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Abstract

This paper attempts to distinguish 'trust in cooperation' from 'trust in ability' with respect to gender through an experimental trust game. 'Trust in ability' is explored in the context of hands-on mechanical ability where females are stereotypically believed to be inherently less skillful. Such stereotypes govern, explicitly or implicitly, women's access to education & employment of certain fields, resulting in gender based occupational segregation of the labour market. This in turn intensifies gender inequality. We observed higher probability of exhibiting stereotypical behavior among men and women paired with women despite statistically insignificant gender gap in actual performances in the mechanical task assigned. It indicates that 'trust in ability' can be governed by such stereotypes and affect economic outcomes. We also describe the demotivating psychological process women suffer from, due to endorsement of such stereotypes by the society.

Key Words: Trust experiment, Gender Inequality, Stereotypes, Experimental Economics

JEL Code(s): C91, J71, Z19

Stereotypical Occupational Segregation & Gender Inequality: An Experimental Study[1]

1:Introduction

Gender division of the labor market is a central feature of gender inequality, both in its economic aspects and in the social construction of gender identities (Huber 1991; Lorber 1994). Gender-based segregation of modern industrial labour market can be seen as the result of discriminatory practices against women. These practices originate from endorsement of prejudices, social beliefs and stereotypes prevailing about women's inability to perform certain tasks. Such 'trust in (in)ability' governs, directly or indirectly, women's access to education and jobs. Informal reservation of some professions for a specific gender can be viewed in this context. For instance, fund management, mechanical engineering, driving etc are mainly perceived as men's fields whereas women are seen as inherently more suited to become nurses, pre-school instructors and elementary school teachers. Professional qualifications or acquired skills often receive lesser weightage in the recruitment process. However, widely divergent economic payoffs and social values attached to these professions empower one of the genders unequally and give rise to occupational inequality and subsequently intensify gender inequality in economic and social contexts. Thus, unscientific 'trust in (in)ability' in the specific gender for certain tasks can be viewed as source of discrimination. Eventually it gives rise to rigid social structures and becomes a long term source of discrimination. Besides, it sets in place a self-fulfilling mechanism. Initially, women face entry barriers in the supposedly "masculine" fields due to such misperceptions. The resultant incompetence is later cited as evidence to substantiate the stereotype and to further block entry. It extends family-based patriarchic culture into industrial-based patriarchal system. Unscientific trust in (in)ability undermines women's potentiality and lowers technological changes, stock of human capital and economic efficiency.

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The conservative attitude about women's ability regarding Science and Engineering Fields (henceforth SEF) & their career opportunities can be explored experimentally in the Indian context. The main focus of this paper is confined to 'trust in mechanical ability' where women are stereotypically believed to be relatively less skilled in hands-on mechanical tasks. Although, gender gap in the performances of mechanical task was found to be statistically insignificant, we observed that in trust game male and female trusters transferred lower amount to their female partners when payoffs were the function of partners' performance in mechanical task assigned.

The paper is organized as follows: Section 2 contains literature review, which is divided as Section 2.1 summarizes studies dealing with scientific and social views about women's mechanical ability. Section 2.2 discuses the experimental methodology employed for this study. 2.3 reviews contemporary research on experimental games for 'trust'. Section 3 discusses the design of our experiment. Section 4 provides data & analysis while section 5 concludes the paper.

2: Literature Review

2.1: Women's Mechanical Ability and Stereotypes

Women in modern society may not experience traditional gender discriminating practices like proscription of women from education & labour market, but they are not free from discrimination. One of the forms such practices take is the prevalence of stereotypes that women are relatively unskilled in fields related to Science & Engineering and particularly in carrying out hands-on mechanical tasks.

The effect of this stereotype is reflected in students' sex composition in SEF. In India, the female enrolment in SEF was less than one percent of the total enrolment till 1960s; it rose to 8.3% by the mid-1990s. It grew further but still was relatively low at 16.2% in 1999-00 (UGC (1999)). Parikh and Sukhatme (2002)[i] reported that mechanical engineering was the least favored discipline among females. Only 9.3% of female engineering students[ii] chose this branch during 1994-98. According to the UGC (2008), women's enrollment ratio in all graduate-level engineering branches (5.81%) was almost half of that of men (10.33%) during 2004-05. Other developing and advanced countries are no exception to this trend. Correll (2001) and Arnot et al. (1998) separately provided sociological evidences for the existence of a norm prescribing math & science as men's domains in US and Britain. Strength of this

stereotype can be best judged by the fact that the US Government had to pass the Science and Engineering Equal Opportunity Act (1980), to ensure gender-wise equal opportunities in education, training, and employment in SEF.

Lower female to male ratio in SEF can be mainly attributed to the misinterpretation of sex differences in cognitive abilities and the wrong belief that aptitude for SEF is a masculine trait and that women are inferior at the same. Gendered institutional policies and practices, different priorities of males and females pertaining to personal and family life and a combination of these factors may have evolved around this misinterpretation.

As argued by Mosedale (1978) and Shields (1975), the origin of research on gender differences lies in traditional concerns either to support or to refute assumptions and expectations about the appropriate social roles for men and women. Justifications for the subordinate social position assigned to women were earlier sought in religious doctrines, which started losing their credibility over a period of time. Thereafter, a "scientific" approach was adopted by invoking the structure of the brain in order to confine women to the role of mothers and wives. Any difference in anatomy of the two sexes is generally comprehended to be immutable and unalterable. Therefore, providing a firm 'biological basis' for assignment of particular social roles to each sex could have been an attempt to yield long-lasting credibility for these social roles.

Although, sophisticated techniques of investigating brains have shown marked 'sex differences' between male and female brains; it is still unclear what those differences may mean in practical terms (Rogoff (2010)). Intelligence tests show negligible differences between men and women (Ripley (2005)). Although, most studies agree that men's brains are about 10% bigger than women's (after adjusting for their height), it has been proved that size does not predict intellectual performance (Giedd 2006). Hanlon et al. (1999) found differences in parts of boys' or girls' brains that mature first: for boys, mechanical and spatial reasoning develops four to eight years earlier, while girls' verbal and facial recognition skills mature much faster. However, negligible differences in intelligence test in fully mature brains suggest that the developmental path may not matter. Given this fundamental difference in the development process of the brain in both the sexes, rudimentary comparison in

performance of both genders in science subjects in same class in schools may be misleading.

Caplan P. and Caplan J. (1997) argued that much research on gender differences in cognition has been poorly conceived and executed, and its findings have been quite irresponsibly interpreted in order to confine women to their socially prescribed roles. They critically reviewed the research on gender difference by shedding light on conceptual and methodological issues in defining mathematical, spatial and verbal abilities, emphasis on construction of 'unbiased' tests for their measurement, magnitude of observed sex-related differences, critical generalization of the results. Rogoff (2010) argued that the very prevalence of so many inconclusive studies on sex differences in brains, implies that what truly appears to be holding women back is not some innate disadvantage, but the belief that they are intrinsically less gifted in SEF. Such a stereotype[iii] acts like a deterrent in the progress of the stereotypic group.

