

Gender Manipulation^{*†}

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Abstract

There are many situations in which people can choose which "gender" to use to represent themselves. To understand whether such a choice of gender can benefit the decision-maker, we run a dictator game experiment in the lab where the recipients choose a gender to represent themselves before the dictator makes the decision. We use a procedure through which recipients can choose the gender of their avatars while holding nearly all else constant. We find that female avatars are generally treated better by dictators, and both male and female recipients choose female avatars more often. Based on reported beliefs, this choice appears to be strategic for men but non-strategic for women.

Keywords: Gender Choice, Dictator Game, Gender Difference

JEL Classification: J16, C91, D63, D64

1 Introduction

A choice of "gender" is available in many real-life settings. In most virtual platforms, be it an online video game or a shopping website, people are free to register accounts with selected gendered avatars and usernames. A charity organization can choose solicitors

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of which gender to send to raise money from a neighborhood. A company can choose celebrities of which gender to promote its products.

More broadly, different industries have drastically different gender compositions. For example, early education industries, health care, social assistance, and clothing stores consist of primarily female practitioners, and manufacturing, transportation, utilities consist of primarily male practitioners.¹ The different gender composition may come from how people choose their career paths, but it may also reflect how firms deliberately choose the gender of their employees.

Given this wide range of phenomena, we ask two research questions. How do people react to these deliberate choices of gender? When such a choice of gender is available, can people get real benefit out of it? To answer these questions in the cleanest possible manner, we design a dictator game experiment where the recipients can choose which gender to represent themselves to the dictators before the dictators make decisions.

The key design issue in our experiment is that we need to allow a recipient to choose gender in a way that can meaningfully affect the dictator’s decision while “holding other things constant.” To solve this issue, we ask our recipients to choose between a real person photo (outside of the experiment) and its gender-modified version with the same facial features. One example is shown in Figure 1 in Section 2.1. Then, whichever photo chosen by the recipient is displayed to the dictator as a representation of the recipient when the dictator makes her decision.

A natural identification issue arises because recipients may choose photos based on their preferences rather than their beliefs that the photo allows them to receive more money from dictators. To identify the latter, we vary how the dictator game is framed. In one version (“giving treatment”), the dictator initially holds all the money and decides how much to transfer to the recipient. In the other version (“taking treatment”), the recipient initially holds all the money and the dictator decides how much to transfer from the recipient. The two versions are strategically equivalent. Varying the framing of the game in such a way allows us to change how the dictator perceives the photos

¹ Data are from Labor Force Statistics from the Current Population Survey (2020) on U.S. Bureau of Labor Statistics.

without changing the photos themselves. Thus, we can attribute any difference in the photo choice between the two treatments to the recipients' beliefs about how much money the photos can raise from the dictators. We also supplement this identification strategy with the elicitation of relevant beliefs.

Our results show that dictators allocate more money to recipients with female photos than those with male photos. This difference is more significant in the taking treatment than in the giving treatment. Interestingly, as if they anticipate that choosing the female photos is more profitable in the taking treatment, recipients choose female photos more frequently in the taking treatment than in the giving treatment. Recipients' intrinsic preferences for the photos cannot explain this phenomenon because the photos used are precisely the same in both the giving and the taking treatment.

In addition, we find that male recipients are more strategic in the choice of gendered photos. Male recipients tend to react to the change in the framing of the game more. Their decisions tend to be more correlated with their beliefs about the profitability of the female photos than female recipients. This is despite female recipients also understanding that female photos receive more money than male photos.

Our experimental design provides a new way of studying how a decision-maker treats different genders differently in the lab. In a typical gender experiment, revealing a subject's gender information to other subjects without telling the subjects that the experiment is about gender has always been a concern. In some experiments (Ben-Ner et al. 2004[6], Holm 2000[19], Brañas et al. 2018[8], Kettner and Ceccato 2014[22]), gender information of another subject is directly and transparently given to the decision-maker, in which case there may be some unwanted experimenter demand effect because the decision-maker knows that the experiment is about gender.

In some other experiments, gender information is given to the decision-maker in a subtler form. Some of these approaches in the literature include showing the real photos of the subjects (Babcock et al. 2017a[4], Isaksson 2018[21]), showing the social security number (Dufwenberg and Muren 2006[14]), and simply telling the information alongside other demographic information (Babcock et al. 2017b[3]). In essence, these approaches attempt to cope with the experimenter demand effect by providing more

information than gender. For example, showing a photo of a subject not only reveals the subject’s gender, it also reveals race, age, emotion, attractiveness, etc.. Thus, from the view of the decision-maker who is shown the photo, it is not apparent that the experiment is about gender. However, a potential issue with these approaches is that other information, which serves to blur the study’s objective, may also affect the decision-maker’s behavior.

Our approach has the advantage of revealing gender information in a subtle but controlled manner. Like the existing photo approach, the decision-maker (in our case, the dictator) sees a photo in our experiment. Unless they know the other gender version of the photo, it is unclear for them that the study is about gender. Moreover, by adequately constructing the other gender version of a photo, the experimenter can maximally control other information delivered by the photo that may affect the decision-maker. In addition, our approach maintains the anonymity of our subjects because our photos are not of any real persons in the experiment.

On the flip side, one may worry that using “fake” photos may diminish the effect of gender because the decision-maker may question the accuracy of the gender information. However, we find that dictators clearly react to the gender information, and the way they react is qualitatively similar to past experiments (Dufwenberg and Muren, 2006; Ben-Ner et al., 2004) that use real gender information.

To our knowledge, there are two other papers offering insights on the effect of gender choices. Drouvelis et al. (2020)[13] randomly allow some participants to misrepresent their gender and analyzes the following cooperative behaviors when this chance is available. He et al.(2020)[18] allow some participants to conceal their gender information (though they cannot lie about their gender information) and see how concealing gender information affects gift exchange. Our paper differs from these two papers as our focus is more on what gender information (male or female) the recipients send and less on the effect of having the opportunity to misrepresent or conceal gender information. In fact, our dictators do not know that the recipients’ choice is about gender, thus cannot react to “recipients having the chance of manipulating gender information.”

2 Experimental Design

Our interest is in understanding whether people strategically choose a gender to gain real benefits. As a first step toward this goal, we choose to implement a dictator game as there is essentially no interaction between players in this game, thus eliminating many other strategic elements that are irrelevant to our goals, such as reciprocity and high order beliefs.

In our version of the dictator game, one player is endowed with 200 points (5 U.S. cents/point), and the other player is endowed with no point. The recipient first sends a one-way gendered message to the dictator, and then the dictator decides how to divide the 200 points between the two players. The main treatment variable of the experiment is whether the dictator or the recipient is initially endowed with the 200 points. Instructions and other details of the design can be found in Appendix A.

