

Too Much of a Good Thing? The Relationship Between Number of Friends and Interpersonal Impressions on Facebook

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A central feature of the online social networking system, Facebook, is the connection to and links among friends. The sum of the number of one's friends is a feature displayed on users' profiles as a vestige of the friend connections a user has accrued. In contrast to offline social networks, individuals in online network systems frequently accrue friends numbering several hundred. The uncertain meaning of friend status in these systems raises questions about whether and how sociometric popularity conveys attractiveness in non-traditional, non-linear ways. An experiment examined the relationship between the number of friends a Facebook profile featured and observers' ratings of attractiveness and extraversion. A curvilinear effect of sociometric popularity and social attractiveness emerged, as did a quartic relationship between friend count and perceived extraversion. These results suggest that an overabundance of friend connections raises doubts about Facebook users' popularity and desirability.

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New forms of computer-mediated-communication (CMC) are raising questions, about the relationship between communication activities and interpersonal judgments. Communication technology has evolved beyond the means by which senders had more or less complete control over the impression-related information that receivers could observe. With the advent of new social technologies, users no longer have to rely on an individual's self-composed emails, chat statements, or personal web pages to garner impressions about a subject. Users employ strategies unique to CMC including browsing archived transcripts of discussions and chats, surfing personal and institutional web sites, or using search engines to uncover a variety of

information repositories (e.g. “googling”) (Ramirez, Walther, Burgoon & Sunnafrank, 2002). Google searches also will soon lead to entries on certain social networking sites such as Facebook, another novel source of social information.

Social networking sites such as Friendster, MySpace, and Facebook have become immensely popular. The rapid adoption of these systems raise questions about the functionalities they offer that make them so popular, and about the communicate dynamics that are shaped by their use. The diffusion of social networking sites can be seen in various usership statistics: MySpace attracted over 114 million visitors globally by July of 2007 (Comscore, 2007). LinkedIn, which allows users to connect with each other for professional and social purposes, recently reached the “10 million member mark” with 130,000 new members joining every week (Allen, 2007).

The focus of this study is the social networking site Facebook, which was originally created as a site for college students, but now includes anyone with an email address who wishes to join. With an estimated 18 million members at this writing, Facebook is now the sixth most trafficked website in the United States (Abram, 2007) and the top web site in Canada, as a million new users establish accounts each week (Levy, 2007). Over 52 million people worldwide have visited the site (Comscore, 2007). Users can create profiles that describe various attributes about themselves such as their hometown, birthday, preferred activities, etc. They can expand their social networks by requesting another person’s friendship. These friends communicate within Facebook primarily by posting statements to each other’s profile “walls”. To be designated as “friend,” an individual directs the Facebook system to initiate a request to be recognized as someone’s friend, to which the two parties—the friend request initiator and the friend request sender—must agree. When individuals become friends, the system reveals their personal profiles as well as all their links to other members of their social networks. New friendship links often snowball via the enlarging and overlapping friends’ networks thus started.

Given these kinds of linkages that Facebook and similar systems provide, the sites are all the more interesting to communication researchers because they are specifically dedicated to forming and managing impressions, relational maintenance, and relationship-seeking. They are novel because, in comparison to typical conversations and in contrast to traditional CMC, the information on these sites contains information provided not only by the creator, but by the creator’s friends, not to mention by the computational programs embedded in the systems themselves.

Another important reason to examine such systems is that they reveal how people manage their social networks, both in manner and in size. Much of the value of these sites derives from their making manifestly visible users’ social network of friends, or at least acquaintances, who also have accounts on the system. While research on traditional social networks suggests that the number of people with whom an individual maintains close relationships is about 10-20 (Parks, 2007) and the total number of social relationships people manage may be around 150 (Dunbar, 1993; Gladwell, 2000), studies examining social networking sites suggest affiliations that often dramatically exceed this figure. One recent study found that

a sample of Facebook users at one university reported a mean of 246 friends (Walther, Van Der Heide, Kim, Westerman, & Tong, 2008), while another reported a similar finding of 272 friends (Vanden Boogart, 2006). The impact on observers' judgments from the purported size of one's social network, as this study will demonstrate, defies conclusions drawn from traditional research.

An additional issue raised by social network sites is what the meaning of "friends" is in these environments. Some observers speculate that the meaning of friend is more broad than conventional understandings. Despite this breadth, there may be an upper limit on the extent to which individuals can credulously support even superficial relationships, and claims exceeding that limit, as this study examines, backfire on successful impression management. This particular study attempted to bring these issues into consideration by focusing on the effect of one feature of the Facebook system: the number of friends a user is purported by the Facebook system to have. This feature allows researchers not only to examine the potency of one cue in the Facebook system, but also to explore previously unseen relationships between traditional attributes—popularity and attractiveness—that are facilitated by the technology in nontraditional ways.

Online Impression Formation and Social Networking Sites

Self, friend, and system as source

Previous studies about online impression formation have demonstrated that individuals can and do form impressions of others through various CMC venues (see for review Walther & Parks, 2002). Social information processing theory (SIP; Walther, 1992), suggests that people avail themselves of whatever information is available within a CMC environment with which to form impressions, despite the absence of the nonverbal cues that typically drive impressions in offline communication. Although SIP theory has focused on a variety of information types in the past, e. g., language style and content, chronemics (see for review Walther, 2006), and photographic or biographic information (Tanis, 2003), new cues such as network size coefficients are not beyond the realm of the theory's logic. At the same time, the theory has not considered incidental information, i.e., information that was not instigated through communicators' volitional behavior, conveyed with some level of intent. System-generated information is not within the class of variables SIP originally envisioned.

