Conformity in contribution games: gender and group effects

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Abstract:

Psychologists have established that task complexity, gender and group identity affect conformity rates. We test the effects of these variables in contribution games. Our experiments consist of two parts: a public goods and a dictator game, both are played once. After subjects make their initial choices, they can revise them. Before revising, they are allowed to choose among different payoff irrelevant information regarding choices made by other cohorts that differed in group and gender. Our data are consistent with some of the findings in the psychology literature. We find that complexity matters and that, when combined with group identity, gender affects conformity rates.

Keywords: Economic experiments, conformity, social influence, gender, group identity, voluntary contribution games.

JEL Classification : C72 ; C92 ; H41 ; J16

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1. Introduction

Social psychologists define conformity as the degree to which members of a group change their behavior, views, and attitudes to fit the views of the group. Under this definition, conformity has a normative meaning because others' behavior serves the individual as a guide for forming beliefs and taking actions. In addition, conformity can happen even when the group's decisions are at odds with the individual's self-interest.

Solomon Asch was the first person to study conformity in the lab. In a famous experiment he tested how a person's opinion about the size of an object was influenced by the opinion expressed by others. Asch (1952) found that about a third of the subjects "gave in" to the pressure to conform to the group's opinions despite theirs being obviously wrong (in a control group, there were almost no opinion errors). Asch's experiment led to innumerable experimental variations and tests, the results of which highlight the importance of group conformity. Some key findings of this literature are that a) conformity persists in non face-to-face paradigms (Crutchfield, 1955), b) the degree of conformity increases as the clarity of the situation decreases (Asch, 1956), c) conformity rates are higher among female subjects than among male subjects (Eagly, 1987), d) participants tend to conform to in-group members more than to out-group members (Turner, 1991), and e) it is possible to categorize subjects as independent, yielding (consciously or unconsciously), and confused (Asch, 1956). The yielding or conformist subjects show evidence of distortions of perception, judgment or action[1].

[1] Distortion of perception means that the subject adopts the groups' beliefs. Distortion of judgment happens when the subject doubts her own beliefs. Distortion of action happens when the subject keeps her beliefs, but conforms to the group to avoid being different. In a fascinating neurological study on conformity, Berns, et al. (2005) show that social influence alters brain regions associated with perception. They also observe "weak" activation in the amygdale among independent subjects, which means that they experienced emotional pain

The findings in the psychology literature are important because some of the behavior that is observed in economic experiments may be better understood if we account for the drive to conform. Indeed, recent papers in public goods games suggest that the declining contribution rates may not only be due to reciprocity or conditional cooperation, but may also be due to imitation. Such imitation may be motivated by confusion, by the need to conform to a perceived social norm, or possibly by the impulse to free ride on others' decisions. This last possibility has been brought to light by Berns' (2005) fMRI studies.

Some evidence supporting non reciprocity reasons for contributing has also been documented in the economics literature. Carpenter (2004), for example, designed a repeated VCM experiments with feedback that included the entire distribution of past contributions. In each of the ten periods, subjects shifted groups. This "strangers" condition was implemented to control for reciprocity. Carpenter shows that subjects' free riding behavior responded to how much free riding was observed in the previous period. In Ferraro and Vossler (2004) subjects played with programmed robots. Ferraro and Vossler (F&V) show that contributions follow the exact same pattern (first are high, then decrease) as those observed in the all-human treatments. Based on observations and follow up questionnaires, F&V claim that at least 50% of the subjects were confused and suggest that confused or naïve subjects eventually mimicked the choices made by the free riders. Confusion in public goods games was also documented by Andreoni (1995).

In Shang and Croson's (2005) field experiment involving donations to National Public Radio, social information (information about how much another donor contributed) had

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when they deviated from the "norm.: The latter "tentatively" suggests that conformity may happen in part because people want to avoid social isolation, which causes pain. The avoidance of social isolation is consistent with social norm theory (see Cialdini, and Goldstein, 2004).

significant effects in the level and persistency of contributions. In another field experiment that involved the donation of money to social causes at the University of Zurich, Meier (2005) observed that the information about how many other students contributed to the funds affected contributions. In seeming contradiction to findings in psychology, he also observed that male students were more sensitive to what others did than female students (i.e., males conform more).

Cason and Mui (1998) studied social influences in a sequential dictator game. Their experiment consisted of two stages. In the first stage, subjects made a dictator allocation. In the second stage, subjects made another dictator allocation, but after observing information about the allocation made by another subject in the session. Cason and Mui (C&M) found little evidence of conformity, but they conclude that subjects became "somehow less self-regarding" after observing information. C&M also observed significant heterogeneity among subjects. Finally, in contrast to C&M, Bardsley and Sausgruber (2005), do find evidence of conformity. These authors use a novel design partly inspired by C&M, but in the context of a public goods game. In their experiment subjects observe information from their own group and from a "payoff irrelevant group"; their objective was to determine how much of "crowding in" in public goods games is due to social influence and how much is due to reciprocity. They find that conformity can explain about 1/3 of the total crowding in effect.

As in Cason and Mui (1998) and Bardsley and Sausgruber (2005), in this paper, we study whether people use others' choices as a benchmark of their own behavior even when doing so may not be in their own self interest. In part inspired by over 50 years of research in psychology, our objective is to see whether conformity rates are affected by task complexity, gender, and group identity. For such a purpose, we design an experiment that consists of two

parts: a public goods game and a dictator game, both are played once only. However, in each of these games, after subjects make their initial choices, they are given the opportunity to "revise" them. Before revising, however, they are allowed to choose among different feedback information regarding choices made by "other" cohorts that differed in class and gender. The ability to select from different feedback allows subjects to choose which information they perceive as valuable in guiding their decisions, thus feedback has normative meaning to them. We argue that conformity happens when decisions are revised in the direction of the selected and observed feedback, despite feedback being completely irrelevant to the subject's monetary earnings. Our control sessions have the exact same setup, but with different informational content. In this paper we explore the following questions: Does task complexity matter? Do subjects conform to the observed choices? Are there gender and group differences in feedback choices and conformity rates? In this paper we do not investigate the reasons for why people conform, but our data shed some light into this important issue.

The next section describes our experiment; results are presented in section 3 and in section 4 we summarize the main results and discuss some other ideas.