2.1 Recipient’s Action

Before dictators make their decisions, recipients choose between a male photo and a female photo to represent themselves. Then, the photo representations are shown to the dictators when they choose to divide the 200 points.

The photos we use are downloaded from Face Research (DeBruine, Lisa Jones, Benedict 2017[11]). A subset of photos (four female photos and five male photos) is chosen from the database, and, for each photo, we modify it to the opposite gender using *FaceApp*² while, to the best we can, holding constant the facial features, perceived age, and overall attractiveness. One example is shown in Figure 1. All photos used are of white faces in case of any racial bias, and all of them are of smiling faces to induce the dictators to divide more points to the recipients³. It is common knowledge that the photos used are not those of any subjects in the experiment.

The choice between the two photos is elicited through a BDM (Becker et al., 1964[5]) process. First, the recipient would see a male photo and a female photo with the same

² *FaceApp* is a mobile app for photo and video editing using AI technology. Gender swapping is one of its functions.

³ See Appendix B for all photos and their modified counterparts.



Figure 1: One Example of A Photo Pair: Original Photo v.s. Gender Changed Photo

facial features. The position of each photo (left or right) is randomized across rounds. Then, the recipient is asked to indicate how much they are willing to pay for the two photos through our BDM table (Table 1). For each row in the BDM table, the recipient is asked to choose between Option A and Option B, and they are not allowed to make inconsistent (i.e., non-monotonic) choices. Finally, the computer randomly selects one row from the table to determine which photo is shown to the dictator and how much the recipient is charged for the choice. The payment for the photo occurs at the end of the round.

	Option A	Option B
You want to	Pay 50 points and choose left photo	Pay nothing and choose right photo
You want to	Pay 40 points and choose left photo	Pay nothing and choose right photo
You want to	Pay 30 points and choose left photo	Pay nothing and choose right photo
You want to	Pay 20 points and choose left photo	Pay nothing and choose right photo
You want to	Pay 10 points and choose left photo	Pay nothing and choose right photo
You want to	Pay nothing and choose left photo	Pay nothing and choose right photo
You want to	Pay nothing and choose left photo	Pay 10 points and choose right photo
You want to	Pay nothing and choose left photo	Pay 20 points and choose right photo
You want to	Pay nothing and choose left photo	Pay 30 points and choose right photo
You want to	Pay nothing and choose left photo	Pay 40 points and choose right photo
You want to	Pay nothing and choose left photo	Pay 50 points and choose right photo

Table 1: BDM Table

2.2 Dictator’s Action

After the recipients make their choices, the dictator is shown a gendered photo resulting from the recipient’s choice⁴. Then, the dictator decides how to divide the 200 points. The dictator only observes the photo chosen by the recipient and does not know that the recipient’s choice is between a male photo and a female photo. The purpose of this design is to minimize the experimenter demand effect on the dictator side.

To best identify the difference in the dictator’s action given different photos, we introduce a slight twist: each point divided to the recipient will be doubled by the end of the round (before the payment for the photos). In this way, we induce the dictator to divide more to the recipient while discouraging them from equally splitting the pie, a common rule of thumb that the dictator follows in the past dictator game experiments (Andreoni and Miller 2002[1], Andreoni and Vesterlund 2001[2]). The dictators are well aware of this twist from the beginning, and they are constantly reminded of it because, as they decide how to split the 200 points, we calculate the outcome for each player (before the payment for the photos) for them.

2.3 Belief Elicitation

At the end of each session, we ask recipients the following questions regarding their beliefs about the dictators in their sessions:

1. How much, on average, a recipient with a male photo receives from a male dictator in the session;
2. How much, on average, a recipient with a female photo receives from a male dictator in the session;
3. How much, on average, a recipient with a male photo receives from a female dictator in the session;
4. How much, on average, a recipient with a female photo receives from a female dictator in the session;
5. The proportion of male dictators in the session.

⁴ To maximize the photo’s potential influence on the dictator’s behavior, the chosen photo is displayed to the dictator for 10 seconds before they can take any action.

We elicit the five beliefs using the binarized scoring rule (Hossain and Okui, 2013[20]), which will guarantee the recipients to reveal their beliefs truthfully irrespective of their risk-preference.

2.4 Treatments and Procedure

The main treatment variable of our experiment is how the dictator game is framed. In our “Giving” treatment⁵, the dictator is endowed with the 200 points and decides how many points to transfer to the recipient, whereas in our “Taking” treatment⁶, the recipient is endowed with the 200 points and the dictator decides how many points to transfer from the recipient.

By changing the framing of the game, we can influence how the game and the photos are interpreted by the dictator, thereby changing the stake of the photo choice without changing the game’s payoff structure. Indeed, as our results show, the choice of photos appears to become of higher stake in the “Taking” treatment than in the “Giving” treatment, and the players react to this difference by choosing photos more strategically.

Participants played nine rounds of the game with no feedback about their payoffs until the end. The roles are held fixed throughout the experiment while the pairs are randomly formed in each round⁷. Different pairs of photos were used in different rounds, but the sequence is the same for each session.

The online experiment was programmed and conducted using oTree (Chen et al., 2016[9]). Subjects were primarily from the undergraduate student population at the Ohio State University, recruited through ORSEE (Greiner, 2004[17]). There were 6 giving sessions with 37 dictators (21 women, 15 men, and 1 non-binary) and 39 recipients (16 women and 23 men)⁸, and there were 4 taking sessions with 35 dictators (13 women

⁵ Forsythe et al. 1994[16], Eckel and Grossman 1998[15], Bolton and Katok 1995[7], Dickinson and Tiefenthaler 2002[12], Dufwenberg and Muren 2006, Ben-Ner et al. 2004

⁶ Suvoy 2003[23], Chowdhury et al. 2017[10]

⁷ Since we run online experiments, no participant could see others’ names or faces.

⁸ The experimenter acted as dictators in two sessions since the assigned dictators dropped the sessions during the experiments. All data related to the two dictators have been dropped.

and 22 men) and 35 recipients (21 women and 14 men)⁹. Each session lasted for around 30 minutes, with payments averaging \$11.8 per subject, including a \$6.25 show-up fee.

3 Results

3.1 Dictators' Transfer

We first start with the analysis of dictators' decisions. Recall that in our experiment, the dictators face a simple task because they do not know the choice set of the recipients. Therefore they could only react to the photo resulting from the recipients' choices¹⁰ and the framing of the game.

