

**Forecasting the Risk Attitudes of Women and Men: An Experimental Test of the Strength  
of Gender Stereotypes\***

Oleksandr Lugovskyy  
University of Kansas

Philip J. Grossman  
Department of Economics  
Saint Cloud State University  
720 4<sup>th</sup> Avenue South  
St. Cloud, MN 56301  
320-308-4232

October 2007

Preliminary draft.

**ABSTRACT**

This paper experimentally investigates the role of gender-based stereotypes in the forecasting of risk attitudes. Subjects predict the gamble choice of target subjects in one of three treatments: 1) Visual – the predictor can only observe the target; 2) Information – the predictor has information about the targets’ response to two statements from a risk-preference survey; and 3) Combined – the predictor both observes the targets and has the targets’ two responses to the risk-preference survey. Our results suggest that stereotypes play a considerable role in forming predictions about others’ risk attitudes and that these stereotypes persist even when more relevant information is available.

Keywords: Experiment, Gender, Risk      JEL codes: C91, D8, J16

\* This research was supported by grants from the John D. and Catherine T. MacArthur Foundation, Network on Preferences and Norms, and a SCSU Faculty Research Grant. We thank Catherine C. Eckel, John Kulas and Orn Bodvarsson for their helpful comments and Rick Wilson for his programming assistance.

## **Forecasting the Risk Attitudes of Women and Men:**

### **An Experimental Test of the Strength of Stereotypes**

#### **I. Introduction**

Whether men and women differ in their attitudes towards risk (and more specifically in their willingness to accept risk, *ceteris paribus*) is a subject of much debate and no clear answer is provided by the existing data. While most evidence suggests that women perceive risks as greater, engage in less risky behavior, and choose alternatives that involve less risk, not all studies find a stable sex difference (see Eckel and Grossman – EG hereafter, forthcoming, for a review of the literature). While it is not known whether or not there are gender difference in risk aversion, some evidence suggests that women are *perceived* to be more risk averse than men. EG report evidence suggesting that subjects in their experiments consistently used visual clues (i.e. the sex of the other subjects) in assessing the risk preferences of others and consistently assessed females to be more risk averse than males. (In general, subjects under predicted the risk preferences of other subjects, but the prediction error was greater when predicting for women than for men.) The evidence suggests that subjects applied stereotypes in predicting the risk attitudes of others.

Stereotyping is the act of assigning to a member of a particular group a characteristic or trait based solely on the individual's membership in that group. Stereotypes may be benign, somewhat accurate, expressions of folk wisdom or may be prejudicial, inaccurate, and used to justify discriminatory behavior. Whether benign or prejudicial, stereotyping results in the individual being seen not as a distinct being with his or her own attributes but solely as a member

of a group conforming to some unvarying pattern, lacking any individuality. If forced to predict the characteristics or actions of an individual with limited or no information, drawing on stereotypes may improve one's forecasting accuracy relative to randomly guessing, assuming the stereotype contains some kernel of truth. When presented with more individuating information relevant to the characteristic or action being predicted, downplaying any stereotype in favor of the individuated information should improve the accuracy of predictions.

The Psychology literature has extensively addressed how and when stereotypes are used when judging others. Dual-process theories argue that there are two different ways of judging a person: either by relying on stereotypes or by assessing the individual's specific attributes or qualities (see Bodenhausen, Macrae, and Sherman, 1999, and Kunda and Thagrad, 1996, for reviews of the evidence regarding dual-processes in stereotyping). The general conclusion is that "...judgment-relevant behavioral information can undercut stereotyping in judgments of individual group members theories" (Gill, 2004, p 629). This conclusion is not, however, universally supported. Some researchers argue that the dominance of individuating information over stereotypes is only evident when considering weak stereotypes or when the individuating information was made salient and the stereotypes were not made salient (see for example Nisbett et al., 1981, and Beckett and Park, 1995). Studies by Sherman (1996) and Trope and Thompson (1997) find that stereotypes dominate individuating information. Kunda, Sinclair and Griffin (1997) find that individuating information weakens the effects of stereotypes regarding assessment of a target's traits but has little effect on stereotypes when predicting the same target's trait-related behavior.

