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April 2013

Discussion Paper

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April 8, 2013

Abstract

We present clean evidence of a direct social context effect on behavior in a laboratory experiment: the gender composition of the room significantly alters the risk decisions of subjects even when the actions or presence of others are neither payoff nor information relevant. Our design is such that subjects do not know the decisions of others, nor can they be inferred. We find that women become more risk taking as the proportion of men in the group increases. This is most consistent with women imitating the expected behavior of others in the session. Our results imply that aggregate behavior is not a simple extrapolation of individual preferences. Groups might have more extreme behavior than the average individual.

JEL codes: C91, D81, J16

Keywords: gender, context effects, risk aversion, experiment

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1 Introduction

We can be strongly influenced by the company surrounding us, even if others are not affected by our decisions, have no bearing on our decisions, and our decisions are made in absolute privacy. There may be many reasons why who we are surrounded by might influence individual behavior. For instance, emotions, triggered by the presence of certain people, may alter our state of mind. Or, social conformity may push us to behave like others to avoid the cost of being different. Understanding whether such effects are present is important because they imply that the meer presence of others can affect the fundamental behavior of individuals.

Despite its relevance to understanding decision making, there is no direct evidence showing that who is in the room affects behavior directly *absent* some mechanism that makes others' decisions informative or payoff relevant. We remedy this by implementing economic experiments which randomly vary the company in which a decision is made while shutting off any payoff or information channels. The results are striking. We find that the composition of the room in which individual decisions are made alters individual behavior. This effect is large and systematic. Women are willing to choose more risky alternatives as the proportion of men in the room increases. When women are surrounded by men, their behavior is statistically indistinguishable from men's. Women in this situation hold double the amount in risky assets than women surrounded by other women. Analysis of our data suggests that the mechanism behind this change in behavior may be due to attempts to imitate homegrown expectations of others.

In our design, subjects were invited to participate in an experiment on decision making and were randomly assigned to participate on a particular date and time. After all subjects arrived, they were randomly assigned to one of two rooms and a seat within the room. Each room was identical and had four computers arranged around a table in a way that guaranteed privacy of decisions but allowed subjects to naturally observe the gender composition of the room. At no point was the composition of the room, or gender, explicily brought to the attention of the subjects.

Subjects were asked to make a series of eight decisions which consisted of dividing \$10 between a certain option that paid \$1 per dollar invested and an investment that paid either $\$H$ for $H = \{1.5, 2.0, 2.5, 3.0\}$ with probability one half and $\$L$ for $L = \{-0.5, 0\}$ with probability one half. In three of the decisions, the investment had an expected return below one dollar per dollar invested, in three of the decisions, the investment had an expected return above one, and in two of the decisions the investment had an expected return of exactly one. While all the subjects in a room faced the same set of decisions, they faced them in a different order.

Individual payoffs were based on one of the eight decisions and chance. Importantly, in no way were subject payments affected by the decisions or actions of the other people in the room. In addition, the decision selected for payoff was chosen independently for each of the subjects in the room. One subject could be paid based on a decision with a low return investment while another subject could be paid based on a high return investment. Finally, all subject payments were private, so no subject knew what another subject decided or earned.

By random assignment to experimental sessions, we minimize the chance that subjects know one another in the session or would interact with each other afterwards. By randomly assigning subjects to rooms, we generate different environments based on gender. By asking subjects to perform a task that is individual in nature, we eliminate the effect of payoff dependence. By randomizing the order of presentation of decisions, we eliminate any subtle information the demeanor of others might reveal. Finally, by randomizing the lottery used for payoffs we reduce any meaningful comparison of payoffs across subjects, should they engage in such cheap talk after the experiment. In our experiment, the composition of the room can affect behavior directly only through emotions or homegrown expectations subjects have of others.

We obtain two main results. First, consistent with previous research (Croson and Gneezy 2009, Eckel and Grossman 2008) we find that women are more risk averse than men. This is true for all decisions faced by subjects.[1] Second, we find that the gender composition of the room has a large effect on the behavior of women, but not on the behavior of men. Female subjects become *less* risk averse in the company of men. This is true for all decisions. The effect is large. A female subject more than doubles the amount invested in the risky asset when passing from being in a room with only women to being the only woman in the room.

Our results contradict theories suggesting that men respond to the presence of potential mates or competitors. Their behavior across environments is stable. Also, we do not find that women become more risk taking in the company of other women as we would expect if changes in decisions are due to payoff comparisons or competitive attitudes (Gneezy, Niederle and Rustichini 2004, Niederle and Vesterlund 2007). In addition, we find that the behavior of women in the presence of men is not consistent with either expected payoff maximization or, in general, with status seeking. To these points, women invest more in lotteries with negative returns in the presence of men and do not maximize the probability of having the largest payoff in the room. Simulation of expected payoffs show that in all but one mixed gender group, men are significantly more likely to obtain the largest payoffs.

[1]This is contrast with Schubert et al. (1999) who show that women are more risk taking than men in lotteries involving losses and no different in lotteries presented as investments.

Emotions, or feeling rushed, do not appear to cause the change in behavior of women (see Rubinstein 2007). The time taken to make a decision is unaffected by the composition of the room. Moreover, women take more time to make decisions than men and their behavior does not become more variable in groups with men. Another explanation is identity priming. Previous research shows that a person's identity is more likely to be primed when they are in the minority (McGuire, 1984). This would mean that a woman should behave more like a woman, i.e. more risk aversely, in a room full of men. This is not what we find, and this negative result is consistent with Benjamin, Choi and Strickland (2010) who find no evidence that gender priming affects risk attitudes.