The mean of recipients' points after the points are doubled but before photo payment are shown in Figure 2. In the giving treatment, dictators allocate similar amount of points to male and female photos ($p = 0.4692$ using clustered t-test¹¹). However, in the taking treatment, dictators allocate significantly more points to female photos ($p = 0.0868$). This general pattern holds for all nine pairs of photos we used, with only a few exceptions. See Appendix B for more details.

We can further break down the dictators' decisions by their own gender. Table 2 reports the decisions of male dictators and Table 3 those of female dictators.^{12 13} On the one hand, male dictators treat male and female photos similarly in giving treatment but significantly allocate more points to female photos in taking treatment. On the other hand, female dictators generally allocate similar points to female and male photos in giving and taking treatment.

Result 1. *Male dictators allocate similar amounts of points to male and female photos*

⁹ The experimenter acted as a dictator in one session and a recipient in one session since the assigned subjects dropped the sessions during the experiments. All data related to the two subjects have been dropped.

¹⁰ In the giving treatment, the dictators see a male photo and a female photo 47.15% and 52.85% of the times, respectively. In the taking treatment, the dictators see a male photo and a female photo 39.37% and 60.63% of the time, respectively. Our data set is fairly balanced because which photo is displayed to the dictator is primarily influenced by which row the computer picks in the BDM table.

¹¹ We will use t-test (clustered at the subject level) unless indicated otherwise.

¹² The distribution graphs are shown in Figure C1.

¹³ Two-tailed Wilcoxon sign tests results are shown in Table C1 and Table C2 in Appendix C. The results are similar.

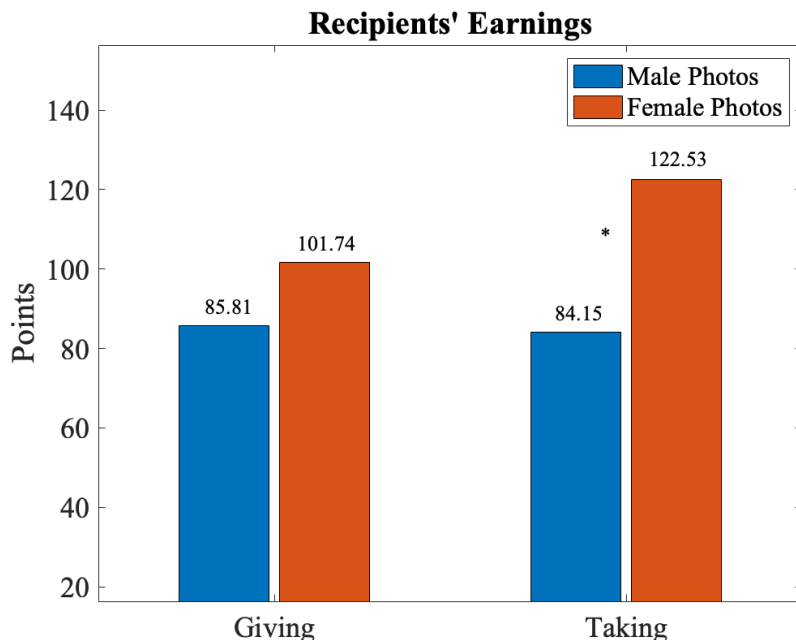


Figure 2: Recipients' Average Earnings: Giving v.s. Taking

in giving treatment but more to female photos in taking treatment. Female dictators allocate similar points to both female and male photos in giving and taking treatment. The general behavioral pattern of our dictators in giving treatment is similar to that of past experiments that use real gender information.

Table 2: Recipients' Average Earnings When Paired with Male Dictators

	Male Photo	Female Photo	Difference
Giving Sessions	84	87.81	3.81
Taking Sessions	88.02	130.84	42.82(*)
Difference	4.02	44.03(*)	

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table 3: Recipients' Average Earnings When Paired with Female Dictators

	Male Photo	Female Photo	Difference
Giving Sessions	77.74	100.78	23.04
Taking Sessions	74.71	111.68	36.98
Difference	3.03	10.9	

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Notably, although it is common knowledge that our photos are not the actual photos of any subjects, the general behavioral pattern of our dictators in the giving treatment is similar to those of past experiments. Ben-Ner et al. (2004)[6]¹⁴ find that the male dictators treat male and female recipients similarly, and Dufwenburg and Muren (2006)[14]¹⁵ find that female recipients are treated better than male recipients.

3.2 Recipients' Choice of Photos

Now we turn to our main object of interest, how the recipients choose between the gendered photos to represent themselves.

We first start with an overview of how the recipients choose between male photos and female photos. Table 4 reports the frequency at which each type of photo is chosen by the recipients when they can choose without any payment (i.e., Row 6 of the BDM Table).

We see that female photos are chosen more frequently than male photos by both male and female recipients in both treatments. However, importantly, male recipients appear to react more (though not significantly) to how the dictator game is framed (53.62% vs. 61.11%, $p = 0.4889$) than female (70.83% vs. 71.43%, $p = 0.9307$). Note that because the sequence of photos is the same in the two treatments, it is clear that this difference, alongside other differences between the treatments reported later, cannot be driven by the recipients' intrinsic preference for the photos.

Table 4: The Rate of Choosing Photos Freely

		Male Recipient	Female Recipient	Average
Giving Treatment	Female Photos	53.62%	70.83%	60.68%
	Male Photos	46.38%	29.17%	39.32%
Taking Treatment	Female Photos	61.11%	71.43%	67.3%
	Male Photos	38.89%	28.57%	32.7%

Result 2. *Without any payment, female photos are generally chosen more frequently*

¹⁴They revealed true gender to look at the interaction of genders.

¹⁵They used subjects' initials plus the last four digits of their social security numbers to reveal the gender.

by both male and female recipients. However, male recipients react to the change of framing slightly more than female recipients.

As we see in the previous section, choosing the female photo is generally more profitable than choosing the male photo in both treatments (although more so in the taking treatment). When both photos are free, it is rational for the recipients to choose the female photo in both treatments, which may explain why the treatment effect is insignificant. Thus, to truly establish that the recipients choose photos strategically, we need to look at other rows in the BDM table, where the recipients have to pay for the photos.

For other rows in the BDM table, recipients are asked to indicate their willingness to pay for choosing female and male photos. Figure 3 shows the distribution of the cutoffs¹⁶ on the BDM table for each treatment. “ $X + m$ ” on the horizontal axis means that the recipient chooses gender X over the other gender when they need to pay m points for it.

We see that a non-negligible fraction of the recipients are willing to pay at least 10 points for the photos. Generally, more recipients, both male and female, are willing to pay for female photos than for male photos. However, there is slight gender difference in the treatment effect. For female photos, male recipients are slightly less willing to pay in the giving treatment than in the taking treatment (24.15% vs. 30.95%, $p = 0.1734$), but this treatment effect is much smaller for female recipients (38.19% vs. 40.21%, $p = 0.2836$). For male photos, neither male nor female recipients show any difference between giving and taking treatment (Male Recipients: 20.77% vs. 21.42%, $p = 0.7202$; Female Recipients: 13.88% vs. 12.7%, $p = 0.8730$).

