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SPECIAL ARTICLE

Stereotypical Occupational Segregation and Gender Inequality

An Experimental Study

SAVITA KULKARNI, NEERAJ HATEKAR

This paper attempts to distinguish "trust in cooperation" and "trust in ability" with respect to gender in an experimental trust game. "Trust in ability" with respect to gender is explored in the context of hands-on mechanical ability where females are stereotypically believed to be inefficient. Such stereotypes govern, directly or indirectly, women's access to education and employment, resulting in occupational segregation of the labour market. All this further intensifies gender inequality. We observed higher probability of exhibiting stereotype among men and women paired with other women, despite a statistically insignificant gender gap in actual mechanical performances. This indicates that "trust in ability" can be governed by such stereotypes and affect economic outcomes. We seek causes of the prevalence of gender stereotype in evolutionary psychology. We also describe the demotivating psychological process women suffered from, due to endorsement of such stereotypes by society.

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Savita Kulkarni (kulkarnisavitu@gmail.com) is a PhD candidate at the department of economics and a project Fellow at the CCSS, University of Mumbai, Mumbai. Neeraj Hatekar (neeraj.hatekar@gmail.com) is the Coordinator of the Centre for Computational Social Sciences, University of Mumbai.

1 Introduction

The gender division of the labour 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 the modern industrial labour market can be seen as a result of discriminatory practices against women. These practices originate from endorsement of prejudices, social beliefs, and stereotypes 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 managers, mechanical engineers and drivers are mainly perceived as men's fields whereas females are seen as best candidates as nurses, preschool instructors and elementary schoolteachers. Professional qualification or acquired skills often receive lesser weight in the recruitment process. However, widely divergent economic pay-offs 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 a source of discrimination. Eventually it gives rise to rigid social structures and becomes a long-term source of discrimination, besides setting in place a self-fulfilling mechanism. Initially, women face entry barriers in so-called masculine fields due to such misperceptions. The resultant incompetency is later cited as evidence to substantiate the stereotype and to further block entry. It transforms family-based patriarchal culture into an industrial-based patriarchal system. Unscientific trust in (in)ability restrains women's potentiality and lowers technological changes, the stock of human capital and economic efficiency.

The conservative attitude about women's ability in science and engineering fields (henceforth SEF) and their career opportunities can be explored experimentally in the Indian context. The focus of this paper is confined to the "trust in mechanical ability" where women are stereotypically inefficient in hands-on mechanical tasks. Although the gender gap in the performances of mechanical task was not statistically significant, we observed that in a trust game, male and female trustees transferred lower amount to their female partners when pay-offs were the function of partners' mechanical performance.

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The paper is organised as follows: Section 2 summarises studies dealing with scientific and social views about women's mechanical ability. Section 2.1 discuses the research methodology of the experimental study utilised in this paper. Section 2.2 reviews contemporary research on experimental games for "trust". Section 3 discusses the design of the experiment conducted. Section 4 provides data and result analysis while Section 5 concludes the paper.

2 Women's Mechanical Ability and Stereotypes

Women in modern society may not experience traditional gender discriminating practices like proscription of women from education and the labour market, but they are not free from discrimination. The practices take different forms. One such form is the prevalence of the stereotype that women are relatively inefficient in science and engineering subjects and particularly in carrying out hands-on mechanical tasks.

The power of this stereotype is demonstrated by students' sex composition in SEF. UGC (1999) report shows that in India, the female enrolment was less than 1% of the total enrolment till the 1960s; it rose to 8.3% by the mid-1990s. It grew further but was still relatively low at 16.2% in 1999-2000. Parikh and Sukhatme (2002)[1] reported that mechanical engineering was the least favoured discipline among females. Only 9.3% of female engineering students[2] chose this branch during 1994-98. According to UGC (2008), women's enrolment 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. Correll (2001) and Arnot et al (1998) separately provided sociological evidence for the existence of a social norm prescribing math and science as men's domains in the US and in Britain. The strength of the stereotype can be best judged by the fact that the US government passed the Science and Engineering Equal Opportunity Act (1980) to emphasise gender-wise equal opportunities in education, training and employment in SEF.