2. Experimental Design and Procedures

The experiment was conducted at the Emory University Economics Lab. Subjects were recruited through local Internet announcements and were paid a $3 show-up fee plus their earnings from their decisions during the experiment, which averaged $9.50. Eight subjects (four female and four male undergraduate students) were recruited for each session that lasted less than one hour. There were a total of 9 sessions, plus one all-graduate student

session.[2] As subjects arrived, they were seated behind closed partitions to ensure privacy. The instructions and decision pages were passed out to each subject and were read aloud. Finally, others' choices and subjects' earnings were revealed and paid to them at the end of the experiment, after *all* parts of the experiment had been completed (see the instructions).

Each experimental session consisted of four parts: a questionnaire, a linear Voluntary Contributions (VC) game, a set of choices under uncertainty or lottery choice, and a dictator game (see Figure 1). We used the questionnaire to extract information about the subject such as major, age, sex and grade. The questionnaire also included multiple-choice questions that were used to have a qualitative measure of gender bias.[3] The lottery choice exercise was placed between the VC and the dictator game as a buffer to try to lessen order of treatment effects. For this part, we used questions from Holt and Laury (2002) with hypothetical earnings only.

We selected the dictator and public goods games because both are contribution games with similar "moral challenges", but different levels of complexity. The dictator game is simple relative to the public goods game. For the VC or public goods game, we chose a group size of four people and each subject was randomly assigned to a group that could include both female and male subjects. Each subject was endowed with 40 laboratory tokens that she could either keep or put in a group fund. Keeping a token was like contributing to a private fund with a constant marginal return equal to 1 whereas, contributing to the group

[2] The graduate student session was organized to gather data for feedback.
[3] In two of these questions, subjects were asked to determine which of four fictitious people were closest to the correct answers to the following questions: how many acres are in a hectare? and, how many people live in Latin America? Two of the fictitious people were female and two were male (see the instructions). Based on the answers to these questions, we saw no evidence of gender bias.

fund had constant marginal return equal to 0.5. Thus, the payoff function was equal to the following expression:

$$\Pi_i = (40 - c_i) + 0.5\sum_{j=1}^{4} c_j$$

Where Π_i and c_i represented subject i's payoff and contribution to the group fund, respectively with i and j =1,2,3, or 4. This game depicts a social dilemma because if all subjects contributed their entire endowment, each subject would receive 80 tokens; however, this is not an equilibrium since 0.5 additional tokens can be made for every token that is taken out of the group fund and put into the private fund (i.e., it pays to free ride). In this game, it is a dominant strategy to contribute nothing to the group fund, which if followed would yield 40 tokens to each subject. For the dictator game, half of the subjects were given an initial endowment of 40 tokens that each could distribute as she wished between herself and a randomly chosen participant in the room.[4] Under the assumption that people only care about their own earnings, we should expect participants to keep all of the tokens to themselves.

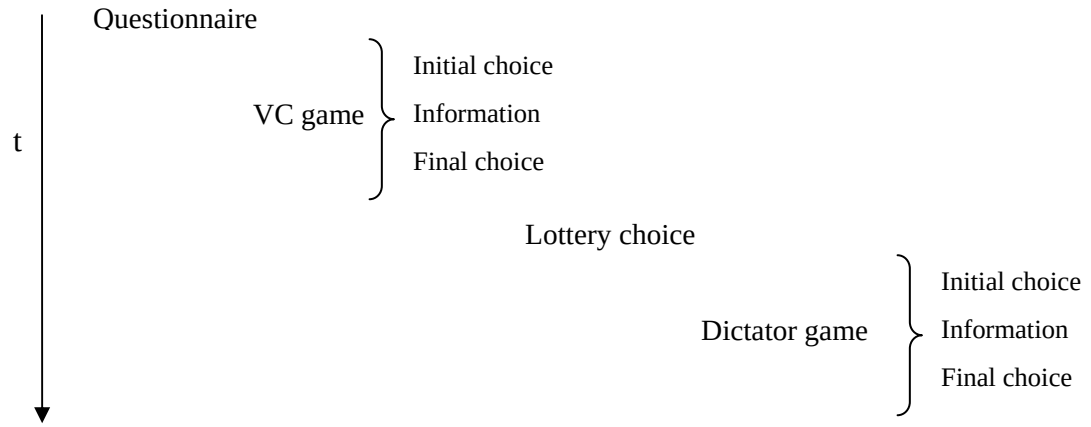
It is now well established that subjects in the laboratory do not play the selfish-rational equilibrium in these games (see Camerer, 2003 for a review). In an attempt to explain these deviations, economists have used models of social preferences that incorporate fairness and reciprocity. In a public goods game, for example, conditional cooperators or subjects who are motivated by reciprocity would contribute more to the group fund if the other "members" of the group contributed more (see, for instance, Falk, Fischbacher et al. (2004)). However, because we are primarily interested in whether we can replicate some of

[4] Cason and Mui (1998) use an exchange framing for the decisions made in the dictator game.

the results that psychologists have found, we try as much as possible to isolate our design from reciprocity motivations. Indeed, to test for conformity in decisions, we study whether and to what degree subjects revise their choices in *one-shot games* after observing decisions made by a group of subjects who participated in a different session.[5] Still, we are aware that in our one-shot/separate group design, it may be impossible to completely isolate from strong reciprocity motivations. For example, it may be that a person who observes cooperative decisions made by another group feels compelled to behave cooperatively to her current group as a way to practice "inter-group reciprocity" for the generous behavior of others (i.e., if you were nice to me, I am nice to others).

Our games consisted of two decision rounds. In the initial round, subjects chose how to distribute their tokens. In the final round, they were allowed to revise their initial choices (only the decisions in the final round counted towards their earnings). However, between the initial and final round, subjects were given payoff irrelevant information. Figure 1 depicts the timing of each session.

Figure 1: Timing within a session



[5] Bardsley and Sausgruber (2005) also use a one-shot setup with feedback from a different group in their experiment.

We designed three experimental treatments that varied in the kind of payoff-irrelevant information that was given to them. In the "control" treatment the information included populations of different countries and metric-English unit conversions. In the conformity 1 treatment, information included choices made by cohorts who belonged to a different class (out-group). In the conformity 2 treatment, information included choices made by cohorts who either belonged to their same academic class (in-group) or to a different academic class (out-group). We call the latter the out-group/in-group condition.

In each of the conformity treatments, we allowed subjects to choose their feedback from a set of options with data on *initial round* contributions of students who previously participated in identical games. Because subjects were allowed to choose the kind and source of the feedback, information had the potential of being normatively valuable to the subject. Indeed, one reason for why subjects may conform in contribution games is that, in others' choices, they seek (moral) guidance for what "the right thing to do" is.

