

Disenchanted the World: The Impact of Technology on Relationships

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Abstract. We explore the impact of technology on the strength of friendship ties. Data come from about two millions ties that members of CouchSurfing—an international hospitality organization whose goal is to promote travelling and friendship between its members—developed between 2003 and 2011 as well as original and secondary ethnographic data. The community, and the data available about its members, grew exponentially during our period of analysis, yet friendships between users tended to be stronger in the early years of CouchSurfing, when the online reputation system was still developing and the whole network was enmeshed in considerable uncertainty. We argue that this case illustrates a process of disenchantment created by technology, where technology increases the ease with which we form friendships around common cultural interests and, at the same time, diminishes the bonding power of these experiences.

Keywords: On-line Communities, Uncertainty, Networks.

Technology has greatly facilitated the establishment and growth of communities centered on unique interests. What is the impact of this development on social networks? The technological revolution of the last decades years has greatly increased opportunities for interaction and the speed with which new relationships develop (DiMaggio et al. 2001). Indeed, finding like-minded people with whom to share a passion, no matter how obscure, has never been easier than it is today (Kairam, Wang, and Leskovec 2012). The sharing of a common interest is a powerful factor influencing the emergence of ties between individuals (Lizardo 2006), and more arcane, more specific interests produce stronger ties. Online communities have emerged as powerful foci (Feld, 1981) through which social ties are formed. Here we investigate how risk and uncertainty influence the strength of these ties.

A key aspect of these online communities is their reliance on reputation systems, which accumulate information about the members of the community in the form of reviews, ratings, comments, etc. The communities and institutions in which individuals are embedded have always stored information about members' past interactions in the form of reputations and collective memories. Yet the processes by which this information was transmitted were less formalized and more contested than those made possible by current technology. Here we consider how the nature of online reputation systems impacts the strength of ties they facilitate.

Data for our analysis come from CouchSurfing (CS hereafter), an international hospitality organization established in 2003. The goal of CS is to promote cultural

understanding between strangers. “CouchSurfers” (CSers) engage in hospitality interactions with other members of the organization with no exchange of money. Host and guest often are previously unknown to each other, save for information provided through the organization’s website. The interaction between the two is not strictly instrumental, thus giving it many characteristics of an altruistic exchange (Bialski 2009). In the decade since the CS’s founding, the organization has developed an elaborate system for reporting reputation. In addition to these hospitality exchanges, local CS chapters organize events where members can meet and interact. While these events are not directly related to the experience of travelling and meeting strangers, they help instead bring together people that have a general interest in travel.

We use the entire friendship network of CSers over time, from 2003, when the website had just a few members, to 2011, when the website had about four million registered users. Of these users, about 650,000 were active members in the sense that they had participated in at least one hospitality exchange (visiting or hosting a stranger) or event organized by a local chapter of CS (a potluck at another member’s house, for instance). We focus the analysis on the set of active users and on the more than two million friendships that formed as a result of their participation in CS. In the great majority of the cases, CS members meet online first and then meet in person as either guest or host. The resulting relationships are therefore a mix of the online and offline worlds—i.e., of the unified social reality most people live in. We think that the data we analyzed is uniquely suited for studying the impact of technology on relationships. Further, we complement the quantitative data with ethnographic observations from a secondary source and with interviews we conducted.

We present evidence that the friendship ties that formed between strangers as the result of guest-host interactions were stronger than interactions formed as result of participation in a local event. In line with prior research (DiMaggio 1987; Lizardo 2006), the sharing of a more unique cultural product—travelling and meeting with strangers in this case—produced stronger ties than just the sharing of a broader interest in travelling. At the same time, we found that the greater the amount of information available about potential hospitality partners, the weaker the friendships that emerged from the experience. These findings highlight a complex processes by which technology is impacting relationships. On one hand, the ways technology facilitates the aggregation of people into cultural communities makes ties easier to develop. On the other hand, the growing amount of information circulating in a community about potential others makes the friendships that are the byproduct of their interactions weaker. The larger point this paper underscores is that technology may be making people more connected than ever before, but these connections have less binding force to meaningfully structure our lives.

