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Nina Cesare

United We Tweet?: A Quantitative Analysis of Racial Differences in Twitter Use

Nina Cesare

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Reading Committee:

Katherine Stovel, Co-Chair

Emma Spiro, Co-Chair

Hedwig Lee

Tyler McCormick

Program Authorized to Offer Degree:

Sociology

University of Washington

Abstract

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Nina Cesare

Chairs of the Supervisory Committee:
Professor Katherine Stovel
Sociology
Assistant Professor Emma Spiro
The Information School

This study is grounded in the perspective that individuals who use Twitter exist within a racialized social structure, and that if handed a flexible platform for communication they may establish different patterns of use. It acknowledges Twitter as a novel social context in which users co-create meaning and structure, and is informed by theory addressing the role of race and racial identity within both online and offline spaces. Chapters analyze black-white racial variation in self-presentation, site use, and network formation using digital traces from two datasets of Twitter of users in the United States. Results indicate that while Twitter is in many ways a race-neutral context, black users are less likely to disclose personal identity indicators, tend to tweet at others less frequently and with a smaller volume of personal ties, and often have higher levels of racial homophily within their networks than white users. White users are more

outwardly vocal, more likely to disclose personal identity indicators, and more likely to engage with Twitter as an information space. Overall, Twitter appears not to be immune to the influence of offline biases and identities, and there are some black users for whom the narrative of Black Twitter – or Twitter as a community building space – may hold true.

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DEDICATION

This dissertation is dedicated to my core support team:

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To my friends and colleagues, Mike Esposito, Julie Morris and Jenni Branstad, for every last one of those campus coffee runs.

To my committee – especially Hedy Lee and Emma Spiro – for the countless hours of feedback guidance you provided.

And to my family for raising me to believe in my potential.

CHAPTER 1: INTRODUCTION: THEORETICAL FRAMING, CHAPTER STRUCTURE AND CLARIFICATIONS

1. BACKGROUND AND THEORY:

1.1 The Net as a “Great Equalizer?”

Following the commercial success and popularization of the World Wide Web in the early to mid-1990s, it became clear that this seemingly boundless outlet for information was also a powerful tool for interpersonal communication. Although not originally designed for this purpose, the potential of the internet to connect individuals of diverse characteristics and backgrounds became immediately apparent to those using it. Internet scholar Howard Rheingold wrote of the social potential of online spaces in his book *Homesteading on the Electronic Frontier*, claiming that interactions online – although disembodied – may in some cases be as real and fulfilling as offline interactions. Communities that formed around these interactions provided members with feelings of connectedness and inclusion, prompted the evolution and establishment of within-community social networks, and eventually heralded the formation of “full-scale subcultures[s]” online (Rheingold 1993:3). The initial popularity of the first official “social networking sites” – classmates.com and sixdegrees.com – sparked interest that eventually motivated the creation of sites such as Friendster, LinkedIn, MySpace and Facebook. By the early 2000s the web was indeed a social space.

Paralleling the growth of the social web, many scholars extolled the benefits of communicating via cyberspace and discussed the potential that this technology had to break down geographic and structural barriers to communication, bringing together individuals from

diverse backgrounds. In addition to linking individuals across time and space, the disembodied nature of online spaces was said to permit individuals to shed offline traits and create online personas that explore new or latent facets of their identity (Turkle 1995). As was suggested in a popular, early internet usage manual:

“[The internet] lets all kinds of computers and humans talk to each other. The old barriers of sexism, ageism, and racism are not present, since you can’t see the person to whom you’re “speaking.” You get to know the person without preconceived notions about what you THINK he [sic] is going to say, based on visual prejudices you have, no matter how innocent” (Polly, 1992 – Quoted in Wolf, 1998).

Given this hopeful sentiment, the initial popularity of the social web may have stemmed in part from the convenience of finding community without regard to temporal and geographic barriers and in part from the notion that online communication could help society promote interaction between individuals divided by age, gender, and race within offline contexts. This interaction, it seemed, may lead to the formation of more diverse friendship networks than users may develop offline, and promote mutual understanding and respect among users of different characteristics and backgrounds. Everyone, it was thought, would have a beneficial and equal – or at least neutral - experience when socializing online.

The promise of the internet as a “great equalizer” (Wolf, 1998) in early internet scholarship projected the illusion that the internet would contribute to the creation of a society less significantly characterized by racial disparities. It was expected that the freedom and low cost of online socialization would allow individuals to create and manage friendships on the

basis of common interest rather than according to structural and agency-based forces that guide patterns of racial homophily offline. There are a number of factors that motivated this misconception. For one, the way in which early internet scholarship addressed the dynamics of online spaces was often implicitly or explicitly disassociated from processes that exist within offline contexts. This is unsurprising given that early online social spaces generally lacked personal profiles and facilitated highly anonymous communication. Rheingold (1993), for instance, celebrates the ability of individuals to replicate the feelings of connectedness that characterize offline communities within a new and separate social “frontier.” Sherry Turkle’s *Life on the Screen* - among the first comprehensive studies of identity within online spaces - discusses the freedom that individuals have in crafting identities within social spaces that are anonymous and separate from their offline lives. In addition to the assumed offline disassociation and anonymity of online spaces, the low cost of communication within online spaces tended to shift the focus of the potential impact of online spaces on society more toward how these platforms could bring individuals together rather than considering what sort of social divides persist within them. While works such as Shirky (2008) highlighted the promise of the internet to unite and organize communities, the excitement of this discussion tended to eclipse consideration of who may or may not be involved in these processes.

As online social affordances evolved and profile-based social media sites moved to the core of the social web, it became increasingly difficult to consider the web as a social equalizer. The proliferation of social networking sites – defined 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 others with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system” (boyd and Ellison 2007: 2011) –

instigated a significant shift that had the potential to disrupt misconceptions about the internet as a race-less space. Among the most marked of these shifts pertains to their lack of anonymity. Social media sites are highly visual, meaning that users can post photos of themselves that communicate information about their demographic characteristics to others. Although the extent to which users are required to provide information about their offline selves varies according to the affordances and normative culture of the site, it may be said that social media sites have made it more difficult to establish connections with others without regard to offline characteristics such as gender, age or race. This may be particularly true within sites such as Facebook, where connections are reciprocal and profiles are highly personalized using visual cues.

Another change stems from the offline/online network overlap that characterizes many popular social media spaces. As the social media landscape matured, the majority of interactions began to take place within a handful of popular social media spaces – a status currently occupied by Facebook, Pinterest, Instagram, LinkedIn and Twitter (Duggan et al. 2015). Existing research suggests that users engage with social media sites not only to make new friends, but to help maintain bridging and bonding capital within existing networks of offline ties as well (Burke, Kraut, and Marlow 2011; Ellison, Steinfield, and Lampe 2007). In regard to this, boyd and Ellison (2007) state: “On many of the large SNSs, participants are not necessarily ‘networking’ or looking to meet new people; instead, they are primarily communicating with people who are already a part of their extended social network” (211). Connections on Facebook in particular so closely replicate individuals’ offline connections that some studies have turned to Facebook metadata as a means of remotely documenting individuals’ offline social lives (Hofstra et al. 2017; Wimmer and Lewis 2010). Given this overlap between individuals’ online and offline

social lives, we may infer that the structural forces that help guide patterns of inequality offline may also operate within online spaces.

Looking beyond interaction patterns within online spaces, the shift toward collective realization that the internet is not a “great equalizer” is sparked in part by the awareness that online platforms and tools were not created in a social vacuum; they are instead imbued with the experiences and biases of the developers who created them, and these forces shape the structure of the platform and/or users’ experiences in unique ways. McPherson (2012) argues that the modular efficiency of the UNIX foundations upon which online life was constructed reflects an intentional blindness to diversity that permeated the culture in which it was developed. A more obvious and concrete example of the link between culture and site usage can be seen within Facebook, which was developed for and by university students and - in the years following its creation - became a migration destination for affluent, wealthy, mostly white MySpace users (boyd 2011). Overall, there is a clear connection between culture, site structure and site use, and it is likely that this interrelation generates online social contexts that are not demographically neutral.

One key identity dimension along which offline life is strongly patterned is race. Race is a politicized social construct that interacts with institutions (Omi and Winant 2014) – often in a way that produces disparities along dimensions such as education (Noguera, 2016), employment and earnings (Kochhar and Fry 2014; Patten 2016), health (Nelson, Stith, and Smedley 2009), and more. The salience of racial identity shapes offline civic engagement, often so strongly that it eclipses the importance of other identity facets in individuals’ decision making (Dawson 1995, 2013). Given the influence of this factor offline, one may expect that it patterns online life as well. However, the role of race within online spaces remains underexplored as a research

topic. The way in which research discusses the social experience of individuals online – particularly the subjective dimensions of online social life, such as identity management and community formation - falls victim to the overall tendency to ignore the role of race within online spaces, and assume that these experiences do not vary by race. Researchers’ default understanding of the social dynamics of online spaces – including how they address presentation of self and community formation online - is race-neutral, and this severely limits our understanding of the social impact of online communication. Moreover, a persistent tendency of digital research to fall victim to the fallacy of digital dualism – or the idea that online and offline life are structurally and culturally separate (Jurgenson 2012) – renders anticipating demographic variation in site use difficult. This project seeks help remedy this deficit in the literature. Subsequent sections will discuss existing literature regarding the intersection of race and online spaces, address the limitations and shortcomings of this work, discuss in detail the ways in which offline racial dynamics may infiltrate online spaces, and propose new pathways for examining how race matters online.

1.2 “Default” Whiteness Online: The intertwining of race and the internet

Early scholarship addressing race and the internet engaged in in-depth exploration of racial inequality in access to online spaces – a phenomenon often referred to as the “digital divide.” A number of studies emerged in the mid-1990s and early 2000s that linked technology use to career status and achievement, and noted a significant level of racial disparity in regard to who was able to access online tools and information (Irving et al.1995; Norris, 2011, Hoffman and Novak, 1998). One of the first major studies to highlight racial inequality in internet access – the National Telecommunications and Information Association’s report “Falling Through the Net: A survey of the “have nots” in rural and urban America” – noted that in the “Information

Age,” the economic and interpersonal wellbeing of an individual is highly dependent on their ability to “access, accumulate, and assimilate information” through digital media. It found that the access rates of black and Hispanic individuals lagged far behind white individuals in urban settings, and that the access rates of Asian and Native American individuals lagged far behind white individuals in rural settings. In response to this, the Clinton administration launched several initiatives to widen and diversify access and digital literacy, and the issue soon became a common topic of public discourse.

While helpful, discussion surrounding the digital divide does not capture the full extent of the intersection between race and the internet. Furthermore, it has the potential to sidetrack further exploration into the ways in which users’ online experiences – particularly their social experiences - are mediated by race. Discourse surrounding the digital divide may offer the impression that universally improving access to online spaces will lead to the creation of a post-racial society (Fouché, 2012). As stated by Nelson (2002), “The rhetoric of the digital divide does more than assume that, in the best of all worlds, technology can and should eliminate racial distinctions” (Quoted in Fouché, 2012: 75). Research examining the pathways through which race may be carried into online spaces suggests that this is not the case.

Those assessing the foundations of the link between race and online spaces often discuss what McIlwain (2017) and McPherson (2012) identify as the intersection between racial formation and technological formation. Racial formations theory addresses how representation systems and social institutions interact to generate differential advantages and disadvantages for particular groups. Viewing the internet as a social space in which users’ experiences are shaped by tools and affordances in the same way their offline experience may be shaped by institutions, it is easy to see how structural inequalities may be reproduced online. On a foundational level,

the bedrock of the internet – the UNIX language – employs a modular logic that represents an intolerance of diversity that characterized the social environment in which it was created (McPherson, 2012). On a surface level, many of the individuals responsible for designing the tools that shape users' online experiences belong to racially privileged groups who may not consider the ways in which bias and prejudice may be implicitly or explicitly carried into what they develop (Nakamura and Chow-White 2013). A very clear example of this arose recently when in 2016 vacation rental company Airbnb realized that their online interface not only facilitated discriminatory behavior on the part of property owners, but left those who experienced discrimination little recourse. The result of the interaction between representation systems and social institutions in the form of affordances is an online environment in which whiteness is often the default and minority users may find themselves ‘othered’ (Chow-White 2006; Noble 2014).

Among the most enduring themes within literature addressing the intersection of race and the internet is the role of race and identity within embodied online contexts. Reacting to the initial popularity of the social web, the *New Yorker* posted a now famous cartoon that featured the punch line, “on the internet, nobody knows you’re a dog.” This work highlights that in the age of social media, however, it is clear that “on the internet everyone knows if you’re a dog...And the color of the dog counts” (Everett, 2008: viii). Regardless of whether online embodiment is communicated visually or through text-based performance, existing work makes clear that racial and ethnic identification – which are both dependent upon and deeply embedded within the social structure (Omi and Winant, 2005) - carries over into online spaces. Nakamura (1995) for instance, assessed the ways in which users may conceal their race or explore alternative racial identities within anonymous online social spaces – a phenomenon she refers to

as “identity tourism.” Her work finds that while the ability to conceal one’s racial identity was among the most “socially valuable features” of anonymous online spaces, racial identity found ways to rise to the surface nonetheless (Nakamura 2008). More recent work from Grasmuck, Martin, and Zhao (2009) finds that within Facebook – a highly *nonymous* space through which one’s offline self may be clearly communicated - teenage users develop ways of grooming their profiles to denote membership within a particular racial or ethnic group. boyd (2011)’s analysis of “white flight” from MySpace after the emergence of Facebook – a community favored by affluent, white young adults in its early days - indicates that users may develop class-based or racial associations with entire social media communities interact with users’ identities and influence their preference to participate in those communities.

Beyond heterogeneity in identity expression and group identification, recent work documents the presence of racial anxiety and overt discrimination as a consequence of online embodiment. Nakamura (2009) notes that while World of Warcraft (WoW) players specifically avoid discussions of race within the context of the WoW environment, campaigns sometimes develop overtly racist undertones. The release of *Rust* – a multiplayer game in which players cannot choose the race of their avatars – displayed just how important authenticity in expressing one’s racial identity is online, and just how aware individuals are of how much race matters online. As reported by Condis (2015), after the release of the game many white gamers were unhappy with the random assignment and felt “drafted into racial discourses that they preferred to ignore.” In regard to overt discrimination, journalist and blogger Jamie Nesbitt Golden posted an article on *XO Jane* in which she described her experiences with harassment as a black, female blogger, and how the harassment stopped when she transformed her visual online persona into that of a stylish, white male (Nesbitt-Golden 2014). Overall, it is clear that despite the capacity

of the internet to bring users together racial discrimination characterizes online interactions in clear ways.

Within non-embodied spaces online, research suggests that racial disparities may emerge in surprising and seemingly innocuous ways. McIlwain (2017) for instance, analyzed the manifestation of racial inequality online by mapping traffic between websites. Working under the assumption that when users select a particular site they must make an assessment of whether the site is targeted to them and/or a place where they feel welcome, this study found evidence of racial steering and the production of website traffic clusters that were more segregated than they would be by chance. The World White Web project (see: <http://www.worldwhiteweb.net/>) addresses bias embedded in Google search algorithms. Project creator Johanna Burai found that images searches for the word “hand” produce a disproportionately large number of white-skinned hands, image searches for “black hand” primarily produced cartoon hand illustrations, and searches for “African hand” produced overtly racist results. These results clearly illustrate that bias and discrimination are deeply embedded in the structure of the web, and these forces and have the potential to shape users’ online experiences and web usage and prevent the web from being ‘race neutral.’

Literature addressing the intersection of racial identity and political identity provides an important perspective on why we may expect internet usage to vary by race. Dawson (1995) suggests that racial identity so strongly shapes individuals' worldviews that concerns associated with this identity may eclipse concerns associated with other identity facets. This overlap between group and individual interests as patterned by race is illustrated most clearly through voting patterns, as historical data indicates that the influence of race consistency supersedes the importance of class among black voters (Dawson, 1995; 2013). Given the salience of this

identity facet, we may expect that providing tools through which geographically disperse but demographically and/or ideologically similar individuals may communicate will not erase divisions but perpetuate them. Similar to the way in which research documents the existence of ideological ‘echo chambers’ in social media contexts (Conover, 2011), we may expect that individuals who carry with them black identities – which, some may argue, are inherently political identities (Omi and Winant, 2005) – may use online spaces to share thoughts and connect. While racial differences in site use that may emerge within online spaces may not directly lead to overt inequality, the nonetheless signify the presence of social division.

To summarize, evidence suggests that race and technology are intertwined and that online spaces are not “post-racial utopia[s]” (Condis, 2015). The evolution of online spaces – from racial ‘identity tourism’ on anonymous MOOs and MUDS to anxiety over racial incongruence between the race of an avatar and user in the context of a multiplayer game – indicate that racial identity matters online and influences how users behave, self-present and interact with one another. Existing research documents how the presence of bias and discrimination online may shuttle users between sites differentially based on race as well. While divisions within rather than between sites may be less overt – particularly, depending on the structural rigidity of the site - research confirms their existence (Kolko, Nakamura and Rodman, 2001). These divisions may be particularly visible within flexible social media sites – such as Twitter and Instagram – which offer a variety of options for self-presentation, interaction and disclosure.

This dissertation will focus on one particularly flexible social media site – Twitter. Twitter is a microblogging site created in 2006 where users can share text and media in 140 characters or less and establish directed ties with other users. It will pay particular attention to how forces such as bias and discrimination, and the desire to build community impact patterns of

Twitter use. Analysis is grounded in researchers' understanding of Twitter as a space that facilitates many types of user engagement. For some, Twitter may function as a source of information about current events (Barthel et al. 2015; Gil de Zúñiga, Jung, and Valenzuela 2012; Kwak et al. 2010; Perez 2016.). For others, it may function as a space to connect with similar others (Prochaska et al. 2012; Takhteyev, Gruzd, and Wellman 2012). On Twitter, users may be largely anonymous, or they may provide detailed personal information. In this dissertation, I recognize the presence of racialized rhetoric regarding the use and function of Twitter (Brock 2012; Clark 2014; Sharma 2013), and hypothesize whether this discussion represents a subset of users or denotes the presence of wider racial divisions in site use.

1.3 Situating this Study within Existing Work

A small but growing body of work examining the intersection of race and social media use informs this work. Similar to researchers' understanding of how racial divisions may be carried into online spaces, scholarly literature exploring the intersection of race and online behavior has evolved over time (McIllwain, 2017). Some of this literature has addressed how a user's race is associated with his or her site preferences. Among the first of such studies were analyses of how race was associated with users' preference for different social media platforms. Hargittai (2007) broadly considers how users' demographic characteristics – including race – are associated with their social networking site preferences. boyd (2011) uses qualitative interviews to study how the decision to adopt Facebook versus MySpace was driven in part by the users' race. These studies suggest that online spaces may not be immune to the structural influences that perpetuate racial inequality offline. Indeed, users of different races may experience social media spaces differently largely because of their site preferences. In addition, these studies offer insight into how the racial composition of social media spaces may

influence friendship choices by limiting cross-racial exposure within a given site. More recent literature regarding site preference has explored how race intersects with site preference beyond just social media use to produce segregated patterns of web traffic (McIlwain 2017).

This study draws on work that has explored how users express their racial identities or experience overt discrimination as a consequence of their perceived race within online spaces. Early analysis of sociality online found that within anonymous online spaces some users decided to combat the assumed homogeneity of the context by explicitly sharing their racial or ethnic identity – an act sometimes perceived as a disruptive and “hostile” identity performance (Nakamura, 1995). More recently, anxious and negative reactions to an online multiplayer game in which users are assigned an avatar with an unchangeable, randomly selected race illustrate that race still influences interaction online (Condis 2015). Grasmuck, Martin, and Zhao (2009) found that when racial identity is visually explicit users still find ways to create divisions and signify group membership through profile grooming. Despite the freedoms that online spaces offer, it seems in many ways they open new contexts in which old mechanisms for discrimination may operate (Nakamura and Chow-White 2013).

This study is also informed by work that addresses the existence of a phenomenon known as Black Twitter. Research on Black Twitter has addressed the within-group dynamics of those who use Twitter as a means of discussing issues related to race and racial identity. Existing research on the within-group dynamics of Black Twitter provides evidence that the way in which users experience Twitter vary broadly by race. Florini (2014) and Clark (2014) note that racialized hashtags often act as a “point of entry” for black users who are interested in using Twitter, which may indicate a racialized process of assimilation into site usage that extends the within-group dynamics of “Black Twitter.” The rapid spread of hashtags that address issues

related to race – often from a humorous perspective – paint a portrait of Twitter as a meta-network for black users and a catcher for the digital diaspora. Twitter may be for many black users a place to tweet their perspectives - which are grounded in their offline reality - and to collectively combat digitally mediated racism. Clark (2014) is perhaps the most comprehensive work on this topic; this author analyzes and compares media depictions of Black Twitter and uses interviews with self-identified Black Twitter participants to establish a definition of the phenomenon as experienced by individual users. It concludes that for many self-identified members of Black Twitter, Twitter is a space to find meaningful, personal connection and make friends with geographically disparate others. It emphasizes the use of Twitter’s social affordances among participants and finds that they commonly connect with others who they “would be friends with in real life” (Clark, 2014: 70). While the point of entry may be hashtag or issue based, the result is a social network.

While many studies that address the intersection of race and the internet focus on access or site preference, this study will focus on within-site dynamics and will address personally subjective dimensions of online sociality such as community formation or identity building. Although studies of Black Twitter focus primarily on defining the conceptual boundaries of this phenomenon, this study will address implications of this literature by examining whether users who the profile of a Black Twitter participant are quantitatively detectable, and whether the existence of the Black Twitter narrative is indicative of broad racial differences in site use.

In addition to building conceptually on existing literature, this study methodologically contributes to work examining race and the internet. Much of the research in this area relies upon systematically collected survey data or interview data rather than incorporating digital trace data to explore race-related online usage trends. In regard to the study of Black Twitter, much of this

work is qualitative and focuses on the experienced of those who identify as participants in this phenomenon. This study intends to build upon this work using a novel data source that links Twitter user metadata (such as profile information, timelines and network connections) to self-reported demographic information. These data allow us to not only analyze behavior through digital traces, but to engage in statistical analyses that lend insight into broad, structural patterns in Twitter use as well. The following section will outline specific questions that motivate this work, provide a summary each chapter's focus, and summarize what these chapters combined contribute to our understanding of the racial dynamics of Twitter.

2. STUDY OBJECTIVES

This dissertation asks whether Twitter usage is patterned by race. Each chapter is grounded in the perspective that users live in a racialized social structure, and that if handed a flexible platform for communication may establish different patterns of use. To build on existing literature, **this study focuses exclusively on black-white differences in self-presentation, site use and network formation among Twitter users in the United States.** The majority of studies analyzing how race matters on Twitter are qualitative and tend to focus on the within-group dynamics of the phenomenon known as Black Twitter, rather than address the possible presence of racial divisions in Twitter that may promote marginalization and/or encourage users to seek community within this space. This dissertation differentiates itself from this previous work by utilizing unique data that link self-identified or crowdsourced-identified race from purposively sampled Twitter users to user metadata. These unique data sources permit quantitative exploration of broad, structural differences in Twitter use by user race.

At its foundation, online interaction is shaped by users' self-presentation strategies. Moreover, the facets of personal identity that a user curates and displays within online spaces is

influenced by their perception of that space. Self-presentation choices shape whether and how other users decide to interact with them (Hogan 2010). Given this, Chapter 2 explores racial differences in self-presentation online. It considers two facets of identity presentation – the disclosure of one’s categorical identity (or membership within a particular group – demographic or otherwise), and disclosure of one’s personal identity (disclosure of identifying data such as real name or location). It finds little difference in the categorical identity presentation of black and white users, but notes that black users are significantly less likely to share a real, searchable name on Twitter. Findings suggest that Twitter is a context in which minority users are visible and active, but that feelings of vulnerability may be carried into this space from offline contexts.

Extending self-presentation to its consequence, interaction, Chapter 3 focuses on whether there exist differences in the extent to which black and white users engage with Twitter as a space for social or content gratification. This chapter draws heavily on literature examining Black Twitter - or the notion that Twitter acts as a context in which black users may discuss race-related issues and connect with others who share their racial identity and/or interests. This literature highlights that popular, race-related hashtags emerge from tightly clustered networks of Twitter users (Sharma 2013), and that participants in Black Twitter use this space to establish friendships with people they would elect to connect with in real life (Clark, 2014). This stands in contrast to analyses of Twitter as an information distribution and broadcast space – a “21st century newspaper” (Bilton 2013; Wexler 2014) suited to analyzing topics such as election forecasting and disaster estimation (Kwak et al. 2010; Tumasjan et al. 2010; Vieweg et al. 2010). Results examine users’ friendship selection patterns, whether they exhibit network structures suited to interaction or information gathering, how often they retweet or tweet at others, and whether these mentions or retweets come from friends or verified accounts, respectively.

Findings suggest that while a noticeable portion of black Twitter users appear to participate in the social engagement patterns characteristic of Black Twitter, they are somewhat less likely to interact frequently with others overall and within their networks. White users, it finds, are more likely to use Twitter as an information gathering space, which has important implications for the use of Twitter as a broadcast tool. Friendship selection patterns do not vary by race, however, and differences in the likelihood of communicating are not statistically significant.

Appropriate site use on Twitter is co-negotiated and learned among peers. As described by Murthy (2012), the sparse profiles of Twitter mean that regular posting by users creates content, meaning and structure. While the affordances of Twitter constrains users' decisions, their understanding of how the site should be used – including what should be posted, how often content should be shared, how they should interact with others, and who they should connect with – these decisions are driven largely by the posted content of others. In order to contextualize how users understand and enact behaviors related to self-presentation Chapter 4 examines the composition of users' networks their network. Specifically, it examines the racial segregation of users' associative networks on Twitter. Using a random sample of Twitter users, it examines a.) the racial composition of their incoming, outgoing and mutual ties and b.) how these distributions compare to the distributions we would see if they selected friends without regard to race. Findings suggest that if accounts that do not display a discernable race (for instance, displaying a brand logo) are placed within their own category then Twitter has a diversifying effect on the networks of white users. Among black users, however, we note that many users appear to seek out connections with same-race others – particularly within the context of mutual ties. This is consistent with literature on Black Twitter, which suggests that

Twitter is a space in which black users may seek out and connect with like-minded others (Brock 2012; Clark, 2014; Florini 2014; Sharma 2013).

Together, these chapters paint a multifaceted portrait of how black and white users engage with Twitter as a social and informational space. They illustrate that Twitter is a context where - as suggested by research such as Grey (2017) and McIllwain (2017) – the salience of race is co-created with and ‘baked in’ to users’ experiences, resulting in the creation of a space that while not necessarily ‘unequal’ is experienced differently by users of different racial groups. Findings suggest that while the Twitter experience is in many ways race-neutral, a desire for personal privacy is more significant among black users, and for many black users Twitter acts as a context in which to find personal connections and build community.

3. NOTES ON METHODOLOGY AND TERMINOLOGY

The following paragraphs provide definitions for terms used throughout this study, a short explanation of why they were chosen and how they are used, as well as a reflection on the methods used for analysis and how they allow this study to stand out from other research on race and internet use. These notes are intended to help unify this work and provide context for the reader.

3.1 Clarification on Terminology

This study frequently refers to the term “affordances” in reference to the structure of online spaces. The term “affordance” is attributable to Kaufmann and Clément (2007), who use it to describe the tools that mediate the interaction between a user and an online interface. While users are required to co-negotiate the norms of an online social space (Papacharissi, Streeter, and Gillespie 2013), affordances help constrain and facilitate individual interaction, as well as shape

how users perceive an online space. A simple example of an affordance highlighted by Butcher and Helmond (2017) is the button provided by Twitter to denote liking another user's status. This button was originally shaped like a star, but Twitter later replaced it with a heart, which caused confusion among users who were worried that their "likes" would now mean something more intense and/or intimate than they intended. Overall, affordances are more than just site design - they shape capabilities of site use and in turn influence how users experience a site (Bricken, 1994). Affordances play a central role in discussions of Twitter use, because affordances within Twitter are highly flexible but constrained. Twitter provides contexts for self-expression (for instance, a field in which to provide a short bio or link to a personal website), and many of these fields are not required and/or are open-ended. They do, however, carry content or format limits (for instance, restricting the character count of user names).

Uses and Gratifications (U&G) is a term frequently used within media studies but that has been adapted to examine and explain online social life. The U&G framework is an audience-centered explanation of media consumption that suggests different media sources compete for individuals' attention and thus must be designed to fulfill particular aims (Han et al. 2017; Raacke and Bonds-Raacke 2008; Stafford, Stafford, and Schkade 2004). Although this framework was originally developed to explain patterns in the consumption of one-to-many mass media (Rainie and Wellman 2012), it has since been adapted to examine patterns in the use of communication media, such as mobile phones and social media spaces. U&G identifies several specific aims that drive social media use in particular. These aims include content gratification, or the use of media as a tool for consuming information or seeking entertainment, and social gratification, or the ability to connect with others and expand one's network/form community (Han et al. 2017). An individual may choose a particular site based on these motivations and

their perception of the site as a tool for fulfilling them. This framework is particularly useful for explaining divergent patterns of use that may emerge within Twitter – a structurally flexible social media space – given that varying narratives of Twitter use emphasize different social and information-based user motivations.

