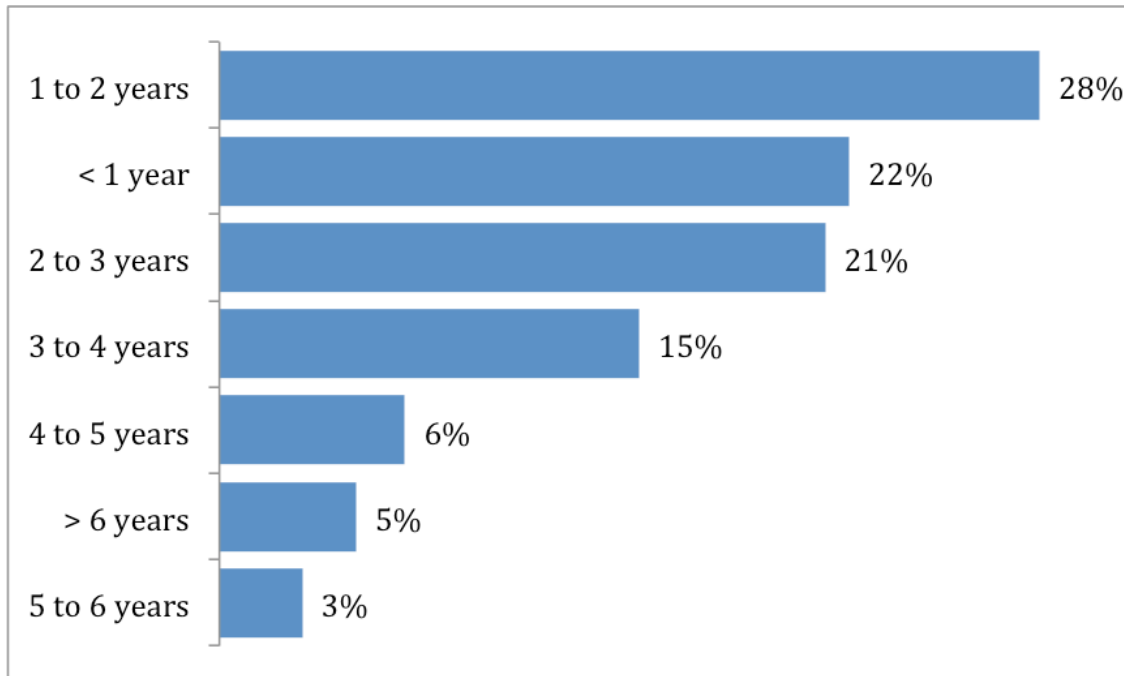
Figure 20 Length of time respondents (n=613) had their Twitter accounts

There were also differences in Twitter use by actual age. It was found that respondents between 36 and 60 years old accounted for 71% of the 613 professors who reported using Twitter. Comparing age ranges proportionally across those professors who reported having a Twitter account, scholars in the 46 to 60 year old range have the highest percent of Twitter accounts at 36%, followed by those between 36 to 45 years old, who account for 35% of the total (see Figure 21). This is in line with Brenner and Smith (2013), who found that users between 30 and 49 years old were the second highest user group behind 18 to 29 year olds. It is important to note that based on the original survey categorization of actual age, every age group reported having at least one Twitter account, but scholars over 75 had only one participant indicating that he or she had an account (1 of 42).
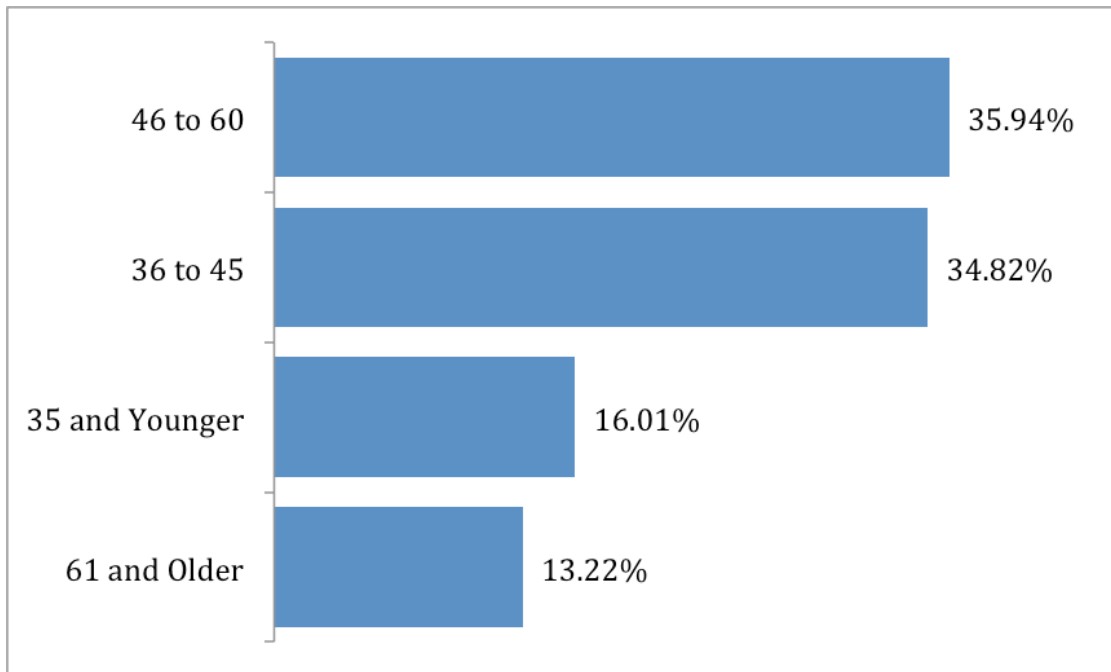
Figure 21 Twitter account holders (n=537) by age.

When looking at differences by gender the data reveals that more males (62%; n=331) are using Twitter than females (38%; n=201). While it was found above that a higher proportion of females who responded to the survey had Twitter accounts (females – 49% n=615, males – 38% n=1,200), this result indicates that males accounted for more Twitter accounts than females in the sample. These results seem to reflect that a greater proportion of the professoriate is male (Larivière, Ni, Gingras, Cronin, & Sugimoto, 2013) and also are in agreement with the latest Pew report on social media use (Duggan, Ellison, Lampe, Lenhart, & Madden, 2015).

The fifth question of the survey asked respondents to identify their account(s) as personal, professional, or both. Of the 553 who reported having a Twitter account and answered this question, most reported using their accounts

both personally and professionally (42%; n=230); personal only use was chosen by 30% (n=164) and professional only use was chosen by 29% (n=159). These results (see Figure 22) reiterate the point made in the literature review that many scholars are using the same Twitter account to communicate both personally and professionally.
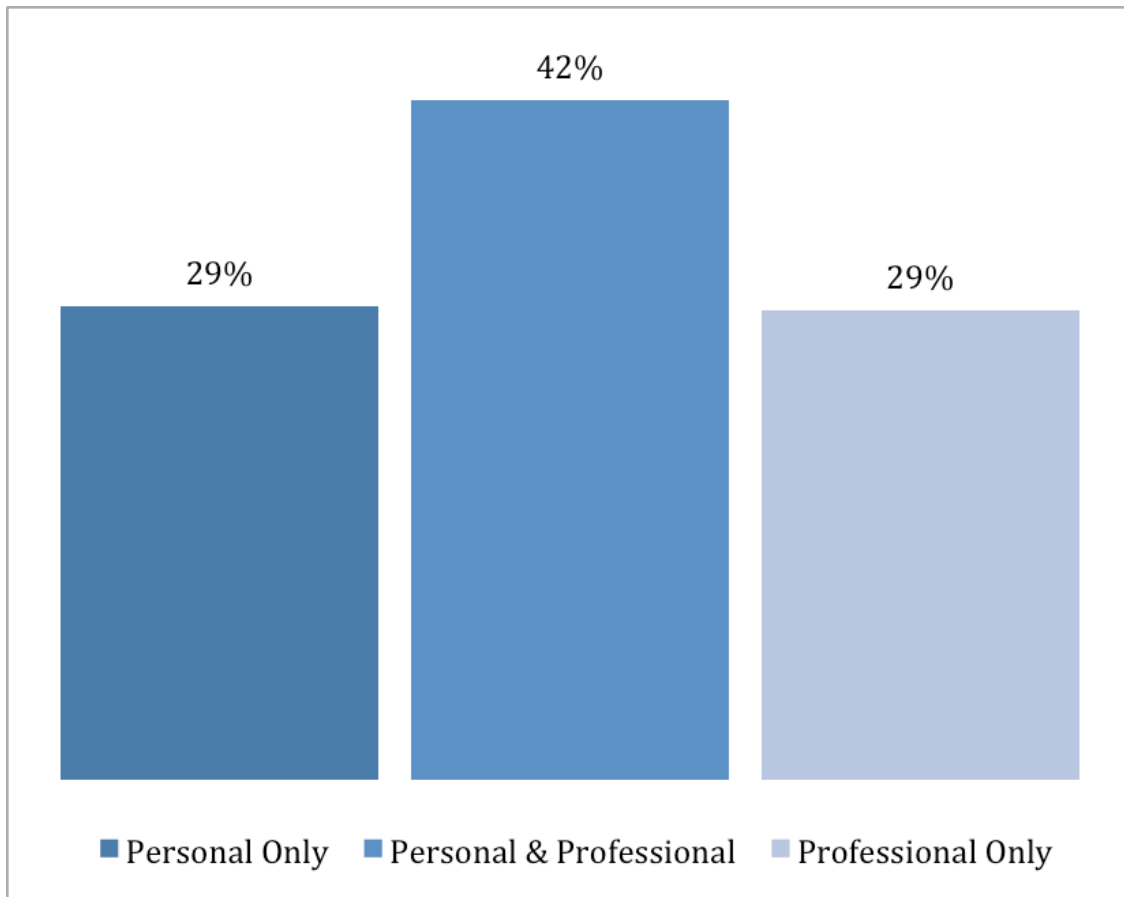

Figure 22 Twitter account categorized as personal, professional, or both.

4.1.2.1 Differences Between Personal and Professional Accounts

        The personal/professional question results were further examined by cross-tabulating these findings by department, age, academic age, and gender. A chi-square test of significance was run to determine any associations between ethnicity,

actual age, academic age, department, academic title, and gender with Twitter

account type; it was found that the results from analysis of ethnicity, academic age,

gender, and academic title were not significant. However, the descriptive statistics

demonstrate that there were significant differences between departments and age

groups.

It was found that departments had a strong relationship with Twitter

account type, χ^2 (14, n=508) = 0.278, p = 0.0005, Cramer's V = 0.195. Examining the

results by department shows that philosophers reported a much higher number of

personal-only accounts (as shown in Figure 23), whereas English professors

reported the highest number of combined personal and professional accounts.
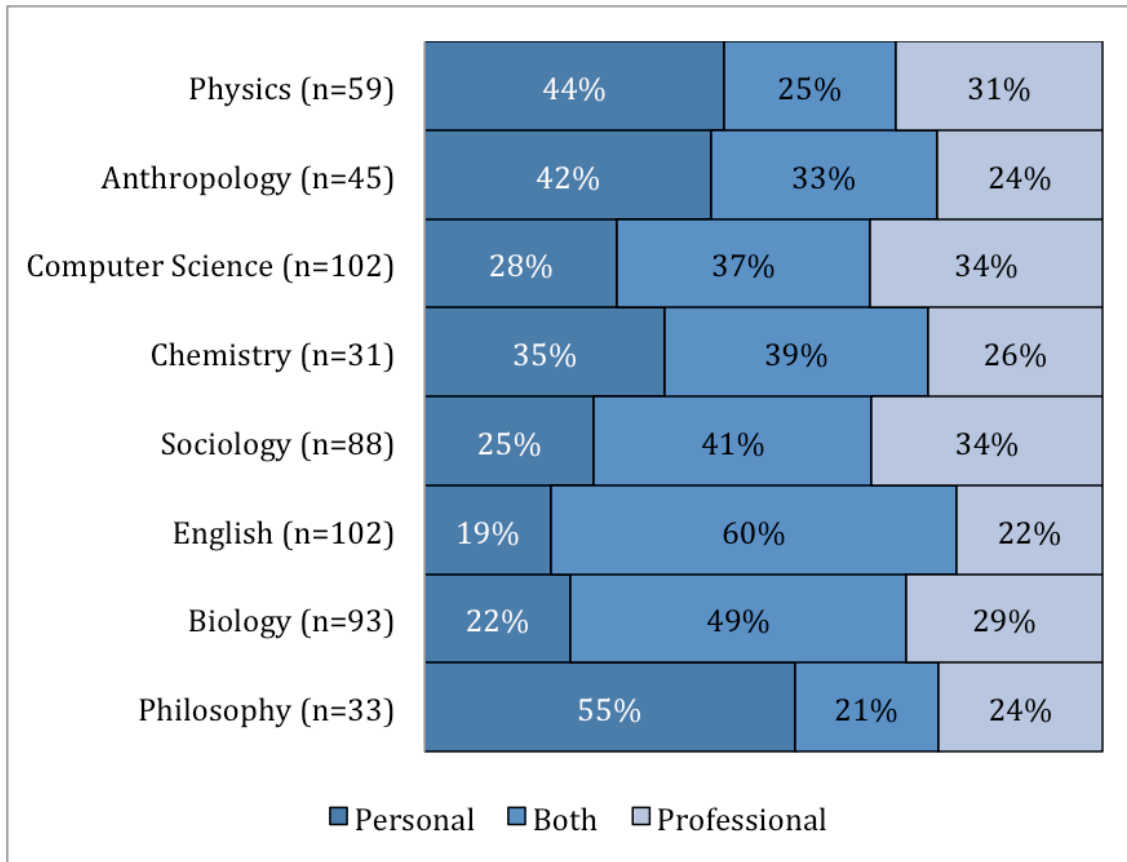
Figure 23 Twitter account type (personal, professional, or both) by department.

There were also significant differences between age groups[17] and Twitter account type. The results from the chi-square showed a moderate relationship between age and Twitter account type, χ^2 (6, n=508) = 0.197, p = 0.003, Cramer's V = 0.139. Younger scholars reported more combined personal and professional accounts than older scholars (as seen in Figure 24). The data illustrated that as scholars became older they tended to use their Twitter accounts less for combined personal and professional communications, with a higher percentage using their account simply for personal communications. Scholars between 36 and 45 years old reported the most combined (personal and professional) accounts, while those

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[17] Reported as 35 and under, 36 to 45, 46 to 60, and 61 and over.

under 35 had the highest difference from the expected value for professional-only accounts.
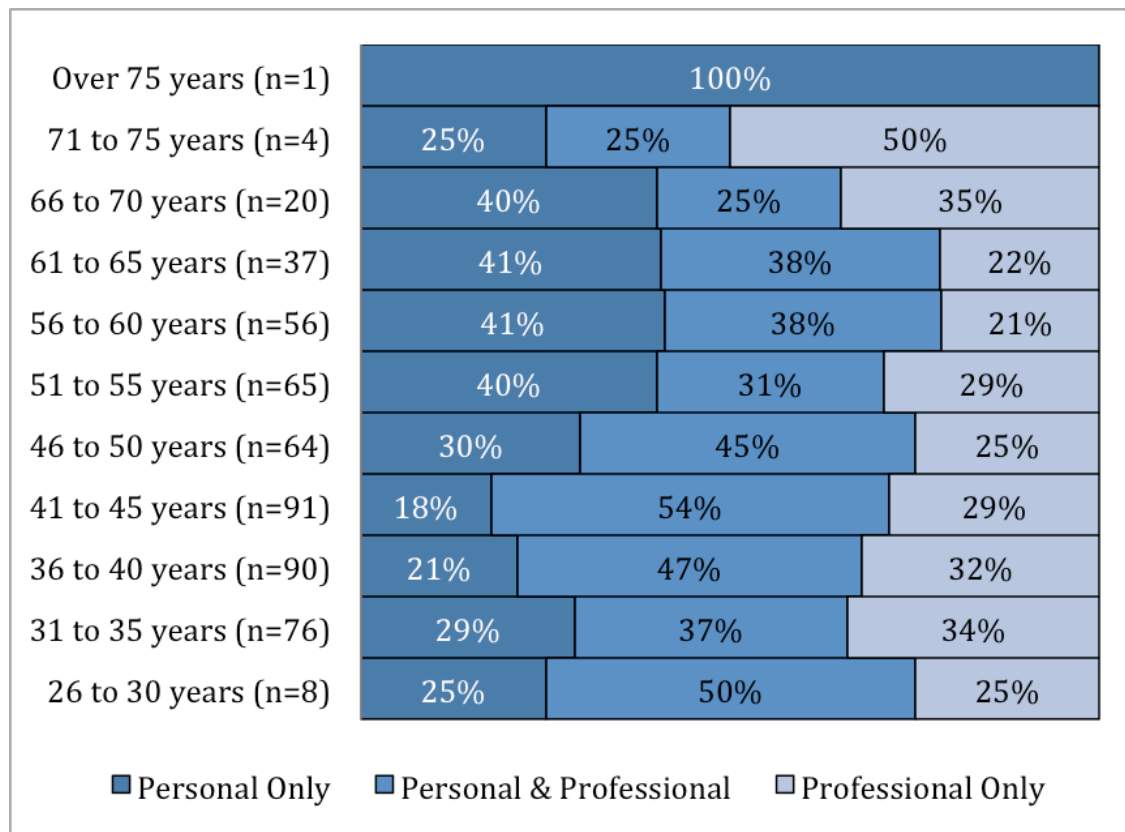

Figure 24 Twitter account type (personal, professional, or both) by age.

4.1.2.2. Affordance-related Survey Questions

This section of the survey focused specifically on respondents' reports of affordance use in Twitter. As mentioned in the literature review, the Twitter environment has many affordances available to the user. Some of these affordances can be specifically used in day-to-day tweeting behavior (such as @user mentions, #hashtags, RT:retweets, and URLs), while others are mechanisms in the Twitter environment that can be used to distribute information about the account (such as sending the Twitter user emails or text messages about account activity) and the

creation of a Twitter profile (what Goffman (1959) would label as self-presentation). The following results are from questions asking respondents to recall their own uses of these affordances.

The first affordance-related question asked respondents describe their everyday tweeting behavior and to indicate the frequency with which they embedded URLs, used #hashtags, @mentioned someone, addressed a message at someone (starting a tweet with a @username followed by text), added a location, and added a photo to their tweets. A five-option Likert scale ranging from Never to Always was used for this question. As shown in figure 25, most respondents claimed to rarely or never use URLs (48%; n=556) #hashtags (61%; n=558), @mentions (58%; n=548), direct messages (68%; n=556), and to not add location (93%; n=553) or embed photos (80%; n=555). The only affordance they reported using above the rare/never category was embedding URLs.
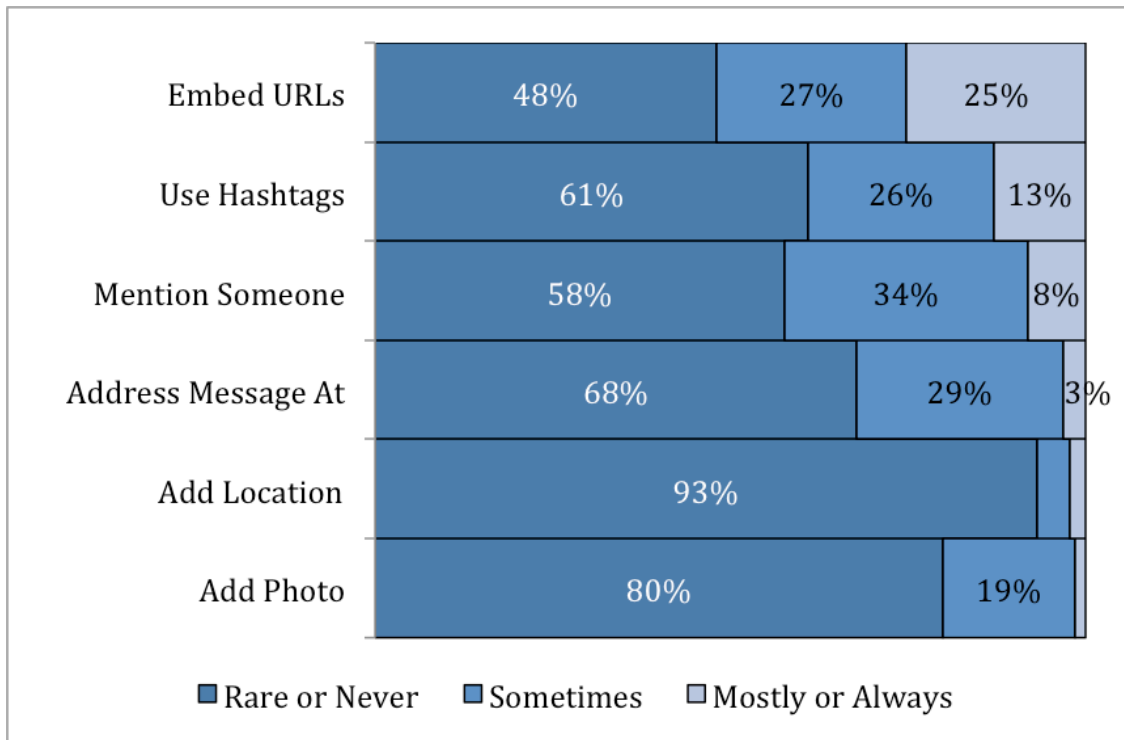
Figure 25 How often respondents used certain affordances in tweets.