A lower female to male ratio in SEF can be mainly attributed to the misinterpretation of sex differences in cognitive abilities, 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 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 through the study of brain anatomy to defend women's confinement 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 "biological basis" for assignment of a particular social role 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). (In fact, similar performance in IQ tests by women despite having 10% smaller brain size should be regarded as more productive than men!) 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 tests 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 and Caplan (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 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 and critical generalisation 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[3] acts like a deterrent in the progress of the stereotypic group.

Schmader (2006) showed how contextual factors, such as existence of stereotypes, can discourage stigmatised groups from pursuing SEF education and careers. Prevalence and awareness of gender stereotype add to concerns of the stereotyped groups that their performance will be judged against the stereotype and it affects their performance negatively (Steele and Aronson 1995). Stigmatised groups interpret regular learning difficulties as proof of the claimed inability rather than natural parts of the educational 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 as well as among girls. McKown and Weinstein (2003) argued that perceived personal efficacy influences their choices, efforts mobilised in a given endeavour, 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 a negligible gender gap in SEF performances, controlling for various demographic variables. Chen et al (2006) 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. They provide plausible explanations for this gender-symmetric result as better pre-college preparation for engineering; a higher female enrolment ratio provides a nurturing environment for female students to excel at studies and strengthens their self-confidence in skills and ability that boost academic performance. 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 did not reflect any substantial gender difference. Controlling for education, work experience, leisure factors and gender explained only 2% of the additional variance (Fortson 1991).

Hyde (2006) synthesised 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) and 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 an institutionalised system of social practices or of constituting people as two significantly different categories, men and women, and organising social relations of inequality on the basis of that difference (Ferree, Lorber and Hess 1999; Lorber 1994; Nakano Glenn 1999; Ridgeway 1997; Ridgeway and Smith-Lovin 1999; Risman 1998).

It may also be observed historically that sociocultural organisations and the institutional framework have been shaped by rigid and self-sustaining stereotypic considerations of the (in)ability of women. The following example could be representative. 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 has approvingly quoted the following from the information brochure of a Japanese university (1929: 479):

> 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 that they shall come to realise 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.

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

There seems to be no significant change in these perceptions about women's ability in SEF cutting across countries and time. In 2006, the former president of Harvard University, Larry Summers also claimed that men have superior innate ability in math-related fields. (He was forced to resign after his public endorsement of this view caused a furore.) Preoccupancy of leaders of prime educational institutions with such stereotypes endows successive generations with a gender bias, distorting human capital and economic efficiency. This emphasises gender-neutral socialisation for eradication of gender inequality, first from the social mind and then from socio-economical institutions and more importantly impartial scientific approach towards gender-related research to deter the formation of any stereotype.

2.1 Methodology of Experimental Economics

Endorsement of such stereotype by a sample can be better investigated by conducting an economic experiment making the relevant context salient. As Nobel Laureate Vernon Smith (2006) describes it, laboratory experiments are methods of inquiry to study the motivated human interactive behaviour in a social context governed by explicit and implicit rules. Explicit rules include move sequences, pay-off structure 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 are not controllable and observable. An experimental set-up 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 cash-motivated participants. It is posited that people refrain from exhibiting idealistic views when sizeable monetary gains are on stake. The protocol of strict anonymity between experimenter and participants and within-participants eliminates participants' fear of being scrutinised and moral pressure (on them) to hide real preferences.

For this study, the trust experiment has been altered to behaviourally differentiate the trust extended towards women in baseline treatment and in treatment when the stereotype

was made salient. So it is pertinent to briefly review the experimental literature on trust games.

