

Social Influence and Reciprocity in Online Gift Giving

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ABSTRACT

Giving gifts is a fundamental part of human relationships that is being affected by technology. The Internet enables people to give at the last minute and over long distances, and to observe friends giving and receiving gifts. How online gift giving spreads in social networks is therefore important to understand. We examine 1.5 million gift exchanges on Facebook and show that receiving a gift causes individuals to be 56% more likely to give a gift in the future. Additional surveys show that online gift giving was more socially acceptable to those who learned about it by observing friends' participation instead of a non-social encouragement. Most receivers pay the gift forward instead of reciprocating directly online, although surveys revealed additional instances of direct reciprocity, where the initial gifting occurred offline. Thus, social influence promotes the spread of online gifting, which both complements and substitutes for offline gifting.

CCS Concepts

•Human-centered computing → Empirical studies in collaborative and social computing;

Author Keywords

Online gifts; peer effects; social learning; reciprocity; cooperation; quasi-experiment; social networks; Facebook

INTRODUCTION

The exchange of gifts has long been thought of as a fundamental part of human relationships [23]. Gifts express affection and celebration, intimacy, and social structure by converting memories and beliefs about someone into tangible artifacts of the relationship [6]. While much of our understanding of gift exchange comes from anthropological and sociological examinations of face-to-face interactions [23, 33], gift giving increasingly occurs online. The Internet reduces geographical and temporal barriers to gift giving by enabling individuals to send gifts over long distances and at the last minute. Technology also helps people remember occasions that might warrant a gift such as a friend's birthday. At the same time, social norms around gift exchange have gradually changed with the

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increased popularity of gift cards [32]. Digital transaction records of gift exchanges offer an unprecedented opportunity to understand the social dynamics of modern-day gift giving.

Gift purchasing and sharing are widely practiced online. Amazon incorporates a number of social features, including wish-lists, and scheduling gift cards for friends' birthdays.¹ Apple's iTunes store allows people to give gift cards or gift specific albums, movies, or apps. Starbucks urges customers to give friends gift cards by "tweeting a coffee".² Popular instant messaging applications, such as Line and WeChat, also enable gift giving.³ Online venues that support gift giving can also provide novel social and non-social cues for gift giving. Yet most research on gift giving has focused on in-person interactions and employed qualitative methods to understand the social process of gift exchange. The current research departs from this tradition by observing gift exchange in a large online social network. We investigate whether online gift giving supplants or complements traditional in-person giving, how people adopt the technology, and the extent to which gift-giving behaviors spread over networks.

Gift exchange has been used as a lens to explain computer-mediated communication practices (e.g., [39, 36]), but there has not been much research on online gift-giving behaviors. A few studies have investigated virtual goods exchanges in a Chinese online community [46], a local gift-exchange system [37], and gifting in online games [45]. Their findings suggest that even the exchange of virtual gifts generates social capital. In this study, we focus on the exchange of gift cards between friends on Facebook, a major online social network largely based on offline connections [16].⁴ Facebook provided individuals with the option to pay money to purchase a gift card and send it to a friend who could redeem it for a variety of goods and services (e.g., a \$15 Starbucks gift card). We investigate the adoption and diffusion of online gift giving with data on 1.5 million gift exchanges on Facebook and 3,380 survey responses of gift givers and receivers. While gift exchanges could occur on any day, we focus on birthday gifts in this research, because (a) the randomness in people's birthdays enables a quasi-experimental analysis to estimate causal effects, and (b) as birthdays are more uniformly observed than religious holidays, they constitute a standard occasion for gift

¹<https://www.amazon.com/gp/socialmedia/birthdays>

²<https://www.starbucks.com/tweet-a-coffee>

³<https://web.wechat.com/> and <http://line.me/en/>

⁴The exchange of gift cards on Facebook was available at the time of the study through a product called Facebook Gifts that has since been phased out.

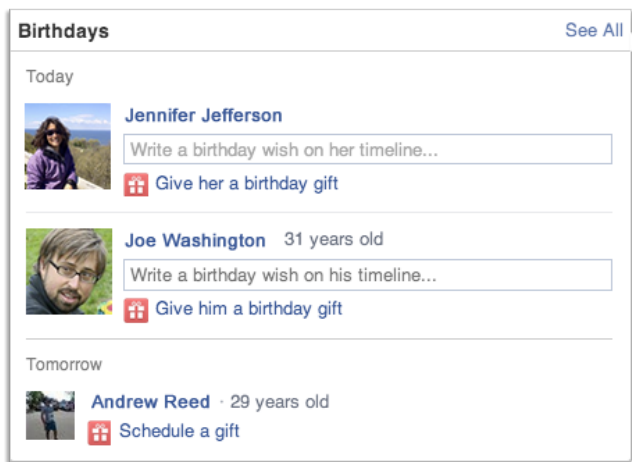


Figure 1. Social network sites can encourage people to send friends gifts. Example of an encouragement to give birthday gifts on Facebook at the time of the study.

giving; in fact, birthday gifts constitute a majority of observed gift exchanges on Facebook.

The paper is organized into three empirical investigations that build on one another. First, we conducted descriptive analyses of cascades of online gift exchanges and exposure to messages about gifting. Then, we conducted a quasi-experimental analysis to quantify the size of peer effects in online gifting and address methodological challenges distinguishing such influence from homophily. Finally, as these analyses raised questions that could not be answered with the behavioral data alone, we surveyed people on Facebook about their offline gifting behaviors and perceptions of norms around online gift giving. The findings contribute new insights into the adoption and diffusion of online gift giving, modern-day gift exchange practices, and design strategies for social technologies to promote cooperative behavior.

