

Do Women Socialize Better? Evidence from a Study on Sociality Effects on Gender Differences in Cooperative Behavior

Anastasia Peshkovskaya^{1,2}, Mikhail Myagkov^{1,3}, Tatiana Babkina^{1,4}, and Evgeniya Lukinova⁵

¹ Laboratory of Experimental Methods in Cognitive and Social Sciences, Tomsk State University, 36, Lenina Avenue, Tomsk, 634050, Russian Federation
peshkovskaya@gmail.com

² Mental Health Research Institute, Tomsk National Research Medical Center, Russian Academy of Sciences, 4, Aleutskaya Street, 634014, Tomsk, Russian Federation

³ Department of Political Science, University of Oregon, 1585 E. 13th Avenue, Eugene, Oregon, 97403, United States

⁴ Skolkovo Institute of Science and Technology, Novaya, d.100, Karakorum Building, 4th floor, Skolkovo, 143025, Russian Federation

⁵ New York University Shanghai, 1555 Century Ave, Pudong, Shanghai, China 200122

Abstract. Human behavior is greatly influenced by the social context. The current study on men' and women's cooperative behavior investigated the influence of long-term and short-term effects of socializing in group. The repeated Prisoner's dilemma carried out in groups of 6 participants was used as the main experimental situation. The differences were found in changes in the level of cooperation, taking into account the effects of mixing social and gender variables. Socialization made cooperation of group members strength and sustainable. However, men' and women's cooperative behavior in groups differed. Women were initially more inclined to cooperate in interaction with strangers. Men showed greater sensitivity to sociality effects. They tended to make cooperative decisions more often if there are friends in the group. Furthermore, men cooperated with previously unknown people after socializing with them significantly more than women.

Keywords: cooperation, social dilemma, Prisoner's Dilemma, sociality, gender differences, group, experiment.

1 Introduction

Social identity and gender differences are of particular interest since they are the most significant reason for the differentiation of social and economic behavior of people between two poles – altruism and egoism. The role of gender in social dilemmas is of keen interest due to evolutionary laws being replaced by new social and cultural de-

terminants that weaken the influence of "traditional" gender roles. Social factors and gender identity taken into account in the widest spectrum of manifestations are the most fruitful subject for research aimed at resolving issues of social interaction and the irrationality of economic behavior.

The explanation of variations in gender differences in behavior related to the influence of social and cultural factors. A number of studies [1-5] have shown that the manifestation of behavior by men and women in accordance with a gender stereotype depends on what behavior in this situation is considered to be "right." In addition, gender stereotypes may serve as a component of the self-concept, regulating behavior in accordance with the standards learned [6].

Studies by social psychologists devoted to gender differences in behavior suggest that women are more likely to compromise [7-8]. However, generalized literature data suggest that the detected differences are small, usually within 10% [9], depending on the situation [10-11]. Eliciting the specificity of social relations between members of microgroups differing in terms of social identity and gender composition, R. Croson and M. Mark suggested a multifactorial (3x2) design for an experiment with a social dilemma. The gender characteristic of a group of five people (all men, all women and a mixed group) was used as the first independent variable. The second group consisted of two levels of group identity – high and low. Twenty-five rounds were held, after each of which the players received feedback. It was shown that cooperativity increased in all of the women's groups, whereas in the men's groups, on the contrary, it decreased. As an explanation, a variant with intensification of the competition for dominance in the men's groups is suggested. In the mixed groups, an effect of the connection with identity was not found [12].

Generally, the high internal and external validity of the paradigm of social dilemmas makes it the most suitable situation to identify possible gender differences in cooperation, which can be summarized in a wide range of situations: from interacting with complete strangers to close relationships, from the behavior of two partners to groups' behavior [13].

Thus, the main focus of the study is aimed at resolving the following issues:

1. Is there any differences between men' and women's cooperative behavior?
2. How does socializing in group influence the cooperative behavior of men and women?
3. Is there a manifestation of in-group and out-group effects in the cooperative behavior of men and women?

2 Participants, Design and Procedures

The article presents the results of a study pooling data from 264 participants (121 women) in 22 experimental sessions conducted in two Russian higher education universities: Moscow Institute of Physics and Technology (MIPT) and Tomsk State University (TSU). Enrollment was carried out with the advertisement in the social network vk.com.