1 Research Hypotheses

Cultural sociologists interested in social networks have for a long time highlighted a direct connection between the emergence of relationships and the consumption of cultural goods. Long (2003) found that women who belonged to reading groups in

Houston, Texas, also shared multiple ties based on neighborhood and affiliations with local religious and educational groups. This study and similar others (Erickson 1996) illustrate how social structure, in the form of pre-existing social ties, impacts cultural tastes and the consumption of cultural goods. At the same time, the consumption of cultural goods such as books also has an effect on social networks in that it facilitates the emergence of new ties. Lizardo has gone farthest in extending the idea that cultural tastes and social networks are mutually constitutive. Using Bourdieu's theory about the fungibility of various forms of capital (1986), Lizardo shows how cultural capital, in the form of individual tastes, generates social capital, in the form of new ties. In investigating this conversion, Lizardo's analysis provides evidence that consumption of more specialized, highbrow cultural content produces stronger ties than consumption of popular culture goods.

While Lizardo's model uses the dichotomy popular and highbrow to explain the mix of weak and strong ties in a community, others have related the strength of ties to the consumption of exclusive versus popular cultural goods. According to Collins (1988), for instance, particularized cultural capital sustains rituals and produces solidarity among community members, making it capable of generating stronger bonds than generalized cultural capital (1988). That is, two strangers are more likely to become closer friends by discovering a common love for a little-known sports team than by discovering a common passion for a world-famous one. While almost any two strangers can talk about a famous team, sustaining a conversation about a lesser-known object activates a more precise symbolic identification of the two partners. Synthetizing this body of work, we expect that:

H1: The more exclusive the experience related to the consumption of a cultural good, the stronger the emerging relationship between the individuals in a given community (everything else equal).

With respect to CS, H1 suggests that stronger hospitality interactions would generate friendship ties than ties that emerge from participation in a common local event. The interaction between host and guest, we argue, generates greater unique and memorable experiences that could become the basis for stronger bonds. Further, H1 suggests that as a novel product spreads and becomes more popular it loses its power to create meaningful bonds. One might compare, for instance, backpackers who meet in a foreign city before and after mass tourism discovers it, or fans who meet at a band's concert before and after the band becomes popular. For early adopters, the circumstances of the meeting are unique and are likely to create strong bonds, but for late adopters the circumstances of meeting are banal and result in weaker bonds.

Social exchange scholars have also investigated the factors shaping the emergence of strong ties. Coleman (1975) showed that negotiated exchanges, or exchanges where the terms of the interactions are known beforehand (e.g., an exchange based on a contract), generate lower levels of trust than reciprocated exchanges. Building on this finding, social exchange scholars have investigated the conditions that create stronger, more trusting bonds between exchange partners. The majority of exchange scholars have focused on the development of trust in market transactions (Kollock 1994; Molm, Takahashi, and Peterson 2000), but others have analyzed trust and strength of

ties with respect to the institutions of a given society. We use findings from this latter group to build our theoretical argument as to how online rating systems are impacting the relationships that develop out of the consumption of cultural goods.

Yamagishi and Yamagishi (1994) note that while the Japanese are less likely to attribute trust to individuals than are Americans, their society has a higher level of trust than U.S. society. They explain this puzzle by distinguishing between trust—an inference about the interaction based on the partner's personal traits—and assurance, which is based on the knowledge of the incentive structure surrounding the relationship. Thus, Yamagishi et al. explain, the Japanese have more relationships backed up by assurance structures than do Americans (1998). Cook, Hardin and Levi (2007) extend this approach to the role of institutions, at least partially departing from a strict rational actor perspective based on incentives and punishments. They argue that institutions facilitate a type of cooperation that does not require trust. Institutions substitute for trust because they provide contexts for creating expectations about the future behavior of interacting partners.

Cheshire (2011) uses the distinction between assurance and trust to draw attention to the impact of online assurance structures on the relationships we form. In environments characterized by high uncertainty—where little is known about the potential partners—strong relationships are more likely to develop. On the contrary, when relationships are assured by a third party—a network administrator or the scores of a rating system—ties that emerge between partners tend to be weaker (Cheshire 2011; Fiore and Cheshire 2010). Reframed with respect to Coleman's argument, greater information about individuals reduces the uncertainty in dealing with strangers and on average makes interactions closer to a negotiated exchange. We argue that a rating system in a given community operates similarly to an assurance structure, in that it decreases the interpersonal trust necessary between partners:

H2: The more information circulating in the community about potential partners, the weaker the emerging friendship between two strangers after the interaction.

H2 suggests that a potential impact of the ubiquitous online ratings system is a reduction of the binding force emerging from the shared experience of consuming cultural goods. The argument here is that, independent of the exclusivity of the good, the experience of travelling generates weaker bonds between CSers in the presence of a ratings system than without one to act as an assurance structure. Considered together, our two hypotheses suggest a technology-driven process of progressive disenchantment of the world: relationships may be easier to form now than ever, but each of these new relationships has a lower binding force and ability to fill our lives with meaning.