2.2 Literature Review of Trust Experiments

Formal government structures or a market economy cannot de-escalate ubiquitous informal bargaining institutions. Social beliefs, prejudices and stereotypes influence trust and trustworthiness, which are fundamental to these informal institutions. Trust is willingness to permit others' decisions to influence one's welfare. In the act of trusting, the individual (the 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 materialise only if the truster knows that the trustee will not exploit her vulnerability and will cooperate with her by reciprocating the trusting behaviour. So "trust in (truster's) cooperation" is the core element.

Berg et al (1995) designed a trust game to capture this trait. In the standard trust game, players are randomly paired and are endowed with sufficiently high endowment ($e > 0$). Player 1 (truster) is given an option of sending x_i part of e to the anonymous player 2 (trustee), where $0 \leq x_i \leq e$. The experimenter multiplies x_i by an integer $k > 1$ and then transfers it to the trustee. Then, the trustee decides to return any amount (y_i) to the truster where ($0 \leq y_i \leq e + k * x_i$).

Thus monetary pay-offs of truster (U_i) and trustee (V_i) are as follows:

$U_i = e - x_i + y_i$

$V_i = e + (k * x_i) - y_i$

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

Experimental evidence however deviated 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 the total. More than 35% of subjects returned more than the amount received by the truster, i e, shared the surplus. The systematic presence of trust and trustworthiness has been found in various studies (Cox 2002, 2004; Glaeser et al 2000; Barr 2003).

"Trust in cooperation" is sensitive to various social contexts, the interactive environment featured by communication, opportunity to reciprocate and punishment, 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 Sato 1988), and pre-experiment communication (Buchan et al 2002) can explain the variation in trust exhibited in experimental studies. We focus on research dealing with trusting[4] behaviour with respect to the gender of the 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 the trustee's gender. Women also sent less to female trustees (58%) than to male trustees (67%).

The 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 when the experimental design distributes property entitlements/endowments randomly, leading to unequal pay-offs for participants. (This concern has been checked by equal distribution of endowments to all participants.)

Similarly, altruism may motivate trusters to transfer positively without expecting reciprocal behaviour by the partner, i e, even in the absence of trust. Cox (2004) decomposed transfer made in a trust game in altruism and expectation of reciprocity (trust) by using a triadic design of a dictator[5] and trust game. He found a statistically significant difference in average transfers made in a dictator game and those in a trust game, implying altruism and trust are two different preferences and altruism can play a role in trusting behaviour.

As in the case of trust, altruist behaviour is also sensitive to a partner's gender information; however, studies are inconclusive. 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's (2004) results in a trust game, Ben-Ner, Kong and Putterman (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 a partner's gender information was made available.

For this study, the experiment was designed to first differentiate trust from altruism and then to compare trusting behaviour towards women in a trust game and in a game where the performance of females in a mechanical task determines the truster's pay-off. To the best of our knowledge, this is one of the few attempts to explain under-representation of females in SEF through experiments.

3 Design of the Experiment

The experiment consisted of two rounds of a dictator game and two rounds of a 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) Standard Trust game (T1): The transfer x is multiplied by one of the randomly chosen numbers (k) from the set of (5,3,1,0) and half of the multiplied amount is deposited in the trustee's account. Then the trustee transfers y to player 1 where $(0 \leq y \leq e+x*k/2)$. So the closing balance for player 1 was $(e - x + y)$ and for the trustee was $(e+x*k/2 - y)$. In this treatment, the multiplication factor (k) was chosen by the computer.

(4) Trust game with mechanical task (T2): Here the value of k was a function of the rank obtained by the trustee in a mechanical task. All trustees for whom a positive x was transferred, received an identical dissembled toy car with a screwdriver. Their performances in assembling the car in five minutes were ranked. A trustee's rank was considered as a pair's rank and all pairs were categorised in three categories (top, middle, bottom) based on their ranks. Trustees whose performance was in the top 30% were categorised in the Top category and their respective x was multiplied by 5. For the middle category (30%-70%), k was 3 and for the bottom category (0%-30%), k equalised with unity. This multiplied amount was equally divided between both the players. Trustees who failed to complete the task within the stipulated time received a zero rank. The transferred amount (x) was forfeited in case of zero rank (thus the closing balance for the truster was $(e-x)$ and (e) for the trustee).