Experimental data are readily available on Harvard Dataverse: <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/MCFQCL>. All the experiments were conducted in two series: strangers and friends.

For each experiment, a series of strangers required 12 men and women unfamiliar with each other. This condition was ensured by taking into account the participant's major, study group, hometown and possible kinships.

For each experiment, a series of friends required 12 men and women, comprising two groups of friends, 6 people in each group. As the criteria for a friendly connection, the following parameters were selected: all members of the group considered each other friends and maintained long (over one year) and constant communication, as well as common interests. Thus each experiment consisted of two groups of 6 friends in each. Members of one group of friends were not familiar with members of the other group of friends participating in the same experiment.

All the participants were informed of the basic terms of the experiment and gave written consent to participate in the study.

At the end of the experiment, participants answered test-questionnaire on self-reported degree of connection with the group. The result of this test is an assessment of the sense of connection with the group on an ordinal scale from the lowest – 1 point – to the strongest attachment – 7 points.

The experimental procedure consisted of three stages.

2.1 Stage 1. Baseline

Participants played the Prisoner's dilemma game (Table 1).

Table 1. Payoff structure of the Prisoner's Dilemma Game.

| | | Column chooser | |
|-------------|------|----------------|-------|
| | | Left | Right |
| Raw chooser | Up | 5, 5 | 0, 10 |
| | Down | 10, 0 | 1, 1 |

To conduct the game, a specialized tool for designing and carrying out experiments in a group of experimental economics, z-Tree, developed at the University of Zurich, was used [14].

Eleven game trials were held. In each trial, men and women were randomly divided into pairs and took decisions simultaneously and independently from each other. Each of the 12 men and women could be combined in a pair with any other participant of the experiment. The participant did not know with whom exactly he/she inter-

acted in the trials. Men and women were reported that they played with one of the 12 participants in the experiment, and each time the partner changed randomly.

Points earned in this stage were included in the total win and converted into real money at the end of the game.

2.2 Stage 2. Socialization

In the second stage of the experiment, participants were involved in a social interaction through the familiarization of participants and their division into groups. This laboratory model combines the classic social psychology minimal group paradigm with group manipulations that cause a sense of social attachment [15-17].

The procedure differed in experiments with strangers and friends.

Strangers' socialization. Participants remember each other's names by playing "snowball": sitting in a circle, the first gives his/her name and a personal characteristic, starting on the same letter as the name; the next participant repeats the name and the description of the first participant and gives his/her name and characteristic; then the chain of the game comes to the last person in the circle, who repeats all the names and characteristics. Then, in a different order, participants share personal information: hometown, major, hobbies, and interests.

After that, two captains are selected on a voluntary basis among the participants. The captains remain indoors, the other members go out, and then, in a random order, they come back to the room one by one. Every participant entering the room chooses the captain, in whose group he/she would prefer to be. Thus, the two groups of 6 people are formed.

In the end, each group of 6 people was given a task to find 5 common characteristics (5 characteristics that unite them) and choose a name for their group.

Friends' socialization. Participants were divided into 2 groups of 6 friends, as part of which they were invited to take part in the experiment. Then each group of friends was given a task to find 5 common characteristics and choose a name for their group. The friends from one group were not previously familiar with the other group members and during the second phase did not interact with them.

2.3 Stage 3. Socialized

The participants again played the Prisoner's dilemma game. However, unlike the first phase, the participants interacted only in groups of 6, formed during socialization in the second stage of the experiment. For each trial the participants were randomly divided into pairs, and they were informed that they were interacting with a member of their "own" group, but did not know with whom.

The Prisoner's dilemma game consisted of 15 trials in the third stage of the experiment.

Group names, which were chosen by participants during the socialization stage, appeared on the monitors in the Prisoner's dilemma game.

Points earned were added to those obtained in the first stage. Therefore, the final prize was formed, which was converted into a cash reward paid to each participant.

The average cash reward was approximately equaled to the cost of full lunch in a cafe.

3 Results

3.1 Result 1. Socialization significantly increases cooperation in men and women.

The level of cooperation after socialization in all experiments increased significantly ($Z = 9.494$, $p < 0.05$, Sign Test). The average values of cooperation before and after socialization in the sample amounted to 25.06% and 59.65%, respectively. In fact, socialization strengthened cooperation in both men and women ($p < 0.05$, Sign Test) (Table 2).