Schmader (2006) showed how contextual factors, such as existence of stereotypes, can discourage stigmatized groups, from pursuing education leading to careers in the SEF. Prevalence and awareness of gender stereotype add to concerns of the stereotyped groups that their performance will be judged against the stereotype which affects their performance negatively (Steele and Aronson (1995)). Stigmatized groups interpret regular learning difficulties as proof of the claimed inability; rather than natural aspects of the learning process. Further, women tend to incorporate negative feedback more than men (Tomi-Ann and Nolen-Hoeksema (1989)). Women may therefore fall into 'confidence traps' from which they do not recover easily (Dweck (2000)).

Negative feedbacks and confidence traps are often accompanied by society's low expectation from stereotyped groups. As a result, women may lack encouragement to overcome these difficulties. Teachers' expectancy effects are one route that improves stereotype consciousness among children (Wolfe and Spencer, 1996). Differential teacher treatment and suspicion of negative evolution of performances would affect girls' performance in school, and would strengthen the stereotype among peers. McKown and Weinstein (2003) argued that perceived personal efficacy influences women's choices, effort levels, persistence in the face of difficulties, the amount of anxiety and stress experienced while coping with

threatening environments, their vulnerability to depression, and their resilience to adversity.

A growing research body shows negligible gender gap in SEF performances, controlling for various demographic variables. Chen et al. (1996) examined the relative performance of female mechanical engineering students of various classes and observed that the female students performed better, by all measures, than the males in all but one class where they performed equally well. The explanations which they provide include the following: better pre-college preparation for engineering and the nurturing environment provided by higher female enrollment ratio, allowing women to excel by boosting their self-confidence in skills & ability. The Bennett Mechanical Comprehension Test (BMCT), designed to measure a candidate's ability to perceive and understand the relationship of physical forces and mechanical elements in practical situations, also failed to reflect any substantial gender difference. Controlling for education, work experience and leisure factors, gender explained only 2% of additional variance (Fortson (1991)).

Hyde (2006) synthesized results of numerous studies on gender differences in mathematics performance in her meta-analysis and proposed the 'gender similarities' hypothesis. She concluded that psychologically, women and men are more similar than they are different. The study spanned a wide range of psychological characteristics, including abilities, communication, aggression, leadership, personality and self-esteem.

Bandura (1986), Beall and Sternberg (1993), Epstein (1997) argued that although some sex differences are biologically founded, most of the stereotypic attributes and roles linked to gender arise more from cultural design than from biological endowment. Innate 'sex differences' are translated into 'gender differences' and they are acquired through social interactions. Gender has been defined as institutionalized system of social practices or of constituting people as two significantly different categories, men and women, and organizing social relations of inequality on the basis of that difference (Ferree et al. (1999), Lorber (1994), Glenn (1999), Ridgeway (1997), Ridgeway and Smith-Lovin (1999) and Risman (1998)).

It may be also observed historically that socio-cultural organizations and institutional framework has been shaped by rigid and self reinforcing stereotypic considerations of (in)ability of women. The following example is representative. Prof.

D K Karve, the founder of the first women's university in India, was inspired by the ideology guiding Japanese Universities for Women, that assumed women's proper role was only as 'wives' and 'mothers'. In his autobiography, Karve quotes approvingly the following from the information brochure of a Japanese University, :
"We cannot support another movement which aims at the so-called emancipation of women. In opposition to this tendency, we lay emphasis on home life as the chief sphere of women's activities. Here her proper place is found as wife and mother, not indeed as a tool or ornament, but as an active partaker in the humanitarian and national spirit which should animate home... Our aim is to educate women so that they shall come to realize their own special mission in life as free personal agents and as members of the Empire of Japan and that, as such they shall be able to perform their services as wives and mothers in a larger sense and more efficient manner than hitherto" (Karve 1929: 479).

Influenced by the ideology that teaching of supposedly masculine subjects to women would reduce their maternal functionality, Prof. Karve included home science, health science and sociology as compulsory subjects in the women's university's curriculum, while mathematics and science were kept optional (Karve 1929:587). Botany, zoology, biology, psychology and child-psychology, singing and painting were other subjects available (Karve 1929: 576).

Cutting across countries and time, there seems to be no significant change in these perceptions about women's ability in SEF. In 2006, the former President of Harvard University, Larry Summers claimed that men have superior innate ability in maths-related fields. Preoccupation of leaders of prime educational institutions with such stereotypes endows successive generations with a gender bias, distorting human capital & economic efficiency.

2.2: Methodology of Experimental Economics

Endorsement of such stereotype by a set of people can be investigated by conducting economic experiments making relevant context salient. As Nobel Laureate Vernon Smith (2002) describes it, laboratory experiments are methods of inquiry to study the motivated human interactive behaviour in social contexts governed by explicit and implicit rules. Explicit rules include move sequences, pay-off structures and other rules pertaining to games and are controlled by the experimenter. Implicit

rules are the norms, social beliefs, perceptions, (here stereotypes, if any) that subjects bring to the laboratory and which are not controllable & observable. An experimental setup is created with the help of explicit rules to capture otherwise unobservable implicit rules. This research methodology is now fairly accepted in economics, mainly because these implicit social rules are exhibited by the cash-motivated participants. It is posited that people refrain from exhibiting idealistic views when sizable monetary gains are at stake. The protocol of strict anonymity between experimenter & participants and within-participants eliminates participants' fear of being scrutinized and moral pressure (on them) to hide real preferences.

For this study, a variant of the well known trust experiment is used to behaviorally differentiate the trust extended towards women in base-line treatment (where the stereotype in not evident) and in treatment when the stereotype was made salient. The following section briefly reviews the literature on the trust experiments.

2.3: Literature Review of Trust Experiments

Formal government structures or market economies cannot entirely substitute for ubiquitous informal bargaining institutions. Social beliefs, prejudices as well as stereotypes influence trust and trustworthiness, which are fundamental to these informal institutions.

Trust is willingness to permit others' decisions to influence one's welfare even when such decisions can potentially harm oneself. In the act of trusting, the individual (truster) puts herself in a vulnerable position in the hope of gaining benefits from the trustee in return, although the trustee has a greater incentive to exploit her vulnerability. A trust-based transaction can materialize only if trusters expect that trustees will not exploit their vulnerability and will cooperate with them by reciprocating the trusting behavior. Cooperation results from trust, but trust itself involves the expectation that the vulnerability of the truster will not be exploited. An act of pure cooperation need not involve this expectation explicitly. Cooperation is possible even without trust. We define an act which leads to cooperation between the truster and the trustee based on the expectation that the truster's vulnerability will not be exploited by the trustee as "trust in cooperation".

