One-Way Mirrors in Online Dating:
A Randomized Field Experiment

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Abstract:

The growing popularity of online dating sites is altering one of the most fundamental human activities of finding a date or a marriage partner. Online dating platforms offer new capabilities, such as intensive search, big-data based mate recommendations and varying levels of anonymity, whose parallels do not exist in the physical world. In this study we examine the impact of one such anonymity-related feature, which is unique to the online dating environment, on matching outcomes. This feature allows users to provide a *weak signal* – the ability to view a potential mate's profile and leave a clear, definitive and observable trail without actually messaging the individual – an ability that is close to impossible to achieve in the physical world. Based on a large scale controlled randomized trial in partnership with a major North American online dating company, we demonstrate causally that weak signaling is a key mechanism in achieving higher levels of matching outcomes. Our results show that this is especially true for women, helping them overcome social frictions coming from established social norms that discourage them from making the first move in dating. Our treatment involves gifting one month of anonymous profile viewing to a randomly selected subset of 50,000 users from a pool of 100,000 randomly selected new users of the site. Anonymous profile viewing is a feature that allows individuals to visit profiles of potential mates anonymously, without leaving a trace, while retaining the ability to know who visited their own profiles. Conventional wisdom suggests that anonymous profile viewing should be associated with improved matching by lowering search costs and allowing users to explore their options freely. At the same time, however, anonymous profile viewing also takes away the ability for our treatment group to send a weak signal, thereby increasing social frictions. Compared to a control group, individuals treated with anonymity view more profiles, are more likely to engage in viewing same-sex and inter-racial mates, but have fewer matches than their non-anonymous counterparts. This effect is significantly stronger for women. This suggests that social frictions, hitherto not considered by the literature, dominate search frictions, leading to a significant drop in matches for those treated.

Motivation and Background

According to the United States Census (Gelles 2011), 46% of the single population in the US uses online dating to initiate and engage in the process of selecting a partner. Finding the optimal dating and ultimately marriage partner is one of the most important socio-economic decisions made by humans. Yet, such dating markets are fraught with frictions and inefficiencies, often leading people to rely on choices made through happenstance—an offhand referral, or perhaps a late night at the office (Paumgarten 2011). Interestingly, this primal human activity is being reshaped with the advent of big data and the billion plus strong online social graph (e.g. Facebook and Twitter). The continued growth of online dating despite the presence of a close substitute, the physical world, reflects the presence of significant frictions in the offline dating and marriage markets. Yet, the underlying processes, dynamics and implications of mate seeking in the online world are largely unstudied.

Online dating sites are attracting millions of new users each month. Although they reduce multiple sources of friction that are present in offline dating markets, they do not eliminate them. Piskorski (2012) documents that dating markets are fraught with frictions ranging from high search costs to asymmetric societal norms that often lead to social failures. Akin to a market failure, which implies an economic exchange that did not take place but had it taken place would have made everybody better off, a social failure is a human connection that should have taken place (in that it would have increased the welfare of both sides), but did not. In the context of heterosexual dating, these matching inefficiencies arise due to a variety frictions—physical constraints of time and space, the costliness of the initial information acquisition, and age-old societal norms, such as those inhibiting women from making the first move (Maccoby & Jacklin 1974, Piskorski 2012). Along the same lines, Sandberg (2013) makes the case that women do not ‘lean-in’ at the workplace. In the process of causally examining the role of search and social frictions in dating markets, we contribute by conceptualizing, exploring, and quantifying the implications of women not ‘leaning-in’ in romantic markets.

As is often the case, the Internet not only replicates the physical world processes of human interaction, but also extends them, supporting a variety of features that afford new capabilities that are next to inconceivable in the physical world, and that can vary the search costs for individuals looking for prospective dates. Given the extreme scale of population of these websites as well as standardized nature of users’ profiles, these capabilities range from extensive search and algorithmic matching to big-data based mate recommendations (Gelles 2011), a science perfected for books and movies, now being deployed to humans. However, certain features of these websites such as completely anonymous browsing of user profiles have no direct analogies in offline world. Thus, existing theories may not be adequate in explaining these online phenomena. Indeed, extant research has not addressed whether these IT-enabled features impact the search, viewing, message initiation and matching behavior of individuals, a gap we begin to bridge.