(5) Risk Attitude (RA) task: 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[6] and nil with 50% probability. The third scheme was a combination of the first and second scheme. They were categorised as risk averse on selection of the first scheme, risk lover on selection of second scheme and risk neutral for the last.

This experiment was conducted using z-tree software.[7] Randomisation of role assignment and pair formation, in addition to double-blind anonymity, was emphasised during instructions. Roles and partners were fixed for the experiment. Private ownership of the endowment was conveyed assertively. Acceptance of zero transfer was affirmed by providing the options of quitting the round before they got a checkbox to enter the amount. All rounds were independent and results of all rounds were informed at the end of the experiment so the strategic element or risk of reciprocation faced while deciding x 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 the Risk Attitude task in case of trusters. The "Order effect" was controlled by reversing the order of only T1 and 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 the D1-D2-T1-T2 & RA manner and the rest in the D1-D2-T2 & RA-T1 manner.

Instructions[8] 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 subjects' comprehension of the instructions.[9] Instructions were neutral and did not have any suggestive terms like dictate, truster, trustee, return, etc.

Information on their demographic profile was collected. It was followed by a questionnaire on gender-mingling of participants. Gender-mixing since childhood was expected to have influence on awareness and endorsement of a gender stereotype. Children are hypothesised to be explaining others' behaviour towards a stigmatised group in terms of broadly held stereotypes only after the age of 10 years (McKown and Weinstein 2003). So data on participants' type of secondary school (5th-10th standard, and whether coed, single-sex or both partially) was obtained. Similarly, data of female siblings and number of female friends in their five closest friends circle was collected. Educational and occupational information about siblings and friends was asked to disguise the purpose. The whole exercise, including payment, took approximately one hour and 30 minutes.

In our experimental design, we replaced constant k in a standard trust game by a varying k to maintain symmetry in the surplus generation method between T1 and T2. In T1, transfer was also a function of the truster's expectation about his/her partner's reciprocation, while in the following treatment, risk of poor reciprocation was eliminated by placing a 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 and Results

Experimental Data

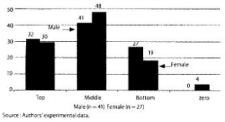
A total of 156 postgraduate students from Pune and Mumbai were covered in nine experimental sessions during September to October 2012. The average age of the sample was 23 years. Of this, 38% of the sample had annual family income ranging between Rs 1 lakh and Rs 5 lakh and 36% had a family income above Rs 5 lakh. Around 17% of the sample belongs to the income group between Rs 50,000 and Rs 1 lakh and the balance 8% had family income below Rs 50,000. Out of 78 pairs, 48 pairs were formed by management students and the rest by students of the science faculty. The sample comprised 68 females[10] and 87 males. A total of 42 males and 35 females played the role of dictator and truster in respective games. A total of 45 males and 32 females played the role of recipient or trustee. Participants in each session belonged to the same class and thus were not strangers in a strict sense. Based on the choices made in risk attitude task, 52% of the trusters were categorised as risk neutral, 30% as risk averse and remaining 18% as risk lover.

Descriptive Statistics

Figure A (Appendix, p 120) shows a positively skewed distribution of transfers in all four treatments. The averages of D1 and D2, as presented in Table 1 (p 117), are lower than the corresponding

figures documented in the literature. It should be noted that the mean transfer in T1 is not comparable with other studies given the key distinction of varying k in our experimental set-up.

Figure 1: Gender-wise Mechanical Performance of Trustees (in %)



Source: Authors' experimental data.