All of this suggests that the reason women become more risk taking when they are surrounded by men is because they adjust their preferences to mimic the expected behavior of those surrounding them. In the presence of women, they are more risk averse. Women seem to be paying attention to their surroundings and conform to the behavior of others.[2] Consistent with this explanation is that the time men and women take to complete their decisions, an observable behavior in the room, is significantly correlated, but decision time is not correlated with the level of investment.

Our paper is not the first to experimentally investigate the role of audiences or room composition on individual behavior.[3] However, in these studies, the actions of subjects are linked through information or payoffs channels. In our paper, we show that room composition alone affects behavior, independent of payoffs linkages, strategic interactions or information feedback. The gender composition of the room was randomly and transparently assigned, and subjects could not gather information from the behavior of others. In our experiment, decisions are individual and payoffs comparisons are meaningless. Even so, individual behavior is affected by who is seated at the table. Importantly, the effect is systematic and suggests there is a mechanism relating individual behavior and individual expectations of the behavior of others.

This implies that peer effects (Bertrand, Luttmer and Mullainathan 2000, Duflo and Saez 2003, Conley and Udry 2010) might be more fundamental and influential apart from the

[2]Eckel and Grossman (2008) show that people correctly guess that women behave more risk aversely than men.

[3]Eckel and Grossman (2001) show that the gender composition of an experimental session affects play in ultimatum games. Gneezy, Niederle and Rustichini (2003) link the composition of a team to subjects' behavior in tournaments. Bogan, Just and Dev (2011) show that the gender composition of teams affects giving and the risk decisions of groups. Charness, Rigotti and Rustichini (2007) provide evidence that behavior is affected when individual decisions consequential to the payoffs of others are done privately or publicly. Lindquist and Soderbergh (2011) show that women's willingness to compete in Jeopardy's daily double diminishes if the opponent is a man. Cooper and Rege (2011) provide evidence of peer effects in that information about others' risky decisions affects individual's risky decisions. Rohde and Rohde (2011) also test for peer effects in risky decisions.

information relevant for economic decisions possessed by group members.[4] Our results are consistent with findings by Cooper and Rege (2011) who provide evidence of informational peer effects in the lab in decisions under risk. Importantly, in our experiment, no information is transmitted and no social risk was involved in making any decision. Our results therefore point to a reflective reaction to the presence of others.

A recent study by Booth and Nolen (2012) shows that 11-year old girls behave less risk aversely in a lottery task when randomly assigned to groups of girls. While similar in spirit, there are several key experimental design differences that distinguish our results. Contrary to our protocol, where previous group interactions or potential comparisons across subjects are eliminated, children in their experiment play a maze tournament prior to choosing in the lottery task and the experimental instructions suggest that children would have to resolve their lottery choice in public.[5] Their results are consistent with research on competitive attitudes (Gneezy, Niederle and Rustichini 2003, Niederle and Vesterlund 2007) and might be affected by audience effects and signaling (Bohnet and Frey 1999, Charness, Rigotti and Rustichini 2007, Andreoni and Bernheim 2009).[6] In our experiment, room composition matters even when competition, feedback and audience effects are not possible.

Our main finding has several implications. It shows that the behavior produced by groups is likely to be different than that produced from the aggregation of individual preferences. Aggregate behavior might be more heterogeneous than individual heterogeneity would predict. For example, if a woman makes more risky investments in a room of men, the environment in which women make financial or retirement decisions could have an important impact on the ultimate financial health of women and their families. Also, the mechanism by which social decisions are reached might be crucial (e.g. secret balloting versus assemblies). Preference reversals are possible and voting in committees might be biased or subject to regret.

The paper is organized as follows. Section 2 covers background literature, Section 3 describes our experimental design, Section 4 discusses results, Section 5 presents possible explanations for room effects, and Section 6 concludes.

[4]This speaks to Manski's (2000) point that peer effects are difficult to identify because they are confounded by information and strategy.

[5]The instructions read "You now face a choice: Option One: Keep your £5. Option Two: Gamble with your £5. If you choose option two you will flip a coin at the end of this round." Later in the instructions, it is stated that all children would have to stand up and flip a coin.

[6]For instance, in their study, even girls that are not socialized in a same-sex environment take more risks in the company of women.

2 Background

It has long been observed that individual decisions may be altered by the presence of others. An early line of relevant research in psychology focused on conformity in judgment experiments. Jenness (1932) and Sherif (1937) showed that, when faced with an ambiguous judgment task, individuals tend to conform their predictions to group averages. Asch (1951) went on to demonstrate that, in a non-ambiguous judgment task, individuals are willing to conform even when group judgments are clearly incorrect.[7] Deutsch and Gerard (1955) suggest these results are driven by two distinct mechanisms. The first of which is *informational influence* where the judgement of others leads to a reduction of uncertainty.[8] The second mechanism is *normative influence* in which individuals respond to a social expectation of conformity.

These mechanisms have parallels in economics. Under a belief that others have unique information, informational influence is similar to the idea that an individual's actions signal something about the true state of reality, thus reducing uncertainty and influencing behavior. This mechanism for influence has received considerable formal attention in a game-theoretic framework and in experimental settings.[9] Normative influence is similar to the idea that when actions in a game are observed by others and those actions have some relevance in a social context, internal incentives are no longer separate from external, social incentives. This mechanism is formalized in models such as Kandori's (1992) model of community norm enforcement.