In particular, in this research we focus our attention on the impact of an anonymity related feature, which we call *weak signaling*, on matching outcomes. Weak signaling is the ability to visit, or “check out,” a potential mate’s profile such that the potential mate knows the focal user visited her. It is akin to making a move without actually making a move, and yet, critically, the counter-party becomes explicitly aware that a move was made. Weak signaling is an important market feature that is unique to the online dating environment, and next to impossible to implement reliably in the physical world, at least not with the level of definitiveness that can be done online. The offline “flirting” equivalents, at best, would be a suggestive look or a forward stance (Hall et al. 2010), each subject to myriad interpretations and possible misinterpretations (Henningsen 2004) contingent on the perceptiveness of the individuals involved. No such ambiguity exists in the online environment if the focal user views the target user's profile and leaves a visible trail in the target's "Recent Visitors" list.

Based on a novel large-scale randomized trial, similar in spirit to Aral and Walker (2011) and Bapna and Umyarov (2012), in partnership with a major North American online dating company, we causally demonstrate that weak signaling is a key mechanism that is linked to increase in matching outcomes, especially for women, helping them overcome social norms that discourage them from making the first move in dating markets. Our treatment involves gifting one-month of anonymous profile viewing to a randomly selected subset of 50,000 users from a pool of 100,000 randomly selected new users of the site. Anonymous profile viewing is a feature that allows individuals to view profiles of potential mates anonymously, without leaving a trace, while retaining the ability to know who visited their own profiles. This feature, bundled with other advanced features, is available for purchase to any user of the dating site and normally costs $14.95 (value changed for de-identification purposes) per month. In our study, we treat the randomly selected users with this feature and observe the changes in behavior that it induces. Using the gold standard of randomization is very important to avoid the myriad problems of endogeneity that would be associated with using observational data in such markets.

Conventional wisdom (McDevitt 2012, Suler 2004) suggests that anonymous profile viewing, by lowering search costs, should be associated with improved matching. Anonymity should lower social inhibitions along the preferences dimension, thus impacting the, hitherto unconsidered, social component of search costs (Holmes et al. 1998, McDevitt 2012, Joinson 1998, Suler 2004). If, under anonymity, individuals search more uninhibitedly and are therefore more proficient in meeting other users who match their preferences we should predict an increase in the number of matching outcomes for the average user. Essentially, in a world of non-anonymous browsing the focal user may search sub-optimally, therefore limiting the options available to her resulting in weaker matching outcomes. The anonymity gift, then, may potentially lower this stigma, therefore lowering the search costs, resulting in improved search and ultimately improved matching. Support for this argument comes from the growing literature on the disinhibition effect of the Internet, where a user's behavior changes once she can behave anonymously, i.e. "people say or write things under the cloak of anonymity that they might not otherwise say or write" (Kling et al. 1999). Such anonymity induced changes have been observed in settings of adult film, books (Holmes et al. 1998) and pizza orders (McDevitt 2012).

In the above scenario, an argument for increased matching outcomes can be made from the gift of anonymity. On the other hand, the advantage of non-anonymous browsing is that it allows a focal user to leave a "weak signal" to another user without actually making any unambiguous explicit first move such as sending a personal message. Thus, treating individuals with the ability to anonymously view profiles, in effect, takes away their ability to leave a weak signal. If weak signaling is an important tool, in particular for women towards overcoming the social barriers that prevent them from making the first move, then our treated group could have lower rates of matching. These opposing forces reflect the fact that human behavior in the context of dating is incredibly complex and largely unmeasured—and largely scientifically untested at the micro-level. We hope to bridge this gap in the literature.

The advent of the online dating platforms is increasing measurability, while also introducing new modalities of behaviors that do not have offline parallels. Thus, our approach in examining these opposing forces is positivist in nature. We refrain from any a priori judgments about the relative efficacy of the competing hypotheses: lower search costs improving matching versus the absence of weak-signaling hurting matching. Instead, we toss these competing forces into a cauldron of a large-scale randomized experiment in the wild, examine the outcome, and then analyze the sub-processes to understand to the observed outcome. A key aspect here is that the online dating platforms provide us with an environment where participants' choices at sub-stages of the dating process are available to the researcher objectively and in unprecedented detail, which is not observable in the offline world. We exploit this rich micro-level data to explain our key finding in a detailed and nuanced manner. In summary, we seek to answer the following research questions in a causal manner: 1) Does weak-signaling have a significant impact on matching levels?; 2) Given known gender asymmetries in mating markets (Fisman et al. 2006), does the effect of weak-signaling differ across genders?; 3) How does weak-signaling manifest itself in the overall dating process, which begins with viewing, is followed by messaging and ends (potentially) in matching?

