

# Homophily in an Anonymous Online Community: Sociodemographic Versus Personality Traits

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## Abstract

In what traits do people interact with others who are similar to them in completely anonymous online communication? Can those traits contribute to greater exchange of opinion and information across the sociodemographic boundaries that often limit interaction between social strata? To answer this question concerning online homophily, we combined survey data on 7,287 users (aged 18 and above) of a Korean online dating advice platform with their behavioral data from June 2015 to August 2015 and explored whether advice exchange occurred between users with similar sociodemographic and personality traits. On this platform, two types of interactions occurred as follows: (1) responses to a randomly distributed problem submitted by an advice seeker and (2) the seeker's indication of approval of any of the responses given. The study found that (1) a receiver was more likely to respond to problems submitted by seekers of a comparable age and that (2) seekers were more likely to approve of a response if the seeker and receiver had similar educational backgrounds. By contrast, homophily based on personality traits was not observed even though some personality traits significantly affected the likelihood of both response and approval. Our findings suggest that online communication may breed sociodemographic homophily, whether based on age or education, more than expected or intended while not easily fostering alternative forms of homophily, such as personality homophily, which can potentially cut across borders dividing sociodemographic groups.

**Keywords:** homophily, anonymous communication, personality, advice platform

## Introduction

PEOPLE WHO SHARE similar characteristics tend to be more attracted to social interaction with each other.<sup>1–3</sup> Sociologists label this attraction between “birds of a feather” as homophily or “love of the same.”<sup>4</sup> In the real world, homophily is typically grounded in sociodemographic traits such as age, race, occupation, and education. These traits commonly form social hierarchies; therefore, homophily is often considered to contribute to the maintenance of social inequality.<sup>5</sup> Anonymous online communication would seem to reduce the occurrence of homophily because most individual sociodemographic traits are not readily observable. If so, online communities could provide greater exchange of opinions and information across the sociodemographic boundaries that often limit interactions between social strata.<sup>6</sup>

It is, however, subject to empirical examination whether homophily is significantly weakened in online communication. Some empirical studies have indicated the presence of new types of homophily based on political preferences (on Twitter),<sup>7,8</sup> personality traits,<sup>9</sup> and other personal prefer-

ences (on social media such as MySpace and online dating services).<sup>10–13</sup> These emerging types belong to a category that sociologists call value homophily as opposed to status homophily.<sup>14</sup> Status homophily is based on sociodemographic traits and promotes social hierarchy, whereas value homophily is based on people's internal traits such as cultural beliefs, personal preferences, and psychological orientation, which are not necessarily associated with sociodemographic traits.

Given these research findings, does online communication, rather than weakening homophily overall, simply facilitate a shift from status homophily to value homophily? This is an important question because value homophily may contribute to social interaction across sociodemographic boundaries to the extent that value traits are independent of or cut across sociodemographic traits. Answering this question for a completely anonymous online platform is challenging, however, because traits for the basis of status homophily and value homophily must be surveyed among its members. Even if surveying an online community were viable, individual traits that form the basis for value homophily would not be detected as easily as would most sociodemographic traits.

Among the possible traits for the basis of value homophily, this study focuses on personality traits and applies the widely accepted five-factor model (FFM) of personality: extraversion, agreeableness, conscientiousness, emotional stability, and openness to new experiences.<sup>15</sup> The FFM is designed to detect a universal structure of personality that is independent of sociodemographic contexts and has been extensively validated across multiple cultures.<sup>16</sup> Furthermore, FFM traits of survey respondents have also been found to be correlated with their usage of certain words in online texts.<sup>17–21</sup> In short, the personality traits that constitute the FFM can be reliably assessed by survey and also deliver their cues through online messages, making them suitable for an investigation of value homophily.