RELATED WORK

Gifts are material and symbolic exchanges designed to capture memories and feelings about a relationship, generate intimacy, and accomplish other relational goals [6]. Giving a gift can induce feelings of mutual support but also indebtedness [22, 23, 21]. Gouldner [14] described gift exchange as a cyclical process of mutual reinforcement driven by a moral norm of reciprocity, a “concrete and special mechanism involved in the maintenance of any stable social system” (p. 247). Gift giving is not necessarily about the economic value of items exchanged; it is also a way to communicate the current and future value of a relationship. Gifts therefore generate social capital by solidifying the potential future benefits each side might expect from the other, such as a ride to the airport or a job lead. Although online gift giving among close friends has received little empirical attention, other forms of online social grooming, such as writing on friends’ walls on their birthdays, have been shown to generate social capital [11].

Quantifying Diffusion

A better understanding of how gift giving spreads in networks can inform the design of successful social systems and policies

built around interpersonal exchange. However, it has proven difficult to study the diffusion of complex social phenomenon with high external and ecological validity. Most research on how cooperation⁵ spreads in networks has been conducted in controlled experiments [12, 28, 19, 17, 38] or observational field studies [42]. Although field studies provide a high level of external validity, distinguishing different causes of correlated adoption of cooperative behaviors (e.g., peer influence, homophily) presents a major challenge [2, 25, 4, 20, 44, 10]. To understand the spread of gift giving, we must first examine the structure of Facebook’s online gifting network, including who exchanges gifts with whom, and how this might induce selection effects [40] within the underlying population of peers who receive gifts. In particular, as online gift exchange is a relatively novel form of social interaction and involves spending money, we expect its adoption to be age-dependent in line with the distribution of friendship ties on Facebook [43], where younger people have more homogeneous networks than older people who have developed more cross-generational relationships [7]. We therefore pose the following research question about peer effects in gift giving and age-based homophily:

RQ1 What is the causal effect of receiving a gift online on future online gift giving, and how does it vary with recipients’ characteristics?

Two relevant mechanisms have been proposed in the literature to explain how acts of generosity spread in social networks [41]. We review both the potential influence of reciprocity and social learning (or third-party influence).

Reciprocity

Gift giving is thought to generate two types of reciprocity: *specific reciprocity* (also known as balanced or direct reciprocity), in which the receiver feels obligated to give something back to the giver, and *generalized reciprocity*, in which receiving a gift generates a desire to be more broadly generous, to “pay it forward” to someone else [31, 21, 26]. Generalized reciprocity could be motivated by expectations that the value of giving will balance out over time [27]. Gifts may evoke either form of reciprocity: siblings may give each other a birthday gift with the expectation that the other will do the same, while a co-worker may bring in holiday cookies, inspired by receiving a treat from her friends earlier that week. Reciprocity can be induced for both positive and negative experiences. Individuals who are treated generously tend to respond with generosity, while those who are treated unfairly project greater unfairness toward others [15]. Therefore, not receiving a gift when one is expected may actually reduce one’s likelihood of giving a gift in the future. We pose the following research question about the role of reciprocity:

RQ2 To what extent do patterns in online gift exchange reflect processes of specific or generalized reciprocity?

Social Learning

In addition to reciprocity, the exchange of gifts also triggers social learning processes [5]. Receiving a gift raises aware-

⁵Behavioral economics defines cooperation as an interaction in which one person pays a cost to benefit another. Thus, gift giving can be understood as an act of cooperation.

ness of the possibility and acceptability of engaging in this form of social exchange. More precisely, the receipt of a gift shapes descriptive and injunctive norms around gift exchange, because it provides social cues about who engages in the behavior and whether it meets social approval. Beyond generalized reciprocity, the mere observation of a social behavior as a third party can influence the observer's decision to also engage in it [41, 8]. This becomes especially important in online social networks, where evidence of gift exchanges may be more visible to others in the network than in offline gift exchange. In fact, Facebook sent out reminders of friends' and acquaintances' birthdays via email, prominently displayed birthdays on the site, and encouraged people to write on their friend's timeline or send them a gift card. These "birthday stories" are cues for social learning—seeing that it is possible to give someone a birthday gift on Facebook, that other friends do it, and that those other friends are sometimes rewarded with positive feedback (e.g., "likes" and comments) from the person whose birthday it is, as well as other mutual friends. We therefore pose the following research question about social learning:

RQ3 To what extent do people learn social norms about online gifting from their peers?

Substitution or Complementation of In-person Gifts

It is unclear what proportion of gift exchanges occurs online, but the overall number of gifts could increase over time as the Internet lowers barriers to give over long distances and at the last minute. Social networking sites can also remind people of gift-worthy occasions such as birthdays, which would have otherwise passed without giving a gift. Online gifts could therefore complement in-person gifts, especially when the convenience of online gifts simplifies the process of giving. This trend was observed in the supermarket industry where the establishment of online channels has increased overall sales [30]. However, online channels can also crowd out activity in traditional markets; for example, the digital version of the *Washington Post* was found to cannibalize sales of the print edition [13]. As the exchange of gifts continues to be a fundamental part of human relationships in the digital age, it is critical to understand how online gifts may affect in-person gifting practices. We therefore pose the following research question:

RQ4 To what extent do online gifts act as complements or substitutes for offline gifts?

THE STRUCTURE OF ONLINE GIFT GIVING

In this exploratory analysis, we examined data on approximately 1.5 million gift exchanges to understand demographic patterns and begin to estimate peer effects.

Empirical Context

Facebook Gifts was a social commerce product available at the time of this study that allowed Facebook users to give gifts to one another. The web interface showed friends with current and upcoming birthdays in the right-hand column of News Feed (see Figure 1), which encouraged the viewer to write on friends' timelines and give them gifts for their birthdays.