The second affordance-related question asked respondents how often they deleted their tweets or acknowledged the tweets of others. Because some Twitter users prune their own accounts of followers, friends, and tweets (Farhi, 2009), it was important to ascertain whether the respondents behaved in this manner. As above, a Likert scale was used asking respondents how often they either deleted a tweet, favorited a tweet, replied to a tweet, or retweeted a tweet. Deleting a tweet was by far the least performed activity (94% rare or never; n=557), followed by favoring a tweet (68% rare or never; n=559), replying to a tweet (58% rare or never; n=558), and retweeting a tweet (53% rare or never; n=558)—as shown in Figure 26. Replying to and retweeting a tweet were more common, but still more than 50% reported doing so rarely or never.
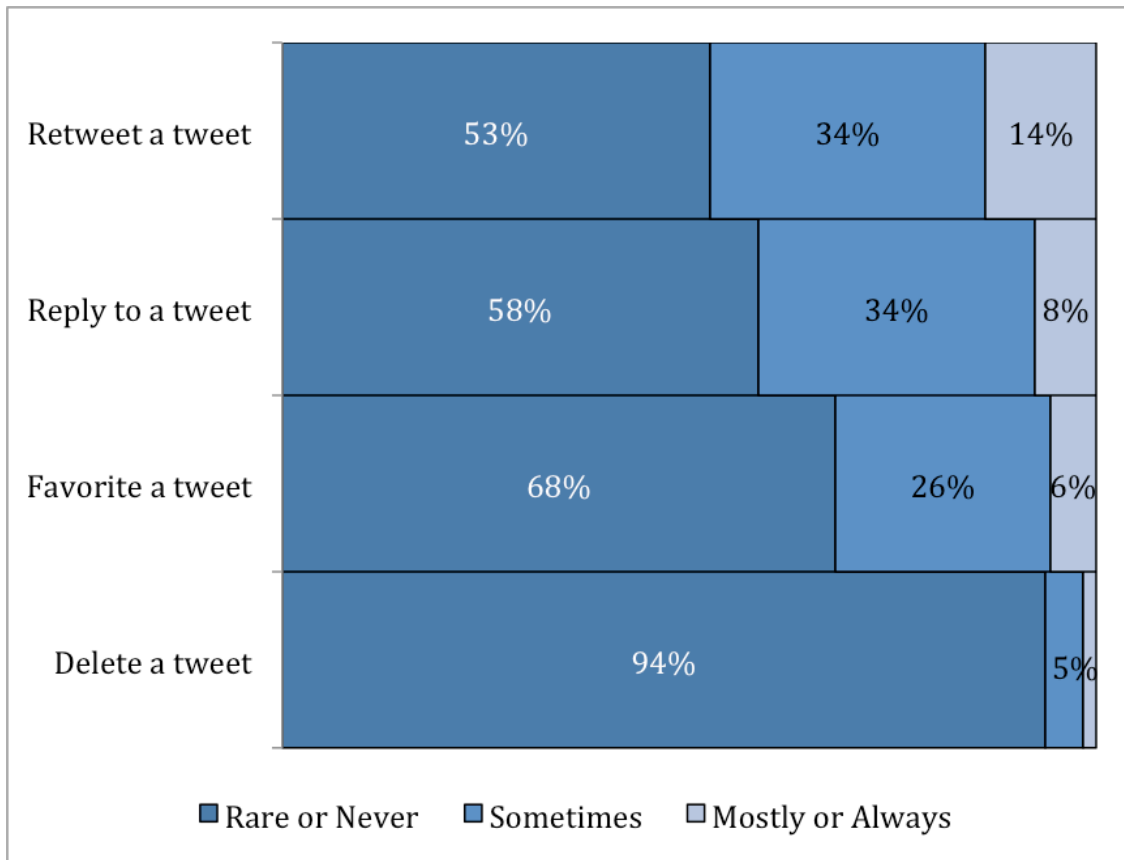
Figure 26 How often respondents replied, retweeted, or manipulated tweets.

Results from the third affordance-related question can be seen in Figure 27.

Respondents were asked to indicate if they changed any of the information listed as

options by simply indicating "Yes." Most scholars who selected from the options

reported changing information related to their Twitter profile. The highest reported

affordance use relating to Twitter profiles is the act of adding a profile picture

(60%), followed by adding bio information (52%),,and changing privacy settings

(41%). Fewer than half of the respondents reported allowing Twitter to send them

text messages about tweeting behaviors (43%). Twitter's sleep settings, which allow

users to turn off content alerts sent to their mobile devices during certain hours of

the day, were the least used affordance (2%).

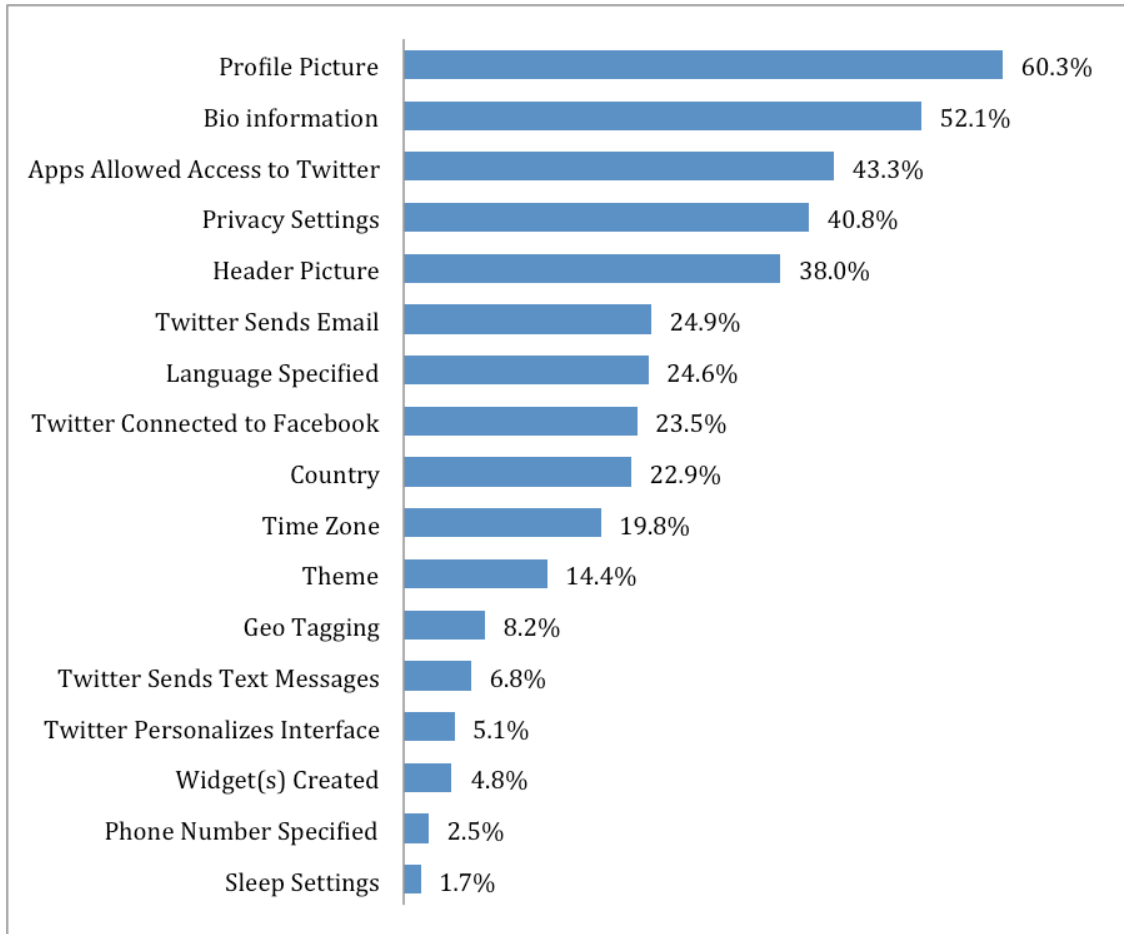**Figure 27**. List of Twitter affordances and if respondents had ever changed them.

With regards to other Twitter settings, 93% reported changing their privacy settings less than once per year. Most scholars (93%) reported changing their profile pictures never or less than once per year and they (96%) reported changing their Twitter header image never or less than once per year (see Figure 28).
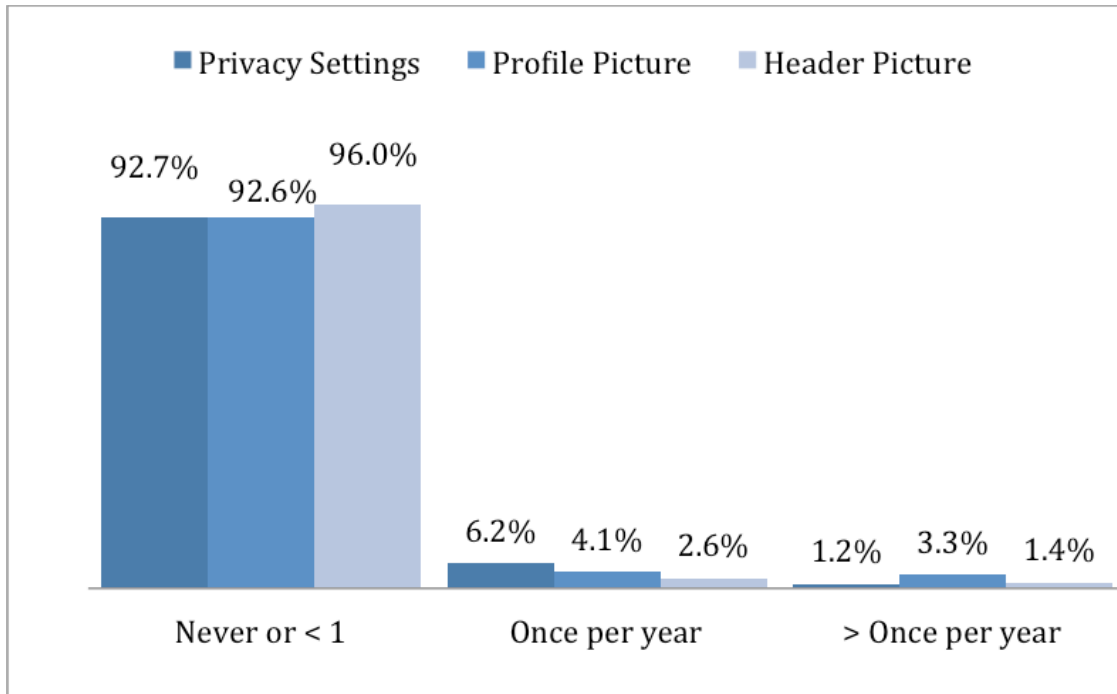
Figure 28 How often respondents changed specific affordances in Twitter.

The fifth affordance-related question asked respondents to indicate from a short list the types of information they had added to their biographies. A large percentage of respondents reported adding both their professional title (87%) and place of work (87%) to their bios. The majority of scholars did not add post-nominal letters (e.g. Ph.D.) to their bios (16.2%). These results (as seen in Figure 29) suggest that while scholars want others to know what they do and where they are, they do not feel it necessary to add their post-nominal letters to their profile descriptions.
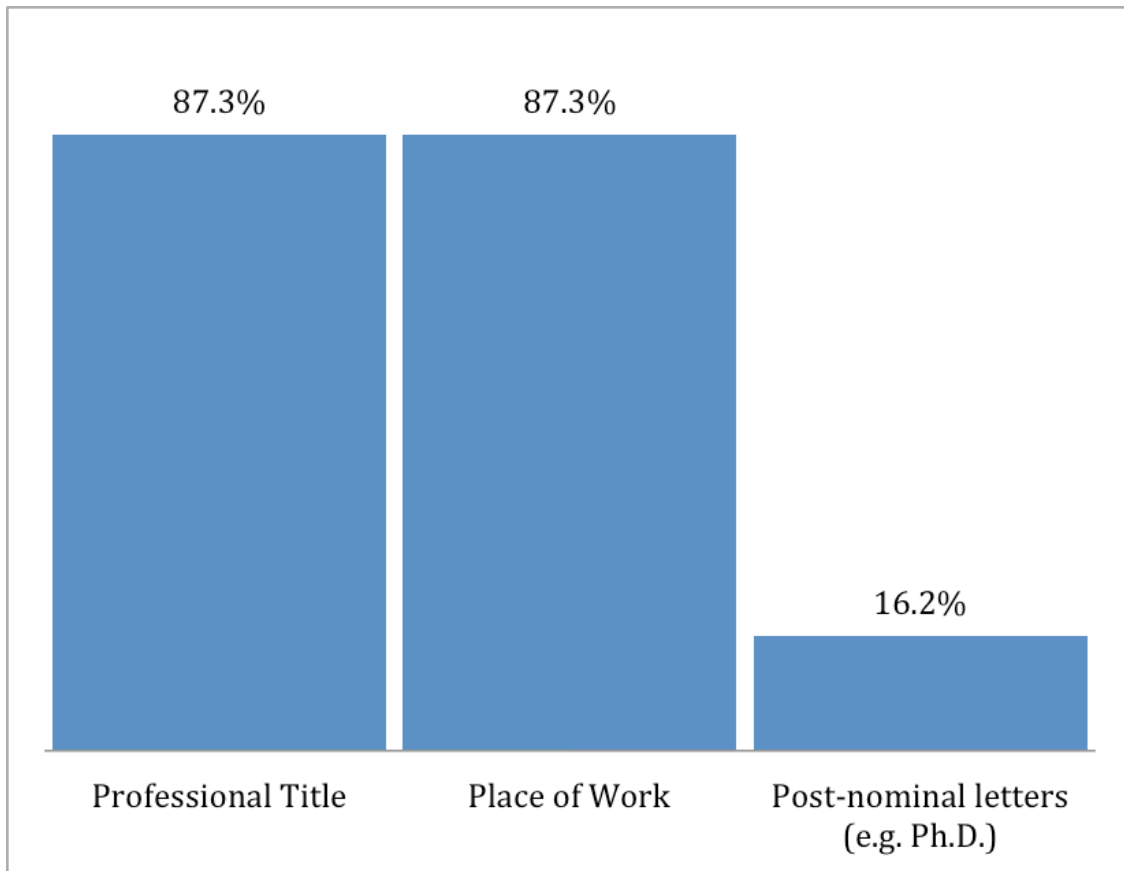
Figure 29 Types of information added to respondents' Twitter profile.

The final two affordance-related questions asked respondents to identify what specifically triggered Twitter to send them information by email and text message (see Figure 30 and Figure 31 below). Respondents who answered the question (n=325) reported that mentions (73%), new followers (79%), and retweets (65%) were the most sought after information they wanted to receive by email. The least sought after information by email were tweets marked as favorites (53%) and a general message about top tweets and stories (34%). When asked about receiving text messages, respondents (n=71) reported that they mostly wanted to know when someone new was following them (62%). As with email messages, the least requested information was about top tweets and stories (31%).
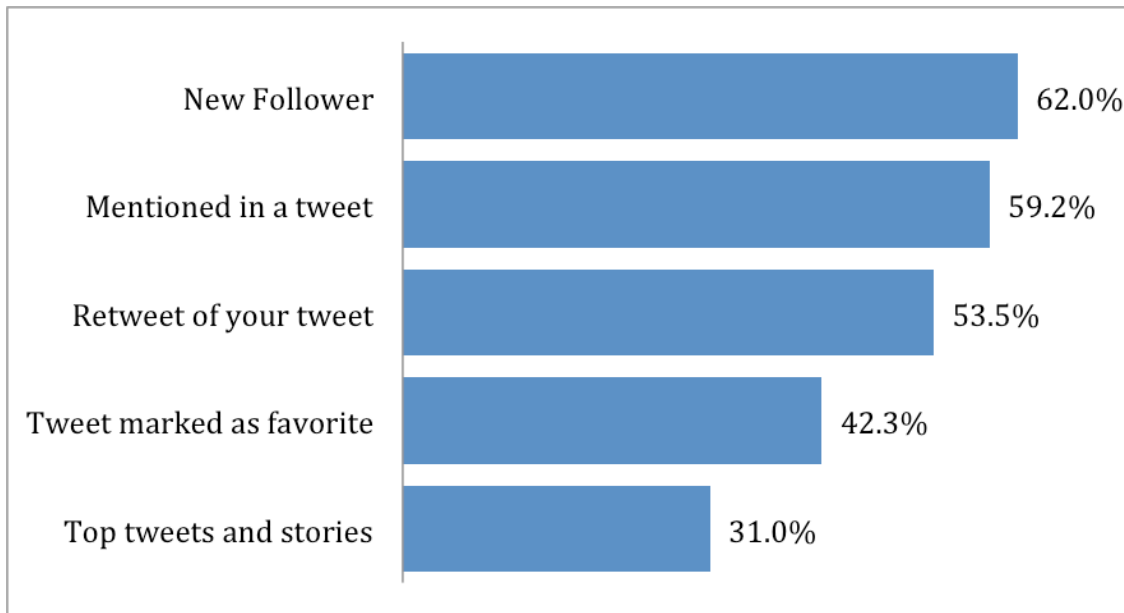
Figure 30 Affordances that trigger Twitter to send text messages.
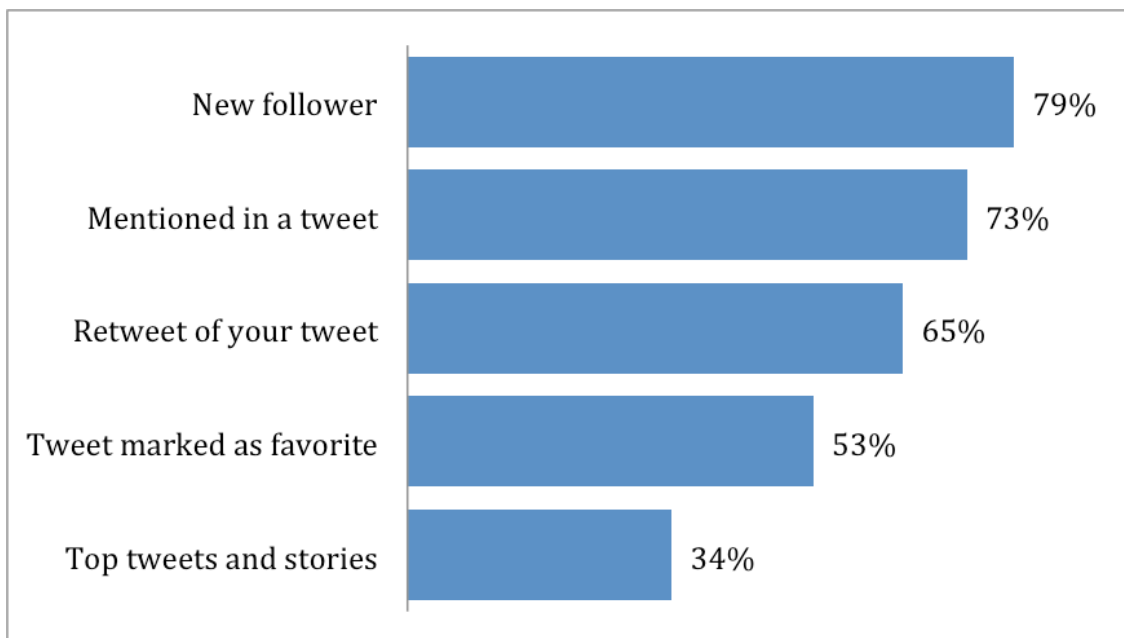
Figure 31 Affordances that trigger Twitter to send email messages.