Homophily can occur at two points in online advice exchange. First, when someone asks for advice regarding their personal problem, the text describing the problem may contain sociodemographic and personality traits; consequently, it may attract more responses from members with similar traits. Second, when reading various responses, an advice seeker may be more frequently persuaded by advice from those with similar traits and, consequently, indicate approval more fervently. This study examines both instances, which represent the two sides of the exchange: response to problems and approval of responses. Accordingly, we constructed its two research questions as follows:

**RQ1: Is an advice-seeking message more likely to receive responses from people whose sociodemographic and/or personality traits are similar to those of the advice seeker?**

**RQ2: Is a response to an advice-seeking message more likely to be approved of by the advice seeker when it comes from someone with similar sociodemographic and/or personality traits?**

Consistent findings between response and approval (i.e., between RQ1 and RQ2) would suggest strong evidence for online homophily, and any nuanced difference between the two may reveal differentiated dimensions of homophily according to the steps of advice exchange. In addition, differing degrees of homophily between sociodemographic and personality traits would emphasize the role of online communication in either maintaining or moderating dividing lines between sociodemographic status groups.

## Methods

Whether status-driven or value-driven, homophily on many online sites such as Twitter, Facebook, and dating services can be reasonably expected. This is because the main goal of these communities is to form social relationships that are largely based on members' personal profiles, which are open. Homophily would be less easily established on a site that is built around completely anonymous advice exchange, where users disclose no personal identifying information and where their personal traits can be perceived only through exchanged messages.

Any effect of individual traits on social behavior is subject to statistical overestimation because those traits may be confounded with social relationships among subjects.<sup>22</sup> This problem is more serious but often ignored in the research of social networking sites, where subjects are connected to each

other and violate the assumption of independent sampling. A statistical analysis should either control network autocorrelation among subjects or sample subjects who are truly independent of each other.<sup>23</sup>

We looked for a platform meeting these criteria of anonymity and independence for our study. Homophily observed under these conditions would be stronger evidence than any evidence observed in typical social media studies.

## Data

Typical anonymous discussion forums, such as Reddit, are not ideal sites to estimate the degree of homophily solely based on message cues because they have the following two problems. First, a message tends to be distributed to or read by only certain members on the basis of user reputation and interest; therefore, those who respond may be trivially homophilous to an advice seeker. Second, an early response by a homophilous receiver may attract subsequent responses from possibly homophilous others.

Textat, the site used in this study, is, to our knowledge, the only virtual site that avoids those two problems. On Textat, an advice-seeking message from a member is distributed to randomly sampled members, and responses from them are delivered only to the original advice seeker. Every communication on this platform is truly memoryless; members neither carry their offline relationships to the platform nor develop new relationships. They make every decision on each communication independent of all other decisions and also independent of the past.

Textat is a Korean mobile phone application for interpersonal emotion analysis.<sup>24</sup> Most users are relatively young people interested in a (potential) dating partner's attitude toward them. In addition to emotion analysis, Textat provides a self-help platform to users. People in search of dating advice (advice seekers) can pay a small amount of money to submit a description of their problem. Textat then sends the problem to randomly selected "receivers" until several dozen users have responded. Among the receivers, those who respond (the advisers) receive a small amount of monetary credit if their advice is approved of or receives a "like" from the advice seeker.

Four datasets were collected from June 2015 to August 2015 with the cooperation of Textat's service provider, ScatterLab,<sup>25</sup> and in compliance with the Institutional Review Board at the authors' university. The first dataset was a short online survey of users' sociodemographic and personality traits. ScatterLab contacted 39,966 users, of whom 10,884 answered the survey—a 27% completion rate. The records of 7,287 adult users (aged 18 and above) were used for the analysis. The other three sets of behavioral data were collected on the self-help platform. They included 408 problems submitted during this period, 14,016 random distributions of those problems to receivers, and 1,602 responses to those distributed problems. The four datasets were matched using encrypted user identification number.

## Measures

The first dependent variable is a dummy for RQ1. It is coded 1 if a distributed problem was answered by a receiver and 0 otherwise. Overall, 11.4% of all distributions were answered. The odds of receiving a response were predicted

by a series of logistic regressions. The second dependent variable, used for RQ2, is a dummy for approval. It is coded 1 if a response was approved of or “liked” by the advice seeker who submitted the problem. In our data, 51.7% of total responses were approved of, and these odds were also predicted by logistic regressions. Descriptive statistics for both dependent variables is presented at the bottom of Table 1 (see Y1 and Y2).