Finally, this study focuses primarily on black/white differences in site use. The reason for this is to situate findings along broader literature regarding race and site use, which often addresses black/white differences – often in the context of Black Twitter. It also denotes Black Twitter as a proper noun. Despite the fact that the conceptual boundaries of this phenomenon – including who participates and how they interpret their experience within the group - remain in question (see Clark, 2014) – existing work does consistently identify novel patterns of Twitter use that characterize the experiences of a subset of black users. Also, this study follows convention proposed by Clark (2014) and refers to Twitter users as “black” rather than African American in order to ensure identity inclusivity among these users.

3.2 Notes on Methodology

Two chapters of this study relies on a unique data source – Twitter data linked to offline self-reported demographic information. These data were collected by the Center for the Study of Health and Risk Behaviors at the University of Washington, funded by the National Institute on Alcohol Abuse and Alcoholism Grant (grant numbers 1R01AA021379-01A1 and 1R21AA021767-01A1) by lead primary investigator Dr. Melissa Lewis. The data represent an aggregate of the surveys associated with each grant. A detailed explanation of the sampling strategy and composition of the sample can be found in Chapter 2. Although these data hold unique opportunities for studying health behavior as it relates to social media use, this study uses only a select number of basic demographic indicators. It does not contain any personally

identifying information (i.e. name or address) and uses the Twitter handle as the sole link between the demographic responses and social media metadata. Data were updated monthly and stored in a secure database, but Chapters 2 and 3 rely on a single snapshot from June 2016.

The third chapter relies on a random sample of Twitter users collected based on common keyword usage and their network of personal ties. For this sample, demographic information is estimated using Amazon's Mechanical Turk (McCormick et al. 2015). Power calculations for this chapter indicated that it required a larger sample than what was available through the linked survey data. Thus, a random quota sample of users – referred to in Chapter 4 as egos – and the complete network ties of each ego were collected via Twitter's REST API.¹ Within each ego's network, a maximum of 65 randomly selected ties were retained. Subsampling networks, while a costly decision, was done to ensure project scalability due to the cost associated with using crowdsourcing to label users.

Although this research utilizes digital data, it relies heavily on statistical analysis approaches rather than computational approaches. Studies that use digital trace data – such as social media – typically sample data directly from the platform of interest. Depending on the sampling frame, this impacts the generalizability of results. For instance, a researcher examining a social phenomenon on Twitter using keyword sampling can only make claims about users who engage with that platform and have chosen to discuss that topic using such keywords within the designated sampling time frame. The sample for chapters 2 and 3 of this study, however, is drawn from the population of the United States rather than a social media platform. Sampled users are then linked to social media accounts through handles. The ability to link digital data to survey responses introduces a new paradigm in analysis (Spiro 2016) – one that, given its ability

¹ For more information on Twitter's public REST API, see <https://dev.twitter.com/rest/public>

to make assumptions about the population from which the data are drawn, can utilize statistical analysis but nonetheless requires the researcher to manage unstructured or semi-structured data. In this way, this study stands out from other digital trace-based analyses of interaction and behavior on Twitter.

Readers may note that this study uses a small samples size for Chapters 2 and 3 (under 300 respondents). While this is not the only methodological choice available, I view the use of a small, purposively sampled respondent base as more ethical than the use of a larger, randomly sampled group of users whose race is systematically estimated due to the ability to exercise standard human subjects research protocols such as informed consent. Unlike Chapter 4, which measures public, objective information, Chapters 2 and 3 investigate subjective, personal topics. Furthermore, the ability to link racial *identity*, which is more nuanced and complex than the racial estimates of a classifier, to analyses of user behavior lends this study valuable depth.

Finally, it is important to note that because this study uses digital trace data in the form of profile information, timeline information and network ties rather than self-reported behavior patterns, it can only make claims about how users *use* Twitter, not how they *experience* Twitter. While discussions may speculate on the subjective meanings of patterns observed, qualitative evidence is needed to support these claims. Future work may explore this possibility.

CHAPTER 2: RACE AND SELF-PRESENTATION ON TWITTER: ANALYZING DIFFERENCES IN THE DISCLOSURE OF CATEGORICAL AND PERSONAL IDENTITY INDICATORS

ABSTRACT

Online self-presentation involves selecting and curating visual and textual cues that convey an intended identity. Users' online self-presentation strategies help manage the nature and content of current and anticipated interactions. Given this motivation, it is likely that decisions about online self-presentation are guided in part by feelings of marginalization and/or vulnerability – particularly among users who occupy underrepresented groups offline. These concerns may influence users to display categorical identity indicators as a means of staking identity claims within a particular space, or withhold categorical and/or personal identity indicators as a means of protecting against bias or harassment. Using a novel dataset that links self-reported demographic information to handles from Twitter, this study explores the relationship between a user's race and their probability of sharing a.) categorical identity indicators, including whether they include a profile photo that allows others to evaluate their race and whether they express their racial identity in their personal narrative and b.) personal identity indicators, including whether they disclose a real location or a searchable full name. It discusses whether users on Twitter - a semi-anonymous site with a flexible user structure – engage in equal patterns of disclosure or whether underrepresented groups exhibit behaviors potentially influenced by perceptions of marginalization or vulnerability. It concludes that Twitter is a context in which minority users are visible and active, but that feelings of vulnerability may be carried into this space from offline contexts.

1. INTRODUCTION

Self-presentation within online spaces involves curating visual and textual cues through which users may communicate to others selected information about their identities, characteristics and group affiliations. Rather than being enacted through performance, self-presentation online is a relatively static process that involves the collection, presentation and maintenance of personal artifacts (Hogan 2010). The version of ‘self’ presented by the user online may parallel key elements of the users’ offline self, but it also may withhold, extrapolate, or even fabricate components based on the user’s perceived or imagined audience (Bargh, McKenna, and Fitzsimons 2002; Courtney Walton and Rice 2013; Marwick and boyd 2011; Turkle 2011).

Online self-presentation is highly related to self-disclosure, as it requires users to regulate their personal boundaries (Derlega and Chaikin 1977) and influence anticipated interactions. For users of social media sites who identify as members of minority and/or oppressed social groups, decisions about online self-presentation are likely tied to awareness of offline marginalization and vulnerability. In particular, revealing information about one’s underrepresented identity may be a means of staking claim within an otherwise homogenous space, though on the other hand concealing selected aspects of one’s identity may be a strategy designed to prevent biased interactions or avoid online harassment. While Kolko, Nakamura, and Rodman (2000) document attempts to interject race into anonymous online spaces and Grasmuck, Martin, and Zhao (2009) identify “resistance to the racial silencing of minorities by dominant color-blind ideologies of broader society” through Facebook profiles, there are nonetheless documented incidents of users expressing unease over presenting as a racial minority online. (Condis 2014) discusses users’ anxiety over a video game in which users are unable to control the default race of their avatar,

and (Nesbit-Golden 2014) describes ‘masquerading as a bearded white hipster’ in order to speak freely on Twitter. Users who feel vulnerable may also take steps to withhold personally identifiable information that may link them to other accounts or to their offline presence. Given their perception of the space and the tools the space offers, they may also withhold disclosure of their underrepresented identity.

When considering self-presentation patterns that may be associated with expressions of perceived marginalization and vulnerability, identity information shared by users may fall into one of two categories: categorical and personal. Categorical identity information refers to information that discloses a user’s group affiliation – in this case, their racial identity. The decision to withhold or express categorical identity indicators may be linked to marginalization through claims making, and to vulnerability if the user perceives hostility to their categorical identity within a particular space. Personal identity information refers to private or semi-private indicators linked to an individual’s offline identity – such as their real name. The decision to withhold or express these identity indicators may be linked to feelings of vulnerability and the desire to establish boundaries between one’s ‘self’ within an online context and their ‘self’ in other online contexts or offline.

While some profile-based sites require a significant amount of categorical and personal identity disclosure, Twitter profiles are flexible in what they allow users to display. In addition to this, the asymmetric or directed social ties on Twitter mean that users have less control over who views and/or interacts with their profile (Courtney Walton and Rice 2013). Taking these factors into consideration, this study analyzes racial variation in self-presentation on Twitter. It acknowledges past work addressing race and self-presentation patterns within nonymous and anonymous social media spaces, discusses what makes Twitter a unique social media space in

which to observe these processes, and analyzes racial differences in four key profile indicators: the probability of sharing a photo through which others may guess your race, expressing racial identity through a personal narrative, disclosing a real location, and disclosing a searchable full name. It concludes by discussing how feelings of marginalization and vulnerability may be associated with differences in self-presentation within this space.

1.1 Evolution and Basic Principles of Self-Presentation

Although communicating information about one's identity to others is important within an increasingly social world wide web, this display is less of a performance (Goffman 1959) and more of a carefully curated "exhibition" of personal artifacts (Hogan 2010). Prior to the emergence of social media- driven Web 2.0, interaction online took place largely within anonymous contexts (Ellison and Boyd 2013). Early analyses of popular multi-user domains (MUDs) examined how the anonymity of online spaces impacted users' freedom of expression in constructing an online self (Grasmuck et al. 2009; Robinson 2007; Turkle 2011). These studies found that while some users chose to present themselves in truthful ways despite the anonymity of the site, the anonymity of MUDs allowed users to create and/or explore facets of their personalities and identities that are hidden or non-existent offline (Turkle 2011).

Following the proliferation of social media sites in the early 2000s, a number of studies analyzed self-presentation and information disclosure strategies within less anonymous, profile-based social media spaces where users are required or expected to provide potentially identifiable personal information and tend to establish connections with users who are familiar with their offline personas (Hogan 2010; Lampe, Ellison, and Steinfield 2007; Tufekci 2008). Facebook – reporting 1.6 billion monthly active users as of December 2016 – is perhaps the most well-known of these sites (Facebook, 2015.). (Acquisti and Gross 2006) find that while users are

not completely aware of the audience to which they present their information on Facebook, they are nonetheless willing to disclose a significant amount of information about their offline lives – but only that which they perceive as inoffensive to those most salient in their personal networks. Zhao, Grasmuck, and Martin (2008) note that displaying personal characteristics is an important goal within profile-based spaces, although within these spaces users have a tendency to “show rather than tell” their identity traits to others.

Overall, research demonstrates that self-presentation online tends to follow three primary principles. One is that self-presentation online is thorough but relatively static and asynchronous; it is curated rather than performed (Hogan 2010). This asynchronicity allows users significant consideration over what sort of ‘self’ they would like to present to their online audience, and what cues are needed to convey this self. While the information and cues presented can be changed, a user may be unable to change them quickly in order to adapt to an encounter with other users. Also, social media users need to craft a persona that appeals to an audience that is co-present at all times and may include individuals from disparate segments of one’s life and/or strangers – what (Marwick and boyd 2011) refer to as “context collapse.” Finally within the context of profile-based sites, users have a tendency to “show rather than tell” key elements of their personal identities (Zhao et al. 2008). Rather than narrating their identities through text, users may engage in more subtle methods of disclosure, such as selecting a profile photo that obscures or hides aspects of their identity, or writing an ‘about me’ section similar in structure to those of their perceived peers (Grasmuck et al. 2009). These concepts are central to understanding factors that guide self-presentation within online spaces, as well as why divisions between groups in regard to self-presentation strategies may exist.

1.2 Self-Presentation and Self-Disclosure: Managing personal boundaries, anticipated interactions

Self-disclosure – or decisions regarding self-presentation that are tied to personal privacy – is an important component of online self-presentation. Users' online self-presentation habits may be thought of as management strategies for negotiating personal boundaries. Users are aware that others may connect and/or interact with them within this space, and they groom their profiles to guide who may engage in these interactions and how they might interact. Key components of identities may be strategically presented and concealed online, and users must decide whether and to what extent their offline self – in regard to identity, demographic traits, or intersections of the two – may be shared with their online connections. Overall, while personal authenticity is always mediated by context (Peterson 2005), the mediated authenticity that occurs online is tied to privacy and anticipated interactions.

For users who identify with groups that are marginalized and/or socially vulnerable, these decisions may carry added complexity. Indeed, strategically concealing and revealing components of one's offline identity may be grounded in perceptions of exclusion or vulnerability both online and offline. Users may have a desire to balance community formation and outreach with awareness of the potential to experience interactions tinged with bias or harassment. Stated simply, displaying personal traits allows users to connect with others who share these traits, but the potential for negative interactions tied to these traits – possibly in the form of online harassment, shunning, or subjection to others' bias – may influence users to withhold them. The following sections will describe the role of marginalization and vulnerability on users' online self-presentation decisions and discuss how these decisions may play out. As stated by Kolko (2002), providing tools for online expression allows platform designers to wield power over users – power that may be grounded in offline inequality - and

self-presentation is a way for users to manage and/or mitigate this power. This power management may be more important for some users than others.

1.3 Self-Presentation and Marginalization

One factor that may shape users' online self-presentation strategies is their perception of being marginalized online and/or offline. Omi and Winant (2014) state that the identification and perpetuation of race as a 'marker of difference' is a core component of what makes race a factor along which individuals are marginalized (Omi & Winant, 2014: 107). While this applies in many offline contexts, it also strongly influences the dynamics of online social life. Analyses of early, anonymous online social spaces – such as MOOs or MUDs – highlight that while these spaces are popularly viewed as 'equal' contexts in which personal differences are collapsed, this collapse was sometimes viewed as a form of marginalization in which whiteness was an unspoken default (Kolko 2002; Nakamura 2007). Kolko (2002) suggests that in light of feelings of marginalization, some online users did find ways to communicate race – such as creating characters in role playing games (RPGs) that share visible racial identity indicators such as skin color – but that this sort of expression was sometimes viewed as confrontational.

As profile-based social media sites became popular, however, the expression of racial identity became more common and less subversive to the status quo. Affordances like profile photos and "about me" segments make sharing key components of offline identity and demographic traits easy. This does not mean, however, that feelings of marginalization are not carried into these sites or that whiteness did not continue to be perceived as the unjust default. Grasmuck et al. (2009) for instance, found that on Facebook, ethno-racial identities are salient and articulated. Young, racial and ethnic minority users included in their study tended to not only express their racial and ethnic identities explicitly, but groom their profiles to more closely

resemble those of users who share their salient identity traits – possibly, the authors claim, as a way of resisting the long-standing silencing of diversity in online spaces. They also, on occasion, shared interest in books, movies and media that affirm these identities.

Overall, existing work suggests that feelings of marginalization do infiltrate online spaces and are expressed more commonly through resistance – such as finding ways to explicitly or implicitly share categorical identity indicators – rather than acquiescence - through hiding or lack of explicit self-disclosure. By claiming race through their self-presentation strategies, users may speak out against the flattening of diversity online. Within anonymous spaces, this may be through explicitly sharing one’s racial identity. Within nononymous spaces, users may achieve this by crafting a profile in which one's racial identity is communicated through tools or affordances provided by the platform – such as a profile photo or an 'about me' narrative.

1.4 Vulnerability and Self-Presentation Online

In the context of this study, vulnerability refers to feelings of stress or perceived personal threat through negative encounters with others. These negative encounters can take many forms in regard to race – ranging from severe negative encounters with overt discrimination or less acute yet persistent encounters with bias and microaggressions. Encounters with bias are known to generate stress in the workplace (Hughes and Dodge 1997; Neckerman and Kirschenman 1991) and result in more frequent punishment in school settings (Skiba et al. 2002). Overt discrimination is well documented within both online and offline contexts and may lead to feelings of stress and fear for one’s personal safety (Williams et al. 1997; Williams, Neighbors, and Jackson 2003). Overall, protecting oneself from vulnerability online – in the context of this study - is to protect oneself from negative, potentially harmful interactions.

As stated by (Kolko 2002), the way a user constructs their profile shapes how other users interact with them. For users who may experience social vulnerability in the form of prejudice, bias or active oppression in offline contexts, these patterns may also influence online behavior. Users elect to present or withhold personal information online, and awareness of social vulnerability may incent them to hold back information that may render them vulnerable. This may be particularly important in sites such as Twitter, where ‘context collapse’ is a significant consideration and controlling one’s audience may be difficult (Courtney Walton and Rice 2013; Marwick and boyd 2011).

Some research has explored the link between social vulnerability and self-presentation as it relates to gender. While early, anonymous online contexts appeared to be spaces where offline identity and/or demographic traits would not influence users' interactions, a 2005 Pew study of gendered internet use found that gender-based harassment accounted for an 11% decline in the use of chat rooms among women (Fallows 2005). Gender also influences the dynamics of Twitter, as was evidenced by the #GamerGate controversy – a wave of female harassment in the 'gamer' community that spread rapidly on Twitter in 2014 – revealing that sexism profoundly influenced online social dynamics in ways that put many women at risk (Bartlett et al. 2014).

Looking beyond gender, writer, blogger and social commentator Jamie Nesbitt Golden, for instance, published a widely circulated piece on *XO Jane* about her negative experience posting opinions on Twitter as a black woman and her decision to change her visible identity to that of a white male as a means of halting potential harassment (Golden, 2014). While this incident is anecdotal, it nonetheless illustrates that online harassment is not associated with gender alone. Indeed, intersectional identities may be the most at risk within open, online spaces.

While perhaps less overt than harassment, users may also encounter inequality through bias online. Expressions of racial bias are well documented in offline contexts on both an interpersonal and institutional level (Omi and Winant 2014). On an interpersonal level, negative expressions of bias may manifest as microaggressions or “brief, everyday exchanges that send denigrating messages to certain individuals because of their group membership” (Sue 2010). On an institutional level, the negative effects of bias can be seen through interactions between minority citizens and law enforcement in the United States (US) (U.S. Department of Justice, 2014; Tyler, 2005). While existing work documents a lack of racial inclusivity and acceptance in online contexts (Kolko 2002; Nakamura 2007), little scholarly work has been done to unpack the ways in which the presence of bias online impacts users’ behavior and self-presentation habits, and whether users take measures to avoid these negative experiences. Users online experience, however, suggests that users are aware of and do avoid bias. Condis (2015), for instance, documents that when users of an online multiplayer game’s avatars were automatically assigned a particular race, white users who received racial minority avatars expressed anxiety over the way others may treat them within the game.

When crafting self-presentation choices with vulnerability in mind, the decision to hide identifiable information may be prudent. If a user encounters – or anticipates, based on offline experiences – harassment or bias online, one clear course of action to protect themselves may be to create a boundary between their offline and online identities. They may choose to design their profile in a way that does not verbally or visually communicate their racial identity. They may also elect to hide identifiable information – such as their real name, birthdate, or place of residence. It may be more easily facilitated on some sites than others. Facebook, for example, requires users to provide a real name when registering their account (Phillips 2015; Wittkower

2014). However, sites like Twitter and Instagram allow user to craft profiles that effectively obscure key details of their offline characteristics and identities.

1.5 Operationalizing Anticipated Behaviors: Categorical and personal identity indicators

Users engage in self-presentation online as a means of communicating key identity features and directing current and future interactions with other users. For users who belong to oppressed and/or marginalized social groups, however, the boundary maintenance associated with online self-presentation strategies may be particularly important. The previous sections describe factors that may influence self-presentation decisions among minority users – perception of marginalization and vulnerability. When considering the self-presentation habits that may arise in response to these feelings, two categories of indicators stand out: categorical identity indicators and personal identity indicators.

Categorical identity indicators reveal one's affiliation within a particular group. In this instance, categorical identity indicators are those that explicitly or visually aim to communicate one's racial identity. When considering race on Twitter, the decision to disclose categorical identity indicators may be tied to feeling of marginalization and a desire to react against the default whiteness of online spaces (Grasmuck et al. 2009; Kolko 2002). Likewise, the decision to withhold this type of categorical identity indicator may be linked to perceptions of vulnerability and anxiety about intolerance within a particular context (Nesbitt-Golden, 2014; Condis, 2015). Personal identity indicators, on the other hand, are those that disclose key elements of one's 'true' offline self. This may include the provision of a searchable name or mentions of where one lives. The decision to withhold these indicators is likely tied to a desire to maintain boundaries between one's 'self' in a particular online context and one's 'self' in other online contexts or offline.

1.6 The Importance of Site Context

One factor that strongly influences the way in which users craft their online identities is the infrastructure of the social media platform itself. Sites are shaped not only by the norms and patterns of use within them, but also by the affordances – or tools that mediate the interaction between a user and the online interface (Kaufmann and Clément 2007) – within them. Summarizing the relationship between site design and site experiences, (Bricken 1994) states, "In a virtual world...We can create any imaginable environment and we can experience entirely new perspectives and capabilities within it. A virtual world can be informative, useful and fun; it can also be boring and uncomfortable. The difference is in the *design*" (363). Differences in site design may have the potential to flatten demographic and identity-based differences – as was the case within anonymous online spaces. However, they may also offer users the opportunity to craft detailed online selves that are exploratory but highly congruous with their offline traits – as may be seen within Facebook. The divide between offline and online is neither stark nor definite and offline traits are likely to find their way online in some capacity (Kolko, Nakamura and Rodman, 2002); structure and site affordances help guide this online-offline interaction.

Due to its capacity for explicit and implicit self-presentation, Twitter is a unique space. On Twitter, users have the opportunity to create profiles of varying detail, connect with others both within and outside their offline social network, and make their profiles searchable by others. Users are not required to provide real names, and they do not always choose to “be their own avatar,” as is often the case with nonymous online spaces (Wittkower 2014). Additionally, because connections on Twitter can be established by just one of the individuals involved (i.e. they represent direction social ties), users’ understanding of their audience varies and may influence what they choose to post in interesting ways (Marwick and boyd, 2011). In other

words, the structure of Twitter allows users to craft online personas that strategically hide and reveal components of their offline selves in complex ways.

1.7 Chapter objectives

This study asks whether there are significant differences in the probability of black and white users displaying select categorical and personal identity indicators on Twitter. This study considers whether, in the context of a Twitter as a semi-anonymous space, racial minorities choose profile features that convey their categorical identity at rates equivalent to that of their white counterparts. Given that Twitter is a profile-based site, it will consider whether minority users are likely to express their racial identity by a.) displaying a profile photo that allows others to reasonably assess their race and b.) crafting their ‘about me’ profile narrative to include an expression of racial identity (e.g. “Political science and pre-law student. Member of the University Black Student Union.”). The presence of differences has important implications for the extent to which users consider or rationalize disclosing this information on Twitter; if minority users disclose this information at a greater rate, then Twitter may be a context in which to react against default whiteness online. If the rate is lower, perception of vulnerability may be to blame. In regard to personal identity indicators, this study will consider whether white and minority users are equally likely to provide moderately identifiable personal information – specifically, the disclosure of a personal location – or strongly identifiable personal information – specifically, a real first or full name – within their profiles. Results will shed light on whether minority users may experience feelings of marginalization and/or vulnerability within this space.

It is important to note that this study does not examine the extent to which users’ experience feelings of marginalization or vulnerability on Twitter. This type of endeavor is best left to

qualitative research. It does, however, draw upon existing literature to anticipate patterns of patterns of self-presentation explored within existing literature regarding online self-presentation operationalizes these patterns into measurable outcomes unique to Twitter. These outcomes fall into two categories - personal and categorical identity indicators. This study uses unique quantitative data to examine racial variation in the expression of both.

2. DATA AND ANALYSES

This study uses a combination of regression models and content analysis to analyze whether there exist significant differences in the probability of black and white users to share categorical and personal identity indicators. The ability to perform this analysis depends on the availability of a unique dataset that links Twitter behavior to self-reported demographic characteristics. A good deal of existing research has sought to explore the relationship between users' demographic characteristics and self-presentation patterns qualitatively (Grasmuck et al. 2009; Kolko et al. 2000; Nakamura 2002, 2007). The presence of limited demographic information such as age and gender on Facebook also opens opportunities to study these trends. However, on Twitter users are not required to disclose any demographic information, and variable profile content means that some users may provide no indication of their age, race/ethnicity or gender through their profiles. Indeed a large body of work exists attempting to infer such characteristics from textual content (Al Zamal, Liu, and Ruths 2013.; Beretta et al. 2015; Bergsma et al. 2013; Burger et al. 2011; Chen et al. 2015; Culotta, Kumar, and Cutler 2015; Longley, Adnan, and Lansley 2015; Mohammady, Ehsan and Culotta, Aron 2014; Pennacchiotti and Popescu 2011b, 2011a; Rao et al. 2010); this work is open to improvement, and opens unique ethical questions about group privacy (Floridi, 2014). The ability to explicitly

link self-reported demographic information to users' profiles and metadata allows one to explore the relationship between user demographics and self-presentation patterns quantitatively and without accompanying uncertainty present in demographic inference methods. This approach may uncover systematic patterns in self-presentation that qualitative research has not captured.

2.1 Survey Population

Data used in this study were collected by the Center for the Study of Health and Risk Behaviors at the University of Washington, funded by the National Institute on Alcohol Abuse and Alcoholism Grant (grant numbers 1R01AA021379-01A1 and 1R21AA021767-01A1). Permission to use these data for this study was granted by project lead Dr. Melissa Lewis. The data represent a composite of the surveys associated with each grant. The first survey relied on a variety of recruitment efforts collect a sample of young adults in the U.S. aged 18-20.² Recruitment methods included many different techniques such as online recruiting, advertisements in-print, and in-person recruiting. Of the 5,480 respondents who participated in the screening survey, 2,803 met the minimum eligibility criteria, a stratified sample of 1,145 were invited to participate in the baseline survey, and 1,002 completed the survey. The second survey – a collection of individuals aged 18-25 in the U.S. – used more rigorous selection criteria.³ Of the 10,242 individuals who were recruited into the survey, 860 met the minimum eligibility requirements, 457 were asked to complete the baseline survey. Within both surveys, respondents were asked to provide Twitter handles both before and after answering a number of

² The minimum eligibility criteria for this survey was as follows: age 18-20, have a birthdate that is consistent with their age, reside in the USA, have an email address, correctly answer the check questions (select 4 for what is 2+2, and select the color green), provide one phone number, and provide a first and last name.

³ The minimum eligibility criteria for this survey was as follows: select 4 for what is 2+2, select the color green); not be in a monogamous relationship; have had vaginal or anal sex after drinking and not used a condom in the past month; have had an alcoholic drink at least once a week on average over the past 3 months; and have had one episode of heavy episodic drinking (4+/5+ drinks for women/men in one sitting) in the past month

survey questions about basic demographic characteristics and drinking behavior.

The racial distribution of the overall sample of respondents, the sample of respondents who elected to provide a Twitter handle, and those withheld this information is approximately the same (19.6-21.1% Black or African American, 47.8-48.9% Caucasian/White, 13.0-15.4% Asian). Marginally more female users elect to provide a Twitter handle than withhold it (former sample is 55.1% female and the latter is 52.5% female), but this difference is not significant. Likewise, the sample of users who have Twitter account and elect to provide Twitter handles is marginally more heterosexual (84.5%) than the sample of users who withhold this information (81.1%), but this difference is not significant. Overall, there is no obvious demographic selection effect determining who does and does not provide a Twitter handle within this sample. Users' handles were linked to valid accounts by hand – a critical step given the possibility of misrepresentation in these data. A snapshot of users' Twitter account metadata from June of 2016 was used for this analysis. In total, 278 unique users – 192 users from the first survey and 86 users from the second survey – are included in this study.

2.2 Survey Demographic Indicators

While the majority of users within this sample are white there is nonetheless a significant amount of racial diversity within the sample. The sample is divided by sex and gender fairly evenly. Users range in age from 18 to 26. While this is a restricted age range and is a limitation, we nonetheless note that this sample allows us to generalize about a large portion of Twitter users. Duggan, Ellison, Lampe, Lenhart and Madden (2014) find that 31% of Twitter users are between the ages of 18 and 29, and it may be said that users within this age group contribute significantly to the normative climate of Twitter. Given this limitation, however, we choose to focus on gender and race as focal variables in this study.

Table 0.1: Self-Reported demographic characteristics of the sample (N=278)

Characteristic		Percent
Gender	Male	39.6
	Female	60.4
	Transgender (FTM)	0.7
Race	Black	19.1
	White	53.9
	Asian	10.4
	Other	16.2
Sexual orientation	Straight/heterosexual	85.9
	LGBTQ+	14.0
	Range	Mean (sd)
Age	18-26	20.1 (1.9)
	Range	Median
Income	\$1-99,999	\$2,000-\$3,000

2.3 Twitter User Metadata

Information from each user profile is collected via Twitter’s REST API and stored in a secure database twice weekly. Initial data exploration indicates that profile content is fairly static – over 80 percent of users did not change their names and over 70 percent of users did not change their profile photos between January 2015 and March 2015. Therefore, a snapshot of time provides an acceptable vantage from which to view users’ self-presentation habits; all Twitter data used in for these analyses reflect were collected in June of 2016

2.4 Twitter Profile Indicators

Demographic data from the surveys are linked with profile metadata from Twitter based

on the handles provided by respondents.⁴ Within this metadata, indicators were selected and/or constructed that reflect a variety of presentation choices (see Table 2.2). Real location and identifiable name are qualitatively coded binary indicators that measure whether or not the user lists an actual global location that may be the user's home location, and whether or not the user includes a searchable first or first and surname via either their screen name and/or name.