Table 2. Socialization increases cooperation.

| Gender | Cooperation Rate, % | | Z | p-level |
|--------|---------------------|-------------------------|-------|-----------|
| | Initial cooperation | Group-based cooperation | | |
| Men | 22.82 | 65.33 | 8.927 | 0.0000001 |
| Women | 27.70 | 52.95 | 4.290 | 0.0000001 |

Socialization also increases cooperation in all types of groups – among both the originally strangers ($Z = 6.709$, $p < 0.05$, Sign Test), and the originally friends ($Z = 7.086$, $p < 0.05$, Sign Test) (Table 3).

Table 3. Socialization increases cooperation.

| Group type | Cooperation Rate, % | | Z | p-level |
|------------|---------------------|-------------------------|-------|-----------|
| | Initial cooperation | Group-based cooperation | | |
| Strangers | 22.32 | 51.06 | 6.709 | 0.0000001 |
| Friends | 32.36 | 82.57 | 7.086 | 0.0000001 |

After socializing in groups of friends, we observed a strengthening of cooperation in men from 31% to 83.37% and women 33.89% to 81.23% ($p < 0.05$, Wilcoxon Matched Pairs Test). This was expected since the social connections formed in a group strengthen the cooperation of its members.

Socialization of 6 previously unknown people in the groups formed during the experiment allowed us to observe changes in the level of initial and group-based cooperation of men and women previously unknown to each other. Socialization among strangers increased cooperation from 19.88% to 58.7% in men ($p \leq 0.0001$, Wilcoxon

Matched Pairs Test) and from 25.28% to 43.75% in women ($p = 0.0001$, Wilcoxon Matched Pairs Test) (Table 4).

Table 4. Socialization increases strangers' and friends' cooperation.

| Cooperation rate, % | Strangers | | Friends | |
|-------------------------|-----------|-------|---------|-------|
| | Men | Women | Men | Women |
| Initial cooperation | 19.88 | 25.28 | 31 | 33.89 |
| Group-based cooperation | 58.7 | 41.9 | 83.77 | 81.23 |

In all the groups, we observed a significant increase in cooperation: for 165% and 240% in women and for 295% and 270% in men among strangers and friends respectively. That fact shows that socialization is a mechanism for strengthening cooperation. Figure 1 graphically shows the data indicated above on the effect of socialization on the cooperation of men and women in groups of strangers and friends (see Fig.1).

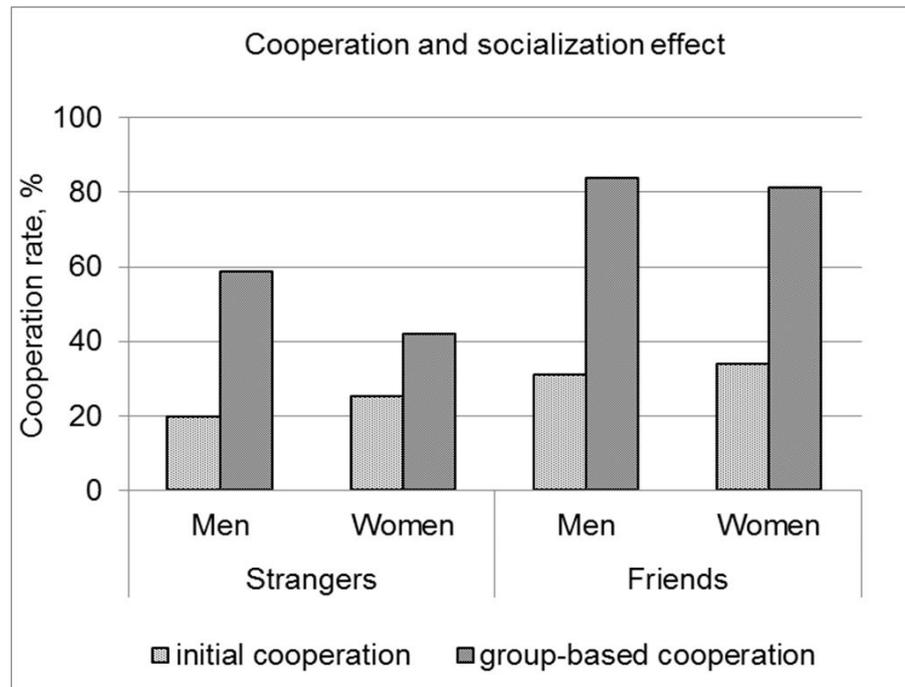


Fig. 1. The cooperation level among men and women before (initial cooperation) and after socialization (group-based cooperation).