In the "out-group" condition, information regarding choices previously made by graduate male and female students was available to the subjects. In the public goods game, subjects had the opportunity to learn one of seven choices: the aggregate/average, maximum, and minimum tokens contributed by a group of four male or four female graduate students, and declining to view any option.[6] In the dictator game, subjects had the opportunity to learn one of seven choices: the average, maximum, minimum tokens contributed by a pair of male or female graduate student and declining to view any option. In the "in-group/out-group" condition, we added six more choices, which included the aggregate/average, maximum, and

[6] We did not provide subjects with the choice of observing the entire distribution of contributions of the payoff irrelevant group because we wanted to have more control on the feedback. If the entire distribution were provided, it would be hard to know which of the 4 observations influenced final round decisions.

minimum contributions by a group of four undergraduate female and four undergraduate male students for the public goods. Similar options were added for the dictator game. Table 1 depicts the kind of information that subjects received in the control and conformity treatments. Note that all feedback available in all treatments is payoff irrelevant to the subjects and should have no effect on their behavior.

Table 1: Experimental Design

Treatment	N subjects	Game	Type of contribution feedback choice	N of feedback choices
Control	21	VCM	Different populations around the world and metric-English conversions	0
		Dictator	Different populations around the world and metric-English conversions	0
Conformity 1 "out-group"	23	VCM	All-female grad (max, min, or aggr./avg.) All-male grad (max, min, or aggr./avg.) No feedback	7
		Dictator	All-female grad (max, min, or avg.) All-male grad (max, min, or avg.) No feedback	7
Conformity 2 "in-group/ out-group"	23	VCM	All-female grad (max, min, or aggr./avg.) All-male grad (max, min, or aggr./avg.) All-female undergrad (max, min, or aggr./avg.) All-male undergrad (max, min, or aggr./avg.) No feedback	13
		Dictator	All-female grad (max, min, or avg.) All-male grad (max, min, or avg.) All-female undergrad (max, min, or avg.) All-male undergrad (max, min, or avg.) No feedback	13

3. Analysis and Results

In this paper, we are interested in testing some of the key conclusions that psychologists have arrived at regarding conformity.[7] These were mentioned in the introduction, but for the sake of clarity we repeat them here. To begin, psychologists have established that the degree of

[7] It is worth to mention that Solomon Asch was concerned about conformity to a group's opinion when the group's opinion was wrong. In contrast to him, we are interested in conformity more generally defined as the tendency to update choices in the direction of the payoff irrelevant information.

conformity increases as the clarity of the situation decreases. The more complex the task is, the more likely the subject is to conform to others' opinions. We test this result in our setup by comparing conformity rates (the proportion of revisions in the direction of the observed choice) in the public good and dictator games, which have different levels of complexity.

Based on the initial Asch experiments and follow ups, psychologists have established that subjects tend to conform to in-group members more than to out-group members. However, like in economics, the vast majority of experiments in psychology use student subjects, so to make differences between groups salient, some experimenters explicitly identify subjects as "in-group" or "out-group." In our setup, all subjects we recruited were female and male undergraduate students; however, they were given an option to choose feedback from both graduate and undergraduate students' choices. We consider the graduate students as "out-group" and undergraduate students as "in-group".[8] We are interested in seeing whether subjects prefer to learn choices made by their own group, and if they do so, whether they are more or less likely to conform. It is possible for subjects to prefer in-group choices because they are curious about what people like them do. Alternatively, the in-group may constitute the subject's reference group, the behavior of which she may want to use as a benchmark of her own behavior (i.e., the norm). On the other hand, it is also possible that subjects would be more interested in graduate student (out-group) choices because grad students are more knowledgeable and enjoy higher status.

The original Asch experiments included male subjects only, but since then many experiments have used different combinations of female/male subjects and all-female

[8] We understand that the arguments for calling graduate students "out-group" seem arbitrary (they are). However, at Emory there is very little interaction between graduate and undergraduate students. Most of our graduate students are older, married and foreign, whereas most undergraduate students are between 18 and 21 years old and American.

subjects. A meta analysis of these papers shows that conformity to the group increases as the proportion of women in the subject pool increases (Bond and Smith 1996). In addition, the experimental literature on gender effects suggests that women may be more socially conscious (Eckel and Grossman 1998 and Bohnet and Frey 1999) and more responsive to social distance (Cox and Deck, 2005) than men. Thus, if subjects do respond to payoff irrelevant social information, it is possible to find marked gender differences. In our experiment, we recruited an equal number of female and male undergraduate students, and they were given the option to choose feedback from either all-female or all-male choices.[9] We want to find answers to the following questions. Whose choices are women more interested in observing: males' or females'? Are women more likely than men to conform? Are women more likely than men to conform to their own group?

Finally, subjects are heterogeneous and can be identified as independent, yielding and confused, depending on their behavior in conformity tasks. We will not study or emphasize this point, but we will label our subjects "Nash", "Cooperators", and "Conformists" depending on their choices.

3.1. Aggregate data:

The typical contribution rate in one-shot public goods games is about half of the endowment (see Camerer, 2003). In addition, there seems to be a great deal of heterogeneity among choices; some people never contribute, whereas others always contribute and may be immune to incentives (Ledyard, 1995). For the dictator game, when subjects can choose to

[9] It was common knowledge that subjects in the experiment were going to be matched randomly and that their groups could include females and males. Subjects also knew that the feedback information was from first round choices of either all-female or all-male subjects, which did not necessarily match the gender composition of their own group.

distribute their endowment in any way they want, as in our experiment, the mean contribution is about 20% of the endowment (Camerer, 2003). In sync with previous works, we find that, on average, subjects in all treatments of our experiment contribute between 40 and 50% of their endowment in the *initial round* of the public goods game and between 10 and 20% of their endowment in the *initial round* of the dictator game. See Table 2 for the average contribution rates in both rounds of each of the treatments.[10]

Table 2: Average contributions as a percentage of endowment

Treatment	Control		Conformity 1 "out-group"		Conformity 2 "in-group/out-group"	
Round	Initial	Final	Initial	Final	Initial	Final
Public goods	39.6%	37.5%	48.9%	42.6%	40.1%	36.74%
Dictator	10.7%	9.1%	13.1%	5.4%	21.8%	13.4%

After the information feedback, subjects were given the opportunity to revise or maintain the contributions they made in the initial round. The type of feedback information requested by subjects is shown in the table below. Most subjects requested information regarding aggregate/average choices.