Occasionally first and surname will be communicated in separate profile fields; for instance, screen name may be @john1999 and user name may be Mr. Doe. Qualitative coding considers both fields in conjunction with one another. Listed website indicates whether the user volunteers an alternative personal webpage in the field Twitter provides for this information. Geo enabled, protected and default profile are all binary indicators available for each user through the REST API. The first indicates whether the user geo-tracks their tweets, the second indicates whether their tweets are public, and the third indicates whether they have customized the colors and background of their profile. Given that an estimated 11% of all Twitter users have protected accounts (Beevolve, 2012), we note that the proportion of users with protected accounts in our sample is very small. Number of friends and number of followers capture the network size of the user at the time of data collection.

Presentation of race/gender/is person in profile photo is a binary indicator coded based on crowd-sourced evaluations of user photos from workers on Amazon's Mechanical Turk (AMT) – a platform through which human workers perform small tasks in exchange for small payments. Each user's isolated profile photo was shown to three AMT workers (Turkers), who were asked to categorize the users as male/female and black/white/Asian/Hispanic/other. Workers were also

⁴ Note that within descriptive tables and subsequent analyses two outlier users were removed. One users had follower network approximately 6 times as large as the next most active user, and another tweeted approximately three times as frequently as the next most active user. Sensitivity analyses indicate that the inclusion of these users does not significantly change results, but we believe they are nonetheless not indicative of the typical user.

asked to determine whether the photo displayed a person, a group, something other than a person, or nothing at all (i.e. a broken photo link). “Cannot tell” options were provided for both questions. In regard to whether race is displayed, photos with the race identification “cannot tell” and group photos for which the Turkers could not agree on race were coded 0 and all other categories were coded 1. Note that this measure does not reflect whether Turkers can accurately guess the user’s racial identity based on their profile photo, but rather whether they were able view the photo and provide an assessment of the user’s race. This measure focuses less on the way in which other users may react to or interpret their photo, and more on the intention of the user to post a clear, visible photo of their face and/or body.

Table 0.2: User profile data

Indicators	Percent Yes
Real Location	49.4
Listed Website	23.7
Real first name	86.7
Real full name	64.7
User Photo: Race is displayed	83.1
User Photo: Is person/group	84.2
Geo Enabled	50.4
Protected	19.7
Default Profile	32.1
Valid 'about me' entry	68.3

3. RESULTS

These results explore racial differences in self-presentation strategies on Twitter. They focus primarily on black/white differences in self-presentation, and pay particular attention to

differences that in the presentation of categorical and personal identity indicators. Analyses addressing categorical identity indicators measure whether there is a significant difference between the probability of white and black users to include a profile photo through which others may assess their race, and whether explicit mentions of racial identity appear within users' bios. Analyses of personal identity indicators analyze whether black users are less likely than white users to include moderately identifiable information – specifically, location – or highly identifiable information – specifically, a real full name – in their profile. Both sets of findings control for other demographic factors – including age, gender and sexual orientation - and Twitter activity patterns under the assumption that highly active, well connected users may behave differently than low activity, isolated users. While hypotheses are drawn from expectations associated with marginalization and vulnerability, these findings do not propose to make a direct, causal link between self-presentation habits and profile displays. They do, however, provide an illustration of how profile indicators that may be associated with these considerations vary by user race.

3.1 Categorical Identity Indicators

Prior work suggests that minority users react against the default whiteness of online spaces by explicitly sharing their race through images and narratives. Twitter users vary in regard to whether they choose to “be their own avatar” (Wittkower 2014) and select a profile photo that a clear image of their actual self. This analysis will first consider whether all users are equally likely to display race in their profile photo or whether minority users, having perceived that Twitter is a space where race is flattened or erased, are actually more likely to elect to have a clear photo of their body and/or face through which others may assess their race. Second, because existing work indicates that within profile-based social media spaces users may react

against marginalization by including information about their racial identity in their personal narratives, this analysis notes whether users share this information in their profile descriptions.

3.1.1 Displaying Race in Profile Photos

If users perceive that Twitter, as a semi-anonymous space, erases diversity then they may react against it by being more likely to select a photo of themselves through which others can assess their race. In this scenario, black users may be more likely than white users to visibly 'claim' their race visually within their profiles. If they feel vulnerable due to their race, however, they may be less likely to display their race through their profile photo. However, bivariate analyses indicate no significant relationship between a user's race and whether others can assess their race through their profile photo ($X^2=3.42$, $p=0.325$).

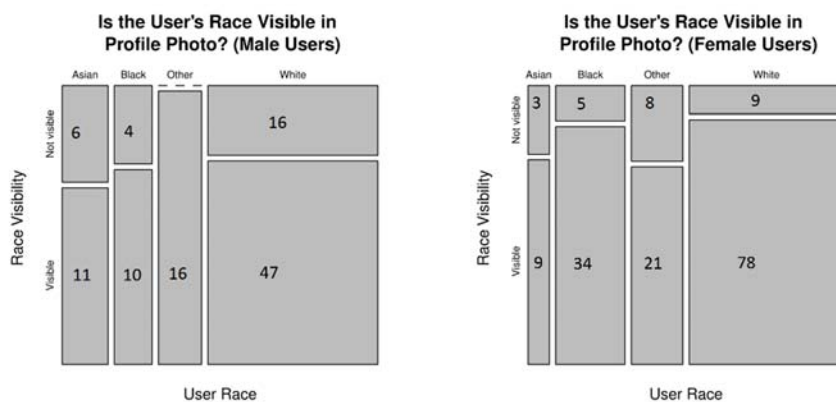


Figure 0.1: Distribution of choosing profile photo through which others can assess your race , by race and gender

Figure 2.1 displays the distribution of visible race within profile photos by participant gender and race. It illustrates that black and white users select photos in which their race is visible in relatively equal proportions, regardless of gender. Interestingly, we note that users who report their race to be Asian or "other" (which includes multiracial, Native American, Pacific Islander or Native Hawaiian, or any category not otherwise specified) appear to be more likely to

display their race. This is especially true of male users. Interestingly, results from a logistic regression analysis in Table 2.2, however, indicate that the factor most strongly associated with a user's probability of having a profile photo in which their race is visible is the number of followers that the user has. It appears that the larger a user's follower network, the more likely they are to physically "face" an audience, regardless of gender or race.

Table 0.3: Probability of choosing profile photo through which others can assess your race

		Estimate (St. Error)	P-value
Intercept		3.601 (1.869)	0.065 .
Race (ref: Caucasian/White)	Asian or Asian American	-0.643 (0.492)	0.191
	Black or African American	-0.430 (0.462)	0.352
	Other	-0.107 (0.482)	0.824
Gender (ref: Female)	Male	-0.506 (0.334)	0.129
Sexual orientation (ref: LGBTQ)	Straight/Heterosexual	0.317 (0.442)	0.474
Age	Numeric	-0.127 (0.092)	0.162
Income	Above median	0.012 (0.360)	0.972
Activity	Followers Count	0.004 (0.001)	0.003**
Protected	True	0.779 (0.495)	0.116

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

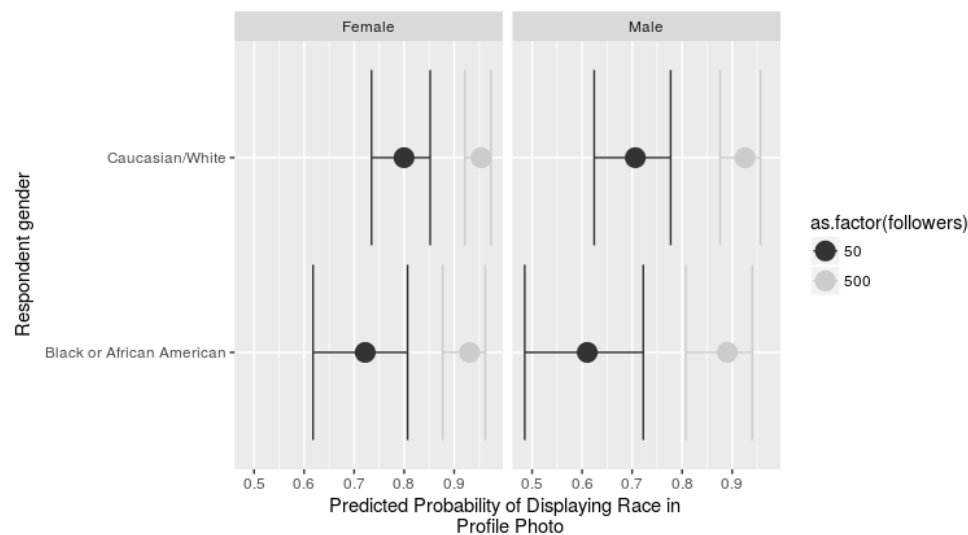


Figure 0.2: Predicted differences in profile photo content by race

Turning our attention back to black/white differences in self-presentation, we note that black users are on average less likely than white users to provide a profile photo through which others can assess their race. Similar racial differences may be observed as we vary both follower count and gender (Figure 2.2). These differences, however, are not significant between white users and users of any racial minority group.

Overall, these results do not support the hypothesis that minority users are more likely to share a photo through which their race is visible as a potential reaction against the “dominant color-blind ideologies” of society and/or online spaces. It also suggests that concerns about bias or discrimination may not systematically encourage minority users to physically hide online. Despite the fact that Twitter users have the option to reveal or conceal aspects of their physical offline self, most users elect to provide a profile photo in which they and their offline traits are visible, regardless of race. It could be that Twitter is a safe, inclusive space for users to simply express that they appreciate how they look. These results invite further, qualitative investigation into what Twitter users elect to share as their profile photo and why these decisions are made.

3.1.2 Including racial identity in personal narrative

Existing work has found that even within nonymous websites, users who identify with racial minority groups assert their ethno-racial identity in the form of personal narratives and stated interests (Grasmuck et al. 2009). The room to engage in personal narrative within a Twitter profile, however, is limited. Profiles do not allow users to select favorite books, movies, music or personal quotes. Given this, this analysis tests whether users mention or imply their racial identity within the short, personal narrative space provided by Twitter – the profile description. The profile description field on Twitter is short, situated beneath the user’s name and handle, and is intended to convey key identity elements of the user’s identity. See Figure 2.1 for an example of the Twitter profile description.



Figure 0.3 Example of Twitter’s description field

Each user's profile description was hand coded to determine whether it provided some indication of the racial identity of the user. Note that results are moderately altered to ensure the anonymity of the respondents – a technique defined by Markham (2013) as ‘ethical fabrication.’ This may include mentions of one’s country of origin or involvement in organizations or movements associated with racially or ethnically charged topics that intersect with their identity. Analysis indicates that of the 87 non-white users in this sample who elect to fill out their profile description field, nine either directly communicate their racial identity or express personal commitment to issues related to their race. Six of these users identify as black, three identify as a

race not specified within census categories. Some disclose this information by sharing their ethnic heritage or city/county of origin. For instance one user who identifies as Asian and female describes herself as follows:

“Ho Chi Minh City native, University graduate, lover of world culture and foodie, constant learner and occasional wanderer.”

Some users elect to explicitly share their race or, in some cases, ethnicity that may intersect with race.

“Nigerian. Programming extraordinaire @College. HHMI Research Fellow @University. Future biostatistician + aspiring professor. Education is the premise of promise.”

“University | Igbo Kwenu | God is my advocate | RIP Dad”

“Your friendly neighborhood black dude who (probably) won’t steal your bike. Lover of milkshakes and champion of puppies.”

Two other users (both black females) project the salience racial identity through involvement in and commitment to the Black Lives Matter movement:

University Alumna. My tweets may or may not make ya feel a certain sort of way #politics #refugees #immigration #SayHerName #BlackLivesMatter”

“Black Lives Matter. Always spilling tea”

Not surprisingly, no white users communicate their ethno-racial identity or commitment to issues related to race – including the Black Lives Matter movement - within their personal narrative. This is likely because in many contexts whiteness is the default and white individuals have the privilege to not actively think about their race (McIntosh, 1988). These results indicate that while race may not overtly color users' self-presentation habits on Twitter, there are nonetheless a small segment of users who carry strong feelings of racial identity salience into Twitter.

In summary, these analyses indicates that black and white users are equally likely to provide categorical identity indicators through their profile photos. There is a small number of black users, however, who include an expression of racial identity in their personal narrative. This suggests that when it comes to the expression of categorical identity, Twitter is largely race-neutral, and a safe space to emphasize these indicators for some.

3.2 Personal Identity Indicators

Perceptions of vulnerability may influence the sharing of personal identity indicators. Evidence indicates that social vulnerability for female users exists across platforms (Bartlett et al. 2014; Norris 2004). While research that explores corollary experiences among racial minority users is limited, there may be differences in the way that perceived vulnerability shapes users' experiences by race. Given this, we may expect black users to be less likely than white users to provide a location and full name.

3.2.1 Disclosing Location

One key piece of potentially identifiable information that Twitter users have is the option to fill out is their physical location. Many users elect to leave this field blank (42% of users within this sample do), and those who do fill it out may generate fabricated locations (i.e. "where

I want to be"). Some users, however, do elect to provide real locations – some as fine grained as specific geo-coordinates. This analysis will explore whether there is a relationship between the user's race and his or her likelihood of providing a real location. It anticipates that black users may be less likely to share this information than white users, possibly due to perceived vulnerability.

Location was qualitatively coded to determine whether it mentions a real location or whether it was a fabrication. Figure 2.4 displays the relationship of listed location to race, by gender. This indicates that the proportion of users who choose to disclose location does not vary significantly by race ($X^2=0.477$, $p=0.924$) or by gender ($X^2=1.012$, $p=0.325$).

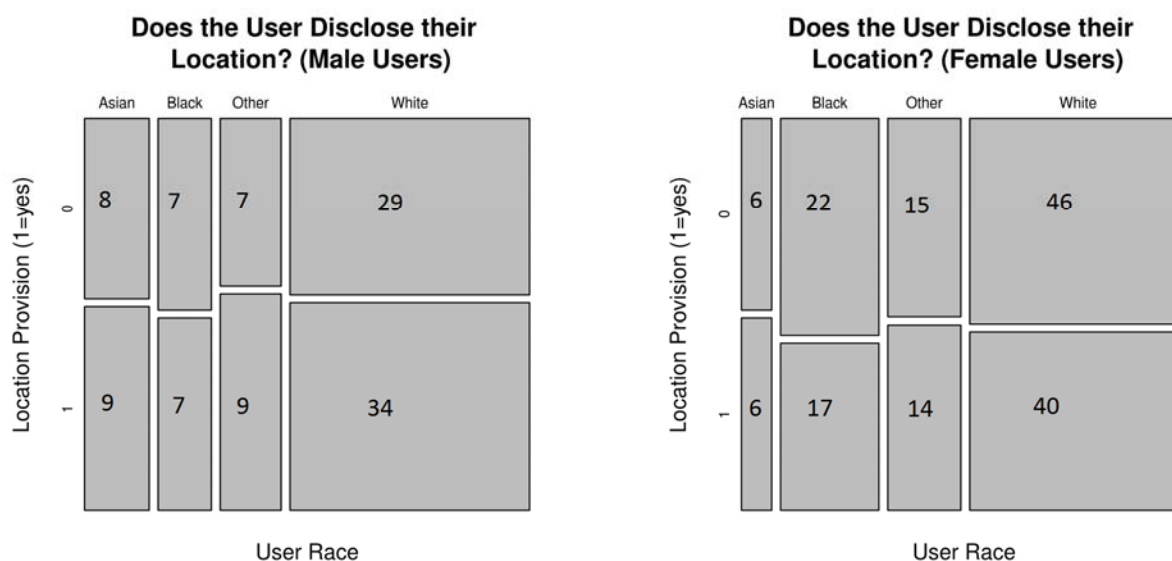


Figure 0.4 Distribution of listing a real location by race and gender

Models controlling for age, income and sexual orientation suggest the same. While approximately half (49.4%) of users with listed locations provide an identifiable location in this field, these patterns do not vary significantly by race. Interestingly, males and older users are

more likely to share a real location (although the relationship is not quite significant for the former). The desire to withhold this personal identity indicator exists for women, but does not extend to race.

Table 0.4 Probability of listing a real location in the optional location field

		Estimate (St. Error)	P-value
Intercept		-3.821 (1.517)	0.001 *
Race (ref: Caucasian/White)	Asian or Asian American	0.163 (0.419)	0.696
	Black or African American	-0.067 (0.336)	0.843
	Other	0.106 (0.354)	0.764
Gender (ref: Female)	Male	0.392 (0.260)	0.131
Age	Numeric	0.194 (0.074)	0.009 **
Sexual orientation (ref: LGBTQ)	Straight/Heterosexual	-0.183 (0.273)	0.504
Income	Above median	-0.212 (0.363)	0.489
Protected	True	0.038 (0.314)	0.902

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.'

3.2.2 Using Searchable Name as Twitter Name

Another personal identity indicator that users may elect to withhold if they feel vulnerable within a space is a searchable name. Unlike sites such as Facebook, where users are required to provide a name that is at least similar to what appears on their identification

documents,⁵ Twitter users may generate personas – and names – that express their creativity. Creating a handle and/or user name that conceals all or part of a user's first and/or surname may allow them to explore or generate facets of their online identity that do not exist offline. Given this, a combination of the user handle (the unique identifier toward which tweets are directed, i.e. "@UserHandle") and user name were coded to determine if either of them provided information on the first and/or first and last name of the user. Note that these names were not confirmed to match the name of the respondent as this data was not made available, but only names with a high confidence of authenticity and search ability were coded as "yes." This yielded two indicators – searchable *first* name and searchable *full* name. This analysis anticipates that black users may be less likely than white users to share a searchable full name,.

Preliminary bivariate analyses indicate that the association between providing a searchable first name and race is moderate ($X^2=6.58$, $p=0.08$), but association between providing searchable full name and race is strong ($X^2=20.01$, $p=0.0001$). Examining the relationship between the race of the user and their decision to disclose a full name by gender indicates that intersectional identity may be strongly associated with this decision. We note that a much larger proportion of black females than white females choose to withhold a full name, but there is little difference between the proportions of black and white males who disclose versus withhold their full name.

⁵ See Facebook's user policy: https://www.facebook.com/help/112146705538576?helpref=faq_content

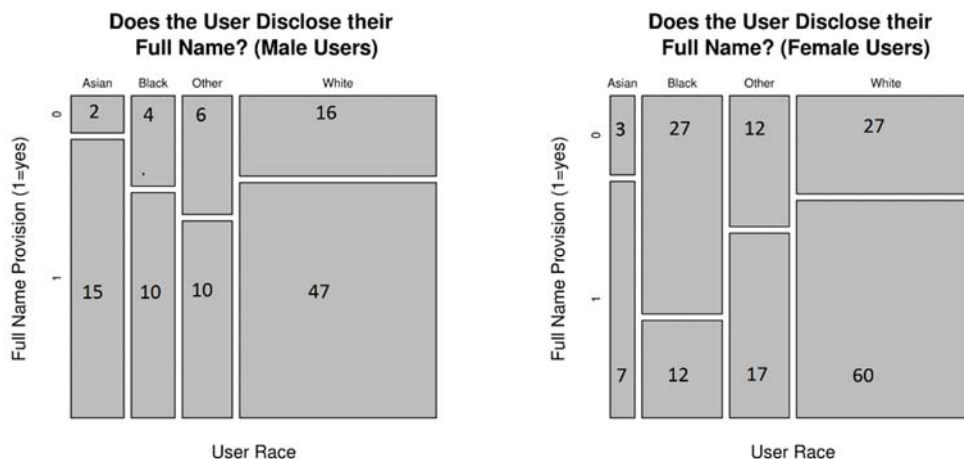


Figure 0.5: Distribution of reporting a searchable full name in profile

Table 0.5 Probability of reporting a searchable full name in profile

		Estimate (St. Error)	P-value
Intercept		2.976 (1.602)	0.064
Race (ref: Caucasian/White)	Asian or Asian American	0.440 (0.544)	0.418
	Black or African American	-0.859 (0.366)	0.012*
	Other	-0.222 (0.383)	0.567
Gender (ref: Female)	Male	0.423 (0.293)	0.148
Sexual orientation (ref: LGBTQ)	Straight/Heterosexual	0.552 (0.383)	0.165
Age	Numeric	-0.127 (0.079)	0.107
Income	Above median	0.340 (0.309)	0.271
Activity	Followers Count	-0.0003 (0.0004)	0.321
	Avg. Tweet Per Mon.	-0.002 (0.001)	0.027*
Protected	True	-0.205 (0.337)	0.543

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.'

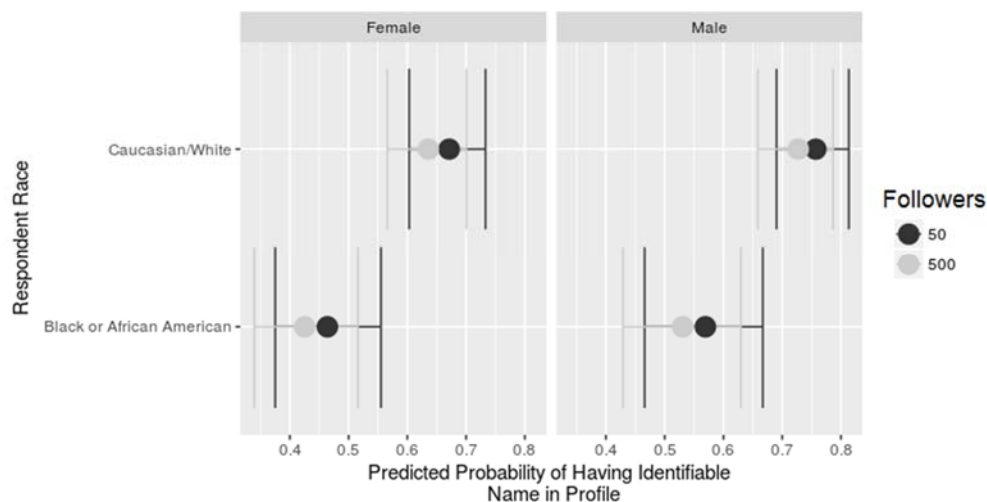


Figure 0.6: Predicted probability of reporting a searchable full name in profile

Together, these results suggest that while users who occupy marginalized or underrepresented groups may be willing to provide less sensitive pieces of identifiable information – such as one’s location – the provision of directly identifiable information is less acceptable. Providing a full name allows one to be searchable online and potentially more vulnerable to expressions of bias or harassment within Twitter *and* other contexts. Figure 2.6 illustrates that users who are black *and* female are the least likely to display this information. This corresponds with existing literature documenting harassment against women online (Fallows 2005; Norris 2004) and suggests that this literature would benefit from acknowledgment of race as well.

In regard to which types of contexts users may have concerns about searchability, the answer is more likely offline than online. Notably, there is no significant difference in the proportion of black and white users who disclose a personal website either through the URL field in their profile or through their profile description (28.3% of black users, 29.3% of white users, $t=-0.142$, $p=0.88$). Results suggest that this pattern may hold even in regard to disclosure of something as

personal as one's Facebook profile (7% of black users and 8% of white users provide a link to a personal Facebook page), but there are not enough cases to determine whether this difference is significant. These results suggest that users may feel capable of maintaining personal boundaries online regardless of site context, but feelings of vulnerability may prevent users from letting one's online and offline identity bleed into one another.

4. DISCUSSION

Online self-presentation involves the careful curation of information about oneself to help guide anticipated, asynchronous, online interactions. When deciding what to strategically reveal and conceal about oneself, considerations of vulnerability and marginalization may influence decisions – particularly for users who belong to underrepresented groups. Existing research on anonymous and nonymous spaces allows us to anticipate how these factors may influence self-presentation habits. In this study, we operationalize these anticipated patterns as relating to the disclosure of two unique types of identity indicators: categorical identity indicators that disclose group affiliation, and personal identity indicators that reveal key identifying information about one's offline self. Using a unique dataset that links Twitter activity to self-reported demographic information, this chapter tests whether the disclosure of these features varies along racial lines and discusses the implications of how Twitter users may experience marginalization or vulnerability within this space.

In regard to categorical indicators, we see no difference between the probability of black and white users to share photos through which others can evaluate their race. We do note, however, nine of the 87 minority users with descriptions provide some indication of their ethno-racial identity in their user description. Six of these users identify as black. They choose a variety of techniques to implicitly and explicitly project the salience of their racial identity in this space –

sometimes by implicitly disclosing their race, and sometimes by addressing issues related to their racial identity. Taken together, these results do not strongly parallel existing research that suggests users react against default whiteness by strongly vocalizing racial identity. While there is a core group of users who prioritize this identity component in their personal narrative, these users are not the majority. While similarity in the disclosure of categorical identity indicators between black and white users does not directly translate to equality on Twitter, they do suggest that users on the whole do not perceive Twitter as being racially 'flat' and/or feel comfortable being visible within this space.

In regard to personal identity indicators – information that might connect a user to other online or offline selves – interesting patterns emerge. Disclosure of location – a less sensitive piece of personal identity information – does not vary by race. However, when it comes to the provision of a searchable name, race does matter. Black users are significantly less likely than white users to provide this information. Black female users are especially unlikely to provide it, suggesting the importance of intersectional identities when considering vulnerability online. Interestingly, there is no significant racial difference in the probability of sharing a personal webpage or alternative social media site in the description or URL field of one's profile. This may be due to the fact that being searched and found within other social media or online spaces may still permit users to engage in important boundary maintenance strategies – such as ignoring or blocking an offending user. However, the act of providing a searchable full name may permit users to be found within offline contexts – such as their schools or workplaces – and this blending of online and offline self may be perceived as unwise for users who anticipate experiencing bias or harassment within this space. Thus, it could be that vulnerability within offline contexts finds its way into Twitter.

Overall, marginalization may dictate the self-presentation of a small core of – largely activist – black users, and vulnerability may dictate the provision of sensitive personal identity indicators for black and/or female users. However, there are few racial differences in the provision of profile features. Factors such as the provision of a personal URL, a social media URL, or a real location do not vary by race. It is possible that these results are tied to the homogeneity of the age group used for this study, or they could indicate that Twitter is an inclusive and/or visually diverse space.

It is important to note that this study does not intend to draw causal links between users' feelings of vulnerability and marginalization and their self-presentation decisions. Rather, it draws on existing work that documents the association between race and self-presentation online, addresses themes within this literature – specifically, the role of marginalization and vulnerability in decision-making – and identifies self-presentation habits that may be used to explore whether similar patterns may be observed within Twitter. The quantitative approach taken in this study is effective for identifying broad trends in self-presentation on Twitter along demographic lines. Nonetheless, the complexity of race and racial identity cannot be captured by quantitative methods alone. Further, qualitative analysis may be used to uncover the motivation of users to select particular self-presentation strategies and to identify the individual and structural factors that drive these decisions.

It is also important to note that this work does not make causal claims between the structure of Twitter and the findings observed. Twitter does stand out from other online contexts in which research has addressed the intersection of race and self-presentation. Twitter profiles are sparse and are better suited to information dispersion and conversation than self-presentation, lending them a level of anonymity characteristic of early online spaces. However, Twitter does offer

profile fields that parallel those provided by popular anonymous sites such as Facebook – such as the ability to include a profile photo and short bio. While Twitter’s unique hybrid of structural features may help generate novel patterns of self-presentation, the features themselves do not explicitly dictate what is observed. While structural affordances help mediate the interaction between the user and the interface, decisions about self-presentation are motivated in part by cultural and normative interpretations of site use. Such factors are perhaps best captured through qualitative analysis and are not the focus of this study.

The ephemerality of Twitter data is an important limitation of this study. This study uses a snapshot of user metadata from June 2016. However, not only do users change elements of their profiles over time, standards of site use may change among users, and the site itself may restructure default options. This change may be slow; we found, for instance, that 70 percent of users did not change their photo over the span of about four months. Nonetheless, future research may consider storing and analyzing profile content as it evolves over the course of months or years.

The most important limitation of these data are that they represent a restricted, stratified sample and are not representative of all young adult Twitter users in the U.S. All users, for instance, are between the ages of 18 and 26. While we may think of these users as the normative trendsetters of the website, it is also possible that these users are more progressive and less divided by racial and gender than previous generations. Nonetheless, the ability to link Twitter data to self-reported demographic information is extremely valuable. Furthermore, if we assume that users within this age group are indeed setting normative trends within this space, then the presence of negative results, or no significant difference in the disclosure of key identity indicators, has important implications for the possible inclusiveness of Twitter. Findings in this

chapter illustrate the value of having data that links users' offline and online lives, and invites researchers to consider requesting optional disclosure of social media handles in future representative surveys.

5. CONCLUSION

This study suggests that minority communities are active and visible on Twitter, but feelings of vulnerability may still exist in this space for some users. Black and white users are equally likely to select a profile photo that allows others to evaluate their race, and while there are some minority users who elect to express their racial identity in their bio they represent a small portion of the sample. There is no significant difference in the probability of black and white users to share a real location, but in regard to the provision of a full, searchable name white users are significantly more likely than black users to include this information. The fact that there is no difference in the likelihood of black and white users to share a link to their personal webpage suggests that withholding a searchable name may be a way to create a boundary between one's Twitter and offline self. Taken together, these results suggest that while Twitter is a space in which the opportunity to be active, visible and participatory is available to all groups, but the extent to which individuals feel comfortable maintaining personal boundaries online does vary by race.