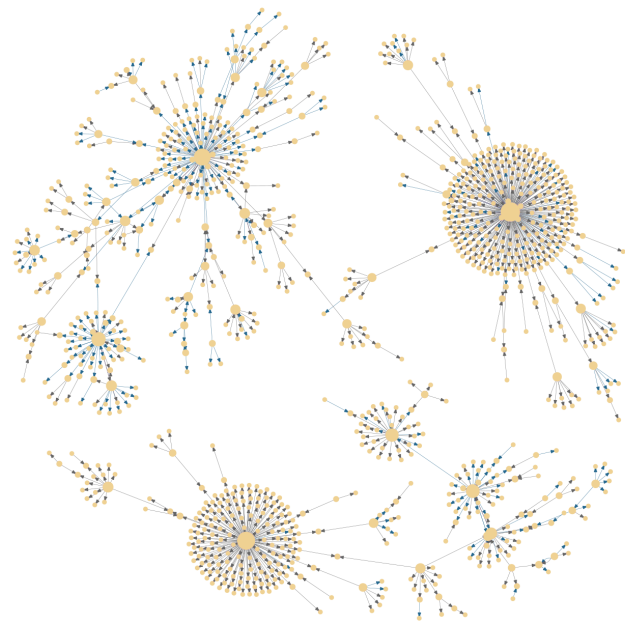


Figure 2. Illustrative network of gift exchange. Directed edges correspond to gifts from senders to recipients.

Gifts cost money, and included electronic gift cards (e.g., for iTunes, Starbucks) as well as physical goods (e.g., flowers, chocolate, barware). As giving gifts required a credit card, we only considered people who were 18 years or older. When someone purchased a gift, the recipient received a private message with information about the gift. The sender could choose to leave a post on the recipient's timeline about the gift, subject to the recipient's privacy settings. This post could be distributed to other friends via News Feed, potentially inducing third-party influence.

Sample

We consider all birthday gifts exchanged between adults in the U.S. in 2013, excluding recipients with common false birthdays (e.g., January 1st). We define birthday gifts as gifts given to recipients within the two days before and after (inclusive) their self-reported birthday. This constitutes over 92% of gifts given within a two week period around users' birthdays. These gifts were exchanged by more than 1.5 million distinct individuals. Approximately 64% of senders and 70% of recipients were female. All data was observational, de-identified, and analyzed in aggregate. The first author asked the [Institution Omitted] institutional review board (IRB) to review a protocol for use of this previously collected anonymized data; the Stanford IRB approved this protocol.

Results

First, we examine the overall pattern of gift giving to address *RQ2* about the prevalence of different types of reciprocity. Figure 2 shows a directed graph of gift giving in three large connected components, suggesting that gift recipients tend to give gifts to others. People at the center of the large clusters gave a lot of gifts, while those closer to the periphery gave or received a single gift. This notably resembles a diffusion pattern with recipients of gifts seemingly "giving forward" to

other friends, hinting at the presence of generalized reciprocity. Although there is some evidence for specific reciprocity, in which a recipient gives a gift to a previous sender (see the double-headed arrows in Figure 2), it accounts for a relatively small amount of gift giving: only 10.9% of gifts given by previous recipients are directly reciprocating. This offers further evidence for the prevalence of generalized reciprocity instead of specific reciprocity in online gift giving.

Next, we compare prior online gift recipients to those who have not received a gift to begin to address *RQ1* about peer effects. We find that recipients are 18.1 times more likely to give gifts than non-recipients (99% CIs [17.9, 18.3]). Putting aside for now the suspicion that this estimate is inflated due to homophily, the observed effect could reflect changing social norms: people who had previously wished to give online gifts now feel more comfortable doing so, knowing that it is socially acceptable. Or, it could simply be an information effect: those who did not know that it was possible to give gifts online are now aware of the option. Or, people feel obligated to reciprocate the gift directly or give it forward in an act of generalized reciprocity.

Does receiving a gift induce people to give more gifts in the future, or are those who receive gifts simply more likely to give gifts in general? In order to approach a causal understanding of diffusion and age-based homophily in gift giving (*RQ1*), we investigate people at different stages of the “gifting cascade.” Givers and receivers are divided into three populations according to their experiences: *seeds* gave gifts before receiving any gifts, *followers* gave gifts after receiving a gift, and *receivers* received but never gave a gift (Figure 3a). We define these three groups to better distinguish between people’s characteristics and their likelihood to give gifts. For example, if older people were more likely to give gifts, and they tended to be friends with other older people, we would expect to observe chains of giving even in the absence of any social influence. This illustrates why those who give gifts after receiving a gift cannot unequivocally be considered to have been induced to gift, because they might have given a gift anyway (the counterfactual is unknown). Consequently, the observed differences between those who appear to initiate cascades (seeds, or “early adopters”) and intermediaries along a cascade could be in part arbitrary.

Figure 3b shows differences in ages by category: seeds tend to be older than followers who tend to be older than receivers (age differences are significant at $p < 0.001$). This is not surprising given that followers represent a mix of those who would have sent gifts anyway (i.e., they would have been seeds) and those who were actually induced to give. Women represented a majority in all categories, consistent with women’s generally higher activity levels on Facebook in the U.S. [7]. Approximately 65% of seeds, 71% of receivers, and 74% of followers were women.

There was strong evidence for age-based homophily in gift giving (*RQ1*). Gift exchanges tended to be between people of similar ages (see Figure 4). This trend was particularly strong for younger individuals; twenty year-olds most frequently gave birthday gifts to other twenty year-olds. In contrast, fifty-

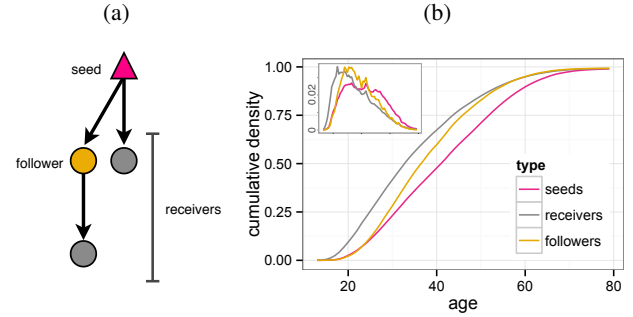


Figure 3. (a) Types of people in the gifting network: people who gave gifts before receiving any gifts (“seeds”), those who gave gifts after receiving a gift (“followers”), and those who received but did not give gifts (“receivers”). (b) Cumulative distribution (probability density distribution inset) of ages for seeds, receivers, and followers. On average, followers are younger than seeds and older than receivers.