Sample Selection Bias and Heckman 2-stage Estimation: The chosen experimental design allowed players to send nil so occasionally dependent variables (transfers in T1 or T2) took a value of zero. In such cases, ordinary least squares (OLS) would

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

Source: Authors' experimental data.

lead to truncation of the sample. Such a "non-random" sample would conceal any systematic difference between the subsample that transferred positively and those which did not. So we corrected this selection bias by using the Heckman two-stage procedure (Heckman 1980). This procedure estimates a 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 that results from excluding the sample of non-transferring participants from the regression. While the estimates yielded by the Heckman method are consistent, they are not asymptotically efficient. We also ran censored Tobit model, which uses maximum likelihood method for estimation to further substantiate our results.

The vector of explanatory variables for both the treatments was same except that transfers in T1 have an additional variable of "risk pay-off 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 a partial idea about their final payment gained due to guaranteed pay-off in this task. However, this might have distorted their future decision, viz, transferred amount in T1 and thus was required to control for. Based on inverse Mills ratio (so.86) presented in Table 2, we failed to reject the null of no sample bias at 10% (p=0.0716); rho stood at 0.8836, suggested absence of perfect correlation in error terms of selection and outcome equations.

Since the OLS estimators, in the absence of sample selection bias, are efficient, the statistically insignificant coefficient of "risk pay-off before transfer in T1" (-0.02, p=0.849) shows that the administrative manipulation did not influence

Table 2: Heckman Estimation and Tobit Model for Transfers in T1 & T2[1]

Dependent variable	Estimates for Transfers in T1		Estimates for Transfers in T2	
Methods	2 Step Heckman[2]	Tobit Model[3]	2-step Heckman[4]	Tobit Model[5]
Truster's gender	-38.33 (0.1152)	-44.28 (0.0598)	-66.37 (0.0118 *)	-76.67 (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 (0.3578)	-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 (0.8016)	-0.04 (0.9939)	1.10 (0.8562)	-0.09 (0.9886)
Scores in 12th class	2.76 (0.0324 *)	1.41 (0.1419)	1.33 (0.1700)	1.33 (0.1801)
Mother's education	-0.96 (0.9179)	-3.52 (0.7829)	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 (0.6139)	-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 (0.5905)
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)	59.79 (0.7854)	89.91 (0.6530)
Risk pay-off 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 & co-ed school partially; 3= co-ed schooling, Class = 1 for undergraduate; 2=postgraduation; 3= PhD Scholars , Order effect =1 for t2t1; 0 for t1t2, Risk averse/loved/neutral = 1 when scheme choice is 1/2/3

[2] censored observations = 19; observed observations = 58
37 free parameters (df = 41)
Adjusted R-Squared:0.5706
Inverse Mill's Ratio= 50.8549 (0.0716 .)
sigma = 57.5542 rho = 0.8836

[3] logSigma = 4.11896 (< 2e-16 ***)
Newton-Raphson maximisation, 7 iterations
Log-likelihood: -320.2466 on 18 Df
Left-censored (19) Uncensored (59) Right-censored (3)

[4] Censored observations =10; observed observations =67
35 free parameters (df = 43)
Adjusted R-Squared: 0.606 ;
Inverse Mill's Ratio = 69.795 (p=0.103)
sigma = 64.406 rho = 1.084

[5] logSigma: 4.25379 (p = < 2e-16 ***)
Newton-Raphson maximisers, 10 iterations
Log-likelihood: -366.011 on 17 Df
Left-censored observations: 10 Uncensored observations: 62
Right-censored observations: 5

(P-values in parenthesis are significant at : '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1)

Source: Authors' experimental data.

transfers in T1. This was confirmed by the Tobit regression. Karl Pearson's correlation coefficient between risk pay-off and transfer in T1 was also low at 0.16. The estimator for altruism, as measured by transfers in T2 was positive and statistically significant; however, its magnitude was considerably lower. The truster's gender was negatively associated with transfers in T1, indicating that female trusters sent lower amounts than their male counterparts. The adjusted R-squared of the outcome model was modest at 54%.