A similar pattern appears when we look at each row. Male recipients are slightly less willing to pay 10 or 20 points for female photos in the giving treatment than in the taking treatment ($p = 0.5135$ for 10 points, $p = 0.5408$ for 20 points). However, they are significantly less willing to pay 30 or more points for female photos in the giving treatment than in the taking treatment ($p = 0.0783$)¹⁷. We do not find any

¹⁶Recall that we do not allow the recipients to choose non-monotonically. Thus, their choices can be summarized by their switching points (i.e., cutoff) on the BDM table.

¹⁷ $p = 0.0694$ for 30 points, $p = 0.0869$ for 40 points and $p = 0.0868$ for 50 points.

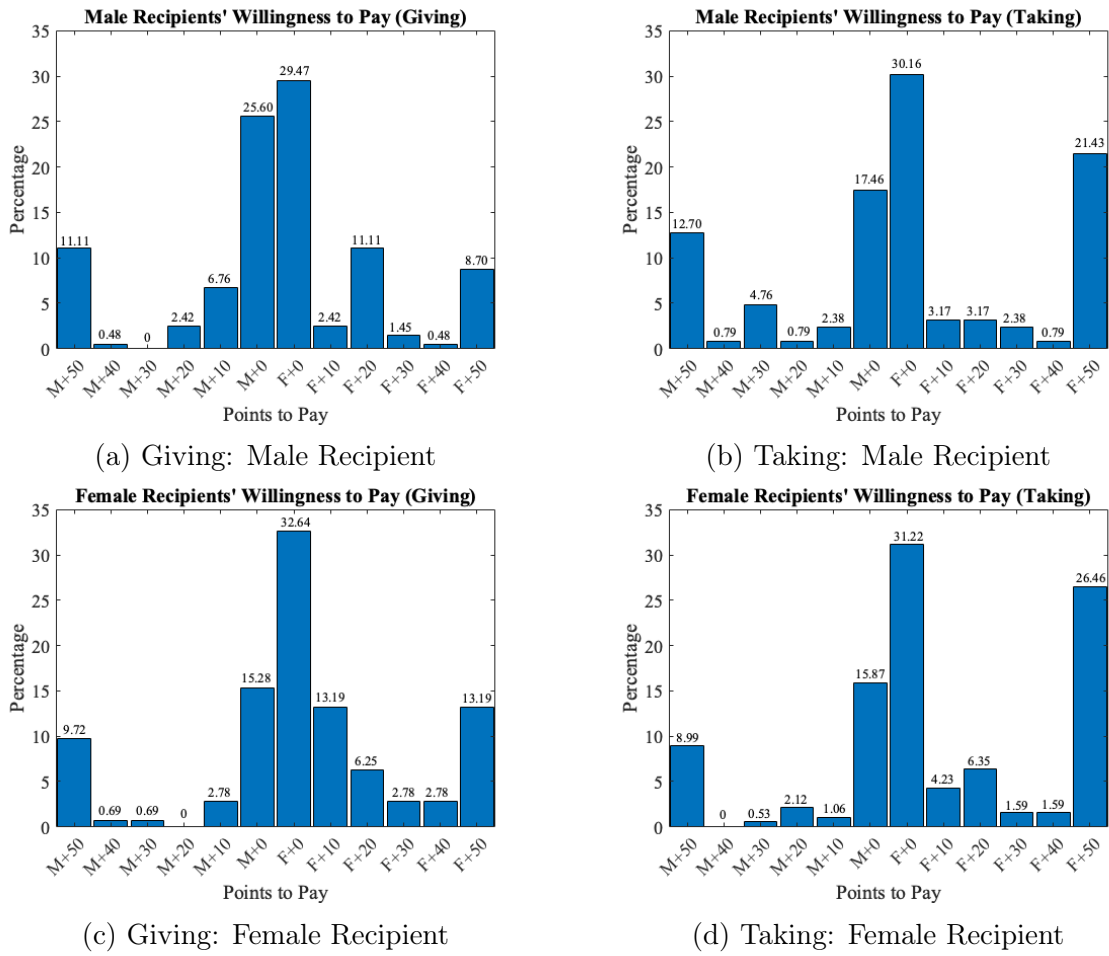


Figure 3: Cutoffs

such treatment effect for either male photos or female recipients. Up to this point, our results suggest that male recipients choose photos strategically while female recipients do not.

There could have been two types of wealth effect that prevent us from drawing such a conclusion. The first type is about the initial endowment. In the taking treatment, the recipients are originally endowed with all the points. Thus, the male recipients' willingness to pay for the female photos may have been affected simply by this placement of the initial endowment. However, our results suggest that this is unlikely to be the case, as the willingness to pay for the male photos is unaffected by our treatment.

The second type is about the dictators' behaviors. Because the dictators allocate significantly more points to female photos in the taking treatment, even if the recipients

choose female photos solely out of intrinsic preference, their willingness to pay for the female photos may increase if they anticipate that they will be compensated in the taking treatment. However, our results also suggest that this is unlikely to be the case, as the willingness to pay of the female recipients, who arguably have a stronger preference for female photos, is unaffected by our treatment.

Result 3. *The male recipients' willingness to pay at least 30 points for the female photos is significantly lower in the giving treatment than in the taking treatment. Meanwhile, female recipients' willingness to pay for photos is similar in taking and giving treatment. Thus, male recipients choose photos strategically while female recipients do not.*

Besides, we can also check the difference between male and female recipients when paying to choose photos. Table 5 reports the fixed effect regression results on cutoffs¹⁸. The dependent variable is the cutoff, which has a range from 0 to 11. 0 means that the recipient strongly prefer to choose male photos with a price of no less than 50 points. 11 means that the recipient strongly prefers to choose female photos with a price of no less than 50 points. The larger the cutoff, the stronger the preference to pay to choose female photos. The independent variables include the dummy variables of recipients' gender, treatments and their cross effects. The grouped variable is the round number. Male recipients are significantly less likely to pay to choose female photos than female recipients in both giving and taking treatment. From the analysis above, we know that this difference does not mean female recipients act more strategically.

Result 4. *Female recipients are more likely to pay for female photos than male recipients in both giving and taking treatment.*

3.3 Recipients' Beliefs

To reinforce our result that female photos are chosen strategically by male recipients, we go forward to investigate recipients' beliefs to complement.