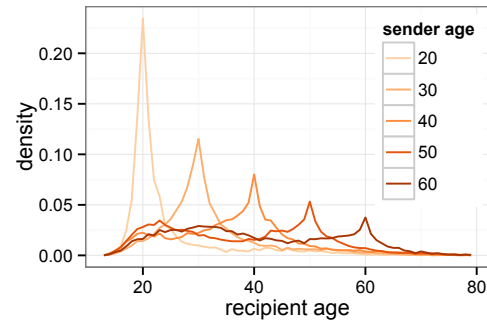


Figure 4. Proportion of birthday gifts given to recipients of various ages by senders of certain ages.

and sixty-year-olds gave gifts to friends across a wide range of ages. These observations are mostly consistent with the underlying distribution of friendship links on Facebook [43]: younger people have more homogeneous networks than older people, who have accumulated friends from a wider variety of contexts. Moreover, older people tended to give more gifts to people in their twenties, likely reflecting parent-child or other cross-generational relationships [7].

In summary, this section provided insight into the structure of online gift exchange, patterns of reciprocity, and homophily. The behavioral data suggest that only one in ten online gifts is directly reciprocal, which is at odds with research on offline gift exchange that finds most gift exchanges to be directly reciprocal [22, 23, 14, 21]. We also find that gifting exhibits strong patterns of homophily. Senders and receivers are typically of similar age, except for older adults who give gifts to a wider range of ages. Prior gift recipients are substantially more likely than non-recipients to give a gift in the future. However, the degree to which this reflects peer influence is still unclear, since many followers may have already been predisposed to give a gift, even if they had not received one. Therefore, in the next section, we employ a quasi-experimental design to better estimate the effect of receiving a gift on future giving.

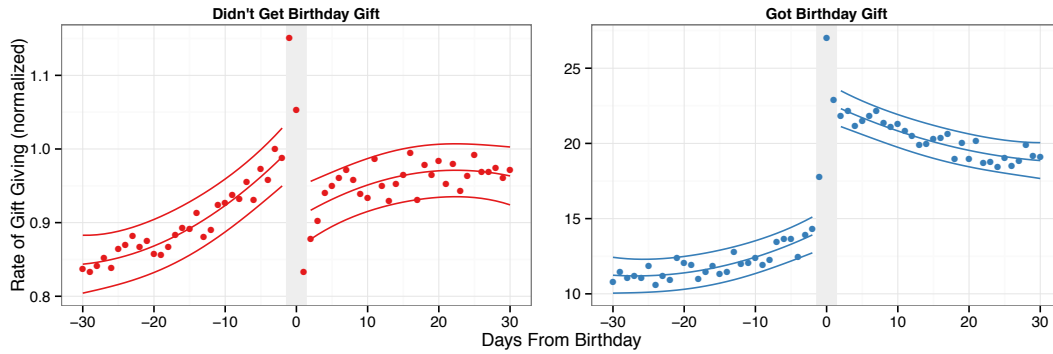


Figure 5. Interrupted time series of normalized daily gifting rate a month before and after people’s birthdays for those who received a birthday gift (right) and those who did not (left). Fitted lines and confidence bounds are estimated using a quadratic model fit by least squares with different intercept and slope before and after the birthday.

QUANTIFYING SOCIAL INFLUENCE

The spread of gift-giving behaviors can be understood as a network diffusion process [2, 4, 20, 44]: receiving a gift produces an in-kind peer effect in which friends are more likely to give gifts after receiving gifts. There are many confounding factors that are difficult to control for in the estimation of peer effects (i.e. social influence, contagion) [2, 3, 4], especially latent homophily [18, 25, 35]. The “naive” estimate that prior gift recipients are 18.1 times more likely to give gifts online than those who did not receive a gift compares potentially different subpopulations: those who are friends with and likely similar to people who give gifts, with those who are friends with and likely similar to people who do not give gifts. To estimate the causal influence of receiving a gift without these biases, the comparison needs to be between equivalent subpopulations.

A more credible estimate of social influence can be found by adjusting for observable covariates (e.g., matching or regression adjustment) [2]. However, these estimates could likewise be biased if important covariates for the adoption of gift giving were not observed or adjusted for. We therefore instead employ quasi-experimental method: we use an individual-level interrupted time series analysis [34] around people’s birthdays when some of them receive a gift, and which are timed haphazardly. Consequently, differences in behavior before and after a person’s birthday are less subject to confounding by common causes. This provides a more credible estimate of peer effects relative to prior observational studies, because it directly compares the same individual before and after an event that is uncorrelated with time trends. The following analyses offer more credible evidence to address *RQ1* about peer effects and age-based homophily.

Sample

The data used in this section is the same as in the previous section. All data was observational, de-identified, and analyzed in aggregate.

Interrupted Time Series

The individuals in the sample were divided into those who received a gift on their birthday or a day before/after (*got birthday gift*), and those who did not (*didn’t get birthday gift*).

Figure 5 shows the daily relative rate (normalized using the overall baseline rate of daily gift exchange) at which people gave gifts for the sixty days around their birthday, centered at day zero (their birthday).