Berg et al. (1995) designed the trust game to capture this trait. In the standard trust game, players are randomly paired and are endowed with sufficiently high

$$0 \leq x_i \leq e$$

endowment (e>0). Player 1 (truster) is given the option of transferring x_i part of e to the anonymous player 2 (trustee), where Experimenter multiplies x_i by an integer k >1 and then transfers to the trustee. Then, the trustee decides to return any amount (y_i) to the truster where $(0 \le y_i \le e + (k \times x_i))$

Thus monetary payoffs of truster (U_i) and trustee (V_i) are as follows:

$$U_i = e - x_i + y_i$$

$$V_i = e + (k \times x_i) - y_i$$

In this sequential game, with complete information and common knowledge of rationality under anonymity, the truster predicts that the trustee in order to maximize V_i, would choose y_i close to zero. Thus, she would choose x_i closer to zero in the first stage. Therefore, by backward induction the sub-game perfect Nash equilibrium strategy is to send nothing and receive nothing. However, the pair foregoes a joint gain of $k \times e$, which could be generated if trusters send out of expectations of reciprocity. Here, x_i is measure of trust exhibited by trusters while y_i is degree of trustee's trustworthiness.

Experimental evidence however deviates from this dominant strategy equilibrium. Berg et.al (1995) found that about 93% of trusters sent around 50% of endowment and an average amount returned by trustees stood at 46% of total. More than 35% of subjects returned more than the amount received by trusters i.e. shared the surplus. Systematic presence of trust and trustworthiness have been found in various studies (Cox (2002, 2004), Glaeser et al. (2000), Barr (2003)).

The 'trust in cooperation' is sensitive to various social contexts, interactive environment featured by communication, opportunity to reciprocate and punish, pattern of interactions (one- shot vs. repeated), individuals' orientations, past experience, societal relations, institutional incentive structure etc. Various demographic parameters like culture, in-group identity (Tyler and Dawes (1993), De Cremer et al. (1999)), ethnicity (Zak and Knack (1998)) and experimental procedures such as group size (Kaori (1988)), pre-experiment communication (Buchan et.al (2002)) can explain variation in trust exhibited in experimental studies. We focus on research dealing with trusting[iv] behavior with respect to gender of players.

Most studies observed that men exhibit more trust than women. Buchan et al. (2004) found that men transferred 74% of endowment to trustees compared to 61% by women. In the study conducted by Cox (2002), this ratio stood at 64% for men and 53% for women. Buchan et al. (2004) showed that women were more sensitive to trustee's gender information change. Women also sent less to a female trustee (58%) than to a male trustee (67%).

Experimental literature on trust also argues that trust is likely to be confounded by unconditional other-regarding motives mainly by altruism and inequality aversion (Cox (2004)). The latter will be activated in case of an experimental design distributing property entitlements/endowment randomly leading to unequal payoffs for participants. (In our study, this concern has been addressed by equal distribution of endowment to all participants.)

Similarly, altruism may motivate trusters to transfer positively without expecting reciprocal behavior by the partner, i.e. even in the absence of trust. Cox (2004) decomposed transfer made in trust game in altruism and expectation of reciprocity (trust) by using triadic designs of dictator[v] and trust game. He found statistically significant differences in average transfers made in dictator game and those in trust game, implying altruism & trust are two different preferences and altruism can play a role in trusting behavior.

As in the case of trust, altruist behavior may also be sensitive to information about partner's gender. Women, on average, donate twice as much as men to their anonymous partners (Eckel and Grossman (1998)). Andreoni and Vesterlund (2001) experimentally showed that when altruism is expensive, women are kinder, but when it is cheap, men are more altruistic. They also commented that men are more likely to be either perfectly selfish or perfectly selfless, whereas women tend to be 'equalitarian'. Parallel to Buchan et al. (2004)'s results in trust game, Ben-Ner et al. (2004) found that women incorporated gender information more in their decision roles and gave systematically less to other women than to men and persons of unknown gender. On the other hand, Dufwenberg and Muren (2004) found no significant differences between male and female giving when partner's gender information was made available.

For the current study, the experiment has been designed to first differentiate trust in cooperation from altruism and then to compare trusting behavior towards

women in the trust game and in the game where performance of females in a mechanical task determines the truster's payoff (after controlling for altruism). Truster's trust in the stereotype about women's mechanical ability was expected to influence their decision of transferring money. To the best of our knowledge, this is one of the few attempts to explain underrepresentation of female in SEF through experiments.

3: Design of the Experiment

The experiment consisted of two rounds of the dictator game and two rounds of the trust game.

1) **Standard Dictator Game (D1)**: Player 1 transfers x amount to the unknown Player 2; where ($0 \leq x \leq e$).
2) **Standard Dictator Game with Gender Information (D2)**: Player 1 decides x after knowing the gender of an unknown partner; where ($0 \leq x \leq e$).
3) **Trust Game (T1)**: The transfer x is multiplied a number k randomly chosen by a computer from the set of (5,3,1,0) and half of the multiplied amount is added to the trustee's account. Then trustee transfers y to player 1 where ($0 \leq y \leq e+x*k/2$). So closing balance for player 1 was ($e - x + y$) and for trustee was ($e+x*k/2 - y$).
4) **Trust Game with Mechanical Task (T2):** Here k was a n explicit function of the rank obtained by trustee in a mechanical task. All trustees, for whom positive x was transferred, received an identical dissembled toy car along with a screw-driver. They were given five minutes to assemble the car completely and their performances (in terms of time taken to complete the task) were ranked. Trustee's rank was considered as the pair's rank and all pairs were grouped in three categories (top, middle, bottom) based on their ranks. Trustees, whose performance was in the top 30% were placed in the Top category and corresponding x was multiplied by 5. For the middle category (30 - 70%), k was 3 and for bottom category (0 – 30%), k equaled one. The resulting amount was equally divided between both the players. Trustees who failed to complete the task within the stipulated time received zero rank. The

transferred amount (x) was forfeited in case of zero rank (thus the closing balance for trustor was (e-x) and (e) for trustee).

5) **Risk Attitude (RA) Task:** Trusters' trust is likely to be confused by the attitude towards risk. In other words, it becomes necessary to decompose transfer into, first, that part of the transfer motivated by the trust in the trustee's reciprocation or mechanical ability and second, that flowing from his/her attitude towards risk. The truster's risk attitude was approximated from their choices between one of the three schemes. The first scheme offered them Rs.150 with certainty. The second scheme offered them Rs.300 with 50% probability[vi] and nil with 50% probability. The third scheme was a combination of the first and second schemes. They were categorized as risk averse on selection of first scheme, risk lover on selection of second scheme and risk neutral for the last.