There are numerous volitional cues on social networking sites. Facebook provides means for a user to post information about the self. A photograph, almost always showing the self, occupies a dominant space on the profile. The system also provides categories for users' textual self-descriptions. Another source of information on one's profile comes from other social network members: An individual's friends can leave messages on one's profile. Finally, the computer system itself leaves information on one's profile, in specifying the number of friends with whom an individual has arranged to have this status.

How do these various information sources affect impressions? Forming impressions from self-selected statements in CMC is well-understood from a SIP theory perspective. With regard to friends' messages, recent research has shown that friends' wall postings also affect judgments of profile owners. Walther et al. (2008) utilized the Brunswikian Lens Model (Brunswik, 1956) in their research examining context effects in Facebook. The Brunswik Lens describes how observers associate non-behavioral clues that reside in an environment that belongs to a social actor to infer that actor's personality. These artifacts, or "behavioral residues," may be intentionally or unintentionally created, may originate with the target or with others, and may be displayed in physical or virtual space (e. g., Vazire & Gosling, 2004). In any case, observers attribute characteristics to targets based on the things they observe in the target's space. Walther et al. (2008) found that statements made by the profile owner's friends had a significant impact on observers' ratings of the social attractiveness and credibility of the profile owner. Wall postings alluding to sociable behavior by the target increased favorable ratings of targets, whereas postings suggesting excessive drinking and philandering prompted a reversal. Moreover, the physical attractiveness of a profile owner's friends (as seen on the profile's wall) directly affected observers' ratings of the profile owner's physical attractiveness. As such, behavioral residue generated by the profile owner's *friends* (rather than explicit identity claims left by the profile owner) was used by observers in impression formation processes.

While previous research has examined self-generated information and recent research examined information provided by friends, research has just begun to examine machine-rendered information, in the form of the coefficient reflecting the size of one's social network. We suspect that the sociometric information found in Facebook conveys impressions as well. The fact that one of the fundamental functions of social networking sites such as Facebook is to render visible and navigable the nature of one's social network suggests that this information may serve not only to establish how well-liked an individual is, but also to provide clues about the profile owner's social status, physical attractiveness, or credibility. That is, a network size coefficient should constitute behavioral residue. It should reflect to observers how an individual relates to others in terms of how many people he or she contacts, as an indicator of popularity. One's network size coefficient also reflects how individuals use the Facebook system, that is, the extent to which they use it normatively or relatively excessively, and consistent with the Brunswik Lens approach (Brunswik, 1956), these perceptions may lead to judgments about other characteristics the profile owner is likely to possess. In order to understand what meanings these coefficients might arouse in observers, we reviewed research on the antecedents and consequences of sociometric popularity, which suggested positive linear effects of friend count with social evaluations. Then we examined recent conjectures about technological transformations of network size and friend specification, which suggested alternative relationships between friend counts and social evaluations.

Effects of Popularity, Offline and Online

Traditional popularity research

One approach to understanding the effect that visible friend count may have on evaluations comes from the assumption that the number of friends one has is an index of popularity. Traditional research investigating offline popularity divides the notion into two constructs: *peer-perceived* (or *perceptual*) popularity and *sociometric popularity*. Perceptual popularity pertains to the judgments about individuals who are members of a group or class believed to be valued by its members. For instance, children and adolescents described as *perceptually* popular were more socially dominant within social interactions; however these individuals were not necessarily well-liked by the raters (Parkhurst & Hoppmeyer, 1998). Several studies have shown that those individuals rated as *perceptually* popular are also more likely to be rated as self-confident, stuck-up, more likely to start fights, and less likely to be subject to social teasing or ridicule (Parkhurst & Hoppmeyer, 1998). Of greater interest to the present research is the construct of *sociometric* popularity—that which corresponds to the number of friends or connections one has, which may be reflected in the coefficient of friends displayed on the profiles of Facebook users.

Sociometric popularity is also associated with a number of social evaluations. Sociometrically popular individuals receive more positive ratings on measures of liking and potential friendship from peers. Furthermore, sociometrically popular individuals are judged as more trustworthy and kind than *perceptually* popular counterparts (Parkhurst & Hoppmeyer, 1998). A meta-analysis conducted by Langlois et al. (2000) revealed that sociometric popularity is associated with physical attractiveness: the more physically attractive one is the more sociometrically popular. This association takes place among both children and adults. For instance, Krantz (1987) studied the influence of physical attractiveness on kindergarten students' preferences of potential friends. When given two photos of same-sex children (one previously rated as attractive, the other unattractive), kindergarten students chose the attractive child to be their potential friend more often than the unattractive child. Previous research suggests that people simply prefer to associate with those whom they find physically attractive. Thus if people prefer to socialize with attractive individuals, then those who are more popular should also be seen as more physically attractive.