All respondents were asked what other social media tools they used besides

Twitter. The results were somewhat varied (shown in Figure 32), as Facebook

(70%), LinkedIn (58%), and Google+ (50%) were by far the most reported general

social media platforms used by the scholars. With regards to academic-related social platforms, respondents reported a low use of Mendeley (7%), while a higher proportion reported using ResearchGate (26%) and Academia.edu (22%).
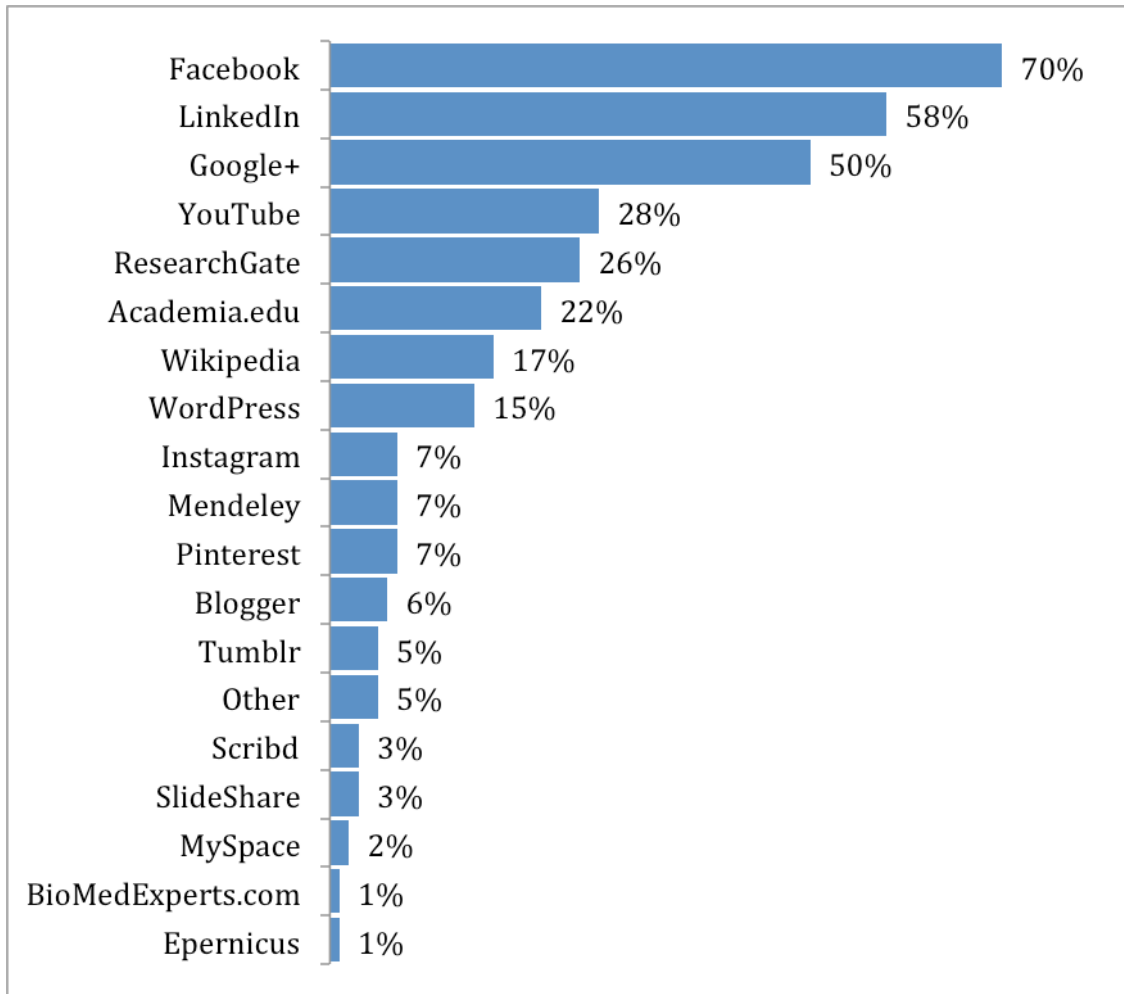
Figure 32 Other social media used by respondents (n=1,639).

4.1.5. Summary

The majority of scholars with Twitter accounts reported using their accounts for both personal and professional communications. Department and actual age had an effect on the types of Twitter accounts professors reported having, with those from the English department reported using their accounts as both personal and

professional most often, physicists reported having the largest number of personal-only accounts, and computer science and sociology scholars were most likely to have professional-only accounts. Age had an effect on the Twitter account type as younger scholars reported using their Twitter accounts as both personal professional more than older scholars, while older scholars tended to use their accounts more personally than professionally.

Regarding affordance use, over 50% of the respondents ranked all of the tweet-based affordances except URLs as being rarely or never used. With regards to the affordances for managing tweets, professors reported retweeting and replying to tweets as the two most used actions. The third type of affordance use the respondents were questioned about related to customizing the Twitter environment and profile. For these questions, professors reported displaying a photo, adding biographical information, changing privacy settings, and allowing other applications access to their Twitter information. The participants also reported that they rarely changed their Twitter environment.

Lastly, scholars were asked about affordances that allow the Twitter application to send them information about their online activity and the activity of their network. Professors were more likely to allow Twitter to send them text messages about new followers, when someone retweeted a tweet they had posted, and when they were mentioned in someone else's tweet.

4.2. Phase Two: Coding in Amazon's Mechanical Turk (AMT)

4.2.1. Tweet Characteristics

As described in Section 3.2, the accounts that could be identified based on the survey information and information gathered from the web generated a sample of 391 scholars with 445 accounts. There were 165 accounts that could either not be found or were set as private at the time of data collection; a private account prevents access to tweets via the Twitter API. There were 41 scholars who reported having two accounts, 11 scholars with three accounts and one scholar reporting five or more accounts. At the time of data collection, the 445 accounts had posted a total of 585,879 tweets, had 410,340 followers and 93,434 friends, and were members of 21,121 lists.

There were 289,934 tweets collected from the 445 Twitter accounts using the Twitter API. The uses of the four primary affordances (hashtags, URLs, user mentions, and retweets) found in the tweets were compared across departments (as show in Table 4) and the results indicate clear differences in the way scholars made use of affordances. It was found that scholars from sociology (7.4%) used hashtags more often than any other department, while those from anthropology (4.4%) used them the least. URL use was quite low for all disciplines, with philosophy professors (1.1%) using URLs the most frequently and chemistry professors (0.3%) using them the least. Professors who used user mentions the most were from sociology (20%), while scholars from computer science (9.2%) used mentions the least. Finally, English professors retweeted the most, whereas chemistry professors (137) retweeted them the least.

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Table 4 Average of mean affordance use by department; **bold** indicates highest use.

	Anthropology	Biology	Chemistry	Computer Science	English	Philosophy	Physics	Sociology	
HASHTAGS	4.4%	5.5%	5.2%	5.2%	4.9%	4.6%	6.4%	**7.4%**	5.5%
URLS	0.7%	1.2%	0.3%	1.1%	0.5%	**1.7%**	0.8%	1.1%	0.9%
MENTIONS	11.6%	16.3%	12.99%	9.2%	13.4%	10.6%	13%	**20%**	13.4%
RETWEETS	241	273	137	244	**291**	171	124	205	211

4.2.1.1. Mean Tweets per Day

The average of the mean tweets per day (mTPD) per scholar was calculated and compared. While the results indicate that scholars from philosophy (1.96) had the highest average of mTPD as compared to chemists (0.52) and physicists (0.52) who demonstrated the lowest average of mTPD, differences in tweeting activity were not statistically significant (Welch's $F(7, 1.537) = 115.843$, $p = .162$). Overall the scholars from the social sciences (1.40) averaged a higher mTPD than the scholars from the natural sciences (0.61). Males (1.02) had a slightly higher mTPD average than females (0.80).

The averages of mTPD were compared across academic age ranges and it was found that scholars who had been at their position between four to six years (1.39) tweeted more often than any others. Lastly, assistant professors (1.03) had a slightly higher average mTPD than associate professors (0.98).

4.2.2. Tweet Categorization

As noted in section 3.2.2, Turkers fully agreed (3/3) on the categorization of 34,969 tweets (47% of all tweets), partially agreed (2/3) on the categorization of 37,355 tweets (49% of all tweets), and disagreed (0/3) on 2,674 tweets (4% of all tweets).

In order to detect affordance use and framing differences in the personal and professional tweets, a closer inspection of the tweet content was made. The next part of the data analysis focuses solely on the personal and professional tweets from the full agreement (3 out of 3 Turkers agreed) set (i.e., 34,969 tweets - 47% of

tweets). In an attempt to determine whether affordance use in Twitter might be associated with tweet activity (as determined by mTPD averages), followers, friends, tweet count, academic age, and actual age, correlations were run on both the personal and professional tweets (see Table 5 and Table 6). Based on the results from the correlation analyses, additional statistical tests were run to identify associations in affordance use and framing behaviors of personal and professional tweets.

Table 5 Spearman's ρ comparing groups, followers, friends, tweets, academic age, and actual age and hashtags, URLs, and user mentions for personal tweets (n=27,264). (GRP: group of professor as determined by mTPD; FOLL: number of Twitter followers as indicated on the Twitter profile; FRND: number of Twitter friends as indicated on the Twitter profile; ACADAGE: academic age of professor; AGE: actual age of scholar; MENT: number of user mentions found in tweets; URLs: number of URLs found in tweets; HASH: number of hashtags found in tweets.

PERSONAL	GRP	FOLL	FRND	TWTS	ACAGE	AGE	MENT	URLS	HASH
GRP		.593**	.398**	.925**	-.040**	.051**	.784**	.649**	.261**
FOLL	.593**		.381**	.637**	.090**	.003	.609**	.428**	.187**
FRND	.398**	.381**		.403**	-.039**	.078**	.446**	.412**	.369**
TWTS	.925**	.637**	.403**		-.035**	.012*	.779**	.663**	.277**
ACAGE	-.040**	.090**	-.039**	-.035**		.694**	-.048**	-.019**	.066**
AGE	.051**	.003	.078**	.012*	.694**		-.133**	.041**	-.007
MENT	.784**	.609**	.446**	.779**	-.048**	-.133**		.719**	.511**
URLS	.649**	.428**	.412**	.663**	-.019**	.041**	.719**		.480**
HASH	.261**	.187**	.369**	.277**	.066**	-.007	.511**	.480**	

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table 6 Spearman's ρ comparing groups, followers, friends, tweets, academic age, and actual age and hashtags, URLs, and user mentions for professional tweets (n=6,810). (GRP: group of professor as determined by mTPD; FOLL: number of Twitter followers as indicated on the Twitter profile; FRND: number of Twitter friends as indicated on the Twitter profile; ACADAGE: academic age of professor; AGE: actual age of scholar; MENT: number of user mentions found in tweets; URLs: number of URLs found in tweets; HASH: number of hashtags found in tweets.

PROFESSIONAL	GRP	FOLL	FRND	TWTS	ACAGE	AGE	MENT	URLS	HASH
GRP		.410**	.450**	.896**	-.135**	-.051**	.842**	.744**	.621**
FOLL	.410**		.383**	.544**	.119**	.197**	.510**	.491**	.406**
FRND	.450**	.383**		.540**	-.223**	-.058**	.436**	.492**	.512**
TWTS	.896**	.544**	.540**		-.122**	-.054**	.831**	.806**	.652**
ACAGE	-.135**	.119**	-.223**	-.122**		.672**	-.121**	-.013	-.234**
AGE	-.051**	.197**	-.058**	-.054**	.672**		-.049**	.066**	.101**
MENT	.842**	.510**	.436**	.831**	-.121**	-.049**		.765**	.708**
URLS	.744**	.491**	.492**	.806**	-.013	.066**	.765**		.640**
HASH	.621**	.406**	.512**	.652**	-.234**	.101**	.708**	.640**	

**. Correlation is significant at the 0.01 level (2−tailed). *. Correlation is significant at the 0.05 level (2−tailed).

The percentages of tweets containing URLs, hashtags, retweets, and mentions were compared in an attempt to identify differences in affordance use across personal and professional tweets. As is evident in Figure 35, the data demonstrated that 69% of professional tweets contained at least one URL, as compared to only 15% of personal tweets. A large disparity in the percentage of retweets also existed between the two categories as professional tweets were composed of 36% retweets compared to only 17% of personal tweets.
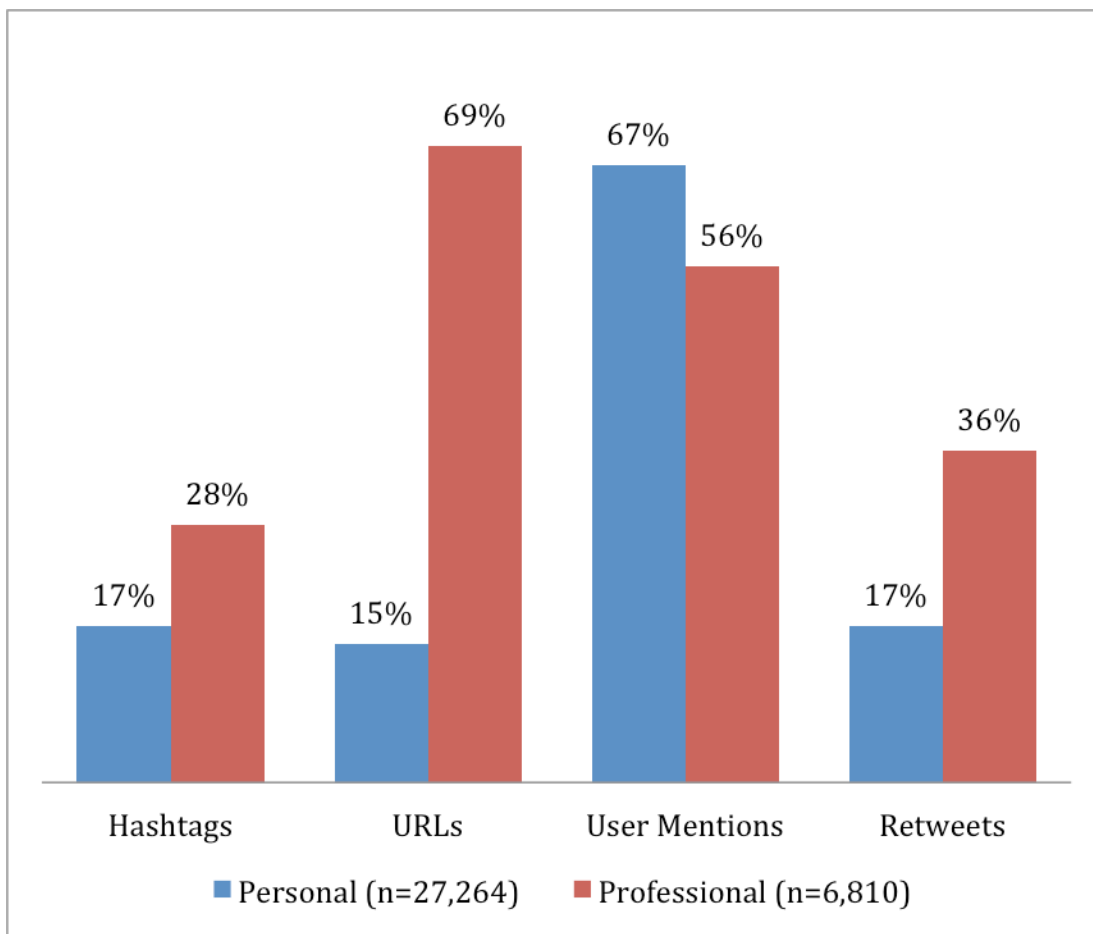

Figure 35 Percentage of tweets with specific affordances by category (personal and professional).

There were also dissimilarities found in the use of hashtags, as 28% of professional tweets contained at least one hashtag compared to only 17% of personal tweets. User mentions are the only affordance that was used more often in personal than in professional tweets; 67% of personal tweets contained user mentions as compared to only 56% of the professional tweets. A chi-square test was used to compare the use of affordances across both categories of tweets and found that there was a significant difference between affordance use and personal and professional tweets. There was a moderate association between hashtags and tweet type, χ 2 (1 n=34074) = 0.112, p = 0.0005, Cramer's V = 0.112, there was a weak association between user mentions and tweet type, χ 2 (1 n=34074) = -0.089, p = 0.0005, Cramer's V = 0.089, a very strong association between URL use and tweet type, χ 2 (1 n=34074) = 0.491, p = 0.0005, Cramer's V = 0.491, and a moderate association between retweets and tweet type, χ 2 (1 n=34074) = 0.187, p = 0.0005, Cramer's V = 0.187. An examination of the frequency of affordances across the two groups of tweets was also conducted, but there were no differences found. This may be due to the 140-character limit on tweets as it limits the number of affordances a Twitter user can place in a single tweet.

To determine whether affordance use was affected by department, gender, academic age, age, tweet activity, or academic title between personal and professional tweets, frequency distributions were calculated (shown in Figure 36). The first cross-tabulation examined the effect that a professor's department might have on affordance use between personal and professional tweets. The differences

in the percentage of tweets between departments are presented in Figure 18. The percentage of professional tweets was greater than the percentage of personal tweets for the departments of biology (18%/11%), computer science (24%/18%), and sociology (16%/14%), while there were more personal tweets categorized for English (33%/22%) and philosophy (7%/4%). Chemistry (2%), anthropology (7%), and physics (7%) all had the same percentage of personal and professional tweets as categorized by Turkers. A chi-square test for association was conducted between department and tweet category. All expected cell frequencies were greater than five. There was a statistically significant moderate association between department and tweet category, $\chi 2(7) = 0.141$, p = .0005, Cramer's V=0.141.
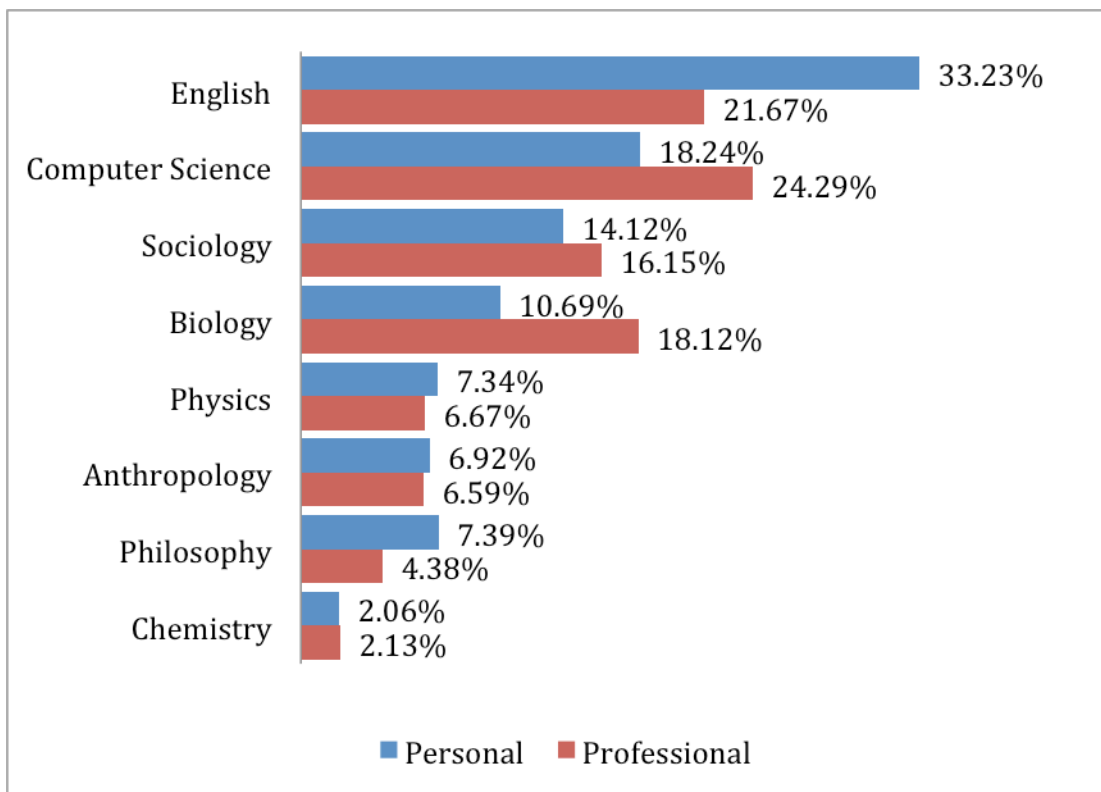

Figure 36 Percentage of personal and professional tweets by department.

4.2.2.1. Affordance Use by Department

Examinations of the use of affordances by department for the sets of personal and professional tweets are presented in Tables 5 and 6. For all the affordances shown (hashtags (ht), user mentions (um), URLs (url), and retweets (rt)) across all agreed-upon tweets, English professors (26% ht, 24% um, 29% url, 27% rt) had the highest percentage of total sum of tweets with each affordance, whereas chemistry professors (3.2% ht, 2.1% um, 1.8% url, 2.6% rt) had the lowest percentage of total sum of tweets with affordances. A chi-square test for association was conducted between department and use of affordances. All expected cell frequencies were greater than five. There was a statistically significant association between department and the use of hashtags, $\chi2(7$ n=34,969) = 0.120, p = .0005, Cramer's V = 0.120, the use of user mentions, $\chi2(7$ n=34,969) = 0.096, p = .0005, Cramer's V = 0.096, the use of URLs, $\chi2(7$ n=34,969) = 0.133, p = .0005, Cramer's V = 0.133, and the use of retweets, $\chi2(7$ n=34,969) = 0.119, p = .0005, Cramer's V = 0.119.

When examining only personal tweets, respondents from the English department (31% ht, 32% um, 29% url, 32% rt) had the highest percentage of the total sum of personal tweets with each affordance. Professors from chemistry (3% ht, 1.5% um, 2% url, 2.2% rt) had the lowest percentage of the total sum of tweets with affordances in the personal tweet set. The results in Table 7 present the percentage of total sum, mean use of affordances, and standard deviations by department for personal tweets. Chemists (0.24) were found to have the highest mean of tweets with at least one hashtag, while philosophers (0.09) had the lowest

mean. Sociologists (0.22) had the highest mean of tweets with at least one URL, while chemists (0.11) and physicists (0.11) had the lowest mean.

An analysis of the quantities of user mentions found that biologists (0.76) had the highest mean of tweets with at least one user mention, while chemists (0.62) had the lowest mean. Finally, biologists (0.26) had the highest mean of tweets that were retweets and physicists (0.12) had the lowest. A chi-square test for association was conducted between department and affordance use. All expected cell frequencies were greater than five. There was a statistically significant association between department and hashtag use, $\chi2(7\ n=27{,}264) = 0.125$, p = 0.0005, Cramer's V = 0.125, between department and URL use, $\chi2(7\ n=27{,}264) = 0.093$, p = 0.0005, Cramer's V =0.093 , between department and user mention use, $\chi2(7\ n=27{,}264) = 0.096$, p = 0.0005, Cramer's V = 0.096, and between department and retweeting, $\chi2(7\ n=27{,}264) = 0.095$, p = 0.0005, Cramer's V = 0.095.