This experiment was conducted using Z-tree software[vii]. Randomization of role assignment and pair formation, in addition to double-blind anonymity was emphasized in the instructions. Role and partners were fixed for the experiment. Private ownership of the endowment was made abundantly clear. Acceptance of zero transfer was affirmed by providing the options of quitting the round, before they got checkbox to enter the amount. All rounds were independent and results of all rounds were informed at the end of experiment so strategic element or risk of reciprocation faced while deciding transfer in each round was eliminated. The portfolio or income effect was controlled by making payment only for one of the randomly chosen rounds, in addition to the payment earned in Risk Attitude task in case of trusters. 'Order effect' was controlled by reversing the order of only T1 & T2 for selected sessions, binding to the aim to study the difference between trust in cooperation and trust in ability. Five sessions were conducted in D1-D2-T1-T2&RA manner and rest in D1-D2-T2&RA -T1 manner.

Instructions (Appendix II) for the rounds were read aloud by the experimenter before each round, and thus were common knowledge. Simple multiple choice questions were asked to check the subjects' comprehension of the instructions[viii]. Instructions were neutral and did not have any suggestive terms like dictate, truster, trustee, return etc.

Information on the demographic profile of participants (Appendix III) was collected. It was followed by a questionnaire on gender-mingling of participants (Appendix IV). Gender-mixing since childhood was expected to have influence on awareness and endorsement of gender stereotype. McKown and Weinstein (2003) have shown that children can correlate broadly held stereotypes and people's behavior towards stigmatized group after reaching the age of 10 years. So data on participants' type of secondary school (5^{th}- 10^{th} std.; whether co-ed, single-sex or both partially) was obtained. Similarly, data on female siblings and number of female friends in their five closest friends circle was collected. Educational and occupational information about siblings & friends was asked to disguise the purpose. The whole exercise, including payment took approximately one hour and thirty minutes.

In our experimental design, we replaced constant *k* in standard trust game by varying *k* to maintain symmetry in the surplus generation method between T1 and T2. In T1, *x* was also a function of truster's expectation about partner's reciprocation, while in the following treatment, risk of poor reciprocation was eliminated by placing rule of equal division of the multiplied amount. This surplus sharing method ensured that truster would react to the fact that *k* is a function of trustee's mechanical performance in T2.

4: Analysis & Results

Experimental Data

A total of 156 post-graduate students from Pune and Mumbai, cities in the state of Maharashtra in India, were covered in nine experimental sessions during September to October 2012. Average age of the participants was 23 years. 38% of the populations had annual family income ranging between Rs.1-5 lakh and 36% had income above Rs.5 lakh. Around 17% of the participants belong to the income group between Rs.50,000 - Rs.1 lakh while 8% had income below Rs.50,000. Out of 78 pairs, 48 pairs were formed by management students and rest by students of science faculty. The sample comprised of 68 females[ix] and 87 males. 42 males and 35 females played the role of dictator and truster in respective games. 45 males and 32 females played the role of recipient or trustee. Participants in each session belonged to same class and thus were not strangers in any strict sense. Based on the choices made in

risk attitude task, 52% of trusters were categorized as risk neutral, 30% as risk averse and remaining 18% as risk lover.

Descriptive Statistics

Figure 1 (Appendix I) shows positively skewed distribution of transfers in all four treatments. Averages of D1 and D2 as presented in Table 1 are lower than corresponding figures documented in the literature. It should be noted that mean transfer in T1, is not comparable with other studies given the key distinction of varying *k* in our experimental setup.

Table 1: Treatment-wise Comparison of Distributive Statistics				
	D1	D2	T1	T2
Mean (% of Rs.300)	25.81 (9%)	21.56 (7%)	38.75(13%)	64.21(21%)
Median (μ)	10	2	10	50
Mode	0	0	0	50
Standard deviation	46.10	48.46	68.36	79.80

Sample Selection Bias & Heckman 2-stage Estimation

The chosen experimental design allowed players to send nothing so occasionally dependent variables (transfers in T1 and T2) took the value of zero. The data are censored from below, leading to a potential sample selection problem. We corrected this selection bias by using the Heckman two-stage procedure (Heckman, 1980). This procedure estimates participation function in the first stage with the help of probit (assuming normally distributed disturbances), to derive an inverse Mills ratio. The ratio is then used in the second stage OLS estimation as a regressor to correct for selection bias. However, it should be noted that while the estimates yielded by the Heckman's two stage method are consistent, they are not asymptotically efficient. We also ran a censored Tobit model, which uses maximum likelihood method for estimation to further substantiate our results.

Table 2: Heckman Estimation and Tobit Model for Transfers in T1 & T2				
Dependent variable	Estimators for Transfers in T1		Estimators for Transfers in T2	
Methods	**2-step Heckman[#]**	**Tobit Model [$]**	**2-step Heckman [##]**	**Tobit Model [$$]**
Truster's Gender	-38.33	-44.28	-66.37	-76.67

	(0.1132)	(0.0598 .)	(0.0118 *)	(0.0023 **)
Trustee's gender	-6.02 0.7114	1.17 (0.9431)	-32.11 (0.0653 .)	-37.53 (0.0368 *)
Transfers in D2	0.82 (4.23e-06 ***)	0.98 (3.36e-08 ***)	0.52 (0.0024 **)	0.53 (0.0029 **)
Coed schooling	-18.66 (0.1578)	-14.44 (0.2582)	-39.22 (0.0055 **)	-40.00 (0.0049 **)
Class	-43.51 (0.3238)	-39.96 (0.3873)	-16.61 (0.7337)	-17.29 (0.7425)
Age	1.42 (0.8036)	-0.04 (0.9939)	1.10 (0.8562)	-0.09 (0.9886)
Scores in 12^{th} class	2.26 (0.0374 *)	1.41 (0.1419)	1.33 (0.1700)	1.33 (0.1801)
Mother's education	-0.96 (0.9379)	-3.52 (0.7809)	20.62 (0.1442)	16.73 (0.2390)
Father's education	15.97 (0.1913)	15.25 (0.1649)	3.10 (0.7948)	2.79 (0.8149)
Family income	-9.55 (0.4294)	-5.69 (0.639)	-18.28 (0.1724)	-15.69 (0.2510)
No. of female siblings	-15.77 (0.2026)	-15.76 (0.1584)	-8.70 (0.4532)	-7.78 (0.5159)
No. of female friends	6.34 (0.3521)	9.1 (0.17)	6.71 (0.3381)	9.22 (0.1921)
Order effect	-17.10 (0.6352)	12.80 (0.7147)	-0.11 (0.9972)	3.82 (0.9123)
Risk averse	-51.96 (0.7766)	-2.27 (0.9899)	76.02 (0.6836)	107.76 (0.5901)
Risk lover	-70.51 (0.7060)	-30.78 (0.8636)	86.73 (0.6374)	115.03 (0.5608)
Risk neutral	-53.07 (0.7712)	1.08 (0.9952)	50.79 (0.7854)	89.91 (0.6530)
Risk payoff before Transfer in T1	-0.02 (0.8429)	-0.05 (0.649)	-	-
n = 77 (as only truster's data is considered)				
Gender =1 for female; 0 otherwise, Coed schooling =1 for single sex; =2 for attendance of single & coed school partially; 3= co-ed schooling, Class = 1 for undergraduate; 2=post-graduation; 3= Ph.d Scholars , Order effect =1 for t2t1; 0 for t1t2, Risk averse/lover/neutral = 1 when scheme choice is 1/2/3; 0 otherwise				
[#] censored observations = 19; observed observations = 58 37 free parameters (df = 41) Adjusted R-Squared:0.5106 *Inverse Mills Ratio= 50.8549 (0.0716 .)* sigma = 57.5542 rho = 0.8836				
[$] logSigma = 4.11896 (< 2e-16 ***) Newton-Raphson maximisation, 7 iterations Log-likelihood: -320.2466 on 18 Df				