Table 6 reports recipients' average response to the five belief questions. Since recipients do not know the composition of dictators, they generally believe that half of the

¹⁸ Similar results from the fixed effect ordered Logit regression are shown in Table C3 in Appendix C.

Table 5: Fixed Effect Regression Results

	Cutoffs
Male Recipient \times Taking	0.4424 (1.44)
Female Recipient \times Giving	0.6676* (1.98)
Female Recipient \times Taking	1.2096*** (4.48)
Observations	666

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

dictators are male. Female photos are commonly believed to receive more points than male photos in both giving and taking treatments. The last row reports the difference in expected payoff between female and male photos. Recipients generally believe female photos earn more than male photos for male and female recipients in both giving and taking treatments.

Table 6: Mean Value of Belief Questions

	Giving		Taking	
	Male	Female	Male	Female
Expected Male Dictator to Male Photo	151.087 (81.11)	155.63 (107.92)	168.79 (110.68)	128.81 (72.14)
Expected Male Dictator to Female Photo	176.57 (93.67)	186.81 (105.55)	169.93 (117.56)	200.95 (107.89)
Expected Female Dictator to Male Photo	139.30 (80.04)	164.38 (99.89)	140.5 (114.92)	146.62 (86.7)
Expected Female Dictator to Female Photo	172.39 (71.23)	171.88 (92.34)	191.14 (124.35)	197.09 (104.14)
Expected Rate of Male Dictator	53.48% (0.12)	46.25% (0.12)	50.29% (0.16)	54.76% (0.14)
Difference in Expected Payoff	27.16 (67.59)	7.77 (75.74)	13.54 (46.25)	65.12 (67.97)

Standard deviation statistics in parentheses

We run a probit regression to check the impact of beliefs on recipients' choosing photos freely. The dependent variable equals 1 when recipients choose female photos in Row 6 of the BDM table and 0 otherwise. The independent variable is the difference

in the expected payoff between female photos and male photos. Table 7 reports the marginal effects of the differences in expected payoffs on choosing photos freely in giving treatment. There are relatively strong and positive marginal effects for both male and female recipients for choosing female photos freely following their expectation differences. Table 8 reports the marginal effects for choosing photos freely in taking treatment. There is a strong and positive marginal effect for choosing photos freely for male recipients.

Table 7: Marginal Rates for Choosing Photos Freely in Giving Treatment

	Male Recipients	Female Recipients
Diff. in Expected Payoff (Female Photos-Male Photos)	0.00176** (2.28)	0.00107* (1.94)
Observations	207	144

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Marginal Rates for Choosing Photos Freely in Taking Treatment

	Male Recipients	Female Recipients
Diff. in Expected Payoff (Female Photos-Male Photos)	0.00316** (2.47)	0.000077 (0.14)
Observations	126	189

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

To further analyze how beliefs influence recipients' choices of photos, we need to look at the whole BDM table. We run an ordered Logit regression. The dependent variable is the cutoff, with a range from 0 to 11. The independent variable is the difference in the expected payoff between female photos and male photos.

The regression results in giving treatment are shown in Table 9 and the results in taking treatment are shown in Table 10. Male recipients' choices of photos were significantly influenced by their expected payoffs. However, for female recipients, their expected payoffs on male and female photos had no impact on their choices of photos. This is despite the fact that female recipients also believe that the female photos on average receive more points than the male photos, and that the variance of their beliefs

is larger. The regression results of beliefs strengthen the results that male recipients choose female photos strategically in the previous session.

Table 9: Factors Influencing Choices of Photos in Giving Treatment

	Male Recipients	Female Recipients
Diff. in Expected Payoff (Female Photos–Male Photos)	0.00767* (1.72)	0.00165 (0.57)
Observations	153	117

z statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Factors Influencing Choices of Photos in Taking Treatment

	Male Recipients	Female Recipients
Diff. in Expected Payoff (Female Photos–Male Photos)	0.01611*** (3.13)	0.000045 (0.01)
Observations	126	162

z statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Result 5. *Male recipients’ choices of photos are significantly influenced by their beliefs on expected payoffs from choosing the photos in both giving and taking treatment. The more they believe to receive from choosing female photos, the more they are willing to pay to choose female photos. Male recipients are more strategically behaving at the time of choosing photos. Female recipients’ choices of photos are relatively uncorrelated with their expected payoffs.*

Our data cannot tell what the motivation to choose photos for female recipients is. Based on the survey answers at the end of the experiment, we conjecture that female recipients choose photos depending on their preferences and the attractiveness of photos.

3.4 Benefits from Choices

We have shown that dictators treat deliberate choices of gendered photos differently, and recipients are more willing to choose female photos. The last question we want to

answer is whether the deliberate choices of gender can generate profits for recipients.

Taking the payment to choose photos into consideration, recipients' net earnings from choosing photos are shown in Figure 4. In giving treatment, the average net earnings for male photos is 82.31 points compared with 97.37 for female photos ($p = 0.2095$). Female photos earn slightly more. In taking treatment, the average net earnings for male photos is 80.98 compared with 114.27 for female photos ($p = 0.0458$). Female photos earn significantly more than male photos. Recipients do get benefits from gender manipulation.

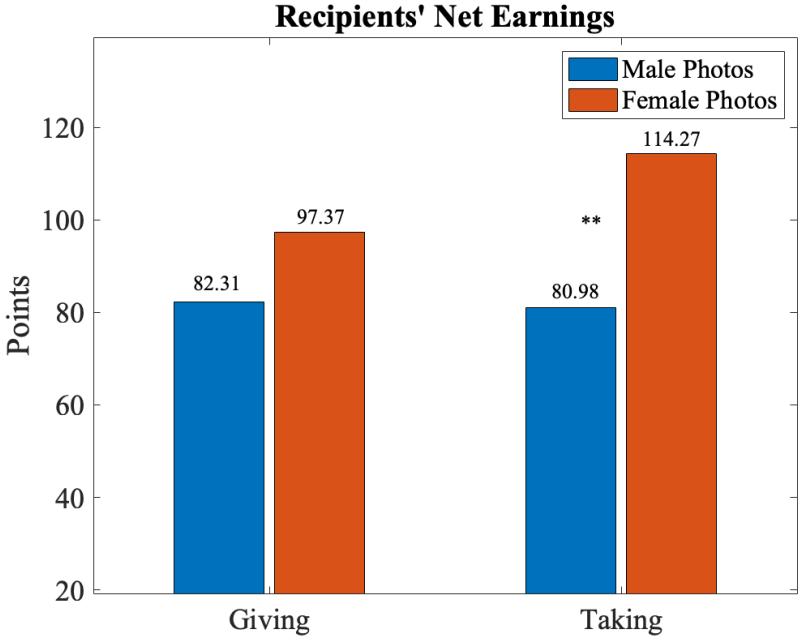


Figure 4: Recipients' Net Earnings: Giving v.s. Taking

Result 6. *Choices of female photos receive slightly more points than choices of male photos in giving treatment. Moreover, choices of female photos secure significantly more points in taking treatment. Recipients get benefits from gender manipulation.*

4 Summary and Conclusions

This experiment explores the choices of "gender" in a dictator game. The main takeaway is that, in our environment, strategic choices of "gender" are frequently used, especially

by males, and gender manipulation could generate more profit. Females' choices can hardly be explained by strategic concerns. Our results are important because choices of "gender" are common in daily life and our results show that taking advantage of them could generate more profits.