The following trends can be observed in the interrupted time series plots. First, those who received gifts had a considerably higher baseline rate of gift giving than those who did not (note the different y-axes on the two panels), even before they received gifts, which is consistent with expected differences between these populations. Second, individuals were much more likely to give gifts on their own birthday, whether or not they received a birthday gift. Possible explanations for this phenomenon include increased generosity on one’s birthday, more disposable income from monetary birthday gifts, strategic behavior to elicit direct reciprocity, direct reciprocity for already received or anticipated online or offline gifts, or increased salience of birthday gift giving in general and specifically on Facebook. Third, gift-giving behavior changed between before and after people’s birthday for both populations: Based on a quadratic model fit by least squares with different intercept and slope before and after the birthday (as shown in Figure 5), individuals who did not receive gifts were 7.1% (99% CIs [2.1, 10.9]) less likely to give gifts two days after compared to two days before their birthday, while those who did receive gifts were significantly more likely to give gifts, approximately 1.6 times as likely (99% CIs [1.49, 1.73]).

However, this simple interrupted time series analysis has certain limitations. In particular, a credible causal interpretation of differences in gift giving is only justified at the birthday discontinuity. Although these results are based on averages across nearly all birthdays in 2013, an upward trend remains as a result of increases in the adoption of gift giving via Facebook over time. This likely contributes to the upward trend in the left panel, and left half of the right panel in Figure 5. In order to fortify the interrupted time series analysis, we developed a simple statistical model of gift giving for those who received gifts on their birthday.

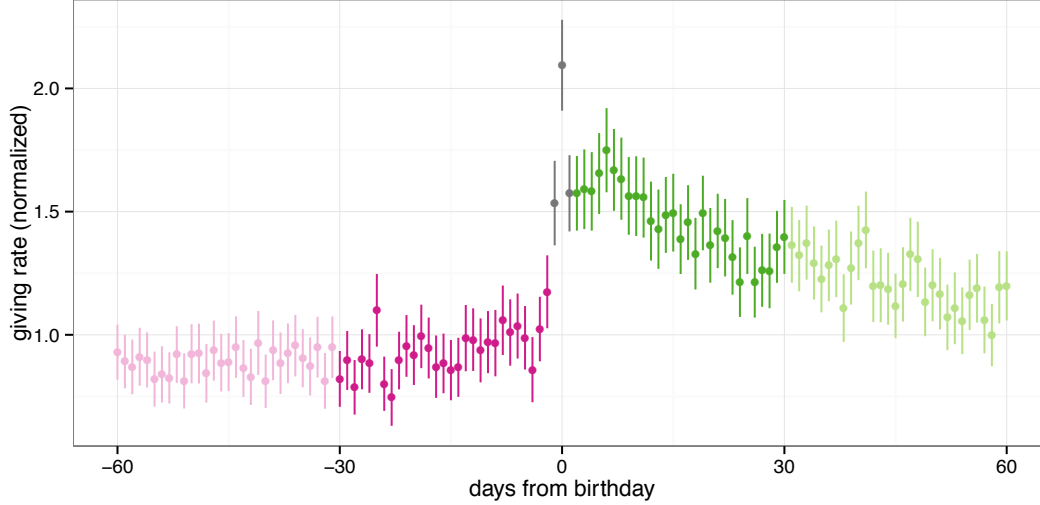


Figure 6. Estimates of gifting rates around the birthday of those who received a birthday gift. Days from the person’s birthday were classified into five periods, indicated here by color. In subsequent analyses, we compare the month after the birthday (dark green) with the month before (fuchsia), excluding the day of their birthday and the days immediately surrounding it (grey). Error bars are 95% confidence intervals from a user-clustered online bootstrap.

Statistical Model of Interrupted Time Series

A statistical model can provide a more robust estimate of the effect of receiving a gift on future gift giving, and supports investigations of individual differences in the magnitude of this effect. The following analyses only include those who received a birthday gift (the “treatment”) with the goal of estimating the average treatment effect on the treated (ATT). For each person, we have an outcome, y_{it} , which is the number of gifts given by person i at time t . A person’s birthday is at time T_i and they receive one or more birthday gifts at times $T_i - 1$, T_i , or $T_i + 1$. For investigations of individual differences, the population was divided into subgroups based on age. We model each person’s outcome at time t as:

$$y_{it} = \alpha + \lambda_t + \beta_{i,f(i,t)} + \epsilon_{it}.$$

where α is the baseline rate of gifting among individuals who received a birthday gift, λ_t is a fixed effect for each day, and $\beta_{f(i,t)}$ is a fixed effect for the number of days from person i ’s birthday where

$$f(i,t) = \begin{cases} -61 & \text{for } T_i - t < -60 \\ T_i - t & \text{for } -60 \leq T_i - t \leq 60 \\ 61 & \text{for } T_i - t > 60 \end{cases}$$

This provided indicator variables for the number of days to each person’s birthday for the 59 days before their birthday, up until the 60th day after their birthday. All days more than 60 days before their birthday were grouped together, as were all days more than 60 days after their birthday. In total, there were 123 ($2 \times 60 + 3$) birthday-relative periods defined by this model; 121 of them were a day long.

The primary goal of this model is to provide estimates for the effect of people’s birthdays on gift giving, before and after they

received gifts.⁶ We observed multiple outcomes for the same person and the error term ϵ_{it} may be correlated across different days for the same person. To account for this dependence, confidence intervals for the coefficients and model predictions were estimated by repeating this process on 1,000 bootstrap replicates of the data using an online half-sampling bootstrap clustered on users [29].

The model was fit to gift exchange data for all days of 2013, excluding people with birthdays within the first or last 60 days of 2013 to avoid issues arising from censoring in the period around a person’s birthday. Rates in this section were normalized by the average gifting rate for all individuals included in the analysis.