Other judgments are also associated with attractiveness, which may also have some relationship with sociometric popularity. Attractive individuals are rated as more intellectually competent than unattractive ones, among both adults in the workplace (Jackson, Hunter & Hodge, 1995) and children in schools (Clifford & Walster, 1973; Jackson, Hunter & Hodge, 1995). Langlois et al.'s (2000) meta-analyses revealed that although differences in evaluation were stronger for children than adults, when compared "with other effect sizes in the social sciences," the effect sizes obtained by Langlois et al. (2000) were still "uncommonly large" for both groups (p. 400). Attractive individuals are judged more favorably than unattractive

individuals on a variety of different dimensions such as academic/developmental competence, interpersonal competence, social appeal, extraversion, self-confidence, and occupational competence. The well-documented “attractiveness halo effect” further suggests that attractiveness and social acceptance are linked (Berry & Miller, 2001; Eagly, Ashmore, Makhijani, & Longo, 1991). The above research suggests that observers make inferences about the popularity of the target individual which in turn affects their evaluations of the target’s physical and personality characteristics in a variety of ways.

Given that there appears to be a reciprocal relationship between popularity and attraction (and other evaluations), it seems plausible an individual who appears to be popular on Facebook (i.e. has lots of friends) is likely to be seen as more physically attractive, and also as having more socially desirable personality characteristics and mannerisms. The popularity/attractiveness research suggests nothing but a linear association for this relationship.

Facebook popularity, to a point

Research by Kleck, Reese, Behnken, and Sundar (2007) supported the notion that the number of friends indicated on one’s Facebook profile triggers positive social judgments in this way. Kleck et al. presented participants with mock-ups of Facebook profiles that varied in the number of friends profile owners appeared to have: 15, 82, or 261 friends. (Additionally, Kleck et al. varied the nature of the pictorial graphic on the profile so that the profile contained text information about the profile owner only, text information and a static photograph, and text information with the addition of a video of the profile owner, although the pictorial variations had no effects on any of the outcome judgments.) The number of friends did affect judgments. Analyses revealed that observers distinguished between low (15 and 82 friends) versus high (261 friends) friend conditions on several ratings: Popularity, pleasantness, heterosexual appeal, and confidence of the profile owner were greater when there was a high number of friends on an individual’s profile than when the lower coefficients were displayed.

Kleck et al.’s exploratory study answered some questions while raising others. It helped establish that the friends coefficients on Facebook—one subtle cue among many—did trigger social evaluations in a pattern consistent with past popularity research. The issue might be settled except when one considers the ranges in the number of friends that have been observed in other Facebook studies. For example, one recent survey found that students reported a mean number of 272 Facebook friends (Vanden Boogart, 2006). Another study found that the mean number of Facebook friends reported by a sample of college students was 246, with a standard deviation of 184 (Walther et al., 2008). These findings raise the elementary question whether the positive relationship determined by Kleck et al. (2007) persists across the larger ranges of friend counts that have been empirically observed in other populations. Beyond elementary skepticism, however, there are reasons to predict that the presence of even greater numbers of friends on a Facebook profile

leads to different social judgments than the popularity dynamics, alone, would suggest.

Other literature has speculated that the meaning of friends changes in social networking sites, particularly as the numbers grow higher. In Brunswikian terms, higher sociometric counts may be interpreted as behavioral residue of something other than genuine popularity. Theoretically, the effect aroused by the Facebook friends coefficient, documented by Kleck et al., may not extend beyond certain boundaries that yet higher numbers of online friends imply.

Shifting Meanings of Friendship in Social Networking Systems

Meanings and network sizes

On Facebook, the meaning of *friend* does not always have traditional connotations, and therefore the sociometric coefficient of the number of friends one has provides clues of a different nature about one's character. That is, in Brunswikian terms, the size of one's network is the behavioral residue of the way one accrues one's associations online. Other emerging research suggests there is a point of diminishing returns in terms of the normative use of Facebook with respect to accruing associations.

What does it mean to be a "friend" on Facebook? It can mean several things. First, it often reflects that individuals have some form of acquaintance that is based in offline interactions. Social networking systems can facilitate mixed-mode relationships. Walther and Parks (2002) defined mixed mode relationships as those which move from an electronic context to a face-to-face setting or vice-versa. In the case of social networking systems we may see many relationships that hover between the virtual and physical quite frequently. Donath and boyd (2004) argue that online social networking systems can help individuals to maintain a larger number of *close* ties than people can typically maintain without such technology, as the systems allow people to check one another's sites for updates, reflect new activities, as well as to facilitate brief verbal exchanges through asynchronous wall postings.

At the same time, that which is labeled "friend" on Facebook often does not correspond to the same label offline, and this difference inflates the potential size of friend networks. "Friending" large numbers of people has been shown to be one of the (if not *the*) main activities of Facebook, according to Ellison, Steinfield and Lampe (2006). Although Ellison et al. found that a large network of weak social ties via Facebook becomes a source of social capital, another survey reported that approximately 46% of survey respondents had either neutral feelings or felt disconnected from their friends on Facebook (Vanden Boogart, 2006). Ethnographic accounts indicate that among Facebook users it is not uncommon to solicit and establish friend status among the most barely acquainted partners (boyd, 2006), and it is socially inappropriate to refuse a friend request from someone who is familiar (boyd, 2007). Thus a wide array of relationship types are all represented as friends on Facebook, and each contributes to the total number of friends reflected in the sociometric coefficient, even though the friend designation is "unnuanced" in that

it does not signal relationship type to the observer (Donath & boyd, 2004). Thus, the size of one's apparent friend network on a system such as Facebook can easily become much larger than traditional offline networks, because friendship is in some cases most superficial, because the technology facilitates greater connection at some level, and because social norms inhibit refusals to friend requests.