CHAPTER 3. ANALYZING RACIAL DIFFERENCES IN SITE USE FROM A USES AND GRATIFICATIONS PERSPECTIVE

ABSTRACT

Social media spaces are often referenced monolithically, but users select particular sites for specific purposes and develop unique patterns of use within these spaces. With this in mind, this study examines whether there exist significant, quantifiably detectable differences in Twitter usage among black and white users. It is informed by the presence of race-focused discussion regarding the use and function of Twitter, coupled with the understanding that Twitter users exist within a racialized social structure that may contribute to different patterns of site. In regard to identifying divisions it has two goals: to determine whether the qualitatively identified phenomenon Black Twitter is quantitatively detectable, and whether the discussion of Black Twitter is indicative of systematic racial differences in Twitter use. In doing so, this work provides much-needed insight into whether there exist racial disparities within social media spaces, and will explore diversity in users' social media experiences – a topic often disregarded by researchers who study the dynamics of social media spaces.

1. INTRODUCTION

Despite the fact that social media sites are often referenced as an aggregate, the landscape of social media use is broad and diverse. boyd and Ellison (2007) provide a working definition of social media sites 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. While this

definition implies social intent, the extent and manner in which sites are indeed social spaces and the types of user-to-user interaction they invite varies significantly.

Differences in site use may be explained from a Uses and Gratifications perspective (U&G) (Raacke and Bonds-Raacke 2008). The U&G framework emphasizes that different social media spaces compete for users' time and attention, and that users may manage this competition by selecting specific sites to fulfill particular aims (Han et al. 2017; Raacke and Bonds-Raacke 2008; Stafford, Stafford, and Schkade 2004). These aims include content gratification (the use of social media for consumption of entertainment and/or information) and social gratification (the ability to connect with others and expand one's network/form community) (Han et al. 2017). The desire for community gratification may exhibit itself as a tendency to reciprocate ties and post frequently toward members of the community, and engage in similar topics of conversation. On Twitter, for instance, this may mean using similar hashtags to one's connections, or having a large proportion of mutual ties. The desire for content gratification may be observed as a disproportionate tendency to consume or broadcast information rather than communicate with users. On Twitter, it may manifest as a tendency to reach out to other – likely media-related accounts – rather than establish mutual connections with other users.

While some sites may be particularly adept at a given function, others are capable of facilitating multiple patterns of use. This flexibility is primarily attributable to the affordances of the site. This study defines affordances as “*the mutuality of actor intentions and technology capabilities that provide the potential for a particular action*” (Faraj and Azad 2012; Majchrzak et al. 2013). Affordances related to the tools that restrain and facilitate behavior and expression within social media spaces. Each social media space offers a unique set of structural features – such as tools that determine whether users' can post publically or privately, whether posts may be long or short, whether users can provide detailed information about themselves within their profiles, whether they can establish directed ties with other

users, and more – which create unique sets of affordances and drive divergent patterns in site use.

Twitter is an example of a site that facilitates multiple uses with equal efficiency (Java et al. 2007; Kwak et al. 2010). Twitter’s sparse and flexible profiles, directed ties, and mixture of individual and brand or media-based accounts may lead users to seek this site to fulfill both social and content motivations for use.

Understanding Twitter as a flexible social media space, this study seeks to examine whether there exist broad racial differences in site use on Twitter. Literature addressing site use on Twitter is divergent and highlights the importance of race. A significant portion of this literature emphasizes how Twitter functions well as a news and information broadcast site. It finds that the directed ties and presence of entities and organizations on Twitter makes it a useful site for gathering information on current events. Some literature published in recent years addresses the importance of Twitter as a community building space, but this work often emphasizes racial identity and interest in racially salient issues as key community building factors. The social phenomenon this work describes is commonly referred to as Black Twitter. While the precise definition of Black Twitter varies and the phenomenon itself is multifaceted (Clark, 2014), it is generally agreed that the term references within-group dynamics among an active subset of Twitter users, and that users within this group tend to use Twitter as a platform for collective discussion – often regarding issues related to race - and establishing friendships with like-minded others.

The phenomenon known as Black Twitter may have emerged through Twitter’s natural capacity to help users establish connections and maintain peer support networks surrounding topics of common interest (Pechmann et al. 2016; Rui, Chen, and Damiano 2013). While those who participate in Black Twitter agree that user-to-user connection and discussion of shared interests is central to the phenomenon, currently no work has explored whether there exist quantifiable evidence of the usage

patterns described by these participants. Furthermore, the extent to which this difference extends beyond bounded, self-identified groups of users and indicates systematic, quantitatively detectable differences in how individuals engage with Twitter has yet to be considered. The presence of Black Twitter could also be associated with the presence of segregated communities on Twitter⁶ but existing work has not explored this possibility. Given this gap, this study explores whether a.) there exists a quantitatively detectable group of Twitter users whose site use parallels trends suggested by literature on Black Twitter and b.) there are systematic racial differences in how users engage with Twitter's capacities as a social media space.

1.1 Uses and Gratifications, Affordances and Site Use

The term “social media” appears monolithic but the landscape of social media use is varied. Part of this variation stems from the fact that individuals select particular sites for specific purposes. The decision to adopt a particular site may be understood from a uses and gratifications perspective. Uses and gratifications is a framework from media studies that is used to understand what draws individuals to a particular form of media and holds their attention. As outlined by Rubin (2009), U&G makes a couple of key assumption. First, it assumes that individuals are active participants in the selection of media, and that their choices are influenced by factors such as the individual's social and psychological characteristics, their social groups and relationships and societal structure. Second, it assumes that for every media choice there exist functional alternatives of use. Third, while media may be created for a specific purpose, individuals decide how it should be consumed or used.

While U&G was not originally developed to explain choices in internet usage, recent work has adapted it to address online behavior. This adaptation of U&G has been used, for instance, to analyze

⁶ See Chapter 4 for an analysis of racial segregation within Twitter networks

users' selection of social media sites – including the choice to use Facebook or MySpace (Raacke and Bonds-Raacke 2008). In describing how U&G may apply to online spaces, Stafford et al. (2004) describe three motivations that may drive individuals to use a particular site. First, users may select a site to fulfill *process gratifications*, or the desire to experience what the site functionally permits. Second, they may select a site to fulfill *content gratifications*, or the desire to use and distribute information available within that site. Finally, they may select a site to fulfill *social gratifications*, or the desire to interact and socialize with others on the site. While individuals may engage in multiple behaviors within a given site, it is likely that the decision to participate is driven largely by the desire to fulfill one or more of these gratifications.

Some social media sites are well tailored for specific uses, and some facilitate a variety of uses. These differences may be attributed to the structural affordances of the space. Affordances may be defined as “*the mutuality of actor intentions and technology capabilities that provide the potential for a particular action*” (Faraj & Azad, 2012; Majchrzak, Faraj, Kane, & Azad, 2013: 39). In other words, affordances constrain and facilitate users' interaction and self-expression within social media spaces. Consider, for instance, the role of affordances within Facebook. The affordances of this site make clear that it is a place to connect with known others. Users are required to establish mutual ties and are encouraged to provide detailed, personal information within their profiles – including their hometown, which schools they attended or where they work. Indeed, existing research on Facebook use suggests that it is often used as a platform for strengthening weak ties (Vitak, Steinfield, and Ellison 2007). Research also finds that users' experience on Facebook is informed by the content produced by their extended ties a – concept described by (Majchrzak et al. 2013) as “networked informed associating.” Taken together, these affordances ensure that even someone unfamiliar with Facebook may discern that Facebook is a place to maintain connections with existing friends rather than establish new friendships.

Twitter is a site that facilitates a variety of uses. On Twitter, users are given sparse personal profiles with a number of optional, open-form fields. While some users elect to “be their own avatar” on Twitter (Wittkower 2014), others choose not to visually present themselves. Users have the opportunity to share information such as their personal location, but may leave this field blank or use it to express themselves (for instance, “in my happy place”) Ties are directed, making it such that users can follow one another without concern of tie reciprocation. As a result of this, Twitter profiles can be used as platforms for interpersonal communication just as easily as they can for broadcasting or gathering information. Indeed, as Twitter use has evolved and expanded over time, Twitter changed its post prompt from “what are you doing?” to a more general “what’s happening?” (Dybwad, 2009).

1.2 Twitter, Race and the U&G Framework

While the U&G framework proposes motivations and fulfillments for social media use, it does not specify which factors drive these motivations and fulfillments. While structural affordances shape and constrain individuals’ activities online, factors such as identity (Whitty, Doodson, Creese, & Hodges, 2016) and offline structural forces (boyd 2011) bleed into online spaces and shape users’ motivations for and habits of site use. One dimension along which identity-based and structural forces may divide site use is racial identity. Existing literature suggests that racial identity and site choice and/or use go hand-in-hand. boyd (2011) for instance, found that the decision to select Facebook versus MySpace as a social media platform was driven largely by considerations of class and race. Facebook, which was initially open only to students at universities, was favored by white, upper middle class internet users. Minority and working class users perceived MySpace as a platform that was more welcoming, and over which they had greater community control. Findings from Hargarttai (2012) suggest that even when controlling for factors such as family socioeconomic status (SES) and education, racial identity is associated with an individual’s probability of engaging with one site over another.

McIlwain (2017) also finds that race drives site visitation habits, generating patterns of web traffic that are more segregated than they would be by chance.

In regard to Twitter, existing literature suggests that race may influence users' motivations for using this site. Rates of use alone are a clue in this puzzle. A 2012 study by the Pew Research Institute regarding the demographics of social media users found that 26% of black internet users also use Twitter, as opposed to 14% of white internet users. The same survey conducted in 2015 found that 28% of black internet users surveyed also use Twitter, as opposed to 20% of white internet users – a narrower margin but still a notable gap. Similarly, Hargittai and Litt (2011)'s analysis of Twitter use among college students finds that black respondents are significantly more likely than white respondents to be Twitter users. Overall, research suggests that the relationship between race and the probability of using Twitter is significant and worthy of researchers' attention (Murthy, Gross, and Pensavalle 2016).

Beyond the decision to join or not join Twitter, divergent rhetoric over Twitter's intended function invites scholars to consider how race may play a role in decisions regarding *how* to use Twitter. The dominant narrative regarding research on Twitter is that Twitter is a flexible, evolving space that lends itself particularly well to the spread and gathering of information – a desire aligned with Stafford et al. (2004)'s *content gratification*. Many acknowledge Twitter as a 21st century newspaper (Wexler, 2014), or as a site with social media capabilities that functions more as a news site than a social media space (Kwak et al, 2010). Literature examining the role of Twitter in emergency management highlights the ability of Twitter to quickly and efficiency broadcast short updates (Wukich and Steinberg 2013). San Francisco's Bay Area Rapid Transit (BART) recently adopted Twitter as a means of engaging in short interpersonal communication regarding transit function and delays (Bromwich, 2016) Other work suggests that while Twitter may be a functional space for getting involved in a movement, connections

between users are not an oft-cited advantage of this function (Castells 2015). A 2016 Pew Internet and American Life Project survey estimates that approximately 89% of Twitter users use Twitter as a place to discuss politics and government "at least a little" (Duggan and Smith 2016). Finally, a number of studies have analyzed the use of Twitter as a space for tracking political opinion and analyzing campaign rhetoric (Larsson and Moe 2012; Park 2013; Stieglitz and Dang-Xuan 2012; Tumasjan et al. 2010, 2010).

In contrast to literature addressing Twitter as an information distribution platform, acknowledgement of Twitter as a social networking site tends to focus on Black Twitter – a term used to describe a collective of like-minded black Twitter users who engage with one another and often use these interactions to reaffirm their racial identity - has been noted by the media and scholars alike as a valid and interesting adaptation of social media technology. Patterns of use associated with Black Twitter align more closely with Stafford et al. (2004)'s *social gratification*. While the precise definition of Black Twitter varies and the phenomenon itself is multifaceted (Clark, 2014), it is generally agreed that the term references within-group dynamics among an active subset of Twitter users, and that users within this group tend to use Twitter as a platform for establishing friendships with like-minded others (Brock 2012; Sharma 2013). Manjoo (2010) cites that the recognition of 'community' in some form on Twitter originally manifested concretely in the form of shared racialized hashtags or "blacktags" – which often emerged within tightly-clustered groups with a higher-than-average volume of reciprocal relationships. In their analysis of urban Twitter usage in the United States, Murthy and colleagues (2016) state: "we believe there is a politics of Twitter use that needs to be unpacked and our results highlight the possibility that particular groups, such as young Black users, see Twitter as a space where they can be vocal" (45). However, the extent to which this difference

extends beyond bounded, self-identified groups of users and indicates systematic differences in how individuals engage with Twitter has yet to be explored.

Overall, literature regarding the function of Twitter paint two very different portraits of site use that imply different U&G based motivations. One illustrates Twitter as a primarily unidirectional space in which users can seek and find information of interest. The other suggests that Twitter is oriented toward interpersonal interaction and is adept at connecting like-minded individuals. The goal of this analysis is to determine whether divergent rhetoric surrounding site use of Twitter is indicative of significant, racial differences in whether Twitter functions as a social networking platform or an information distribution platform. It will note whether there exist significant racial differences in behavior profiles that are indicative of each general usage pattern. It will also consider whether, in the absence of significant average differences there nonetheless exists a subset of users whose tweeting and interaction behaviors fit the social gratification narrative that characterizes discussion of Black Twitter.

2. DATA AND ANALYSES

This chapter uses the same dataset containing self-reported demographic information linked to Twitter metadata used in Chapter 2. As mentioned previously, these data were collected by the Center for the Study of Health and Risk Behaviors at the University of Washington, funded by the National Institute on Alcohol Abuse and Alcoholism Grant (grant numbers 1R01AA021379-01A1 and 1R21AA021767-01A1) and led by primary investigator Dr. Melissa Lewis. See Chapter 2 for a full description of the sampling strategy used to generate these data. The demographic composition of this sample is displayed in Table 3.1.

Table 0.1 Self-Reported demographic characteristics of sample (N=278)

Characteristic		Percent
Gender	Male	39.6
	Female	60.4
	Transgender (FTM)	0.7
Race	Black	19.1
	White	53.9
	Asian	10.4
	Other	16.2
Sexual orientation	Straight/heterosexual	85.9
	LGBTQ+	14.0
	Range	Mean (sd)
Age	18-26	20.1 (1.9)
	Range	Median
Income	\$1-99,999	\$2,000-\$3,000

In addition to profile information, this analysis also requires the collection of users' networks and timelines. User timelines include up to the past 3200 tweets and replies posted by the user. Timelines for this project represent a snapshot gathered between June and July of 2016. This analysis considers the rate at which the user tweets at and/or retweet others. For user networks, it analyzes the count of users' friends and followers, and mutual ties, as well as the ratio of mutual to total and verified⁷ following to total following. In regard to terminology, this study refers to the study subject in the context of their personal network as the *ego*. The term *friend* refers to users whom the ego follows. *Follower* refers to those who follow the ego. *Mutual* ties represent overlap between friends and followers (see Figure 3.1). Table 3.2 displays descriptive statistics on the timeline and network characteristics of the

⁷ Verified users are typically important broadcasters and often represent accounts associated with news sites, celebrities, brands and other entities.

users in this sample. Note that there is no network or timeline information available for users with protected accounts, or for users who have never tweeted and/or have no friends and followers. Also, due to a data storage issue networks were collected in May 2017 rather than June 2016, so there was more user attrition than expected.

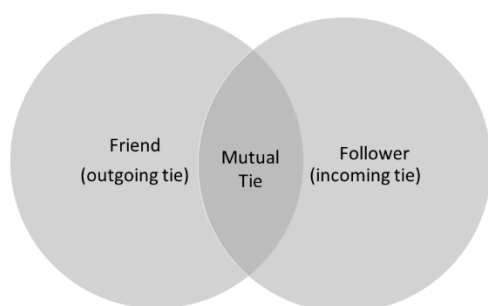


Figure 0.1 Network structure of user

Table 0.2 Network (N=212) and timeline (N=213) indicators

Characteristic	Mean(s.d.)
Friends (out degree)	376 (1291)
Followers (in degree)	350 (720)
Mutual ties	163 (610)
Tweets	6234 (15513)
Tweets per month	89 (196)

This analysis will first study the network distribution of users. It considers average differences in key network measures (i.e. count of friends, followers and mutual ties), and uses maximum likelihood estimation to fit stochastic processes to the tie distributions observed. It then develops indices representative of network structures that may result from social and information gratification-based motivations in site use and develops a series of beta regression models to analyze disparities in these indices. Finally, it analyzes tweeting behavior, taking note of how frequently users mention or retweet others, and whether these activities link to users within their network or verified accounts, respectively. Results provide insight about whether there exist systematic racial differences in site use. Each analysis

is also accompanied by a visual representation of the distribution of the measures analyzed in order to determine whether there exist pockets of users that fit the profile of someone active within Black Twitter who likely uses Twitter for social gratification, and whether there exist pockets of users whose usage patterns fit with the interpretation of Twitter as an information seeking and broadcast space

3. RESULTS

This analysis examines the network structure and communication activities of black and white Twitter users in this sample, taking note of whether these patterns are indicative of social or information-seeking behavior patterns. Results consider both the distribution of measures for black and white users, as well as systematic average differences.

3.1 Network structure and friend selection

This analysis first uses t-tests to examine whether there exist significant differences in the average number of friends, followers and mutual ties for black and white users. As indicated in *Table 3*, black users are on average more social than white users. They have significantly higher friend, follower and mutual tie counts. The strongest difference relates to mutual ties – ties indicative of developing or maintaining personal connections within the site.

Table 0.3 Differences in tie counts

Tie	Black users	White users	t/p
Friend	408	209	2.447 (0.017)
Follower	447	261	2.027 (0.048)
Mutual	214	96	2.46 (0.017)

The broad standard deviations of network ties illustrated in Table 3.3, however, invite us to consider not just tie counts but distributions of ties. Figure 3.2 displays the distribution of friends, followers and mutual ties within this sample. As we can see, black and white users do appear to have

very different friend, follower and mutual tie distributions. The distribution among white users have a stronger, negative skew. This is particularly true of mutual ties. In regard to this tie type, black users display a broad, nearly uniform distribution. This difference invites us to consider whether these distributions are generated by different processes. To explore this, I fit candidate distributions to empirical data using likelihood-based modeling of degree sequence. Note that in the context of this analysis, only users with a friend/follower count at or below 4000 were retained. Two users were excluded who had tie counts over double this volume and their presence appeared to skew results.

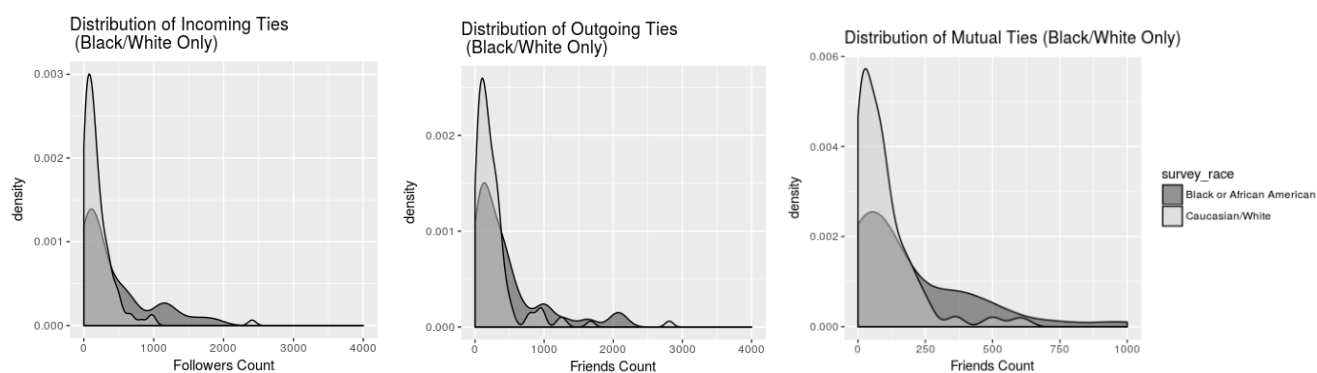


Figure 0.2 Tie Distributions by Ego Race

Table 0.4 Fitting tie distributions to stochastic processes

Race	Tie type	Model	Cutoff	Log-Lik	AICC	BIC
Black	Mutual	Poisson	1	-4745.406	9492.916	9494.500
		Geometric	1	-244.591	495.849	500.249
		Neg. Binom.	1	-242.451	491.568	495.968
		Yule	1	-266.632	539.930	544.330
		Waring	1	-245.466	497.599	501.999
Caucasian/White	Friend	Poisson	2	-5226.131	10454.384	10455.818
		Geometric	2	-230.203	467.180	471.071
		Neg. Binom.	2	-230.328	467.430	471.322
		Yule	2	-266.778	540.330	544.222
		Waring	2	-237.157	481.087	484.979

	Follower	Poisson	1	-5744.924	11491.972	11493.374
		Geometric	1	-216.580	439.960	443.739
		Neg. Binom.	1	-217.326	441.452	445.231
		Yule	1	-241.063	488.927	492.706
		Waring	1	-220.541	447.881	451.661
White	Mutual	Poisson	1	-6326.233	12654.501	12657.193
		Geometric	1	-632.936	1272.093	1280.055
		Neg. Binom.	1	-630.257	1266.735	1274.697
		Yule	1	-698.427	1403.073	1411.035
		Waring	1	-635.325	1276.871	1284.833
	Friend	Poisson	1	-9750.903	19503.843	19506.497
		Geometric	1	-697.284	1400.797	1408.642
		Neg. Binom.	1	-701.616	1409.460	1417.305
		Yule	1	-817.395	1641.019	1648.864
		Waring	1	-723.303	1452.834	1460.679
	Follower	Poisson	3	-9887.253	19776.543	19779.216
		Geometric	3	-693.173	1392.570	1400.474
		Neg. Binom.	3	-694.065	1394.354	1402.258
		Yule	3	-784.191	1574.605	1582.510
		Waring	3	-707.260	1420.744	1428.648

Results from this analysis indicate that despite observed differences, the friend, follower and mutual tie distributions for black and white users follow the same functional forms. We observe that mutual ties for black and white users most closely resemble negative binomial distributions (as determined by AIC scores). It is possible that this distribution was created by a two-step process: first by selecting candidates and then settling on ties from within that pool of candidates. The geometric distribution provides the best fit for friends and followers among black and white egos. The geometric distribution may occur when a series of random trials have occurred prior to a success. In the context of social networks, this may mean that users try out a variety of ties before one sticks. While we cannot

draw a direct link between the distributions observed and the processes they imply, the fact that both black and white distributions follow similar functional forms implies some homogeneity in use.

According to the distributions displayed in Figure 3.2, however, it is possible that differences in distribution structure may still exist for the most active users – those within in the upper quartile of the distribution. The tails of distributions of friend, follower and mutual ties for black users have consistently higher volumes than they do for white users. Given this, distributions were fit for users who have more than 350 mutual ties, more than 500 followers, and more than 600 friends. Due to the fact that the sample used is small and the data source is unique and difficult to supplement, bootstrap sampling was used to generate 10,000 simulated observations for each tie type. Interestingly, results suggest that the binomial distribution provides the best fit for mutual and friend ties among black and white users. For followers, the geometric distribution provides the best fit among white users and the negative binomial provides the best fit for black users. However, this difference in fit is fairly minor. Overall, it appears that tie selection processes may be similar for black and white users regardless of network activity. Results for this sensitivity analysis are displayed in the appendix.

3.2 Site Use: Interpersonal Connections versus Information Seeking

In addition to examining the functional forms of users' friend and follower distributions, this analysis also considers the extent to which users' behavior appears to align with the narrative of Twitter as a space for content gratification (i.e. Twitter as a "21st century newspaper") versus social gratification (i.e. Black Twitter). To measure this, this analysis considers the relationship between the incoming and outgoing ties of the user, and whether or not these ties belong to verified accounts. Overall, it is expected that users who engage with Twitter as a space for social interaction will be more strongly embedded within their networks. These users may have a high ratio of mutual ties to total ties. For

users who engage with Twitter as an information-gathering space, many of the accounts they choose to follow (their friends) may be verified (e.g. belong to celebrities, news sources, brands and other entities).

To measure the extent to which users engage with Twitter as a social space, this analysis calculates the ratio of mutual ties to total unique ties within each users' network. The higher the value, the greater the proportion of mutual ties – presumably a stronger, more intimate tie than unidirectional ties – within the ego's network. Preliminary exploration of this measure suggests that the distribution is very different for black and white users. White users exhibit a normal distribution, while black users exhibit a fairly uniform, almost bimodal distribution. For some black users Twitter appears to very much be a social space, but an equal number may not engage with Twitter for social gratification.

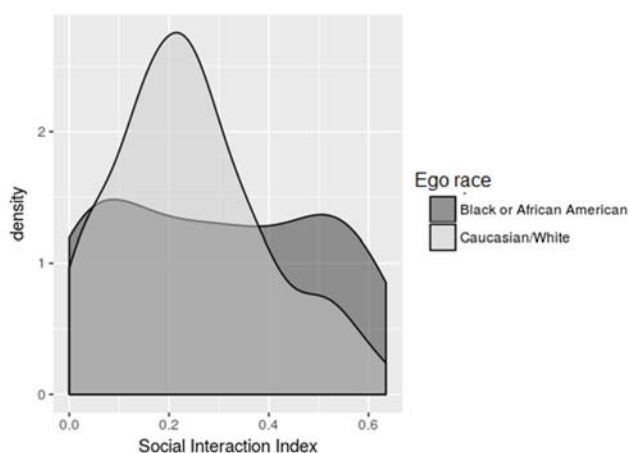


Figure 0.3 Social interaction index (mutual ties/total ties) by race

A moments-matching estimation tests indicates that this outcome is fairly normally distributed across the sample. However, because the values are bounded between 0 and 1, a beta regression model proves to be the best fit for these data. Table 3.5 displays the results of the relationship between the user's race and their social interaction index value. Control factors include the respondent's gender and sexual orientation, their friends count, and their tweet activity levels. This and all models in this chapter are fit by AIC score.

Table 0.5 Social interaction index

		Estimate (Std. Error)	P-value
Intercept		-0.163 (0.198)	0.000***
Race (ref: Caucaisan/White)	Asian or Asian American	-0.329 (0.199)	0.097
	Black or African American	-0.165 (0.168)	0.363
	Other	0.195 (0.175)	0.263
Gender (ref: Female)	Male	-0.160 (0.124)	0.197
Sexual orientation (ref: LGBTQ)	Straight/Heterosexual	0.566 (0.187)	0.003**
Activity measures	Friends Count	0.0002 (0.00008)	0.092.
	Avg, tweet per mon	-0.0008 (0.0003)	0.005 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Pseudo R-squared: 0.1261

These results indicate that activity measures – including how often one tweets and how many friends they have – are among the strongest predictors of whether a user engages with Twitter as a social space. It is also interesting to note that non-LBGQT users appear more likely than LBGQT users to engage with Twitter as a social space, which suggests that Twitter may have not have social gratification appeal for this marginalized community. Overall, there is no significant difference between the social interaction indices of black and white users. While there may be a number of black users for whom Twitter is a highly social space – as indicated by the somewhat uniform distribution of index values for this group - from a uses and gratification perspective both groups turn to Twitter for social gratification at approximately equal rates.

In addition to measuring social interaction, this analysis consider the extent to which users engage with Twitter a as an information-seeking space. This is measured by calculating the proportion of verified friends (outgoing ties) over the total friends for each ego. The higher the value, the stronger the use of Twitter as an information seeking space. Consistent with expectations generated by existing narratives regarding Twitter use, white users display a broader distribution of information seeking than

black users. That is, a larger proportion of white users than black users have high information seeking indices (0.50 and higher).

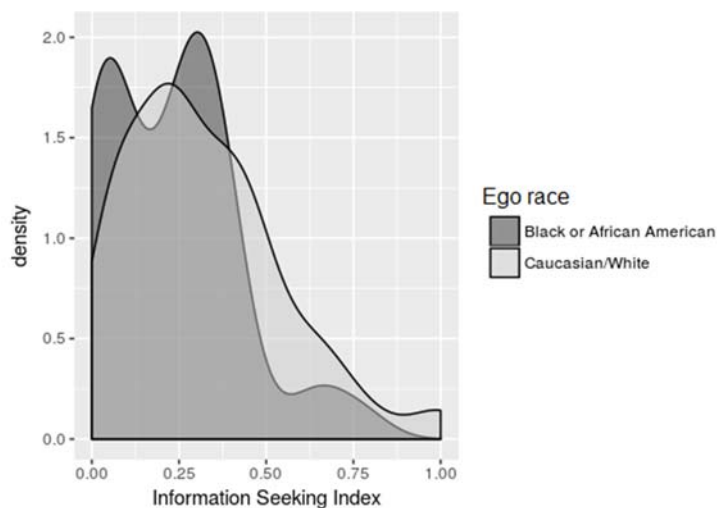


Figure 0.4 Distribution of information seeking index (verified friends/total friends) by race

The results of a beta regression model examining the relationship between user race and use of Twitter as an information seeking space are displayed in Table 3.6. Interestingly, it appears that black users are less likely than white users to have a high information seeking index score, indicating that they are less likely to use Twitter as an information distribution space. Indeed, holding sexual orientation, age and income constant, white male and female users are predicted to have information seeking scores of 0.445 and 0.357, respectively. Black male and female users, on the other hand, have predicted scores of 0.343 and 0.266, respectively. While this difference does not directly translate into inequality within this space, disparities in the perception of Twitter as an information seeking space has important implications for the use of Twitter as an emergency management and/or news distribution tool. This point will be addressed in greater detail in the discussion.