Table 3: Kind of feedback requested (numbers and percentages)

	Public goods				Dictator			
Treatment	Agg/Avg	Max	Min	None	Avg	Max	Min	None
Conformity 1	13	7	2	1	6	1	2	2
	56.52%	30.44%	8.70%	4.35%	54.54%	9.09%	18.18%	18.18%
Conformity 2	9	8	5	1	8	1	1	1
	39.13%	34.78%	21.74%	4.35%	72.72%	9.09%	9.09%	9.09%
Total	22	15	7	2	14	2	3	3
	47.83%	32.61%	15.22%	4.35%	63.63%	9.09%	13.64%	13.64%

[10] We observed marked gender differences in aggregate contribution in the initial rounds. The average contribution rate by male subjects was 49.45% in the public goods game, and 8.83% in the dictator game. Whereas women contributed on average 37.80% and 21.73% of their endowment in the public good and dictator games, respectively.

To see if the observation in the conformity treatments has an effect on final round contributions, we run a simple linear regression, where the independent variables are the chosen observation amounts and the initial contribution amount. For the public goods game, the estimated coefficient for the observation is positive and weakly significant ($\hat{\beta} = 0.2068$, p-value = 0.1436, n=44, d.f. = 2, $R^2 = 0.45$). For the dictator game, the regression results show that the observation has no effect on the final round choices. To see whether final contribution amounts in the VC and dictator games are affected by gender and group, we added to our regressions three dummy variables; one for female, one for in-group and one interaction dummy between these two variables. Again, only the observation variable was weakly significant in the VC game ($\hat{\beta} = 0.2068$, p-value = 0.12, d.f. = 4, $R^2 = 0.4529$); the rest of the variables were not significant. The aggregate data tentatively suggest that contribution amounts are influenced by the observed contribution.

3.2. Conformity and revisions:

We define conformity as the tendency of subjects to revise their initial contributions in the direction of the observed choice. However, the opportunity to revise their decisions also gives subjects a chance to make better choices because they have more time to think. In the table below we classify initial and final choices in all treatments by whether they moved in the direction of the Nash equilibrium "+" (lower contributions), away from Nash equilibrium "-" (higher contributions), or no change "nc." (Table 4 contains this information). Notice that most of the revisions in the conformity treatments moved "away" from the Nash equilibrium. Most people who changed their decisions increased their contributions. The p-values for a

one-tailed sign test are shown in the last row of the table. The null hypothesis states that revisions can go equally in the direction of the Nash equilibrium (lower contribution) as away from the Nash equilibrium (higher contribution). The alternative hypothesis states that there should be more moves in the direction of the Nash equilibrium.

Table 4: Direction of changes for the VC game (all treatments)
Towards NE (+), away from NE (-), no change (nc)

	Control			Conformity 1			Conformity 2		
	+	-	nc	+	-	nc	+	-	nc
Male Undergraduate Subjects	4	1	6	4	3	4	2	4	5
Female Undergraduate Subjects	2	2	6	1	4	7	3	3	6
Total Number of Subjects	6	3	12*	5	7	11**	5	7	11***
p-values	0.090			0.806			0.806		

*4, **3 and *** 4 of these subjects chose 0 in both rounds

The table above also shows many subjects whose decisions did not change. There are three reasons for why subjects may have desired to keep their initial contributions. First, their initial choices were zero and there was no way to decrease contributions. Indeed, four subjects in the control and conformity 2 treatments fell into this category and three in the conformity 1 treatment. Second, they observed information that was identical to their initial choice; this happened once in conformity 1 and three times in conformity 2 treatment. Third, subjects ignored information.

In the dictator game, most subjects who did not change choices had contributed zero in the initial round. Table 5 depicts the direction of changes in the dictator game. The p-values for the control and conformity 1 conditions are omitted due to the small number of observations.

Table 5: Direction of changes for the dictator game (all treatments)
Towards NE (+), away from NE (-), no change (nc)

	Control			Conformity 1			Conformity 2		
	+	-	Nc	+	-	nc	+	-	nc
Male Undergraduate Subjects	1	1	6	0	0	5	3	0	2
Female Undergraduate Subjects	0	1	2	3	0	4	2	0	4
Total Number of Subjects	1	2	8*	3	0	9**	5	0	6***
p-values		-			-			0.031	

*6, **7 and *** 4 of these subjects chose 0 in both rounds

From the tables we observe that in the conformity treatments of the VC game there were more revisions away from the Nash equilibrium than towards it. In contrast, in the dictator game no revisions away from the Nash equilibrium were observed. From the VC game data we conclude that feedback from a payoff irrelevant group has the effect of moving a larger proportion of choices away from the dominant strategy than towards it. These changes had a cost to the subjects. Indeed those who imitated by increasing their contributions after observing information forwent an average of 2.79 and 3.35 tokens by changing their initial contributions in the conformity 1 and 2 treatments, respectively.[11]

3.2.1 Subject categorization:

As mentioned above, a subject can respond to an observation in three general ways: 1) she can maintain her initial contribution, 2) move her contribution in the direction of the observation, or 3) move it in the opposite direction. Based on these general responses to the observation, we categorize subjects into four categories.

[11] If these subjects had not increased their contributions, the average group earnings would have been lower by an amount equal to 8.33 and 10 tokens, respectively.

"Nash players" are those subjects who do not change their initial contributions and contribute zero in both the initial and final rounds. "Cooperators" are those subjects who contribute a large percentage of their endowment in both rounds or increased their contributions close to the maximum in the final round despite information suggesting the opposite. "Conformists" are those subjects who change their contributions in the direction of the observation. The rest of the subjects ignored information and contributed 25% or less in both rounds. Table 6 shows the number of subjects who fell into the above-mentioned categories.[12]

Table 6: Categorization of subjects based on decisions

Treatment	Control		Conformity 1		Conformity 2		Total for Conformity 1&2	
	VC	Dic	VC	Dic	VC	Dic	VC	Dic
Nash players	4*	7	4	7	5	4	9	11
Cooperators	4	0	3	1	3	1	9	2
Conformists	-	-	10	3	12	4	22	7
Ignored (contributed =<10)	-	-	6	1	3	2	9	3
Total			23	12	23	11	46	23