Despite the flexibility of the friend association in social networking systems, it appears that judgments about users are based on the friend coefficients, in ways that Kleck et al. (2007) documented, but in other ways as well.

Incredulity and evaluation

In social networking systems, social norms apply in assessing whether friending reaches a point of incredulity or foolishness. Offline, there seems to be no upper limit to the number of friends one can have; the bigger one's social network, the higher the ratings of positive attributes (i. e., "Jane has lots of friends, she must be so likable, kind, trustworthy, etc."). Gross excesses that Facebook can facilitate appear to violate this relationship. After a point, too many connections may result in *negative* judgments. Gratuitous friending is noted: O'Murchu, Breslin, and Decker (2004, p. 6) note that "over exposure on these sites can also at times equate to a popularity contest based on status of how many friends or friends of friends one has." Donath and boyd (2004) noted a similar phenomena with regard to a corresponding social networking website, Friendster.com, where individuals who gratuitously aggregated superficial friends became known as "Friendster whores":

a pejorative term that was sometimes used self-mockingly, but also reflects the negative reaction of people who realised [sic] that an invitation to join someone's network of friends arrived not because they were perceived as an interesting or desirable person, but simply as an addition to a collection of links, one among hundreds (p. 80).

Terms like "Friendster whore" suggest that in this new domain of online social networks, there comes a point when too many apparent friendship connections becomes too much of a good thing. When the number of friends becomes implausible, apparent sociometric popularity becomes a hindrance, rather than an advantage, to the good impression of the profile owner, according to Donath and boyd (2004). In terms of Brunswikian "behavioral residue," an abnormally high friend count may fuel the inference that the profile owner spends more time superficially friending others beyond a plausible extent, i.e., the behaviors they appear to have made are gratuitous and disingenuous. This "sociometric overload" seems to be a phenomenon unique to CMC that does not generalize to offline encounters. Although certain individuals can be said to "know everybody" in offline acquaintances, such a phrase is clearly hyperbole. Further, the literature on offline popularity suggests no asymptotic trend in the association of friend count and positive evaluations.

Although the line separating an acceptable from an absurd number of friends online is not yet known, accounts suggest that the number of friends individuals

appear to have on Facebook may arouse a non-linear relationship with the kinds of social evaluations previously associated with popularity. Therefore, we posit the following hypothesis:

- H1:** There is a curvilinear inverted U-shaped relationship between the number of friends a profile owner has and observers' perceptions of the profiler's (a) social attractiveness (b) physical attractiveness.

Because extraversion is conceptualized as how verbose or outgoing one is, we do not necessarily expect the curvilinear relationship with this trait. In fact, it is likely that a profile owner would appear to maintain high levels of extraversion online in order to accumulate so many sociometric ties.

- H2:** There is a linear relationship between the number of friends a profile owner has and observers' perceptions of extraversion.

Method

A sample of 153 undergraduate students at a large university in the Midwestern United States voluntarily participated in the research in exchange for course credit. Participants were provided a URL with which to access a website that displayed all research materials. They were instructed to complete this research individually using a WWW browser at a location of their choice. This allowed them to view the stimuli in a natural environment.

The website initially presented informed consent information. The informed consent material explained that this was a study on impression formation in electronic communication and that they would be asked to make some judgments about another individual on the basis of looking at a sample of some online communication such as a Facebook profile, a transcript of an Instant Messenger chat, or an email exchange among prospective targets. In actuality, each participant was redirected to a Facebook mock-up. After participants read the informed consent information they selected a link which led to a javascript routine programmed to randomly redirect each participant's web browser to one of five versions of the stimulus (see Burton & Walther, 2001). Participants were instructed to view the stimulus material as long as was required in order to form an impression of the owner of the profile. Participants then clicked another link to open and then address questionnaire items.

Standard demographic information (gender, age, college year) and information pertaining to Facebook (Facebook usage, Internet usage, number of friends, etc.) was collected and analyzed. After removing respondents who indicated they did not have a Facebook profile and those who reported extreme outlier scores on number of friends, 132 subjects remained in the sample. Analyses revealed sample sex (53% female), age ($M = 20.18$, $SD = 1.32$, mode = 21), and year in school (20% freshmen, 28% sophomores, 31% juniors, 19% seniors, 2% missing). With regard to Facebook friends, analysis showed $M = 395.02$, $SD = 316.03$, median = 300, mode = 300. The

mean was skewed by some respondents with very high friend counts; 6 individuals reported 1000, 1 reported 1200, and 1 reported 2700 friends.¹ Participants reported the number of hours a day they spent on Facebook, $M = 4.51$, $SD = 4.31$.

Stimuli

Participants examined one of five stimuli, each containing a Facebook profile mock-up. Elements of these stimuli (e.g. photographs, wall posts, etc.) remained constant over the five versions, with the exception of the *number of friends* which appeared on the profile as 102, 302, 502, 702, or 902. These intervals were chosen in order to reflect equal intervals amenable to trend analysis. The specific quantities represented were suspected to range from lesser- through greater-than-normal sizes of Facebook friend networks based on previous research (Ellison, Steinfield, & Lampe, 2007; Vanden Boogart, 2006; Walther et al., 2008) and informal discussions with Facebook users.