2 The Case Study

CouchSurfers engage in hospitality exchanges with other members of the organization. Host and guest often are previously unknown to each other except for information

provided through the organization's website. Visiting a stranger's house—or hosting a stranger in one's house—poses the risk of some particularly devastating events, as well as some minor inconveniences. Despite such risks and the fact that no money changes hands to compensate for them, there are now millions of CSers worldwide engaging in thousands of hospitality exchanges every day. Friendship ties are a byproduct of these exchanges. After the hospitality interaction, the host and the guest have the option of voluntarily and independently reporting to CS the formation of a new friendship binding them. Furthermore, each partner is also asked to rate the strength of that new tie. While this reporting is completely voluntary, a large majority of CSers in our data fulfilled the request.

We purposefully use the concept of exchange to characterize the interaction between a host and a guest. Scholarly work on the CS community suggests that while exchanges do not necessarily recur with the same partners (i.e., many pairs do not share more than one exchange with each other), CSers interpret hospitality interactions through the lens of reciprocity (Molz and Gibson 2007). CSers alternate between roles, sometimes serving as guest and sometimes as host, thereby generating a “pay-forward reciprocity” that informs their behavior and expectations (Bialski 2009). The word “exchange” captures the idea that, despite the fact that a given pair often does not interact more than once, most users in the CS community feel the binding that comes from belonging to a community.

As previously detailed, hospitality exchanges are not the only mechanism through which CSers form friendships. Members organize many informal events for locals and travelers, and CSers may also meet each other casually for, say, a meal or conversation. As with hospitality exchanges, participants in CS events and have the option of reporting new friendships with people that they meet in these ways. Because the CS reporting mechanism asks users to specify how they met, it is possible to distinguish between friendship ties formed from hospitality exchanges and those formed from other interactions. We term the latter “non-hospitality exchanges.” There are two key differences between hospitality and non-hospitality exchanges. First, there is higher perceived risk in a hospitality exchange. Second, non-hospitality interactions are less in line with the concept of exchange as described above. However, for clarity we maintain the term *exchange* with the caveat that we use the non-hospitality interactions mainly as a benchmark against which to compare hospitality exchanges. It is useful to apply Simmel's (1950) analysis of interactions occurring within a dyad and interactions occurring in groups of three or more when considering hospitality versus non-hospitality exchanges. In a dyad, ties are personal because a tie has to bind both actors for it to exist. In larger groups, ties are social because the group can continue even if the ties produced do not bind all actors. Thus, hospitality ties are personal while non-hospitality ties are social.

Since its founding, CS has enjoyed growing popularity and media attention. Unsurprisingly, the fact that hundreds of thousands of people around the world are brave enough to open their houses to strangers strikes many members of both the public and the social scientific community as remarkable. So focused on potential negative outcomes is the public discourse surrounding CS that the word “risk” itself appears in

about one out of every six online mentions of the organization.¹ Yet members of CS engage in these seemingly risky interactions almost as a matter of routine. CS thus offers the opportunity to study a rare kind of data—well-documented, real-life, risky interactions between strangers and the evolution of the ties they form through those interactions.

Perhaps because of its combination of more and less dangerous behaviors or because of an appetite for adventure among the key demographic of its members, CS has become for many a sort of idealistic lifestyle community (Marx 2012). However, the community aspect of CS did not exist at the beginning. It emerged over time. Key to its development was the implementation of a reputation system for collecting information about others, facilitating the calculation of risk. The cornerstone of CS's reputation system is the personal reference. Members may write testimonials about others (usually a few sentences but sometimes several paragraphs), describing their experiences with their interaction partners. References, as well as other reputation signals, may be submitted unilaterally, but are often reciprocated.²

References may be exchanged between any pair of users, but the reference form solicits information regarding the circumstances in which two individuals met and, importantly for our analysis, whether they met through the organization or knew each other beforehand. Data gathered also includes whether an individual hosted another and, if so, for how many nights.

The reputation system makes it possible for a member to anticipate the type of interaction she will have by hosting or by being hosted by a particular other user. The reputation system thus represents a capital asset of the organization and the key element that facilitates the millions of CS interactions worldwide between strangers. However, when CS began, members could gain very little information about one another from the website, other than self-completed profiles whose credibility could always be cast into doubt.

The reputation system developed over the years. Its expansion favored the circulation of information about members and facilitated the rise of interactions among travelers—interactions which, in turn, were folded into the reputation system, helping to further its development. During this period the organization grew steadily by adding new members, but hospitality exchanges increasingly took place between repeat users—i.e., individuals who had already had the experience of offering or receiving hospitality through the organization.