Our work complements the economics literature devoted to measurement of mate preferences (Fisman et al 2006, Hitsch et al 2010), a topic also of interest to scholars in sociology and psychology (Buss 1995). Similar to Hitsch et al. (2010), our measurement of mate preferences relies on data from a large online dating site. Recognizing the gender asymmetries established in the literature—for instance, women put greater weight on intelligence than men, while men place more value on physical appearance (Fisman et al. 2006 and Hitsch et al. 2010)—we report our empirical findings separately for men and women. Where we depart from this stream of literature is in our use of a randomized treatment to identify the effect of a unique IT-enabled artifact—weak signaling—that could potentially alter individuals' matching outcomes. This effect, if significant, will lead to welfare gains in mating markets and will result in lower levels of social failures (Piskorski 2012).

We expect this study to be the basis of a stream of work looking at how the Internet is changing some of the fundamental activities we carry out as humans. In the remaining sections we describe the institutional details of the online dating site we work with, our dataset and outcome variable, the design of the randomized experiment, and the experimental results.

Institutional Details

To conduct this experiment, we partnered with one of the world's largest online dating site, which we call monCherie.com (name disguised). As is typical for online dating websites, monCherie.com offers the following functionality to its users:

- Users may set up their own online profiles where they describe themselves, may post a set of pictures, and reveal characteristics sought in a desired partner.
- Users may view profiles of all other users without limits.
- Users may search for profiles of other users using an advanced search engine that allows filtering by age, location, religion and a number of other demographic variables. Users may also discover partners using a proprietary recommendation engine provided by the website.
- Users may send private messages to any other user.

In addition to these features, monCherie.com constitutes a typical freemium community: most of the users sign up for free and with that can utilize the key features of monCherie.com website listed above. In addition to these free features, users can obtain premium features if they pay $14.95 (value changed for de-identification purposes) and purchase a one-month premium subscription to monCherie.com. These premium features include anonymous browsing of profiles of others as well as extra search options and statistics.

By default, free users of monCherie.com are browsing in the non-anonymous mode such that if the focal user A visits the profile of the target user B, user B knows through her "Recent Visitors" page that user A checked her out. On the other hand, premium users are browsing in the anonymous mode such that that if the focal user A visits the profile of the target user B, user B does not know that user A checked her out. However if user B were to visit user A's profile, user A would know that. This feature is the proverbial "one-way mirror," the impact of which is the subject of the research of this paper.

Experimental Design

In order to test the impact of one-way mirrors on user behavior in online setting, we collaborated with senior executives and engineers of monCherie.com. Our high-level experimental design involves randomly selecting a subset of users of monCherie.com website and treating them with a gift of one month of anonymous browsing on the site. Then, we examine the matching outcomes for these users as compared to the control group, who were not treated. The exogenous random assignment of the treatment rules out myriad problems of endogeneity and alternative explanations that could confound any analysis of such a question based on observational data. In addition, we do not ask for anything in exchange from users who are receiving the gift and no action is needed on their side. Users are also unaware of being a part of the experiment at all, so observer bias is not applicable.

More specifically, we selected a random sample S of 100,000 users of monCherie.com website from an undisclosed geographical area of the United States. Subsequently, 50,000 random users from S received the “anonymous feature gift” from us and were labeled as treatment group (group T, manip = 1), while the remaining 50,000 users from S did not receive anything from us and were labeled as control group (group C, manip = 0). As discussed above, our field experiment relies on removing the “weak signal” ability for group T while keeping it for group C in order to compare their resulting search and messaging behavior as well as matching outcomes. The sample size for the experiment is selected based on the field experiment reported in Bapna and Umyarov (2012) dealing with rare events in online communities and the agreement with administrators at the monCherie.com website. We limit our sample to only valid and active users as explained below in order to remove spammers and dead accounts.

Experimental Data

Based on the specifics of the agreement with monCherie.com, our experiment was conducted on 100,000 random users of the website over the period of three months that we refer to as Month 1 (Pre-manipulation), Month 2 (During-manipulation) and Month 3 (Post-manipulation). The table below lists the data about the website users who are a part of our experiment:

1. Anonymized user ID
2. Manipulation binary variable: This variable stores whether the user received the anonymity gift from us (Manipulation = 1) or not (Manipulation = 0).
3. Gender: A binary variable set to 1 for male users and 0 for female users.
4. Age
5. Sexual orientation: A binary variable indicating whether a use is of straight orientation (Straight = 1) or not (Straight = 0).
6. White race indicator: A binary variable indicating whether the user’s race is White (White = 1) or not (White = 0).
7. Attractiveness score: Users on monCherie.com can rate each other on attractiveness on a scale of 1 (least attractive) to 5 (most attractive). We define a variable, *AttractScore*, as the average rating reflecting user’s attractiveness as per monCherie’s rating system. This variable can be missing for some users if these users were not rated by other website users.
8. Valid: This binary variable is 0 if a user is a spammer or otherwise an invalid user as determined by the internal algorithms of monCherie.com. For the purposes of our analysis we only look at valid users (Valid=1).
9. Active: This binary variable is 1 if a user visited at least one profile 10 days prior to the manipulation.

