Sexual Identity Bias in Home Appraisal

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This paper presents a field experiment studying bias in home appraisals against homosexual couples. The study is conducted using the internet as a research platform through the use of a voluntary Implicit Association Test which measured participant's response times categorizing home appraisal values based on home characteristics and presented images representing sexual orientation. Our findings show that an implicit bias exists for an association between heterosexual couples and higher home values when compared to homosexual couples.

INTRODUCTION

The increased promotion or diversity and inclusion in society has led to research examining what biases exist within the various sectors of American life. In particular, researchers have started to examine the role of racial discrimination in the housing market. Results of many of these experiments have indicated a prevalent racial bias within the housing market that unfairly discriminates against minorities looking to buy, sell, or rent homes (Perry 2021). The increased visibility of this research has led many to wonder whether there is bias in the housing market based on other demographic factors such as sexual orientation. However, compared to racial bias, there is much less research related to discrimination in the housing market based on sexual orientation. Ahmed and Hammarstedt (2009) conducted the first field experiment studying discrimination against homosexuals on the housing market. Specifically, they studied bias in the rental housing market by submitting online applications for vacant apartments while posing as a heterosexual couple and as a homosexual male couple. They measured bias by observing the rate at which landlords emailed or called the fictitious couple back with additional information concerning the availability of the apartment and/or an invitation to tour the apartment. Their findings showed that the homosexual male couple received fewer responses from landlords with further information and invitations to view the apartment when compared to the heterosexual couple. These results, among other subsequent studies that have been conducted, indicate the presence of bias in the housing market against homosexual couples. However, there are very few studies that have conducted experiments related to bias in home appraisal values based on sexual orientation. The true extent to which sexual orientation biases affect home appraisal values is still unknown.

This paper presents the findings of our experiment to understand the effect the sexual orientation of a homeowner has on the value of a home appraisal. We hypothesized that appraisers biases within the housing market would lead to lower home appraisals for same-sex couples when compared to heterosexual couples. The remainder of the paper is organized in the

following order: Section I discusses our experimental design, Section II reports our results, and Section III presents our conclusions.

I. EXPERIMENTAL DESIGN

Study Design

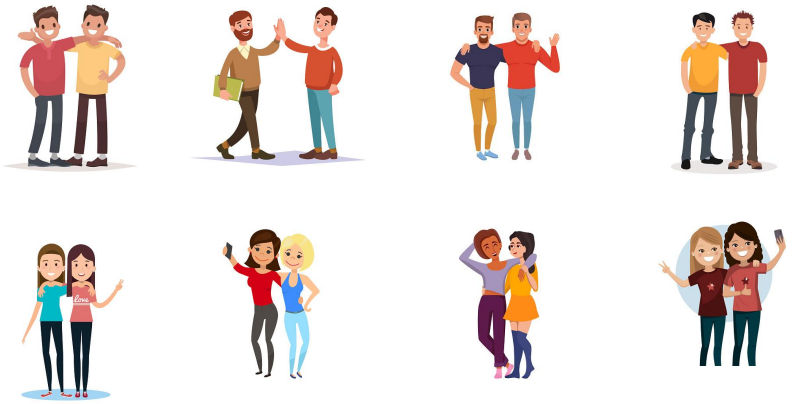
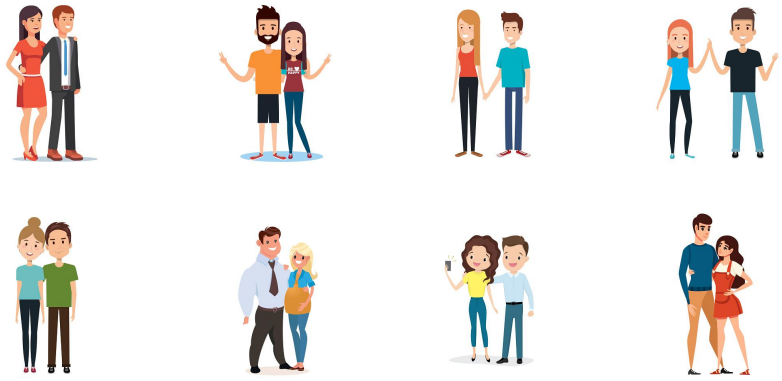
For our experiment, we recruited participants to take a survey in the form of Implicit Association Test (IAT) that was designed to measure their evaluation of home prices based on a series of characteristics of the home and the sexual orientation of the homeowner. The design of the survey was such that the results would indicate whether or not a bias exists when evaluating the home appraisal values for straight couples compared to gay couples. Details regarding the contents of our survey will be discussed in the Treatment Details section of our Methods.