The mechanisms posited by Deutsch and Gerard (1955) require that the actions of others are observable to the individual decision maker. This is not the case in our experiment. Nonetheless, subjects may respond to expectations of these influences as the room composition changes. For example, subjects may seek to conform to the expected behavior of others around them. The gender composition of the room may increase the saliency of an individual's gender and influence decisions. Subjects may make decisions to signal fitness in a competition for mates or seek status. Finally, a subject's emotions might affect decsions. We examine each of these possibilities in turn.

In terms of conformity, the social context would result in different choices as subjects

[7]Perrin and Spencer (1980) suggest that the Asch results may be unreliable– an artifact of their time or particular experimental methods.

[8]Note that in the ambiguous judgment task of Asch (1951) there is not a true reduction in uncertainty, however since subjects believe that others' actions are informative, they may update their expectations anyway.

[9]For examples in game theory, see Welch (1992); Bikhchandani, Hirshleifer and Welch (1992); Banerjee (1992); Bikhchandani, Hirshleifer and Welch (1998). Examples of experiments include information cascades. See Anderson and Holt (1997) for a survey.

seek to adhere to the expected behavior of the group. If the average behavior of men and women differ, then the standard of conformity will depend on the gender composition of the group. If the room is comprised primarily of women, and women tend to be more risk averse, then an individual trying to conform would take on less risk.

In terms of identity saliency, individuals have many social identities based on gender, nationality, religion, occupation, etc. These identities may carry competing behavioral influences, however, a particular situation might remind an individual of the behavioral demands that are associated with one of their social identities, thus making that identity salient. McGuire (1984) suggests that the identities which become salient are the ones associated with the traits an individual has which make him or her distinctive in a particular social environment. For instance, this would suggest that a blond haired person in a room of brown-haired people would be more likely to identify as a blond.[10] This distinctiveness hypothesis suggests that the social demands associated with being male or being female will become more salient for anyone in the minority gender of a group. That is, when a woman is surrounded by men, her gender identity is the most salient.[11]

In terms of signaling and competition for mates, the handicap principal of Grafen (1990) suggests that risk taking may work as a signal of mate quality.[12] Mate signaling may then explain why men are more likely to take everyday risks when in the presence of women (Pawlowski and Atwal, 2008). This explanation implies that men would make more risk-loving choices in a room with more women.[13]

In terms of competition for status, when games are embedded in a social context, an individual's preferences over outcomes may include the status gains associated with each outcome. Status can be valued as a means to obtain future resources or as an end in itself (Huberman, Loch and Onculer, 2004). For instance, if being the highest earner in a group confers status, then subjects might make choices to maximize expected payoffs relative to others in the room. If status is most relevant within gender, then a woman in a room full of women would make more risky investment choices to maximize the probability of being

[10]Empirical evidence for McGuire's "distinctiveness theory" with respect to gender is found in Ruble and Higgings (1976) and Cota and Dion (1986).

[11]Benjamin, Choi and Strickland (2009) find no evidence for gender saliency on risk preference measures when gender is directly primed.

[12]The idea behind this is that the risk associated with a certain activities may affect low-quality males more than high-quality males. Even if such risky activities have a lower mean payoff than less risky alternatives, high-quality males may engage in such activities, and thus handicap themselves. This then becomes a credible signal of quality to potential mates. Hawkes and Bird (2002) demonstrates how the handicap principal is consistent with the emergence of hunting as "men's work" in the human species.

[13]The domain of the risky activity may be relevant to the perceived benefit of mate signaling. For example, Wilke, Hutchinson, Todd and Kruger (2006) find that men and women report social and recreational risk as attractive in potential mates and correctly predict that the opposite gender will find these activities attractive. They also report evidence that some risks, such as gambling, are seen as unattractive.

the highest earner. If instead status is most relevant across gender, and women tend to underperform when competing against men (as shown by Gneezy, Niederle and Rustichini, 2003), the opposite result would occur. Women in mixed groups may compete less than in groups with only women.

Emotions may have an influence in some economic decisions (Haselton and Ketelaar, 2006). For instance, Fessler, Pillsworth and Flamson (2004) find evidence that, for men, risk taking increases with anger and, for women, disgust decreases risk-taking. Our experiment does not manipulate, nor measure, emotions. However, subjects might approach the risky investment task with gut reactions, rather than cool-headed reasoning. If this is the case, we would expect faster decision making (Kahneman 2003) and this could vary as room composition changes and a subject is affected by the time with which others in the room make decisions.

Finally, in the experimental economics literature, there is ample evidence that behavior is affected by the gender composition of the other subjects in the experiment. In these experiments, however, the characteristics of those in the room has relevance for payoffs and expectations. For example, the choices of the other subjects directly affect the subject's payoffs (e.g. in bargaining, social dilemma or tournament experiments). The subject's choices affect the other subjects' payoffs (e.g. in individual decision making experiments where subjects make decisions over own and other's payoffs). The gender composition of the room can affect expectations (e.g. in dictator games where the gender composition of the room in which the dictators sit informs the likely gender of the recipient). Or, the other subjects can view the subject's decisions so there may be audience or signaling effects (e.g. in Charness and Rustichini (2011) where audience effects in the context of social dilemmas differ by gender).

3 Experimental Design

Subjects are sent an invitation to participate in an experiment on a particular date and time. The date and time is randomly assigned. Subjects arrive at the lab and are randomly assigned to one of two rooms with identical setups. The room assignment procedure is transparent to subjects and guarantees that the gender composition of the room in which subjects make decisions is random and subjects know this. One room is called A and the other B. The letter of the room and a seat number is written on an index card. The index cards for the two rooms are shuffled in front of subjects, and each subject chooses a face-down card assigning a room and a seat.