Table 0.6 Information seeking index

		Estimate (Std. Error)	P-value
Intercept		-3.530 (0.818)	0.000 ***
Race (ref: Caucasian/White)	Asian or Asian American	-0.252 (0.223)	0.257
	Black or African American	-0.477 (0.185)	0.010 *
	Other	-0.494 (0.210)	0.018 *
Gender (ref: Female)	Male	0.401 (0.145)	0.006 **
Sexual orientation (ref: LGBTQ)	Straight/Heterosexual	-0.103 (0.204)	0.615
Age	Numeric	0.151 (0.040)	0.000 ***
Income	1=Above median	-0.381 (0.149)	0.010 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Pseudo R-Squared 0.1266

3.3 Site use: Social and informational tweeting

Given the low social cost of connecting with others on Twitter, it may be that what matters for users is not the composition of their network but with whom within (or outside) of it they elect to communicate. With this in mind, this analysis also considers the composition of users' timelines, paying particular attention to the content of their directed and retweeted posts. It is possible that users who engage with Twitter for social gratification more frequently tweet at (@) users overall and within their own networks. It is also likely that users who engage with Twitter for content gratification are more likely to retweet content – specifically, content from verified accounts such as news sources, celebrities, and brands. The following models will explore this.

3.3.1 Model set 1: Tweeting at Others

This analysis first considers the overall tendency of black and white users to tweet at other users. Given the existing narratives surrounding race and Twitter use, it is expected that black users are more likely to engage with Twitter as a social space and therefore more likely to tweet at other users. Initial explorations of this relationship control for the user's activity level – as defined by the average number of tweets issued per month, broken into four quartiles. Contrary to what is expected, a larger proportion of white users appear more likely to tweet at others than black users. There is an increase in the number of black users with a high proportion of tweets directed at others within the second quantile of tweet activity, but this drops dramatically for users who occupy the third and fourth quartile.

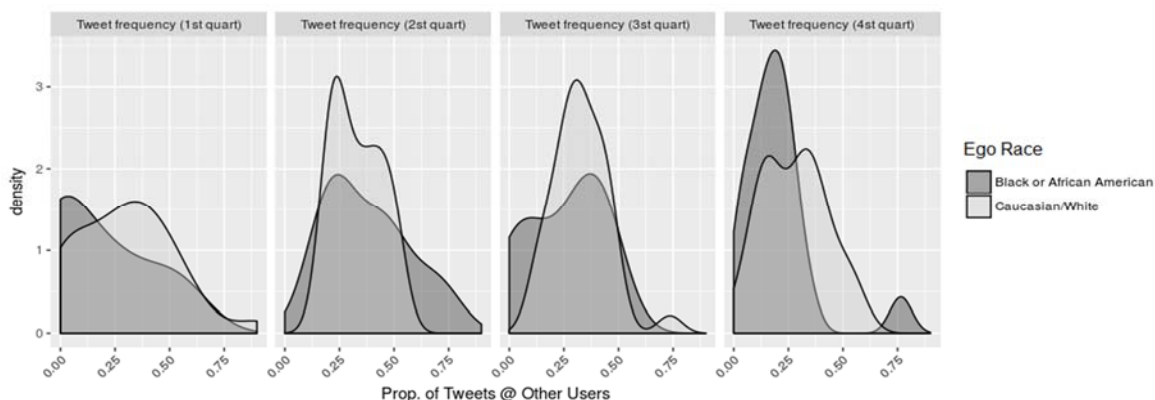


Figure 0.5 Proportion of tweets that tweet at (@) others by race, activity level

Modeling the relationship between the user's race and the proportion of tweets directed at others using a beta regression model indicates that there is a significant overall difference in the outward-directed tweet communication of black and white users, and that users who identify as black, Asian or other are likely to display a significantly lower proportion of tweets directed at others than white users. This stands in contrast to the narrative suggested by existing literature that Twitter acts as a community context for minority users. These results combine may speak to the level of comfort that white users versus minority users feel when interacting within this space.

Table 0.7 Proportion of tweets that tweet at (@) others

		Estimate (Std. Error)	P-value
Intercept		-0.817 (0.767)	0.288*
Race (ref: Caucasian/White)	Asian or Asian American	-0.513 (0.203)	0.012
	Black or African American	-0.519 (0.174)	0.003 **
	Other	-0.292 (0.188)	0.120
Gender (ref: Female)	Male	0.066 (0.132)	0.617
Sexual orientation (ref: LGBTQ)	Straight/heterosexual	0.433 (0.188)	0.021 *
Age	Numeric	-0.024 (0.038)	0.532
Income	1=Above median	0.223 (0.137)	0.103

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Pseudo R-Squared: 0.0781

While analyzing the proportion of tweets directed at other users is informative, it is also important to consider *who* the user is tweeting at. The following analysis models the proportion of the users that the ego tweets at who are also within their networks. It is likely that users who view Twitter as a social space are more likely to tweet at known others – especially friends with whom they have mutual connections. To explore this, we consider what proportion of the users whom the ego tweets at are mutual ties, friends and followers in their network. Gathering at mentions from the user’s timeline, this analysis first finds how many of the user ids associated with these mentions match the ids of the user’s friends and followers, and then calculates the proportion of these intersections over the total number of mentions. Figure 3.6 displays the proportions for each tie type. These visualizations appear to indicate that there are no racial differences in the proportion of mentions that are within the user’s network. Table 3.8 displays the association between the user’s race and the proportion of mentions that are mutual connections – the tie type most closely associated with friendship or acquaintanceship – using a beta

regression model. Results suggest that if we control for sexual orientation, gender and tweet activity, black users have on average lower proportions of tweets directed at mutual connections, which stands in contrast to discourse regarding Black Twitter as a space for social gratification.

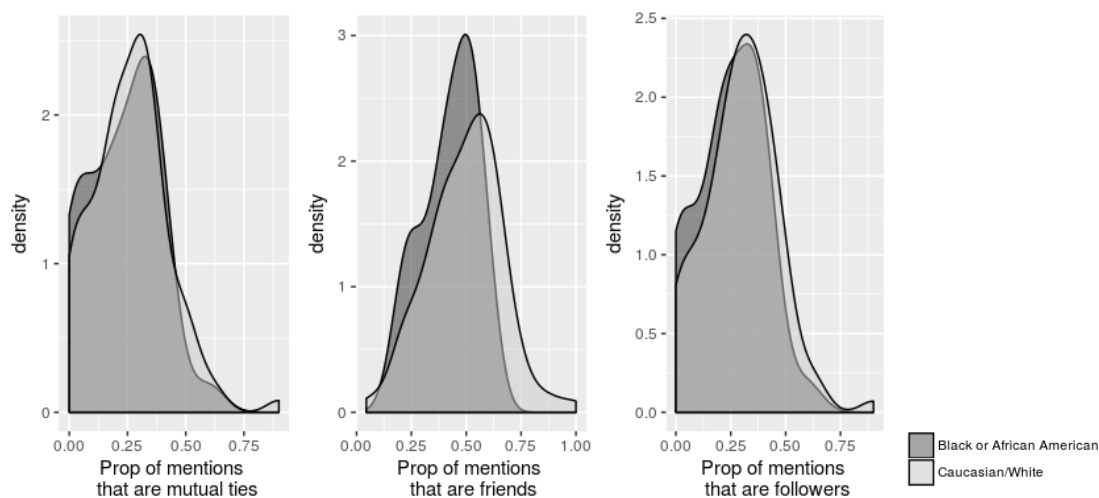


Figure 0.6 Proportion of users that you tweet at who are also in your network, by race and tie type

Table 0.8 Proportion of users that you tweet at who are mutual ties

		Estimate (Std. Error)	P-value
Intercept		-1.652 (0.226)	0.000***
Race (ref: Caucasian/White)	Asian or Asian American	-0.513 (0.247)	0.038 *
	Black or African American	-0.362 (0.196)	0.065 .
	Other	-0.357 (0.213)	0.094 .
Gender (ref: Female)	Male	-0.320 (0.146)	0.028 *
Sexual orientation (ref: LGBTQ)	Straight/Heterosexual	0.715 (0.218)	0.001 **
Activity	Avg. tweet per mon	0.0007 (0.0003)	0.018 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Pseudo R-Squared: 0.1336

3.3.2 Model Set 2: Retweeting Behaviors

Another, more passive way that users can communicate with one another involves retweeting the content of other users. Those who use Twitter for content gratification and information spread may be more likely to retweet tweets – particularly from verified sources such as celebrities, news agencies and other entities. This model series analyses the proportion of tweets posted by black and white users that are retweets, as well as the relative frequency with which they retweet verified versus known sources. Figure 3.7 displays the overall proportion of tweets that are retweets within the users’ timelines. While the distribution for white users displays a slight negative skew but overall normal distribution, the distribution for black users appears almost bimodal, which some users retweeting very often. Using a beta regression model to measure the association between user race and retweet proportion and controlling for other basic demographic and activity indicators, indicates that there exists no overall difference the proportion of tweets that are retweets between these groups.

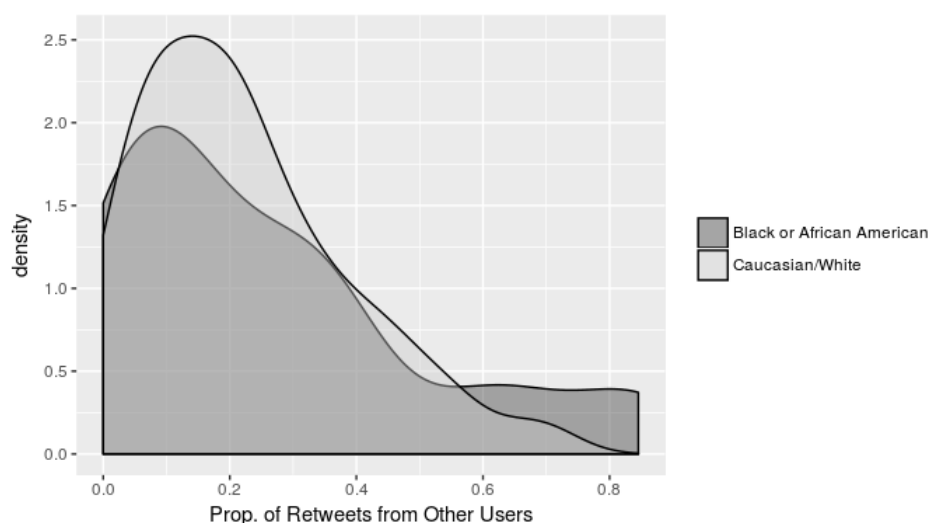


Figure 0.7 Proportion of tweets that are retweets, by race

Table 0.9 Proportion of tweets that are retweets

		Estimate (Std. Error)	P-value
Intercept		-0.184 (0.790)	0.302 ***
Race (ref: Caucasian/White)	Asian or Asian American	-0.462 (0.213)	0.030 *
	Black or African American	-0.230(0.191)	0.227
	Other	0.188 (0.194)	0.332
Gender (ref: Female)	Male	0.171 (0.141)	0.225
Sexual orientation (ref: LGBTQ)	Straight/Heterosexual	0.597 (0.200)	0.003 **
Age	Numeric	0.079 (0.038)	0.038 *
Activity	Friends count	0.0002 (0.00006)	0.001 ***
	Avg. tweets per month	0.0005 (0.0003)	0.115

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Pseudo R-Squared: 0.1366

In addition to considering the overall proportion of tweets that are retweets within a user's timeline, this analysis consider what proportion of retweets are retweets from verified sources. Users commonly re-share information from verified sources on their own timelines. These verified accounts may be celebrities, brands or news agencies. A preliminary visualization of this relationship (Figure 3.8) suggests that there exist almost no difference between the proportions of retweets that come from verified sources between black and white users. Similar to past models, these results use a beta regression model due to the fact that measures are bounded within the zero to one range, and are positively skewed. Table 3.10 confirms that there exists no significant difference between these groups, controlling for gender, age, and average tweets per month.

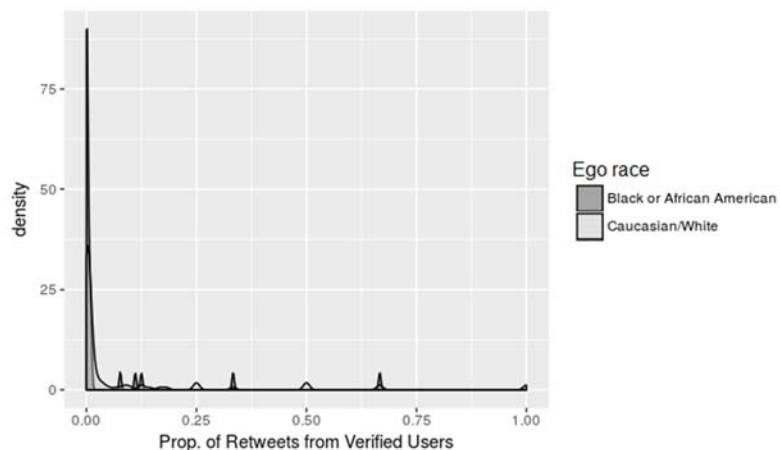


Figure 0.8 Proportion of retweets that come from verified sources, by race

Table 0.10 Proportion of retweets that come from verified sources

Variable		Coefficient (Std. Error)	P-value
Intercept		-1.972 (0.909)	0.058 .
Race	Asian or Asian American	-0.086 (0.235)	0.714
	Black or African American	-0.110 (0.221)	0.620
	Other	0.020 (0.244)	0.936
Gender	Male	0.034 (0.167)	0.983
Age	Numeric	- 0.008 (0.044)	0.856
Activity	Avg. tweet per month	-0.0006 (0.0004)	0.131

Pseudo R-squared: 0.0516

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.'

4. DISCUSSION

Existing literature suggests that racial divisions are baked in to social media contexts. As stated by Campbell (2016), online spaces are “assumed to be white and masculine” because they are a reproduction of a culture that values whiteness and masculinity. These divisions manifest in overt ways, such as: expressions of racial prejudice and discrimination (Nesbitt-Golden, 2014), identity tourism (Nakamura, 2002), or within-network segregation (see Chapter 4). They may also manifest in more subtle ways that relate to how individuals use online spaces. This chapter reviews the U&G perspective,

which provides a framework for understanding site usage that factors in the needs and desires of users. U&G suggests that individuals may seek out different sites to fulfill different needs, such as a desire to collect information, a desire to interact with existing connections, or a desire to make new friends (Raacke and Bonds-Raacke 2008). The fulfillment of these desires may lead individuals to self-segregate between similar social media sites, or to develop unique patterns of use within the same sites depending on the flexibility of available site affordances.

While the U&G framework is often used to explain differences in social media site choice based on factors such as a desire for interactivity (Ruggiero 2000), it is particularly helpful when addressing the divergent rhetoric that has emerged regarding how users interpret the intended use and capacities of Twitter. While existing research on Twitter suggests that it functions particularly well as an information gathering and distribution space - a '21st century newspaper', rather than a social context (Bilton 2013; Wexler 2014), emerging research examining Black Twitter suggests that for underrepresented users, Twitter may function particularly well as a social space – a context in which users can establish connections with like-minded others and meet people that they would be friends with in real life (Clark 2014; Sharma 2013). These two narratives stand in contrast to one another and propose that Twitter is effective at fulfilling a variety of uses and desires. They also suggest that a user's racial identity may be an important factor in producing divergent patterns of use.

This analysis examines whether divergent and racially-salient narratives surrounding motivations for Twitter use are detectable within users' digital traces and assesses whether the presence of these narratives, while potentially overgeneralized in popular literature, is indicative of broad, structural differences in site use. It considers several factors associated with the tendency to use Twitter as a social or information seeking space. First, it examines the distribution of black and white Twitter users' friends, followers, and mutual connection and hypothesizes whether these distributions were generated by

the same social processes. Next, it examines tie distribution and interaction-based indices in order to assess the extent to which users view Twitter as an information gathering or social interaction space. Finally, it considers the extent to which users directly engage with others through at mentions and retweets, as well as who within or outside the user's network is involved in these interactions.

In regard to friend/follower/mutual tie distributions and the processes that may have generated them, the shape of these distributions appears very different for black and white users, with the distributions for black users featuring longer, wider tails. This is particularly true of mutual friends. However, fitting stochastic processes to these distributions indicates that they are most likely generated in the same way. For mutual ties, the negative binomial distribution provides the best fit for both black and white users. This is consistent with a careful, two step processes of narrowing down and finally selecting mutual connections within this space. For friends and followers, the geometric distribution – a semi-random pattern of selecting ties, some of which 'stick' and some of which do not – provides the best fit. A sensitivity analysis using a bootstrapped sample suggests that these patterns hold true even if we narrow our perspective to more active users – those with 1000 or more mutual ties, and 4000 or more friends or followers. While these analyses do not provide causal evidence of how friendships on Twitter are made, they do suggest that on average the tie development process of Twitter do not vary significantly between black and white users.

This analysis assesses the distribution and average differences in two index scores designed to capture intentions for site use. When plotting values for the users' social interaction index scores – or the ratio of mutual ties to total ties – it is clear that the distribution for black users is broader than that of white users. This fits with expectations that Twitter is more commonly viewed as context for interaction by black users than by white users. Controlling for other demographic and activity factors, however, we note no significant difference between these groups. Visual results for the information seeking index

also align with expectations, and modeling these results indicates that white users do have, on average, significantly higher information seeking indices.

In addition to these indices, this analysis also seeks to systematically measure how frequently and with whom users communicate. Using data from users' timelines, it first analyzes the proportion of tweets that are tweeted at other users (i.e. @username). Overall, the distributions of black and white users appear somewhat similar, and results of a linear regression analysis suggest that white users are actually significantly more likely to tweet at others. When we analyze whether they're tweeting at others in their network, these findings hold. This is somewhat contradictory to analyses of users' social interaction indices, in which we noted a fairly uniform distribution of indices for black users and no significant difference between the two groups. However, it is possible that interacting and finding community on Twitter are very different experiences for users. A user may tweet at others, but not be embedded in a community. Retweeting analyses finds that white users are more likely to retweet others, and to retweet from verified sources, but that these differences are not significant between black and white users. Future work may explore who the accounts commonly retweeted by black and white users are and whether there are consistencies in the content posted by these accounts.

Findings regarding interaction indices and patterns of interaction are somewhat contradictory and suggest that the presence of two divergent narratives surrounding Twitter seems to be an oversimplified explanation. While black users appear (visually) to have larger proportions of mutual to total ties, they are less likely to tweet at other users overall and within their networks. One possible explanation for this is that content rather than volume of user-to-user interaction is what truly indicates network engagement. It is also possible that community is built less around tweeting at others, and more about the content of conversations (i.e. common hashtag use). Manjoo (2010) and Sharma (2013) for instance, suggest that black community is built largely on hashtags that emerge from tightly clustered networks.

These networks may be users who connect with and view one another, but do not necessarily talk every day. For white users, there is a strong social interaction element to their Twitter experience, but they appear to be less embedded within their networks according to their proportions of mutual to total ties.

While findings suggest that the presence of social versus informational narrative is an oversimplification, the concept of Black Twitter as a *political* space may add interpretative depth to these results. This chapter notes that literature regarding Black Twitter highlights the use of Twitter's social affordances, but another interpretation of Black Twitter is a context for political expression. As highlighted by Dawson (1995; 2013), racial identity and political identity are intertwined. Offline literature documents that black users are more strongly motivated to engage in action that concerns their racial identity than their affiliation with other groups (such as class) (Dawson 1995, 2013; Coates, 2017). Existing work documents this within voting patterns, and Twitter may be another context in which to engage in this collective political expression. Thus, while the social interaction component of Black Twitter is important – and is reflected to some extent in these findings – what may matter most is the content shared and consumed by users and whether this relates to common social and political affiliation and concerns.

While these results illustrate that Twitter is a race-neutral context when it comes to some usage patterns (for instance the tendency to retweet others), it is important to clarify that race neutral does not mean equal. The extent to which users engage with Twitter as an information seeking space, for instance, may have implications for cultural awareness. A number of large and small organizations – such as the BART train in San Francisco (Bromwich 2016) and the Federal Emergency Management Agency (FEMA) now use Twitter as a means of communicating directly with constituents and citizens (Wukich and Steinberg 2013). Users who are less likely to engage with Twitter as an information seeking space may be less likely to receive critical updates about current events within and outside of

emergency situations. This possibility is particularly concerning given that we do note lower average information seeking indices for black users than for white users.

Looking beyond black/white differences, other relationships within these results suggests that Twitter may not be universally appealing to marginalized communities. First, it is interesting to note that LGBTQ+ users appear to have lower social interaction indices than straight/heterosexual identifying users. Furthermore, users who identify as Asian or “other” are less likely than white users to tweet at others within and beyond their personal network. Contrasting this with the fact that there exists no significant difference in the retweeting behavior of these groups, these findings suggest that white users are more comfortable being outwardly vocal within this space.

Future work will consider the content of messages shared between users. It could be that the social gratification activity associated with Black Twitter is as Sharma (2013) suggests, clustered around common hashtags or topics of conversation. Users may build a small but meaningful network connections around topics of common interest. This may account for the large proportion of Black users who have high social interaction indices, but the overall tendency of white users to interact – through both at mentions and retweets – more frequently than black users.

Future work may also explore how users’ networks and posts change over time, and in doing so permit a more causal analysis of user behavior. One important limitation of this work is that it captures users’ networks during a snapshot of time. A benefit of using the Twitter REST API, however, is that multiple snapshots of users’ networks may be collected, leading to an analysis of how the composition of users’ networks, patterns of interaction, and topics discussed change over time. Twitter is a socially evolving platform, so these factors are important to consider.

5. CONCLUSION

This study explores racial variation in how users engage with Twitter. Drawing upon a U&G-based interpretation of variation in the use of social media sites, it suggests that there exist divergent narratives of Twitter use that appear to highlight race as a driving factor. Dominant narratives of Twitter portray it as a “21st century newspaper” rather than a social space. However, literature on Black Twitter suggests that for black users Twitter may function as a space for finding others with similar identities and interest, and establishing meaningful connections with these users. Analyses explore network structure and patterns of interaction to unpack whether these divergent narratives can be quantitatively detected and/or indicate systematic racial differences in users’ interpretations regarding the uses of Twitter.

Findings suggest that while interpretations of *divergent* narratives may be an oversimplification of how race and site use collide on Twitter, to some extent the phenomenon of Black Twitter is digitally detectable. A subset of black users have very high mutual-to-total tie ratios (although the overall difference is not significant between black and white users), and white users are significantly more likely to have a high proportion of verified-to-total friends than black users. White users are, however, more likely than black users to tweet at other users both within and outside their network. The latter is particularly true if they tweet frequently. They are also less likely to retweet others users, although these differences are not significant. This may speak to the level of comfort that black and white users have when reaching out to others within this space. It also invites further investigation into the content of Twitter users’ conversations, as the content of interactions may matter more than their frequency in building community.

6. APPENDIX

Analysis of stochastic processes behind network structure: High activity users, bootstrapped samples

	Distribution	Cutoff	Log Likelihood	AIC
Mutual: Black egos	Poisson	1	-80504.62	161011.23
	Geometric	1	-16107.20	32237.51
	NegBinom	1	-14541.51	29106.14
	Yule	1	-19880.21	39783.54
	Waring	1	-17693.68	35410.48
Mutual: White egos	Poisson	1	-7968.381	15938.769
	Geometric	1	-4053.158	8112.360
	NegBinom	1	-3391.553	6789.149
	Yule	1	-5028.788	10063.618
	Waring	1	-4468.970	8943.983
Follower: Black egos	Poisson	1	-125015.824	250033.65
	Geometric	1	-7373.429	14752.88
	NegBinom	1	-7059.782	14125.59
	Yule	1	-8998.889	18003.80
	Waring	1	-8095.635	16197.29
Follower: White egos	Poisson	1	-60955.334	121912.673
	Geometric	1	-4511.817	9029.668
	NegBinom	1	-4563.085	9132.204
	Yule	1	-5299.806	10605.647
	Waring	1	-4705.648	9417.329
Friend: Black egos	Poisson	2	-129047.978	258097.96
	Geometric	2	-9261.680	18529.38
	NegBinom	2	-8813.458	17632.94
	Yule	2	-11330.045	22666.11
	Waring	2	10153.153	20312.32
Friend : White egos	Poisson	1	-34691.051	69384.11
	Geometric	1	-5046.594	10099.22
	NegBinom	1	-4670.237	9346.51
	Yule	1	-6211.644	12429.32
	Waring	1	-5587.905	11181.85

CHAPTER 4. REDRAWING THE “COLOR LINE”: EXAMINING RACIAL SEGREGATION IN ASSOCIATIVE NETWORKS ON TWITTER

ABSTRACT

Online social spaces are increasingly salient contexts for associative tie formation. Users’ social media experiences may be significantly shaped by the content of their personal networks – particularly within sites that invite flexible patterns of use such as Twitter. However, the racial composition of networks within most of these spaces has yet to be examined. This chapter examines racial segregation patterns in associative networks on Twitter. Acknowledging past work on the role that social structure and agency play in influencing the racial composition of individuals’ networks, this chapter argues that Twitter blurs the influence of these forces and may invite users to generate networks that are more or less segregated than what has been observed offline. While we expect to find some level of racial segregation within this space, this chapter unpacks the extent to which we observe same-race connectedness for black and white users, assesses whether these patterns are likely generated by opportunity or by choice, and contextualizes results by comparing them with patterns of same-race connectedness observed offline.

1. INTRODUCTION

Despite policymakers’ best efforts to derail a legacy of racial inequality in the United States (US), neighborhoods, schools, and other social contexts continue to be defined along racial lines. In particular, most individuals’ social networks remain racially homogeneous even

among cohorts born decades after the dismantling of Jim Crow and federal regulation of other discriminatory practices and policies (Moody 2001; Quillian and Campbell 2003). While no one causal explanation exists, a large body of sociological research examining friendship segregation across a variety of contexts concludes that both individual preferences and structural barriers help to either foster or reduce the existence of cross-race ties within associative networks (McPherson, Smith-Lovin, and Cook 2001; Moody 2001; Quillian and Campbell 2003; Wimmer and Lewis 2010).

While the macro- and micro-level factors associated with patterns of racial segregation in social networks offline are well examined, social scientists have yet to explore whether similar patterns appear within social media sites – online spaces that allow users 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" (boyd and Ellison 2007): 211). In regard to the capacity to facilitate interaction, social media spaces have unique constraints and affordances. While some sites are “nonymous,” meaning that users online self-presentation is strongly anchored in their offline social identity (Zhao, Grasmuck, and Martin 2008), others are more anonymous and allow individuals to strategically display or conceal parts of their offline selves and selectively reach out to others with or without the desire for reciprocation. Indeed, some have proposed social media spaces are in fact unique social contexts that constitute a “habitus of the new” where social structure and individual agency are perpetually co-evolving (Papacharissi and Easton 2013; Taylor-Smith 2012). Overall, the unique structure of social media spaces invites consideration of whether or not patterns of segregation within these spaces are similar to those observed within offline networks.

This analysis focuses on the composition of network ties within social media. It first reviews literature examining the role of structure and agency in the development of friendship networks and argues that social media spaces, particularly Twitter, may blur the role of these forces in shaping network composition. Within online contexts users interact in a social space where they are actively engaged in constructing their own "structure" in the form of norms and expectations (Papacharissi and Easton 2013; Taylor-Smith 2012). Moreover, within some sites users may have the opportunity to connect with others outside of their immediate offline social context, thus reducing the role of structural barriers affecting network integration. Indeed, many describe social media as being "borderless" – meaning that they facilitate communication patterns that transcend geographic bounds. While it is likely that online networks exhibit some degree of segregation, it is difficult to anticipate the patterns of segregation that may be observed. Furthermore, the degree to which these connections are formed as the result of opportunity or choice necessitates unpacking.

Results assess patterns of friendship segregation within Twitter – a popular microblogging space. Twitter is selected as a study context due primarily to the fact that Twitter offers directed rather than forced reciprocal ties, which help lower the cost of connecting with others and may encourage the formation of diverse networks. To explore segregation on Twitter, we first randomly sample a set of Twitter users, obtain information on the friends and followers of these users, and extract demographic information from these profiles using Face++ facial recognition software (www.faceplusplus.com) and crowdsourced human evaluations (McCormick et al. 2015). They then assess the same-race connectedness of black and white users, and unpack whether the levels of same-race connectedness we observe are likely the result of opportunity/proximity or user choice. Finally, to contextualize these results the analysis

compares racial composition of these networks to those reported for offline networks in nationally-representative survey data and related estimates from (DiPrete et al. 2011).