Bodenhausen, Macrae, and Sherman (1999) note that "[W]ell-educated undergraduates may often be quite reluctant to furnish stereotypic reactions and may well be on their guard to

ensor such responses when their behavior is being monitored by a researcher (pp. 280-281).” This highlights an important difference between many psychology experiments and economic experiments. The typical subject (at least historically) in a psychology experiments is an undergraduate participating as a requirement of his or her psychology class. The salient incentive is the requirement to show up; the actual decisions made have no relevance. The typical subject in an economics experiment is an undergraduate participating voluntarily. The salient incentive is the possibility of earning money with the actual decisions made directly affecting the amount of money earned. In the experiment reported on in this paper, subjects predict the behavior of other subjects and if correct they increase their earnings. If they believe applying a stereotype has predictive ability, they have less incentive to censor their responses than they would in a psychology experiment.

This paper experimentally investigates the strength of gender-based stereotypes in the forecasting of risk attitudes in the face of what should be more relevant, individuating information. In the EG study, the only information provided subjects making predictions was that provided by observing the other subjects visually (i.e. when a subject’s risk choice was to be predicted, that subject stood so all other subjects could view him/her). Subjects making predictions have nothing but visual clues upon which to base their predictions.<sup>1</sup> For this study, subjects make predictions in one of three treatments. Our first treatment replicates the EG procedure, providing subjects only visual clues on which to base their predictions. In the second treatment subjects receive no visual clues but instead are provided the other subjects’ responses to two statements from the Weber, Blais, and Betz (2002) risk-preference survey (one of which is a gamble-oriented statement). For the third treatment subjects receive both the visual clues

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<sup>1</sup> Our focus here, as in EG, is on the sex of the target. Predictors may have drawn clues from visual factors other than the sex of the target (i.e. manner of dress, hairstyle, or posture for example). We did not collect this type of data.

and the responses to the two survey statements. We report evidence consistent with EG; treatment one predictions are consistent with gender stereotyping. More importantly, predictions are still consistent with gender stereotyping even when subjects are provided the target's responses to the risk survey statements. Our results suggest that individuating information is largely downplayed in favor of gender stereotypes.

The design and procedures of our experiment is described in the next section. In Section III we present the results. Section IV concludes.

## **II. The Experiment**

### Design

Our experiment design largely mimics that of EG. The experiment consists of three tasks: a psychological survey measure of risk attitudes, a gamble choice with substantial financial stakes, and a prediction of others' gamble choice. Each of the tasks is discussed in more detail below.

For the first task, the participants are asked to complete the Weber, Blais, and Betz (2002) Domain Specific, Risk-Attitude Scale (DSRAS) survey (see the Appendix for the survey). They are informed they will earn \$8 for completing the survey. Subjects are paid for completing the task rather than just being given the money. This is intended to engender a sense of ownership and help minimize any "house money" effect<sup>2</sup>. The subjects are informed that this money may be at risk at a later stage of the experiment.

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<sup>2</sup> One issue that has only rarely been addressed in experimental research is the effect of "house money" on subjects' decisions in gambling experiments, i.e., do subjects make riskier choices than they would if playing with their own money? An exception is Thaler and Johnson (1990), who, besides coining the term "house money," find that subjects increase their preference for a risky choice after a previous win under conditions of low or hypothetical stakes. Since we are interested in subjects' risk preferences relative to each other, the house money effect is not

The DSRAS survey consists of 50 statements. The survey is designed to measure risk attitudes across five domains: financial, ethical, health/safety, recreational and social. Subjects indicate (on a Likert scale of 1 to 5) both their likelihood of engaging in a risky activity and their perception of the risk associated with that activity. Sample statements include:

Arguing with a friend, who has a very different opinion on an issue (Social).

Investing 5% of your annual income in a very speculative stock (Financial).