Each room has a table with four laptop computers arranged such that, when seated, each

subject's computer screen is not visible to any other subject (see Figure 1 for a picture of the room setup). There are no privacy dividers, and all subjects can see the other subjects in the room during the entire experiment. The room composition is never explicitly pointed out to the subjects, but they can naturally see who else is in the room. Each laptop has a computer mouse to facilitate decision making, and there is a lottery cage with numbered bingo balls on the table. Subjects enter the room and sit at the seat number listed on their index card. The seat number also serves as the subject login number. The instructions for the experiment are on the computer screen, and the subjects follow along as an experimenter reads the instructions out loud. A copy of the instructions is in the Appendix.

Subjects make individual decisions over eight separate lotteries. The lotteries we use are similar to those used by Charness and Gneezy (2008) but half include losses. For each lottery, a subject is asked how many dollars out of \$10 he would like to put in a lottery that pays H with 50% probability and L with 50% probability, where H>\$1>L. The subject can allocate any amount from zero to ten dollars, in one dollar increments, in the lottery. Any dollar not allocated to the lottery pays \$1 with certainty. For the eight lotteries, H can take on one of four values, {\$1.50, \$2.00, \$2.50, \$3.00}, and L can take on one of two values, {\$0, -\$0.50}. The eight lotteries are constructed from all possible combinations of H and L. Three of the lotteries have an expected payoff strictly less than \$1, two have an expected payoff equal to \$1 and three are strictly greater than \$1.

Figure 2 shows a picture of the decision screen for a lottery where H=\$1.50 and L=-\$0.50. The subject enters the amount of money he would like to allocate to the lottery in the box on the left side of the screen. On the right side is a table that lists total earnings for all possible amounts of money put in the lottery, conditional on whether the high payoff, H, or low payoff, L, is randomly chosen. The subject enters the amount to put in the lottery and clicks update. The payoffs for that decision are highlighted in the table. The subject is free to change his decision at any time and can easily move between the eight decisions to make changes. The confirm button for each decision must be clicked before all decisions can be submitted. The presentation of lotteries is therefore transparent.

It is important to note that payoffs in the experiment depend only on the individual's own decisions and chance. The choices of the other subjects in the room have no bearing whatsoever on an individual's payoffs. Our setup is different from previous studies that have looked at room composition because in those studies the actions or presence of others had some impact on an individual's payoffs or expectations. For example, in terms of payoffs, a room made up primarily of men might affect decisions, and therefore payoffs, in a public goods game where an individual is making decisions in a randomly-assigned group composed of a portion of the people in the room. Or, in terms of expectations, the gender composition

of the room may affect giving decisions in a dictator game, where subjects are divided into two rooms with dictators in one and recipients in the other, because the proportion of men and women in the room will give the dictator some expectation of the gender of the recipient in the other room. Our design, by contrast, allows us to measure the effect of the environment (room composition) on decisions without payoff or expectation confounds.

The eight lotteries are presented in a random order for each subject. Because of this, at any given time during the decision making phase of the experiment, the individual subjects in the room are making different decisions. This is an important element of the experimental design because it ensures that choices across subjects for a particular lottery are uncorrelated. This allows us to further isolate environmental effects (the presence of those around you) from choices.

Decisions are made on the computer. When all eight decisions are submitted by everyone in the room, one decision is randomly chosen to be paid by using the bingo cage. Eight balls, numbered 1 to 8, are placed in the bingo cage and mixed up in front of the subjects. One ball is drawn from the cage, with the number on the ball corresponding to the decision number to be paid. Because the eight lotteries over which the subjects made decisions are presented in a random order for each subject, paying for a particular decision number meant that each subject is ultimately paid for a different lottery.

Payments, as well as decisions, are in no way correlated across subjects. Once a decision has been chosen to be paid, two more bingo balls are put in the bingo cage, numbered 9 and 10. The bingo cage is mixed up again, and a ball is chosen to determine the amount paid for the decision chosen. Bingo balls with numbers 1-5 paid one amount and balls numbered 6-10 paid another amount. Finally, whether the amount paid for each set of numbers is the larger or smaller amount ($\$H$ or $\$L$) also differs across subjects. This means that a draw of ball number 1, for instance, may pay a low return for one subject but a high return for another. All subjects know these procedures ahead of time, and our protocol ensures that subjects have little to learn from others decisions, attitudes or reactions. Subjects make different decisions over the course of the experiment, and their payments are not correlated in any way.

Total earnings from the experiment include the payoff from the lottery chosen for payment plus a \$6 show-up fee. Subjects are paid in cash privately. Because the lotteries include losses, total earnings from the experiment could be as low as \$1. Average earnings were \$17.02 (s.d. \$7.45), and the experiment lasted 30 minutes in total. 140 subjects (58% men) participated in the experiment across 39 sessions (we refer to an experiment conducted in a room a session). Sessions consisted of 3 or 4 people, depending on the number of subjects

that showed up.[14]

4 Results

There are two main results. First, men are more risk taking than women. Second, the gender composition of the room affects the risk taking behavior of women but has no effect on men. In particular, women become more risk taking in the company of men.

Our first result is illustrated in Figure 3.[15] The figure shows the average amount of money invested in the lottery by men and women for each of the eight lotteries. The lotteries are ordered from left to right such that the lotteries are increasing in expected value and variance. The first three lotteries on the left have an expected payoff of less than \$1, the middle two have an expected payoff of \$1, and the last three lotteries have an expected payoff greater than \$1. A risk neutral individual should not invest in the first three lotteries, should be indifferent in investing in the middle two and should invest all his \$10 in the last three.