In this study we limit our attention only to users who were valid and active prior to our manipulation. Table 1 outlines descriptive statistics of user demographic variable. Here we see that the treatment (manip=1) and control (manip=0) groups have similar observed statistical properties. In our analysis, we break down all statistics by gender (F=female; M = male) given significant gender asymmetries in dating markets.

In addition to that we collected all profile viewing and messaging activity for the users in our sample for three consecutive months that we refer to as Month 1, Month 2 and Month 3. Based on our data on individual-level viewing and messaging activity, we computed the following dependent variables:

- ViewSentCntX. No. of unique users that the focal user visited during month X.
- ViewRcvdCntX. No. of unique users that visited the focal user during month X.
- MsgSentCntX. No. of unique users that the focal user initiated a message to during month X.
- MsgRcvdCntX. No. of unique users that initiated a message to the focal user during month X.

In order to establish that Month 1 is pre-experimental, Month 2 is the month of the experiment and Month 3 is post-experimental month. We will name our variables as follows ViewSentCntPre (for views sent in Month 1), ViewSentCnt (for views sent in Month 2) and ViewSentCntPost (for views sent in Month 3).

Measure of success in online dating

It is a challenge to define a perfect and all-encompassing measure of success in the context of online dating. For example, even if we knew which couples went for an offline date, this would not necessarily be a perfect outcome measure of success given that many offline dates turn out to be unsuccessful and do not result in a relationship. Similarly, even if we had the data on actual weddings for our users such a measure would still hardly constitute a perfect success measure given that current divorce rates are reaching almost 50%.

Recognizing that we are unable to know the ultimate success of any observed relationship, we operationalize the success in online dating as a successful outcome at a certain intermediate step in the otherwise long, complicated process: a process that starts with successful online communication, leading to a successful offline date, leading to a successful relationship, a wedding, and finally a successful marriage.

Instead of trying to predict the entire sequence of these steps and define the "perfect" success measure, we concentrate on the first step of this online dating process: successful online communication. Clearly, without establishing successful online communication first, the rest of the steps towards a successful relationship are not possible in the context of online dating. Thus, our measure is an important foundational step to what would be a successful relationship.

We define successful online communication as a match between user A and user B. A match occurs if user A messages user B, user B responds and then user A messages user B again (with user A possibly responding to that and so on), therefore forming a sequence of *at least* three messages between user A and user B. As is evident from this definition, a conversation that constitutes a match may potentially be much longer than three messages. More specifically, as demonstrated in Figure 2, the average length of a conversation between matched users is 12.6 messages (median is 7 messages).

While we are not aware of the content of these messages, monCherie.com does know the content and insists that this definition of a match is a very strong predictor of an actual offline date and therefore is an industry-standard dependent variable[1]. Despite knowing the content of user messages, monCherie.com is using this metric as a measure of matching for their own internal success-tracking systems. Based on this definition of match and consistent with our prior naming schemes, we computed the following variables:

- MatchCntX. No. of total matches that the focal user achieved during month X.
- MatchSentCntX. No. of matches that were initiated by the focal user during month X.
- MatchRcvdCntX. No. of such matches that were initiated not by the focal person, but by the counter-party during month X.

We will name our variables as follows MatchCntPre (for views sent in Month 1), MatchCnt (for views sent in Month 2) and MatchCntPost (for views sent in Month 3).

Experimental Results

We start our analysis by exploring changes in profile browsing behavior that were induced by our manipulation. As demonstrated by ViewSentCnt in Table 2, manipulated users of both genders viewed significantly more profiles, on average, as compared to their non-manipulated counterparts. Interestingly, as observed in Table 10, both straight men and women increase their browsing behavior of individuals of their same-sex under the treatment. Further evidence of disinihibtion is evident in Table 11 where we find that women are significantly more likely to view someone from another race under treatment (for men the effect is not significant at the 10% level). These findings are suggestive of some level of the expected disinhibition effect, at least at the level of profile viewing, of users browsing under the cloak of anonymity. Users indeed

[1] We conducted multiple robustness checks of our results with different definitions of a match, such as, for example, a match being an exchange of at least 5 messages (or, even at least 7 messages). All results presented in this paper were robust to changing the definition of a match. Therefore, we decided to use the industry-standard definition of a match as our formal definition.

browsed more and displayed the patterns consistent with disinhibition theory: they browsed more often same sex users and users of other races.