Following the completion of our experiment, we compiled the results of our survey and conducted statistical analysis to determine whether any significant differences between the response times for straight couples versus gay couples existed. We also analyzed whether trends existed within certain characteristics of participants and their responses (i.e. age, gender, whether or not they have experience with real estate).

Treatment Details

The treatment for our experiment is the Implicit Association Test (IAT) test that survey participants will be presented within the survey. The IAT is an online test of quick responses to a series of words and pictures; the test measures response time to the computer images as a proxy for implicit bias. The test was hosted on Qualtrics using a survey template generated by the tool, *iatgen*, built by Tom Carpenter, Michal Kouril, Ruth Pogacar, and Chris Pullig (2019). We chose the IAT as it is especially interesting if it shows that one has an implicit attitude that one does not know about. The IAT measures the strength of associations between concepts (e.g. straight couple, gay couple) and evaluations (e.g., good, bad) or stereotypes (e.g., high house appraisal, low appraisal). The IAT typically consists of 7 rounds. In each round, an individual is asked to use 'E' and 'I' computer keys to categorize items into groups as fast as they can. Each round has a different number of items to be classified. We selected 8 variables that are typically associated with home appraisal value (home square footage, bedrooms and bathrooms, age of property, garage/carport, air conditioning, quality of landscape, basement, porch/patio/deck). For example, if we consider the age of the property: Typically, for two houses having the same characteristics, the higher the age of the property, the lower the appraised value. For the sexual identity variables, we decided to use icons of straight couples, gay female couples and gay male couples.

Table 1. Groups and their stimulus

Group	Stimulus
Higher Home Value	• Has air conditioning • Has basement • Has Porch • Has quality landscaping • Higher square footage • More bedrooms and baths • More garage spaces / carport • New property
Lower Home Value	• No air conditioning • No basement • No Porch / Patio / Deck • No quality landscaping • Lower square footage • Less bedrooms and baths • Less garage spaces / carport • Old property
Gay	
Straight	

The IAT score is based on how long it takes a person, on average, to sort the words in the third block versus the sixth block of the IAT (i.e. the two practice blocks) and the fourth block versus the seventh block of the IAT (i.e. the two test blocks). The results would indicate that one has an implicit preference for straight couple relative to gay couple if they are faster in categorizing words when Straight Couple and High Home Value share a response key and Gay

Couple and Low Home Value share a response key, relative to the reverse. It is important to note that we believe that the IAT is an effective educational tool for raising awareness about implicit bias, but the IAT cannot and should not be used for diagnostic or selection purposes.

Inclusion and Exclusion Criteria

At the outset of our experiment, our intent was to source our sample from real estate organizations in order to have survey participants with a background understanding of real estate and how to evaluate the price of homes. However, due to time constraints and limited responses from real estate organizations we contacted, we expanded our sample population to include a random sample of compensated volunteers and family and friends. Our final sample population consisted of volunteers from the UC Berkeley Mechanical Turk (MTurk) for Online Research and our family and friends. For our family and friends population, we each sent the survey out to people within our social and familial circle and requested voluntary participation in the survey. Family and friends were then able to anonymously complete the survey if they chose to do so.

For our experiment, we did not have any inclusion or exclusion criteria for participation in the survey. All surveys were conducted anonymously and did not collect any personally identifiable information on participants. Participants in the survey were asked to indicate whether or not they had real estate experience in the beginning of the survey but those answers did not affect their ability to participate in the survey and were not attributed to their results in the survey. All demographic questions asked at the beginning of the survey were intended to provide information regarding the aggregated results of our data and establishing potential trends within the results.