*3 additional subjects chose 0 in the final round

The table above shows that about 43% and 52% of the subjects in the VC game can be classified as conformists in the conformity 1 and 2 treatments, respectively; whereas only 25% and 36% in the Dictator game. About 22% in conformity 1 and conformity 2 treatments were "strong conformists" in the VC game and 0% in the dictator game. We use the chi-square test to see if there are any differences in the proportion of conformists. The null

[12] All the players that were categorized as "Nash" in the VC game and were randomly selected to be dictators in the dictator game contributed 0 in both rounds (there were 11 Nash players who were also dictators in all three treatments). Three out of six of the players who were categorized as "cooperators" in the VC game and were randomly selected to be dictators in the dictator game contributed positive amounts to the second player.

hypothesis states that proportion of conformists in the dictator game should be the same as the proportion of conformists in the public goods game. The alternative hypothesis states that there should be less conformity in the dictator game, because it is less complex. At the aggregate level, taking both conformity treatments together, we reject the null hypothesis of no difference (p-value=0.0707 for a 1-tailed test).[13]

Result 1: Complexity affects conformity rates. There is evidence of conformity in the public goods game, but no evidence of conformity in the dictator game.

3.3. Feedback choices:

3.3.2. Differences in feedback choices in the Conformity 1 or "out-group" treatment:

Gender preferences:

Eleven male and twelve female undergraduate students participated in the "out-group" treatment, where they were provided the choice to observe decisions previously made by *graduate* students only. In the voluntary contributions game, 16 of 23 students (69.57%) chose to look at choices made by male graduate students while only 6 out of 23 students (26.09%) chose to look at choices made by female graduate students (one student preferred no information). Of those who chose feedback, thirteen subjects (59.09%) chose to look at choices previously made by members of the same sex while nine subjects (40.91%) chose to look at choices previously made by members of the opposite sex. Seven female subjects chose to look at male graduate student data whereas only two males chose to look at female

[13] Taking each conformity treatment separately, we cannot reject the null hypothesis of no difference in conformity rates between the public goods and dictator games (p-value = 0.2276 and 0.1589 for the conformity 1 and conformity 2 treatments, respectively (1-tailed test)).

graduate subject data. Table 7 summarizes the data. From the data we can conclude that in the out-group treatment, subjects prefer to observe males' choices (binomial 1-tailed p=0.0466). In addition, we reject the null that both genders are equally interested in learning the choices made by peers of their own sex (Fisher exact test p=0.0805). This means that females prefer to observe male choices, but males prefer to observe their own gender choices.

Table 7. Number and percentage of subjects who chose male graduate, female graduate, or no feedback in the VC Game – Conformity 1 Treatment

Feedback from:	Male Graduate	Female Graduate	No information	Total number of subjects
Male subject	9 (39.13%)	2 (8.70%)	0 (0.00%)	11
Female subject	7 (30.43%)	4 (17.39%)	1 (4.35%)	12
Total Number of observations	16 (69.57%)	6 (26.09%)	1 (4.35%)	23

In the dictator experiment, six males and four females were randomly chosen as the dictators. Choices previously made by male graduate subjects were revealed to eight of the ten subjects while only two students opted for information regarding choices previously made by female graduate students (see Table 8). The proportion of subjects who preferred to observe males' choices is higher than that who preferred to observe females' choices (binomial 1-tailed p=0.0547). Six students chose feedback of the same gender while four students observed choices previously made by those of opposite gender. Of those subjects who chose to observe data from the opposite gender, three were female; but, the hypothesis of no difference in own gender feedback preference cannot be rejected (Fisher p=0.2381).

Table 8. Gender Feedback Choices from Dictator Game in the Conformity 1 Treatment

Feedback	Male Graduate	Female Graduate	No information	Total number Of subjects
Male Subject	5 (50%)	1 (10%)	0 (0%)	6
Female Subjects	3 (30%)	1 (10%)	0 (0%)	4
Total number of observations	8 (80%)	2 (20%)	0 (0%)	10

Result 2: In the Conformity 1 treatment, where subjects were given a set of decisions made by "out-group" cohorts, the majority of the subjects prefer to observe males' choices in both the public goods and dictator games. In addition, in the public goods game, both females and males prefer to observe choices made by male subjects.

3.3.2. Differences in feedback choices in the Conformity 2 or "in-group/out-group" treatment:

Group preferences:

In the Conformity 2 treatment, we provided participants a choice of information that contained decisions previously made by male and female undergraduate and graduate students. Eleven male and twelve female undergraduate students participated in the sessions. In the voluntary contributions game, 19 students (82.61%) chose to look at choices previously made by undergraduate students and only 3 students (13.04%) chose to look at choices previously made by graduate students (one female student opted for no information).

In the dictator game, twelve subjects, six male and six female, were randomly selected as the dictator. Five male and five females subjects chose to look at choices previously made by undergraduate students. No subject chose to look at choices previously

made by graduate students. One female and one male student opted for no information. The hypothesis that subjects are as likely to observe out-group as in-group feedback is rejected for both games (P-value=0.0009 and 0.000).[14]

Table 9. In-group/Out-group feedback in the Conformity 2 Treatment

	Graduate		Undergraduate		No Information	
	VC	Dic	VC	Dic	VC	Dic
Male Subjects	1	0	11	5	0	1
Female Subjects	2	0	8	5	1	1
Total Number Of observations	3 (13.04%)	0 (0%)	19 (82.61%)	10 (83.33%)	1	2

Result 3: When given the choice between in-group and out-group feedback, subjects prefer to observe information from their own group.

Gender preferences:

In the public goods experiment, 9 out of 23 students (39.13%) chose to look at the choice made by male students while 13 (56.52%) chose to look at choices made by female students. The hypothesis that subjects in this conformity condition are more likely to observe males' choices is rejected (binomial 1-tailed p=0.5235). Six male and three female undergraduate subjects selected information about choices made by male students while eight female and five male students wanted information regarding choices previously made by female students. In contrast to the results in the Conformity 1 treatment, of those who chose the opposite gender's data, five were male subjects while three were female subjects. Of these three females, two chose to see information from male graduate students. Finally, one

[14] It is likely that subjects chose to observe other undergraduate students' choices because they considered those choices a proxy for the behavior of others in their session. However, the payoff significance of this is not clear. As mentioned in section 3, there are different reasons for why we should expect this or the opposite result.

female student opted for no information. Table 10 below summarizes these results. The hypothesis of no difference in own gender preference between female and male undergraduate students cannot be rejected (p-value = 0.6594). These results mean that subjects prefer to observe choices that belong to people of their own group and own gender.