Other elements of the Facebook mock-ups were selected based on the results of pre-testing with college-age focus groups. The photograph used to represent the profile owner was rated in pre-tests as neutral in physical attractiveness, and two offsetting positive and negative statements appeared on the profile “wall” (see Walther et al., 2008). The random selection of both male and female photographs used to represent “Friends in other networks” was held constant across conditions, and the two photos representing the friends featured on the wall (i.e., those who made the wall posts) were counterbalanced with one being attractive and the other being unattractive. The counterbalancing approach was selected in an effort to advance ecological validity while still maintaining an overall neutral information background. All profiles depicted females only although the effects of gender may be examined in future research.

Because most Facebook users rarely have all their friends confined to one network, the total number of friends was split among three different networks. The primary network displayed on stimuli was the university where respondents were enrolled. To select the other two networks, researchers gave a list of several other universities and colleges in the same US state to an offset group of college-aged raters from the university comprising the primary network. This procedure elicited prestige ratings of the alternative colleges, so that researchers could select two neutral exemplars for the secondary networks depicted in the mock-up profiles. The majority of the profile owner’s friends were depicted as members in the primary network with fewer friends in the other networks.

Dependent Measures

Data were collected on the physical and social attractiveness of the profile owner using measures created by McCroskey and McCain (1974). Analysis showed a Cronbach’s *alpha* reliability estimate of .77 for social attractiveness, and $\alpha = .80$ for physical attractiveness. Post-test items also included measures of extraversion ($\alpha = .84$) (McCroskey, Hamilton, & Weiner, 1974).

Results

Hypotheses Tests

Hypothesis 1 predicted a curvilinear (inverted U-shaped) relationship between the number of friends a profile owner has and observers' perceptions of the profile owner's (a) social and (b) physical attractiveness. In order to test these relationships, one-way analyses of variance (ANOVA) were conducted with number of friends as the independent variable and social attractiveness and physical attractiveness as the dependent variables. Hypothesis 1a was supported. Results showed a significant quadratic effect for the relationship of number of friends on social attractiveness, $F(1, 129) = 2.78, p = .098, \eta^2 = .02$.² Descriptive statistics appear in Table 1. In order to confirm the direction of the curve, the means were subjected to a post-hoc least significant differences (LSD) test. The LSD test revealed that the apex of the curvilinear relationship was at the 302 friend condition. That is, targets were viewed as most socially attractive when they had 302 friends.

The relationship between number of friends and physical attractiveness did not follow the predicted curvilinear relationship. The overall F and the specific test for quadratic effects were not significant, $F(1, 129) = 2.47, p = .119$. Hypothesis 1b was not supported. Post-hoc LSD analyses failed to show any pairwise differences among the five means (see Table 1).

Hypothesis 2 predicted a linear relationship between the number of friends a profile owner has and observers' perceptions of the profile owner's extraversion. An omnibus one-way ANOVA with extraversion as the dependent variable was significant, $F(4, 129) = 3.12, p = .02$. However, the linear effect specified by H2 was not supported, $F(1, 129) = 2.32, p = .13$. Rather, a significant quartic effect emerged, $F(1, 129) = 5.66, p = .02$. Post hoc analysis using LSD comparisons demonstrated significant pairwise differences among some of the cells suggesting (a) a curvilinear inverted-U effect overall, with the highest level of extraversion occurring at the 502 friends level. Although perceived extraversion trailed off beyond the apex, the higher numbers of friends (702 and 902) stimulated no less extraversion than the apex. However, the lowest numbers of friends (102 or 302) prompted

Table 1 Means and Standard Deviations of Social Attractiveness, Physical Attractiveness, and Extraversion by Apparent Number of Facebook Friends

Experimental Condition	Social Attractiveness	Physical Attractiveness	Extraversion	<i>n</i>
102 Friends	4.05 (1.01) ^{a,c}	3.50 (0.66) ^a	3.56 (1.08) ^{a,b}	24
302 Friends	4.77 (0.87) ^b	3.88 (0.99) ^a	3.48 (0.89) ^{a,b}	33
502 Friends	4.38 (1.17) ^{a,b,c}	3.81 (1.24) ^a	4.40 (1.36) ^c	26
702 Friends	4.22 (1.32) ^{a,c}	3.73 (1.15) ^a	3.95 (1.06) ^{a,b,c}	30
902 Friends	4.12 (1.14) ^{a,c}	3.50 (1.03) ^a	3.86 (0.99) ^{a,b,c}	21

Note: Means with different superscripts differ within columns at the $p < .05$ level.

significantly lower extraversion judgments compared to the apex of 502 (see Table 1 for complete results). It appears that having a lot more friends indeed connotes greater extraversion for Facebook profile owners, somewhat as predicted, but that the association is not a direct linear pattern. The most extroverted attributions are relegated to individuals with a greater-than-average number of friends.