Table 7 Percent of total sum and mean use of affordances by department in personal tweets. A = Percent of total sum; B = Mean of tweets with affordance (standard deviation); BOLD indicates highest mean use; nU = number of users and nT = number of tweets

PERSONAL TWEETS	Anthropology nU=23 nT=1,887	Biology nU=56 nT=2,914	Chemistry nU=13 nT=562	Computer Science nU=79 nT=4,974	English nU=70 nT=9,061	Philosophy nU=21 nT=2,014	Physics nU=40 nT=2,002	Sociology nU=62 nT=3,850	nU=364 nT=27,264
HASHTAGS									
A	9%	15%	3%	13%	31%	4%	10%	15%	100%
B	0.22 (0.41)	0.24 (0.43)	**0.27 (0.44)**	0.12 (0.32)	0.16 (0.37)	0.09 (0.29)	0.24 (0.43)	0.19 (0.39)	0.17 (0.39)
URLS									
A	7%	13%	2%	15%	29%	8%	5%	20%	100%
B	0.16 (0.37)	0.18 (0.38)	0.11 (0.31)	0.13 (0.33)	0.13 (0.34)	0.17 (0.38)	0.11 (0.32)	**0.22 (0.41)**	0.15 (0.36)
MENTIONS									
A	7%	12%	2%	18%	32%	7%	7%	15%	100%
B	0.68 (0.47)	**0.76 (0.43)**	0.62 (0.49)	0.64 (0.48)	0.64 (0.48)	0.64 (0.48)	0.63 (0.48)	0.72 (0.45)	0.67 (0.47)
RETWEETS									
A	8%	16%	2%	16%	32%	6%	5%	15%	100%
B	0.20 (0.40)	**0.26 (0.44)**	0.19 (0.39)	0.15 (0.36)	0.17 (0.37)	0.13 (0.33)	0.12 (0.33)	0.18 (0.39)	0.17 (0.38)

Table 8 displays the percentage of total sum, mean use of affordances, and standard deviations by department in professional tweets. The results showed that chemists (0.27) had the highest mean of tweets with hashtags, while philosophers (0.09) had the lowest. As with personal tweets, sociologists had the highest mean of tweets with URLs, whereas professors in chemistry (0.11) and physics (0.11) had the lowest mean. The results examining user mentions showed that biology professors (0.76) had the highest mean of tweets with at least one user mention, while chemists (0.62) had the lowest. Professors in biology (0.26) had the highest mean of retweets and that physicists (.20) had the lowest mean of tweets that were retweets.

Table 8 Percent of total sum and mean use of affordances by department in professional tweets. A = Percent of total sum; B = Mean of tweets with affordance (standard deviation); **BOLD** indicates highest mean use; nU = number of users and nT = number of tweets

PROFESSIONAL TWEETS	Anthropology nU=23 nT=449	Biology nU=56 nT=1,234	Chemistry nU=13 nT=145	Computer Science nU=79 nT=1,654	English nU=70 nT=1,476	Philosophy nU=21 bT=298	Physics nU=40 bT=454	Sociology nU=62 nT=1,100	nU=364 nT=6,810
HASHTAGS									
A	8%	20%	3%	28%	16%	2%	7%	17%	100%
B	0.32 (0.47)	0.31 (0.46)	**0.43 (0.50)**	0.32 (0.47)	0.21(0.41)	0. 11(0.32)	0.29 (0.45)	0.29 (0.45)	0.28 (0.45)
URLS									
A	7%	20%	2%	21%	21%	5%	6%	20%	100%
B	0.69 (0.46)	0.75 (0.44)	0.65 (0.48)	0.60 (0.49)	0.67 (0.47)	0.71 (0.46)	0.57 (0.50)	**0.83 (0.38**	0.69 (0.46)
MENTIONS									
A	7%	21%	3%	22%	19%	4%	5%	20%	100%
B	0.58 (0.49)	0.64 (0.48)	**0.72 (0.45)**	0.50 (0.50)	0.49 (0.50)	0.56 (0.50)	0.45 (0.50)	0.68 (0.47)	0.56 (0.50)
RETWEETS									
A	5%	22%	3%	24%	19%	3%	5%	18%	100%
B	0.30 (0.46)	0.45 (0.50)	**0.54 (0.50)**	0.35 (0.48)	0.32 (0.47)	0.27 (0.45)	0.26 (0.44)	0.41 (0.49)	0.36 (0.48)

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A cross-tabular analysis was performed on affordance use in personal and professional tweets (Tables 9 and 10 below) by gender. Respondents were able to choose from a) male, b) female, and c) other. Gender information was available for 358 scholars in the personal tweets (three scholars answered "other" and 31 scholars' gender identity was unavailable because they did not answer the survey question in phase one). Males (n=23,520) posted 74% of the total tweets and females (n=8,135) posted 26% of the tweets. When removing the "other" category (nU=3; nT=519 tweets), it was found that there was a weak association between gender and tweets containing hashtags, user mentions, URLs, and tweets that were retweets. There were 12.2% (n=3,865) of males and 6% of females (n=1,908) who had tweets containing hashtags in this set (n=31,655), χ^2 (1 n=31655) = 0.079, p = 0.0005, Cramer's V = 0.079. The use of user mentions (65%; n=24,451) also differed significantly as there was an association between males (63%; n=15,003) and females (67%; n=5,448) and use, χ^2 (1 n=31655) = 0.029, p = 0.0005, Cramer's V = 0.029. 25.7% of tweets contained a URL and there was a weak association between males (25%; n=5971) and females (27%; n=2,158) and URL use, χ^2 (1 n=31655) = 0.011, p = 0.042, Cramer's V = 0.011. Finally, retweet use for males (20%; n=23,520) and females (23%; n=8,135) was also significantly associated, χ^2 (1 n=31655) = 0.035, p = 0.0005, Cramer's V = 0.035.

When examining the personal tweet set (see Table 9) and comparing males to females, it was found that females had a larger mean of tweets containing hashtags (0.22), user mentions (0.68), and retweets (0.19) than males, who were

found to use only URLs (0.15) at the same rate as females (0.15). A chi-square test found that each relationship between gender and affordance use was significant. For retweets the association was weak (χ^2(1 n=24,818) = .030, p = 0.0005, Cramer's V = 0.030), while the association with gender and hashtags was slightly higher (χ^2(1 n=24,818) = 0.075, p = 0.0005, Cramer's V = 0.075). User mentions were weakly associated with gender (χ^2(1 n=24,818) = 0.015, p = 0.019, Cramer's V = 0.015) and that URLs were not significantly associated with gender. Note that the results from the professors in the "others" category were not used in calculations for the "Average" column because there were only three participants in this category.

Table 9 Percent of total sum and mean use of affordances by gender in professional tweets. A = Percent of total sum; B = Mean of tweets with affordance (standard deviation); **BOLD** indicates highest mean use; nU = number of users and nT = number of tweets

PERSONAL TWEETS	FEMALE nU=111 nT=6,459	MALE nU=225 nT=18,359	nU=336 nT=24,818
HASHTAGS			
A	33%	67%	100%
B	**0. 22** (0.41)	0.15 (0.34)	0.17 (0.37)
URLS			
A	26%	74%	100%
B	0.15 (0.36)	0.15 (0.36)	0.15 (0.36)
MENTIONS			
A	27%	73%	100%
B	**0.68** (0.47)	0.66 (0.48)	0.66 (0.47)
RETWEETS			
A	29%	71%	100%
B	**0.19** (0.39)	0.16 (0.37)	0.17 (0.38)

The results in Table 10 present a similar picture for professional tweets. Females again had a higher overall mean use of affordances than males. The results indicated that females had a higher mean of tweets containing hashtags (0.31), URLs (0.71), user mentions (0.64), and retweets (0.42) than males. A chi-square test was run on all the relationships. Retweet use reflected an association with gender (χ^2 (1 n=5,972) = 0.073, p = 0.0005, Cramer's V = 0.073), hashtag use was strongly associated (χ^2 (1 n=5,972) = 0.109, p = 0.0005, Cramer's V = 0.109), and user mentions demonstrated a strong association (χ^2 (1 n=5,972) = 0.109, p = 0.0005, Cramer's V = 0.109). URL use was not significantly associated with gender in professional tweets.

Table 10 Percent of total sum and mean use of affordances by gender in professional tweets. A = Percent of total sum; B = Mean of tweets with affordance (standard deviation); **BOLD** indicates highest mean use; nU = number of users and nT = number of tweets

PROFESSIONAL TWEETS	FEMALE nU=98 nT=1,587	MALE nU=193 nT=4,385	nU=291 nT=5,972
HASHTAGS			
A	32%	68%	100%
B	**0.31** (0.46)	0.24 (0.42)	0.26 (0.44)
URLS			
A	27%	73%	100%
B	**0.71** (0.45)	0.69 (0.46)	0.70 (0.46)
MENTIONS			
A	31%	69%	100%
B	**0.64** (0.48)	0.52 (0.5)	0.55 (0.50)
RETWEETS			
A	31%	69%	100%
B	**0.42** (0.49)	0.34 (0.47)	0.36 (0.48)

4.2.2.3. Affordance Use by Academic Age

When looking at the effect of academic age—reported as six years or less (group one), seven to nine years (group two), and 10 years or more (group three)—on affordance use in personal and professional tweets, the results demonstrated certain trends (see Tables 11 and 12). Professors reporting from group one posted 31% (n=9,736) of the total tweets, those in group two posted 18% (n=5,759) of the tweets, and those in group three posted 51% (n=16,162) of the tweets. There was an association between the three groups and tweets containing hashtags, user mentions, URLs, and retweets. The results showed that there was a weak association between academic age groups—group one (17%; n=1,653), group two (17%;

n=974) and group three (20%; n=3,217)—and hashtags, χ^2 (2 n=31,657) = 0.038, p = 0.0005, Cramer's V = 0.038.

The use of user mentions displayed a significantly weak association with academic age, χ^2 (2 n=31,657) = 0.026, p = 0.0005, Cramer's V = 0.026; 65% of group one (n=6,323), 67% of group two (n=3,843), and 64% of group three (n=10,245) contained user mentions. With regard to URLs, 26% (n=2,492) of group one, 24% (n=1,356) members of group two, and 27% (n=4,379) of group three had tweets that contained URLs, χ^2 (2 n=31,657) = 0.030, p = 0.0005, Cramer's V = 0.030. Finally, retweet use was also weakly associated with the three groups, χ^2 (2 n=31,657) = 0.025, p = 0.0005, Cramer's V = 0.025, as group one had 22% (n=2,085) retweets, group two had 23% (n=1,336) retweets, and group three had 21% (n=3,307) retweets.

When looking at differences in personal tweets only (as seen in Table 11), results showed that professors who had been in their faculty position 10 years or more (group three) had the highest mean of tweets with a hashtag (0.18) and URLs (0.67), whereas professors who had been in their position between seven to nine years (group two) had the highest mean of tweets with a user mentions (0.67) and used slightly more retweets (0.18). A chi-square test for association was conducted between academic age and affordance use in personal tweets. All expected cell frequencies were greater than five. There was a statistically significant association between academic age and hashtag use, $\chi2(2$ n=24,758) = 0.038, p = .0005, Cramer's V = 0.038, and between academic age and URL use, $\chi2(2$ n=24,758) = .031, p = .0005,

Cramer's V = 0.031. There was no significant association between academic age and retweets or user mentions.

Table 11 Percent of total sum and mean use of affordances by academic age in personal tweets. A = Percent of total sum; B = Mean of tweets with affordance (standard deviation); **BOLD** indicates highest mean use; nU = number of users and nT = number of tweets

PERSONAL TWEETS	6 & UNDER nU=118 nT=7,490	7 to 9 nU=56 nT=4,722	10 & OVER nU=193 nT=12,546	nU=367 nT=24,758
HASHTAGS				
A	29%	17%	55%	100%
B	0.16 (0.37)	0.15 (0.36)	**0.18** (0.39)	0.17 (0.38)
URLS				
A	32%	16%	52%	100%
B	0.16 (0.37)	0.13 (0.34)	**0.67** (0.47)	0.15 (0.36)
MENTIONS				
A	30%	19%	51%	100%
B	0.65 (0.48)	**0.67** (0.47)	0.66 (0.47)	0.66 (0.47)
RETWEETS				
A	30%	20%	50%	100%
B	0.17 (0.37)	**0.18** (0.39)	0.17 (0.38)	0.17 (0.38)

Table 12 displays the results by academic age for professional tweets. The most frequent hashtag use was among respondents in the seven to nine year range (0.25), who used slightly more hashtags than those in the six years and under range (0.24). Respondents in the 10 years or more range (0.19) were the least frequent users of hashtags. URL use increased as professors were in their position longer, with respondents in the 10 years or more range using URLs (0.71) more than the others. The use of user mentions was highest among the faculty members who reported being at their position six years or less (0.63). Finally, professors who

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reported being a faculty member six years or less used more retweets (0.49) than

any other group.

Table 12 Percent of total sum and mean use of affordances by academic age in professional tweets. A = Percent of total sum; B = Mean of tweets with affordance (standard deviation); **BOLD** indicates highest mean use; nU = number of users; nT = number of tweets

PROFESSIONAL TWEETS	6 & UNDER nU=100 nT=1,529	7 to 9 nU=56 nT=980	10 & OVER nU=137 nT=3,522	nU=313 nT=6,031
HASHTAGS				
A	26%	16%	58%	100%
B	0.26 (0.44)	0.26 (0.44)	0.25 (0.44)	0.26 (0.44)
URLS				
A	27%	17%	57%	100%
B	**0.73** (0.44)	0.72 (0.45)	0.68 (0.47)	0.70 (0.46)
MENTIONS				
A	26%	19%	56%	100%
B	0.57 (0.50)	**0.64** (0.48)	0.53 (0.50)	0.56 (0.50)
RETWEETS				
A	27%	20%	53%	100%
B	0.38 (0.49)	**0.44** (0.50)	0.33 (0.47)	0.36 (0.48)

4.2.2.4. Affordance Use by Actual Age Range

The next analysis examined the effect of the actual age of the Twitter account

holders on affordance use across the total set of agreed tweets. For the analysis, age

ranges were combined into four groups—35 and under (group one), 36 to 45 (group

two), 46 to 60 (group three), and 61 and older (group four)—to determine if

affordance use in the set of tweets was associated with the age of the professor.

Professors from group one posted 24% (n=7,541) of the total tweets, those in group

two posted 42% (n=13,284) of the total tweets, those in group three posted 25%

(n=7800), and those in group four posted 8% (n=2,680) of the total tweets. Results

indicated that there was a weak association between the age of the professor—

group one (15%; n=1,150), group two (19%; n=2,536), group three (21%; n=1,636), and group four (18%; n=489)—and hashtags, χ^2 (3 n=31,305) = 0.053, p = 0.0005, Cramer's V = 0.053. With regards to user mentions, the analysis also shows a weak association with age as those in group one had 68% (n=5,134) of their tweets include user mentions, group two had 64% (n=8,517), group three had 62% (4,862), and those in group four also had 62% (n=1,656), χ^2 (3 n=31,305) = 0.046, p = 0.0005, Cramer's V = 0.046. URL use was was found to have a moderate association with age as group one professors had URLs in 22% of their tweets (n=1,660), group two professors had 24% (n=3,215), group three had 34% (n=2,637), and group four had 21% (n=572) , χ^2 (3 n=31,305) = 0.108, p = 0.0005, Cramer's V = 0.108. Finally, retweet use was found to have a weak association with age. Professors from group one had 19% (n=1,392) of retweets, group two professors had 22% (n=2,879), group three had 24% (n=1,827), and group four had 15% (n=398), χ^2 (3 n=31,305) = 0.046, p = 0.0005, Cramer's V = 0.046.

Table 13 presents data about the frequency of affordance use in the personal tweets by age range groups. Professors in group two and group three used more hashtags than any others with both having a mean of .18 (n=10,762/n=5,758). Professors in group three (.20) had the highest mean use of URLs. With regards to user mentions, professors in group one (.69) had the highest mean of use, but overall the use went slightly downward as age increased. The use of retweets was the same for both group two (.19) and group three (.19) who had the highest use. Group one (.14) and group four (.14) represented the lowest use. A chi-square test

for association was conducted between age and affordance use in personal tweets.

All expected cell frequencies were greater than five. There was a statistically strong

association between age and affordance use, χ2(1) = 5.195, p = .023.

Table 13 Percent of total sum and mean use of affordances by age in personal tweets.
 A = Percent of total sum; B = Mean of tweets with affordance (standard deviation);
BOLD indicates highest mean use; nU = number of users; nT = number of tweets

PERSONAL TWEETS	UNDER 36 nU= 86 nT=6,428	36 to 45 nU=136 nT=10,762	46 to 60 nU=111 nT=5,758	OVER 60 nU=36 nT=2,304	nU=369 nT=25,252
HASHTAGS					
A	21%	46%	25%	8%	100%
B	0.14 (0.35)	**0.18** (0.39)	**0.18** (0.39)	0.15 (0.36)	0.17 (0.37)
URLS					
A	23%	39%	29%	9%	100%
B	0.14 (0.35)	0.14 (0.35)	**0.20** (0.40)	0.15 (0.36)	0.15 (0.36)
MENTIONS					
A	26%	43%	22%	9%	100%
B	**0.69** (0.46)	0.67 (0.47)	0.65 (0.48)	0.64 (0.48)	0.67 (0.47)
RETWEETS					
A	21%	47%	25%	7%	100%
B	0.14 (0.65)	**0.19** (0.39)	**0.19** (0.39)	0.14 (0.35)	0.17 (0.38)

Affordance use in professional tweets by age range is shown in Table 14

below. Hashtag use in professional tweets demonstrated an upward trend with

respondents in group four (.36) using hashtags more frequently than others and

those in groups one and two (0.23) using hashtags the least. Respondents in group

three (.74) embedded URLs in tweets more frequently than did anyone else and

group four (0.62) did so the least. User mentions were fairly consistent across all

categories with respondents in group one (0.64) adding user mentions to their

tweets more often than others and those in group four (0.51) using user mentions the least. Respondents in group one (0.43) retweeted more frequently than others and those in group four (0.21) retweeted the least. A chi-square test for association was conducted between age and affordance use in professional tweets. All expected cell frequencies were greater than five. There was a weak association between age and hashtag use, $\chi2(3) = 0.083$, p = .0005, Cramer's V = 0.083, between age and URL use, $\chi2(3) = .073$, p = .0005, Cramer's V = 0.073, and between age and user mention use, $\chi2(1) = 0.085$, p = .0005, Cramer's V = 0.085, while there was a moderate association between age and retweeting, $\chi2(3) = 0.105$, p = .0005, Cramer's V = 0.105.

Table 14 Percent of total sum and mean use of affordances by age in professional tweets.
A = Percent of total sum; B = Mean of tweets with affordance (standard deviation);
BOLD indicates highest mean use; nU = number of users; nT = number of tweets

PROFESSIONAL TWEETS	UNDER 36 nU=73 nT=1,113	36 to 45 nU=130 nT=2,522	46 to 60 nU=85 nT=2,042	OVER 60 nU=26 nT=376	nU=314 nT=6,053
HASHTAGS					
A	17%	37%	38%	9%	100%
B	0.23 (0.42)	0.23 (0.42)	0.29 (0.45)	**0.36** (0.48)	0.26 (0.44)
URLS					
A	18%	40%	36%	6%	100%
B	0.69 (0.46)	0.68 (0.47)	**0.74** (0.44)	0.62 (0.49)	0.70 (0.46)
MENTIONS					
A	21%	39%	34%	6%	100%
B	**0.64** (0.48)	0.53 (0.50)	0.56 (0.50)	0.51 (0.50)	0.56 (0.50)
RETWEETS					
A	22%	40%	35%	4%	100%
B	**0.43** (0.50)	0.34 (0.47)	0.37 (0.48)	0.21 (0.41)	0.36 (0.48)

4.2.2.5. Affordance Use by Twitter Activity

Finally, the results of a cross-tabulation that examined the effect of Twitter activity on affordance use across personal and professional tweets are presented in Tables 15 and 16 below. Using the Twitter account start date and the number of tweets users posted until May 2014, Twitter activity was calculated by dividing the amount of tweets by the number of days the account was open, resulting in a tweets-per-day average. The respondents were divided into ten groups ranging from the least active users, who were placed in group one, to the most active scholars, who were placed in group ten (see the Section 3 for a detailed explanation of the group breakdown).

Professors from group one posted 15% (n=5,190) of the total tweets, those in group two posted 11% (n=3,847), group three posted 15% (n=5,220), group four posted 8% (n=2,843), group five posted 7% (n=2,572), group six posted 8% (n=2,782), group seven posted 8% (n=2,866), group eight posted 7% (n=2,393), group nine posted 9% (n=2,972), and professors in group ten posted 12% (n=4,284). Results indicated that there was a strong association between the Twitter activity of the professor and hashtags, χ^2 (9 n=34,969) = 0.126, p = 0.0005, Cramer's V = 0.126, with professors in group ten accounting for 14% of tweets with hashtags. With regards to user mentions, the analysis also showed a very strong association with Twitter activity, χ^2 (9 n=34,969) = 0.208, p = 0.0005, Cramer's V = 0.208, as professors in group ten accounted for 14% of the total user mention use. URL use was was found to have a strong association with activity in Twitter, χ^2 (9 n=34,969) = 0.124, p = 0.0005, Cramer's V = 0.124, and professors in group one

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posted 18% of tweets with URLs. Finally, retweet use was also found to have a strong association with Twitter activity, χ^2 (9 n=34,969) = 0.102, p = 0.0005, Cramer's V = 0.102, with professors in group one accounting for 12.5% of total retweet activity.