Buying an illegal drug for your own use (Health).

Chasing a tornado by car to take photos that you can sell to the press (Recreational).

Cheating on an exam (Ethical).<sup>3</sup>

For the second task, subjects are presented with six different gambles. Each gamble has two outcomes, each with equal probability of occurring. Table 1 lists the six gambles, their payoffs and risk (subjects only saw columns 1 – 4 of Table 1).<sup>4</sup> The gambles (excluding gamble 6) are designed so that their expected payoff and risk increase linearly. Gamble 1 offers a sure payoff of \$10. The expected payoff increased by \$2 with each of the gambles two through five. Gamble six has the same payoff as Gamble 5 but with higher associated risk. We include this gamble to distinguish the risk-lovers. Gambles 1—3 offer positive payoffs regardless of outcome. Gambles 4—6 have negative payoffs should outcome B occur. Subjects are informed that if they select a gamble with a negative payoff for outcome B, negative payoffs will be deducted from their payment for completing the survey in Part 1 of the experiment.

For the final task participants predict the gamble choice of every other participant in their session. To motivate subjects to make their best prediction, participants are paid \$1 for every

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likely to change the pattern of our results. It is our belief that our procedure – earning the \$8 – should instill a greater sense of property rights in the money and therefore elicit a more accurate measure of risk preference.

<sup>3</sup> See Englestad, Grossman, and Lugovskyy (2006) for a complete discussion of the survey results.

<sup>4</sup> As measured by standard deviation from the expected payoff.

correct prediction they make. Three treatments are used in this task. Treatment 1 (Visual hereafter) replicates the EG procedure. The EG protocol is "...designed to activate unconscious stereotypes (p.9)." A subject (the target) stands up and the rest of the participants (the predictors) are asked to predict the gamble choice of the person standing. This procedure is followed for all participants in a session. All sessions are mixed gender and no mention of gender or visual characteristics is made so subjects are unaware of the purpose of the task.

For treatment 2 (Information hereafter) the predictors do not see their target. Instead of visual clues, the target's responses to the two likelihood of engaging in the activity statements (one social and one financial) from the DSRAS survey are substituted. The social risk statement is: Arguing with a friend, who has a very different opinion on an issue; the financial risk statement is: Investing 10% of your annual income in a very speculative stock. The predictors are informed about the target's likelihood of engaging in each activity. Subjects are asked to predict the target's gamble based on this information alone. Treatment 3 (Combined hereafter) is a combination of Visual and Information. Subjects are asked to stand up one at a time and their responses to the two survey statements are provided as well. The three treatment design permits us to test whether or not predictions are driven by stereotypes, and whether or not the provision of more relevant information about the subject's risk-taking choices diminishes the role of stereotypes.

The financial statement used is selected because, while it is not specifically a gambling statement, it projects the air of a gamble since the statement refers to a "very speculative stock." It is believed that subjects' responses to this statement will correlate well, or at least subjects might believe the responses will correlate well, with the decisions made in the gambling exercise. Subjects' responses to this statement provide predictors with individuated information

relevant to the action being predicted. We include the responses to the social risk statement to determine if subjects ignore or not information that should be irrelevant.

### Procedure

All sessions of the experiment followed a standard procedure. The experiment is conducted online with participants seated individually in front of terminal screens. All instructions and forms are completed online (except the consent form and a final survey form that collected socio-economic characteristics). Subjects are instructed that if they have any questions they should raise their hands and one of the experimenters would come to them. Consent forms are distributed, signed by the individuals and collected. Slips of paper with ID numbers and machine numbers are randomly distributed.

After logging in with their ID and machine numbers the subjects receive instructions for the DSRAS survey. They are informed that they will be paid \$8 for completing the survey. After all subjects have completed the DSRAS survey, subjects are presented with the six gambles and asked to choose one. (Subjects complete each, task 1 and 2, at their own speed but are prevented from moving on from one task to another until all subjects have finished.)