3 Data and Methods

As previously mentioned, CS has gathered social network information from its members through its online platform from its very beginning as an organization. Users are

¹ The statistic is based on a Google search performed February 16, 2012. At that time there were 2.2 million mentions of either Couchsurfing.com or Couchsurfing.org, about 375,000 of which included the word “risk” or its derivatives.

² Lauterbach et al. (2009) report that about three quarters of CS “vouches” were reciprocated in 2009.

encouraged to record their ties with other members of the organization—both with friends they know from elsewhere who also happen to be users of the platform and with friends they met through the organization (through a hospitality exchange or a non-hospitality exchange). These different circumstances of meeting are captured in the CS data, as well as the date of tie formation and an explicit, self-reported measure of tie strength.

Our quantitative analysis is based on a set of 2.2m observations of social ties mediated by CS, with valid and non-missing data in all the relevant variables, recorded on the CS platform from 2003 to 2011. The ties under scrutiny are only those between people who did not know each other before they met on CS; interactions for which no time stamp was reported were excluded from the analysis. Further, we distinguished those social ties that developed as a result of a hospitality exchange from those that developed from a non-hospitality exchange. There are 645,411 unique users represented in the dataset. Because our unit of analysis is a tie (i.e., a pair of two users), repeated experiences at the individual level do not imply repeated experiences for the pair. Indeed, only a tiny fraction of the interactions in our dataset occurred more than once. We operationalize our key concepts below:

Tie strength: In the CS reputation system, users may characterize their relationships with other users as “Acquaintances,” “CS Friends,” “Friends,” “Good Friends,” “Close Friends,” and “Best Friends.” Tie strength is measured on this scale for 98% of all ties reported between CSers who did not know each other before joining CS. Figure 1 plots the cumulative log-count of friendship ties generated by hospitality exchanges, separated by strength.³ An interesting pattern appears. Early in the life of CS, strong friendships (“Best Friends” and “Close Friends”) were significantly more prevalent than weak ties (“Acquaintances,” “Friends” and “CS Friends”), but the reverse was true from about the 40th month onward. The category “Good Friends” remained much in the middle, before and after the 40th month.

It appears that hospitality exchanges produced stronger relationships on average when CS was new than later in its existence. In our analysis, we collapse the above six categories into three: ties rated by users as “Acquaintances” and “CS Friends,” are coded as Acquaintances; ties rated as “Friends” and “Good Friends” are coded as Friends; ties coded as “Close Friend” and “Best Friend” are coded as Best Friends. This classification preserves the underlying ordered nature of the recorded variable while at the same time protecting us from the ambiguity of distinctions such as “Acquaintances” versus “CS Friends” or “Close Friend” versus “Best Friend.”

Ties: As previously mentioned, we distinguish between two kinds of interactions facilitated by the organization. Hospitality exchanges represent the *raison d’être* of CS. There is arguably a great deal at stake for both host and guest in this kind of interaction.

³ When the two users’ reports of tie strength do not coincide, we randomly assign the tie strength to one of the categories reported by the users. Because we have no longer access to the CS dataset, this decision cannot be reversed. While we agree that studying discrepancies of ratings could be very interesting, we think that such a study is outside the scope of this paper. We are here interested on the average strength of ties at the systemic level, not on the dyadic perception of these experiences.

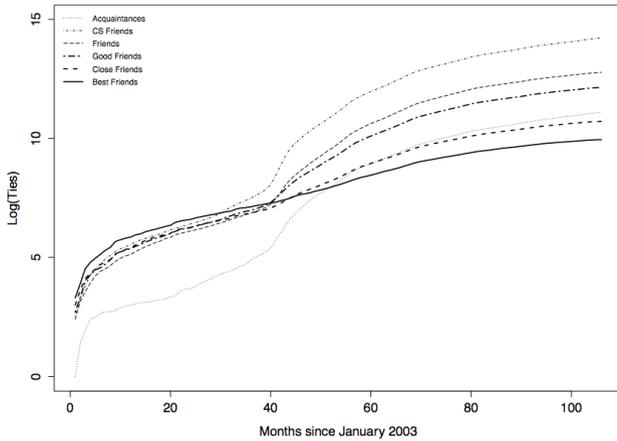


Fig. 1. Distribution of ties over time

In the worst-case scenario, both participants ultimately expose themselves to risks of theft, abuse or injury. We contrast hospitality exchanges with ties formed through less risky, non-hospitality exchanges, such as informal CS events (parties, collectives, organizational meetings, common meals, etc.) or any other occasion that does not involve one party hosting the other (one-on-one dinners, conversations, etc.).