For the entire set of personal and professional tweets, the most frequent hashtag users were found in group one (0.25) and the least frequent users were in group ten (0.11). The trend for hashtag use was mostly downward with those tweeting more frequently using fewer hashtags, except for those in groups seven (0.22) and eight (0.22). The embedding of URLs in tweets demonstrated no trends as those in group six (0.36) embedded URLs more than anyone else. User mentions tended to trend upward and were highest amongst those tweeting more frequently, with the highest use among those in group seven (0.82). There was no trend found in retweeting activity, as those in both group four (0.29) and eight (0.29) had the highest mean of tweets that were retweets.

Affordance use in personal tweets by Twitter activity is presented in Table 15. Hashtag use in professional tweets demonstrated a mostly downward trend with respondents in group two (.26) using hashtags more frequently than others and those in groups nine (0.09) and ten (0.10) using hashtags the least. Respondents in group six (.22) embedded URLs in tweets more frequently than anyone else and those in group three (0.09) did so the least. User mentions were fairly consistent across all categories with respondents in group seven (0.85) adding user mentions to their tweets much more often than others and those in group one (0.56) and

three (0.56) using user mentions the least. Respondents in group eight (0.25)

retweeted more frequently than others and those in groups one and five (0.13)

retweeted the least. A chi-square test for association was conducted between

Twitter activity and affordance use in personal tweets. All expected cell frequencies

were greater than five. There was a statistically significant association between

Twitter activity and hashtag use, $\chi2(9) = 0.144$, p = .0005, Cramer's V = 0.144,

between Twitter activity and URL use, $\chi2(9) = .104$, p = .0005, Cramer's V = 0.104,

between Twitter activity and user mention use, $\chi2(9) = 0.194$, p = .0005, Cramer's V

= 0.194, and between Twitter activity and retweeting, $\chi2(9) = 0.097$, p = .0005,

Cramer's V = 0.097.

Table 15 Percent of total sum and mean use of affordances by Twitter activity in personal tweets. A = Percent of total sum; B = Mean of tweets with affordance (standard deviation); **BOLD** indicates highest mean use; nU = number of users; nT = number of tweets

PERSONAL TWEETS	GROUP 1 nU=242 nT=3,590	GROUP 2 nU=33 nT=2,974	GROUP 3 nU=28 nT=4,005	GROUP 4 nU=13 nT=1,758	GROUP 5 nU=10 nT=2,093	GROUP 6 nU=10 nT=2,127	GROUP 7 nU=10 nT=2,217	GROUP 8 nU=6 nT=2,078	GROUP 9 nU=8 nT=2,438	GROUP 10 nU=9 nT=3,984	nU=369 nT=27,264
HASHTAGS											
A	16%	17%	16%	9%	5%	7%	7%	9%	5%	9%	100%
B	0.21	**0.26**	0.19	0.23	0.12	0.15	0.15	0.20	0.09	0.10	0.17
	(0.41)	(0.44)	(0.39)	(0.42)	(0.33)	(0.36)	(0.36)	(0.40)	(0.29)	(0.20)	(0.38)
URLS											
A	14%	13%	9%	8%	6%	11%	7%	8%	11%	13%	100%
B	0.16	0.18	0.09	0.19	0.11	**0.22**	0.13	0.15	0.19	0.14	0.15
	(0.36)	(0.38)	(0.29)	(0.39)	(0.32)	(0.42)	(0.34)	(0.36)	(0.39)	(0.34)	(0.36)
MENTIONS											
A	11%	10%	12%	7%	7%	8%	10%	8%	9%	16%	100%
B	0.56	0.59	0.56	0.75	0.64	0.70	**0.85**	0.73	0.68	0.74	0.67
	(0.50)	(0.49)	(0.50)	(0.43)	(0.48)	(0.46)	(0.36)	(0.44)	(0.46)	(0.44)	(0.47)
RETWEETS											
A	10%	13%	12%	9%	6%	9%	8%	11%	9%	15%	100%
B	0.13	0.20	0.14	0.23	0.13	0.20	0.17	**0.25**	0.17	0.18	0.17
	(0.34)	(0.40)	(0.35)	(0.42)	(0.33)	(0.40)	(0.37)	(0.43)	(0.37)	(0.38)	(0.38)

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When examining affordance use by group in professional tweets, results (in Table 16) showed that hashtag use varied quite a bit with Twitter activity and that professors in group seven (0.46) had the most tweets with hashtags. Respondents in group nine (0.09) used hashtags the least whereas those in group two used hashtags the most (0.26). The embedding of URLs demonstrated a primarily upward trend and those in group six (0.87) used URLs in their tweets more frequently than anyone. The use of user mentions showed a mainly upward trend as well, with those in group ten (0.81) using user mentions more than any other group. Finally, retweeting behavior also demonstrated a primarily upward trend, as those in group ten were found to be retweeting the most (0.64). A chi-square test for association was conducted between Twitter activity and affordance use in personal tweets. All expected cell frequencies were greater than five. There was a statistically significant association between Twitter activity and hashtag use, χ^2(9 n=6,810) = 0.188, p = .0005, Cramer's V = 0.188, between Twitter activity and URL use, χ^2(9 n=6,810) = 0.232, p = .0005, Cramer's V = 0.232, between Twitter activity and user mention use, χ^2(9 n=6,810) = 0.249, p = .0005, Cramer's V = 0.249, and between Twitter activity and retweeting, χ^2(9 n=6,810) = 0.220, p = .0005, Cramer's V = 0.220.

Table 16 Percent of total sum and mean use of affordances by Twitter activity in professional tweets. A = Percent of total sum; B = Mean of tweets with affordance (standard deviation); **BOLD** indicates highest mean use; nU = number of users; nT = number of tweets

PROFESSIONAL TWEETS	GROUP 1 nU=187 nT=1564	GROUP 2 nU=33 nT=830	GROUP 3 nU=28 nT=1145	GROUP 4 nU=13 nT=531	GROUP 5 nU=10 nT=455	GROUP 6 nU=10 nT=558	GROUP 7 nU=10 nT=621	GROUP 8 nU=6 nT=305	GROUP 9 nU=8 nT=515	GROUP 10 nU=9 nT=286	GROUP nU=314 nT=6810
HASHTAGS											
A	29%	8%	14%	8%	7%	5%	15%	6%	7%	3%	100%
B	0.35	0.17	0.23	0.29	0.27	0.18	**0.46**	0.35	0.27	0.20	0.28
	(0.48)	(0.38)	(0.42)	(0.45)	(0.45)	(0.39)	(0.50)	(0.48)	(0.44)	(0.40)	(0.45)
URLS											
A	22%	10%	14%	8%	7%	10%	8%	6%	9%	6%	100%
B	0.67	0.57	0.57	0.74	0.76	**0.87**	0.63	0.80	0.85	0.83	0.69
	(0.47)	(0.50)	(0.50)	(0.44)	(0.43)	(0.34)	(0.48)	(0.40)	(0.35)	(0.38)	(0.46)
MENTIONS											
A	20%	9%	13%	9%	8%	9%	12%	6%	9%	6%	100%
B	0.48	0.43	0.43	0.67	0.64	0.61	0.73	0.75	0.63	**0.81**	0.56
	(0.50)	(0.50)	(0.50)	(0.47)	(0.48)	(0.49)	(0.45)	(0.43)	(0.48)	(0.50)	(0.50)
RETWEETS											
A	19%	10%	12%	8%	6%	10%	12%	7%	8%	7%	100%
B	0.30	0.30	0.26	0.39	0.35	0.43	0.50	0.60	0.37	**0.64**	0.36
	(0.46)	(0.46)	(0.44)	(0.49)	(0.48)	(0.50)	(0.50)	(0.49)	(0.48)	(0.48)	(0.48)

4.2.4. Affordances Used in Personal and Professional Tweets

4.2.4.1. Hashtags

  A summary of the top 20% of hashtags used by at least two distinct users in both personal and professional tweets is shown in Appendix 9.5. The hashtags are ordered by unique users and by the number of times each hashtag was used; preference was given to the number of distinct users instead of most popular hashtag, as the interest is in the hashtags used by more than one participant.

  As can be seen, the types of hashtags used differ between personal and professional tweets with some overlap. "#FF" (nU=18; nT=25; nU is number of users and nT is number of tweets) is the most frequently used hashtag in personal tweets; this hashtag stands for "Follow Friday" and is typically used by others to get people to follow other interesting people on Twitter. The second most used hashtag in personal tweets is "#fb" (nU=13; nT=71), a tag automatically generated when Twitter users connect their Facebook accounts to their Twitter accounts. The most frequently used hashtag in professional tweets after "#fb" (nU=9; nT=16) is "#highered" (nU=8; nT=9). There is also a trend in which hashtags related to academic conferences were found in personal tweets as categorized by Turkers in phase two (such as #chi2010, #mla13, #dh2012, #chi2013, #dh2013, and #aaas2014).

  While some of the hashtags did seem to distinguish between personal and professional topics, there were many that were used for both personal or professional topics (such as #Science, #health, #jobs, etc.) and thus must be

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combined with other affordances to better frame the tweet as either personal or professional.

4.2.4.2. URLs

A presentation of the top 20% of URLs used by at least two unique users in both personal and professional tweets is presented in Appendix 9.10. The data demonstrated similar trends as the hashtag comparison in that there were several URL domains that pointed to content that could either be interpreted either as personal or professional in nature by themselves.

Reviewing the top URL domain in personal tweets, content on YouTube (nU=98; nT=275) was linked to more frequently by distinct users than any other domain. The second most frequently used domain in personal tweets was the website for The New York Times (nU=71; nT=153). This is similar to the findings about professional tweets but reversed; the top domain was The New York Times (nU=81; nT=187) followed by YouTube (nU=48; nT=81). Within the personal tweet category there were links to news organizations (such as huffingtonpost.com, theguardian.com, washtingtonpost.com, etc.) and popular media sites (such as slate.com, buzzfeed.com, theonion.com, etc.). In the professional tweet category there were links to scholarly resources (such as nature.com, chronicle.com, insidehighered.com, scientificamerican.com, etc.) and also links to news organizations (such as theguardian.com, washingtonpost.com, newyorker.com, wired.com, etc.).

Just as with hashtags, some URLs were more related to either personal or professional topics, but there were many domains that contained both personal or professional topics and thus had to be combined with other affordances to better frame the tweet as either personal or professional. In addition, Twitter automatically shortens the URLs to display in tweets and thus readers are not always able to ascertain the specific information being linked without visiting the site. Twitter has recently introduced a summary of linked content from URLs, but this can only occur if the site being linked to provides appropriate metadata for Twitter to harvest and display to the readers of the tweets.

4.2.4.3. User Mentions (excluding retweets)

A summary of the top 20% of unique user mentions used by at least two distinct users in both personal and professional tweets that were *not* retweets is presented in Appendix 9.11. The user mentions are ordered by unique users and then by number of times the user mention was used; preference was given to the number of distinct users instead of most popular user mention, as the focus was on the user mentions used by more than one participant.

As can be seen, the user mentions differed between personal and professional tweets with some overlap. Just as in the professional tweets category, some of the user handles belonged to organizations (such as NewYorker, chronicle, guardian, etc.) and universities (BrownUniversity, UWMadison, and Princeton), while others were academic-related Twitter accounts (NatureNews, HarvardBiz, and ASANews).

4.2.5. Summary of Affordance Description

In summary, the examination of affordance use across the personal and professional tweets emphasized some trends that help shed light on the framing behaviors of scholars in each category of tweet. As shown above, there is a sizable difference between the percentage of personal and professional tweets containing URLs, a large difference in the number of retweets, and a smaller difference in the use of hashtags, with all three of these affordances occurring more often in professional tweets. User mentions were the only affordance that was used more often in personal tweets.

Differences in affordance use were determined by looking at activity by department, gender, academic age, age, and Twitter activity. When examining differences across departments, it was found that scholars from English had a higher percentage of the total sum of all four of the main affordances (hashtags, URLs, user mentions, and retweets) across all tweets, whereas chemistry professors had the lowest percentage of total sum of tweets with affordances. Examining differences by gender revealed that males made more of the total tweets than females.

There was a significant association between academic age and affordance use across all four affordances; in addition, there was a weak association between age and the four affordances. Lastly, there was a strong association found between all four affordances—hashtags, URLs, user mentions, and retweets—and activity on Twitter. The mean average of hashtag use was highest for the least active professors on Twitter (group one; less than 0.5 tweets per day), whereas those in group six (2.5

to 3 tweets per day) had the highest mean of tweets with URLs. Professors in group seven (3 to 3.5 tweets per day) had the highest mean of tweets with user mentions, whereas participants from both group four (1.2 to 2 tweets per day) and group eight (3 to 4 tweets per day) had the highest mean of tweets that were retweets.

Focusing specifically on the personal tweets, it was found that English professors had the highest percentage of total sum of all four main affordances and chemists had the lowest. Professors in chemistry were found to have the highest mean of tweets with at least one hashtag, sociologists had the highest mean of tweets with at least one URL, and biology professors had the highest mean of tweets with at least one user mention, as well as having the highest mean of tweets that were retweets. Females had a larger mean of tweets containing hashtags, user mentions, and retweets than males. Professors who had been in their faculty position (academic age) for 10 years or more had the highest mean of tweets with a hashtag and with URL, while respondents who had been in their positions between seven and nine years had the highest mean of tweets with a user mention and tweets that were retweets.

Regarding age, professors between 36 and 60 had a higher mean of tweets with hashtags than did others. Professors between 46 and 60 had the highest mean of tweets with URLs, while those 35 and under had the highest mean of tweets with user mentions. The use of retweets occurred mostly with those professors between 36 and 60. Finally, considering affordance use by Twitter activity, professors in group two (0.5 to 1 tweets per day) had the highest mean of tweets with hashtags

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and those in group six (2.5 to 3 tweets per day) had the highest mean of tweets with URLs. With regards to user mentions and retweets, group seven (3 to 4 tweets per day) professors had the highest mean of tweets with user mentions while respondents in group eight (4 to 5 tweets per day) had the highest mean of tweets that were retweets.

Chemists had the highest mean of professional tweets with hashtags, sociologists had the highest mean of tweets with URLs, and biology professors had the highest mean of tweets with at least one user mention, as well as the highest mean of retweets. Females had a higher mean of professional tweets with all four affordances: hashtags, URLs, user mentions, and retweets than men did.

When examining academic age and professional tweets, hashtags were used more frequently by those who had been at their positions for seven to nine years, while professors who had been at their position for over 10 years had the highest mean of tweets with URLs and professors reporting six years or less in their position had the highest mean of tweets with user mentions and retweets. Regarding age, professors 61 and older had the highest mean of tweets with hashtags, while respondents from group three (46 to 60) had the highest mean of tweets with URLs. Those in group one (35 and under) recorded the highest mean of tweets with user mentions and also had the highest mean of tweets that were retweets. When looking at Twitter activity, professors in group seven (3 to 4 tweets per day) had the highest mean of tweets with hashtags, whereas URL use was found to be the highest with professors from group six (2.5 to 3 tweets per day). Professors in group ten (8 to 24

tweets per day), the most active Twitter users, had the highest mean of tweets with user mentions and with tweets that were retweets.

When examining the affordances more closely, it was found that some of the hashtags could be described as more personal than professional and vice versa, but there was overlap between the two categories as well. The domains of the URLs embedded in tweets were then examined and much like the hashtags being used, there were domains that could be considered either personal or professional, but again there was some overlap between the categories. User mentions, on the other hand, seemed to be a more accurate indicator of personal and professional tweets as it was found that many professional tweets mentioned accounts that were from organizations, universities, and news outlets as compared to personal tweets. While any one affordance was not necessarily a primary indicator of personal or professional tweets, the use of hashtags, URLs, and/or user mentions in combination allowed a scholar to frame the tweet in a way that should be better understood as either personal or professional by the persons reading their tweets.

4.3. Phase Three: Follow-up Survey and Categorization of Tweets
4.3.1. Respondents

The survey was designed so that respondents would provide information related to affordance use when writing and posting personal and professional tweets. The first question asked respondents which affordances helped them frame a tweet as either personal or professional in nature; the options were a) hashtags, b) mentions, c) URLs, d) media, e) retweeting, f) emoticons, g) directed messages, h)

punctuation, capitalization, quotes, i) other, or j) not used in this way. Results from question one showed that more respondents reported that the four main affordances (hashtags, user mentions, URLs, and retweets) were used to frame tweets in a professional way much more often than they were used to frame personal tweets.

As shown in Figure 38, URLs and mentions were chosen to frame professional tweets (85% and 85% respectively) almost twice as often than for framing personal tweets (42 and 54% respectively). Hashtags were chosen by 78% of respondents to frame professional tweets, whereas only 42% chose them for personal tweets; a similar trend was observed for retweets, where 80% chose them to frame professional tweets as compared to only 44% for personal tweets. The two affordances that were chosen to frame personal tweets at a higher percentage than those chosen to be used in professional tweets were media and emoticons; media was chosen 2% more for personal tweets than professional tweets (56% and 54% respectively) and emoticons were chosen 31% of the time for personal tweets compared to only 14% in professional tweets.
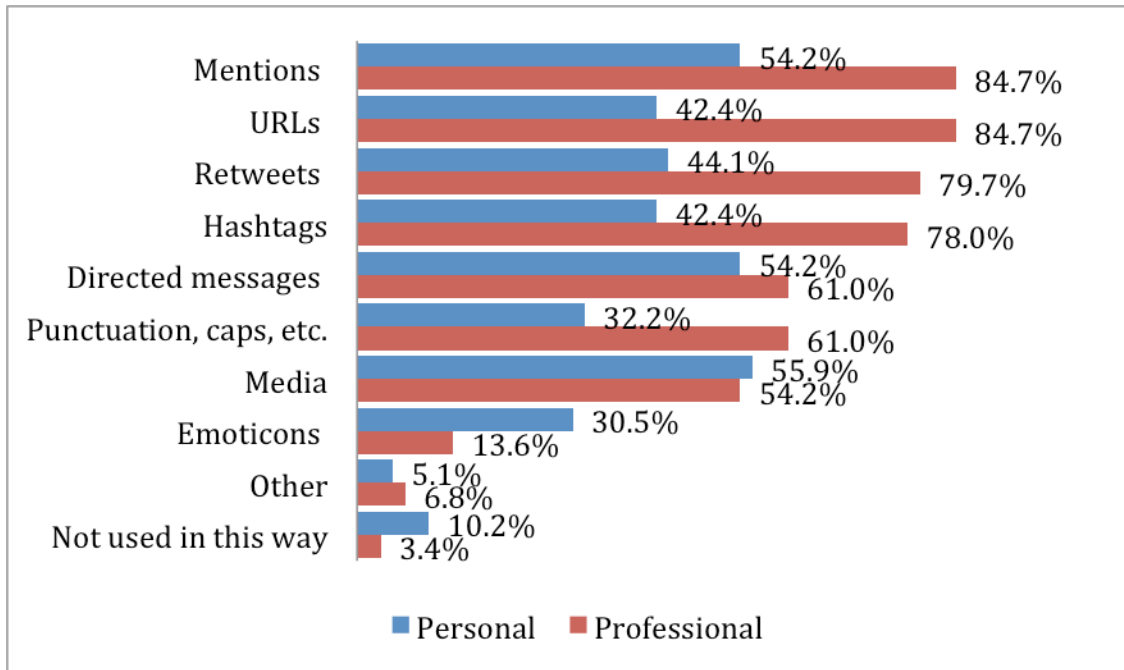
Figure 38 Rating of affordance use for personal and professional tweets by most active Twitter users.

Question two asked respondents if they had ever had a circumstance where one of their professional tweets had been misinterpreted as a personal tweet or vice versa. Most scholars (85%) said that they had never had a circumstance where their tweets were misinterpreted in this manner, but nine out of the 62 respondents (15%) acknowledged that this had happened to them at some point on Twitter.