Once everybody has completed task 2 the subjects move on to task 3. For VISUAL and COMBINED, subjects are called by ID number to stand up. As the target subject stands, the remaining participants are asked to enter their prediction for the standing subject's gamble choice. For Combined, as a target stands her responses to the two survey statements are displayed on the predictors' screens.<sup>5</sup> Every predictor has to have entered a prediction for the target before the next target is asked to stand (or survey responses are displayed). For Information the ID numbers and survey responses are shown on the screen, one subject at a time.

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<sup>5</sup> We did not sequence the visual clues and survey responses; the survey responses appeared at the same time the target is asked to stand. It is possible that the order in which the predictor registered the information may have influenced the prediction made.

A prediction is entered for one subject before the ID and survey responses for the next subject is displayed.

After everyone completes task 3, the outcome of the gamble is determined. Subjects' terminals display ten cards. The subject selects one card. That card is turned over to reveal either an A or a B, the outcome of the gamble. The rest of the cards are then turned over to show that initially there were five cards labeled A and five labeled B. Subjects are informed of their total earnings. Subjects then complete the socio-economic survey. One at a time, subjects are then called out of the room and paid their earnings in private. They are then free to go.

### **III. Results**

#### Subject Characteristics

A total of 120 individuals (75 men and 45 women) participated in the experiment. There were six sessions with 15 individuals and three sessions with 10 individuals. There were three sessions for each treatment. Forty-five subjects participated in Visual sessions, forty subjects in Information sessions; and thirty-five subjects in Combined sessions. Every session had no less than 30 percent and no more than 40 percent women. On average subjects earned \$27.13.

#### Gamble Choices

Table 2 reports mean gamble choices for all subjects by treatment and by sex. The overall mean gamble choice is 4.00. Mean gamble choice vary little by treatment; Visual = 3.98, Information = 4.08, and Combined = 3.94. A  $\chi^2$  contingency table test does not reject the null hypothesis that gamble choices do not differ by treatment (p-value = 0.71). In general, our results are consistent with the findings of EG that women are more risk averse than men. The mean gamble choice for women is 3.78; the mean gamble choice for men is 4.13. However, our

results are not significant; a  $\chi^2$  contingency table test does not reject the null hypothesis that gamble choices do not differ by sex (p-value = 0.54).<sup>6</sup>

In making their predictions, predictors know the sex of the targets, the targets' responses to the two survey statements, or both the targets' sex and responses. How well these factors correlated with gamble choice is reported in Table 3. Of the three, only a subject's response to the financial risk statement (Investing 10% of your annual income in a very speculative stock, mean response = 2.38; std. dev. = 0.94) is significantly, and positively, correlated with gamble choice. Sex (1 = male) is positively correlated with gamble choice, while response to the social risk statement (Arguing with a friend, who has a very different opinion on an issue, mean response = 3.97; std. dev. = 1.02) is inversely correlated with gamble choice.

### Gamble Predictions

Table 4 reports gamble predictions by treatment and sex of the predictor. The first thing to note is that predictors tend to underestimate the amount of risk taken. The mean prediction is 0.25 less than the mean gamble choice (3.75 vs. 4.00).<sup>7</sup> The mean gamble prediction does not vary greatly across treatments (3.75, 3.68, and 3.83 for Visual, Information, and Combined, respectively). A  $\chi^2$  contingency table test cannot reject the null hypothesis of no differences in predictions across the three treatments (p-value = 0.144). The mean gamble prediction also does not differ by the sex of the predictor. Mean predictions by men and women are 3.77 and 3.71, respectively. A  $\chi^2$  contingency table test does not reject the null hypothesis of no differences in predictions by sex of the predictor (p-value = 0.162).

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<sup>6</sup> A means test also cannot reject the null hypothesis that gamble choices do not differ by sex (t-statistic = 1.44, p-value = 0.15, two-tailed test).

<sup>7</sup> The mean gamble prediction is significantly less than the mean gamble choice (t-statistic = 1.93, p-value = 0.03, one-tailed test).