Table 10. Gender Feedback Choices from VC Game in the Conformity 2 Treatment

Feedback information	Males	Females	No Information	Total number of subjects
Male Undergraduate Subjects	6 (26.09%)	5 (21.74%)	0 (0.00%)	11
Female Undergraduate Subjects	3 (13.04%)	8 (34.78%)	1 (4.35%)	12
Total Number of observations	9 (39.13%)	13 (56.52%)	1 (4.35%)	23

In the dictator game, six males and six females subjects were randomly selected as the dictators. Choices previously made by male subjects were revealed to six of the twelve subjects (50%) while four students (33.33%) opted for information regarding choices previously made by other female students. Unlike the previous treatment, subjects here were equally likely to observe female choices as male choices (binomial 1-tailed p=0.7539). Of the ten subjects who chose to receive feedback, seven chose information from the same sex while three chose information from those of opposite sex; two were female seeking information regarding choices previously made by male participants and one was a male seeking choices of a female participant. The hypothesis that subjects prefer to observe own gender feedback cannot be rejected (p-value = 1.0000)

Table 11. Gender Feedback Choices from Dictator in the Conformity 2 Treatment

	Males	Females	No Information	Total number of subjects
Male Subjects	4 (33.33%)	1 (8.33%)	1 (8.33%)	6
Female Subjects	2 (16.67%)	3 (25%)	1 (8.33%)	6
Total Number of observations	6 (50%)	4 (33.33%)	2 (16.67%)	12

Result 4: In contrast to the "out-group" condition, in the Conformity 2 treatment, subjects are equally likely to observe female choices as male choices. In addition, the proportion of both female and male subjects who prefer to see information from their own sex is statistically the same in both the public goods and the dictator game.

3.4. Gender differences among conformists[15]

We classified 10 subjects as conformists in the "out-group" treatment of which 6 were male and 4 female (see Table 4). In the "in-group/out-group" treatment, 12 subjects were classified as conformists and 5 of them were male. Thus, aggregating across treatments, exactly 50% of the conformists are women. In addition, taking each conformity treatment, separately, we can test for the existence of gender differences in conformity rates across treatments. Using the Fisher exact test, we reject the null hypothesis (p-value=0.7683, 2-tailed) of no differences.

Result 5: There are no differences in the proportion of men and women who conform to observed information in the VC game.

[15] The analysis in this section will concentrate on the public goods game because there is weak evidence of conformity in the dictator game (see Table 5 and Table 6).

3.6. Whose information do conformists follow in the VC game?

Table 12 shows whose choices conformists are imitating. From this table, we can observe that 8 of the 10 conformists in the out-group treatment imitated male choices. In the in-group/out-group treatment half imitated male choice and half female choices.[16] The last two columns of Table 12 show the aggregate data.

From the data below we observe that in the out-group condition, people conform to male choices more than to female choices (binomial 1-tailed p =0.0547). The data also show, however, that there are no statistically significant differences between females and males in own gender preferences among conformists. The p-values on Table 12 correspond to the Fisher exact test under the hypothesis that there are no differences in the proportion of female and male subjects who conform to their own gender. Thus, the reason for why subjects conform more to male choices in the out-group condition is that, in that treatment, there are more male conformists than female conformists.

Table 12: Conformity by gender

	Conformity 1 Out-group		Conformity 2 In-group		Total	
Feedback	Male	Female	Male	Female	Male	Female
Male Subjects	5	1	3	2	8	3
Female Subjects	3	1	3	4	6	5
Total	8	2	6	6	14	8
H_0: own gender conformity rates are the same						
	p-value = 0.2381		p-value = 1.000		p-value=0.3870	

[16] We will call the conformity 2 treatment "in-group" because all of the conformists chose to observe feedback from fellow undergraduate students.

Table 12 also shows that in the conformity 1 treatment 25% of the conformists were women, but 50% in the other treatment. Thus, women conform more when they observe in-group choices as opposed to out-group choices, but the difference in proportion is only weakly significant (p-value=0.1563, 1-tailed).

Result 6: In general, subjects tend to conform to male choices more than to female choices. In the out-group condition, subjects are more likely to conform to male choices and most conformists are male. In the in-group condition, there are no differences in conformity rates to male and female observed choices.

4. Conclusion

We designed an experiment to test whether conformity rates in contribution games are influenced by complexity, group identity and gender as psychologists have argued. Our analysis of the data supports some, but not all of the findings made by psychologists.

From observations of choices made in a one-shot VC game and a one-shot Dictator game, we may conclude that there is evidence of conformity in the public goods game, but no evidence of conformity in the dictator game. The evidence of conformity in the public goods game supports Bardsley and Sausgruber (2005); whereas, the lack of evidence of conformity in the dictator game supports Cason and Mui (1998). Thus, conformity rates are higher in the more difficult task.

Social psychologists argue that conformity effects are larger in in-group situations, those in which subjects observe decisions made by people belonging to their group or by people with whom they can easily identify. Our in-group/out-group treatment was designed

to capture whether subjects prefer to observe information from their own group. We also wanted to determine whether observing their own group decisions makes them more likely to conform as compared to observing the out-group decisions. We found that undergraduate subjects overwhelmingly prefer to observe information from their own group; however, aggregating across genders, there are no differences in conformity rates in the "in-group" and "out-group" conditions.

Eagly (1987) argues that females conform to the group choices more than males. In contrast to her findings, we did not observe any differences in gender conformity rates. However, gender differences were observed when they were combined with the group conditions. In the "out-group" condition most women and most men were interested in observing male choices. In the "in-group/out-group" condition, subjects preferred to observe choices by their own gender. In the public goods game, by isolating the conformists among all subjects, we were able to determine what type of information these people chose to observe and conform to. In the "out-group" condition, conformists conformed to male choices, but most conformists were men. More females conformed in the "in-group" condition than in the "out-group" condition, and in the "in-group" condition conformists females conformed to their own gender. We also observed differences, although not statistically significant, among those people who observed the other gender's choices. When subjects observe the opposite gender's choices, women are more likely than men to conform to their observations. Thus, to summarize, in the context of contribution games, psychologists are right in that complexity affects conformity. Gender and group, however, affect conformity in combination.