Results are intended to build upon both literature assessing same-race connectedness within associative networks, as well as literature exploring trends in social media use. Given the proposal that Twitter is a “habitus of the new” (Papacharissi, Streeter, and Gillespie 2013) where users co-negotiate the norms and appropriate uses of this site, the presence of segregation has important implications for whether Twitter is a ‘race neutral’ space.

1.1 Understanding Segregation Offline: The roles of structure and agency

Despite efforts to increase cross-race contact and promote diversity, racial segregation continues to be a defining characteristic of social networks (Hellerstein, Neumark, and McInerney 2008; Moody 2001; Quillian 2002; Quillian and Campbell 2003). In high school and middle school, adolescents are twice as likely to have a same-race friend as a cross-race friend (Moody 2001). The tendency to associate with similar others is taken by some as a near social fact (DiPrete et al. 2011), and this tendency often manifests along racial lines. Though the frequency of contact between individuals of difference races is increasing (Sigelman and Welch 1993), cross-race friendships are still relatively uncommon (Dunsmuir 2013; Mouw and Entwisle 2006; Sigelman and Welch 1993).

Explanations of factors driving racial segregation within friendship networks generally highlight one of two factors: structural constraints – such as redlining or racial steering (Massey and Denton, 1993) or individual agency - such as a preference to make friends similar to oneself (McPherson et al. 2001). These two factors are not mutually exclusive. A number of studies showcase the relationship between structural- and agency-based factors in creating racially segregated associative networks by highlighting, for example, how residential segregation

restricts individual friendship choices in schools by limiting cross-race exposure (Mouw and Entwisle 2006). The following sections will provide an overview of research that examines structural and individual factors associated with persistent racial segregation across offline contexts in the US.

1.1.1 Explaining Racial Segregation: The Structural Perspective

The publication of *American Apartheid* in the 20th century (Massey and Denton 1993) sparked a fresh wave of investigation regarding why segregation was so prevalent within the US, why this segregation persisted long after the formal dissolution of segregated spaces, and what sort of impact neighborhood-level segregation has had on the life outcomes for those within each segregated sphere. Examining how racial segregation persists on a macro-level invited scholars to consider factors that lead to the emergence and maintenance of racial segregation within associative networks as well. As a result, social scientists have dedicated a significant amount of effort toward understanding the structural mechanisms that lead to the development of segregated friendship networks.

The rise in popularity of suburban living and white flight from city centers influenced patterns of city-wide segregation, but this process was also influenced by institutional mechanisms such as redlining, racial steering and restrictive zoning (Massey and Denton 1988a, 1993; Muller c1981.). Despite the fact that overtly discriminatory housing and zoning policies have largely been dismantled, neighborhood segregation persists and the legacy of these policies still impact network formation. Many cities and towns remain heavily segregated, which reduces opportunities for same race contact through schools and everyday interactions. Massey & Denton (1988) highlight that as a result of these forces minority members of a population may be spatially distributed in a way that renders them underrepresented in some geographic areas and

overrepresented in others. These patterns of overrepresentation and underrepresentation have unique behavioral and social implications - particularly in regards to individuals' interracial exposure and the resultant likelihood of individuals of different racial backgrounds being connected through the same social network. Furthermore, existing literature addresses the importance of neighborhood in helping individuals establish social ties and build social capital (Sampson, Morenoff, and Gannon-Rowley 2002), meaning that segregated neighborhoods are in part responsible for building segregated networks.

Shifting the structural explanation of racial segregation in associative networks from the residential level, (Moody 2001) seeks to explain what school structures promote segregation among students. He hypothesizes that the way in which classes and extracurricular activities are organized within the school directly impacts interracial contact, and in doing so likely accounts for within-network segregation. Incorporating both school structure and neighborhood structure into their explanation of racial segregation, (Mouw and Entwisle 2006) examine why racial segregation persists in schools even after repeated attempts to diversify the student body. These authors find that approximately one third of the segregation found in schools is attributable to residential segregation. Students are more likely to be friends with other students within their immediate residential proximity (a distance of 0.25 km or less – a trend they refer to as the “bus stop effect”), and that those within their immediate proximity are usually of the same race. Despite the limited setting in which these analyses took place, all illustrate how structural forces guide patterns of interaction and consequentially influence the racial composition of individuals' social networks.

1.1.2 Explaining Racial Segregation: The Agency Perspective

In addition to understanding how structure influences the racial composition of

individuals' networks, we can examine this phenomenon from an agency or individual preference level as well. (McPherson et al. 2001) helped shift conversations about racial segregation within associative networks toward an agency-based perspective by emphasizing the tendency of individuals with similar characteristics to group together in a social setting. These authors state that homophily in social networks is exaggerated by factors such as family, propinquity, institutions, and isomorphic positions in social institutions, but it is nonetheless grounded in individual choices (McPherson et al. 2001). They find that rates of within-network racial diversity are generally much lower than would be expected if individuals chose connections at random. These findings suggest that in general, there exists low baseline homophily – homophily attributable to actual diversity in interpersonal exposure - and high inbreeding homophily – homophily attributable to individuals' preference to connect with similar others – within individual friendship networks.

Building on (McPherson et al. 2001)'s proposal that individuals actively make the choice to befriend others who are like themselves, (DiPrete et al. 2011) uses data from the 2006 General Social Survey (GSS) to determine if evidence of self-selected segregation appears not only along racial lines, but along dimensions such as political ideology, religious affiliation, and socioeconomic status (SES). These authors measure (1) how socially connected Americans are to one another (DiPrete et al. 2011) 235) and (2) how often these connections cross racial boundaries (among other factors). They found that Americans are highly segregated both within their core groups and among their acquaintances across all dimensions analyzed – including race - lending favor to (McPherson et al. 2001)'s homophily proposal. In regard to race specifically, evidence from this study suggests that while segregation along racial lines did not increase between 1970 and 2000, it also did not decrease despite repeated efforts to create residential and

educational conditions that enable cross-race friendship. These findings lend support to the idea that individuals often act upon the individual desire to seek similar friends.

Identity may also play a role in determining the racial composition of individuals' social networks. According to social identity theory, personal identity is heavily influenced by known membership within various social categories (Tajfel 1982). Memberships within some categories, such as racial groups, are more salient to self-concept than others; for these influential categories, individuals tend to favor "in-group" interactions over those with "out-group" actors (Goar 2007; Tajfel 1982). Even as legal and political divisions between racial groups have diminished over time, racial identity remains a strong factor influencing whether and how often, members of different racial groups interact (Goar 2007). As a result, racial identity continues to shape social interaction even in the absence of structural barriers separating members of different racial groups.

1.1.3 Addressing the Interdependence of Structure and Agency

Structure and agency influence network segregation in unique ways, but these factors are highly interdependent. While structure may influence cross-race contact, individual agency may influence who within that contact pool an individual may choose to befriend. A number of studies that examine racial segregation highlight this interaction. (Mouw and Entwisle 2006)'s study of racial segregation within schools, for example, cites residential segregation as a structural factor that influences patterns of cross-race exposure among students, but nonetheless implies the role of agency in prompting students to *choose* friends based on residential proximity. Similarly, (DiMaggio and Garip 2012) emphasize that residential segregation perpetuates facets of inequality directly related to race, such as SES. Residing and interacting within segregated settings impacts individuals' interpersonal exposure and influences their

friendship choice by constraining their contact pool (DiMaggio and Garip 2012).

As stated by (Martin and Dennis 2013) “there are no such 'things' as social 'structures,' 'classes', or indeed 'societies', yet terms such as these are indispensable, not only for sociologists but for the purposes of everyday communication” (14). This vocabulary provides a basis for understanding structure and agency as semi-stable entities. However, the fluidity and interdependence of structure and agency require researchers to understand how these forces influence opportunities for choice and behavior, especially in emergent contexts such as online social media spaces.

1.1.4 Structure and Agency Online

While the topic of racial segregation within social networks is well explored within offline spaces, little research has addressed whether comparable patterns of segregation exist within online spaces. Indeed, the key factors driving racial segregation offline (e.g., the historic legacy of discriminatory housing laws or a tendency toward homophily) may be non-existent or operate differently in social media spaces. It is difficult to anticipate the extent to which online networks would exhibit racial homogeneity. Furthermore, determining whether patterns of segregation are influenced by structural factors that shape exposure to other users or agency-based factors such as a preference for same-race connections requires significant unpacking.

There are some ways in which we might expect structural- and agency-based factors to foster patterns of segregation online that significantly differ from patterns that exist offline. Some social media – such as Facebook – may augment or parallel users’ offline connections (Wimmer and Lewis 2010). Twitter networks, on the other hand, may be composed of a mixture of users known offline and users known only through the website/platform (Duggan and Smith 2016). This may minimize the effect of offline structural constraints such as residential

segregation or administrative practices in schools. Additionally, it is difficult to predict how agency-based factors may operate within this space. Online spaces may be considered a “habitus of the new” (Papacharissi and Easton 2013) where social structure in the forms of norms and expectations along with individual agency are continually being negotiated and redefined (Little 2011; Martin and Dennis 2013). This process of rapid co-evolution renders it difficult to predict whether agency-based factors influence tie selection in similar ways online as they do offline. Moreover, individuals may strategically hide and reveal components of their offline selves online, which may complicate users’ ability to seek out or be found by users of the same race.

Despite the unique structure of online spaces and the apparent disconnect between online and offline social networks, it is also possible that the same structural- and agency-based factors that influence segregation offline have infiltrated online spaces. For instance, online users may choose to make connections with same-race friends as a way of confirming race as a salient social identity. In addition to this, existing literature suggests that online spaces are not immune to structural factors that influence racial inequality offline. Indeed, existing studies have shown that preferences for particular social media spaces are sometimes divided along racial lines (boyd 2011). Finally, regardless of a perceived online/offline disconnect, offline geography may still influence online relationships which may create online/offline similarities in patterns of segregation.

1.2 Racial Segregation Online

1.2.1 What Do We Know About Race and Friendship Online?

This study examines the extent to which segregation may be observed within online networks. Furthermore, it seeks to understand whether patterns observed are generated by opportunity or choice. Analysis focuses on Twitter, a social networking site unique in its directed

network relationships and sparse profile content. This paper examines the racial composition of egocentric user networks to compare the observed segregation of black and white users, unpack whether these patterns are driven by opportunity or by choice, and compare these patterns to known patterns of same-race connectedness in acquaintances offline.

A small body of existing literature has sought to address the extent to which user race is associated with segregated patterns of internet and social media use. Among the first of such studies were analyses of how race impacted users' preference for different social media platforms, broadly considering how users' demographic characteristics – including race – were associated with their choice of social networking sites. boyd (2011) used qualitative interviews to study how race played a role in users' decision to transfer their social media presence from MySpace to Facebook. Researchers have also considered how racial associations are displayed online. For example, (Thelwall 2009) examined patterns of homophily within MySpace by analyzing the relationship between users' characteristics and their frequency of interaction with similar users within their network. This work suggests that structural and agency-based forces that influence segregation may continue to affect cross-race exposure and friendship selection within these spaces. Hofstra et al. (2017) analyzed the ethnic segregation of Facebook ties in the Netherlands, and although their study is designed to analyze the composition of weak versus strong ties their findings suggest interesting patterns about how individuals choose to associate online – notably, that networks are often more segregated by ethnicity than by gender. Looking beyond social media sites McIllwain (2017) found that patterns of web traffic and site choice are more segregated than they would be by chance. Overall, evidence suggests that race produces patterns of segregation online by dictating how users engage with online spaces and with whom they connect.

While existing literature attempts to draw upon the advantages of social media to examine racial segregation trends online, there are important dimensions of online interaction that these studies do not address. Studies such as (Hargittai 2007) and (boyd 2011) offer insight into how the racial composition of social media may influence friendship choices by limiting cross-racial exposure on a given site, but they do not examine observed patterns of same-race connectedness within these sites. In addition, most studies do not consider sites in which ties between users are symmetric/mutual or asymmetric/directed. Establishing a mutual tie is likely to be perceived as costlier than establishing a directed tie, and it is possible that this requires a more intimate connection or stronger sense of certainty to initiate. Finally, these studies primarily analyze sites that contain rich and informative user profiles. It is unclear whether such patterns will emerge within more anonymous spaces.

Given this current gap in researchers' understanding of segregation within online spaces, this chapter seeks to examine same-race connectedness in Twitter, a social media space in which users' online networks may not necessarily parallel their offline networks, in which ties are directed, and in which profiles are sparse and variable. While it is likely that some level of segregation exists within this context, scholars have yet to examine what levels of segregation exist for users of different races on Twitter or predict whether these processes are driven by opportunity or choice. This study will address these questions and will also consider the challenges of: (1) sampling users from Twitter, (2) assessing users' demographic characteristics, (3) leveraging the diversity of tie relationships found on Twitter, and (4) determining whether the patterns observed are significantly different from those generated by opportunity and thus likely generated by choice.

1.2.2 The Twitter Environment

Twitter is a microblogging platform that allows users to post single photos, videos or links and text-based content containing 140 characters or less. Messages – called “tweets” – tend to focus on personal updates, humor, or thoughts on media and politics. This concise format allows users to update their blogs multiple times per day, providing a real-time depiction of their thoughts and experiences (Java et al. 2007). In addition to projecting thoughts, users can communicate with one another through private messages, by re-tweeting a post from another user, or by using the @ command to reach out reply to a post from another user. They may also contribute to broader conversations by including a *hashtag* identifier in their tweet. Users are shown tweets from accounts that they follow in a feed that is updated in real time. Twitter was originally intended to be used via mobile devices, but tweets can also be sent and viewed using other internet capable devices, including tablets and personal computers.

Network structure on Twitter is different than that of other well-known social networking sites such as Facebook. Whereas Facebook is characterized by mutually acknowledged friend connections and often parallel or supplement users’ existing friendship networks (Duggan and Smith 2016; Vitak, Steinfield, and Ellison 2010), the “Twittersphere” features directed network relationships that allows users to “follow” another user without considering whether that user will acknowledge or reciprocate the tie. The level of reciprocity in users’ networks varies significantly according to how he or she intends to use the platform. (Krishnamurthy, Gill, and Arlitt 2008) distinguish three types of Twitter users based on the structure of their associative networks. One group – the broadcasters – is characterized by a large number of followers but a small number of reciprocated ties. Acquaintances are users who tend to establish mutual ties with their followers. Finally, there are those who have small follower networks but follow a large number of users either to spam them (miscreants) or to gain followers (evangelists). Although

this taxonomy is a simplification of the types of unique personal network structures that exist on Twitter, it nonetheless represents what makes network formation on Twitter particularly diverse and unique.

1.2.3 Anticipating Patterns of Segregation within Twitter

Addressing the structure of networks and social ties on Twitter is critical to understanding why Twitter constitutes a unique space in which to study racial segregation. This structure suggests that Twitter users may not be subject to structural constraints that exist offline. According to previous research, macro-level, structural conditions – such as redlining or school tracking - play an essential role in understanding why patterns of racial segregation persist in other contexts (Massey and Denton 1988b, 1993; Mouw and Entwisle 2006). (Thelwall 2009) summarizes: “in the offline world there are many [structural] factors that promote baseline homophily of various types so that people encounter others that are more similar to themselves in some way than average for the general population” (221). Given that an estimated 85% of Twitter users’ networks are composed of users that they do not know personally or a combination of personal and non-personal connections (Duggan and Smith 2016), it is possible that structural factors perpetuating segregation are less influential or nonexistent within this space. Overall, while the offline world is structured along barriers and borders, Twitter is (in theory) relatively “borderless.”

As discussed previously, notions of structure and agency, while often highlighted separately in literature surrounding patterns of racial segregation offline, are actually fluid and inseparable. This is especially true of social media, where users actively create and maintain a normative “structure,” which reciprocally places constraints on their expressions of agency. We can frame an explanation of this condition within Twitter specifically in terms of *place* and

space. As described by (Harrison and Dourish 1996), *space* refers to the objective structure of an environment and *place* is what happens to spaces when users transform them into social settings with unique behavioral appropriateness, cultural expectations, and other normative constraints. Given this distinction, it is clear that Twitter not only differs from offline contexts in terms of *space* but also in terms of *place*. Within Twitter, the active, user-generated construction of *place* – an entity somewhat synonymous to Bourdieu’s notion of the “habitus” – blurs the line between structure and agency and renders the influence of each on network segregation ambiguous (Taylor-Smith 2012). Thus, aside from the structural differences in space between the offline social world and the Twitter community, the co-evolution of structure and agency within Twitter invites social researchers to consider the phenomenon of racial segregation and investigate whether it persists given the norms and expectations within this unique and evolving social place.

Despite the blurred relationship between structure and agency online, it is possible that what social scientists know about agency and patterns of friendship segregation may not change as these connections move online. Twitter users may still prefer to follow and/or communicate with others who are similar to them, and factors promoting homophily may persist even when opportunities to interact with diverse peoples expand in online social media spaces. According to (Sigelman and Welch 1993), the number of cross-race contacts in individuals’ friendship networks is determined at least in part by preferences and biases developed in early childhood. It is possible, then, that these preferences and biases will carry into online spaces and generate online networks that are just as segregated as users’ offline connections. In addition to this, it is possible that racial identity is such a salient social identity for users that they continue to seek out connections with others who affirm this identity within online spaces.

In addition to the influence of identity, existing research suggests that online spaces may not be immune to the social forces that guide patterns of segregation offline. boyd (2011), for instance, illustrates that offline forces may influence site choice and thus limit cross-race exposure within sites. Furthermore, while Twitter networks contain a more diverse mixture of known and unknown ties than Facebook (Duggan and Smith, 2016) some users may have networks that overlap heavily with their offline networks and thus carry racial homophily into this space. Overall, geography and distance may still matter in the age of the internet (Pflieger et al. 2010), and structural forces that guide segregation may exist within both.

2. DATA AND ANALYSES

2.1 Data

Data used for this study were collected using Twitter's REST application programming interface (API) - a quick but limited access point for gathering behavioral trace data directly from Twitter. The REST API allows researchers to access tweets created within the past nine days, core information about user accounts – including handles, profile photos, location, and more – as well as users' connections, interactions, and the timelines (or the aggregated text content of their profiles). Our data includes a sample of US based Twitter users and includes metadata for each user and the users they follow/are following. Throughout this analysis, we will refer to this set of sampled U.S. based Twitter users as *egos*, and those following and/or followed by the egos as *alters*. Those who follow the ego (incoming ties) are *followers*. Those whom the ego follows (outgoing ties) are *friends*. Ties that are reciprocated are *mutual*. Figure 4.1 provides an illustration of the data.

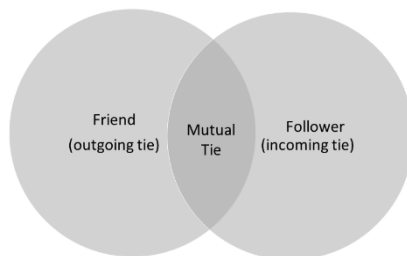


Figure 0.1 Network structure

Preliminary exploration of Twitter user IDs indicate that they are assigned in a largely linear and monotonic manner, but it is unclear whether each ID value is assigned sequentially. Given this, we use a keyword-based sampling approach that attempts to randomly select active users based on usage of randomly selected common keywords from Ogden’s Basic English word list (see: <http://ogden.basic-english.org/>). This method yielded a sample of 347,990 ID values from which the egos in our dataset were sampled. In total, we sampled 25,000 IDs at random from this set and successfully identified 23,150 of these ID values as those for active accounts.

In order to situate our findings within existing literature examining race within associative networks, we reduce our sample to include only users from the US. In order to do this, we rely upon the location data listed within users’ Twitter profiles. Although location is an optional profile field, many users choose to provide some indication of where they live. Because the content of the field varies greatly, this data does not lend itself well to automated analysis. For example, a user living in Washington state may list “Pacific Northwest” or “PNW” as their location, and a user from California may list “The Golden State.” Given this, we used Amazon’s Mechanical Turk (AMT)⁸ workers to identify whether a user’s listed location is a location in the

⁸ AMT is a marketplace for work that requires human intelligence and offers an efficient way to obtain answer to specific questions by defining new tasks (known as a Human Intelligence Tasks or HITs), which can be performed by online workers. AMT workers, or AMT workers, are anonymous, independent individuals who are identifiable only by their unique ID numbers. Previous research indicates that the AMT workers are skilled at a variety of tasks and are highly reliable experimental research subjects (Buhrmester, Kwang, and Gosling 2011; Mason and Suri

US. This yielded 15,594 accounts with information in the location field, 4,245 of which were confirmed by AMT workers to live within the US.

In order to draw comparisons between these results and existing literature regarding racial segregation within associative networks, only black and white users were selected for analysis. Using methods outlined by McCormick et al. (2015), we again used AMT workers to evaluate the race of the egos. Under this framework, each photo was displayed to three AMT workers, who were asked to estimate the race (i.e. black, white, Asian, other or unknown) and ethnicity (i.e. Hispanic/Latino or non-Hispanic/Latino) of the primary individual in the photo. AMT workers were also asked to identify whether the photo displayed an image of a person, a group of people, or something other than a person (a logo, pet, object, etc.). While we acknowledge that these estimates are based on others' impressions and in some cases be inconsistent with personal identity, research has confirmed that the AMT workers nonetheless provide estimates of users' approximate age, sex and race that correspond well with estimates provided by expert trained coders. This left us with a total of 561 black egos and 1,841 white egos to include in this analysis. We used Twitter's REST API to collect and save the ID values and metadata of each ego's friends and followers.

2.2 Extracting Demographic Information from Twitter Profiles

We use profile photo data to infer the demographic characteristics of users – egos and alters. Due to the cost and time required to infer demographic characteristics using AMT, we choose to probabilistically subsample the ties within each ego's network. Given that preliminary analyses indicated that the minimum non-zero same-race connectedness of egos is approximately

2012; McCormick et al. 2015) as well as skilled and demographically diverse survey respondents (Behrend et al. 2011).

12%, we determined that we were 95% likely to find at least five different-race friends by sampling approximately 65 ties (alters) per ego. Given this, for all egos with a count of unique friends and followers between 65 ties and the 95th percentile of tie counts (17457 ties) we randomly selected from their networks 65 unique alters. We also removed all egos with an alter count above the 95th percentile, and retained the full networks of egos with 65 alters or fewer.

After collecting and sub-sampling network data, we sample within our egos. In order to a.) ensure we are likely to detect a true average same-race connectedness difference between these groups of five percent or more and b.) render the inference of demographic information from these photos as efficient and cost effective as possible, we used a random quota sample to select 460 white and 460 black egos to include in the analysis. The network characteristics of the users included in this analysis (with full network ties rather than randomly subsampled ties) are displayed in Table 4.1.

Table 0.1 Characteristics of ego networks (prior to random subsampling)

Ego race		Follower	Following	Mutual
Black Users	Mean (SD)	1436 (1918)	1016 (1183)	619 (967)
	Min	7	0	0
	Max	16759	10061	9535
White Users	Mean (SD)	1375 (2002)	1054 (1457)	615 (1196)
	Min	0	0	0
	Max	13217	11316	9502

The race of the subsampled alters for these egos was estimated using a two-step process. First, drawing on the precedent of (Zagheni et al. 2014) the profile image URLs of the alters

were run evaluated using the facial recognition software API Face++⁹. Only results for photos that were estimated with 99 percent confidence or higher were retained. For photos featuring multiple faces, results were retained only if all users were estimated to be the same race, and the average confidence of the estimations met or exceeded 99 percent. This method captured approximately 9% of the total alters used. For the remaining alters, race was coded using evaluations from AMT workers and methods outlined by McCormick et al (2015). In total 98.6% of all alter photos were successfully coded.

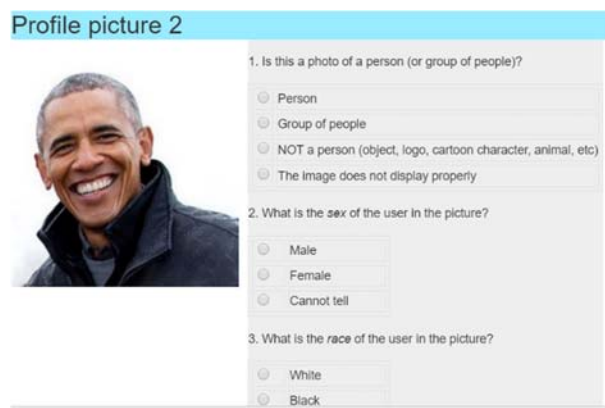


Figure 0.2 Example of coding task posted to Mechanical Turk

3. RESULTS

This analysis is divided into three parts. The first part provides a descriptive illustration and comparison of same-race connectedness among black and white egos. The second part seeks to unpack whether the patterns of segregation observed are generated by opportunity or by choice. The third part contextualizes findings by comparing measures of segregation within sampled Twitter networks to data from a 2006 GSS module that asks respondents to estimate the proportion of their acquaintanceship ties that are the same race as themselves.

⁹ Face++ offers a public API for Automated Facial Recognition. See www.faceplusplus.com for additional details.

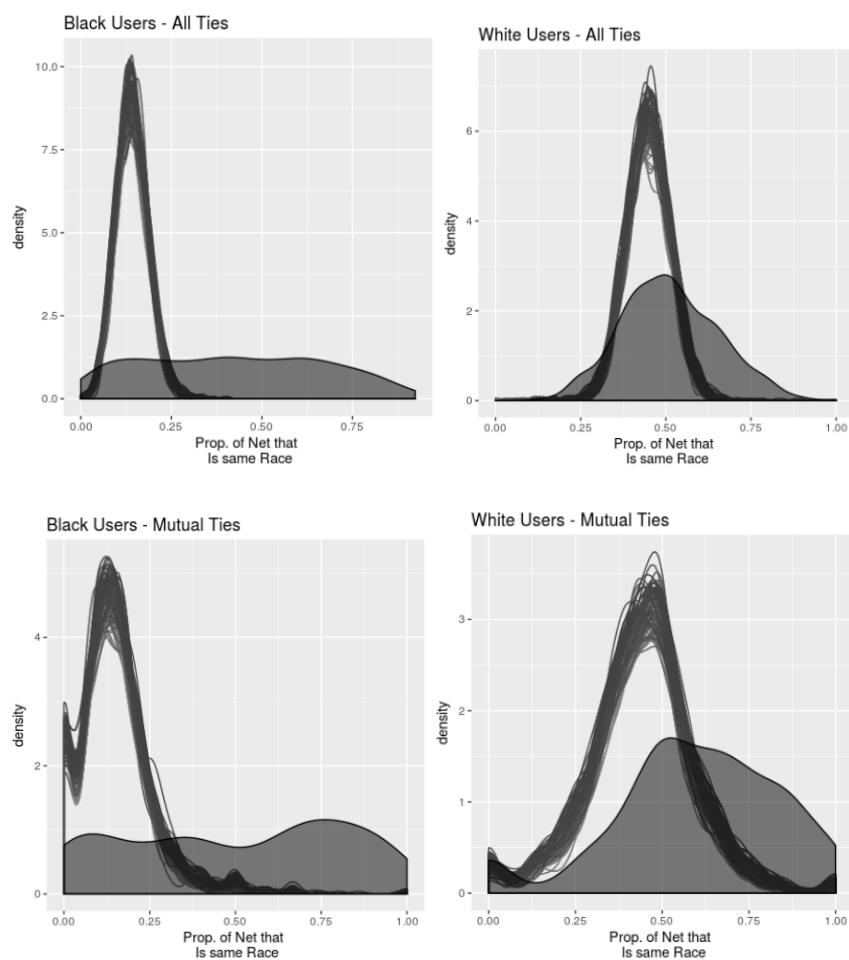
Within the context of this analysis, alters with the racial categorization “unknown” are treated as a separate racial category. Some alters may represent a brand or entity, and some may be private individuals who wish to present a version of themselves within Twitter that does not accurately reflect their racial identity (Nakamura 2013). Because some alters whose photos are categorized as “group” or “person” lack clear racial categorization due to picture quality or content and thus fall into the ‘unknown,’ category, we perform sensitivity analyses for portions of these findings that classify these users as either all white or all black (see *Appendix B*).

As mentioned previously, Twitter is unique from sites such as Facebook in that it features directed ties. On Twitter, a user may elect to follow another user without consideration of reciprocation. This unique structural trait facilitates a variety of usage patterns and friendship types on Twitter. As described by (Krishnamurthy et al. 2008) friendship patterns on Twitter appear to be motivated by either a desire to establish interpersonal connections (termed by Krishnamurthy et al. As 'acquaintances') or a desire to gather and/or spread information (termed 'evangelists'/'miscreants' and 'broadcasters', respectively). This study seeks to leverage this unique structural feature of Twitter and analyze patterns of segregation by tie type. The following analyses consider the ego’s outgoing ties – those whom the *ego is following* - as an expression of friend preference. It treats *mutual* ties between ego and alters as the strongest available connection –something akin to acquaintanceship within this space. It acknowledges that while incoming ties – those who *follow the ego* - reflect very little about choice on the part of the ego, they nonetheless provide important context about the ego’s broader network.