The figure shows that investment in the lottery increases for both men and women as expected payoff goes up. The amount of money invested, however, is always larger for men than women for every lottery, and it is significantly larger in five of the eight lotteries. This result that men are more risk taking than women confirms previous research (see Croson and Gneezy, 2009, for a review).

Our second result is illustrated in Figure 4. The figure shows the average amount invested in the lotteries by men and women as the room composition changes. To account for repeated measures, means and standard errors are calculated using average behavior over the eight lotteries the subjects faced. The data are split into five groups: rooms in which there are only women, rooms with only one man, rooms with an equal split of men and women, rooms with only one women and rooms with only men. The amount of money invested in the lottery by men is not significantly different across room compositions. They invest between \$4.50 to \$5.50 no matter who is in the room. Women, on the other hand, increase their investment in the lottery as the number of men in the room increases. In rooms of only women, they invest about \$1.80 in the risky bet, but if they are surrounded by men, they invest about \$4.80. This monotonic increase in risky bets as the number of men in the room increases is significant for women. Importantly, this pattern of behavior is consistent across sessions.

[14]Sixteen of the sessions had 3 subjects and 23 had 4 participants. The distribution of gender composition of the rooms with 3 subjects is: one all female, 8 with one male and two females, 4 with two males and one female, and 3 all male. The distribution of gender composition of the rooms with 4 subjects is: one all female, 3 with one male and three females, 7 with two males and two females, 9 with three males and one female, and 3 all male.

[15]Standard error bars in the figures are standard errors of the mean.

This result is confirmed in Table 1. This table shows ordered logit regression results of the amount of money invested in the lottery as a function of the gender composition of the room and controlling for the lottery the subject is facing. These regressions are run for men and women separately, and we control for room composition in two ways. The first way we do so is to include dummy variables for whether the subject is the minority sex in the room or the room is composed of the same sex. The omitted category are mixed rooms with an equal number of men and women. The second way is to include a continuous variable of the proportion of men in the room other than oneself, ranging from zero to one.

Column 1 in Table 1 shows that, even controlling for lottery type, women put significantly more money in the risky bet when they are surrounded by only men and significantly less when they are surrounded by only women. This also holds in the alternative specification (Column 3). As the proportion of men in the room increases, women invest more in the lottery. None of these coefficients are significant for men. Men do not change the amount placed in the risky bet as the sex composition of the room changes.

To look more closely at how investments in the risky bets are changing as room composition changes, we split the lotteries into two groups: lotteries that have a chance of losing money in addition to the amount invested (loss lotteries) and lotteries that do not (gain lotteries). The former group includes the four lotteries that have a 50% probability of losing 50 cents in addition to every dollar invested in the lottery. The latter group includes the remaining lotteries that have a 50% probability of no return on the dollar invested in the lottery and no additional loss.

Classifying the lotteries this way, we look at variation in the extremes of investing: not investing at all in the lottery or going all in. Specifically, we examine how the proportion of bets of zero dollars men and women make over the four loss lotteries changes as room composition changes. We do the same for the proportion of bets of ten dollars. Table 2 shows ordinary least squares (OLS) regressions for the proportion of bets of zero dollars. For both loss and gain lotteries, women are significantly more likely to not place any money at all in the lottery when they are surrounded by other women. The proportion of times that women do not invest at all in the lottery increases by 33-42 percentage points. Women become more extreme in their risk aversion (do not invest at all) when there are no men in the room. For men, there is no significant effect of room composition.

Table 3 shows the results of going "all-in" the lottery. The OLS regressions are the proportion of investments of the entire endowment (ten dollars) as room composition changes for loss and gain lotteries. There is no significant effect on men. When women are surrounded by men, however, they are significantly more likely to invest their entire endowment in the loss lotteries. The proportion of lotteries in which they invest everything in the risky asset

increases by 4 percentage points.

Taken together, Tables 2 and 3 suggest that the change in the behavior of females is mainly explained by the decrease in safe bets as the proportion of men in the room increases and, to a lesser degree, by the increase in extreme risk-taking investments in a room with a majority of men.

5 Possible Explanations for Room Effects

In this section, we explore some explanations for why room composition matters.

First, the composition of the room might affect the behavior of subjects if it makes the environment similar to that of a competition for mates. Depending on whether gambling is considered a good or bad trait to attract mates, the proportion of subjects of the opposite sex might alter the amount invested in risky lotteries. The strongest reaction would be when a subject is in the majority group because competition is the highest in this case. For women, this would imply that either they are the most risk averse or the most risk taking when there is only one man in the group. We do not find evidence for this. Women are the most risk taking when the proportion of men in the group is the largest and the most risk averse when surrounded by women.

Second, subjects may perceive the task as a tournament either against everyone in the session or their peers in the session. Room composition in this case might matter because a person forms expectations on others' behavior based on their gender or because a person cares about competing against his or her own gender. The behavior of women is not consistent with the task being a tournament. They do not appear to try to either increase expected payoffs or the probability of having the largest payoffs in the session as the proportion of men in the room increases. An expected payoff maximizing individual would not invest in losing lotteries and would invest the most in gain lotteries. If gender matters for payoff comparisons, this behavior should be attenuated by the composition of the group. Looking at investments in gain and loss lotteries in same sex groups compared to groups in which the subject is a minority, we see that in all women groups, women invest 2.25 in gain lotteries and 1.25 in loss lotteries, and in one woman groups, women invest 6.1 in gain lotteries and 3.3 in loss lotteries. Instead of investing the most in gain lotteries when surrounded by one's peers, women do the opposite.[16]

Looking more closely, we see that women's investment in gender balanced groups (see

[16]For men, they invest 5.7 in gain lotteries and 3.1 in loss lotteries in all men groups and 6.4 in gain lotteries and 3.6 in loss lotteries in minority groups. For lotteries in which the expected value is strictly greater than one, they invest 6.1 in all men groups and 7.3 in minority groups.