The third question asked respondents to distinguish which affordances related to their Twitter profile they had set up and/or changed in order to let others know the account was to be considered more personal or more professional in nature. Respondents could select any of the following options as either personal, professional, or both: a) profile image, b) description, c) theme, d) header (banner image), e) colors, f) location, g) other, and h) not used in this way. The results, shown in Figure 39, indicated that respondents rated the Twitter profile description

as the most important affordance (77% professional, 25% personal) to utilize in order to frame the account in such a way that a follower of the account understood that it was either personal or professional. Not surprisingly, the profile image was the second most important affordance used to either frame the Twitter account as either personal (21%) or professional (60%). All affordances were chosen more for distinguishing professional accounts than personal accounts, and more respondents (19% personal to 11% professional) indicated that they didn't use the account as either personal or professional, but used it for both.
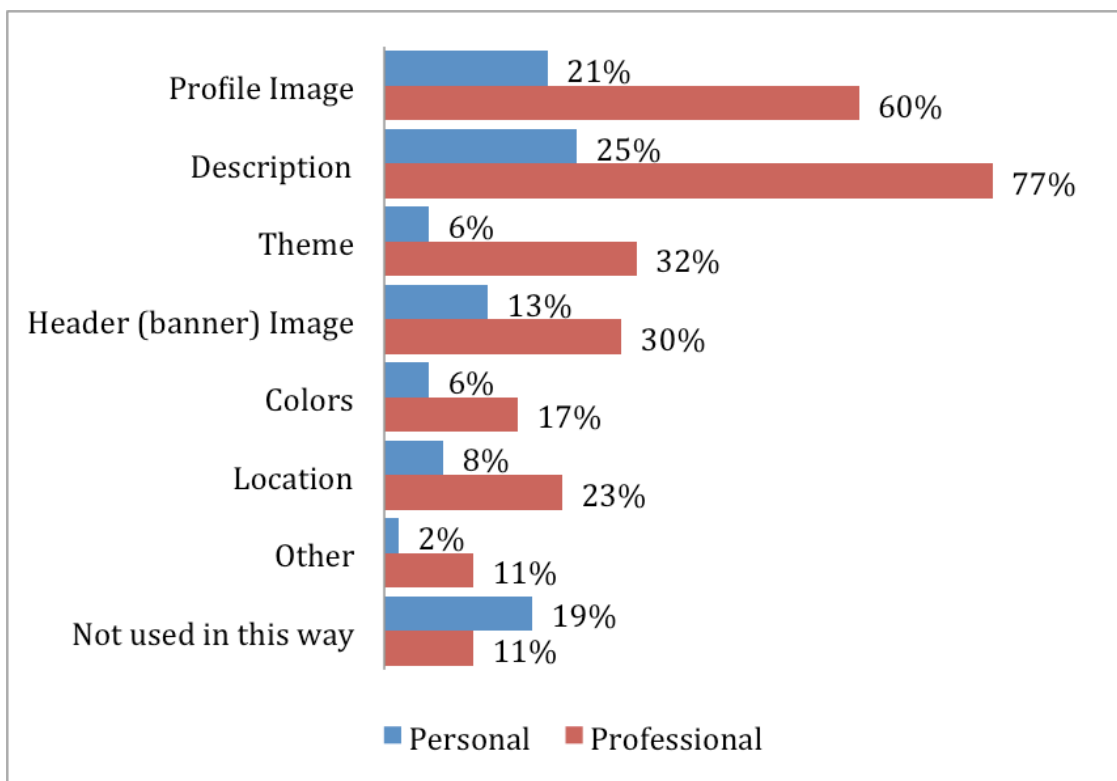
Figure 39 Profile affordances selected to frame account as more personal or professional.

4.3.2. Categorization of Tweets by Scholars

The final question in the survey asked respondents to categorize five of their own publicly available tweets as either personal or professional. These tweets were chosen from the set of tweets downloaded in May 2014 and used in phase two of this work; the Turkers from Amazon Mechanical Turk fully agreed (3 out of 3) on the categorization of these tweets as either personal or professional. Three professional and two personal tweets were randomly selected and then randomly ordered and presented to the respondents in the same format as they were shown to the Turkers. The scholars were given similar instructions as those given to the Turkers (see Appendix 9.3) and asked to categorize the tweets as either personal or professional (but not as both). This question was posed in order to be able to compare a respondents' own categorizations of his or her tweets with the categorizations of the tweets by the three Turkers.

Results from the categorization are shown below in Table 17. A total of 255 tweets were presented to the 51 scholars. Each scholar was given five random tweets; two of the tweets were personal and three were professional (as categorized by the Turkers). The 51 scholars were made up of 15 assistant professors, 19 associate professors, and 17 full professors.

Table 17 Results from scholar and turker coding agreement.

	Personal Tweets	Professional Tweets	
Turkers (3 out of 3)	102	153	255
Professors	44	125	169
	43% Agreement	82% Agreement	62%

A Cohen's kappa analysis was done comparing the results of the five tweets categorized by the scholars with those of the Turkers. As shown in Table 18, the Cohen's kappa result was 0.26 for all of the tweets categorized. While the Cohen's Kappa result provides a fair measure of inter-rater reliability, the problem seemed to be with the perception of tweets intended to be professional (as highlighted in Table 15 in red); when a turker thought the tweet was personal in nature (102 tweets total), respondents thought the tweet was professional (58 tweets incorrectly categorized equaling 59% of all personal tweets).

Table 18 Cohen's kappa results.

OBSERVED AGREEMENT		Turkers			EXPECTED AGREEMENT		Turkers	
		Personal	Professional				Personal	Professional
Professors	Personal	**44**	28		Professors	Personal	**29**	43
	Professional	58	**125**			Professional	73	**110**
								Cohen's kappa = 0.26

This problem of distinguishing between personal and professional tweets is at the heart of the difficulties faced by scholars and university administrators. When scholars' tweets are misinterpreted by the public or, to use Goffman's (1974) terms, when the public, the media, or politicians frame a tweet in a specific way that was unintended by the tweeter, problems can occur (as discussed in Section 2).

4.3.3. Examples of Personal and Professional Tweets

4.3.3.1. Incorrectly Categorized Tweets

A closer analysis of incorrectly categorized personal tweets suggests why Turkers might have categorized certain tweets as personal when the respondent categorized them as professional. In Goffman's terms, the audience (Turkers) misframed this communication as professional when the professor (actor) intended it to be personal.

For example, Figure 40 displays a tweet made by a respondent who categorized it as a professional tweet. Upon closer inspection, the tweet is a retweet

from the @hardsci account that makes use of a URL affordance and a second user mention. The user mention points to an individual's account (@jpsimmon) and the URL goes to the datacolada.org domain. The original message from @hardsci states that it is a "Fun fact" and goes on to describe the fact as being part of a "CPI Empathy scale". While scholars might recognize this as a science-related tweet, it is understandable that readers may read the text, look at the affordances, and assume that it is a personal tweet (which is what the three Turkers presumably had done). However, no follow up data was collected from the Turkers to verify this hypothesis at this time.
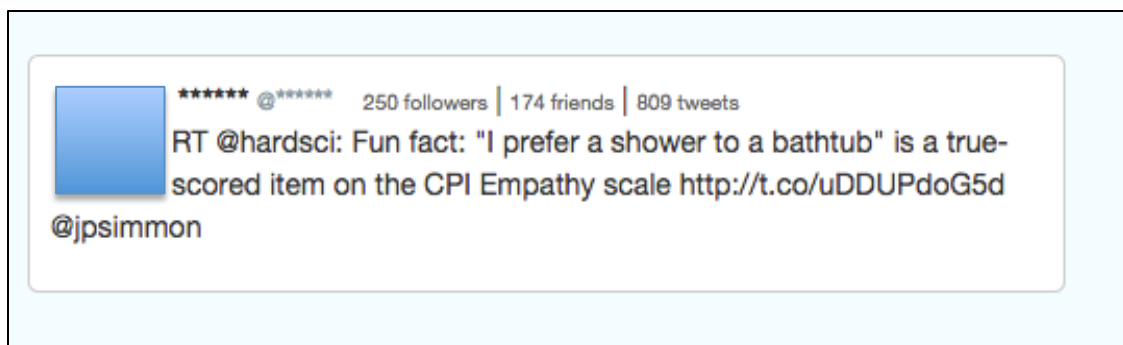
Figure 40 Example of a tweet incorrectly categorized as "personal" by Turkers.

In another example, Turkers incorrectly categorized a tweet as professional where the respondent categorized it as personal. The tweet (shown in Figure 41) is another retweet, but has no hashtags, URLs, or user mentions other than the original retweeted user (@familyunequal). With no other affordances to assist with interpretation, Turkers had to rely simply on the text and the retweet and user-mention affordances noting that this person was retweeting a message from a

possibly professional-sounding account (@familyunequal) and that there was

academic-sounding text referencing psychiatry and JAMA.

Figure 41 Example of tweet incorrectly categorized as "professional" by
　　　Turkers.

It seems understandable why both of these tweets would be interpreted in a

way different from the sender's intent. Without the use of affordances as tools

people can use to help readers frame a tweet, it is difficult for the reader to

understand how to frame the tweet appropriately.

4.3.3.2 Correctly Categorized Tweets
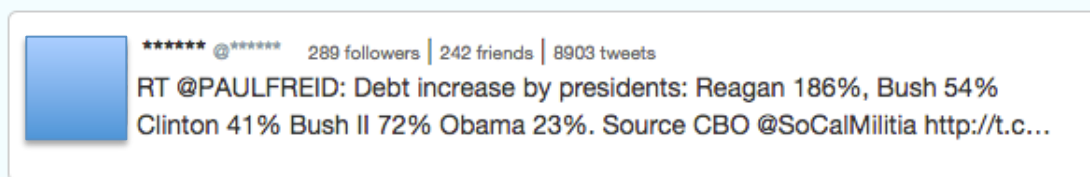
Figure 42. Example of tweet correctly categorized as "personal" by both the three Turkers
and scholar.

There were many tweets (n=169; 62%) categorized by the Turkers that

agreed with the respondents' categorizations. In Figure 42, the tweet is a retweet

from @PAULFREID and discusses debt increase. It makes use of two additional

affordances, a user mention to (presumably) an organization account

(@SoCalMilitia) and a URL that has been cut off by the 140-character limit of

Twitter. A reader of this tweet can use the fact that it is a retweet, has another user-mention to an organization, and points to an outside information source (through the use of a URL), in combination with the textual content, to have a better idea of how to categorize this tweet.

5.0. DISCUSSION

The purpose of this study was to examine the ways in which scholars managed their impressions in Twitter through the use of affordances to frame their tweets. This section discusses the ways in which the data from the survey in phase one, the AMT categorization of tweets in phase two, and the follow up survey and passive participant observation in phase three were able to describe these phenomena and be used to answer the primary research questions: 1) In what ways do scholars utilize affordances to manage impressions on Twitter? 2) In what ways do scholars frame interactions to manage impressions on Twitter? and 3) What are the differences in the use of framing strategies and affordances by scholars for managing the presentation of their professional and personal selves on Twitter?

5.1. Question One: In what ways do scholars utilize affordances to manage impressions on Twitter?

The three phases of this work, the survey, tweet categorization by AMT, and follow-up survey and tweet categorization by professors, allowed for the collection of triangulated data on affordance use to answer this question.

Considering that Gibson's definition of affordance focused on describing how agents (e.g., animals, humans) distinguish the functional attributes of an object from its properties within a specific context (or niche), it is a fitting concept to consider when looking at interactions within social media environments. This dissertation has examined tweet-based affordances (#hashtags, @user mentions, URLs, and retweets), Twitter profile-based affordances (such as profile image, bio information, and language), and Twitter application-based affordances (such as geo coding,

privacy settings, and Twitter push content based mechanisms) in order to determine if, when, and how frequently professors made use of these affordances as they used Twitter.

In the survey results, respondents indicated that they rarely or never directed a message at another user (68%), added a location (93%), added photos (80%), used hashtags (61%), or user mentions (58%) when tweeting. Results from analyzing all of the collected tweets from the 445 accounts revealed that on average there were URLs in 37% (n=108,508), mentions in 76% (n=254,360), hashtags in 32% (82,050), and photos (media) in 5% (n=14,014) of the tweets. These results suggest that the survey respondents used hashtags, user mentions, and URLs more regularly than they reported in the survey. It could be that respondents either used these affordances more than they realized or that they were unable to accurately recall their affordance use when completing the survey as mention in Section 3.1.

The use of affordances was shown to vary when examining differences across departments, gender, academic age, age, and Twitter activity. Differences across departmental affiliation suggest that there may have been different social norms and framing behaviors that varied by department, which is in accordance with other research findings indicating that publication activity and general academic norms and behavior vary by department (Piro, Aksnes, & Rørstad, 2013; Sugimoto & Cronin, 2012) and that Twitter use varies between disciplines (Holmberg & Thelwall, 2014).

There were more male than female scholars who reported using Twitter in the final sample, thus reflecting gender differences inherent in science (Larivière et al., 2013). The data also revealed differences between affordance use by males and females in personal and professional tweets. Females were found to have more tweets that contained affordances in both personal and professional tweets. It could be that females tend to use more affordances in their tweeting activity because they utilize different impression management tactics than males (Guadagno & Cialdini, 2007) and that these tactics (such as self-enhancement, charm, modesty, flattery, ingratiation, etc.) are reflected in the different use of affordances across personal and professional tweets.

Results revealed that scholars utilized affordances differently at the beginning, middle, and late stages of their careers. This may indicate that new professors feel pressure to tweet in a professional way at the beginning of their careers and then change their behavior when they become tenured faculty in stable academic positions. When focusing specifically on hashtag use, the analyses found that use increased in both personal and professional tweets as academic age increased, suggesting that professors who have been in academia longer sought to categorize and associate their tweets with others talking about the same topic more than professors who were in the earlier stages of their career.

URL use in personal tweets increased as the academic age of the professor increased; however, URL use in professional tweets peaked at 4 to 6 years. This may be reflective of the need for younger scholars to substantiate their communications

on Twitter with additional information (by adding a URL) as compared to older

scholars who are more confident about their communications and only link to

outside information when the need arises. This is intriguing because as mentioned

in Section 2.1.2., scholars working in the area of altmetrics are interested in the

dissemination and consumption of scientific information through the mention of

scientific output (typically recorded as URL use) on Twitter.

The number of retweets decreased in both personal and professional tweets

as academic age increased, suggesting that the longer one has been in academia the

less need there is for retweeting others' tweets. This is somewhat surprising as

conversations in Twitter have been shown to occur (boyd et al., 2010) and replying

to a tweet reflects conversations in this environment. It is also surprising that

scholars are less likely to retweet as this behavior is very common in Twitter.

Within the area of social media metrics some (Haustein, Bowman, et al., 2014) have

suggested that retweets may be akin to citing another's academic work, a finding not

supported by this data.

The last affordance that was focused on in this work, user mentions, differed

across personal and professional tweets. Results found that when communicating

personally, respondents tended to decrease the use of user mentions as academic

age increased, whereas in professional tweets user mentions remained relatively

consistent as the academic age increased.

Twitter activity and affordance use was compared for the respondents and

the use of hashtags decreased as Twitter use increased in both personal and

professional tweets. This may reflect the respondents' familiarity with the norms and rules of their contexts, because, as Gibson (1977) noted, experience plays a part in affordance use.

The use of URLs and retweets was similar between the two sets of tweets; when framing both personal and professional tweets, respondents' URL use and retweeting increased as Twitter activity increased. User mentions were used differently; within personal tweets the use of user mentions increased as Twitter activity increased. Compared to the personal tweet activity, user mentions used in professional tweets demonstrated a right-skewed bell-shaped curve where usage peaked with group three (1 to 1.5 tweets per day) and then decreased as activity increased.

It was found that affordance use varied when considering department, gender, academic age, age and Twitter activity of scholars. As Gibson noted in his original ideation of the concept, affordance use in a context depends on an agent's ability to recognize the existence of the affordance. This could explain why affordance use increases as Twitter activity increases. There were also differences between the other categories examined, which could be due to social norms and rules inherent in offline communication that have been brought to bear on communications within the Twitter environment.

To better understand these differences, it is useful to examine the framing patterns of these tweets making use of Goffman's theoretical model.

5.2. Question Two: In what ways do scholars frame interactions to manage impressions on Twitter?

According to Goffman, a strip of activity is contained in a frame so that the participants in the interaction understand what is happening. A frame is a useful concept to consider when examining interactions because it allows one to make use of cultural norms and rules in combination with the uniqueness of the place and time in which it occurs and the other participants who are included in the strip of activity. Frames are typically layered onto one another and keyed or fabricated in a way so that participants can use their prior experiences in combination with the context in which the activity is occurring to understand the interaction being framed.

This research found that when composing tweets, respondents used affordances to frame their personal and professional tweets. Evidence suggests that framing behavior takes place in Twitter and that affordance use has a role in this behavior. As scholars face more pressures from organizations and their universities (as described in the Section 2) with regards to their social media activity, it is important to identify the types of framing behaviors that influence audience members when they judge a tweet as personal or professional.

Any tweet can be misframed in such a way that it is misinterpreted or misunderstood by the audience, leading to unintended consequences either personally or professionally. In addition, tweets can be fabricated in such a way as to dupe audience members in to believing that the tweet is about something that it is not. It is important to make use of the appropriate keys when communicating on

Twitter so that the audience understands the tweet correctly, unless the goal of the

person tweeting is to fabricate. As the data suggests, there may be combinations of

affordances that help the audience interpret a tweet in the way intended by the user.

5.3. What are the differences in the use of framing strategies and affordances by scholars for managing the presentation of their professional and personal selves on Twitter?

As described in sections 5.1 and 5.2, differences in framing behavior and

affordance use between personal and professional tweets were found. These

differences can assist professors with the management of their self-presentations so

that those reading their tweets do not misframe them. As mentioned earlier, it is

important for professors to utilize affordances in the context of social media to help

frame their tweets so that audience members understand what role they are taking

and how to interpret the communication. As Goffman (1959) discussed in *The

Presentation of Self in Everyday Life*, actors make use of symbols and props in the

physical environment to manage impressions and maintain the role they have taken

during any interaction, but interaction in an online environment is devoid of

physical props and therefore requires users to find other means of managing their

impressions and maintain their roles.

In order for professors to attempt to better frame their communications

when using Twitter, it is important that they make use of affordances available in

this context. Goffman (1974, p. 552) believed that the framing in talk is a "social

function" that serves to "provide each of us with sympathizers who will stand by

while we recycle remains of our old experience." Framing tweets is no different as

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professors are simply describing their experience through communications that range from mundane to extremely important .To be able to frame a tweet so that their readers understand what they are trying to describe, professors must make use of the affordances available in the Twitter environment. The differences in affordance use when framing and posting personal and professional tweets indicate that there are patterns to be uncovered and distinctions to be made.

6.0. CONCLUSION AND FUTURE RESEARCH

To the author's knowledge, this work was one of the most comprehensive examinations to date of scholars' use of Twitter. It is difficult to identify scholars using Twitter and the method used in this work offers a unique way of identifying scholarly Twitter accounts. In addition, this is also one of the first studies to make use of Turkers in the Amazon Mechanical Turk application to categorize tweets by a wide range of academics in many different disciplines.

As discussed in the literature section, a combination of the frameworks and concepts from Goffman (1974) and Gibson (1977) allow for a better understanding of the tweeting activity of professors by accounting for, at a theoretical level, how professors make use of the affordances of the Twitter environment to frame tweets. The frame analysis model allows for the examination of any strip of activity using a social lens to interpret how it is that readers of tweets make sense of the content. Content can be keyed or fabricated using signs and symbols, what Gibson considers affordances of the environment, to frame the interaction in a specific way.

There are documented instances (see the literature review section above) where scholars have had their tweets misframed in a way that has led to serious consequences for both the individual and the organization. This has occurred, in part, because, once posted, it has not been clear if a specific tweet was professional or personal. Because of these occurrences, universities and other organizations have looked to create social media use policies that dictate how their employees make use of social media. This blurring of the personal and professional has led to scholars creating separate social media accounts, quitting social media, or setting

their social media activity to private in order to prevent their communications from being read and potentially misinterpreted by the invisible audience who can search for, replicate, and store their communications.

By making use of this socio-technical interpretation of Goffman and Gibson, more analyses can be completed on the tweeting patterns of scholars (and others) in order to establish clearer boundaries between the personal and professional impressions being made on Twitter. Because social media contexts provide users with access to content at ever increasing levels and the affordances of the environment are changing at a rapid pace, it is important to analyze and interpret the framing behaviors and affordance use of users in order to understand how they manage the blurring boundary between personal and professional communication.

Scholars are under pressure from their employers and private and government organizations providing funding for their research to create and disseminate scholarly content. Technological advances and access to information have created an environment where scholars are being evaluated on the basis of an ever-increasing plethora of metrics (Cronin & Sugimoto, 2014) that are accessible through digital means. Organizations such as the National Science Foundation in the U.S. are now stipulating that scholars submit a list of their "products," not just a list of relevant "publications," when applying for funding (Piwowar & Priem, 2013). This indicates that a scholar's publications are no longer enough to determine productivity, impact, and overall value.

To better understand how professors make use of social media, how to measure their activity, and how to differentiate between personal and professional communications this dissertation demonstrates that theoretical frameworks can be used to interpret, differentiate, and understand events within this context. This hybrid of Goffman and Gibson's concepts is a step toward in understanding these issues.

While this dissertation has focused on affordance use, further examinations of the textual content of personal and professional tweets can be accomplished with this data set. Goffman's (1974) last chapter of *Frame Analaysis* discusses analyzing frames in small portions of textual content. The next step in this work will be to perform a frame analysis on the textual content of the tweets examining the linguistic signs and symbols used across personal and professional communications by department, gender, academic age, age, and Twitter activity.

In addition, this work has demonstrated the usefulness of the Amazon Mechanical Turk (AMT) platform for categorizing social media data when dealing with large datasets. While some have criticized the platform (as noted in Section 3.2.1.), others have demonstrated that reliable results can be obtained from this platform when following specific guidelines. In this study, the experience of working with Turkers was beneficial in that it helped improve the overall quality of the results. Future work should consider utilizing the AMT platform to categorize large amounts of social media data.