3.2 Result 2. Socialization maintains cooperation in men and women well above the initial level.

The cooperation level is maintained on a level much higher than initial level after socialization in all experiments. At the Baseline stage, the cooperation of men comprised 28.85% and 14.04% respectively in the first and last five trials of the Prisoner's dilemma in groups of strangers. The women's cooperation also decreased in the last five game trials from 32.9% to 20.26%. However, after socialization the cooperation of strangers not only increased, but also was maintained on a level much higher than the initial one ($p < 0.05$, Sign Test). After socialization, the cooperation of men comprised 50.96%, and women – 40.5% for the last five game trials in experiments with strangers (see Fig. 2).

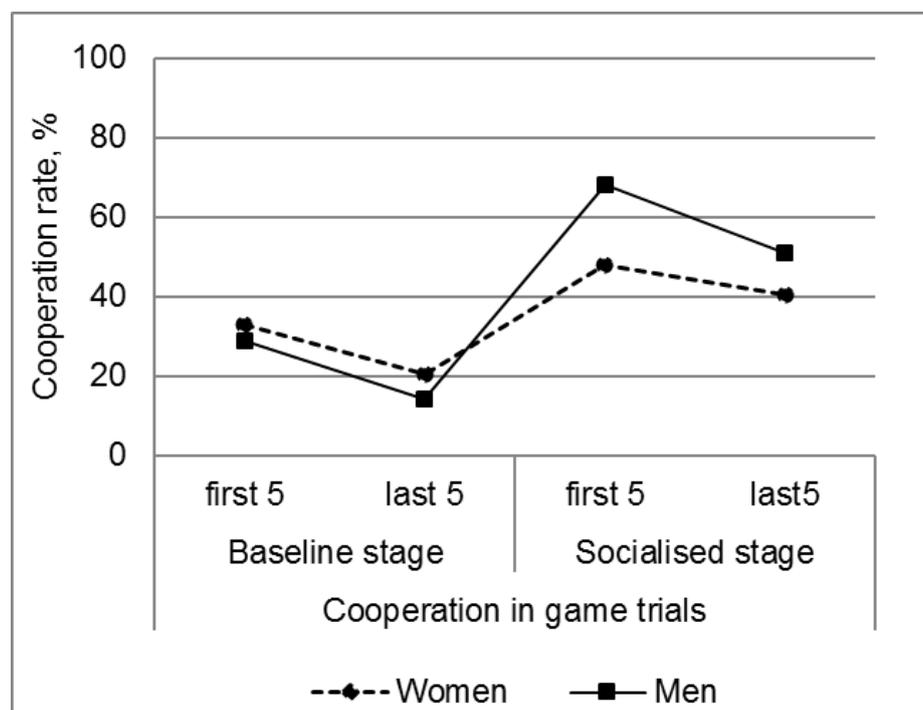


Fig.2. Cooperation dynamics before and after socialization in groups of strangers.

In experiments with friends at the Baseline stage, we observed similar cooperation dynamics. Men lowered the cooperativity of their decisions from 40% in the first five trials of the Prisoner's dilemma to 20.53% in the last five trials of the game. However, after socialization, the level of cooperation of men was 83.68% in the first five trials of the game and 86.32% in the last five trials, which is significantly higher than the

baseline ($p < 0.05$, Sign Test). In the group of friends at the Baseline stage, women's cooperation was 41.18% in the first five trials of the Prisoner's dilemma, and decreased to 28.82% in the last five trials of the game. After socialization in groups of friends, the women's cooperation was 82.35% in the first five trials of the game and 80% in the last five trials (Figure 3).