Overall peer effect

The normalized average gifting rate for all those who received a gift for their birthday is illustrated in Figure 6. The qualitative shape and magnitude of the discontinuity are similar to what was found in the preceding analysis. The average daily gifting rate for the 30 days prior to a person’s birthday (*pre-birthday* period) was compared with the the average for the 30 days after their birthday (*post-birthday* period), excluding the birthday itself and the day before/after it.⁷ Overall, recipients of birthday gifts gave 1.56 times (95% CIs [1.50, 1.61]) as

⁶Since y_{it} is a count that is most often 0 or 1, a generalized linear model is commonly used in this case. We use a linear model instead for multiple reasons. Most importantly, the performance of a linear fixed-effects model under a wide-range of possible misspecifications is well-studied [1], while other models, such as logistic regression, can suffer from aggregation bias in the presence of unmodeled heterogeneity. Since our goal is to account for time trends while summarizing the interrupted time series to produce estimates of average effects, we opted for a linear model. There are also interpretative and computational advantages.

⁷Excluding these days was motivated by the observation that many people received birthday gifts on these surrounding dates, due to variation in time zones, early gifting, and other factors.

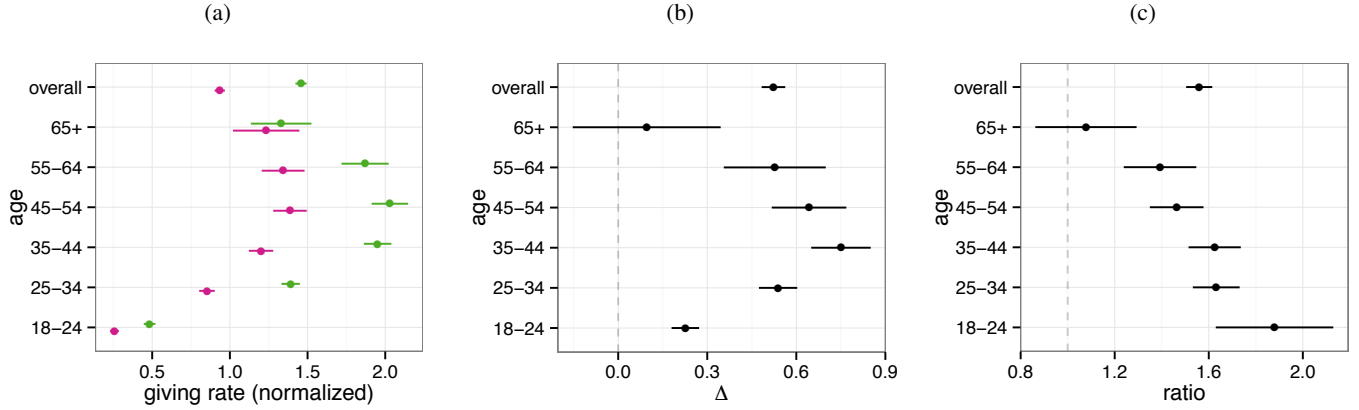


Figure 7. Heterogeneity in treatment effects by age of the initial recipient. (a) Rates of giving gifts for people of varying age in the pre-birthday (fuschia) and post-birthday (green) periods (normalized by the overall average rate). (b) Absolute increase in normalized average gifting rates ($\Delta = \text{post} - \text{pre}$). (c) Relative increase in gifting from pre- to post-birthday. Error bars are 95% confidence intervals from a user-clustered online bootstrap.

many gifts on days in the post- than the pre-birthday period. This estimate is marginally lower than the estimate from the simple interrupted time series analysis and provides strong evidence that receiving a gift induces more future gift giving.

Heterogeneity in effects by age

We expected treatment effects to vary with recipients' age based on the observed differences in the age distributions of seeds, receivers, and followers (Figure 3). We therefore focused on age-based heterogeneity in effects and fit the fixed effects model with varying coefficients for subgroups defined by age. Figure 7 illustrates comparisons between average gifting rates \hat{y}_{pre} and \hat{y}_{post} by plotting (a) both estimates, (b) their absolute difference, $\Delta = \hat{y}_{\text{post}} - \hat{y}_{\text{pre}}$, and (c) the relative increase, $RR = \hat{y}_{\text{post}}/\hat{y}_{\text{pre}}$. These quantities are shown for five age subgroups alongside the pooled results.

We find that older recipients were more likely to give gifts in both the pre- and post-birthday periods (Figure 7a). The absolute effect of receiving a gift, however, was not linear with age. Instead, 35- to 44-year-olds exhibited the largest effect with increasingly smaller absolute effects for younger and older people (Figure 7b). In contrast, the relative increase in the gifting rate was largest for the youngest receivers, who were generally less likely to engage in gift exchange overall (Figure 7c).

This heterogeneity has consequences for estimating the peer influence of receiving a gift. Out of all the gifts given in the post-birthday period, which could be naively considered as entirely induced by receiving a birthday gift, the share of gifts that was actually caused by the birthday, and presumably by receiving a birthday gift, is given by $\Delta/\hat{y}_{\text{post}} = 1 - RR^{-1}$. For instance, 47% of gifts given by a 18-to-24-year-old recipient in their post-birthday period were caused by receiving a birthday gift according to estimates from the statistical model. In contrast, for 55-to-64-year-old recipients, only 28% gifts in their post-birthday period were products of this causal mechanism.

INVESTIGATING ADOPTION MECHANISMS

In the previous section, we estimated the causal effect of receiving an online birthday gift on future online gift giving. However, this analysis could not account for offline gift giving or explain *why* these effects occur. We therefore conducted a survey to better understand the mechanisms underlying the adoption of online gift giving. In particular, the survey is designed to help distinguish between instances of general and specific reciprocity while accounting for offline gifts (*RQ2*) and to understand the role of social learning in the decision to give online (*RQ3*). Additionally, the survey aims to quantify the extent to which online gift giving complements or substitutes offline gift exchange (*RQ4*).

Sample

A random sample of four pre-stratified groups of Facebook users were invited to complete a survey: those who were seeds, followers, receivers, and a complete random sample. Respondents ($N=3,380$) were 60% female, aged 18-80 (mean = 40.0). The survey was optional and all data was de-identified and analyzed in aggregate. Stanford's IRB reviewed and approved a protocol for use of this anonymized data.