While it is difficult to obtain a sample of scholars using Twitter, future studies should consider other methods to gather diverse samples of this population. In addition, future work should also look at the activity of scholars in universities outside of AAU, as professors at other types of universities may have different experiences with using social media and Twitter.

7.0. LIMITATIONS

As with any work, this study is not without limitations. There are four main limitations that will be discussed here: the study population, the survey instrument, the low survey response rate, and the low Cohen's kappa.

The survey in phase one invited scholars to respond to questions about scholarly communication in Twitter. Therefore one dominant kind of scholar may have been recruited for the survey—those who have had experience with Twitter and social media and who may be interested in scholarly communication. In addition, the initial sample members who were invited to take the survey were limited to full, assistant, and associate professors at AAU member institutions that had profiles on their departmental websites at the time of data collection. Some limitations are inherent in these two choices including a self-selecting sample and ambiguity in identifying relevant academic departments.

Another limitation involved the phase one survey instrument. While it was beneficial to use an electronic survey in Qualtrics to collect the data because of the large number of invitees, there were disadvantages to using this mechanism. One was the need to send invitations to scholars in two groups due to the limitations of the Qualtrics mail functionality. In addition, a shorter survey may have ensured greater survey response rate by decreasing the amount of time participants needed to answer all the questions. Future work should evaluate better ways to collect data from professors using social media.

While email reminders were sent to the population reminding them to fill out the phase one survey and the design of the survey was condensed to only 20

questions, this work was limited by a low survey response rate of 8.5%. As Sauermann and Roach (2013, p. 273) noted, "more detailed online surveys often exhibit lower response rates of around 10-25%", therefore it was expected that with this large of a population that the response rate would be between 10 and 25 percent. This limits the generalizability of the results. Future work should consider better ways to engage the scholars in order to facilitate a higher response rate. In addition, there may have been bias in who responded to the survey as people more familiar with social media and Twitter may have been more willing to respond than those who had little knowledge of Twitter or did not use the service.

Lastly, a fair rating was obtained using Cohen's kappa for the inter-rater reliability measure in phase three of this work. This limits the reliability of the data obtained from this phase of the work. Future work should consider better coding instructions to ensure better inter-rater reliability.

8.0. REFERENCES

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9.0. APPENDIX

9.1. Phase One Survey

Scholarly Twitter Use

Welcome.

I would like to invite you to participate in this survey for my dissertation work that looks to provide insight into the ways in which scholars communicate on Twitter. Even if you aren't currently a Twitter user, I would be interested in having you fill out the survey so that my work can provide insight into scholarly Twitter use.

This survey contains 19 questions (only 6 if you don't use Twitter) and will take approximately 6 minutes to complete. As a member of the academic community your experience with Twitter is of high importance to my dissertation work; please consider participating. Participants will be given the option of being entered for a drawing for three $50 gift certificates to Amazon.Your responses to the survey will remain confidential and be anonymized before reporting. Responding to the survey implies consent to participate and you may discontinue the survey at any time. There are neither direct risks nor direct benefits to participation in this survey. However, your responses will help to advance knowledge regarding the diverse communication channels used scholars.

If you have any questions about this research or the survey feel free to contact me at tdbowman@indiana.edu. Thank you for taking the time to participate in this study.

With kindest regards,

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Q1: Do you have one or more Twitter accounts?

◯ Yes (9)
◯ No (10)

Q2: How many Twitter accounts do you have?

◯ 1 (1)
◯ 2 (9)
◯ 3 (10)
◯ 4 (11)
◯ 5 (12)
◯ more (13)

Q3: What is your Twitter handle? (e.g. @myname) NOTE: If you do not want to share your Twitter handle, please enter an asterisk followed by a nickname for your account(s) so that you may finish the survey. (e.g. *accountOne)

Twitter Handle (e.g. @johnsmith) (1)
Twitter Handle #2 (e.g. @johnsmith) (2)
Twitter Handle #3 (e.g. @johnsmith) (3)
Twitter Handle #4 (e.g. @johnsmith) (4)
Twitter Handle #5 (e.g. @johnsmith) (5)

Q4: For approximately how long have you had the account(s) (Twitter launched in 2006)?

	< 1 year (1)	1 to 2 years (2)	2 to 3 years (3)	3 to 4 years (4)	4 to 5 years (5)	5 to 6 years (6)	> 6 years (7)
@HANDLE (1)	◯	◯	◯	◯	◯	◯	◯
If Q3 (1) Is Not Selected @HANDLE (2)	◯	◯	◯	◯	◯	◯	◯
If Q3 (1) Is Not Selected And Q3 (2) Is Not Selected @HANDLE (3)	◯	◯	◯	◯	◯	◯	◯
If Q3 (4) Is Selected Or Q3 (5) Is Selected Or Q3 (more) Is Selected @HANDLE (4)	◯	◯	◯	◯	◯	◯	◯
If Q3 (5) Is Selected Or Q3 (more) Is Selected @HANDLE(5)	◯	◯	◯	◯	◯	◯	◯

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Q5: Do you use the account(s) to communicate in a personal and/or professional capacity?

	Personal Only (1)	Personal & Professional (2)	Professional Only (3)
@HANDLE (1)	○	○	○
If Q3 1 Is Not Selected @HANDLE (2)	○	○	○
If Q3 (1) Is Not Selected And Q3 (2) Is Not Selected @HANDLE (3)	○	○	○
If Q3 (4) Is Selected Or Q3 (5) Is Selected Or Q3 (more) Is Selected @HANDLE(4)	○	○	○
If Q3 (5) Is Selected Or Q3 (more) Is Selected @HANDLE (5)	○	○	○

Q6: Approximately how often do you do the following when you Tweet from your account(s)?

	@HANDLE1					@HANDLE2					@HANDLE3				
	Never (1)	Rarely (2)	Sometimes (3)	Most of the time (4)	Always (5)	Never (1)	Rarely (2)	Sometimes (3)	Most of the time (4)	Always (5)	Never (1)	Rarely (2)	Sometimes (3)	Most of the time (4)	Always (5)
Embed URLs (1)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Use Hashtags (#survey) (2)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Mention Someone (...@me) (3)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Address Message At Someone (@me...) (4)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Add Your Location (5)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Add a Photo (6)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Q7: Approximately how often do you do the following using your account(s)?

	@HANDLE1					@HANDLE2					@HANDLE3				
	Never (1)	Rarely (2)	Sometimes (3)	Most of the time (4)	Always (5)	Never (1)	Rarely (2)	Sometimes (3)	Most of the time (4)	Always (5)	Never (1)	Rarely (2)	Sometimes (3)	Most of the time (4)	Always (5)
Delete a tweet (1)			○		◖	◖	◖	○		◖	◖	◖	○		◖
Favorite a tweet (2)			○		◖	◖	◖	○		◖	◖	◖	○		◖
Reply to a tweet (3)			○		◖	◖	◖	○		◖	◖	◖	○		◖
Retweet a tweet (4)			○		◖	◖	◖	○		◖	◖	◖	○		◖

Q8: Please choose which of the following features you've added or changed on your Twitter account:

	@HANDLE1	@HANDLE2	@HANDLE3	@HANDLE4	@HANDLE5
	Yes (1)	Yes (1)	Yes (1)	Yes (1)	Yes (1)
Allow outside applications to access Twitter (1)	❍	❍	❍	❍	❍
Allow Twitter to personalize interface based on website visits (2)	❍	❍	❍	❍	❍
Allow Twitter to send email messages related to tweeting behavior (3)	❍	❍	❍	❍	❍
Allow Twitter to send text messages related to tweeting behavior (4)	❍	❍	❍	❍	❍
Bio information (5)	❍	❍	❍	❍	❍
Connect Twitter with Facebook (6)	❍	❍	❍	❍	❍
Country specified (7)	❍	❍	❍	❍	❍
Geo Tagging (8)	❍	❍	❍	❍	❍
Header Picture (9)	❍	❍	❍	❍	❍
Language Specified (10)	❍	❍	❍	❍	❍
Phone Number Specified (11)	❍	❍	❍	❍	❍
Privacy Settings (12)	❍	❍	❍	❍	❍
Profile Picture Added (13)	❍	❍	❍	❍	❍
Sleep Settings (14)	❍	❍	❍	❍	❍
Theme Chosen (15)	❍	❍	❍	❍	❍

Time Zone Specified (16)	○	○	○	○	○
Widget(s) Created (17)	○	○	○	○	○

Q9: How often do you change the following:

	@HANDLE1					@HANDLE2					@HANDLE3				
	Never (1)	< once per Year (2)	Once per Year (3)	> once per Year (4)	Monthly (5)	Never (1)	< once per Year (2)	Once per Year (3)	> once per Year (4)	Never (5)	< once per Year (1)	Once per Year (2)	> once per Year (3)	Monthly (4)	Never (5)
Privacy Settings (1)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Profile Picture (2)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Header Picture (3)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Q10: Did you add any of the following to your bio?

	@HANDLE1	@HANDLE2	@HANDLE3	@HANDLE4	@HANDLE5
	Yes (1)	Yes (1)	Yes (1)	Yes (1)	Yes (1)
Professional Title (1)	○	○	○	○	○
Place of Work (2)	○	○	○	○	○
Post-nominal letters (e.g. Ph.D.) (3)	○	○	○	○	○

Q11: Please choose all of the following events that trigger Twitter to send you an email:

	@HANDLE1	@HANDLE2	@HANDLE3	@HANDLE4	@HANDLE5
	Yes (1)	Yes (1)	Yes (1)	Yes (1)	Yes (1)
About top tweets and stories (1)	○	○	○	○	○
When your tweet is marked as favorite (2)	○	○	○	○	○
Someone retweets your tweet (3)	○	○	○	○	○
Someone new follows you (4)	○	○	○	○	○
When someone mentions you in a tweet (5)	○	○	○	○	○

Q12: Please choose all of the following events that trigger Twitter to send you a text message:

	@HANDLE1	@HANDLE2	@HANDLE3	@HANDLE4	@HANDLE5
	Yes (1)	Yes (1)	Yes (1)	Yes (1)	Yes (1)
About top tweets and stories (1)	○	○	○	○	○
When your tweet is marked as favorite (2)	○	○	○	○	○
Someone retweets your tweet (3)	○	○	○	○	○
Someone new follows you (4)	○	○	○	○	○
When someone mentions you in a tweet (5)	○	○	○	○	○

Q13: Is there anything else that you do when communicating with Twitter that you would like to share?

_____

Q14: Besides Twitter, with which of the following social media tools do you have an account?

o   Academia.edu (1)
o   BioMedExperts.com (2)
o   Blogger (3)
o   Epernicus (4)
o   Facebook (5)
o   Google+ (6)
o   Instagram (7)
o   LinkedIn (8)
o   Mendeley (9)
o   MySpace (10)
o   Pinterest (11)
o   ResearchGate (12)
o   Scilink (13)
o   Scribd (14)
o   SlideShare (15)
o   Tumblr (16)
o   Wikipedia (18)
o   WordPress (19)
o   YouTube (20)
o   Other (21) _____

Q15: How long have you been a faculty member at a university?

o   Less than 1 Year (1)
o   1 to 3 Years (2)
o   4 to 6 Years (3)
o   6 to 9 Years (4)
o   10 Years of More (5)
o   I'm not (6)

Q16: With which gender do you identify?

o   Male (1)
o   Female (2)
o   Other (3) _____

Q17: In what age range do you fall?

o   Under 25 years (2)
o   26 to 30 years (3)
o   31 to 35 years (4)
o   36 to 40 years (5)
o   41 to 45 years (6)
o   46 to 50 years (7)
o   51 to 55 years (8)
o   56 to 60 years (9)
o   61 to 65 years (10)
o   66 to 70 years (11)
o   71 to 75 years (12)
o   Over 75 years (13)

Q18: How would you characterize your ethnicity?

o   American Indian / Native American (1)
o   Asian (2)
o   Black / African American (3)
o   Hispanic / Latino (4)
o   White / Caucasian (5)
o   Pacific Islander (6)
o   Other (7)

Q19: Do you want to participate in the Amazon gift certificate drawing?

o   Yes (1)
o   No (2)

<mark>Answer If Please provide an email address. Is Selected</mark>

Q20: Please provide an email address.

_____

9.2. JSON Data Example

```
1.  [
2.    {
3.      "coordinates": null,
4.      "favorited": false,
5.      "truncated": false,
6.      "created_at": "Wed Aug 29 17:12:58 +0000 2012",
7.      "id_str": "240859602684612608",
8.      "entities": {
9.        "urls": [
10.         {
11.           "expanded_url": "https://dev.Twitter.com/blog/Twitter-certified-
     products",
12.           "url": "https://t.co/MjJ8xAnT",
13.           "indices": [
14.             52,
15.             73
16.           ],
17.           "display_url": "dev.Twitter.com/blog/Twitter-c\u2026"
18.         }
19.       ],
20.       "hashtags": [
21.
22.       ],
23.       "user_mentions": [
24.
25.       ]
26.     },
27.     "in_reply_to_user_id_str": null,
28.     "contributors": null,
29.     "text": "Introducing the Twitter Certified Products Program:
     https://t.co/MjJ8xAnT",
30.     "retweet_count": 121,
31.     "in_reply_to_status_id_str": null,
32.     "id": 240859602684612608,
33.     "geo": null,
34.     "retweeted": false,
35.     "possibly_sensitive": false,
36.     "in_reply_to_user_id": null,
37.     "place": null,
38.     "user": {
39.       "profile_sidebar_fill_color": "DDEEF6",
40.       "profile_sidebar_border_color": "C0DEED",
41.       "profile_background_tile": false,
42.       "name": "Twitter API",
43.       "profile_image_url":
     "http://a0.twimg.com/profile_images/2284174872/7df3h38zabcvjylnyfe3_normal.
     png",
44.       "created_at": "Wed May 23 06:01:13 +0000 2007",
45.       "location": "San Francisco, CA",
46.       "follow_request_sent": false,
47.       "profile_link_color": "0084B4",
48.       "is_translator": false,
49.       "id_str": "6253282",
50.       "entities": {
51.         "url": {
52.           "urls": [
53.             {
54.               "expanded_url": null,
55.               "url": "http://dev.Twitter.com",
```

```
56.              "indices": [
57.                   0,
58.                   22
59.                 ]
60.               }
61.             ]
62.           },
63.          "description": {
64.             "urls": [
65.
66.             ]
67.           }
68.         },
69.        "default_profile": true,
70.        "contributors_enabled": true,
71.        "favourites_count": 24,
72.        "url": "http://dev.Twitter.com",
73.        "profile_image_url_https":
     "https://si0.twimg.com/profile_images/2284174872/7df3h38zabcvjylnyfe3_norma
     l.png",
74.        "utc_offset": -28800,
75.        "id": 6253282,
76.        "profile_use_background_image": true,
77.        "listed_count": 10775,
78.        "profile_text_color": "333333",
79.        "lang": "en",
80.        "followers_count": 1212864,
81.        "protected": false,
82.        "notifications": null,
83.        "profile_background_image_url_https":
     "https://si0.twimg.com/images/themes/theme1/bg.png",
84.        "profile_background_color": "C0DEED",
85.        "verified": true,
86.        "geo_enabled": true,
87.        "time_zone": "Pacific Time (US & Canada)",
88.        "description": "The Real Twitter API. I tweet about API changes,
     service issues and happily answer questions about Twitter and our API.
     Don't get an answer? It's on my website.",
89.        "default_profile_image": false,
90.        "profile_background_image_url":
     "http://a0.twimg.com/images/themes/theme1/bg.png",
91.        "statuses_count": 3333,
92.        "friends_count": 31,
93.        "following": null,
94.        "show_all_inline_media": false,
95.        "screen_name": "Twitterapi"
96.      },
97.      "in_reply_to_screen_name": null,
98.      "source": "<a href=\"http://sites.google.com/site/yorufukurou/\"
     rel=\"nofollow\">YoruFukurou</a>",
99.      "in_reply_to_status_id": null
100.        },
101.        {
102.         "coordinates": null,
103.         "favorited": false,
104.         "truncated": false,
105.         "created_at": "Sat Aug 25 17:26:51 +0000 2012",
106.         "id_str": "239413543487819778",
107.         "entities": {
108.           "urls": [
109.               {
110.                 "expanded_url": "https://dev.Twitter.com/issues/485",
111.                 "url": "https://t.co/p5bOzH0k",
```

```
112.              "indices": [
113.                97,
114.                118
115.            ],
116.            "display_url": "dev.Twitter.com/issues/485"
117.          }
118.        ],
119.        "hashtags": [
120.
121.        ],
122.        "user_mentions": [
123.
124.          ]
125.      },
126.      "in_reply_to_user_id_str": null,
127.      "contributors": null,
128.      "text": "We are working to resolve issues with application
    management &amp; logging in to the dev portal: https://t.co/p5bOzH0k ^TS",
129.      "retweet_count": 105,
130.      "in_reply_to_status_id_str": null,
131.      "id": 239413543487819778,
132.      "geo": null,
133.      "retweeted": false,
134.      "possibly_sensitive": false,
135.      "in_reply_to_user_id": null,
136.      "place": null,
137.      "user": {
138.        "profile_sidebar_fill_color": "DDEEF6",
139.        "profile_sidebar_border_color": "C0DEED",
140.        "profile_background_tile": false,
141.        "name": "Twitter API",
142.        "profile_image_url":
    "http://a0.twimg.com/profile_images/2284174872/7df3h38zabcvjylnyfe3_normal.
    png",
143.        "created_at": "Wed May 23 06:01:13 +0000 2007",
144.        "location": "San Francisco, CA",
145.        "follow_request_sent": false,
146.        "profile_link_color": "0084B4",
147.        "is_translator": false,
148.        "id_str": "6253282",
149.        "entities": {
150.          "url": {
151.            "urls": [
152.              {
153.                "expanded_url": null,
154.                "url": "http://dev.Twitter.com",
155.                "indices": [
156.                  0,
157.                  22
158.                ]
159.              }
160.            ]
161.          },
162.          "description": {
163.            "urls": [
164.
165.            ]
166.          }
167.        },
168.        "default_profile": true,
169.        "contributors_enabled": true,
170.        "favourites_count": 24,
171.        "url": "http://dev.Twitter.com",
```

```
172.        "profile_image_url_https":
    "https://si0.twimg.com/profile_images/2284174872/7df3h38zabcvjylnyfe3_norma
    l.png",
173.        "utc_offset": -28800,
174.        "id": 6253282,
175.        "profile_use_background_image": true,
176.        "listed_count": 10775,
177.        "profile_text_color": "333333",
178.        "lang": "en",
179.        "followers_count": 1212864,
180.        "protected": false,
181.        "notifications": null,
182.        "profile_background_image_url_https":
    "https://si0.twimg.com/images/themes/theme1/bg.png",
183.        "profile_background_color": "C0DEED",
184.        "verified": true,
185.        "geo_enabled": true,
186.        "time_zone": "Pacific Time (US & Canada)",
187.        "description": "The Real Twitter API. I tweet about API changes,
    service issues and happily answer questions about Twitter and our API.
    Don't get an answer? It's on my website.",
188.        "default_profile_image": false,
189.        "profile_background_image_url":
    "http://a0.twimg.com/images/themes/theme1/bg.png",
190.        "statuses_count": 3333,
191.        "friends_count": 31,
192.        "following": null,
193.        "show_all_inline_media": false,
194.        "screen_name": "Twitterapi"
195.      },
196.      "in_reply_to_screen_name": null,
197.      "source": "<a href=\"http://sites.google.com/site/yorufukurou/\"
    rel=\"nofollow\">YoruFukurou</a>",
198.      "in_reply_to_status_id": null
199.    }
200.  ]
```

Retrieved July 27, 2014 from

https://dev.Twitter.com/docs/api/1.1/get/statuses/user_timeline

9.3. Association of American Universities (AAU)

1. Boston University
2. Brandeis University
3. Brown University
4. California Institute of Technology
5. Carnegie Mellon University
6. Case Western Reserve University
7. Columbia University
8. Cornell
9. Duke University
10. Emory University
11. Georgia Institute of Technology
12. Harvard
13. Indiana University
14. Iowa State
15. Johns Hopkins
16. McGill
17. Michigan State University
18. MIT
19. New York University
20. Northwestern
21. Princeton University
22. Purdue University
23. Rice University
24. Rutgers, The State University of New Jersey
25. Stanford University
26. Stony Brook University
27. Texas A&M University
28. The Ohio State University
29. The Pennsylvania State University
30. The University of Chicago
31. Tulane University
32. University at Buffalo, The State University of New York
33. University of Arizona
34. University of California, Berkeley
35. University of California, Davis
36. University of California, Irvine
37. University of California, Los Angeles
38. University of California, San Diego
39. University of California, Santa Barbara
40. The University of Iowa
41. The University of Kansas
42. The University of North Carolina at Chapel Hill
43. The University of Texas at Austin
44. The University of Wisconsin-Madison
45. University of Colorado, Boulder
46. University of Florida
47. University of Illinois at Urbana-Champaign
48. University of Maryland
49. University of Michigan
50. University of Minnesota
51. University of Missouri-Columbia
52. University of Oregon
53. University of Pennsylvania
54. University of Pittsburgh
55. University of Rochester
56. University of Southern California
57. University of Toronto
58. University of Virginia
59. University of Washington
60. Vanderbilt University
61. Washington University in St. Louis
62. Yale University

9.4. Amazon Mechanical Turk Instructions and Requirements

Description:	You will be asked to categorize tweets as either personal or professional based on a simple set of criteria.
Keywords:	Twitter, tweets, categorization, personal, professional
Qualification Requirement:	Number of HITs Approved greater than 10000 (Required for preview) HIT Approval Rate (%) for all Requesters' HITs greater than or equal to 99 (Required for preview)
Reward per Assignment	$0.10
Number of Assignments per HIT	3
Time Allotted per Assignment	10 minutes
HIT Expires in	5 days
Auto-Approve and Pay Workers	7 days

9.5. Amazon Mechanical Turk HIT Interface

Instructions [click to show]

Thank you for agreeing to participate in our research. Before you begin, please note that the data you provide may be collected and used by Amazon as per its privacy agreement. Additionally, this research is for residents of the United States over the age of 18; if you are not a resident of the United States and/or under the age of 18, please do not complete this HIT.