Table 1 lists the predictors in the regressions. Traits of advice seekers and receivers were measured by the user survey, with age measured in years and gender represented by a male dummy. For education, the survey asked users regarding their current school enrollment or final degree, and this study combined them to generate a 5-point scale for educational status: 1=high school, 2=2-year college, 3=currently in 4-year college, 4=graduated from 4-year college, and 5=graduate school.

The survey also included 10 items used for assessing FFM personality traits. Each trait was measured by averaging two answers to “I see myself as...,” one of which was reverse coded and marked with (–) in the next sentence.<sup>18,20,21,26</sup> Extraversion was measured by averaging “extraverted, enthusiastic” and “reserved, quiet” (–); agreeableness by “critical, quarrelsome” (–) and “sympathetic, warm”; conscientiousness by “dependable, self-disciplined” and “disorganized, careless” (–); emotional stability by “anxious, easily upset” (–) and “calm, emotionally stable”; and openness by “open to new experiences, complex” and “conventional, uncreative” (–).

We generated the absolute difference between each advice seeker and their receivers on each of the 8 traits (3 sociodemographic traits and 5 personality traits). These variables were used to test for homophily. If the odds of response or approval decreased (or increased) with a greater degree of absolute difference for a specific trait, it could be inferred that homophily (or heterophily) of that trait was present. Finally, at the user level, a dummy variable was generated for currently dating receivers detected by Textat survey.

For each problem (or response), the text length in kilobytes was controlled in predicting the odds of response (or approval).

## Results

In addition to providing descriptive statistics for the variables used, Table 1 divides all users into two groups and compares the traits of advice-seeking users who posted a problem ( $N=246$ ) and those of users who did not ( $N=7,041$ ) over the 3 months of data collection. At the 5% statistical significance level, users who sought others’ advice were younger, less educated, less conscientious, and less emotionally stable than those who did not. Overall, more mature users with regard to sociodemographic and personality traits were less likely to ask others’ advice on their romantic relationships.

Table 2 reports odds ratios as to whether a problem was responded to. Model 1 contains advice seekers’ traits, whereas Model 2 contains the traits of receivers. Model 3 is a difference model for RQ1, with the absolute difference for each of the traits. Model 4 added to Model 3 the average trait value between a seeker and a receiver and checked whether the effects in Model 3 remained robust. The text length in kilobytes was controlled in all the models, and a dummy for the currently dating receiver was controlled in the receiver model, or Model 2.

Model 1 in Table 2 suggests that the odds of receiving a response were not significantly influenced by the seeker’s three sociodemographic traits but were influenced by personality traits. Problems sent by less extravert and more conscientious advice seekers were more likely to receive responses. Messages from these advice seekers may have been more carefully delivered, consequently enabling receivers to better understand the problem and provide an answer. Longer messages did not attract more responses.

TABLE 1. DESCRIPTIVE STATISTICS OF THE VARIABLES USED

Level	Mean	SD	Min/Max	Difference in mean	
				Seekers (N=246)	Others (N=7,041)
Users (N=7,287)					
Age	23.286	5.171	18/42	22.12	23.33***
Male	0.354		0/1	0.33	0.35
Education	2.853	1.041	1/5	2.43	2.87***
FFM personality					
Extraversion	4.270	1.291	1/7	4.18	4.27
Agreeableness	4.575	0.978	1/7	4.61	4.57
Conscientiousness	3.979	1.147	1/7	3.83	3.98*
Emotional stability	3.488	1.183	1/7	3.21	3.50***
Openness	4.493	1.165	1/7	4.51	4.49
Currently dating	0.261		0/1		
Problems (N=408)					
Problem length	0.508	0.429	0.002/2.930		
Distributions (N=14,016)					
Y1. Responded	0.114		0/1		
Responses (N=1,602)					
Y2. Approved	0.517		0/1		
Response length	0.193	0.132	0.098/1.464		

\* $p < 0.05$ ; \*\*\* $p < 0.001$ .

FFM, five-factor model; Max, maximum; Min, minimum; SD, standard deviation.