Despite the significant increase in browsing activity of manipulated users as demonstrated by Table 2, our experimental results in Table 3 reveal that manipulated users themselves were visited, on average, by a significantly smaller number of people. This finding supports our theory of the importance of weak-signaling: despite visiting more profiles, the manipulated users were visited by fewer people.

Further, as demonstrated by Table 4, manipulated users received less incoming conversations after manipulation as compared to non-manipulated users, despite the fact that they initiated the same number of conversations, as represented in MsgRcvdCnt and MsgSentCnt variables respectively. This result regarding MsgSentCnt suggests that the manipulated users do not change their message initiation behavior significantly, but nevertheless they do experience a significant change in the number of incoming messaging initiated towards them.

Since a match between two users by definition depends on reciprocity of communication and there is a clear decline in incoming views and messages initiated towards treated users, it is natural to hypothesize that our manipulation will reduce the total number of matches achieved by the treatment group. This hypothesis is confirmed in Table 5 as demonstrated by MatchCnt variable. Notably, the total number of matches declined very significantly for females, while it declined only marginally for males.

Heterogeneity of the effect by gender

Table 5 clearly demonstrates gender asymmetries in the strength of the effect of anonymity on MatchCnt. As shown in Table 6, males and females tend to play different role in their matches. For males, more than 75% of their matches are self-initiated, while for females less than 25% of matches are self-initiated. Therefore, in order to explore these gender asymmetries in message and match initiation, we break the MatchCnt into two variables MatchRcvdCnt and MatchSentCnt that emphasize whether the match was initiated by the focal user (as in MatchSentCnt) or by the counter-party (as in MatchRcvdCnt) and subsequently explore the change in each of these variables induced by our treatment.

If weak-signaling is at play in causally influencing matching we would expect that MatchSentCnt and MatchRcvdCnt are affected differently by our manipulation: MatchRcvdCnt should be affected significantly since the focal user is unable to “leave a trace” in profiles of others and remains unknown to all the users she visited. On the other hand, MatchSentCnt should not experience significant changes since an outgoing match is initiated by the explicit message coming from the focal user and therefore, the anonymity of the focal user is irrelevant as the focal user reveals herself by her initial message.

Based on the empirical results from Table 6, it can be seen that MatchSentCnt and MatchRcvdCnt are indeed affected very differently by our manipulation: MatchSentCnt basically remains statistically unchanged for both genders, while MatchRcvdCnt is reduced very significantly with a drop of 20%-25% for both genders. This empirical finding supports the predictions given by weak-signaling theory. This observation explains the observed gender asymmetries in response to treatment: MatchSentCnt is not changed for both genders and only MatchRcvdCnt is significantly reduced. However, since MatchRcvdCnt is a much more significant component of MatchCnt for females as compared to males, it is females who experience a significantly bigger drop in the overall MatchCnt.

Robustness

We carried out a series of robustness analysis to rule out any alternative explanations for our results. For reasons of brevity these are described in summary form below:

1. **Alternative ZIP model based specification**: Tables 12 and 13 show the presence of main effect of the manipulation even after controlling for observed covariates. In order to make the coefficients comparable between the models with and without the interaction terms, we normalize all the regressors (except for *Manipulation*) so that their means are all equal to zero. Observe that the Poisson-model (Table 12) suggests that *Manipulation* has a significant negative effect on the expected match count, while the zero-model (Table 13) suggests that *Manipulation* increases the probability of getting zero matches, both validating our main finding.
2. **The timeline of the effect**: It is interesting to note that the observed effect of anonymity disappears in Month 3 once the anonymity gift has expired (post-manipulation month). As demonstrated by Tables 7-9, the treatment group reverts to the behavior that is statistically indistinguishable from the control group in Month 3. That is, prior to manipulation (in month 1) the treatment and control groups were statistically indistinguishable in any observed aspect. As we have seen above, during manipulation (month 2), the treatment and control groups become statistically different in numerous observed variables in a way that is consistent with weak-signaling theory. Finally, after the manipulation has expired (month 3), the treatment and control groups became statistically indistinguishable in any observed aspect again as demonstrated by Tables 7-9.
3. **Different definitions of a match**: For the purpose of the robustness check, we define a 5-match between user A and user B if user A and B exchanged at least five messages. Similarly, we define a 7-match between user A and user B if user A and B exchanged at least seven messages. We find that the effect of anonymity is strongly observed and constitutes the same decrease of approximately 20%-25% in both Match5RcvdCount and Match7RcvdCount despite having a stricter threshold for declaring a communication a match.
4. **Gift effect**: to rule out the possibility of users simply were acting in response to getting a gift from the experimenters, we examined whether the treatment effect was present in the last week of the treatment month, and compared it to the first week of the post month (to see if it indeed disappears). The treatment effect is alive in the last week of the treatment month, ruling out the novelty of the gift as driving the result. The effect disappears as early as the first week of the post-treatment month, indicating the salience of the manipulation.
5. **Users exit the site after finding the perfect match under treatment**: We ask whether users are still active in the post-month to rule this out. We compare the levels of activity of users in the treatment and control groups in the last weeks of the post-treatment month and find treated users are still on the website in the post-manipulation month in the same quantities and are acting in the same way as the control group.