Information: We measure the amount of information circulating in CS about potential partners by counting the number of ties (hospitality and non-hospitality) a member had prior to the focal exchange. That is, for every dyad in our set, we counted and summed the number of prior ties each user had up to the point of the latest interaction. For instance, if user A had one prior tie before interacting with user C, and user C had no prior ties, the variable cumulative ties for the dyad A-C would take the value of 1. Furthermore, the relationship between A and C would increase the number of prior ties for the two users so that the next time A established a tie with another user, say D, the total number of prior ties she contributed to the new interaction would be 2; for C, the new number would be 1.

Given that the overwhelming majority of CS interactions left a trace in the form of a review, we think that number of prior ties before the focal interaction is a good proxy for the amount of information circulating in the system about the exchanging partners. Because we wish to contrast the presence or the absence of information, rather than quantifying the impact of one extra review on the strength of the emerging relationship, we further segmented this variable in three categories: No prior information; Information about one partner; and Information about both partners.

Friends in common: To disentangle any potential confounding influences of triadic closure on our analysis, we include the number of prior friends in common as a control in our model by counting the number of triads a newly created tie closes. Furthermore, we distinguish embedding triads according to the strength of the ties they contain. We collapse the tie strengths the two users reported into a global measure of open triad strength. As in the case of contradictory tie strength reports, whenever the

two ties forming an open triad are not the same strength, we randomly assign the strength of the triad to either of the strength scores the open triad received.

We include a number of other control variables in our analysis. Appendix B contains summary statistics for all the variables included in our sample. The majority of ties in our sample were between opposite-sex pairs (57%) who were on average in their mid-twenties (24 years old) and had been members of CS for a bit more than one year (13 months). Reflecting the growth of the website itself, most of the ties in our sample occurred during CS's seventh year (81 months after January 2003). Additionally, the average dyad was composed of members whose tenures in the organization were 13.88 months apart.

Our analysis also takes into account the organizational tenure of both members participating in the interaction. The average pair of CSers involved in an interaction had been members of the organization for 13 months at the time when the interaction occurred. However, the average difference in organizational tenure between the two members is just under 14 months, suggesting that a large number of interactions were between established and novice CSers.

Because of the nature of our dependent variable, *Tie strength*, we employed an ordinal logistic model with three categories. Technical details of this model are provided in the Appendix A. We also support our quantitative analysis with interview data from two sources – a series of 2005-2006 interviews reported by Bialsky (2009),⁴ as well as our own ethnographic interviews conducted in 2010.⁵

4 A Community of Like-Minded People

Often stated reasons for joining and using CS included an idealistic desire to create a better world through travel and a search for opportunities for personal. This type of idealism still runs high among the CSers we interviewed and is in full display even to a cursory look at the current version of the website. Indeed, creating a better world through travel is still the motto of CS: “To make the world a smaller and friendlier place, one life-changing experience at a time.”

Perhaps because of a common mindset or because of a shared ease in forming relationships, the friendship network of CSers grew rapidly from its 2003 origins. The opportunity

⁴ Bialsky's study contains interviews and observations capturing the early CS (from February 2005 to the summer of 2006), when the community consisted of 200,000 users worldwide (a tiny fraction of what it is now). The scope of this study was rather different from ours. Bialsky's goal was to study the impact of CS on tourism and to suggest technology's potential disruption of how people travel. Bialsky's interviews are useful to us because they reflect a time when CSers had fewer references and, as a consequence, interactions with strangers were enmeshed in greater uncertainty than present-day interactions.

⁵ We conducted a series of 18 interviews we conducted during the summer of 2010 in Amherst, MA; Santa Fe, NM; and Reykjavik, London and Milan. These interviews took place when one of the authors surfed as a guest on the couches of the interviewees. The sample includes eight females and ten males ranging in age from their early 20s to late 50s. All interviewees knew that we were conducting a research study on CS.

to make new friends was a main reason for joining CS among many early members.⁶ Friendships developed from the uncertainty about how to properly interpret the roles of host and guest. This uncertainty created opportunities for a process of friendship discovery, albeit in an accelerated format. Long conversations about life with the (more) unknown alter were central to this process, and quite common at the time.⁷

If a common sentiment of bettering the world through travelling and meeting strangers has been part of CS since its very beginning, a crucial difference between the early years of CS and the more recent period is the amount of information available about potential others before an interaction takes place. Figure 2 plots for each month in the organization's life the average number of prior hospitality exchange experiences