Left-censored (19) Uncensored (55) Right-censored (3)
Censored observations =10 ; observed observations =67 35 free parameters (df = 43) Adjusted R-Squared: 0.606 ; *Inverse Mills Ratio = 69.795 (p=0.103)* sigma = 64.406 rho = 1.084
$$ logSigma: 4.25379 (p = < 2e-16 ***) Newton-Raphson maximisation, 10 iterations Log-likelihood: -366.011 on 17 Df Left-censored observations: 10 Uncensored observations: 62 Right-censored observations: 5
(P values in in parenthesis are significant at : '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1)

The vector of explanatory variables for both the treatments was same except that the model for T1 has an additional variable, 'risk payoff before transfer in T1'. To recall, the risk attitude task was administered simultaneously with T2 in order to avoid boredom on part of trusters when their partners were busy in completing the mechanical task. Hence, a subsample (n=48) which played the game in D1-D2-T2&RA-T1 manner, had at least a partial idea about their final payment gained due to guaranteed payoff in this task. However, this might have distorted their future decision viz. transferred amount in T1 and thus was required to control for. This was done by including the 'risk payoff before transfer in T1'. This variable turned out to be statistically insignificant.

Based on the inverse Mills ratio (50.86) presented in Table 2, we failed to reject the null of no sample bias at 5% (p=0.0716) in treatment T1. The Heckman Two Stage estimator shows that the coefficient of 'risk payoff before transfer in T1' (-0.02,p=0.8429) was statistically insignificant, thereby indicating that the administrative manipulation did not influence transfers in T1. This was also confirmed by results of the Tobit regression. Karl Pearson's correlation coefficient between risk payoff and transfer in T1 was also low at 0.16. The estimated coefficient for altruism was statistically significant, however its magnitude was rather low. Truster's gender was negatively associated with transfers in T1, indicating that female trusters sent lower than their male counterparts. Adjusted R-Squared of the model was 51%, indicating that slightly over 50% of the transfers are explained by the model.

Inverse Mills ratio for model for T2 stood at 69.795, insignificant at 10% (p=0.103) . In this case too, we failed to reject the null of no sample bias in the data.

As far as treatment 2 is concerned, both the Heckman Two stage and Tobit estimates show, though with different magnitudes, that female trustees received statistically significantly lower transfers compared to males, an indication of endorsement of stereotype by trusters. In treatment T1, the coefficient of the trustee's gender was statistically insignificant according to both the estimates, while in T2, it became significant in both. On an average, as both the set of estimates indicate, female trustees received a substantially lower amount (lower by approximately Rs.32 (Heckman's estimates) to Rs. 37 (Tobit estimates)) in T2 in comparison to T1. This is the central finding of the paper, which empirically brings out the existence of the stereotype about women's poor mechanical ability.

Female trusters also sent less than male trusters. Results also indicate that more altruistic people are likely to transfer more. There also existed statistically significant causal relationship between school type during the secondary school education and transfers. The estimated coefficients for order effect, risk attitudes and other gender-mingling variables were statistically insignificant. Adjusted R-square of the outcome model was relatively high at 60%.

Non-parametric Tests and Hypotheses testing:

Non-parametric tests were undertaken to compare median values (μ) of various treatments (D2, T1 and T2). The results would shed light on the existence of social preferences like altruism, trust in cooperation and trust in ability. Table 3 shows the results of the non-parametric tests.

Table 3: Results of non-parametric tests

	D1	D1 & D2	D2 & T1	T1 & T2
Wilcoxon Paired Rank Sum$^{\$}$ (WPRS) test (P value)	H0: $\mu_{D1} = 0$ H1: $\mu_{D1} > 0$	H0: $\mu_{D1} = \mu_{D2}$ H1: $\mu_{D1} \neq \mu_{D1}$	H0: $\mu_{D2} = \mu_{T1}$ H1: $\mu_{D2} < \mu_{T1}$	H0: $\mu_{T1} = \mu_{T2}$ H1: $\mu_{T1} < \mu_{T2}$
	$W^{\$\wedge} = 1596$, $(3.165e\text{-}11)^{\alpha}$	V= 989 (0.0307)	V=1003 $(0.0055)^{\alpha}$	V=1144 $(5.058e\text{-}07)^{\alpha}$

$ with continuity correction, ^ Wilcoxon Signed Rank Sum (WSRS) test, α denotes one-tailed test

1) *In D1, dictators were expected to confirm to the sub-game perfect Nash equilibrium strategy so expected null was the zero average transfer:* As shown in Table 4, the mean transfer was 9% (Rs.25.81) of the endowment (Rs.300). Around 27% of dictators chose to retain the whole endowment while only one

participant gave away the whole endowment. WPRS test indicated that the median transfer was significantly greater than zero (W= 1596, p = (3.165e-11)$^{\alpha}$). It established the presence of altruist motivation in the sample studied.

2) *Information about the partner's gender was expected to lead to a difference in participants' altruist behavior in D2, compared to D1:* The central tendency measures (except mode) showed decline in transfers from D1 to D2. WPRS test (two-tailed) confirmed the existence of statistically significant difference (V =989, p =0.0307).

3) *Expectation of reciprocity was expected to encourage trusters to transfer more in T1 compared to D2, with unchanged information about trustee's gender:* Around 25% of trusters retained the whole endowment; on the other hand 4% retained nil. Mean transfer increased marginally from 7% in D2 to 13% and the difference was statistically significant (V=1003, p=0.0055). Thus we also observed significant trusting behavior in T1, consistent with Cox (2004)'s results.