Conclusions

Online dating platforms are rapidly growing worldwide. Such growth underscores the inherent frictions and inefficiencies in offline markets of dating and marriage. Our work is motivated by the fact that today's online dating platforms introduce new capabilities that have no direct parallels in the offline world, such as weak-signaling, the focus of this paper. We contribute by considering of two types of social inhibitions that have not been considered in our extant understanding of dating markets. While the economics literature has relaxed Becker's (1973) assumption of a frictionless market by accounting for search frictions (Burdett and Coles 1997), the view of search costs in this literature does not consider the social inhibition in expressing true or latent preferences, which would limit who you search for. We give treated individuals the license to search more and to search broadly and they do. The prior literature has also focused on using equilibrium outcomes (Hitsch et al. 2010 and Fisman et al. 2006) in online dating and speed dating markets to arrive at our understanding of peoples' preferences and to establish the general idea of positive assortative sorting, with significant gender asymmetries. However, observing dating outcomes is conditional both on search and making-the-move, both of which are influenced by powerful social norms. We demonstrate that when we take away the ability that the Internet gives for women to leave a weak signal, and thereby bringing them to closer to the physical world of offline dating, it's akin to taking away their weapon.

Matching two humans is not only something that applies to dating and marriage, but also to new models of distributed work and crowdsourcing (Burtch et al. 2012). Thus, we expect this study and our associated methodology to be the basis of a stream of work on how the Internet is changing some of the fundamental activities we carry out as humans.

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Tables and Figures

Table 1. Treatment and control groups are statistically identical

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	Age	30.6528	0.14227	18	75.21	0.27	0.7896
F	1	Age	30.5998	0.13874	18	75.38	.	.
M	0	Age	30.0518	0.09999	18	78.21	0.52	0.6035
M	1	Age	29.9786	0.09916	18	78.80	.	.
F	0	Premium	0.0128	0.00155	0	1	0.57	0.5655
F	1	Premium	0.0116	0.00145	0	1	.	.
M	0	Premium	0.0198	0.00149	0	1	0.36	0.7168
M	1	Premium	0.0190	0.00147	0	1	.	.
F	0	Straight	0.8388	0.00505	0	1	0.99	0.3199
F	1	Straight	0.8316	0.00508	0	1	.	.
M	0	Straight	0.9025	0.00317	0	1	-0.65	0.5184
M	1	Straight	0.9054	0.00315	0	1	.	.
F	0	AttractScore	3.0534	0.01088	1	5	-0.50	0.6183
F	1	AttractScore	3.0611	0.01075	1	5	.	.
M	0	AttractScore	2.2176	0.00895	1	5	0.80	0.4210
M	1	AttractScore	2.2075	0.00886	1	5	.	.
F	0	White	0.7835	0.00566	0	1	0.50	0.6160
F	1	White	0.7795	0.00563	0	1	.	.
M	0	White	0.7417	0.00468	0	1	-0.28	0.7801
M	1	White	0.7436	0.00470	0	1	.	.

Table 2. The effect of manipulation on profile browsing behavior

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	ViewSentCnt	43.180	1.05373	0	1413	-3.41	0.0007
F	1	ViewSentCnt	48.700	1.22712	0	2451	.	.
M	0	ViewSentCnt	72.614	1.60982	0	3199	-2.89	0.0038
M	1	ViewSentCnt	79.443	1.72966	0	3441	.	.

Table 3. The effect of manipulation on profile browsing behavior

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	ViewRcvdCnt	126.380	2.12382	0	1790	2.43	0.0153
F	1	ViewRcvdCnt	119.371	1.96109	0	1401	.	.
M	0	ViewRcvdCnt	26.134	0.48755	0	1696	3.46	0.0005
M	1	ViewRcvdCnt	23.931	0.40785	0	782	.	.