Randomization

Randomization for our experimental population was achieved through the use of the third party services MTurk and the random sample of participants from our social and familial circles as well as not collecting any personally identifiable information from survey participants. These practices helped to maintain the randomness of the experiment and ensured the privacy of our participants. Randomization within our experiment was achieved by presenting the images of straight and gay couples and the various home characteristics to survey participants in a random order. Additionally, we presented the classification categories in a random order and alternated between the left and right side of the screen. For example, in one round of testing “Gay or Lower Home Value” would be presented on the left side of the screen and in another round of testing “Gay or Higher Home Value” would be presented on the lef side of the screen. Our intent with presenting these in a random order was to eliminate the possibility of survey participants recognizing patterns within the test and anticipating the next image, home characteristic, or classification category that would be presented. We wanted to see how the participants would

answer purely based on their own evaluation or biases with respect to the stimuli and randomization assisted in achieving this goal.

Outcome Measure

The outcome measure for this experiment was the IAT measure (D-Score) for each survey participant which indicated the normalized difference in time taken to identify two contrasted groups or conditions (i.e. straight, gay, higher appraisal value, and lower appraisal value). For a detailed description and interpretation of the metric, please see the *Statistical Analysis* section.

Data Treatment and Metric Selection

IAT's effect is based on latencies for two tasks that differ in instructions for using two response keys to classify four categories of stimuli. There could be some problems that occur in latency measures, such as speed-accuracy tradeoffs, age-related slowing and spurious responses that appear as extreme values. Greenwald et al. (2003) investigated different methods to overcome these problems in a series of studies. The authors recommended the following data treatment as a way of (a) better reflect underlying association strengths, (b) more powerfully assess relations between association strengths and other variables of interest, (c) provide increased power to observe the effect of experimental manipulations on association strengths, and (d) better reveal individual differences that are due to association strengths rather than other variables:

- *Use data only from blocks 3,4,6 and 7*: The rest of the blocks were discarded; they were just attempted to be a way for the survey respondents to get used to the dynamics of the test.
- *Eliminate trials with latencies >10,000 ms ("Slow answers") and eliminate subjects for whom more than 10% of trials have latency less than 300 ms ("fast answers")*: Individuals can answer the test very quickly or very slowly, in a way that they wouldn't help us out to understand their mental associations. Maybe some people only want to finish the task as soon as possible, or maybe they got distracted in the middle of it and they took a long time in between trials
- *Error treatment*: Errors could be treated as a way of "penalizing" the fact that a person made a mistake when classifying the concepts in the test. There are several ways to treat errors, but the following three were selected to be tested during this project: Not to treat the error at all, replace the error with the block mean plus 600 ms or replace the error with the block mean plus 2 s.d.
- *Use D-Score as IAT measure*: Showed better performance when compared to other central tendency measures such as Median, Mean, Log and Reciprocal and hence, it was selected to be used as the IAT effect.

Three samples were utilized to calculate the results: Family and Friends Sample, MTurk sample and finally, a sample including the previous two samples together. Table 2 shows a quantification of the data treated in each one of our samples:

Table 2. Quantification of treatments per sample

Sample	"Slow answers": % Trials with latencies >10,000 ms	"Fast answers": Subjects with more than 10% of trials having latency less than 300 ms	% Errors present
Friends and Family	0.038%	0%	6.59%
MTurk	0.049%	5.29%	6.06%
All cases	0.048%	4.68%	6.13%

Statistical Analysis

As mentioned in the metric selection section, in order to determine the bias associated with our survey results, we utilized a metric called D-score, which is a measure of the strength and direction of the implicit association assessed and is a scaled estimate of the difference in mean reaction times in stereotype-congruent and incongruent matching tasks. Table 3 shows the blocks utilized to calculate the D-score.

Table 3. D-Score practice and test blocks

Block	Function	Left-Key	Right-Key	Stereotype-Congruent
3	Practice	Gay HIgher Home Value	Straight Lower Home Value	N
4	Test			
5	Practice	Straight HIgher Home Value	Gay Lower Home Value	Y
6	Test			

The D-Score is calculated by first finding the difference in average speed (latency) per participant using blocks 4 & 7 (original critical blocks) and blocks 3 & 6 (original practice blocks). Then, each difference is scored by a pooled standard deviation for that pair of blocks. This yields two "D-Score" type measures. For our results, a positive D-score is associated with

stereotype incongruence meaning that there is an association with gay people and higher appraisal value. Conversely, a negative D-score is associated with stereotype congruence meaning there is an association with straight people and higher appraisal values. A D-score of zero would correspond to no bias meaning there is no association between sexual orientation and a higher appraisal value in either direction.