Please classify a tweet as either *mostly* **PERSONAL** tweet, *mostly* **PROFESSIONAL** tweet, a tweet that you are **UNSURE** about, or as *mostly* **NON-ENGLISH** if you are unable to comprehend the text. While you read the tweets in the HIT, please think about the way that you personally interact with friends, colleagues, and strangers online and offline. I would like you to use this insight in the way you behave to try to determine how the person tweeting is behaving; there are no correct answers.

IMPORTANT:

1. In every HIT there will be one test tweet (in order to ensure proper coding instructions are being followed); this tweet will specifically instruct you to categorize the tweet in a specific way. **Failure to do so will result in a rejection of the HIT by the requester**.
2. You must choose one of the four categories for each tweet. **Failure to do so will result in a rejection of the HIT by the requester**.

****** @****** 2175 followers | 60 friends | 6374 tweets
Baby Face (33, B+): Stanwyck's electric, but surely one male actor or role could have given her a run for her money. Film has sinew and wit.

Select one category for this tweet (required)
○ **Personal**   ○ **Professional**
○ **Unknown**   ○ **Non-English**

Category Description [click to show]
- **Personal:** for example using incomplete thoughts/sentences, profanity, everyday events/language, personal opinions, excessive punctuation, informal
- **Professional:** for example using academic/scientific/business language or subjects, correct punctuation, mention job title, referencing professional organization, formal
- **Unsure:** from the text it is impossible to categorize as personal, professional, or both
- **Non-English:** the text is not written in English

****** @****** 1174 followers | 1457 friends | 9584 tweets
@audreyhaynes <like>

Select one category for this tweet (required)
○ **Personal**   ○ **Professional**
○ **Unknown**   ○ **Non-English**

Category Description [click to show]

****** @****** 1003 followers | 1004 friends | 6320 tweets
@susanorlean @littlebrown @nookbn great choices; congrats @susanorlean!

Select one category for this tweet (required)
○ **Personal**   ○ **Professional**
○ **Unknown**   ○ **Non-English**

Category Description [click to show]

****** @****** 2175 followers | 60 friends | 6374 tweets
One among many happy things I learned at this tribute is that @jwqualls is just as sweet and equally handsome in person as you'd think.

Select one category for this tweet (required)
○ **Personal**   ○ **Professional**
○ **Unknown**   ○ **Non-English**

Category Description [click to show]

****** @****** 203 followers | 44 friends | 98 tweets
Categorize this as a personal tweet.

Select one category for this tweet (required)
○ **Personal**   ○ **Professional**
○ **Unknown**   ○ **Non-English**

Category Description [click to show]

****** @****** 1021 followers | 1403 friends | 8848 tweets
Lorde: "to move beyond the manner of presentation to the substance,to tap that anger as an important source of empowerment."

Select one category for this tweet (required)
○ **Personal**   ○ **Professional**
○ **Unknown**   ○ **Non-English**

Category Description [click to show]

****** @****** 1174 followers | 1457 friends | 9584 tweets
@filarena @ahsanib Very odd that Political Analysis is a nonresponder.

Select one category for this tweet (required)
○ **Personal**   ○ **Professional**
○ **Unknown**   ○ **Non-English**

Category Description [click to show]

Submit

9.6. Phase Three Survey

Welcome

Welcome ${m://FirstName}.

This survey contains four questions (with a maximum of six brief follow-up questions) and will take approximately   five minutes to complete. As a member of the academic community your experience with Twitter is of high   importance to the final phase of my dissertation work. My research goal is to provide insight into the ways in   which scholars communicate on Twitter. To meet this goal my dissertation research has been carried out in three   phases, the first of which was a survey sent in the spring in which you participated (thank you), the second phase   included sending tweets to Amazon's Mechanical Turk application for categorization, and the third phase is this   follow-up survey.

As in the previous survey, your responses to this final survey will remain confidential and be anonymized before   reporting. Responding to the survey implies consent to participate and you may discontinue the survey at any   time. There are neither direct risks nor direct benefits to participation in this survey. However, your responses will   help to advance knowledge regarding the diverse communication channels used by scholars and help me finish my dissertation. The survey will end in approximately two weeks from the time you receive this email.

If you have any questions about this research or the survey feel free to contact me at tdbowman@indiana.edu.   Thank you for taking the time to participate in this study.

With kindest
regards,
Timothy D.
Bowman

Department of Information and
Library Science School of
Informatics and Computing
Indiana University
1320 E. 10th St., LI 011
Bloomington, IN 47405-3907

Question One

When communicating in a professional or personal manner on Twitter, which of the following features or functionality do you use to help frame a tweet as personal or professional?

	Personal	Professional
Hashtags (e.g. #NASA)	☐	☐
Mentions (e.g. @Prof_S_Hawking)	☐	☐
URLs (e.g. http://www.nature.com/)	☐	☐
Media (e..g photo, video)	☐	☐
Retweets (e.g. retweet what someone else has tweeted)	☐	☐
Emoticons (e.g. :-P)	☐	☐
Directed messages (e.g. starting tweet with @someone)	☐	☐
Punctuation, capitalization, quotes, etc.		
Other	☐	☐
Not in this way	☐	☐

Please describe what *other features* you use to frame a tweet as personal:

Please describe what *other features* you use to frame a tweet as professional:

QUESTION TWO

Have you had any instances when someone reading your tweet has misinterpreted it as personal when it was professional or vice versa?

Yes

No

Can you provide an example tweet?

What about the tweet could you have changed to help the person interpret the communication in the way you   wished it to be interpreted?

Question Three

Which particular features or functionality of your profile have you set up or changed in order for others on Twitter   to understand that the account is meant to either be more personal and/or more professional in nature?

	Persona	Professional
Profile Image	☐	☐
Description	☐	☐
Theme	☐	☐
Header (banner) Image	☐	☐
Colors	☐	☐
Location		
Other	☐	☐
Not used in this way	☐	☐
	☐	☐

Please describe the *other features or functionality* that you set up or changed in order for your followers to   understand that the account is more personal in nature:

Please describe the *other features or functionality* that you set up or changed in order for your followers to   understand that the account is more professional in nature:

Question Four

Please categorize the following five public tweets you made as either personal or professional.

	Personal	Professional

TWEET	○	○
	○	○
	○	○
	○	○
	○	○

9.7. Survey Questions and Research Questions

Survey Question	Purpose

1) Do you have one or more Twitter accounts?
 	
  1A) How many Twitter accounts do you have?
 	
  1B) What is your Twitter handle? (e.g. @myname) NOTE: If you do not want to share your Twitter handle, please enter an asterisk followed by a nickname for your account(s) so that you may finish the survey. (e.g. *accountOne)
	Established whether the participant was a Twitter user and determined if they would be including in the next two phases of the research

2) For approximately how long have you had the account(s) (Twitter launched in 2006)?	Determine whether Twitter experience has an impact on framing behaviors and affordance use.
3) Do you use the account(s) to communicate in a personal and/or professional capacity?	Validation measure for the tweets coded in phase II and as a check against the survey responses in phase III
4) Approximately how often do you do the following when you Tweet from your account? (a) Embed URLs (b) Use Hashtags (c) Mention someone (d) Address messages at someone (e) add your location (f) add a photo	Use of tweet-related affordances; establishes a baseline of activity
5) Approximately how often do you do the following using your account(s)? (a) Delete a tweet (b) Favorite a tweet (c) Reply to a tweet (d) Retweet a tweet	Use of tweet-related affordances; establishes a baseline of activity
6) Please choose which of the following features you've added or changed on your Twitter account: (a) allow outside applications to access Twitter (b) allow Twitter to personalize interface based on website visits (c) allow Twitter to send email messages related to tweeting behavior (d) allow Twitter to send text messages related to tweeting behavior (e) bio information (f) connect Twitter with Facebook (g) country specified (h) geo tagging (i) header picture (j) language specified (k) phone number specified (l) privacy settings (m) profile picture added (n) sleep settings (o) theme chosen (p) time zone specified (q) widget(s) created	Twitter environment based affordances; establishes a baseline of activity
7) How often do you change the following? (a) privacy settings (b) profile picture (c) header picture	Twitter environment based affordances; establishes a baseline of activity
8) Did you add any of the following to your bio? (a) professional title (b) place of work (c) post-nominal letters (e.g. Ph.D.)	Twitter profile related affordances; establishes a baseline of activity
9) Please choose all of the following events that trigger Twitter to send you and email: (a) about top tweets and stories (b) when your	Twitter communication related affordances; establishes a

tweet is marked as favorite (c) someone retweets your tweet (d) someone new follows you (e) when someone mentions you in a tweet	baseline of activity
10) Please choose all of the following events that trigger Twitter to send you a text message: (a) about top tweets and stories (b) when your tweet is marked as favorite (c) someone retweets your tweet (d) someone new follows you (e) when someone mentions you in a tweet	Twitter communication related affordances; establishes a baseline of activity
11) Is there anything else that you do when communicating with Twitter that you would like to share?	Open-ended comments about Twitter
12) Besides Twitter, with which of the following social media tools do you have an account? (a) Academia.edu (b) BioMedExperts.com (c) Blogger (d) Epernicus (e) Facebook (f) GooglePlus (g) Instagram (h) LinkedIn (i) Mendeley (j) MySpace (k) Pinterest (l) ResearchGate (m) SciLinks (n) Scribd (o) SlideShare (p) Tubmlr (q) Wikipedia (r) WordPress (s) YouTube (t) Other	Overall use of social media platforms; used to validate this work and compare against others
13) How long have you been a faculty member at a university?	Determine if academic age has an impact on framing behaviors and affordance use.
14) With which gender do you identify?	Determine if gender has an impact on framing behaviors and affordance use.
15) In what age range do you fall?	Determine if age has an impact on framing behaviors and affordance use.
16) How would characterize your ethnicity?	Determine if ethnicity has an impact on framing behaviors and affordance use.
17) Do you want to participate in the Amazon gift certificate drawing?	
18) Please provide an email address.	
19) Do you want to participate in the Amazon gift certificate drawing?	

9.8. Follow-up Survey Questions and Research Questions

Survey Question	Purpose
1) When communicating in a professional or personal manner on Twitter, which of the following features or functionality do you use to help frame a tweet as personal or professional?	Distinguish between affordances used for framing tweets as personal or professional from the perspective of the scholar
2) Have you had any instances when someone reading your tweet has misinterpreted it as personal when it was professional or vice versa?	Determine if the scholar had ever encountered a situation in which their tweets were misinterpreted
3) (IF YES to QUESTION #2) Can you provide an example tweet?	Provide an example of a misinterpreted tweet
4) (IF YES to QUESTION #2) What about the tweet could you have changed to help the person interpret the communication in the way you wished it to be interpreted?	Determine if the scholar might use affordances in a different way to frame in the tweet in the appropriate manner
5) Which particular features or functionality of your profile have you set up or changed in order for others on Twitter to understand that the account is meant to either be more personal and/or more professional in nature?	Use of profile-related affordances; establishes a baseline of activity and distinguishes between personal and professional
6) Please categorize the following five public tweets you made as either personal or professional.	Provide five tweets of the scholar as categorized by Turkers in AMT to validate Turkers coding or show where problems arise

9.9. Top 20% of Hashtags Where Unique Users Greater Than One

	PERSONAL			PROFESSIONAL	
Distinct Users	Total Count	#Hashtag	Distinct Users	Total Count	#Hashtag
18	25	FF	9	16	fb
13	71	fb	8	9	highered
11	40	debate	6	7	cnn
11	15	Science	6	7	SCOTUS
10	16	Sandy	5	14	climate
9	14	SixWordPeerReview	5	9	climatechange
9	10	fail	5	8	p2
7	16	oscars	5	7	digitalhumanities
7	16	SOTU	5	7	openaccess
7	13	SuperBowl	5	6	health
7	7	shutdown	5	6	scicomm
6	19	mla13	5	5	MLA14
6	9	scicomm	5	5	STEM
6	8	Romney	5	5	Storify
6	6	Obama	4	39	HCIL
6	6	Obamacare	4	34	nlproc
6	6	sigh	4	14	Higgs
6	6	wtf	4	10	evol2013
5	27	Cosmos	4	10	UNC
5	11	GRAMMYs	4	8	aas223
5	10	sociology	4	7	OA
5	9	mla14	4	7	sna
5	8	ASA13	4	6	neuroscience
5	8	THATcamp	4	5	jobs
5	7	awesome	4	5	mizzou
5	7	Election2012	4	5	mooc
5	7	NYC	4	5	science
5	7	SCOTUS	4	5	SocialMedia
5	7	winning	4	5	Turkey
5	6	CHI2014	4	4	MOOCs
5	5	Sochi	4	4	Syria
4	15	Ukraine	4	4	womeninscience
4	10	chi2011	3	28	socy201
4	9	aas223	3	19	sociology
4	9	Climate	3	18	smem
4	8	p2	3	10	UMD

4	8	Twitter	3	8	Fracking
4	7	trayvonmartin	3	7	FIAumd
4	7	wi	3	6	chi2012
4	6	openaccess	3	6	energy
4	6	PussyRiot	3	6	Women
4	6	quote	3	5	ATLAS
4	6	race			
4	5	highered			
4	5	mla12			
4	5	notreally			
4	5	Oscars2014			
4	5	research			
4	5	trayvon			
4	4	BreakingBad			
4	4	firstworldproblems			
4	4	gop			
4	4	mooc			
4	4	nerdland			
4	4	NFL			
4	4	Obama2012			
4	4	OCCUPY			
4	4	oldSchool			
4	4	olympics			
4	4	ows			
4	4	Sochi2014			
4	4	solidarity			
4	4	Wow			
4	4	Zimmerman			
3	27	chi2010			
3	17	HCIL			
3	14	9sinst11			
3	11	4C14			
3	11	VPDebate			
3	10	DH2013			
3	9	UMD			
3	9	UVA			

9.10. Top URL Domains Used Ten or More Times

	PERSONAL			PROFESSIONAL	
Distinct Users	*Total Count*	*URL Domain*	*Distinct Users*	*Total Count*	*URL Domain*
98	275	www.youtube.com	81	187	www.nytimes.com
71	153	www.nytimes.com	48	81	www.youtube.com
39	111	www.facebook.com	36	42	www.theatlantic.com
37	50	www.huffingtonpost.com	35	50	www.huffingtonpost.com
34	48	www.theguardian.com	30	55	www.nature.com
28	50	www.slate.com	29	69	www.theguardian.com
27	50	Twitter.com	27	40	www.facebook.com
27	37	www.washingtonpost.com	26	33	www.washingtonpost.com
24	120	instagram.com	25	34	www.newyorker.com
22	39	www.newyorker.com	23	28	chronicle.com
20	31	en.wikipedia.org	22	29	www.insidehighered.com
20	28	www.theatlantic.com	21	26	trib.al
18	21	www.buzzfeed.com	20	35	www.bbc.co.uk
17	22	trib.al	20	25	www.npr.org
16	22	www.salon.com	18	32	arxiv.org
15	44	twitpic.com	18	26	www.wired.com
15	16	chronicle.com	15	18	www.slate.com
15	16	www.nature.com	13	19	www.scientificamerican.com
15	15	www.amazon.com	12	24	vimeo.com
14	15	www.npr.org	12	17	www.plosone.org
12	16	www.cnn.com	11	28	bit.ly
12	15	www.insidehighered.com	11	27	onlinelibrary.wiley.com
12	14	www.bbc.co.uk	10	17	twitpic.com
12	13	www.businessinsider.com	10	12	docs.google.com
11	13	Twitter.yfrog.com	9	17	plus.google.com
11	13	www.flickr.com	9	16	thinkprogress.org
11	13	xkcd.com	9	12	www.sciencedirect.com
10	21	thinkprogress.org	9	10	blogs.scientificamerican.com
10	14	arxiv.org	9	10	www.pbs.org
10	14	www.tumblr.com	9	9	www.amazon.com
10	13	blogs.scientificamerican.com	9	9	www.salon.com
10	12	plus.google.com	8	76	feeds.feedburner.com

10	10	www.kickstarter.com	8	13	www.ncbi.nlm.nih.gov
9	9	jezebel.com	8	11	www.forbes.com
9	9	www.vox.com	8	10	ow.ly
8	16	i.imgur.com	8	9	www.economist.com
8	11	vimeo.com	8	9	www.sciencemag.org
8	11	www.theonion.com	8	9	www.thenation.com
8	9	mobile.nytimes.com	8	8	mobile.nytimes.com
8	9	ow.ly	8	8	www.businessinsider.com
8	9	www.motherjones.com	7	11	www.sciencedaily.com
8	8	www.forbes.com	7	10	t.co
8	8	www.google.com	7	9	www.reuters.com
7	18	t.co	7	8	dx.plos.org
7	11	bit.ly	7	8	www.pnas.org
7	7	slate.trib.al	7	7	host.madison.com
6	57	foursquare.com	7	7	opinionator.blogs.nytimes.com
6	9	www.cbc.ca	7	7	slate.trib.al
6	9	www.nybooks.com	7	7	Twitter.com
6	9	www.upworthy.com	7	7	www.theonion.com
6	7	espn.go.com	6	19	pubs.acs.org
6	7	www.pinterest.com	6	13	www.aljazeera.com
6	7	www.wired.com	6	10	www.tumblr.com
6	6	feedproxy.google.com	6	9	www.nybooks.com
6	6	io9.com	6	9	www.the-scientist.com
6	6	mashable.com	6	8	io9.com
6	6	online.wsj.com	6	8	online.wsj.com
6	6	www.bloomberg.com	6	7	www.brainpickings.org
6	6	www.boston.com	6	7	www.motherjones.com
6	6	www.dailymail.co.uk	6	7	www.newscientist.com
6	6	www.thewire.com	6	7	www.nsf.gov
6	6	www.vulture.com	6	6	feedproxy.google.com
			5	12	www.bostonreview.net
			5	10	www.esajournals.org
			5	9	andrewgelman.com
			5	8	github.com
			5	8	www.cbc.ca
			5	7	instagram.com
			5	7	Phys.Org
			5	7	www.theglobeandmail.com
			5	6	lareviewofbooks.org
			5	6	research.microsoft.com

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	5	6	www.businessweek.com
	5	6	www.ft.com
	5	6	www.livescience.com
	5	5	econ.trib.al
	5	5	en.wikipedia.org
	5	5	ideas.time.com

9.11. Top 20% of User Mentions Where Unique Users Greater Than One

PERSONAL			PROFESSIONAL		
Distinct Users	Total Count	User Handle	Distinct Users	Total Count	User Handle
9	41	AstroKatie	7	12	NewYorker
9	28	Ted_Underwood	7	11	addthis
9	17	omar_lizardo	5	8	chronicle
9	14	jeremyfreese	5	8	ShareThis
9	10	alexhanna	5	6	sciam
8	48	ibogost	4	7	guardian
8	34	briancroxall	4	5	wordpressdotcom
8	26	mkirschenbaum	4	4	NatureNews
8	11	shamuskhan	3	6	BrownUniversity
7	32	labroides	3	4	ASAnews
7	15	KateClancy	3	4	HarvardBiz
7	15	kfitz	3	4	HuffPostPol
7	14	WITWhat	3	4	Princeton
7	12	BarackObama	3	4	StephanieCoontz
7	11	fabiorojas	3	4	thinkprogress
7	8	JustinWolfers	3	4	UWMadison
7	8	phylogenomics	3	4	washingtonpost
6	41	saragoldrickrab	3	3	brainpicker
6	25	treycausey	3	3	carlzimmer
6	23	Mammals_Suck	3	3	edyong209
6	21	tressiemcphd	3	3	HuffPostScience
6	15	vaiseys	3	3	jbprime
6	13	guzdial			
6	12	mattyglesias			
6	10	JenHoward			
6	9	barrywellman			
6	9	seanmcarroll			
6	8	alexismadrigal			
6	8	carlzimmer			
6	8	elotroalex			
6	8	pgbovine			
6	6	BadAstronomer			
6	6	FiveThirtyEight			
6	6	guardian			
6	6	nprnews			

5	**36**	**markowenmartin**
5	20	ProfLikeSubst
5	16	betajames
5	16	ctitusbrown
5	15	sramsay
5	15	wynkenhimself
5	14	jamesjbrownjr
5	13	fetner
5	12	doc_becca
5	12	johnmyleswhite
5	12	surt_lab
5	10	adelinekoh
5	10	BananaKarenina
5	10	pankisseskafka
5	10	RogerWhitson
5	9	mbeisen
5	9	miriamkp