Table 4. The effect of manipulation on messaging behavior

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	MsgSentCnt	2.655	0.09832	0	94	-1.16	0.2460
F	1	MsgSentCnt	2.833	0.11779	0	262	.	.
M	0	MsgSentCnt	11.958	0.55317	0	2116	-0.31	0.7565
M	1	MsgSentCnt	12.187	0.48880	0	1181	.	.
F	0	MsgRcvdCnt	19.787	0.41282	0	469	2.28	0.0227
F	1	MsgRcvdCnt	18.519	0.37398	0	434	.	.
M	0	MsgRcvdCnt	1.741	0.04296	0	132	5.00	0.0000
M	1	MsgRcvdCnt	1.475	0.03085	0	57	.	.

Table 5. The effect of manipulation on matching behavior

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	MatchCnt	4.068	0.11848	0	264	4.01	0.0001
F	1	MatchCnt	3.474	0.08994	0	94	.	.
M	0	MatchCnt	2.436	0.07171	0	141	1.86	0.0624
M	1	MatchCnt	2.252	0.06772	0	174	.	.

Table 6. The effect of manipulation on matching behavior

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	MatchRcvdCnt	3.098	0.09814	0	262	5.26	0.0000
F	1	MatchRcvdCnt	2.476	0.06714	0	87	.	.
M	0	MatchRcvdCnt	0.565	0.01831	0	85	6.24	0.0000
M	1	MatchRcvdCnt	0.432	0.01095	0	18	.	.
F	0	MatchSentCnt	0.971	0.03876	0	46	-0.50	0.6165
F	1	MatchSentCnt	0.998	0.03909	0	54	.	.
M	0	MatchSentCnt	1.870	0.06398	0	138	0.55	0.5790
M	1	MatchSentCnt	1.820	0.06403	0	174	.	.

Table 7. The effect on profile visits disappears once manipulation is expired

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	ViewSentCntPost	18.3702	0.67783	0	1228	-0.87	0.3828
F	1	ViewSentCntPost	19.2024	0.67056	0	828	.	.
M	0	ViewSentCntPost	50.7441	1.28378	0	2640	-0.84	0.4009
M	1	ViewSentCntPost	52.3459	1.41125	0	3542	.	.
F	0	ViewRcvdCntPost	87.6012	1.63607	0	1896	1.01	0.3131
F	1	ViewRcvdCntPost	85.3288	1.54968	0	1929	.	.
M	0	ViewRcvdCntPost	13.3855	0.24834	0	408	0.09	0.9304
M	1	ViewRcvdCntPost	13.3559	0.23002	0	272	.	.

Table 8. The effect on messaging disappears once manipulation is expired

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	MsgSentCntPost	1.8825	0.08102	0	104	-0.01	0.9951
F	1	MsgSentCntPost	1.8832	0.08064	0	131	.	.
M	0	MsgSentCntPost	8.9467	0.43456	0	1600	0.11	0.9135
M	1	MsgSentCntPost	8.8815	0.41414	0	1465	.	.
F	0	MsgRcvdCntPost	13.9244	0.32814	0	461	0.79	0.4298
F	1	MsgRcvdCntPost	13.5712	0.30445	0	378	.	.
M	0	MsgRcvdCntPost	1.3237	0.03398	0	119	0.70	0.4818
M	1	MsgRcvdCntPost	1.2931	0.02706	0	39	.	.

Table 9. The effect on matching disappears once manipulation is expired

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	MatchCntPost	2.60041	0.090997	0	227	0.77	0.4428
F	1	MatchCntPost	2.50893	0.077298	0	143	.	.
M	0	MatchCntPost	1.79833	0.057232	0	115	0.25	0.8055
M	1	MatchCntPost	1.77815	0.058660	0	167	.	.
F	0	MatchRcvdCntPost	1.94211	0.076456	0	223	0.98	0.3254
F	1	MatchRcvdCntPost	1.84638	0.060639	0	141	.	.
M	0	MatchRcvdCntPost	0.40848	0.013033	0	32	0.81	0.4165
M	1	MatchRcvdCntPost	0.39464	0.010933	0	20	.	.
F	0	MatchSentCntPost	0.65831	0.029330	0	43	-0.10	0.9189
F	1	MatchSentCntPost	0.66255	0.029629	0	60	.	.
M	0	MatchSentCntPost	1.38985	0.052490	0	115	0.08	0.9333
M	1	MatchSentCntPost	1.38351	0.054678	0	167	.	.