4) *With the presumption that trust in ability is different from trust in cooperation, we expected a statistically significant difference between transfers in T1 & T2:* The fraction of sample retaining the endowment slipped to 13% from 25% in T1. Nearly 6% in T2 compared to 4% in T1 passed on the whole endowment. Mean transfer increased sharply from 13% in T1 to 21% in T2 and difference was confirmed by WPRS test (V=1144, p =5.058e-07). It suggests that 'trust in cooperation' and 'trust in ability' are two distinct aspects of trust.

It was imperative to study the gender-wise differences in these social preferences. Table 5 presents mean transfers pattern in cross-gender (female-male(fm), & mf) and same-gender pairing (ff,mm).

Table 4: Comparison of Mean transfers

Average (in Rs.)	**Ff**	**Fm**	**Mf**	**Mm**	**Pattern**
D2	30.27	9.55	17.59	28.64	*ff > mm > mf > fm*
T1	33.93	21.65	34.59	58.16	*mm > mf > ff > fm*
T2	31.20	41.85	49.35	112.00	*mm > mf >fm > ff*
No. of pairs	15	20	17	25	

1) Altruist behavior in same-gender pairing was higher than that in cross-gender pairing, however we failed to reject the null of pair-wise equality in averages based on WPRS test results. (The results are not presented here for the sake of brevity).
2) *S*ame-gender pairings again reported relatively higher trust than the cross-gender pairing in T1. Males trusted both types of partners more than did females (*mm & mf > ff & fm*). Trust extended by male trusters to their male trustees was higher than the trust among female pairings in statistically significant way (W =240.5 & p=0.0696).
3) In T2, when payoffs were the function of partners' mechanical ability, male trusters sent remarkably higher amounts to their male partners (Rs.112) compared to their female partners (Rs.49.35). WPRS (one-tailed) test results also allow us to reject the null of equality of median (p=0.0187) in favor of alternative hypothesis of $\mu_{mm} > \mu_{mf}$. These results undoubtedly suggest the prevalence of gender stereotype against female's mechanical ability among male trusters. Female trusters also appeared to be endorsing the stereotype as mean transfer sent to their female partners was low (Rs.31.2) than that was sent to male partners (Rs.41.85), however the difference was not statistically significant (p=0.8269).

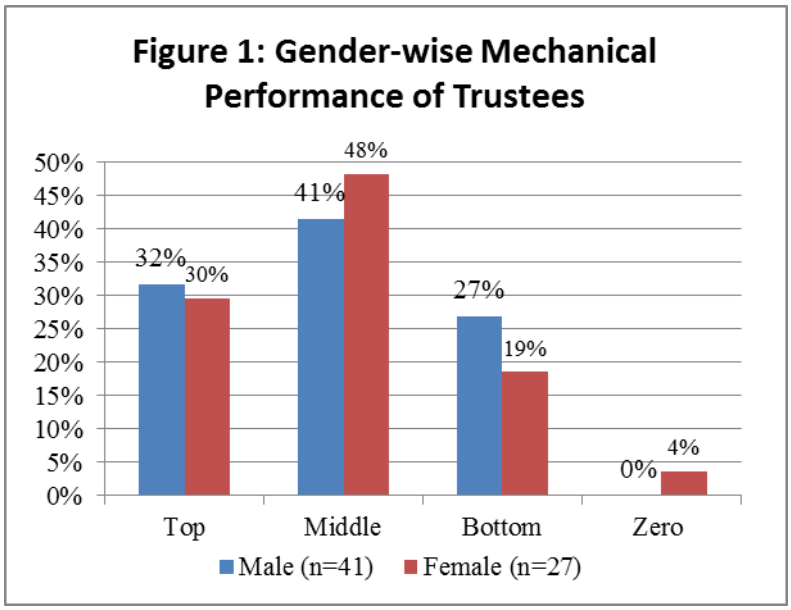
These results imply that both genders had poor opinion about female's mechanical ability. Average transfer for female trusters was statistically significantly lower than comparable figure for male trustors (for W=407, p=0.0004 with H0: $\mu_{f\ T2}=\mu_{m\ T2}$). This is consistent with pattern of averages for T2 (ff <fm<mf<mm). Few alternative explanations can be proposed whose consistency needs to be examined. Firstly, women could have shied away from the competitive environment. Additionally, women's prediction about others' competence in the mechanical task could be highly influenced by their own stereotyped inferiority complex about the same. So information that trustees were males might not have brought out drastic changes in transfers.

Post-experiment questionnaire also revealed sample's inclination towards endorsing the stereotype. It shows 47% of trusters thought that mechanical engineering is more a man's field. Around 33% of trusters expressed the view that women are generally less efficient than men at hands-on mechanical tasks. The

fraction of trusters adhering to the statement that ‘Some people believe that women are less skilled at 'hands on' mechanical tasks compared to men’ was 38%.

Gender-wise comparison of actual performance

Actual performance of trustees suggested modest gender gap, however it was not statistically significant for any of the categories (using test for equality of proportions). As shown in the figure 2, the percentage of female trustees placed in the Top category was lower than their male counterparts. Bottom category saw more male trustees than female while only one female trustee obtained zero rank. Four males and six female trustees could not complete the mechanical task as their partners quit the round.



Limitations of the study

The decision to endorse the stereotype could be also influenced by the experimental environment. Firstly, these computerized experiments were administered by a female experimenter, accompanied by female volunteers who handled all computer-related accessories and computer-networking efficiently. This might have influenced participants’ view about the engineering and mechanical ability of women.

It might also be that the assigned mechanical task might have perceived to be very simple by trusters. Around 81% of trustees also reported that the task was ‘very easy’ or ‘easy’, while rest admitted that it was ‘manageable’. Additionally, since

participants in each session were from the same class, the partial non-anonymity and their past interactions could have contaminated the salient experimental context.

On top of it, the sample we have studied belonged to the metropolitan city having relatively higher gender mingling social contacts and wide exposure to various dynamic processes enriching their experience-based knowledge. All being post-graduate students having decided their career options, the contexts striking the gender stereotype could be absent or rare in their personal lives. These factors might have weakened the stereotype strength. Similar exercise with samples from rural area, patriarchal societies, junior colleges, human resource managers might reflect the stronger presence of the stereotype and a clear distinction between gender-wise trust in cooperation and trust in ability.

Our design suffered from asymmetry between T1 and T2 regarding surplus sharing method. While in T2, the surplus was equally divided, the division was based entirely on the trustee's discretion in T1. The procedural difference was viewed essential to qualify T1 as trust game. As a result, two risks confronted by truster (in T1) namely realization of lower value of k and poor reciprocation would have suppressed transfers in T1 unequally. Selection of k i.e. the surplus generation method also differs in another plausibly important aspect. In T1, it was non-human (by computer) whereas depended on human actions (mechanical task) in the subsequent treatment. Impact of this process-discrimination can be tested referring to the studies which observed that human participants behave differently when opponents are non-human (Blount 1995). Nonetheless, regression results of transfer in T2 confirming gender bias cannot be undermined because of these shortcomings.