3.1 *Black and White Same Race connectedness by Tie Type*

To help understand whether the openness of Twitter helps facilitate diversity within

users' networks, we first compare the same-race connectedness of black and white egos by tie type (i.e. all unique alter ties, alters followed by the ego, alters following the ego, and mutual connections between the ego and alter). Examining these patterns by tie type lends valuable granularity to our understanding of same-race connectedness within Twitter, as tie directionality may be related to the strength and nature of the relationship between ego and alter. Results of this analysis are shown in Table 4.2. Observed distributions appear filled in Figure 4.3



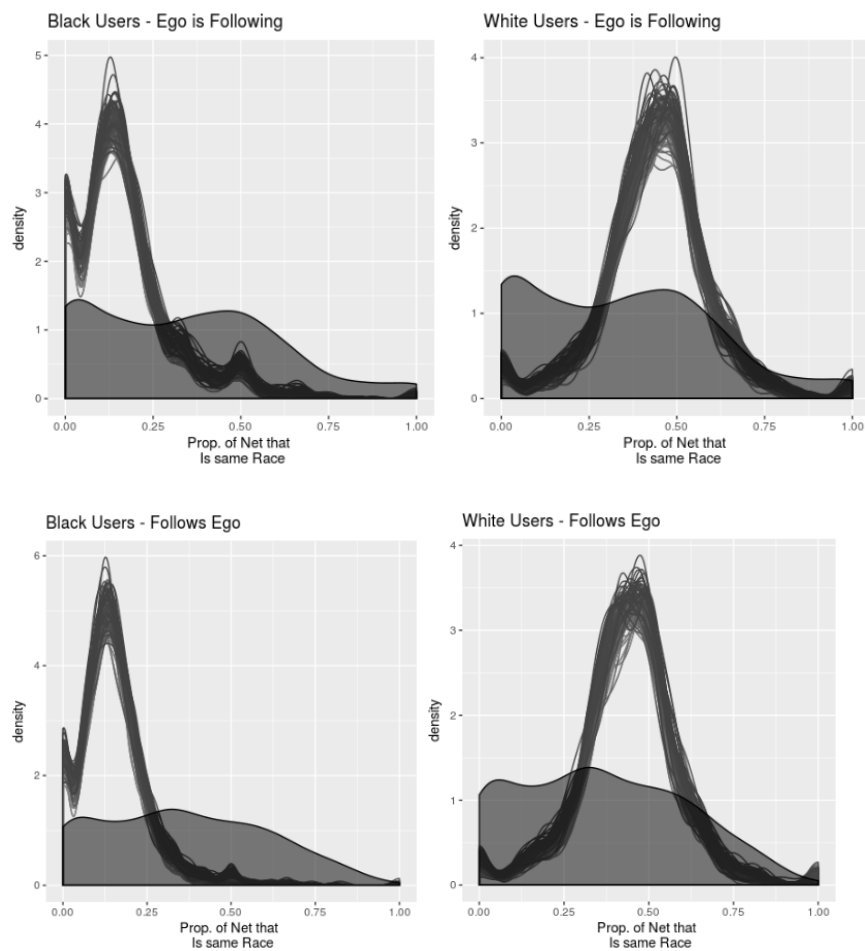


Figure 0.3 : Black and white egos same-race connectedness by tie type (fill=observed)

Table 0.2 Same-Race connectedness for black and white egos by tie type

	Mean	SD	Lower quart	Upper quart	Min	Max
Black egos						
Total ties	0.423	0.246	0.206	0.626	0.000	0.923
Mutual	0.498	0.316	0.200	0.778	0.000	1.000
Friend	0.340	0.268	0.106	0.500	0.000	1.000
Follower	0.358	0.247	0.145	0.550	0.000	1.000

White Egos						
Total ties	0.512	0.141	0.415	0.616	0.143	0.892
Mutual	0.597	0.239	0.467	0.769	0.000	1.000
Friend	0.446	0.218	0.307	0.583	0.000	1.000
Follower	0.461	0.201	0.333	0.600	0.000	1.000

Viewing the distribution of black and white same-race connectedness by tie type observed on Twitter (see filled distributions in Figure 4.3) we note that the same-race connectedness of white egos generally follows a normal to slightly positively skewed distribution, but the distribution of same-race connectedness among black users is more uniform across tie types. These striking visual differences indicate that the way in which users experience Twitter as a diverse social space varies by race. T-test comparisons of the average same-race connectedness of black and white egos (displayed in Table 4.2) indicate that there are strong black/white differences in same-race connectedness across all tie types. The difference in same-race connectedness between black and white egos appears to be strongest when considering those whom the ego follows. Under this criteria, black egos follow significantly fewer same-race connections than do white egos ($t=-7.44$, $p<0.001$). Black egos also have significantly fewer same-race mutual ties ($t=-6.453$, $p<0.001$), same-race followers ($t=-5.71$, $p<0.001$), and total same-race connections ($t=-11.622$, $p<0.001$). Sensitivity analyses in Appendix A reflect these trends as well.

Given the unexpectedly uniform distribution of observed same-race connectedness for black egos, we elect to engage in a close, qualitative analysis of egos on either extreme of the homophily distribution for total ties. Examining the ten black egos with the most and least

homophilous networks, we note significant disparities in Twitter use. Egos with remarkably low levels of homophily appear to primarily represent older users and users who engage with the Twitter audience as a means of promoting a personal business or brand. Those with high levels of homophily, however, appear to use Twitter as a purely social platform, providing personal details and updates on their personalities and lives.

3.2 Opportunity and Choice within Friendship Networks

While finding black/white differences in same-race connectedness for egos in this sample indicates that there is a racial divide in how users experience the potential diversifying effects of Twitter, these patterns could be driven by the fact that black users are still a minority on Twitter and are less likely than white users. Given this, compared the distribution of same-race connectedness observed among egos to the distribution of same-race connectedness we would expect if they chose friends without regard to race. This lends depth to the analysis by lending insight into whether users select same-race friends due to propinquity or choice.

This analysis acknowledges the challenge of defining opportunity in Twitter due to the fact that a.) Twitter algorithmically suggests users to follow and b.) it is unclear to what extent users' offline and Twitter social connections overlap. However, it conceptualizes Twitter as a bounded social space and examines interactions only as they occur within this space. Furthermore, it assumes that in absence of a preference for homophily, users will select connections from a pool of other users with a given racial distribution.

To detect whether egos choose connections through opportunity or choice, we begin by simulating what users' networks would look like if they selected friends at random. Within each tie type for each user, we generate 100 simulated networks that select friends according to their estimated proportion within the Twittersphere. For instance, if the Twittersphere is

approximately 45% white, then the expected probability of selecting a white friend is 0.45. We then compare the distribution of these simulated networks to the distribution of observed same-race connectedness within our data. Results of this analysis are displayed in Figure 4.3; transparent distributions represent simulated ties and filled distributions represent observed ties. If observed data deviates from these simulated distributions, then we may assume that observed same-race connectedness is the result of choice rather than opportunity.

Table 0.3 Mean same race connectedness among observed, simulated networks

	Observed	Simulated
Black egos		
Total ties	0.423	0.142
Mutual	0.498	0.145
Following	0.340	0.160
Follower	0.358	0.144
White Egos		
Total ties	0.512	0.448
Mutual	0.597	0.439
Following	0.446	0.438
Follower	0.461	0.441

When considering users' total connections, the observed and simulated same-race distribution of white egos are both normal with similar means, although the observed data displays a slightly wider standard deviation than the simulated data. The observed and simulated distribution of all ties for black users, however, is markedly different. While the simulated distribution is normal with a mean near the estimated total proportion of black users within the

Twitter population, the observed distribution of same race connectedness is notably uniform. These results alone suggest that many black Twitter users are more likely than white users to seek out and establish connections with same-race others.

When observing mutual ties, it seems that both black and white egos have a tendency to prefer same-race connection. For black and white egos, the observed same-race connectedness of mutual ties displays a more positive skew than the simulated data. Again, this effect seems stronger for black egos, as the simulated distribution appears normal and the observed data more uniform. When considering asymmetric (i.e. following and follower) relationships, Twitter seems to have a diversifying effect for white egos. Often times these egos have fewer same-race friends than we would expect if they chose friends at random. This is not the case with black egos, who seem to have on average more same-race connections than would be expected if they chose friends without regard to race. Taken together, these results suggest that even though Twitter opens the opportunity to create low cost networks, establishing ties – especially 'close' mutual ties – with similar others remains important for many black egos.

To further understand how choice operates to influence network composition, we draw upon the capabilities of the Twitter API to examine the sequence in which users select ties. It is expected that the Twitter API returns friendship connections in the approximate order in which they are established. Given this, we are able to view whether there is an association between the sequence of users' connections and the race of these connections. Primarily, we are interested in viewing whether users initially give preference to same-race connections and then diversity.

To examine this, an ego's connections are coded as "1" if they are the same race as the ego and "0" if they are not. If these connections are plotted by sequence, then a user who initially exhibits a strong preference for same-race connections but whose network diversifies over time

would display a negative correlation (see Figure 4.4). We may think of initial homogeneity may be a reflection of the user's unfiltered preferences, and the diversification of their network over time may emerge as a consequence of finding connections through others.

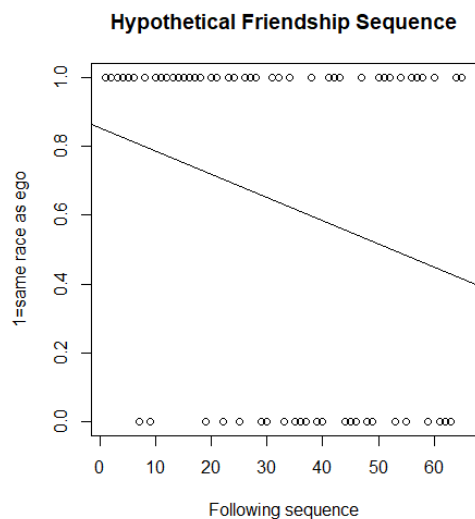


Figure 0.4 Friendship ordering sequence for hypothetical user.

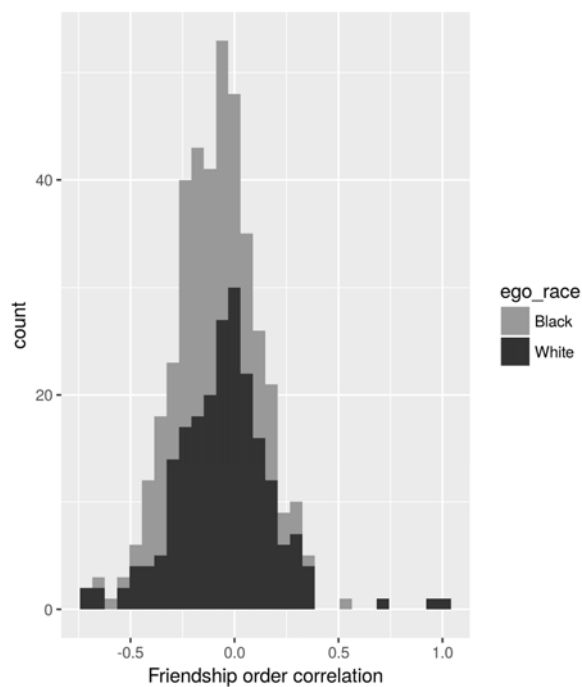


Figure 0.5 Distribution of friendship order/correlation by ego race

We find, however, that sequence does not play a strong role in friendship choice. Indeed, the average correlation between same-race connection and friending sequence is -0.11 for black egos and -0.05 for white egos. This indicates weak initial inclinations toward homophily for egos of both races.

3.3 Comparing Measures of Segregation on Twitter to Measures of Segregation Offline

The previous sections of this analysis illustrate racial differences in same-race connectedness within Twitter and provide some indication of whether Twitter users actively seek out same-race connections on this site. To help ground these findings within existing research regarding racial segregation in associative networks, we also consider whether the racial composition of Twitter networks parallels that of offline associative networks. We compare measures of same-race connectedness among sampled egos to measures of same-race connectedness among offline acquaintances as reported by the 2006 GSS special module on social connectedness.

The 2006 GSS module used in this analysis asks respondent to estimate the number of friends they have that are of their own race on a scale from 1 (almost all of them) to 5 (almost none of them). In contrast to the exact, observed measures in the Twitter data, the measures provided by the GSS acquaintanceship data are ordinal. In order to draw rough comparisons between the two, however, we consider the 1 to 5 measures to be equivalent to a 0-100% scale. Table 4.4 illustrates the average percent of same-race acquaintances for respondents of each race calculated using midpoint estimation (i.e. 5=90%, 4=70%, 3=50%, 2=30%, 1=10%) (N=1206).

Table 0.4 How many of your acquaintances are of the same race as you?

	Almost all are same (1)	Most are same (2)	About equal (3)	Most are not same (4)	Almost none are same (5)	Average Score Average.	Percent approx. using midpoint estimation
Black	48	48	66	14	5	2.34	63.3
White	379	459	162	16	9	1.84	73.1

Note: Table 4 displays the responses from the GSS to the question “Are the people that you are acquainted with 1.) Almost all the same race as you 2.) Mostly the same race as you 3.) About evenly divided between the same race as you and other races 4.) Mostly a different race than you 5.) Almost all a different race than you”

In order to draw a comparison between the measures reported by the GSS and data gathered from Twitter, this section focuses exclusively on egos’ mutual ties. While it is difficult to unpack the nuance and significance of friendships on Twitter, we may expect that mutual connections within this space are in some way similar to offline acquaintanceships - which the GSS defines as people whom the respondent would “stop and talk at for at least a moment” if they “ran into the person on the street or in a shopping mall.”

In this analysis we manage alters of “unknown” race in two ways. The first analysis (Table 4.5) treats “unknown” as a separate category from which egos may choose when selecting friends. The second analysis (Table 4.6) proportionally assigns the “unknown” users a racial category according to the racial composition of Twitter as estimated by the racial distribution of randomly sampled egos.

Results in Tables 4.5-4.6 indicate that if “unknown” cases are treated as a separate racial category from which egos can select acquaintances then both black and white networks are

significantly less segregated than they are offline. The effect for black egos, however, is less strong. However, if we proportionally assign “unknown” cases a racial identity, this difference changes dramatically. White Twitter acquaintanceship networks appear to be *more* segregated than offline networks under this adjustment. Black networks remain less segregated, but this effect is less strong than what is observed in Table 4.5.

Table 0.5 Average percent of each individual’s acquaintanceship network that is the same race as them (“unknown” as separate category)

	GSS (percent equivalent)	Twitter
White	73.1 (72.1 ,74.1)	62.6 (60.4, 64.7)
Black	63.2 (60.9, 65.6)	47.3 (48.2, 53.0)

Table 0.6 Average percent of each individual’s acquaintanceship network that is the same race as them (“unknown” removed)

	GSS (percent equivalent)	Twitter
White	73.1 (72.1 ,74.1)	80.5 (78.7, 82.3)
Black	63.2 (60.9, 65.6)	54.9 (52.3, 57.6)

The contents of *Table 5* suggest that Twitter does open the possibility of expanding the diversity of users’ networks. However, the desegregating effect of Twitter appears to impact white egos more strongly than black users. However, when combined with the results of *Table 6* we note that this desegregating effect may have more to do with a preference among white egos to connect with “unknown” accounts, which may represent entities, brands, and news sources rather than individuals.

4. DISCUSSION

This chapter seeks to contribute to broader understanding of patterns of racial segregation in associative networks within Twitter – a social context that may be somewhat disconnected from offline structural forces and features evolving usage norms. It acknowledges that users' online experience may be shaped by the users with whom they are connected, and notes that existing literature suggests patterns of internet and social media use may be segregated by race. While the analysis anticipates some evidence of segregation within this space, the way in which structure and agency are co-evolving within Twitter invites consideration of whether patterns segregation observed are significantly greater or lesser than those we would expect to see if they were generated by chance. Results imply whether patterns of segregation that existing within this space are due more to opportunity or to conscious choice on the part of users.

This chapter begins by noting that black and white users have significantly different overall levels of same-race connectedness within Twitter. Paralleling what offline data documents – in which white individuals have very high levels of same-race connectedness but black individuals display more diverse networks (Dunsmuir, 2013) – the white egos analyzed have overall higher levels of same-race connectedness than black egos. This pattern holds true for all tie types on Twitter, and is consistent across sensitivity tests included in this analysis.

Central to this analysis is the desire to analyze whether patterns of segregation observed within the data are more likely driven by opportunity or choice. To answer this, we simulate what egos' networks would look like if they selected friends at random. We note that the same-race connectedness of black and white users is consistently more negatively skewed than that of the simulated distributions, indicating that users do elect to select same-race friends within this space. This effect seems to be strongest among black egos, particularly in regard to their

selection of mutual ties. We do not find a strong association between the ordering of users whom an ego chooses to follow, and we find weak evidence that users have a preference to prioritize the selection of same-race ties (i.e., to connect with similar users first and diversify their network later). Overall, these results suggest that homophily does influence patterns of same-race connectedness within Twitter, despite the fact that Twitter offers the opportunity to diversify one's network at little social cost. However, this effect is strongest among black egos, and is most likely to manifest among mutual rather than directed ties.

Perhaps most interestingly we note that the tendency toward homophily varies significantly among black users. Among black egos analyzed the distribution of same-race connectedness across all ties and mutual ties is strongly uniform. This indicates that usage patterns vary significantly for black egos. While some users display highly diverse networks, others exhibit very high levels of same-race connectedness. A qualitative analysis of profiles among black egos indicates that many of the users who exhibit very low levels of same-race connectedness are either older users, or use their Twitter presence for self-promotion. Those with very high levels of segregation appear to use Twitter for purely social purposes. Overall, it appears that while homophily may exist on Twitter, its influence varies according to who is using the platform and for what purpose.

To help contextualize these findings within existing literature examining racial segregation in associative networks, this analysis also compares levels of segregation seen within Twitter to patterns of within-network segregation seen offline. Results indicate that despite the fact that individuals on Twitter still seem to exhibit a preference for same-race connections, they nonetheless have networks of mutual ties – or what we may think of as ‘acquaintances’ on this site that are more diverse than we see offline. This holds true for black users regardless of how

“cannot tell” cases are treated in the analysis. For white users, however, it only holds true if “cannot tell” is treated as a racial category that is unique to Twitter. These results suggest that in comparison with offline contexts Twitter may encourage users to reach out to others who do not outwardly belong to the same racial category as them, but that this effect is stronger for white users than for Black users. Some studies suggest that Twitter is a context for information gathering more so than social interaction (Duggan and Smith 2016; Kwak et al. 2010), so this difference may be attributable in part to a tendency among white users to engage with Twitter in this way.

Overall, these measures indicate that Twitter may indeed constitute a “habitus of the new” in which race places a less significant role in influencing users’ friendship choices. However, this freedom to choose friends of a different race appears to impact the network composition of white users more so than black users. It is possible that this unequal impact is due to the fact that for black users, race is a particularly salient social identity that remains so even within this new context (Rowley et al. 2008). This may influence black users to be more likely to a.) display their race to other users and b.) seek out friends who are of the same race as them. It may also influence them to seek out and interact with others who share their concerns and experiences regarding race, making the observed difference potentially an artifact of “Black Twitter” ((Clark 2014). In addition to this, it is possible that black users’ networks are more strongly connected to their offline networks than those of white users, and that this online-offline connection increases the influence of structural forces that perpetuate segregation within this space.

5. CONCLUSIONS, LIMITATIONS AND DIRECTIONS FOR FUTURE WORK

This chapter suggests that while Twitter may be a “habitus of the new” where existing norms – including those regarding the role of race in the development of interpersonal connections – segregation and homophily nonetheless exists within this space. Specifically, we note that many black users have higher levels of same-race connectedness than we would expect if they chose friends without regard to race. While they on average experience lower levels of same-race connectedness than white users, and have more diverse networks on Twitter than they report offline, we nonetheless see evidence of homophily. For white users, Twitter may have a somewhat diversifying effect, but results comparing Twitter networks to measures from the 2006 GSS suggest that this may be driven in part by a preference to connect with brands and other non-person entities on Twitter.

Online social media spaces, such as Twitter, are revolutionizing the ways in which social scientists are able to examine the social world. Social media sites can be viewed as emerging social contexts that provide social scientists new avenues in which to examine the role of social structure and norms on behaviors and attitudes. Despite its potential, social media data present challenges to social science research for a number of reasons. For one, these data are dynamic; not only must researchers be aware of changes in the way the platform stores information, but must account for the fact that users’ profiles and networks are constantly changing. In addition to this, different platforms have different affordances that restrict or permit the collection of particular types of user metadata. Additionally, social media spaces feature evolving patterns of use. Social scientists are responsible for tracking these changes and assessing the ways in which the current normative/cultural state of a social media space may impact their results.

The use of social media data to analyze the social world also raises unique ethical challenges. For one, because Twitter users as research subjects do not 'participate' in the research process in a traditional sense (Ang et al. 2013), researchers must reevaluate and redesign institutional review board (IRB) procedural standards regarding the ethical treatment of research subjects. While procedures such as informed consent are not realistic when handling datasets of tens of thousands of users, this does not mean that those managing, producing and analyzing the data should not consider how to best to mitigate harm, ensure beneficence and protect privacy. Furthermore, ethical data use may relate to the manner in which results are framed and disseminated. As (boyd and Crawford 2012) suggest, the practice and dissemination of Big Data research raises important questions about truth, power and control. It is the responsibility of the researcher to consider the relationship between the results of a study and the perpetuation of inequality.

The analysis of segregation within Twitter raises some unique methodological challenges. For example, not all users choose to display their race through their profile picture and it unclear how researchers should characterize these photos. In this study we treated individuals who choose not to display their race through their profile photo as belonging to their own category, albeit a category in which racial identity does not play a role. While we believe this serves our analyses well, future research may incorporate other metadata to estimate users' race. Additionally, while the automated detection of social media users' gender is well-addressed within existing literature (Burger et al. 2011; Liu and Ruths 2013; Mislove et al. 2011), estimating users' race or ethnicity with great accuracy remains a challenge. This study relies on human evaluation to assess the race of egos and alters. While this method ensure estimates are

accurate and reliable (McCormick et al. 2015), it nonetheless requires us to scale down the size of the sample used.

Another methodological challenge associated with the user of Twitter data stems from the fact that Twitter is a dynamic data source and that the structure of the site and content of users' profiles can and do change over time. The way in which Twitter tracks users and stores user information is not static and it is the responsibility of the researcher to keep up-to-date with changes to Twitter and the Twitter API. In addition to this, users change the content of their profiles quickly, so it is important to examine photo-based metadata as soon as possible following data collection. Further, it is the responsibility of those who use these data to develop sustainable methods of preserving snapshots of user metadata – including profile photos – over time.

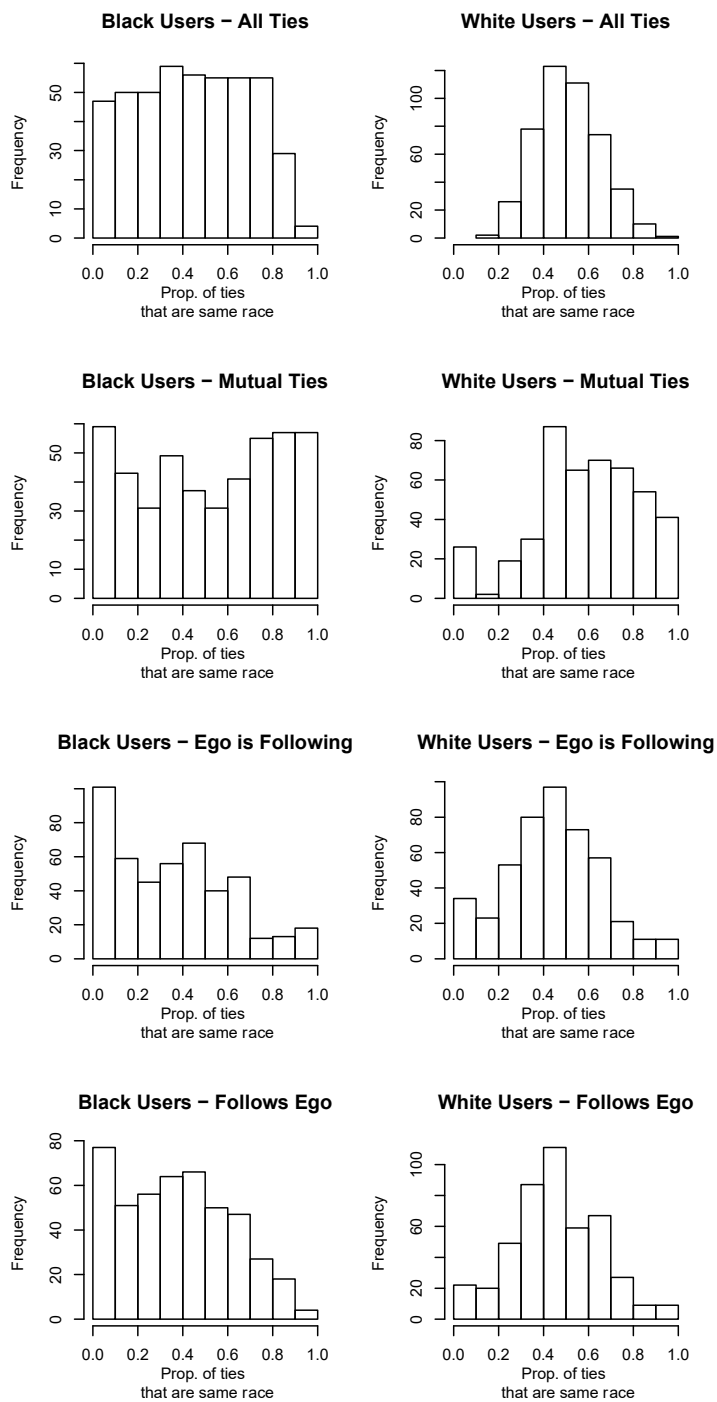
There are important limitations associated with these findings. For one, we recognize that these results cannot disentangle the influence of Twitter's friendship selection algorithms from the patterns of same-race connectedness observed. If these algorithms suggest friends that are similar to those already followed by or following the ego, then they may help perpetuate processes of segregation or diversification already in place. We do not believe this process strongly influences our results given that there seems to be little connection between friendship ordering and tie race, but it is nonetheless important to knowledge. We also cannot address the possible overlap between users' offline and Twitter connections. While (Duggan and Smith 2016) estimate that only a small fraction of Twitter users (15%) have pre-existing relationships with their Twitter ties, the presence of any online-offline network overlap has the potential to perpetuate forces known to influence patterns of same-race connectedness observed offline within this space.

Through future research we hope to not only examine egos' mutual follower networks, but networks of users with whom the ego communicates as well. It is possible that networks of communication wherein users mutually engage in conversation through private messaging or public interaction – which may be thought of as conceptually equivalent to networks of friendship or trust – are not as diverse as users' tie-based networks. Narrowing the focus of our analysis to users who mutually communicate with one another may change the levels of segregation reported within this study.