## Gamble Predictions and Stereotyping

These summary results however mask some important differences, suggestive of stereotyping, which become evident once we control not only for treatment, but also for sex of the target (see Table 5). The null hypothesis that gamble predictions are independent of the predictor/target pairing is rejected for Visual and Combined, where sex of the target is known, but not for Information, where sex of the target is unknown ( $\chi^2$  contingency table test p-values = 0.000, 0.203, and 0.000 for Visual, Information, and Combined, respectively, see column 11).<sup>8</sup>

To better address the issue of stereotyping, consider first Visual and Combined. In Visual, the predictor only has visual clues (i.e. the sex and minority status of the target); in Combined, the predictor has visual clues plus the targets' responses to the two survey statements. In the absence of stereotyping, predictions in both treatments should be independent of the sex of the target. If in the absence of other, more relevant, information predictors revert to stereotyping, then predictions in Visual will not be independent of the sex of the target, but predictions in Information will be independent. As reported in Table 5 for both treatments  $\chi^2$  contingency table tests reject the hypothesis that predictions are independent of the sex of the target. Men and women both consistently predict women to be more risk averse than men (by approximately 1 gamble choice), consistent with the general stereotype.

The impact of the extra information (responses to the two survey statements) provided predictors in Combined has no significant impact on the pattern of predictions. Using  $\chi^2$  contingency table tests, we compared predictions in Visual to predictions in Combined in total, controlling for sex of the predictor, sex of the target, and sex of both predictor and target (see Table 6). In no instance is the null hypothesis that predictions are independent of treatment

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<sup>8</sup> We also find that, within any treatment, predictions are not independent of the sex of the predictor for Visual and Information, but not Combined. The Combined predictions are not independent of the sex of the predictor at the 10 percent level of significance, however. Results are available upon request of the authors.

rejected. This conclusion is further supported when we consider mean prediction errors controlling for both the sex of the predictor and the sex of the target (see Table 7). We define prediction error as the difference between the prediction and the target's actual gamble choice (i.e. predicted gamble choice – actual gamble choice, which can vary between -5 and 5). For all predictor/target pairings, the extra information has no significant impact on the prediction error; the mean prediction errors are insignificantly different across treatments.

Further evidence that stereotyping is occurring is provided when we consider Information and Combined. In Information subjects do not know the sex of their targets but do know how their targets responded to the two survey statements (one of which, as noted above, is significantly correlated with gamble choice). In the absence of stereotyping, predictions in both treatments should be independent of the sex of the target. If the addition of irrelevant (sex of target) information results in stereotyping then predictions in Information will be independent of the sex of the target, but predictions in Combined will not. As reported in Table 5,  $\chi^2$  contingency table tests do not reject the null hypothesis that predictions are independent of the sex of the target for Information but do reject the null for Combined.

Now the impact of the extra information (sex of the target) provided in Combined has a significant impact on the pattern of predictions. Using  $\chi^2$  contingency table tests, we compare predictions in Information to predictions in Combined in total, controlling for sex of the predictor, sex of the target, and sex of both predictor and target (see Table 8). For every predictor/target pairing except all/all and female/female the null hypothesis of treatment independence is rejected.<sup>9</sup> Comparing mean prediction errors (Table 9) provides additional evidence of stereotyping. Providing information about the sex of the target significantly

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<sup>9</sup> Treatment independence for the all/all pairing is rejected at the 7 percent level.

increases the degree men's gamble choices are over estimated and exacerbates (but not significantly) the degree women's gamble choices are under estimated.<sup>10</sup>