TABLE 2. ODDS RATIOS OF RECEIVING A RESPONSE, WITH *T*-SCORE IN PARENTHESES (*N*=9,949)

	<i>Model 1</i> <i>Seeker's traits</i>	<i>Model 2</i> <i>Receiver's traits</i>	<i>Model 3</i> <i>Difference</i>	<i>Model 4</i> <i>Difference<sup>a</sup></i>
Age	1.010 (1.058)	0.971*** (-3.795)	0.968*** (-3.810)	0.971** (-2.844)
Male	0.946 (-0.795)	0.851* (-2.243)	1.018 (0.282)	1.133 (1.784)
Education	0.974 (-0.890)	0.995 (-0.149)	0.965 (-1.041)	0.945 (-1.622)
Extraversion	0.941* (-2.085)	1.093*** (3.334)	1.005 (0.174)	1.005 (0.151)
Agreeableness	1.062 (1.912)	1.086* (2.536)	0.959 (-1.209)	0.967 (-0.944)
Conscientiousness	1.079* (2.488)	0.954 (-1.600)	1.023 (0.739)	1.014 (0.436)
Emotional stability	0.978 (-0.644)	0.989 (-0.384)	0.975 (-0.802)	0.980 (-0.616)
Openness	1.018 (0.569)	1.070* (2.388)	0.970 (-0.950)	0.966 (-1.054)
Dating receiver		1.418*** (5.376)		
Problem length	1.042 (0.616)	0.994 (-0.091)	1.000 (-0.003)	0.995 (-0.077)
Constant	0.082*** (-7.024)	0.114*** (-7.197)	0.172*** (-15.990)	0.057*** (-6.039)
Pseudo R <sup>2</sup>	0.003	0.014	0.003	0.008

Cases in which the seeker or receiver did not answer the survey are excluded.

\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001.

<sup>a</sup>Adjusted for eight average trait values between advice seeker and receiver.

Model 2 found more statistically significant traits than Model 1, revealing that who responds to a problem is determined more by the receiver than by the seeker. Younger, female, and more extravert, agreeable, and open receivers were more likely to respond. Receivers who were in dating relationships themselves were much more willing to help as the odds of response increased by 41.8% for this group.

Among the differences included in Model 3, only one factor, age difference, was strongly significant. The odds of response increased by 13.9% ( $= 1/0.968$ )<sup>4</sup> if the age difference between seeker and receiver decreased by 4 years. Controlling the mean age between sender and receiver in Model 4 did not show any notable change. None of the personality traits were significant in either model. In sum, age homophily was observed, but personality homophily was absent.

Table 3 for RQ2 presents results from the same sequence of four models as Table 2, examining the odds regarding whether a response was approved of by an advice seeker. Model 1 in Table 3, interestingly, showed the same significant personality traits as those in Model 1 of Table 2. This indicates that introvert and conscientious advice seekers whose problems attracted more responses were also more likely to approve of the responses that they received. This might be because the better-framed problems distributed by introvert and conscientious seekers induced better advice. Alternatively, introvert and conscientious seekers may have simply appreciated others' advice more.

Not a single adviser's trait was significant in Model 2 of Table 3. Combined with the finding in Model 1, this finding implies that the one who requested for the advice, not those

who responded, determined whether the advice was considered to be satisfactory. Even advice from currently dating members did not obtain more frequent approval, nor did longer responses. Responsive members were not necessarily helpful or persuasive.

Model 3, on seeker-adviser differences, indicates that the odds of approving of advice increased when the difference between the seeker's and adviser's educational achievements was smaller. A one-point decrease in educational difference led to a 16.7% ( $= 1/0.857$ ) increase in the odds. No personality differences were significant. In sum, education homophily was observed between advisers and the advice seekers who appreciated them, whereas personality homophily was absent. This contrast between education homophily and personality homophily was robust in Model 4.

## Discussion

To explore the types of homophily in completely anonymous online communication, this study collected data from an online platform for dating advice and proposed research questions concerning each part of the exchange: responses to problems and approvals of responses. Unlike age and education, personality traits did not produce any homophily even though they significantly affected the odds of both response and approval.