The reasons for why people conform in economic experiments are not clear. Some argue that subjects (either consciously or unconsciously) are compelled to avoid social punishment and isolation and to seek social reward in the form of group acceptance. This argument seems to be supported by Meier, Shang and Crosson, and Bardsley and Sausgruber. On the other hand, it could be that subjects are simply confused. Ferraro and Vossler and Carpenter seem to support this view. In this paper, we do not investigate the reasons for why people conform; however, the differences in conformity rates between the dictator and public goods games, both of which present similar moral dilemmas for subjects, suggest that confusion may be partly responsible for conformity. In support of Ferraro and Vossler (2004), it is likely that the subjects who conformed were confused about what they needed to do, and looked at others' choices as a model for their own choices. Finally, the differences in the number of revisions towards the Nash equilibrium in the control and conformity treatments of the VC game suggest that feedback may be enhancing confusion among subjects or reducing the subjects' incentives to think. It is possible that information may have this counterintuitive effect because it may relieve subjects from the cognitive cost of making a decision. Indeed Berns, Chappelow et al. (2005) observe *decreased* activation in frontal regions when subjects learn about others' choices.

Our plan is to extend our research to include more complex tasks. Based on our research, we believe that the relationship between complexity and conformity is not linear. We also believe that there may be cultural differences in conformity rates. Indeed, psychologists have determined that cultures that emphasize collectivism rather than individualism are more likely to conform. Also, using similar experiments as the original Asch experiments, psychologists have found that conformity rates in the US have changed

throughout time, as culture either emphasized or deemphasized individuality (see Bond and Smith, 1996). Finally, recent neourobiological studies suggest that that the brain structure of adolescents is different from that of adults and that this difference may explain marked disparities in their behavior and responsiveness to group pressure. Thus, our plan is to study conformity rates among adolescent subjects.

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The remainder of this document contains the instructions for the experiment to aid the referees and editors in evaluating the manuscript. These are the instructions for the Conformity 2 treatment. Record sheets are not included. Please note that this material is not intended for publication.

General Instructions:

You will now be taking part in an economics experiment. Funds for the experiment were provided by institutional grants. Your earnings in this experiment will partly depend on your decisions, decisions of others, and chance events. It is, therefore, very important that you read these instructions with care.

The instructions we have distributed to you are solely for your private information. It is **prohibited to communicate with the other participants** during the experiment. If you violate this rule, we will have to exclude you from the experiment and from all possible payments.

There are a total of 3 different treatments. We will now begin with a short questionnaire. **Your name will not be used in any reports**. After a short questionnaire, you will be assigned a player ID number. **Everything you report will be kept under the assigned ID number and will be totally confidential**.

How to Earn Money:

During the experiment, your earnings will be in the form of tokens. At the end of the experiment, your tokens will be converted into US dollars at a rate of $____ per token and you will be paid your entire earnings in cash at the end of the experiment, once all treatments are finished.

If you have any questions, please ask the experimenter now.

Questionnaire

Your name will not be used in any reports. Everything you report will be confidential.

Age: _____
Current Grade Level: Freshmen / Sophomore / Junior / Senior
Gender: Male/ Female
Major:_____

Have you participated in other experiments in the department of Economics before?
Yes / No

Please choose your father's or your mother's highest level of education, whichever is higher.
A) Some High School
B) Complete High School
C) Some College
D) Completed College
E) Completed a graduate or professional degree

Please read:

A group of high-school and junior high students were asked to estimate the number of people who live in Latin America and the Caribbean. John, who is about to enter college said 300 million. Lara, who is starting college next fall, said 250 million. Marie, who is in junior high, said 530 million. Thomas, who is also in junior high, said 420 million. Who is closer to the right answer?
A) John
B) Lara
C) Marie
D) Thomas

How many acres are in one hectare? Alan says 0.81, Gina says 1.39, Mike says 3.56 and Rose says 2.47. Who is correct?
A) Alan
B) Gina
C) Mike
D) Rose

Instructions (Treatment 1)

This part consists of **2 rounds**. In this treatment, you will be randomly matched with **three other people in the room** for both rounds. The decisions you and the members of your group make will determine the amounts that you earned by each of you.

Initial Round:
At the beginning of the initial round, each participant will receive **40 tokens**. During this round, you will be given the option to **keep** any number of your tokens for yourself, or **contribute** any number of your tokens to a group project. At the same time, the three people who are matched with you will also be deciding how many of their tokens to keep or contribute. All decisions must be in integer amounts.

Earnings: you receive…
1 token for each token you **keep**,
0.50 token for each token you **contribute**, and
0.50 token for each token contributed by the 3 other people in your group.

Therefore, your **contributions** raise the earnings of others, while their **contributions** raise your earnings as well.

Thus, your total earnings equal:
Total earnings = (1 * Tokens you kept) + (0.50 * Total Tokens Contributed by the Group, which includes your own contribution)

Information:
After the **initial** round, and before the **final** round, you will be given an option to learn some information

Final Round:
In the final round, you will be asked to either **maintain** your original decision made in the initial round or **change** your decision. **Only the decision you make in the final round will count towards your earnings.**

No one will be able to see the decisions until the end of the experiment. **All decisions will be made anonymously** so no one will be able to identify who is playing with you.

I will now randomly assign you to either group **X** or group **Y**. You will not know who is in your group; all you will know is which group you belong to.

If you have any questions, please ask the experimenter now.

Player ID #____

Information:

Your ID is written on the top-right part of this sheet.

The table below can reveal some information; by selecting the appropriate cell on the table, we will reveal to you information regarding **choices previously made by four other subjects who in the past fulfilled the exact same tasks you were asked to fulfill in the initial round.**

The rows in the table below show these subjects divided by class and gender and the columns represent different information about the choices these subjects made; these are: "group/average contribution," the group contribution is the sum of all four subjects' contribution; from this information, you can get the average contribution by dividing by four. "Maximum number of tokens contributed" to the group, which is the largest amount contributed by one of the subjects of the group of four, and "minimum number of tokens contributed" to the group, which is the lowest amount contributed by one of the subjects of the group of four.

Finally, the last row contains the option of declining to see what others have done.

You have the chance to choose **ONE** of the **THIRTEEN** following combinations of options, A, B, C… and M. Using your pen, please circle the letter (A, B, C, …, or M) of the cell that contains the desired option and the experimenter will fill in the appropriate information. For example, if you are interested in learning about the maximum number of tokens contributed by a female undergrad student, you should circle H. If you are interested in learning about the group/average contribution of four female graduate students, you should circle A.