A word of caution is needed about the interpretation of our results. Our results do not necessarily imply that males are generally the more strategic gender in gender choice. The reason is that, in our particular environment, we see that choosing a female photo is a more profitable choice in giving treatment and even more so in the taking treatment. Thus, if both genders have a natural preference for choosing their own gendered photo, then male subjects' preference and strategic concern go in the opposite directions, making it easier to identify their strategic concern. To understand whether female can also be strategic in gender choice, an ideal environment is one as clean as the dictator game where males are generally treated better than females in one version of the game but less so in another version of the same game, but we have yet to find such an environment, and we believe this is an important direction for future research.

Appendix

A Instructions

A.1 Instructions

Please DON'T close the web page throughout the experiment.

This study will take approximately 30 minutes. You will receive \$6.25 for showing up. You may also receive additional money, depending on the decisions made (as described below). Upon completion of the session, this additional amount will be paid to you individually and privately.

There are 9 rounds. One round will be randomly selected for payment at the end of the experiment. Your earnings will be \$6.25 + the earnings of the round randomly

selected.

In each round, you will be randomly paired with one other person. You will not know who you are paired with. One of you will be Role 1, and the other will be Role 2. The Roles will be fixed throughout the experiment. The interaction between the two roles is as follows.

1. (Giving) Role 1 has 200 points. Role 2 has 0 points. Each point is worth 5 cents.
1. (Taking) Role 1 has 0 points. Role 2 has 200 points. Each point is worth 5 cents.
2. Role 2 chooses a photo to represent himself or herself. The photos are not the actual pictures of any person in the experiment.
3. Role 1 is shown the photo chosen by Role 2.
4. (Giving) Role 1 decides how many points (from 0 to 200) to transfer to Role 2.
4. (Taking) Role 1 decides how many points (from 0 to 200) to transfer from Role 2.
5. (Giving) Each point held by Role 1 is worth 1 point for Role 1. Each point transferred to Role 2 is worth 2 points for Role 2. For example, if Role 1 transfers 190 points to Role 2, Role 1 gets 10 points, Role 2 gets 380 points.
5. (Taking) Each point transferred by Role 1 is worth 1 point for Role 1. Each point held by Role 2 is worth 2 points for Role 2. For example, if Role 1 transfers 10 points from Role 2, Role 1 gets 10 points, Role 2 gets 380 points.
6. The points each person has at the end of the round determines that person's earning of the round.

After that, you will be randomly paired again and move to the next round. You will not know your payment in any round till the end of the experiment.

A.2 Instructions for Recipients' Choosing Photos

You are Role 2. Here you choose one of the following two photos to represent yourself. The other person will only see the photo you choose and not the one you don't choose. You may have to pay for your choice of photo, and your choice may affect how many

points the other person transfers to you.¹⁹

For each of the following 11 rows, please indicate how you would choose between Option A and Option B. Then the computer will randomly pick one row out of the 11 rows. Your choice together with the computer’s choice determines the photo shown and how much you pay for the photo. If in the row the computer picked you choose Option A, we will charge you the amount listed and show the other person only the Left Photo. If in the row the computer picked you choose Option B, we will charge you the amount listed and show the other person only the Right Photo. If you choose Option A in one row, you need to choose Option A in all the rows below that row (i.e., no Option B after Option A).

	Option A	Option B
You want to	Pay 50 points and choose left photo	Pay nothing and choose right photo
You want to	Pay 40 points and choose left photo	Pay nothing and choose right photo
You want to	Pay 30 points and choose left photo	Pay nothing and choose right photo
You want to	Pay 20 points and choose left photo	Pay nothing and choose right photo
You want to	Pay 10 points and choose left photo	Pay nothing and choose right photo
You want to	Pay nothing and choose left photo	Pay nothing and choose right photo
You want to	Pay nothing and choose left photo	Pay 10 points and choose right photo
You want to	Pay nothing and choose left photo	Pay 20 points and choose right photo
You want to	Pay nothing and choose left photo	Pay 30 points and choose right photo
You want to	Pay nothing and choose left photo	Pay 40 points and choose right photo
You want to	Pay nothing and choose left photo	Pay 50 points and choose right photo

B Original and Modified Photos

We used 9 pairs of photos in the experiment, which are shown below. The left photos are original photos and the right photos are gender changed photos by using FaceApp.

Pair 1

¹⁹(Taking) You may have to pay for your choice of photo, and your choice may affect how many points the other person transfers from you.



The rate of choosing the female photo is 64.1% in giving treatment and 51.43% in taking treatment. In giving treatment, the female photo receives 79.42 points and the male photo receives 90.15 points ($p = 0.7729$ by Two tailed Wilcoxon sign tests²⁰). In taking treatment, the female photo receives 58.47 points and the male photo receives 112.35 points ($p = 0.0356$).

Pair 2



The rate of choosing the female photo is 79.42% in giving treatment and 68.57% in taking treatment. In giving treatment, the female photo receives 104 points and the

²⁰Two-tailed Wilcoxon sign tests are used in Appendix B.