Discussion

The goal of this research was to determine the nature of the relationship between sociometric indicators of connectedness depicted on Facebook and the social attractiveness, physical attractiveness, and extraversion of the profile owner perceived by others. This study posed questions about the nature of these relationships and subsequently found effects of the information generated by the social networking system on others' perception of an individual in a social networking environment.

There is a curvilinear relationship between the number of friends that profile owners are purported to have and others' perceptions of their social attractiveness. More specifically, in the condition where the profile owner had the fewest friends (102), ratings of the individual's social attractiveness were among the lowest. Ratings of the individual's social attractiveness were highest when the profile displayed that the profile owner had approximately 300 friends. Beyond that level of friends, ratings of a profile owner's social attractiveness declined to a level approaching the 102 friends condition. Although there were no significant differences between social attractiveness in the very lowest and very greatest number of friends' conditions, the absolute values of the associated means are trending in the direction that suggests it is better to have too many friends than to have too few.

Whereas H2 predicted a linear relationship, results yielded a complex, quartic relationship between the number of friends on an owners' profile and perceptions of the profile owner's extraversion. Although more friends connoted greater extraversion than did less friends, analyses revealed that there were significant deviations from linearity in this relationship, with the greatest degree of extraversion associated with moderately large numbers of friends, but declining at the greatest numbers. It seems that having an exceedingly large number of friends leads to judgments that profile owners are not sociable and outgoing, but are relatively more introverted. Observers apparently infer that an individual with an excessive number of friends may not have accumulated them as a result of extraversion, but rather by some other characteristic.

This possibility is consistent with the Brunswik's (1956) Lens approach, which suggests that observers interpret artifacts as clues to the behaviors one likely committed, from which personality assessments are inferred. Individuals with too many friends may appear to be focusing too much on Facebook, friending out of desperation rather than popularity, spending a great deal of time on their computers ostensibly trying to make connections in a computer-mediated environment where they feel more comfortable than in face-to-face social interaction (see Caplan, 2003).

Although these precise interpretations are not revealed in the present study, they are consistent with Donath and Boyd's (2004) ethnographically-based speculations why "friending" too many others may lead to negative judgments about the profile owner.

Although this interpretation is plausible, caution is warranted in placing too much of a premium on participants' or observers' own accounts of the mechanisms by which they make judgments. Individuals may not be aware of the degree to which friends counts actually affect them. A modest follow-up study explored this issue.

In the primary study, the only active independent variable among all the Facebook mockups was the representation of the number of friends, and since these coefficients were demonstrably different (whether or not they were noticed by research participants), no manipulation check was warranted and none was conducted (see O'Keefe, 2003). The question of observers' cognizance is intriguing nevertheless, and therefore a post hoc experiment was conducted to explore this question. Students from the same university as the primary experiment (from one intact course), $N = 24$, were each randomly presented one of the same stimuli described in the main study as discussed above, on full-sheet, color-printed paper handouts. These observers were asked to list impressions about the targets, and then to list the bases of their judgments. Only 5 of the 24 respondents specifically mentioned the number of friends that the profile listed. When these identifications occurred, they appeared across the array of friend count manipulations except for the most normative (302) level: 102, 502 (twice), 702, and 902.

It appears that while friend counts had a reliable effect in the initial impression task, the basis of the effect was not something of which most observers are consciously aware. Such a phenomenon is most consistent with the anchoring effects described by Tversky and Kahneman's (1974) classic research on human reactions to exposure to numbers: Brief exposure to high or low numbers unconsciously triggers decision heuristics in a variety of settings, leading to biased estimations of populations, differential bidding, and other irrational numerically-related effects. Understanding the precise mechanisms or attributions resulting from such anchoring, however, will require additional research.

One plausible mechanism that can be explored behaviorally from the present study is a possible similarity effect: The optimal number of friends is related to the rater's number of friends. The participants in the present study reported a modal number of friends of 300. Given that the optimal number of Facebook friends in the stimuli was the number closest to the average number of friends claimed by the respondents, it is plausible that judgments of social attractiveness are due to similarity of the rater to the target. If this is the case, then if observers who have 100 Facebook may judge an individual with 300 friends to be less like them and therefore less socially attractive than an individual with 100 friends. Likewise, the rater with 1000 friends may find the profile owner with 900 friends more similar and thus more socially attractive than the profile owner with 300 friends.

The similarity effect was examined post hoc through a multiple regression analysis in which social attractiveness scores were regressed on a term representing the interaction of the number of friends in the stimuli by respondents' number of friends (adjusting the respondents' friends count with a log-normal transformation due to the non-normal distribution of that count; Osborne, 2002). The analysis was not significant, $\text{adj. } R^2 = .01$, $F(1, 130) = 2.33$, $p = .13$. It appears that the social attractiveness assessments attributable to the number of friends on a Facebook profile are not a significant function of the observer's own friend count. It seems reasonable that some normative standards apply, deviations from which trigger derision in some manner, and judgments of greatest social attractiveness go to those individuals who are closest to average. Such a process may be thoughtful or heuristically-derived.