The Inverse Mills ratio for transfer in T2 stood at 69.795, insignificant at 10% (p=0.103) and rho was 1.08. We failed to reject the null of no sample bias in the data studied. In the probit selection equation (not reported here), only the truster's gender dummy showing positive transfers in T2 was statistically significant (-3.26197 (p=0.0452) and 1.694458 (p= 0.0598) respectively). It suggests that females were less likely to participate voluntarily and this particular recruitment mechanism was likely to attract more altruist individuals.

Table 3: Logit Model and Calculation of Probability
Dependent Variable: Logit (stereotype)

Regressors	Estimate/Coefficient	mm	MF	fm	FF
Intercept	-3.15 (p=-0.0002***)	-3.1526	-3.1526	-3.1526	-3.1526
Truster's gender	0.94 (p=-0.3137)	0	0	1	1
Trustee's gender	0.35 (p=0.7219)	0	1	0	1
Estimated logit		-3.15	-2.82	-2.22	-1.91
Estimated probability = 1/(1+(exp(- estimated logit)))		0.04	0.06	0.1	0.13

Residual deviance: 41.071 on 75 degrees of freedom AIC: 47.071

Number of Fisher Scoring Iterations: 5.

Source: Authors' experimental data.

Both the OLS (outcome) and Tobit models showed, with different magnitudes, that female trustees received statistically significantly lower transfers compared to males, an indication of endorsement of stereotypes by trusters. Female trusters also sent less than male trusters. Transfers in D2 explained the variation in transfers in T2 in a significant way. There also existed a statistically significant causal relationship between school type during the secondary school education and transfers. It implies that gender-mixing in the age group of 10-15 years contributes significantly in the formation of the stereotype. The estimated coefficients for order effect, risk attitudes and other gender-mingling variables were statistically insignificant. The adjusted R-square of the outcome model was satisfactorily high at 60%. The Censored regression model obtained the logarithmised variance of 4.2539, significant at 1% (p = < 2e-16 ***).

We also calculated the probability of male and female trusters reducing the transfers in T2 as an indicator of endorsement of the stereotype with respect to *ff, mm, fm, mf*. A dummy variable called "stereotype" (=1, when truster reduces transfer in T2; 0 otherwise) was created.

As shown in Table 3, the estimated probability of transfer reduction in T2 is just 0.04 for *mm*. It increases to 0.06 when male trusters are paired with females. The chance of exhibiting stereotype was slightly higher for *ff* (0.13) than for *fm* (0.10).

These results imply that both genders had a poor opinion about female mechanical ability; however, modest increases in probabilities indicate that the stereotype might not be very prominent. Alternatively, stereotype power might have been confounded by the supposition that women are hard-workers (Schwieren and Sutter 2007) and thus would put in more efforts for better mechanical performance. Whatever the cause, being paired with women, did not discourage trusters to sharply cut down their transfers.

Remarkably, the probability of reducing the transfer was higher for female trusters, irrespective of trustees' gender. Few alternative explanations can be proposed whose consistency needs to be examined. First, women could have shied away from the competitive environment. Additionally, women's prediction about others' competency 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 about drastic changes in transfers.

The post-experiment questionnaire also revealed the 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 the 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 moderate at 38%.

Gender-wise Comparison of Actual Performance

The actual performance of trustees suggested a modest gender gap; however, it was not statistically significant for any of the categories (using the test for equality of proportions). As shown in the Figure 1 (p 117), the percentage of female trustees placed in the top category was lower than their male counterparts. The 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.