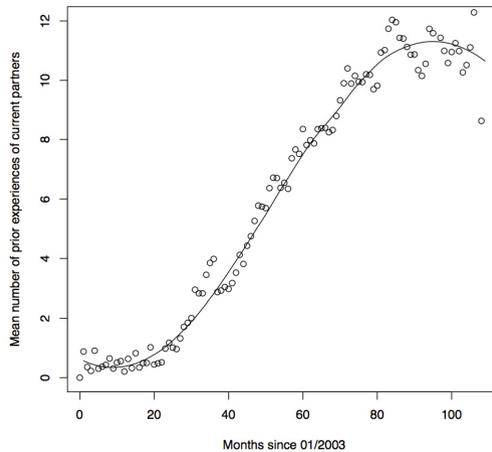


Fig. 2. Average amount of information about potential partners over time (LOESS regression)

⁶ Johan, a 27-year-old Dutch CSer, stated: “I look back on my friends, I’ve been in Holland and I think I got into more meaningful relationships with CSers than people whom I’ve known for years.... I just see them being so static, as they are, they didn’t get out. Even though we spent all these years together as friends, drinking together, or whatever, they still stay static, they’re still in the same place.” (PB, 33). Likewise, Ulla, a 26-year-old Finnish woman remarked, “all the Finnish culture and the Helsinki culture is just so closed down somehow. It’s tough to break into circles and meet people for the first time.... There are people who do not understand this side of me... CSers all have the same needs to see.” (PB, 33).

⁷ This is, for instance, what Paula Bialski wrote about her very first hosting experience in 2004: “He [the guest] would speak, and I would often listen. It was the first time I ever invited a stranger into my home, and the first time I ended up speaking to a stranger until the late hours of the night” (PB, 9). Not knowing what to expect or how to behave when playing the role of host or guest also represented a challenge. Yet despite the perils of uncertainty, the psychological and emotional rewards of a successful interaction were substantial. Karen, a 27-year-old Australian traveling in Ireland, was “extremely nervous” (PB, 46) before meeting her first host in Dublin. Nevertheless, they ended up talking until two in the morning (PB, 46).

that any two partners had prior to a given interaction.⁸ The figure shows an upward trend in the number of prior hospitality exchanges starting about 20 months into the life of the organization, when interactions were on average based on less than one prior experience, and leveling off around month 85, when hospitality exchanges reached an equilibrium level of about eleven prior experiences.

A key difference between early CSers and the ones we interviewed is the importance that the latter group attributes to reading references before selecting with whom to spend the night either as a host or a guest.⁹ In contrast to early CSers' openness to the uncertain, the people we interviewed are more calculating of the type of "transformative experience" they are looking for when choosing other CSers. It is not the case that later CSers are less idealistic about the importance of the website for transforming the world. Rather, information has rationalized the process of selection and reduced the uncertainty associated with meeting strangers. Next we explore how greater information has impacted the strength of ties.

5 Results

Table 1 below presents the results of a partial proportional odd logistic model. We decided to use this model instead of a more standard ordered logistic model because the proportional odds assumption built in the ordered logistic model breaks down for three covariates—*Report tie*, *Exchange tie* and *Information*. A way to think about the partial proportional odd model is to see it as divided into two parts—one part with all the variables whose estimated coefficients do not change with the levels of the dependent variable (*proportional odds variables*, in Table 1) and one part made of variables whose coefficient estimates change across the levels of the dependent variables (see Appendix A for details). In Table 1, all the coefficients are standardized so that their magnitudes can be compared. Also, given the statistical power of our test all effects are significant at .0001 unless otherwise noted.

The table has some potentially-surprising results. Gender emerged as significant in affecting tie strength: opposite-sex dyads formed stronger ties than same-sex dyads.

⁸ For example, if A, who has participated in three prior hospitality exchanges, hosts B, who has engaged in one prior hospitality exchange, then A and B's interaction is assumed to be informed by four prior experiences. We averaged these figures across the dyads in our data.

⁹ Lisa, a woman in her 20s in London, told us she was concerned about safety when she joined CS. She had since become confident because "...the first experience was great and because, I suppose, the community's existing for many years now so the reference system is also increasing." For Lisa, experiences with other CSers appear to be mediated by the organization's reputation system. When we asked if safety ever became a concern for him, Peter, a new CSer in his 20s from Reykjavik, told us, "I will check my references. That's the only [...] thing that I learned—just check people's references." Now that information about others is available on CS, it plays an important role in maintaining a sense of safety within the community even when meeting with strangers. Roberto, a man from Milan in his 30s, told us, "Every time you write a message, there is a message that it is recorded for safety reasons. This is guaranteed and it's important because it's true that strangers are friends that you haven't met yet, but at the same time, strangers are always strangers."