Sociodemographic homophily, whether based on age or education, was consistently observed for both response and approval. This finding suggests that the homophily present in anonymous online communication may not be notably

TABLE 3. ODDS RATIOS OF RECEIVING APPROVAL, WITH *T*-SCORE IN PARENTHESES (*N*=1,178)

	<i>Model 1</i> <i>Seeker's traits</i>	<i>Model 2</i> <i>Adviser's traits</i>	<i>Model 3</i> <i>Difference</i>	<i>Model 4</i> <i>Difference<sup>a</sup></i>
Age	1.010 (0.587)	1.007 (0.411)	1.024 (1.358)	1.023 (1.092)
Male	0.933 (-0.518)	0.953 (-0.353)	0.987 (-0.111)	1.021 (0.153)
Education	1.009 (0.154)	1.000 (-0.004)	0.857* (-2.298)	0.837* (-2.535)
Extraversion	0.877* (-2.367)	0.908 (-1.916)	1.056 (0.976)	1.036 (0.622)
Agreeableness	1.111 (1.757)	1.055 (0.848)	0.994 (-0.086)	0.995 (-0.068)
Conscientiousness	1.149* (2.439)	1.043 (0.760)	1.019 (0.316)	0.988 (-0.206)
Emotional stability	0.960 (-0.673)	0.933 (-1.249)	0.953 (-0.811)	0.991 (-0.140)
Openness	1.119 (1.827)	0.966 (-0.629)	0.963 (-0.630)	0.954 (-0.766)
Dating adviser		1.074 (0.572)		
Response length	1.543 (0.965)	1.523 (0.944)	1.459 (0.852)	1.437 (0.805)
Constant	0.322 (-1.674)	1.225 (0.348)	1.100 (0.445)	0.628 (-0.505)
Pseudo R <sup>2</sup>	0.011	0.006	0.005	0.018

Cases in which the seeker or receiver did not answer the survey are excluded.

\* $p < 0.05$ .

<sup>a</sup>Adjusted for eight average trait values between advice seeker and receiver.

different than that influenced by face-to-face communication. Note that this study chose an online platform of maximum anonymity and independence among members such that sociodemographic homophily is least likely to be overestimated. Even though this case study should not be overgeneralized to the entire virtual community, online communities that are more typical than this memoryless platform permit the accumulation of sociodemographic cues through repeated communication, enabling the development of homophilous relationships even if sociodemographic homophily is neither intended nor expected.<sup>27</sup>

Furthermore, this study observed a consistent lack of personality homophily in both responses and approvals. This does not mean that personality did not matter. In contrast, introvert and conscientious people were more likely to attract a response from a given recipient and to approve of the advice received. However, people did not respond more frequently to dating problems submitted by people with similar personalities, nor were they more likely to approve of advice from those with similar personalities. Given the persistence of sociodemographic homophily, this lack of personality homophily suggests that online communication may not create forms of homophily that could cut across the divisions between sociodemographic status groups. In summary, sociodemographic homophily may be more prevalent than expected in online communities, whereas diversity-nurturing interactions in anonymity are less extensive than anticipated.

Age homophily for response and education homophily for approval call for careful interpretation and further research. Receivers may be more sympathetic to the prob-

lems of advice seekers when sharing the same life course, which is based on being approximately of the same age. It has, however, already been noted that sympathetic responses are not necessarily persuasive. Sharing the same social context, which is based on being at the same educational level, may help a respondent in providing persuasive advice. In psychological terms, sympathy may be relevant at the stage of motivating oneself to respond, whereas empathy could be more important at the stage of providing compelling advice.<sup>28</sup> We will need further research to understand how different psychological mechanisms drive different forms of homophily depending on the stages of online communication.

This study has some limitations. First, it analyzed a relatively small online community that satisfied the criteria of randomly distributed requests and fully independent responses, unaffected by any knowledge of or prior communication with the participants. Future research should examine how the degree of homophily might change when criteria are changed in this study. Second, personality traits are only one basis for value homophily; other personal preferences and cultural beliefs should be explored. Those explorations should prioritize traits that could moderate rather than ossify sociodemographic hierarchies. Third, exchanges that are more information-driven than those on dating advice should be examined. Sociologists have noted the value of obtaining nonredundant information outside a homophilous clique<sup>29-31</sup>; therefore, more information-rich exchanges may facilitate alternative forms of homophily, or even heterophily, better than advice exchange on dating.

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