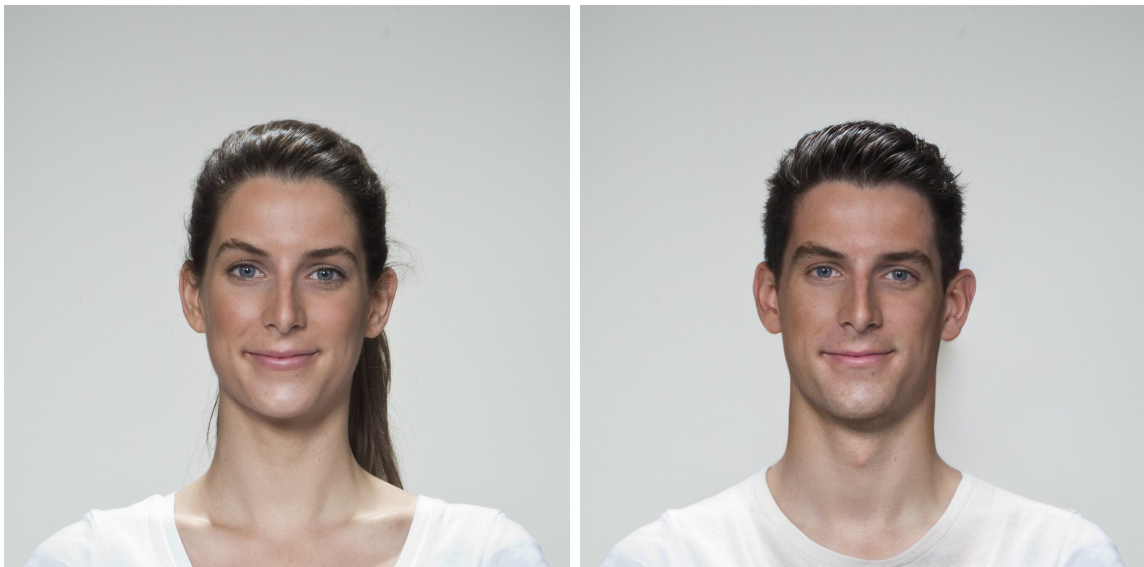
male photo receives 84.59 points ($p = 0.2333$). In taking treatment, the female photo receives 102 points and the male photo receives 69 points ($p = 0.217$).

Pair 3



The rate of choosing the female photo is 74.36% in giving treatment and 71.43% in taking treatment. In giving treatment, the female photo receives 94.27 points and the male photo receives 74.4 points ($p = 0.6856$). In taking treatment, the female photo receives 137.55 points and the male photo receives 83.17 points ($p = 0.1314$).

Pair 4



The rate of choosing the female photo is 43.59% in giving treatment and 60% in taking treatment. In giving treatment, the female photo receives 119 points and the male photo receives 84.38 points ($p = 0.0996$). In taking treatment, the female photo receives 127.05 points and the male photo receives 55.85 points ($p = 0.0257$).

Pair 5



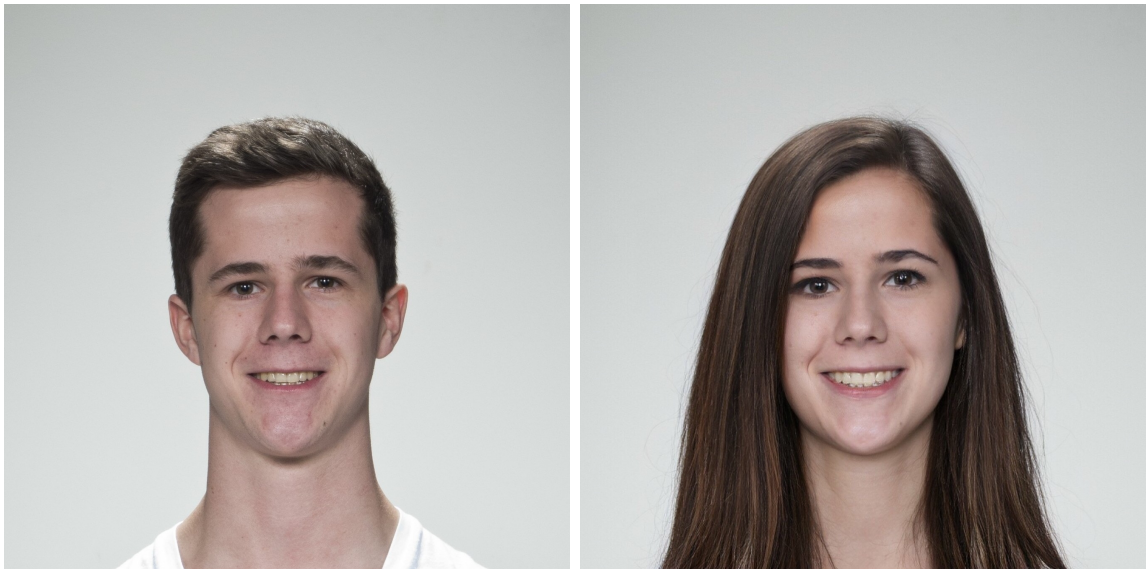
The rate of choosing the female photo is 61.54% in giving treatment and 71.43% in taking treatment. In giving treatment, the female photo receives 72.71 points and the male photo receives 80.8 points ($p = 0.6438$). In taking treatment, the female photo receives 130 points and the male photo receives 91.64 points ($p = 0.353$).

Pair 6



The rate of choosing the female photo is 61.54% in giving treatment and 74.29% in taking treatment. In giving treatment, the female photo receives 111.2 points and the male photo receives 94.71 points ($p = 0.747$). In taking treatment, the female photo receives 154.24 points and the male photo receives 113.3 points ($p = 0.2027$).

Pair 7



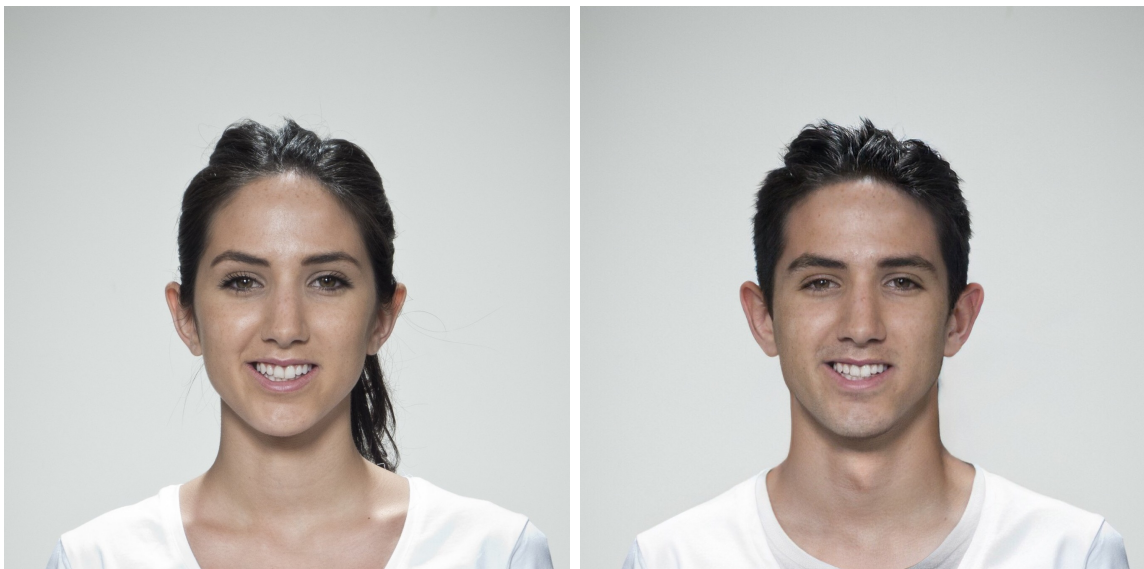
The rate of choosing the female photo is 66.67% in giving treatment and 71.43% in taking treatment. In giving treatment, the female photo receives 112.12 points and the male photo receives 100.2 points ($p = 0.7014$). In taking treatment, the female photo receives 126.67 points and the male photo receives 89.54 points ($p = 0.1517$).