Figure 4) are lower than those of men, implying that they would likely either tie with other women or end up losing to a man who risked more. Similarly, the increase in safe bets by women in groups with more women suggests that they are not trying to maximize the probability of winning.[17] To verify this we calculated the expected probability that a woman would have the largest payoff in a session by recalculating payoffs 10,000 times. In groups where men are the minority, the probability that a women would have the largest payoffs is 28.2 percent and that of men is 35.9 percent (t-test = -3.3442, p-value = 0.0020). In groups with equal numbers of men and women, the probability that a women would have the largest payoffs is 22.3 percent and that of men is 27.7 percent (t-test = -1.8435, p-value = 0.0767). Only in groups were women are the minority is the probability of having the largest payoffs the same for men and women (27.9 for women and 26.8 for men, t-test = 0.4895, p-value = 0.6268).

Third, the presence of members of the opposite sex might elicit an emotional response. While we do not have direct measurements of emotions or arousal, we could rely on Rubinstein's (2007) evidence that instinctive responses are taken more quickly than reasoned ones to test if the change in behavior is accompanied by a change in emotional states. The correlation between the total time to finish the task and the average bet is -0.1514 (p-value = 0.0742), so those who bet more take less time. This is consistent with the hypothesis that riskier investments are more instinctive or less reasoned. If emotions partly explain the reason why women change their behavior across room composition, we would expect that the time to make decisions is shortest when women are the minority. Table 4 shows times to make decisions by men and women as the composition of the group varies. Neither men nor women significantly change the time to make decisions based on the composition of the group. Moreover, there is no evidence that the time to make decisions by others affects investment decisions either. As Table 5 shows, the regression parameter of the average individual investment on the time taken by others to finish the task is -0.00 (p-value = 0.413) for women and 0.00 (p-value = 0.446) for men. These parameters are neither economically nor statistically significant. If emotions play a role in the change of behavior of women, they do not express strongly in the data.

Fourth, the composition of the group might prime subject identity. For instance, McGuire (1984) concludes that gender identity is more likely to be salient when a person is in the minority. Since women are found and generally thought to be more risk averse (Croson and Gneezy 2009, Eckel and Grossman 2008), one would expect women to focus more on this aspect of gender identity in groups where they are in the minority. However, it is not clear

[17]This behavior would contradict recent research in competitive attitudes (Gneezy, Niederle and Rustichini 2004) which shows that women are more competitive against other women.

how women's behavior should change when this aspect of gender-identity becomes salient. For instance, if risk aversion is seen as an expectation for women then this mechanism suggests women would behave the most risk aversely in the groups in which they are the minority. This is not the case in our experiment.

Fifth, subjects might seek to either conform to or imitate the behavior of others in the group. For instance, Eckel and Grossman (2008) find that female experimental subjects are more risk averse than men, and that this is correctly predicted by subjects. Our experimental data is consistent with the joint hypothesis that women attempt to mimic the behavior of the group and that their homegrown expectations are that men are more risk taking. Table 5 shows that both men's and women's time to complete the task and number of mouse clicks made are postively correlated with the time to finish the experiment and the number of mouse clicks made by others in the room.[18] This is consistent with both men and women being affected by the outward actions of others. However, since only women are affected by the composition of the room, it may be that men ignore their contextual surrounding and women mimic the expected decisions of men.

6 Conclusion

We set out to investigate the influence of social context on individual decision making in the absence of information feedback, strategic interaction or payoff relevant information. To do this we randomly assigned experimental subjects to small groups and asked them to privately make a series of lottery decisions involving gains and losses. Subjects faced menus that were personalized in terms of the order in which the lotteries were presented, the lottery selected to determine payoffs and the randomizing device used with each individual. In sum, experimental subjects faced completely individualized decisions with no meaningful way to link their decisions, payoffs and actions to the decisions, payoffs and actions of other people in their session. We find that even under these strict conditions, individual decisions are strongly influenced by the gender composition of the room: women become *less* risk averse as the proportion of men in the room increases, to the point where women's behavior, when surrounded only by men, is indistinguishable from that of men.

We do not find that this change in behavior is due to women trying to either obtain the highest expected payoffs in the group or trying to maximize the probability of having the largest payment in the group. This implies that theories based on status seeking cannot explain our data. Behavior is also at odds with the idea that decisions are a reflection of a competition for mates. If women become more risk taking as competition for mates increases,

[18]The regressions exclude the subject's behavior in the calculation of the average behavior of the group.

we would then expect that they would be the most risk averse in the absence of competition. Women are the most risk taking in this case.

We do not find a significant relationship between time to make decisions and the composition of the room nor do we find that the time others take to make decisions is at all related to the amount invested in risky bets. If time to make decisions is a marker of whether choices are based on emotions or reasons (Rubinstein 2007), we find little evidence that women's change in behavior is due to a change in their emotional status.[19]

While group composition is not correlated with the duration of the experimental session, we find that men's and women's time to finish the task is correlated with the time taken by others in the session. This is consistent with women paying attention to their surroundings and being influenced in their investment decisions by the composition of the group even when time itself is not correlated with the composition of the group. This is possible whenever time to make decisions is not strongly correlated with the investment itself. Indeed, we find that while time to make decisions by others in the session do not predict individual investment decisions, the composition of the group does.