6. APPENDIX

Sensitivity analysis set 1: Comparing same-race connectedness*Sensitivity analysis 1A: All 'unknown' photos featuring people are assumed to be black*

Distribution of same-race connectedness for black and white egos



Same race connectedness: Black Egos

Tie type	Mean	SD	Lower quart	Upper quart	Min	Max
Total ties	0.448	0.245	0.234	0.651	0.000	0.923
Mutual	0.524	0.314	0.250	0.800	0.000	1.000
Following	0.383	0.272	0.182	0.571	0.000	1.000
Follower	0.363	0.248	0.195	0.5544	0.000	0.000

Same race connectedness: White Egos

Tie type	Mean	SD	Lower Quart	Upper Quart	Min	Max
Total ties	0.512	0.141	0.415	0.616	0.143	0.892
Mutual	0.597	0.239	0.467	0.769	0.000	1.000
Following	0.446	0.218	0.307	0.583	0.000	1.000
Follower	0.461	0.201	0.333	0.600	0.000	1.000

Mean B/W difference total: $t = -4.8718$, $df = 733.58$, $p\text{-value} = 1.356e-06$

Mean B/W difference mutual: $t = -3.9793$, $df = 857.47$, $p\text{-value} = 7.495e-05$

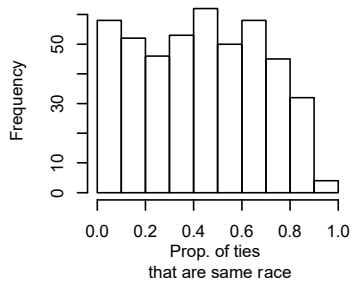
Mean B/W difference following: $t = -5.0829$, $df = 876.84$, $p\text{-value} = 4.545e-07$

Mean B/W difference follower: $t = -5.3073$, $df = 880.24$, $p\text{-value} = 1.409e-07$

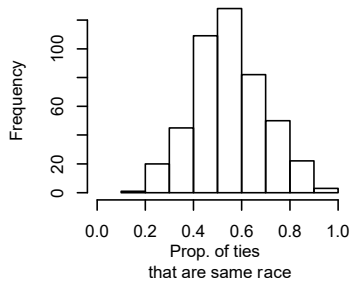
Sensitivity analysis 1B: All person unknowns are white

Distribution of same-race connectedness for black and white egos

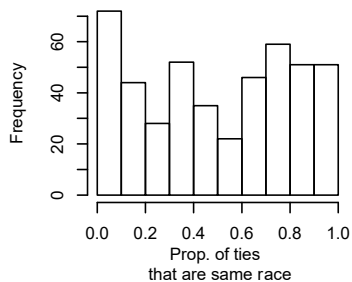
Black Users - All Ties



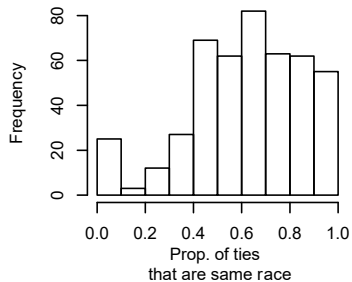
White Users - All Ties



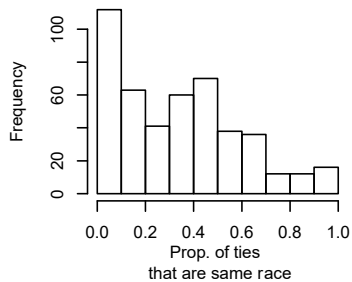
Black Users - Mutual Ties



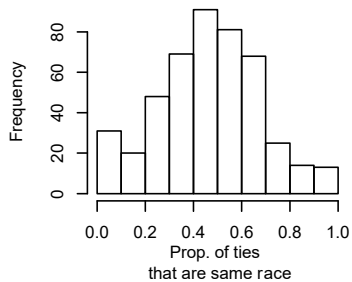
White Users - Mutual Ties



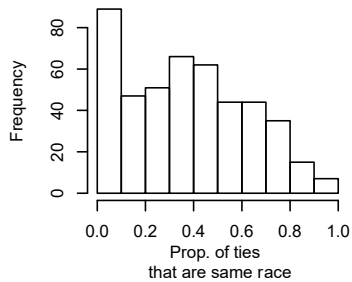
Black Users - Ego is Following



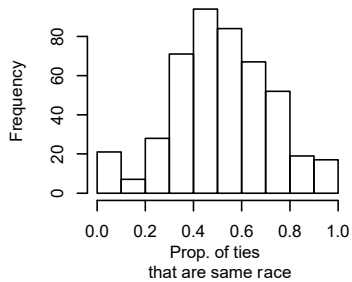
White Users - Ego is Following



Black Users - Follows Ego



White Users - Follows Ego



Same race connectedness: Black Egos

Tie type	Mean	SD	Lower quart	Upper quart	Min	Max
Total ties	0.423	0.246	0.206	0.626	0.000	0.923
Mutual	0.498	0.316	0.200	0.778	0.000	1.000
Following	0.340	0.268	0.106	0.500	0.000	1.000
Follower	0.358	0.247	0.145	0.550	0.000	1.000

Same race connectedness: White Egos

Tie type	Mean	SD	Lower Quart	Upper Quart	Min	Max
Total ties	0.552	0.145	0.452	0.651	0.164	1.000
Mutual	0.626	0.245	0.500	0.810	0.000	1.000
Following	0.472	0.223	0.333	0.654	0.000	1.000
Follower	0.523	0.212	0.400	0.662	0.000	1.000

Mean B/W difference total: $t = -8.8746$, $df = 734.21$, $p\text{-value} < 2.2e-16$

Mean B/W difference mutual: $t = -6.6883$, $df = 857.22$, $p\text{-value} = 4.071e-11$

Mean B/W difference following: $t = -8.0304$, $df = 888.39$, $p\text{-value} = 3.073e-15$

Mean B/W difference follower: $t = -9.3263$, $df = 886.13$, $p\text{-value} < 2.2e-16$

Sensitivity Analysis Set 2: Comparison to Random Connections

Sensitivity analysis 2A: All 'unknown' photos featuring people are assumed to be white

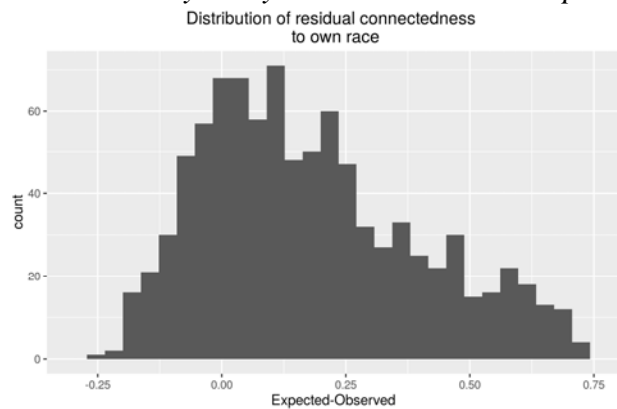


Figure 1: Residual Connectedness to Own Race

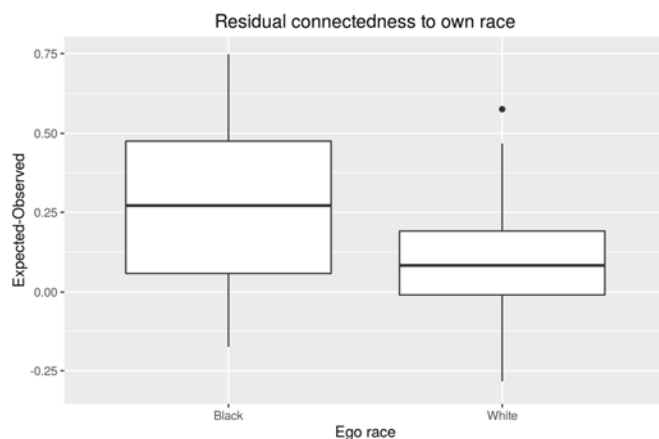


Figure 2: Black/White Residual Connectedness to Own Race

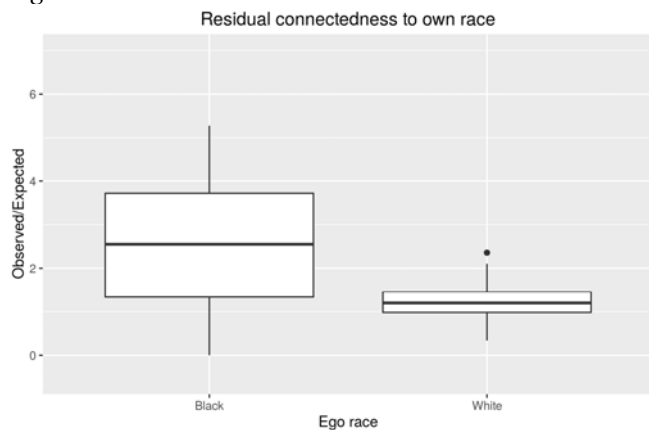


Figure 3: Black/White Residual Connectedness to Own Race (Scaled)

Sensitivity analysis 2B: All person unknowns are white

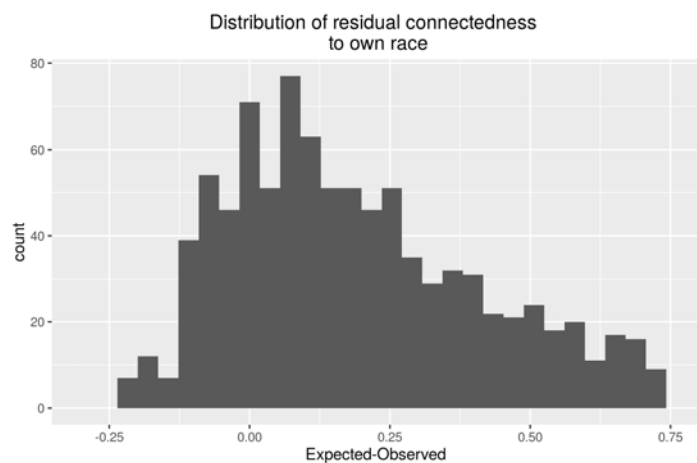


Figure 1: Residual Connectedness to Own Race

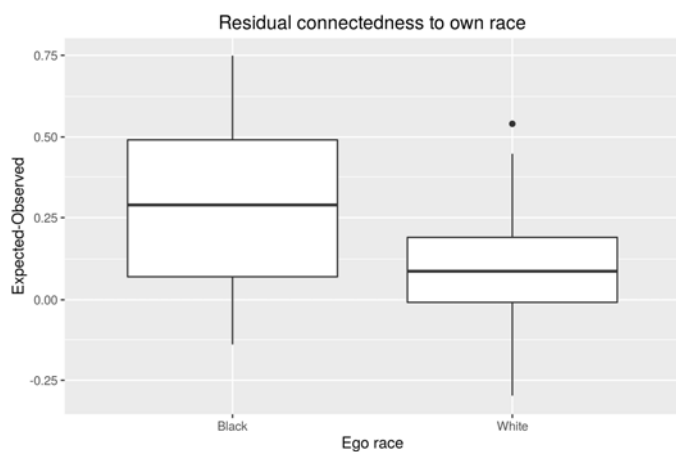


Figure 2: Black/White Residual Connectedness to Own Race

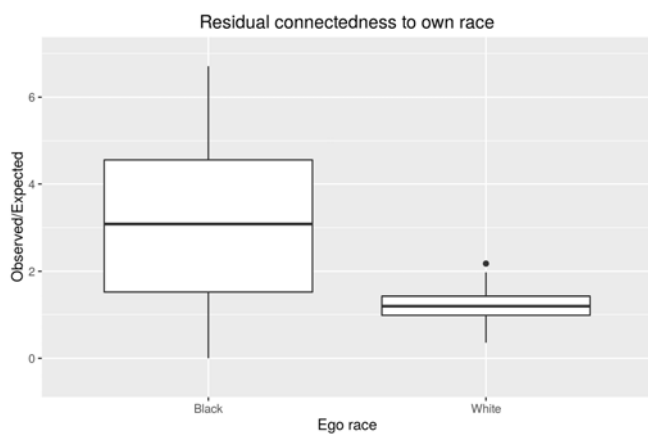


Figure 3: Black/White Residual Connectedness to Own Race (Scaled)

CHAPTER 5. CONCLUSION: WHAT DOES THIS STUDY TELL US, AND WHERE DO WE GO FROM HERE?

1. SUMMARY OF FINDINGS

Existing literature informs us that despite initial hope that the internet would act as a “great equalizer,” race is associated with differences in internet usage. While preliminary analyses of race and the internet focused on the so-called “digital divide” - or differences in internet access among demographic groups – this work implicitly but incorrectly suggests that increasing access for underrepresented groups will make online spaces more equitable (Fouché 2012). Research produced since then finds that race and identity are associated with differential patterns of use within embodied online spaces, regardless of the level of anonymity they provide (Grasmuck, Martin, and Zhao 2009; Nakamura 1995, 2008), and that race may influence site use within non-embodied spaces in a way that produces seemingly innocuous but clear disparities such as segregated patterns of website traffic (Burai 2015; McIlwain 2017).

Overall, it is clear that narrowing gaps in online participation alone does not generate race neutral contexts; those designing and using online spaces carry identities, experiences and biases into online spaces. These differences may manifest between sites – as documented by McIlwain (2017)’s analysis of racially segregated web traffic and boyd (2011)’s assessment of race-based site preference - or they may emerge within sites – as described by Grasmuck, Martin and Zhao (2009)’s determination that Facebook users engage in explicit and implicit ethno-racial identity displays as a means of combating the assumed whiteness of online spaces. Online interactions guided by race sometimes invoke immediate, negative social consequences such as harassment (Nesbit-Golden 2014), and confronting users with issues related to race has been shown to cause anxiety and discomfort (Condis 2015). Kolko and colleagues summarize this by

stating: "Race matters in cyberspace precisely because all of us who spend time online are already shaped by the ways in which race matters offline, and we can't help but bring our own knowledge, experiences and values with us when we log on" (Kolko, Nakamura and Rodman, 2002: 5). While some race-based differences in internet use may not have direct, negative outcomes for a specific group, in some cases the presence of divergent site use could create or perpetuate divisions or inequality

The goal of this study is to explore the ways in which use of Twitter – a flexible social media space that permits a variety of uses – varies by race. Analyses focus specifically on patterns of self-presentation, community building and site use. It recognizes Twitter as a “habitus of the new” in which users have the opportunity to co-create meaning and negotiate structure, and anticipates that this process may vary according to the identity of the user involved. Given past research it anticipates that there exists some racial variation in how users engage with Twitter as a social and information gathering space, and explores ways in which offline structural forces may manifest online and drive disparities in use within this context. It focuses specifically on black/white differences and draws upon literature regarding Black Twitter and black/white offline segregation to inform expected patterns of use. While findings may not speak directly to the ways in which Twitter use replicates offline racial disparities, it does address the extent to which Twitter is race-neutral and anticipates ways in which this lack of neutrality may produce or perpetuate inequality.

Chapter 2 approaches this question from the perspective of identity and self-presentation. It considers whether race is associated with differential displays of categorical identity – affiliation within a particular demographic group – or personal identity – identifying details about oneself that specifically make one easier to find on other websites or offline. Based

on previous literature, it notes that previous literature suggests minority users may be *more* likely to share categorical identity indicators given that doing so may increase chances of meeting similar others, but that they may be less likely to share personal identity indicators due to factors such as vulnerability to online harassment. It finds that when it comes to self-presentation decisions Twitter is in many ways race-neutral. White and black users are equally visible within this space. However, there is a subset of minority – often black – users who elect to share their racial identity explicitly or implicitly within their user narratives. In regard to personal identity indicators – factors that are perhaps more closely tied to considerations of privacy – there is evidence that white users are more likely than black users to provide a searchable full name. Given that black and white users appear to disclose social media and other web personal presences at equivalent rates, it may be that withholding a full name is a way for more vulnerable users to maintain a boundary between their online and offline selves. Thus, while Twitter is in many ways race-neutral when it comes to self-presentation, vulnerability related to user race and a desire to combat this neutrality through self-expression may still exist within this space.

In addition to examining self-presentation, Chapter 3 considers how patterns of site use may be associated with user race. It draws upon two sources of literature to guide expected patterns: the uses and gratifications framework, which is used often within communication studies and differentiates between informational and social motivations for site use, and existing literature examining the phenomenon Black Twitter, which highlights Twitter's social affordances and suggests for many black users Twitter is not a '21st century newspaper' but a place where users can go to establish friendships and build community. Findings explore whether there exists a quantitatively detectable subset of users that fit the activity profile of Black Twitter – as indicated by an emphasis on social versus informational site use and whether the presence

of racially-motivated divergent narratives in the use and purpose of Twitter indicate broad, structural differences in site use. Findings suggest that black and white users have structurally similar friendship distributions, but that a subset of black users have a much higher social interaction index (proportion of mutual to total ties) than white users, and that white users have on average higher information-seeking indices (proportion of verified outgoing ties – i.e. friends - to total outgoing ties). Findings also indicate that white users are more vocal and interactive within Twitter, which invites investigation into how the content of users' conversations is associated with community building. Thus, identifying Black Twitter as an emphasis on social rather than informational site use may be an incorrect dichotomy to draw, but results do signify critical differences in site use.

Chapter 4 builds upon Chapter 3 by acknowledging that 'typical' Twitter use is co-negotiated by users and, given this, it is important to consider to whom users are connected. It draws upon existing literature examining the role of structure and agency in patterns racial segregation offline and speculates how these forces may generate segregated user networks on Twitter. Using a dataset containing subsampled network ties for 400 black and 400 white users randomly sampled from Twitter, this chapter examines the extent to which users' observed same-race connectedness differs from patterns that we would observe if they selected friends without regard to race. Findings suggest that if we treat users with no visual racial identity as a separate racial category, then Twitter does have a diversifying effect for white users, but if these users are dropped networks are approximately as segregated than we would observe online. It also finds that a large proportion of black users have large volumes of same-race connections – particularly among mutual ties. This corresponds with findings from Chapter 3, in which the distribution of the proportion of mutual to total ties for black users is fairly uniform, and suggests that a subset

of black Twitter users may come to Twitter as a space for interpersonal connectedness. Similar patterns are not observed for white users.

Overall, these results indicate that there do exist some broad, structural differences in how black and white users engage with Twitter as a social and informational space. Some of these differences are aligned with the expectations provided by existing literature on Black Twitter, which suggests that Twitter is more of a community building platform for black users than it is for white users. We also note that while black and white users are equally visible on this space, white users may be more comfortable maintaining connections between their offline and Twitter ‘self’ and are more likely to broadcast outward within this space. In many ways, however, Twitter appears to be race neutral, meaning that black and white users exhibit similar patterns of patterns of behavior. They have similar profile grooming habits, are likely to retweet verified and non-verified accounts at similar rates, and appear to have structurally similar distributions of network ties.

2. IMPLICATIONS AND EXTENSIONS

It is important to note that while findings assess the ways in which Twitter may be race variant or race-neutral, race-neutrality on Twitter is not the same as race equity on Twitter. We can see a distinction between neutrality and inequality in relation to the use of Twitter as an information space. As Chapter 3 suggests, Twitter fulfills a variety of uses. This flexibility attracts individuals with different usage desires, but it also attracts organizations interested in spreading key messages to citizens and constituents. Emergency management organizations, for instance, have found that Twitter is an effective tool for spreading messages quickly in times of crisis (Wukich and Steinberg 2013). Transit organizations such as Bay Area Rapid Transit (BART) have utilized Twitter as a means of sharing timely information about traffic patterns and

responding to user complaints (Bromwich 2016). Individuals who use Twitter as a tool for social interaction may be less likely to receive these messages, and if there is a disproportionate number of minority users who engage with Twitter as a social interaction space this may lead to inequity in the spread of critical information.

While drawing the distinction between social versus information Twitter use may be an oversimplified or mis-identified dichotomy, findings in this dissertation do point toward the validity of the Black Twitter narrative as a framework for understanding key racial differences in Twitter use. Findings regarding segregation and social connectedness suggest that Twitter may have the capacity to unite users who belong to underrepresented and geographically disperse groups for whom group belonging is a salient identity feature. In regard to race, this relates to literature from Dawson (1995, 2015) and the intersection that this work identifies between political and racial identity. Although Sullivan and Ghara (2012) draw a distinction between group identification and group consciousness in regard to racial identification and its influence on political participation, Dawson notes that the importance of racial identity tends to supersede other identity dimensions when it comes to making political decisions, indicating that in regard to this identity facet group interest corresponds with individual interest. This may manifest offline through civic engagement. Twitter's reputation as a news site (Bilton 2013; Wexler 2014), coupled with its social affordances, may provide a ready platform for black users to aggregate and connect on common social and political issues. This may be revealed through further analysis of users' post content and whether topics discussed often center on issues of political identity, racial identity, or some intersection of the two.

One factor implicit in this work is the importance of Twitter's place in society. Despite the availability of social media outlets, Twitter has risen to unique prominence as a tool for

political engagement (Duggan and Smith 2016; Larsson and Moe 2012; Park 2013; Stieglitz and Dang-Xuan 2012; Tumasjan et al. 2010, 2010)), for information distribution (Bromwich 2016; Wukich and Steinberg 2013; Vieweg et al. 2010), and for friendship formation (Kwak et al. 2010; Java et al. 2017). It is a democratizing forum for individuals and institutions to assemble and express identities, interests and grievances in a common space. However, given recent declines in the stock value of Twitter (Meyer, 2017) we may imagine another forum taking its place. While the platform itself may have unique affordances that lend itself well to the functions it has assumed, Twitter functions as a social institution – a replaceable one at that. We may expect to see racially differentiated patterns of use emerge in other sites that, like Twitter, adopt a variety of functions. However, the fact that we see evidence of race neutrality in regard to many self-presentation and usage patterns – such as the extent to which black and white users are visible within this space – speaks to the fact that Twitter may be an outlet that invites novel patterns of social behavior nonetheless.

This work points toward the need to increase the volume of literature available that links what we know about social processes - including those regarding race - offline to what we observe online. It is likely that structural and agency-based forces operate within online spaces, but the extent to which online spaces – each as a 'habitus of the new' (Papacharissi and Easton 2012) – are likely to replicate or reshape these forces is difficult to anticipate. The reason for this most likely stems from digital dualism – or the tendency to treat online and offline spaces as contexts in which social processes are, to varying degrees, distinct (Jurgenson 2011; Jurgenson 2012; Maddox 2012). While the extent to which theorists acknowledge online-offline parallels varies, with some viewing online contexts as spaces that invite completely novel processes and some viewing them as augmented extensions of offline realities, there currently exists no

standardized framework for anticipating online/offline process connectedness. This dissertation, which is largely descriptive in nature, seeks to provide material that may guide our understanding of the way in which offline structural and identity processes related to race are carried into or modified by online spaces. However, additional descriptive and theoretical work is needed in this area to help guide future research examining the intersection of race and site use.

While this work examines a snapshot of Twitter activity, future work may consider how users' profiles and networks change over time. Data collection and storage efforts for this study were established in fall 2015 under the guidance and permission of University of Washington faculty. Through these efforts, metadata associated with users' profiles, user timelines, and user networks were collected every two weeks and stored in a secure, password protected database. This facilitates future work that considers how outcomes analyzed in chapters 1 and 2 change over time, which may lend itself to a more causal rather than associational analysis.

The small, survey samples used in Chapters 1 and 2 have unique advantages – namely, the ability to infer population processes, to engage in qualitative analyses of profile content, to utilize self-identified race, and to unpack pattern of behavior as observed within Twitter's dominant age-based demographic group. However, it is possible that expanding the data analyzed to incorporate a broader portion of the Twitter network will allow researchers to draw broader insights regarding structural differences in site use. This proposed expansion of research scope, however, would benefit from improved research regarding the automated demographic detection of social media users. There is a large and growing body of work that proposes automatically detecting the age, race and gender of social media users. Currently, literature on gender detection reports accuracy scores in the 0.90 to 1 range (Bergsma et al. 2013; Culotta,

Kumar, and Cutler 2016; Vicente, Batista, and Carvalho 2015). However, detection of age and race lag behind these metrics. While some age prediction papers achieve accuracy scores between 0.70 and 0.90, they do so by using coarse measures – for instance, above/below 18 (Tuli 2015), and within-category performance suffers from a tendency to conflate age with life stage (Nguyen et al. 2014). Race prediction remains in its infancy. The earliest studies on the automatic prediction of social media user race did not emerge until 2010 (Chang et al. 2010) and existing work features a number of significant roadblocks - such as low within-category prediction rates, a reliance on large volumes of difficult-to-scale user text, and a tendency to conflate race and ethnicity. Pennacchiotti and Popescu (2011) achieve a macro F1 score of 0.78, but only by predicting whether Twitter users were black or not black. Chang et al. (2010) present a highly scalable approach to predicting race in the United States using census data and Bayesian estimation, but this method is prone to algorithmic bias and has a notable tendency to over-predict white users. Overall, techniques for the automated prediction of user race must improve before studies of a similar nature are conducted on a scale that utilizes the extensive, interconnected nature of Twitter data. In the meantime, more researchers may consider linking social media related questions to representative surveys.

These findings also invite researchers to consider the way in which the content of users' conversations impacts their capacity to generate community. We note that for some black users, Twitter appears to be very much a social space. However, we do not see distributions of retweeting and mention frequencies that might correspond with these highly social users. It may be that what augments a user's social experience is not the frequency with which they interact with others, or the overall volume of ties they have. The content of users' conversations may be more indicative of their community experience. Interviews from Clark (2014) suggest that

intimate communication between online ‘friends’ contributes to users’ community experience. Sharma (2013) suggests that community forms when users interact and share tweets based on common hashtags. Given this, future research may track networks of direct communication between users, as well as compare themes and hashtags discussed by users and their immediate networks.

Future work may explore how members of other marginalized or underrepresented communities – racial or otherwise - engage in self-presentation and community formation on Twitter. Given that analyses are grounded in work regarding both black Twitter and black-white segregation, this study elects to examine only black-white differences in Twitter use. This scope is limited and does not fully acknowledge the potential complexity of the relationship between racial identity – which is itself a structurally and individually complex concept – and Twitter use. Findings highlight potentially interesting differences, for instance, in the site use of white versus Asian users. For example, Asian users are less likely than white users to display a profile photo through which others can assess their race, and this difference is nearly significant. Similar to black users, Asian users are also less likely to retweet or tweet at others than white users. Findings from Chapter 3 also indicate that users who identify as LGBTQ+ are less vocal and interactive than straight/heterosexual users. Taken together, these findings suggest that Twitter may not be a context in which all users are equally comfortable being visible and/or vocal. Further analyses may unpack these trends.

Further analysis may look beyond Twitter. As websites become increasingly social, users are confronted with the significance of their offline identity within them. This invites exploration not only of other social media sites, but of any profile-based website. Take for instance recent controversy regarding the race-salient mistreatment of clients on the popular

room sharing website Airbnb (Martin, 2015). It is possible that the experiences of users who encountered discrimination within this space have encountered similar incidents through other profile-based apps and sites that contribute to the sharing economy – such as the ridesharing services Uber or Lyft. Understanding how race contributes to the use of these online social spaces has important implications for how companies – social media based and otherwise – should design their websites to ensure better experiences for future users.

Finally, future work should consider the role of algorithmic steering in creating divergent patterns of use. There is growing recognition that social biases are sometimes knowingly ‘baked in’ to algorithms designed with objectivity in mind. A prominent example of this is the COMPAS algorithm, which is commonly used in the context of parole hearings to predict rates of recidivism and was found by Angwin et al. (2016) to be consistently biased against black defendants regardless of past criminal history. Work from McIllwain (2017) suggests that similar algorithms may be partially responsible for generating segregated patterns of web use. McIllwain notes that individual websites or clusters of interconnected sites may project subtle clues that they are for or not for particular demographic groups. Similar to the way in which the World White Web project identified racial bias in image search results (Burai, 2015), McIllwain finds that searching for news on Google often pushes news sources that have a small but noticeable white perspective skew to the top of the list. Similar forms of steering and in-group boundary maintenance may be responsible for generating segregated spheres of Twitter use as well. Future work may unpack these processes by closely examining the content of users’ networks and how they change over time.

Ethical Implications of Social Media Research

The use of digital data poses unique ethical challenges for social science researchers. To begin, participants sampled from within social media sites do not “participate” in research in a

customary sense (Ang et al. 2013). Traditionally, researchers would engage in informed consent and communicate participants' anticipated risks and options for leaving the study. Currently, standards of data ownership and site usage agreements govern how users' data may be used and may apply to hundreds of thousands or millions of participants. However, these standards vary by site and internet users may not take the time to investigate and fully understand their role in data ownership.

Privacy is another critical ethical challenge associated with the use of digital data. As existing research exemplifies, even when researchers take steps to de-identify the participants in their sample the fingerprint-like nature of individuals' idiosyncratic digital data sometimes allows them to be found. This breach of privacy happened most prominently in the Tastes Ties and Time project – a research initiative through which researchers gathered, analyzed and released a dataset containing public Facebook information for an entire cohort of undergraduate students that was quickly de-identified by other researchers (Wimmer and Lewis 2010; Zimmer 2010). Extra measures should be taken to ensure privacy is upheld, including presenting only aggregated results, using extreme caution when linking digital data to other sources (Rivers and Lewis 2014), engaging in the ethical fabrication of qualitative information (Markham 2012), and generally exercising respect for the circumstances in which the data were generated (Rivers and Lewis 2014). This study seeks to engage in these practices but acknowledges that additional work is needed to ensure the exercise of beneficence toward digital data research subjects.

Beyond individual privacy, existing work should also be aware of the ethical challenges associated with the disclosure of group status. The concept of *group privacy* has emerged in recent years in reference to the ethical implications of big data research. This concept suggests that identifying users as members of a particular group could have important implications for the

treatments of these groups (Floridi 2014). One typical application of this concern involves users who are unfairly targeted by particular advertising campaigns, but implications may extend well beyond marketing. If their collective behavior is profiled, groups may unknowingly find themselves manipulated in the context of critical collective events such as election campaigns (Zwitter 2014). While this work finds that in many respects Twitter is a race-neutral context, it is nonetheless important for researchers who might utilize usage differences identified through this study to do so under full consideration of the ethical implications of their actions.

2.1 Concluding Statement

Overall, this dissertation is one small contribution to the somewhat neglected study of race and the internet. **It is this author's hope that others will recognize the need to acknowledge that social media experiences are not uniform and more deeply consider the ways in which offline identities may shape their online lives.** Race is one dimension along which this association may be analyzed. There are other salient identity indicators to consider as well. This and other work tells us that increasing online access alone is not an immediate route to diminishing demographic inequality or creating a more unified society. Research must continue to unpack how users' offline identities are associated with their online experience, and how differential uses of online spaces may perpetuate or create divisions, unequal or otherwise. If these goals are achieved, researchers may better consider how Twitter - and other online spaces - may be used to promote social good.

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VITA

Nina Cesare received her Bachelors of Arts in Sociology at Ohio University and her Master of Arts in sociology at the University of Washington. Her research uses unsolicited digital data to understand both how social processes operate within online spaces, as well as how individuals engage with institutions and/or issues within these spaces