Group of subjects	Group/average contribution	Maximum number of tokens contributed	Minimum number of tokens contributed
Female graduate students	**A**	**B**	**C**
Male graduate students	**D**	**E**	**F**
Female undergraduate students	**G**	**H**	**I**
Male undergraduate students	**J**	**K**	**L**
I do not wish to know about anyone's contribution	**M**		

Player ID # ___

Instructions (Treatment 2)

Please choose one of the following 2 options. **Your choice in this section will NOT affect your earnings. The dollar amounts shown below are hypothetical amounts.** After this treatment, you will participate in a different treatment.

Choices (A or B)	Choice A	Choice B
	1/10 of $2.55, 9/10 of $1.75	1/10 of $4.60, 9/10 of $0.15
	2/10 of $2.55, 8/10 of $1.75	2/10 of $4.60, 8/10 of $0.15
	3/10 of $2.55, 7/10 of $1.75	3/10 of $4.60, 7/10 of $0.15
	4/10 of $2.55, 6/10 of $1.75	4/10 of $4.60, 6/10 of $0.15
	5/10 of $2.55, 5/10 of $1.75	5/10 of $4.60, 5/10 of $0.15
	6/10 of $2.55, 4/10 of $1.75	6/10 of $4.60, 4/10 of $0.15
	7/10 of $2.55, 3/10 of $1.75	7/10 of $4.60, 3/10 of $0.15
	8/10 of $2.55, 2/10 of $1.75	8/10 of $4.60, 2/10 of $0.15
	9/10 of $2.55, 1/10 of $1.75	9/10 of $4.60, 1/10 of $0.15
	10/10 of $2.55, 0/10 of $1.75	10/10 of $4.60, 0/10 of $0.15

Choices (A or B)	Choice A	Choice B
	1/10 of $22.95, 9/10 of $15.75	1/10 of $41.40, 9/10 of $1.35
	2/10 of $22.95, 8/10 of $15.75	2/10 of $41.40, 8/10 of $1.35
	3/10 of $22.95, 7/10 of $15.75	3/10 of $41.40, 7/10 of $1.35
	4/10 of $22.95, 6/10 of $15.75	4/10 of $41.40, 6/10 of $1.35
	5/10 of $22.95, 5/10 of $15.75	5/10 of $41.40, 5/10 of $1.35
	6/10 of $22.95, 4/10 of $15.75	6/10 of $41.40, 4/10 of $1.35
	7/10 of $22.95, 3/10 of $15.75	7/10 of $41.40, 3/10 of $1.35
	8/10 of $22.95, 2/10 of $15.75	8/10 of $41.40, 2/10 of $1.35
	9/10 of $22.95, 1/10 of $15.75	9/10 of $41.40, 1/10 of $1.35
	10/10 of $22.95, 0/10 of $15.75	10/10 of $41.40, 0/10 of $1.35

Choices (A or B)	Choice A	Choice B
	1/10 of $94.35, 9/10 of $64.75	1/10 of $170.20, 9/10 of $5.55
	2/10 of $94.35, 8/10 of $64.75	2/10 of $170.20, 8/10 of $5.55
	3/10 of $94.35, 7/10 of $64.75	3/10 of $170.20, 7/10 of $5.55
	4/10 of $94.35, 6/10 of $64.75	4/10 of $170.20, 6/10 of $5.55
	5/10 of $94.35, 5/10 of $64.75	5/10 of $170.20, 5/10 of $5.55
	6/10 of $94.35, 4/10 of $64.75	6/10 of $170.20, 4/10 of $5.55
	7/10 of $94.35, 3/10 of $64.75	7/10 of $170.20, 3/10 of $5.55
	8/10 of $94.35, 2/10 of $64.75	8/10 of $170.20, 2/10 of $5.55
	9/10 of $94.35, 1/10 of $64.75	9/10 of $170.20, 1/10 of $5.55
	10/10 of $94.35, 0/10 of $64.75	10/10 of $170.20, 0/10 of $5.55

Player ID # ___

Instructions (Treatment 3)

This part consists of **2 rounds**. You will be randomly matched with the **same** participant for both rounds. The decisions you and the person you are matched with make, will determine the your earnings

Initial Round:
At the beginning of round 1, we will randomly assign you one of two types: N or P. Half of you will be type N and half type P. Those people who are type N will receive 40 tokens. Those of you who have type P will **not** receive tokens. During each round, the type N participants will have the option to distribute the 40 tokens between themselves and the type P participants. Type P participants will not make any choices. All decisions must be made in integer amounts.

Information:
After the initial round, and before the final round, type N will be given the option to learn some information.

Final Round:
In the final round, type N participants will be asked to either **maintain** their original decision or **change** their decision. Only the decisions made in this final round will count towards your earnings.

No one will be able to see the decisions until the final decision in the **final round** has been submitted. **All decisions will be made anonymously** so no one will be able to identify his or her partner.

If you have any questions, please ask the experimenter now.

I will now assign the roles of type N and type P randomly by having you each draw an index card. The index card will be titled either "type N" or "type P." If you receive the card index with "type N" written on it, you will receive 40 tokens. If you receive the card index with "type P" written on it, you will not make any choices.

Player ID #___

Information:

Your ID is written on the top-right part of this sheet.

The table below can reveal some information; by selecting the appropriate cell on the table, we will reveal to you information regarding **choices previously made by two other subjects** who in the past fulfilled the exact same tasks you were asked to fulfill in the initial round.

The rows in the table below show these subjects divided by class and gender and the columns represent different information about the choices these subjects made; these are: "average number of tokens given" to type P, which was calculated by adding the amounts that the two subjects gave to P and dividing by two, the "maximum number of tokens given" to type P, which is the largest amount given between the two subjects, and the "minimum number of tokens given" to type P, which is the smallest amount given between two subjects.

Finally, the last row contains the option of declining to see what others have done.

You have the chance to choose **ONE** of the **THIRTEEN** following combinations of options, A, B, C,…, and M. Using your pen, please circle the letter (A, B, C, …, or M) of the cell that contains the desired option and the experimenter will fill in the appropriate information. For example, if you are interested in learning about the maximum number of tokens contributed by a female undergrad student, you should circle H. If you are interested in learning about the average amount given by a pair of people, both female graduate students, you should circle A.

Group of subjects	Average number of tokens give	Maximum number of tokens given	Minimum number of tokens given
Female graduate students	**A**	**B**	**C**
Male graduate students	**D**	**E**	**F**
Female undergraduate students	**G**	**H**	**I**
Male undergraduate students	**J**	**K**	**L**
I do not wish to know about anyone's choice	**M**		