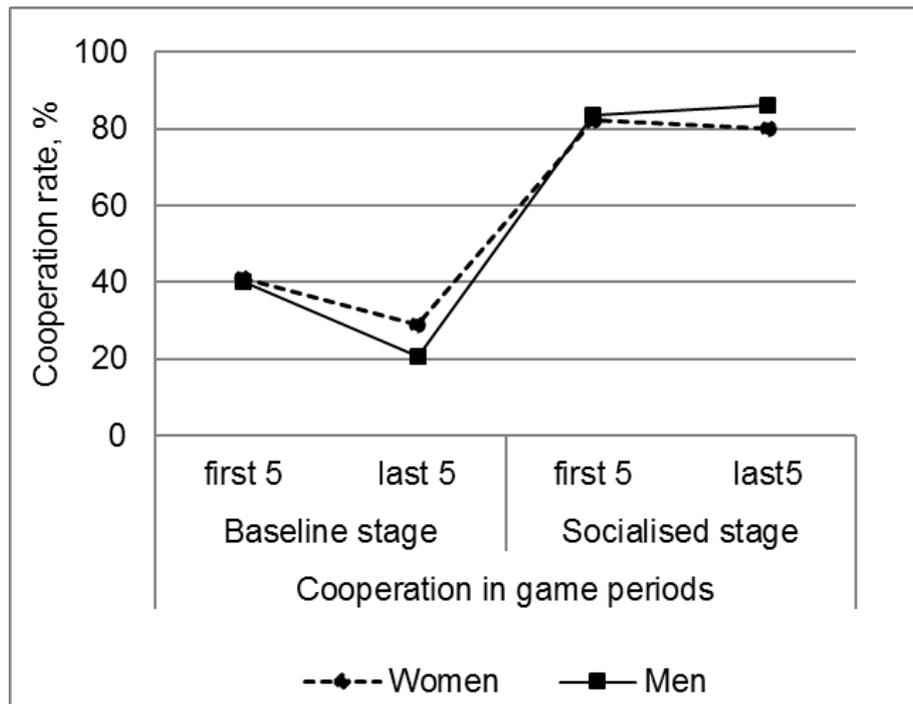


Fig. 3. Cooperation dynamics before and after socialization in groups of friends.

In groups of friends, there were no statistically significant differences in cooperation between the first and last trials of the game at the Socialized stage. Thus, we not only observed the strengthening of cooperation, but also the maintenance of a high level of cooperative decisions in groups with established social connections. Moreover, socialization led to the increasing and maintaining of cooperation of previously unknown people at a level much higher than the initial one.

3.3 Result 3. Gender differences in cooperation are caused by social context.

Previous results of the current study showed that socialization strengthened and made cooperation of group members sustainable. After socialization, the highest (above 80%) and stable cooperation was in groups of friends where men and women cooper-

ated equally ($p = 0.473$, Mann-Whitney U-Test). However, the cooperative level differs between men and women in groups of strangers. Women were more inclined to cooperate in interaction with strangers. The baseline of women's cooperation was significantly higher than that of men during interactions with strangers in the Prisoner's dilemma ($Z -2.340$; $p = 0.018$, Mann-Whitney U-Test) (see Fig. 1).

At the same time, men tended to make cooperative decisions more often if they had friends in the group (see Table 5).

Table 5. Differences in cooperation of men and women in experiments with strangers and friends, %.

| Gender | Group composition | Initial cooperation rate, % |
|--------|-----------------------|-----------------------------|
| Men | Only strangers | 19.88 |
| | Strangers and friends | 31 |
| Women | Only strangers | 25.28 |
| | Strangers and friends | 33.89 |

Men initially showed a low level of cooperation in the Prisoner's dilemma among strangers (19.88%), but were more likely to cooperate if there were five close friends among 12 participants (31%; $Z -2.071$; $p = 0.036$). In this case, men cooperated at an equal degree with women ($p = 0.407$), although the level of cooperation of both genders remained low.

It should be noted that the presence of five friends among strangers as possible participants in the interaction did not affect the cooperation of women ($Z -1.753$; $p = 0.079$).

Socialization was accompanied by the formation of a sense of group belonging. The reported assessment of a feeling of connection with a group of men and women did not differ ($p = 0.527$). Despite this fact, men cooperated significantly more than women after socializing with previously unknown participants, when strangers became members of their group ($Z 3.106$; $p = 0.002$). The share of cooperative decisions taken by men was on average 58.7%, whereas for women it was 41.9%.