Survey Measures

The survey questions were developed specifically for the purpose of understanding adoption mechanisms of Facebook gifts. Participants were asked how familiar they were with the Facebook gifts product, how they first learned about it, whether they had ever given or received a Facebook gift, and gift-givers were asked whether they had previously received a gift (online or offline) from the person to whom they later gave a gift. In the end, 30% of respondents had given a gift on Facebook, 25% had received one, and 48% had done one or the other.

Results

First, we examined instances of reciprocity, comparing between self-report and observational estimates (*RQ2*). While the behavioral analysis identified specific reciprocity in only 10.9% of gift-giving episodes, many cases of specific reciprocity may have been unobserved, having occurred offline.

Indeed, the survey data indicate a far greater proportion of specific reciprocity including exchanges outside of Facebook: 73% of gift givers report having previously received a gift from the person to whom they gave the gift. In contrast, only 11% report engaging in specific reciprocity via Facebook, which is consistent with the estimated 10.9% from the behavioral data. Moreover, giving an online gift creates a similar expectation for reciprocity, with 87% of givers reporting that they expect to receive a gift from the recipient at some point in the future.

Second, the decision to adopt online gift giving is also influenced by perceptions of social norms (*RQ3*). Approximately one in four respondents who was aware of the possibility to give and receive gifts on Facebook reported learning about it via a social mechanism: 17% said they learned by receiving a gift from a friend and 6% learned by seeing a friend give someone else a gift, while the remaining 77% observed a link on the site encouraging them to give. By comparing the beliefs of those who learned about Facebook gifts socially to those who learned about it via a non-social link, we can better understand social learning about online gifts being acceptable substitutes for in-person gifts. Respondents were asked how they felt about giving gifts on Facebook compared to giving gifts in person, with a 5-point response scale ranging from “Much better in person” to “Much better on Facebook”. Among gift givers who first learned about gifts via a link, 44% reported that giving gifts on Facebook felt at least as good as giving gifts in person. In contrast, among those who learned about it through social means (i.e. observing friends’ participation), 66% felt that giving gifts online was as good as in person—a significantly larger proportion ($p = 0.002$). Surprisingly, only 40% of those who learned about Facebook gifts by receiving one felt that they were as good as in-person gifts, which was not significantly different from those who learned via a link ($p = 0.46$).

Third, we examined how online gifts complement or substitute for offline gifts (*RQ4*). To this end, we asked online gift givers about their recent exchange and found that only 58% would have been likely to give that person a gift for the same occasion if they had not used Facebook. Thus, nearly half of the gift givers gave a gift online that they would not have given otherwise. These complementary online gift exchanges occurred partly for their convenience: 46% reported that it would have been at least somewhat difficult to give the recipient a gift outside of Facebook. This indicates that online gifts comprise both substituted gifts that would have otherwise occurred in person or through alternative channels, and complementary (i.e. incremental) gifts that would not have been given outside of Facebook, often because of difficulty.

In summary, the survey filled in gaps from the behavioral analysis, identifying additional instances of specific reciprocity, where the initial gifting event occurred offline, bringing the results in line with previous literature [22, 23, 14, 21]. We also observed patterns of social learning related to different beliefs about social norms of giving gifts online. People who learned about Facebook gifts by observing other friends participate were far more likely to consider the behavior socially acceptable than people who learned about Facebook gifts through

a non-social encouragement. Thus, social learning shaped people’s beliefs about the normativity of giving gifts online. Finally, the survey data also shed light on whether online gifts complement or substitute for in-person gifts, with about half of the people indicating that they would have given the person a gift anyway, and another half indicating that giving a gift would have been difficult without Facebook.

DISCUSSION

This research examined the diffusion of online gift giving. Gift exchange is a pervasive form of human interaction with significant social, cultural, and economic implications. Our analysis yields strong evidence for the spread of gift giving in a large social network of friends and family by distinguishing social influence from other potential causes. In fact, a third of all gift exchanges we observe was caused by the sender receiving a gift in the first place (*RQ1*). The strength of this diffusion process partly depends on individual characteristics such as age. In multiplicative terms, younger people are more affected by receiving a gift, with notably stronger diffusion from older to younger people. In this context, peer influence helps contribute to product adoption by demographic segments who may not adopt by themselves.

Furthermore, we find evidence for two diffusion mechanisms of gift giving: reciprocity and social learning. Three in four online gifts were reportedly the product of specific reciprocity, where the initial interaction occurred either on or off Facebook. Additionally, we saw strong evidence that gift giving also spreads by “paying it forward” (i.e. generalized reciprocity) when considering the observed interactions in isolation. Thus, people give gifts partly because they feel indebted to others (*RQ2*). Another diffusion mechanism that we observe is people internalizing descriptive and injunctive norms about online gift giving (commonly described as third-party influence). People who saw friends exchange gifts were more likely to consider online gift giving “normal” than those who learned about online gifts through non-social means, or who learned by receiving an online gift themselves (*RQ3*). Finally, we find that online gifts serve as both substitutes and complements for in-person gifts (*RQ4*). About half of the observed online gift exchanges would reportedly not have occurred otherwise, in part due to barriers to in-person giving. Before discussing the implications of our findings, we first consider some limitations of this research.

Limitations

One concern may arise about the specific setting of online gift exchanges on Facebook. Social influence on Facebook may be different than in other online venues for gift exchange, as Facebook users in the United States have large, reciprocally endorsed networks consisting of a variety of relationship types, including many of their closest confidants [16]. Inducements to perform an action that has both monetary and relational implications, such as giving a gift, may therefore be stronger on Facebook than on a site like Twitter, which is based on unidirectional, fan-follower connections. Similarly, opportunities for social learning, such as viewing a story about one friend giving a gift to another, may have a stronger effect

on Facebook, where those friends are more likely to be mutual friends of the viewer and known from offline contexts. However, lower barriers to give online and the availability of inexpensive gift cards may mean that gift giving could propagate across a wide variety of online social networks, not just the close social graph on Facebook.