II. RESULTS

D-Score

D-score metric could change depending on which error treatment is used. We wanted to test whether the direction of the D-Score was modified or not based on the error treatment technique used. We also calculated the D-Score in each one of our samples: Friends and Family, MTurk and all cases together.

Graph 1 shows a summary of the metrics calculated. The D-scores were negative in all of our samples, implying congruence with the stereotype: an association between straight people and higher appraisal value. The bars represent different types of D-scores. The darkest bars represent the D-score in the Friends and Family sample, the gray and lightest bars represent the D-score in MTurk and All cases, respectively.

Graph 1. D-Score (distinct error treatments) in all samples

We calculated the t-test with null hypothesis being the difference between the means of the two groups is equal to zero to see how significant our results were. In all cases, the p-values are less than 5% and hence, we rejected the null hypothesis.

The IAT effect (a D score) has a possible range of -2 to +2. Break points for 'slight' (.15), 'moderate' (.35) and 'strong' (.65) were selected conservatively according to psychological conventions for effect size (Harvard University 2011). Based on this scale, we can conclude, in every sample, we have a *moderate* association between straight people and higher appraisal value.

Demographics

Taking a look at the background of the respondents, it was seen that 84% (n = 175) of them were through the Mechanical Turk. It was also seen that 81% (n = 168) had neither studied or worked in the real-estate industry before, however, there were a few respondents who were working in this industry. Of those who worked in the real-estate industry, the average years of experience was 4.7 with 2 appraisers and 7 real estate agents (self-identified) in the sample. The respondents mentioned that 50% (n = 104) had either a Bachelor's or Associate degree as their highest level of education. More than 73% (n=150) of the respondents identified as White, with Black or African American being the second majority group in the sample with 7% (n = 15). Approximately 6% of the respondents identified with Hispanic / Latinx ethnic identity. Additionally, the average age of the sample was 45. The sample majorly consisted of male respondents 47% (n = 96), with 81% (n = 167) of the respondents identifying as Heterosexual and 9% (n=18) identifying as either Bisexual or Homosexual. Of those who identified, 44% (n = 90) were single and 37% (n = 77) married. Lastly, we also looked at the location of the respondents. While most respondents lived in either California (n = 17) or Florida (n = 14), 33% (n = 68) of respondents lived in a suburban area and 29% (n = 61) lived in an urban area. Majority of the respondents (49%, n = 101) currently owned or had owned a property in the past, and this was closely followed by 32% (n = 65) of the respondents who were currently renting from a property owner or management company.

III. CONCLUSIONS

In general, responses collected from the test indicate an association of higher appraisal values with straight people more than with gay people. While this association appears to be moderate, it reveals the existence of potential discrimination for homosexual couple home owners during home appraisal process, which could then lead to financial loss.

Thus, we are calling for more awareness from home appraisal professionals and the public to stay educated and informed, avoid steering clients based on LGBTQ identities, speak up and take the initiative to correct biases that are present within the housing market and in other industries.

We plan to take the following next steps moving forward after achieving the results from our initial experiment:

- *Collect more data*: Ideally our sample population for further testing would be a random sample of home appraisal and real estate professionals. This would allow us to gain greater insights into bias specifically within the housing market and how implicit biases of real estate professionals could impact homosexual couples looking to buy or sell homes.
- *Conduct within-group behavior for specific demographics*: Given the results of our initial experimentation, we are interested in delving into specific demographics such as male versus female to see if different categories of respondents yield significantly different results.
- *Publish our results to bring more awareness from the public and real-estate community*: We believe that publishing these findings will help to call attention to the issue of implicit bias and for education and training programs to find and implement solutions to this important issue. Our hope is that the work we have done will help contribute to bringing more equity and fairness to the real estate market.

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