5. Concluding remarks

The paper finds substantial evidence that a stereotype about women's relative incompetence in tasks involving mechanical dexterity is widely held in society. We observed that endorsement of the stereotype by both males and females lowers women's economic payoffs. Our results importantly emphasize that making the social identity salient leads to changes in individuals' behaviour mainly through changes in expectations. Hoff and Pandey (2004) had shown that activating caste identities debilitated the low caste and hurt even the performance of the high castes.

These findings call for cogitation by the society about the unscientific social belief about mechanical ability of women. Females' self-efficacy belief, higher tendency to fall in confidence trap in addition to society's poor expectations underline necessity of gender-neutral socialization. Statistically significant negative regression coefficient of co-ed education emphatically underlines conscious initiation of gender-blind socialization from the age of 10 years. It would help to correct the underrepresentation of women in SEF and subsequent stereotypical occupational segregation of the labour market.

[i] The study was conducted between 1994-98 in 13 engineering institutes in Andhra Pradesh, Delhi, Gujarat, Karnataka, Kerala, Maharashtra and Tamil Nadu. The sample is argued to be a representative of 80% of India's women engineers.

[ii] 37% of female engineering students preferred electronics, 20% opted civil engineering and another 16-17% chose electrical and computer engineering respectively.

[iii] According to Fung and Ma (2000) stereotype is a subjective perception, which may be an intuition, a prejudice, an imagination, or past impression of what a person has been.

[iv] Restricting the focus on trust behavior, studies on gender-wise differences in reciprocation is not provided. Similarly, our experimental data on reciprocity is not discussed here.

[v] Dictator game is widely used to infer altruist motivation. In dictator game, player 1 (dictator) splits the endowment with his unknown partner, who have no right of rejection. While the game theory predicts is zero transfer, experimental literature reports positive transfers (Forsythe et al. (1994), Hoffman et al. (1994) Camerer (2003)).

[vi] Probabilities were calculated as follows: Player 1 selecting scheme 2 received a keypad on their screen with two blank & jumbled keys meant for head & tails. Player 1 hits on any key. If 'head' appears, he receives Rs.300 and zero otherwise. For third scheme, first keypad provided two keys for both the schemes & payment was generated according to selected scheme.

[vii] It is Zurich Toolbox for Readymade Economic Experiments having client-server application developed by Fischbacher (2007). http://www.iew.uzh.ch/ztree/index.php

[viii] Players who gave wrong answers, received the instructions again.

[ix] Observation of a female player 1 was eliminated as she provided insufficient data.

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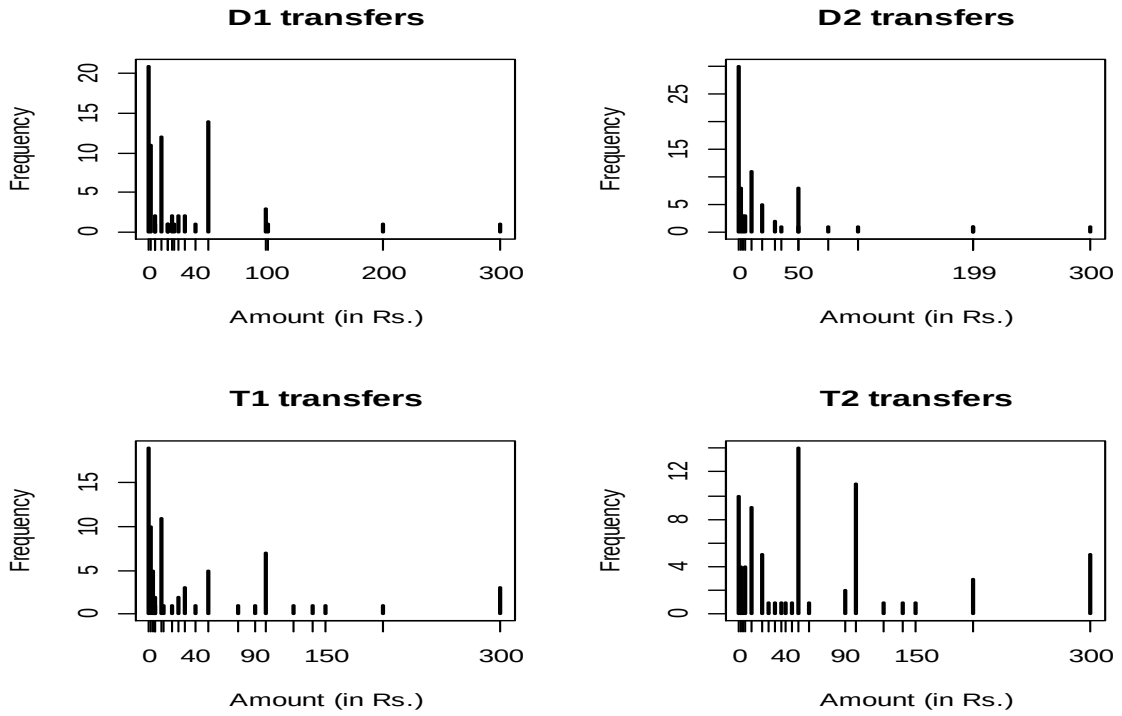
Appendix I

Figure 2: Distributions of transfers in various treatments



Appendix II

Instructions

Welcome to the experiment conducted by the Centre for Computational Social Sciences at University of Mumbai.

The experiment consists of four rounds and it will take approximately one & half hour.

The computer will randomly form various pairs of two participants sitting in this room.

During and even after the experiment, everyone's identity will be kept secret. No such private information will be asked that will reveal or help to trace anyone's identity. So no one will able to identify his/her partner in the experiment. However, individual's total earning will depend on his own and his/her unknown partner's decision, taken during the experiment.

For each round, a new account will be created for each of you and your earnings during that round will be deposited in that account.

Each round is independent of the other. So you can NOT use money earned in one round in other rounds.

Results of all rounds will be informed to you at the end of the experiment.

HOWEVER, only one of the rounds will be selected RANDOMLY to make final payment.

At the end of the experiment, you will receive a key pad with four blank keys. Each key will be meant for one round. You will hit on any key on it. The chosen round will be selected for your payment. Amount in your account for that round will be paid to you.

Since the round will be chosen randomly, every round has equal chance of getting selected. Hence, it is in your best interest to take decisions carefully in each round.

Please do not discuss the experiment among yourselves or share any information with your friends. Any such attempt will disqualify your participation in the experiment.

Volunteers will assist you in case of any query.