Our experiment is the first to successfully show that group composition has an effect on behavior independent of feedback or payoff-relevant information. We find that decisions made in groups are affected by the characteristics of the group even when these decisions are individual. The effect is manifested in the decisions of women, not men. These effects seem to be due to the activation of homegrown expectations and imitation.

Our results have implications for the aggregation of preferences. Depending on the environment in which individual decisions are made, aggregate preferences could differ significantly, even when decisions are private. The composition of peers has a fundamental effect on preferences, apart from information.

[19]Incidentally, the correlation between the amount invested in risk lotteries and time to make a decision is small.

7 References

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8 Figures and Tables

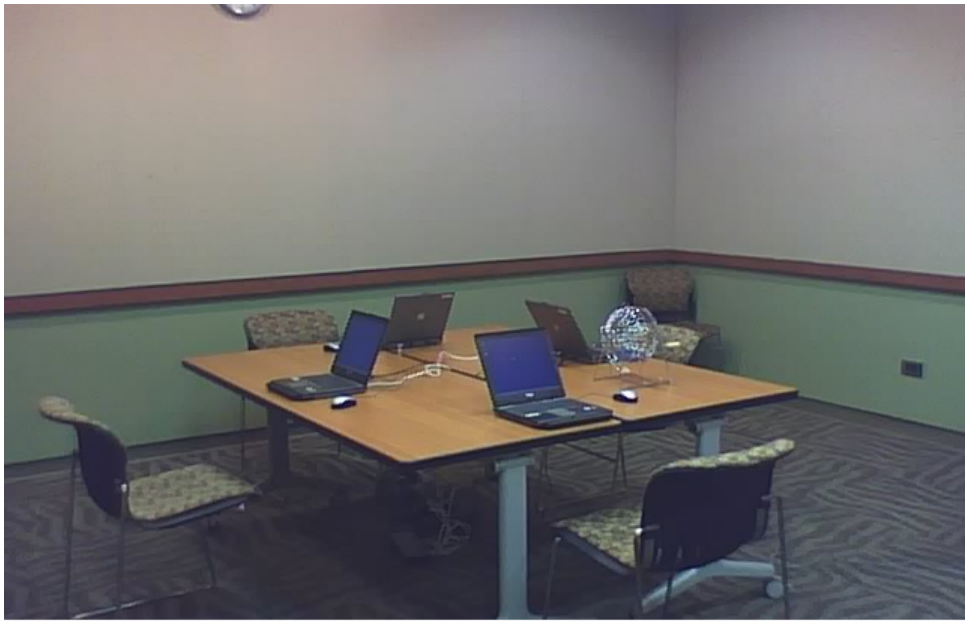

Figure 1: Room Setup for Experiment

Figure 2: Example Decision Screen for payoffs of $1.50 or -$0.50

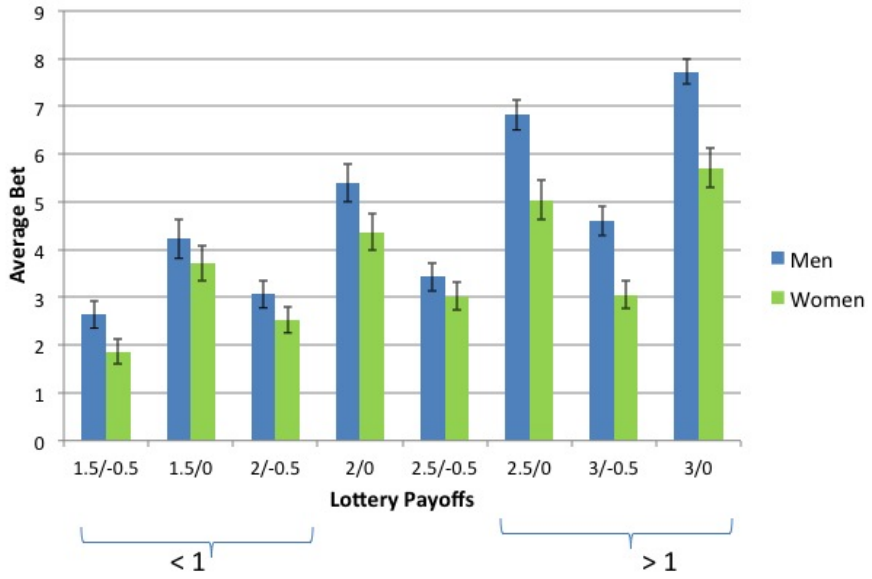

Figure 3: Average Bet by Lottery and Gender (Error bars are standard errors of the mean)