Contrary to predictions, there was no relationship between the number of friends a profile owner had and the physical attractiveness attributed to the profile owner by others. It is, perhaps, not altogether surprising that the number of friends did not affect physical attractiveness perceptions. First, a photograph of the same profile owner was present on each of the experimental stimuli. Little variation on an impression that was strongly and directly cued by a photo would be somewhat expected. Although past research has found that a profile owner's physical attractiveness is affected by differences in the attractiveness of those who comment on a Facebook profile's "wall," as well as what those comments contain (Walther et al., 2008), these factors were held constant in the present study. Therefore, it seems likely that the presence of these other cues anchored physical attractiveness judgments beyond a level which would be influenced by the number of friends purported by one's profile. It is possible that in the absence of photographic cues and messages, the number of friends a person has may serve as a more potent cue in the determination of physical attractiveness, in addition to other judgments.

The effect sizes in this study were relatively small. This raises concerns about whether manipulations were inadequate, whether the experiment captured ecologically valid assessments, or whether the true effect of the number of friends on social judgments in Facebook is in fact small. It should be noted however, that significant results were obtained despite an infinitesimally small experimental manipulation. Facebook profile content was held constant with the exception of the alteration of one value of one information item per Facebook profile (by means of alteration to the friends' networks so that the sum of friends totaled the number presented on the profile). Given this small induction and the subsequent results, it seems reasonable to conclude that sociometric information such as the number of friends one has is a relatively potent cue to various social judgments in a social network environment.

The present findings extend and modify conclusions to be drawn from Kleck et al.'s (2007) research. Kleck et al. argued that greater numbers of apparent Facebook friends impel positive impressions of a profile owner. This study confirms that assertion but only to a certain point. In light of the present study, Kleck et al.'s manipulation was restricted in range—only low and median amounts of friends were tested—which led to the linear relationship their results suggested. Their finding was

replicated within the present design, for the difference between 102 versus 302 friends. However, the present findings indicate that people with an excessive number of apparent friends do not continue to increase positive evaluations.

This study raises questions for theories of online impression formation and management about the nature of the role of sociometric information in online and offline impressions. Walther and Parks (2002) posited that the warranting value of information (the degree to which information about oneself is more or less self-presented rather than presented by others) raises its value in making judgments about what a person encountered online is really like offline. First-person messages about one's self on the Internet are of less value to a rater than are third person messages about a target, according to the warranting principle. It seems reasonable to ask, from this perspective, what the role of sociometric information might be in the impression formation process. Sociometric coefficients are not clearly either first-person or third-person reports about an individual. Rather, sociometric data, in the case representing the number of accepted social networking friendship requests, are a behavioral residue of both a profile owner's behavior and the behavior of a certain set of friends. This characteristic might render the number of friends moderate in warranting value. Alternatively, given that friend requests must be sanctioned by others, they may have strong warranting value. Furthermore, since sociometric information is generated by the mechanics of the social networking computer system itself rather than by any one specific person, we should expect this information to be seen as truthful by perceivers. That said, given the common knowledge that Facebook "friends" are often simply acquaintances, and that refusals of friend requests are uncommon (boyd, 2007), the truthfulness of one's apparent tendency to gather friends meaninglessly online (or one's apparent inability to gather "sufficient" friends) is likely to carry credence in the virtual environment. Future research should evaluate the weight of this information in the context of people who meet offline or in Internet discussion venues "Facebooking" one another as a means of reducing the uncertainty of the initial acquaintance.

In conclusion, this study advances the important finding that sociometric data such as the number of friends one has on Facebook can prove to be a significant cue by which individuals make social judgments about others in an online social network. This study contributes findings that in the case of social attractiveness and extraversion, individuals who have too few friends or too many friends are perceived more negatively than those who have an optimally large number of friends. Regarding sociometric information, future research should certainly examine if more detailed sociometric data (i.e. friend status, connectedness, etc.) has any effect on the evaluations of the profile owner in different types of populations and settings. More broadly, future research should investigate how individuals utilize other types of machine-rendered (website-generated) data when making social judgments of others. It would be of interest as well as scholarly and practical value to scholars to apply these questions to aspects of other social networking sites. While MySpace, Orkut, and LinkedIn are all rooted in the same social networking phenomenon, there

are some features and attributes of each that are unique. For instance, in MySpace, an individual can be friends with a professional musical group or other collectives, and in such cases, are not likely to have had any face-to-face contact with the friend entity. Does sociometry mean anything similar in such an environment, where the label of friend persists but its meaning is even more obscure? Do affiliations signal something other than popularity or desperation altogether, or do some meanings cross contexts? What are the range of judgments that result from various affiliation signals, as new communication technologies change the definitions of relationship terms and modify the demonstration of social networks, if not the nature of our social networks themselves? As researchers move forward in understanding the ways individuals interact with one another in online social networking environments, these are some of the questions that will further inform our understanding of these new communication technologies.

Notes

- 1 Reanalysis restricted only to those participants with less than 1000 friends yielded $M = 340.66$, $SD = 192.55$, a figure still well above those reported in other studies referenced above. It may be that, compared to earlier studies, Facebook has gained more users and users have discovered greater connections.
- 2 A statistical significance rule of $p < .10$ for directional hypothesis tests was employed, given the a priori prediction of the inverted-U curvilinear function (see Levine & Banas, 2002).