Round 1

The COMPUTER will RANDOMLY form various pairs of two participants available here.

They will be named as Player 1 & Player 2. Everyone will be informed about his/her own name for the experiment.

A sum of Rs.300/- will be deposited in both the Players' accounts. This amount will be personal endowment of each player and every one is free to take any decision regarding it.

Player 1 will have two options : 'To continue the round' or 'To quit the round'.

a) If he/she decides to quit the round, the round 1 will finish for that pair only and they will enter into next round. In such case, the closing balance for both of them will be Rs.300 .

b) If Player 1 decides to continue, he/she will send any amount from received Rs.300 to Player 2;

so the closing balance will be as follows :

for Player 1 : Rs.300 - amount sent to Player 2

for Player 2 : Rs.300 + amount sent by Player 1

If you have any query, please raise your hand; else you can start the experiment.

Round 2

This round will be similar to the first round.

This time, some information about your unknown partner will be shared with you. However, you will not able to identify your partner based on that information.

After this, same as in Round 1

Round 3

A sum of Rs.300/- will be deposited in both the Players' accounts. This amount will be personal endowment of each player and every one is free to take any decision regarding it.

Player 1 will have two options: 'To continue the round' or 'To quit the round'.

a) If he/she chooses to quit the experiment, the round 3 will finish for that pair only and the closing balance for both the players will be Rs.300

b) If Player 1 chooses to continue, he/she will send any amount from received Rs.300 to Player 2; the balance amount will remain in his/her account.

*** Before depositing this amount in Player 2's account, the computer will randomly select one number from the bracket (5,3,1,0) and will multiply

the amount by the chosen number and half of this multiplied amount will be deposited in Player 2's account.

*** So this half of the multiplied amount will be added to Player 2's personal endowment. Now he/she can take any decision regarding the whole amount.

*** Now Player 2 can also send any amount from the his/her personal endowment to Player 1. The balance money will remain in his/her account.

Round 3 ends here. Results of the round will be informed to you after Round 4.

If you have any question, please raise your hand; a volunteer will come to you to solve your query.

Round 4

For Round 4, the role & partner will be same as in Round 3.

Both the players will receive Rs.300 per head. Player 1 will have option to either 'Quit the round' or to 'Continue & so option of sending some money to Player 2'.

If Player 1chooses to quit, the round will end for that pair. If Player 1 chooses to send some money to unknown Player 2, the round will continue.

*** This time, the computer will not choose the multiplication factor randomly but value of the multiplication factor will depend on ranks obtained by Player 2 in a MECHANICAL TASK.

All the Players 2 will be given the engine of a small car, its wheels, model of the car, one screw & a screw-driver separately. They are required to assemble the car in given 5 minutes.

As soon as Player 2 finishes the task, he or she is supposed to submit it to the volunteers.

We will check the assembled car. If all parts are assembled properly & if it runs well, the mechanical task will be finished only for that Player 2. Similarly, all cars will be checked.

** Whoever finishes the task first, will get the rank 1. Next Player 2 will get the rank 2 & so on. All players 2, who submit after 5 minutes, will get the rank 'zero'.

Players 2 will be given chits with ranks written on it. They are requested to keep it confidential.

*** The rank obtained by Players 2 will be considered as pair's rank and all pairs will be placed in 3 categories (Top, Middle and Bottom) depending on the ranks.

** Pairs which obtain higher ranks compared to others, will be categorized in Top category and the sent money will be multiplied by 5

** For pairs categorized in Middle category, the sent money will be multiplied by 3

** For pairs categorized in Bottom category, the sent money will be multiplied by 1.

** This multiplied amount will be divided equally between both the players in the pair and will be deposited in each player's account.

** Pairs with 'zero' rank, will move out of the competition. In such case, amount sent by Player 1 to Player 2 will be taken away. Thus, Player 1 will retain the residual amount whereas Player 2 will not receive any amount from Player 1. So the closing balance for player 2 will be his personal endowment (Rs.300)

Do you have any question? Please raise your hand; volunteers will come to you to solve your query.

Round 5

Till Players 2 finish their mechanical task, please participate in round 5.

You have to choose one of the following three schemes.

Scheme 1 : pays you Rs.150

Scheme 2 : pays you Rs.300 with 50 % chance and Rs.0 with 50% chance.

Once you select this scheme, a keypad will appear on your screen.

It will have two keys, meant for 'head' and 'tail'. However, it will not be visible to you and keys will be jumbled.

You have to hit on any key randomly.

If 'head' gets selected from the chosen blank key, you will earn Rs.300 and if 'tail' gets selected, you will earn nothing.

Scheme 3 : is the combination of above two schemes.

If you opt for Scheme 3, you will face two keypads with blank keys.

First keypad will have names of the schemes underwritten the blank and jumbled keys.

Once you hit on any key randomly, if it happens to be 'scheme 1', you will earn Rs.150 however if 'scheme 2' gets selected, you will face another blank keypad for 'head' & 'tail'

Your payment will be calculated according to Scheme 2, as explained earlier.

You will be paid for this task in certain way. It means this payment will be in addition to the payment made for the randomly selected round.

If you have any query please raise your hand; else you may start the round.

Appendix III

1) Your Age :

2) The discipline you study in :

1)Science 2)Commerce 3)Arts 4)Vocational 5)Others

3) Educational Background of your father :

1)No Education 2) Matriculation 3)Graduation 4)Post-graduation 5)Doctorate 6)Other

4) Educational Background of your mother :

1)No Education 2) Matriculation 3)Graduation 4)Post-graduation 5)Doctorate 6)Other

5) Occupation of your father :

1)Govt/Private/Public Service 2) Self-employed 3)Medicine/Law/Accounts 4)Education 5)Household work 6)Other

6) Occupation of your Mother :

1)Govt/Private/Public Service 2) Self-employed 3)Medicine/Law/Accounts 4)Education 5)Household work 6)Other

7) Your parents' annual income is :

1)<Rs.50,000 2)Rs.50,000 - Rs. 1 lakh 3)Rs.1 lakh - Rs. 5 lakh 4)>5 lakh

8) Have you attended any experiment conducted by this Centre : Yes No

Appendix IV

Login ID for the experiment:

Please provide following information

1. Please provide your marks in 12^{th} (if 12^{th} not available provide 10^{th} marks)

_____%

2. Please write names of your three closest friends & their details

Sr. No.	Name	Gender	Age	Education & Occupation
1				
2				
3				
4				
5				

3. Do you have siblings (brothers & sisters) : _____

4. Information about your siblings :

Sr. No.	Name	Gender	Age	Education & Occupation
1				
2				
3				
4				
5				

5. Please write names of your five closest friends & their details

Sr. No.	Name	Gender	Age	Education & Occupation
1				
2				
3				
4				
5				