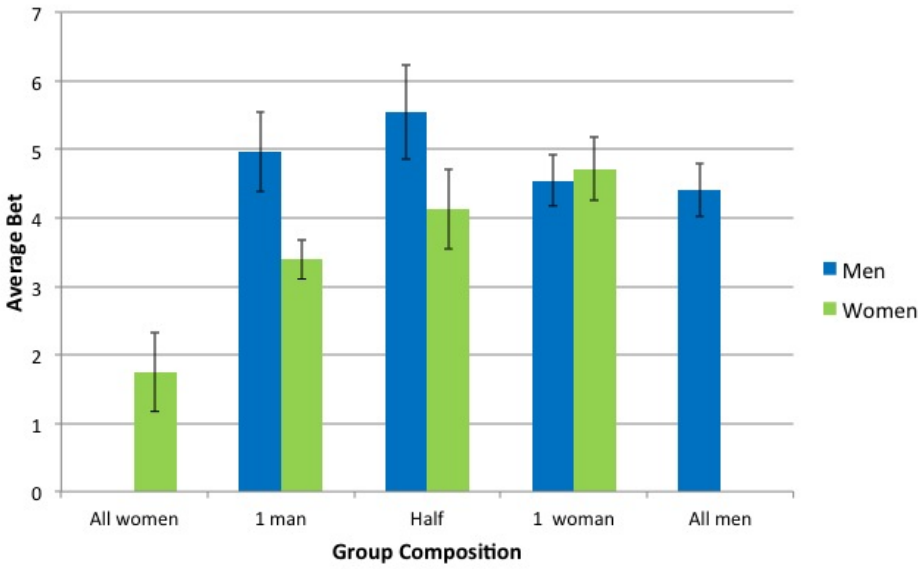

Figure 4: Average Bet by Room Composition and Gender (Error bars are standard error of the mean)

Table 1: Ordered Logit of Lottery Bet by Room Composition and Gender

	(1)	(2)	(3)	(4)
VARIABLES	Women	Men	Women	Men
Minority in Group	0.69*	0.04		
	(0.387)	(0.394)		
All same gender in group	-1.55**	-0.22		
	(0.678)	(0.305)		
Proportion of males			2.61***	-0.61
			(0.793)	(0.572)
lottery 1	0.39	-0.19	0.43	-0.19
	(0.271)	(0.294)	(0.270)	(0.295)
lottery 2	-0.98***	-1.12***	-0.97***	-1.12***
	(0.249)	(0.209)	(0.244)	(0.209)
lottery 3	0.87***	0.56**	0.86***	0.56**
	(0.268)	(0.260)	(0.266)	(0.261)
lottery 4	-0.36	-0.83***	-0.35	-0.83***
	(0.223)	(0.178)	(0.221)	(0.178)
lottery 5	1.26***	1.33***	1.30***	1.33***
	(0.263)	(0.189)	(0.260)	(0.189)
lottery 6	-0.02	-0.63***	-0.01	-0.63***
	(0.209)	(0.148)	(0.204)	(0.148)
lottery 7	1.77***	1.86***	1.77***	1.86***
	(0.269)	(0.225)	(0.263)	(0.224)
Observations	472	648	472	648
Log likelihood	-988.81	-1331.04	-990.78	-1330.15

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10

Table 2: OLS Regression of Proportion of Bets of Zero Dollars by Lottery Type, Room Composition and Gender

	(1)	(2)	(3)	(4)
	Loss lotteries	Loss lotteries	Gain lotteries	Gain lotteries
VARIABLES	Men	Women	Men	Women
Minority in Group	0.03	-0.03	0.06	-0.04
	(0.114)	(0.097)	(0.072)	(0.065)
All same gender in group	-0.05	0.33***	0.03	0.42***
	(0.089)	(0.124)	(0.056)	(0.083)
Constant	0.24***	0.21***	0.12***	0.08**
	(0.049)	(0.048)	(0.031)	(0.032)
Observations	81	59	81	59
R-squared	0.01	0.12	0.01	0.34

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10

Table 3: OLS Regression of Proportion of Bets of Ten Dollars by Lottery Type, Room Composition and Gender

	(1)	(2)	(3)	(4)
	Loss lotteries	Loss lotteries	Gain lotteries	Gain lotteries
VARIABLES	Men	Women	Men	Women
Minority in Group	0.08	0.04*	0.12	0.03
	(0.062)	(0.021)	(0.112)	(0.072)
All same gender in group	-0.05	-0.00	-0.03	-0.12
	(0.048)	(0.026)	(0.088)	(0.092)
Constant	0.06**	-0.00	0.27***	0.12***
	(0.026)	(0.010)	(0.048)	(0.036)
Observations	81	59	81	59
R-squared	0.04	0.06	0.02	0.04

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10

Table 4: OLS Regression of Time Taken to Submit Decisions and Number of Clicks Made by Room Composition and Gender

VARIABLES	(1) Num of Clicks Women	(2) Num of Clicks Men	(3) Time to Submit Women	(4) Time to Submit Men
Minority in group	-15.85	-4.22	-61.26	48.76
	(35.31)	(21.38)	(58.22)	(40.58)
All same gender in group	-32.73	12.35	-1.93	14.70
	(45.26)	(16.72)	(74.62)	(31.72)
Constant	151.15***	143.22***	371.64***	305.06***
	(17.66)	(9.16)	(29.11)	(17.38)
Observations	59	81	59	81
R-squared	0.01	0.01	0.02	0.02

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10

Table 5: OLS Regression of Time Taken to Submit Decisions and Number of Clicks Made by Behavior of Others in Room and Gender

VARIABLES	(1) Avg Investment Men	(2) Avg Investment Women	(3) Time to Submit Men	(4) Time to Submit Women	(5) Num of Clicks Men	(6) Num of Clicks Women
Avg time taken	0.00	-0.00	0.54***	0.62***		
by others	(0.002)	(0.002)	(0.119)	(0.152)		
Avg number of clicks					0.25**	0.94***
by others					(0.103)	(0.164)
Constant	4.16***	4.17***	139.44***	142.38**	108.31***	10.59
	(0.797)	(0.661)	(40.482)	(56.452)	(16.676)	(25.860)
Observations	81	59	81	59	81	59
R-squared	0.01	0.01	0.21	0.23	0.07	0.37

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10