A limitation of our behavioral data collection is that gift exchanges on other sites and offline were not directly observed. Moreover, our analyses ignored price differences across gifts. We considered both physical gifts and gift cards, but not virtual or free goods (e.g. [46, 45]). Free gifts could still be as meaningful as paid gifts—if “it is the thought that counts”—but their exchange practices may differ. We focus on birthday gifts which may differ in their exchange dynamics from gifts given on other occasions and we therefore caution against broad generalizations. Nevertheless, birthdays are a universal occasion to give gifts and the randomness in birthdays enabled a quasi-experimental analysis to estimate causal effects. Moreover, we consider acts of giving and receiving gifts in this study, though it may be of interest to examine third-party influence from observing other people give and receive gifts, especially in the context of social learning. We found evidence that reciprocity and social learning promote the spread of gift giving, two diffusion mechanisms that have been identified by controlled studies using economic games [41, 12]. However we cannot disentangle their relative influence here. This extra step could provide valuable insight into how encouragements could be targeted to match people’s underlying motivations to give.

Finally, there are some threats to validity of the interrupted time series analysis arising from other events that occur contemporaneously with a person’s birthday (e.g., receiving gifts in person, receiving attention on Facebook). Comparison of the time series for people who did and did not receive a gift on their birthday suggested that birthdays were not always followed by increased gifting on Facebook, but some of these events may occur differentially for different subgroups, including by age or likelihood of receiving a gift on Facebook.

Implications

The findings offer theoretical implications for the gifting literature, which is dominated by qualitative accounts of in-person gift exchange. The exchange of gifts in the digital age continues to be a fundamental part of human relationships [23]. This study provides new insights into the social structure of online gift exchange between Facebook users in the United States and the ways in which online gifts may supplant or complement in-person gifting practices. Online gift exchange mirrors offline gift exchange in that the majority of gift giving is motivated by specific reciprocity. People who receive a gift in person are prepared to reciprocate with an online gift, and vice versa. This suggests that societal norms and practices transcend the digital/in-person divide, which creates new opportunities for reciprocal giving that can foster feelings of trust and contribute to building social capital [26]. Moreover, our findings suggest that online gifts both complement and substitute for offline gifts, especially in cases when giving a gift in person would be inconvenient. One would expect the overall number of

gifts to increase as the Internet lowers barriers by facilitating gifting over long distances and at the last minute, and also by reminding people of gift-worthy occasions such as birthdays.

Prior research has argued that there are substantial positive peer effects in various behaviors. This study provides credible evidence that there are substantial peer effects in online gift giving—a type of cooperative behavior—and that this results not just in substitution from offline gifting but in incremental gifting. This finding advances our understanding of human behavior by contributing to research on social contagion. Human cooperation can take different forms and occur in various contexts. Behavioral economics research typically studies cooperation using economic games in which a player can give up money to benefit another player (e.g., [41, 12]). This offers a controlled research environment, but the findings have low ecological validity. Prior purely observational research suggested that divorce, a specific decision to stop cooperating, is contagious [24], but this is the first quasi-experimental study to our knowledge to establish the contagiousness of a cooperative behavior in the field. While online gift giving cannot stand in for all types of cooperative behavior, it does enable us to learn about the spread of a particular cooperative behavior, which is not only thought to be a fundamental part of human relationships [23] but also involves real financial costs, in a network of close friends.

The implications of our findings for the design of social interfaces are significant. The strength of social influence induced specifically by receiving a gift suggests that the salience of the possibility to give gifts should be increased after receiving a gift. However, consistent with research on social influence [9], the survey data suggest that third-party influence is even more influential in shaping attitudes towards online gifts than directly receiving a gift: People who saw friends exchange gifts were more likely to consider this behavior desirable than those who learned about it through non-social means, or who learned by receiving a gift themselves. User experience designers should consider increasing the visibility of cooperative behaviors among other friends to support the development of social norms, perhaps over standard advertisements. Alternatively, the observed differences in beliefs about the social norms of online gift exchange could reflect underlying differences in network structure or individual characteristics. People who learn about online gifts by observing their friends exchange gifts may just have denser networks of more engaged friends. And yet, those who saw friends exchange gifts rated online gifting as more socially acceptable than those who received a gift from a friend. This suggests that differences in beliefs persist even in social contexts with only one friend who is engaged enough to give a gift.

Moreover, interface designers should account for demographic features in targeting people to reciprocate an act of cooperation, as the magnitude of social influence varied considerably with age. This pattern of age-based homophily may be partly due to the costly nature of the interaction and partly due to the underlying network structure [43, 7]. The finding suggest that in online gift exchange prompting older people to give to younger connections, and prompting younger people after

they received a gift to give to others of similar age would be most supportive of people's existing behavior. From a marketing perspective, the study highlights the value of peer-to-peer spread of product adoption for reaching more diverse potential adopters and inform our understanding of how peer adoption in online social exchange evolves over time.

Concluding Remarks

This research makes progress towards gaining a better understanding of the spread of a fundamental social phenomenon in the real world. This required overcoming a number of methodological challenges. We adopted a mixed-methods approach to triangulate and gain a broader picture of online gift exchange. An exploratory analysis of behavioral data provided initial evidence for peer effects and homophily in age, and the quasi-experimental method provided a credible estimate of peer effects in online gift giving. The survey allowed us to fill in the gaps for offline behavior and highlighted variation in perceived social norms. Mixed-methods research approaches like this one can be applied in many other domains, in particular for studying the spread of other socio-technical phenomena.

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