Table 1. Estimates of partial proportional odds logistic model

<i>Variable</i>	Log odds std. error	
<i>Proportional Odds Variables</i>		
Female to female tie	-0.077	(0.007)
Female to male tie	0.039	(0.0048)
Mean age	0.003	(0.0018) [^]
Age difference	-0.059	(0.0018)
Difference join CS	0.009	(0.0018)
Mean join CS	0.176	(0.0027)
Month tie creation	-0.281	(0.0027)
Friend in common	0.039	(0.0015)
<i>Pr(Friend+ vs. Acquaintances):</i>		
(Intercept)	-0.83	(0.007)
Report ties within one month	-0.449	(0.003)
Hospitality Exchange Tie	0.091	(0.0033)
Information about one partner	-0.009	(0.0086) [^]
Information about both partners	0.115	(0.0065)
<i>Pr(Best Friend vs. Friend, Acquaintances):</i>		
(Intercept)	-2.773	(0.0134)
Report ties within one month	-0.872	(0.008)
Hospitality Exchange Tie	0.474	(0.0081)
Information about one partner	-0.285	(0.0018)
Information about both partners	-0.501	(0.013)
N = 2,171,966		
Residual deviance: 2940528 on 4343914 d.f.		
Log-likelihood: -1470264		
N. of iterations: 4		
Note: All coefficients are significant at .001 level unless marked (.)		

This finding runs counter to the expectations that similarities reinforce ties and that, with a given level of information, females would perceive higher risk in staying overnight with males than in staying overnight with females. Indeed, the model shows a significant positive effect for ties that are heterogeneous across gender and a significant negative effect for “Female to Female” ties. The decrease in tie strength for ties between two members of the same sex was greater than the increase for heterogeneous ties, suggesting that meeting people of the opposite sex was a sought-after experience (perhaps for individuals using CS for intimate encounters; see Zigos, 2013) among this community of travelers. The results also show that CSers place importance on their partner's tenure with the organization (*Difference join CS*)—the greater the difference between the two members of the pair, the stronger the resulting friendship. Further, the greater age difference between the two partners the lower the odds ratio of a strong tie.

We also considered the possibility that changes in tie strength over the life of the organization were influenced by the number of friends the two members of the pair had in common, with the assumption that the stronger the relationships between a CSer's friends' friends, the more binding the new tie would be. Table 1 shows that triadic closure operated in the expected direction and that the proportion of friends in common with whom the two members of the dyad had strong ties greatly reinforced the likelihood of a strong tie. Finally, we considered when the two members of the dyad joined CS (*Mean join CS*). On average, Table 1 shows a positive and large effect, suggesting that a tie between two early members was weaker than a tie between two later members or of a tie between an early member and a later member.

Against this background, we tested our two hypotheses. First, we establish that sharing the experience of travelling produced greater bonds than just participating in the local activities of CS. Focusing on the effect of *Exchange tie*, the log-odds of describing the relationship as *Friends or Best Friends vs. Acquaintances* increases by .091, while the same effect for answering *Best Friends vs. Friends* or *Acquaintances* is $(.091 + .474) = 0.565$, or an odds-ratio of 1.76. That is, the effect of common experience on strength of ties is stronger for higher categories of the dependent variable. Both results support H1.

The effect of information on the strength of ties is more complex. In broad terms, we can say that while information increases the likelihood of moving a new friendship from the lowest category to the middle, it decreases the likelihood that the friendship moves further. Broadly speaking this provides evidence in support of H2. A closer look reveals however that the effect for low- to mid-level strength occurs only when information is available on both exchanging partners. When information exists on just one individual in the exchange, the effect is negative. However, this effect is not statistically significant. The narrative for the formation of strong ties is more straightforward: as predicted in H2, greater information decreases the chances that a strong tie will emerge.

6 Conclusion

We used a unique dataset and ethnographic fieldwork to capture how technology influences the strength of friendship ties. Our data span several years, thousands of users worldwide and millions of interactions. We parsed all of this to discover that the relatively exclusive cultural experience of travelling and discovering oneself through overnight stays with a stranger, created stronger relationships than just a common interest in travelling. At the same time, the rating system's accumulation of information about users took something away from the experience of travelling and meeting strangers. As a consequence, the binding force of the ties that developed later among CSers was on average lower than the ties that developed in a regime of greater uncertainty.