4 Discussion

The current study shows that the social environment matters and gender differences in cooperation are sensitive to social factors. Socializing in groups strengthened cooperation in both men and women. Socialization in groups is also able to maintain men's and women's cooperation level. We observed the maintenance of a high level of cooperative decisions, above 80%, in groups with established social connections (friends). Furthermore, socialization led to the increasing and maintaining the cooperation of previously unknown people at a level much higher than the initial one.

Men and women in groups of friends made cooperative decisions equally. However, the level of cooperation between men and women in groups of stranger differed.

Women were more inclined to cooperate in interaction with strangers. Men tended to make cooperative decisions more often if there are friends in the group. In this case, the level of cooperation in men was higher and comparable to cooperation rate in women. Moreover, after the procedure of experimental socialization, men cooperated significantly more than women with previously unknown people if strangers were a part of their group. Thereby, varying the conditions of collective interaction enables the neutralizing or strengthening of differences in the cooperative behavior of men and women.

Acknowledgements. This research was supported by The Tomsk State University competitiveness improvement program.

References

1. Klein, H. M., & Willerman, L.: Psychological masculinity and femininity and typical and maximal dominance expression in women. *Journal of Personality and Social Psychology*, 37, 2059-2070 (1979).
2. Charnessa, G., & Rustichinib, A.: Gender differences in cooperation with group membership. *Games and Economic Behavior*, 72(1), 77–85 (2011).
3. Cox, J., & Deck, C.: When are women more generous than men? *Economic Inquiry*, 44(6), 587-598 (2006).
4. Putnam, L. L., & McCallister, L.: Situational effects of task and gender on nonverbal display. In D. Nimmo (Ed.), *Communication Yearbook* (Vol. 4). New Brunswick, NJ: Transaction (1980).
5. Serbin, L. A., Powlisha, K. K., & Gulko, J.: The development of sex typing in middle childhood. *Monographs of the Society for Research in Child Development*, 58, 1-74 (1993).
6. Witt, M. G., & Wood, W.: Self-regulation of gendered behavior in everyday life. *Sex Roles*, 62, 635-646 (2010).
7. Feingold, A.: Gender differences in personality: a meta-analysis. *Psychol Bull*, 116(3), 429-56 (1994).
8. Eagly, A. H.: The his and hers of prosocial behavior: An examination of the social psychology of gender. *American Psychologist* (64), 644-658 (2009).
9. Maccoby, E. E., & Jacklin, C. N.: *The psychology of sex differences*. Stanford, CA: Stanford University Press (1974).
10. Hyde, J. S.: *Half the Human Experience: The Psychology of Woman*. Lexington, MA: D.C. Heath and Company (1991).
11. Spence, J. T.: Gender-related traits and gender ideology: evidence for a multifactorial theory. *Journal of Personality and Social Psychology*, 64(4), 624-635 (1993).
12. Croson, R., & Mark, M.: Groups Work for Women: Gender and Group Identity in Social Dilemmas. *Negotiation Journal*, 24(4), 411–427 (2008).
13. Balliet, D., Li, N. P., Macfarlan, S. J., & Van Vug.: Sex differences in cooperation: a meta-analytic review of social dilemmas. *Psychological bulletin*, 137(6), 881-909 (2011).
14. Fischbacher, U.: z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10(2), 171–178 (2007).

15. Lukinova E., Myagkov M., Shishkin P.: The value of sociality. *Foresight*, 16, 309-328 (2014).
16. Babkina T., Myagkov M., Lukinova E., Peshkovskaya A., Menshikova O., Berkman E.T.: Choice of the group increases intra-cooperation. *CEUR-Workshop*, 1627, 13-24. <https://cla2016.hse.ru/data/2016/07/24/1119025624/EEML2016.pdf> (2016).
17. Peshkovskaya A.G., Babkina T.S., Myagkov M.G., Kulikov I.A., Ekshova K.V., Harriff K.: The socialization effect on decision making in the Prisoner's Dilemma game: An eye-tracking study. *PLoS ONE*, 12(4): e0175492, <https://doi.org/10.1371/journal.pone.0175492> (2017).