Limitation of the Study

The decision to endorse the stereotype could also be influenced by the experimental environment. First, these computerised experiments were administered by a female experimenter, accompanied by female volunteers who handled all

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computer-related accessories and computer-networking efficiently. This might have contaminated participants' views about the engineering and mechanical ability of women. We also feared that the assigned mechanical task might have been perceived to be very simple by trusters. Around 80% of trustees also reported that the task was "very easy" or "easy", while the 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 a metropolitan city having relatively higher gender-mingling social contacts and wide exposure to various dynamic processes enriching their experience-based knowledge. All being postgraduate 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. A similar exercise with samples from a rural area, patriarchal societies, junior colleges or 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 the surplus-sharing method. While in T2, the surplus was equally divided, it was based on the trustee's discretion in T1. The procedural difference was viewed essential to qualify T1 as a trust game. As a result, the two risks confronted by the truster (in T1), namely, realisation of lower value of *k* and poor reciprocation, would have suppressed transfers in T1 unequally. The 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 it was dependent on human actions (mechanical task) in the subsequent treatment. The impact of this process-discrimination needs to be tested referring to the studies which observed that human participants behave differently when opponents are non-human (Blount 1995). Nonetheless, the regression results of transfers in T2 confirming gender bias may not be undermined because of these shortcomings.

5 Concluding Remarks

This paper addresses the theoretical distinction between "trust in cooperation" and "trust in ability" with the help of an experimental trust game. "Trust in ability" of partners was tested by making the pay-off dependent on the trustee's performance in a hands-on mechanical task, where the fact that females are stereotypically considered as less efficient was expected to play a decisive role.

"Trust in ability" was found to be governed by the stereotype. Both male and female trusters appeared to be endorsing the stereotype as the probability of reduction in transfer in T2 was higher when paired with female trustees. Adjusted for sample bias and controlled for other relevant explanatory variables, the OLS and Tobit regressions too confirmed the negative causal relationship between transfers in T2 and information of trustees being female. However, we did not find a gender gap in actual mechanical performances.

These findings call for cogitation by society about the unscientific social belief about the mechanical ability of women. The self-efficacy belief of females and a higher tendency to fall in a confidence trap, in addition to society's poor expectations, underline the necessity of gender-neutral socialisation. The statistically significant negative regression coefficient of coed education emphatically underlines the conscious initiation of gender-blind socialisation from the age of 10 years. It would help to correct the under-representation of women in S&P and subsequent stereotypical occupational segregation of the labour market.

NOTES

1 The study was conducted between 1994 and 1998 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.

2 37% of female engineering students preferred electronics, 20% opted civil engineering and another 16%-17% chose electrical and computer engineering, respectively.

3 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.

4 Restricting the focus on trust behaviour, studies on gender-wise differences in reciprocities are not provided. Similarly, our experimental data on reciprocity is not discussed here.

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

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

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

8 Instructions, questionnaires on demographic profile and gender-mixing will be supplied on request.

9 Players who gave wrong answers received the instructions again.

10 The observation of a female player 1 was eliminated as she provided insufficient data.

11 Regression models are run in R open source software. R Development Core Team (2008): R: A language and environment for statistical computing, R Foundation for Statistical Computing, Vienna, Austria, ISBN 3-900051-07-0, URL http://www.R-project.org

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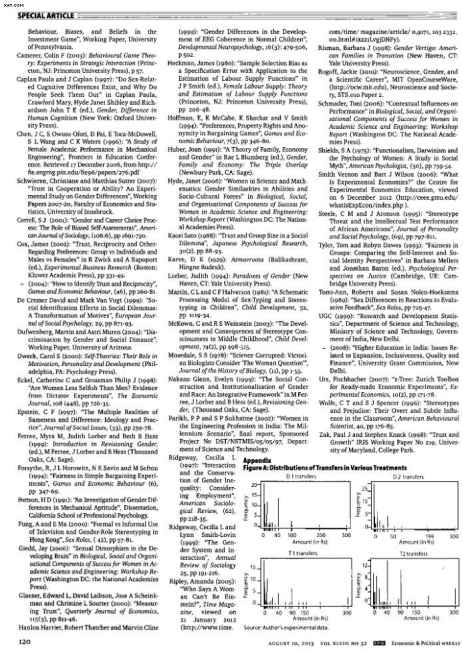
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Appendix

Figure A: Distributions of Transfers in Various Treatments

Source: Author's experimental data.