We see this process as one of progressive disenchantment. While finding a community suited to arcane cultural tastes is easier now than ever, the relationships that develop out of the shared experiences are becoming weaker. Rating systems are the key aspect of this process because they reduce the overall uncertainty present in the environment. To the extent to which online rating systems provide assurance structures for relationships they will supplant the need for interpersonal trust between partners and thus result in the formation in fewer deep ties.

These findings may apply to other Internet platforms, especially those of companies in the emerging "sharing economy." Despite the fact that many such platforms are commercial in nature, personalized interaction is arguably a touchstone value of the sharing economy. Our results suggest that inasmuch as personalization is concerned, sharing economy platforms may become victims of their own success. As these platforms mature they acquire more information about more users. But this very

process makes the platforms' use less distinctive and more automatic resulting in more impersonal interactions. This paradoxical process is the result of the sectors' growing institutionalization. That we can observe its effects at the interpersonal level speaks to the enormous potential the online world has to change our understanding of society.

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Appendix A: Proportional Odds Model Description

The standard ordered logistic model assumes a latent variable, Y^* , that is connected to the observed dependent variable with three categories (Y) through a series of cut points (α):

$$Y_i^* = \alpha + \mathbf{x}' \beta + \epsilon_i$$

$$\begin{aligned} \text{and, } Y = 1 & \text{ if } Y^* < \alpha_1 \\ Y = 2 & \text{ if } \alpha_1 < Y^* \leq \alpha_2 \\ Y = 3 & \text{ if } Y^* > \alpha_2 \end{aligned}$$

By assuming that the error terms are independently distributed and follow a logistic distribution, a proportional odds model can be defined as,

$$\Pr(Y \leq y_j | \mathbf{x}) = \frac{e^{(\alpha_j - \mathbf{x}' \beta)}}{1 + e^{(\alpha_j - \mathbf{x}' \beta)}} \tag{1}$$

and estimated using standard log-odds ratio and the logit link function. Proportional odds imply that the coefficients that describe the relationship between $\Pr(Y=1)$ and $\Pr(Y=2)$ are the same ones that describe $\Pr(Y=2)$ and $\Pr(Y=3)$. A strong benefit of such a model is that it produces a simple set of coefficients that can be easily interpreted. A major drawback is that the proportional odds assumption is a strong assumption that is seldom respected. When the proportional odds assumption does not hold, the model in [1] produces biased results. A compromise is to estimate a model where the proportional odds assumption is relaxed for the subset of coefficients that do not maintain it (\mathbf{t}):

$$\Pr(Y \leq y_j | \mathbf{x}) = \frac{e^{(\alpha_j - \mathbf{x}' \beta - \mathbf{t}' \gamma)}}{1 + e^{(\alpha_j - \mathbf{x}' \beta - \mathbf{t}' \gamma)}} \tag{2}$$

In our analysis we start with a proportional odds model and then visually inspect the results by plotting the expected probabilities (analysis not shown). If the proportional odds assumption holds, the distance between the categories of the given covariate ought to remain the same across the levels of the dependent variable as specified in [1]. We performed the test by first normalizing all the coefficients to the lowest category of the dependent variable and use it as the reference category for the estimates across the other levels. The distance between the coefficients for the three covariates specified above in the text differs significantly so that, for example, the estimated probability of *Best Friend* differs for the two levels of *Exchange tie* (yes and no). As a result, we opted to selective relax the proportionality assumption as in [2].

Appendix B: Univariate Statistics

	Mean or proportion	std. dev.	N
<i>Tie Strength:</i>			
Acquaintances	.72		1,564,853
Friends	.249		541,106
Best Friends	.03		66,007
<i>Gender:</i>			
Female to female tie	.144		313,326
Female to male tie	.503		1,091,738
Male to male tie	.24		521,151
<i>Mean age</i>	24.44 years	6.29 years	
<i>Age difference</i>	6.01 years	6.25 years	
<i>Difference join CS</i>	13.88 months	12.58 months	
<i>Report tie:</i>			
After a month	.392		850,355
Within the same month	.608		1,321,611
<i>Information:</i>			
No information	.063		136,851
... about one partner	.063		137,594
... about both partners	.874		1,897,521
<i>Hospitality Exchange Tie:</i>			
No	.698		1,516,475
Yes	.302		655,491
<i>Month tie creation (since 1/2003)</i>	81.43 month	16 month	
<i>Friend in common</i>	.136	.64	