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Too Much of a Good Thing?
The Relationship Between Number of Friends
and Interpersonal Impressions on Facebook

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Abstract

A central feature of the online social networking system, Facebook, is the connection to and links among friends. The sum of the number of one's friends is a feature displayed on users' profiles as a vestige of the friend connections a user has accrued. In contrast to offline social networks, individuals in online network systems frequently accrue friends numbering several hundred. The uncertain meaning of friend status in these systems raises questions about whether and how sociometric popularity conveys attractiveness in non-traditional, non-linear ways. An experiment examined the relationship between the number of friends a Facebook profile featured and observers' ratings of attractiveness and extraversion. A curvilinear effect of sociometric popularity and social attractiveness emerged, as did a quartic relationship between friend count and perceived extraversion. These results suggest that an overabundance of friend connections raises doubts about Facebook users' popularity and desirability.

Zu viel des Guten? Zur Beziehung zwischen der Anzahl der Freunde und interpersonalen Eindrücken bei Facebook

Eine zentrale Eigenschaft des sozialen Online-Netzwerks Facebook ist die Verbindung von Freunden. Die Gesamtanzahl der Freunde eines Nutzers wird als Merkmal im Benutzerprofil angezeigt und dient als eine Statistik der Freundeverbindungen, die ein Nutzer gesammelt hat. Im Gegensatz zu Offline-Netzwerken, haben Personen in Online-Netzwerken oft mehrere Hundert Freunde. Die unklare Bedeutung des Freundestatus in diesem System wirft die Frage auf, ob und wie soziometrische Popularität die Attraktivität auf nicht-traditionelle, nichtlineare Weise ausdrückt. In einem Experiment wurde die Beziehung zwischen der Anzahl der Freunde im Facebook-Profil und der Einschätzung von Attraktivität und Extraversion durch den Beobachter untersucht. Es zeigten sich ein kurvilinearereffekt von soziometrischer Popularität und sozialer Attraktivität, sowie eine biquadratische Beziehung zwischen der Anzahl der Freunde und wahrgenommener Extraversion. Diese Ergebnisse deuten an, dass eine übermäßig hohe Zahl an Freunden Zweifel an der Popularität und Attraktivität des Facebook-Nutzers aufkommen lässt.

¿Una Cosa Demasiada Buena?
La Relación entre el Número de Amigos y las Impresiones Interpersonales en
Facebook

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Resumen

Una característica central del sistema de red social online, Facebook, es la conexión entre los amigos. La suma del número de amigos de una persona es una característica manifestada en los perfiles de los usuarios como un vestigio de las conexiones de amistad que un usuario ha acumulado. En contraste con las redes sociales fuera de línea, los individuos en los sistemas de redes online acumulan frecuentemente amigos hasta llegar a varios cientos. El significado incierto del estatus del amigo en estos sistemas genera preguntas si, y cómo, la popularidad sociométrica comunica atracción en formas no tradicionales y no lineales. Un experimento examinó la relación entre el número de amigos que aparecen en el perfil de Facebook y la clasificación del atractivo y la extraversión por parte de los observadores. Un efecto curvilíneo de popularidad sociométrica y atractivo social emergió, así como también una relación entre el conteo de amigos y la extroversión percibida. Los resultados sugieren que una sobreabundancia de conexiones de amigos genera dudas sobre la popularidad y el atractivo de los usuarios de Facebook.

好过头了?

Facebook 中朋友数目和人际印象的关系

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摘要

网上社交系统 Facebook 的一个核心功能是朋友间的联系和连接。一个人朋友数目的总和可显示于用户档案，用来表示这个用户所累积之朋友。与网下社交相对比，网上社交系统的个体累积的朋友经常达数百个。在这些网上系统中，“朋友”概念之不确定性带来了如下问题：社会度量意义上的受欢迎程度是否以及怎样以一种非传统的、非线性的方式传达这个用户的魅力。通过实验我们检验了 Facebook 用户的朋友数量和观察者对其魅力和外向度之评价的关系。我们发现社会度量的受欢迎程度和社会魅力之间存在一种曲线关联；朋友数目和所感知的外向度之间存在一种四次关系。这些结果显示：过多的朋友数目会使人们对 Facebook 某个用户的受欢迎度和被渴望度产生怀疑。

너무 많은 좋은 것들?
페이스 북에서 친구들 숫자와 개인적 호감도의 관계

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요약

온라인 사회적 네트워크 시스템—페이스 북—의 중요한 특징은 친구들과 친구들 사이의 연결이다. 어떤 개인 친구들의 합계는 사용자가 획득한 친구들 연계의 종적으로서 사용자의 인물소개에 나타난다. 오프라인 사회 네트워크와 대비하여, 온라인 네트워크 시스템에서의 개인들은 종종 수백명이 넘는 친구들을 얻게된다. 이러한 체계들에서 친구들 상태가 불확실하다는 것은 어떻게 사회관계를 측정하는 대중성이 비전통적인 방법에서 매력도를 전달하는지, 그렇다면 어떻게 전달하는지에 대한 의문을 제기하고 있다. 하나의 실험이 페이스 북 인물소개에 나타나는 친구들의 숫자와 관찰자들이 본 매력도와 외향성의 관계를 연구하였다. 연구 결과, 사회관계를 측정하는 대중성과 사회적 매력도의 곡선 효과가 나타났으며, 친구수자와 인지된 외향성 사이에서는 4 차원의 효과가 나타났다. 이러한 결과들은 친구 연계의 과도한 정도가 페이스 북 사용자의 인기도에 대한 의문을 제기하고 있는 것이라 할 수 있다.