Pair 8



The rate of choosing the female photo is 46.15% in giving treatment and 71.43% in taking treatment. In giving treatment, the female photo receives 115.37 points and the male photo receives 84.44 points ($p = 0.2532$). In taking treatment, the female photo receives 97.6 points and the male photo receives 61.14 points ($p = 0.1814$).

Pair 9



The rate of choosing the female photo is 56.41% in giving treatment and 65.71% in taking treatment. In giving treatment, the female photo receives 113.52 points and the

male photo receives 76.5 points ($p = 0.2298$). In taking treatment, the female photo receives 153.78 points and the male photo receives 83.5 points ($p = 0.0309$).

C Other Results

Figure C1 shows the distributions of dictators' allocation to male and female photos.

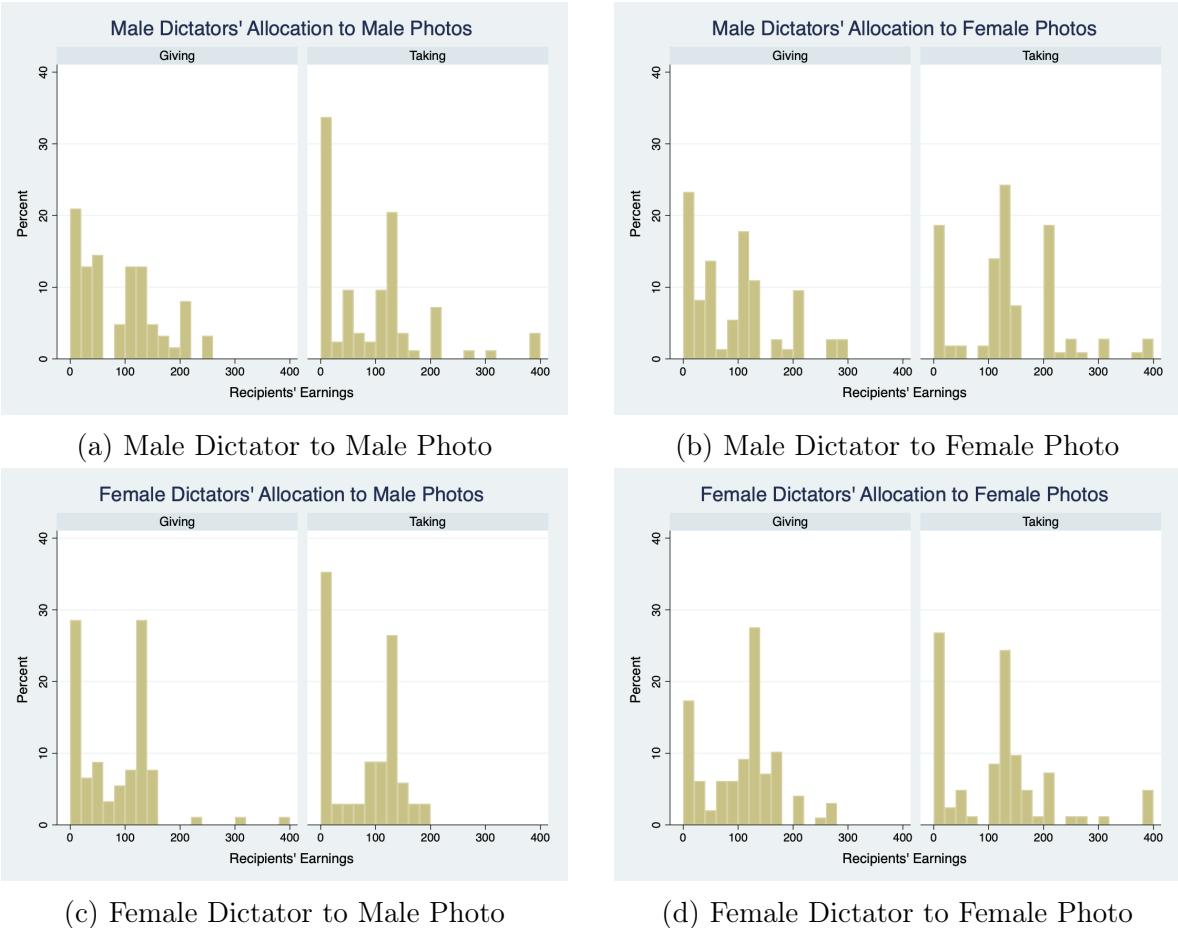


Figure C1: Distributions of Dictators' Allocation

In the giving treatment, dictators allocate 101.74 points to female photos and 85.81 points to male photos ($p = 0.4899$ using Two-tailed Wilcoxon sign tests). In comparison, dictators allocate 122.53 points to female photos and 84.15 to male photos in the taking treatment ($p = 0.0495$). There is no difference in dictators' allocation to male photos between giving and taking treatment (85.81 v.s. 84.15 $p = 0.5844$). In contrast, dictators allocate significantly more points to female photos in taking treatment than

giving treatment (101.74 v.s. 122.53 $p = 0.0298$). Table C1 and Table C2 show the detailed allocation from male dictators and female dictators.

Table C1: Recipients' Average Earnings When Paired with Male Dictators

	Male Photo	Female Photo	Difference
Giving Sessions	84	87.81	3.81
Taking Sessions	88.02	130.84	42.82
Difference	4.02	44.03(**)	

Two-Tailed Wilcoxon sign tests used.

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table C2: Recipients' Average Earnings When Paired with Female Dictators

	Male Photo	Female Photo	Difference
Giving Sessions	77.74	100.78	23.04
Taking Sessions	74.71	111.68	36.98
Difference	3.03	10.9	

Two-Tailed Wilcoxon sign tests used.

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table C3 shows the fixed effect ordered Logit regression results of gender and treatment effect on choosing photos. Compared with male recipients, female recipients are willing to pay more to choose female photos in both giving and taking treatment.

Table C3: Fixed Effect Ordered Logit Regression Results

	Cutoffs
Male Recipient \times Taking	0.2701 (1.43)
Female Recipient \times Giving	0.4079* (1.93)
Female Recipient \times Taking	0.7424*** (4.53)
Observations	666

z statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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