Table 10.
The effect of manipulation on inter-racial browsing

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	ViewOtherRace	0.4880	0.00686	0	1	-2.45	0.0142
F	1	ViewOtherRace	0.5117	0.00678	0	1	.	.
M	0	ViewOtherRace	0.6523	0.00509	0	1	-1.40	0.1618
M	1	ViewOtherRace	0.6624	0.00509	0	1	.	.

Table 11.
Effect of manipulation on same-sex messaging

Gender	Manip	Variable	Mean	Std Err	Min	Max	t-value	p-value
F	0	MsgSameSex	0.0092	0.00143	0	1	-0.26	0.7967
F	1	MsgSameSex	0.0097	0.00146	0	1	.	.
M	0	MsgSameSex	0.0106	0.00115	0	1	-0.30	0.7615
M	1	MsgSameSex	0.0111	0.00119	0	1	.	.

Table 12.
The Poisson model coefficients (with and without interactions)

Parameter	Estimate	Std Err	p-value	Estimate	Std Err	p-value
(Intercept)	1.02962	0.00720	<.0001	1.011149	0.00885	<.0001
Manipulation	**-0.07179**	**0.00705**	**<.0001**	**-0.03445**	**0.01273**	**0.0068**
Gender (centered)	0.097619	0.00826	<.0001	0.106031	0.01122	<.0001
Age (centered)	-0.00092	0.00039	0.0194	-0.00067	0.00053	0.2035
White (centered)	-0.01014	0.01041	0.3298	-0.08049	0.01427	<.0001
LogMatchCntPre (centered)	0.785506	0.00377	<.0001	0.791542	0.00522	<.0001
AttractScore (centered)	0.024766	0.00520	<.0001	0.07453	0.00716	<.0001
Straight (centered)	0.090662	0.01093	<.0001	0.066446	0.01498	<.0001
Manipulation * Gender				**-0.02429**	**0.01659**	**0.1430**
Manipulation * Age				**-0.00079**	**0.00079**	**0.3147**
Manipulation * White				**0.144605**	**0.02086**	**<.0001**
Manipulation * LogMatchCntPre				**-0.01412**	**0.00754**	**0.0612**
Manipulation * AttractScore				**-0.10623**	**0.01044**	**<.0001**
Manipulation * Straight				**0.056388**	**0.02192**	**0.0101**

Table 13.
The zero model coefficients (with and without interactions)

Parameter	Estimate	Std Err	p-value	Estimate	Std Err	p-value
(Intercept)	-0.55744	0.02408	<.0001	-0.5705	0.02480	<.0001
Manipulation	**0.068296**	**0.03343**	**0.0411**	**0.090042**	**0.03482**	**0.0097**
Gender (centered)	0.046807	0.03929	0.2335	0.122526	0.05634	0.0297
Age (centered)	-0.00589	0.00185	0.0015	-0.00548	0.00263	0.0373
White (centered)	-0.39447	0.04219	<.0001	-0.47607	0.05962	<.0001
LogMatchCntPre (centered)	-0.89409	0.01967	<.0001	-0.91525	0.02808	<.0001
AttractScore (centered)	-0.21875	0.02334	<.0001	-0.22244	0.03303	<.0001
Straight (centered)	0.107066	0.05246	0.0413	0.044474	0.07462	0.5512
Manipulation * Gender				**-0.15243**	**0.07871**	**0.0528**
Manipulation * Age				**-0.00114**	**0.00371**	**0.7595**
Manipulation * White				**0.166572**	**0.08452**	**0.0487**
Manipulation * LogMatchCntPre				**0.040531**	**0.03919**	**0.3010**
Manipulation * AttractScore				**0.001748**	**0.04674**	**0.9702**
Manipulation * Straight				**0.130307**	**0.10514**	**0.2152**

Figure 1. The definition of a match: the exchange of *at least* 3 messages

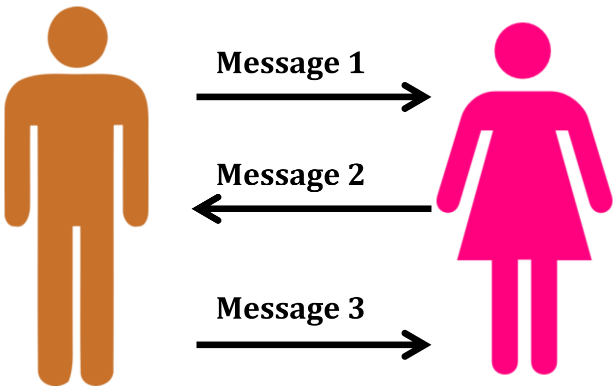

Figure 2. The length of the conversation in a typical match