To control for the fact that subjects made multiple predictions, we perform random effects, ordered probit regressions.<sup>11</sup> Table 10 reports results for two ordered probit models for each treatment. Model 1 includes only the target's characteristics; Model 2 includes both the target's and the predictor's characteristics. Target characteristic variables include the visual characteristics MALE TARGET (= 1 if male) and MINORITY TARGET (= 1 if non-Caucasian).<sup>12</sup> Also included are target's responses to the survey statements –TSOCIAL and TINVEST. Predicting subject variables include MALE PREDICTOR (= 1 if male), PREDICTOR GAMBLE CHOICE (the predictor's own gamble choice), and MINORITY PREDICTOR (= 1 if non-Caucasian). Likelihood ratio tests reject the null hypothesis that the coefficients for the predicting subject variables jointly equal to zero for Information and Combined, but not for Visual ( $\chi^2(3) = 6.24$ , p-value = 0.100 for Visual;  $\chi^2(3) = 28.30$ , p-value = 0.000 for Information; and  $\chi^2(3) = 25.78$ , p-value = 0.000 for Combined). We therefore focus our discussion on the results from Model 2.

We include in both models all target characteristic variables whether observed by the predictor or not. As expected, in the Visual regression, the coefficients for TSOCIAL and TINVEST are insignificantly different from zero (see Table 10). Likewise, in the Information regressions, the coefficients for MALE TARGET and MINORITY TARGET are insignificantly different from zero.

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<sup>10</sup> The change in the mean prediction error for the male/female pairing is significant at the 6 percent level.

<sup>11</sup> Gamble choices and gamble predictions were coded from risk less to riskiest as 0, 1, 2, 3, 4, and 5.

<sup>12</sup> We do not control for the target or predictor subject's age due to small variation in this variable. Subjects ranged in age from 17 to 29. While we expect age to be an important visual characteristic for predicting risk preferences, the visual physical characteristics on which such predictions might be made are unlikely to be evident without greater age variation. In preliminary regressions, we controlled for major, number of economics classes taken, and self-reported grade point average. We do not report these results because these variables were individually and jointly insignificant.

Consider first the four target characteristics variables. The argument for the existence and persistence of gender stereotyping is supported by the significant and positive coefficients for MALE TARGET in Visual and Combined; the two treatments were sex of the target is known. Furthermore, the coefficients are virtually identical, even though in Combined predictors have the targets' survey statement responses. This suggests that the target sex's *ceteris paribus* effect on the prediction does not differ between Visual and Combined. Interestingly, the evidence does not show the same persistence for racial stereotyping. The coefficient for MINORITY TARGET, significant and negative in Visual, is insignificant in Combined. One possible explanation for this finding is the heterogeneity within minority status targets; there may not be a widely accepted stereotype regarding minorities that deemed applicable across all racial/ethnic groups. Lacking some hard and fast stereotype to draw upon, predictors may have believed accuracy would be enhanced by making use of the survey statement responses.

While the results suggest that gender stereotyping persists in the face of other, more relevant, information, the additional information is not ignored. In Information, the coefficients for both TSOCIAL and TINVEST are significant. Interestingly, the least relevant information (recall that TSOCIAL is insignificantly, and negatively, correlated with target gamble choice) is positively correlated with predicted gamble choice. The more relevant information (recall that TINVEST is significantly and positively correlated with target gamble choice) is being used correctly but has less impact on gamble predictions. The coefficient for TINVEST is only one-third of the coefficient for TSOCIAL. In Combined, the coefficients for the two survey statement response variables are still positive and significant, but of roughly equal size. Subjects

may have treated both bits of information as indicators of risk attitude but not distinguishing between the types of risk each is associated with.

Consider next the predicting subject variables. First, for all three treatments, the riskier one's own gamble choice (PREDICTOR GAMBLE CHOICE), the riskier one assumes the target's gamble choice will be. This relationship is significant for Information and Combined.<sup>13</sup> This result is consistent with the "false consensus bias", the empirical regularity that a person's predictions about others' attitudes or behavior are affected by their own (Ross, Green and House, 1977). There is no significant effect of either the predicting subject's sex or race (with the exception of Information where a positive, and significant, correlation is observed between prediction and the predictor's minority status).

#### **IV. Conclusion**

This study reports evidence of the existence of gender stereotyping and the persistence of such stereotyping even when other, more relevant, individuating information is provided. Subjects participate in a three-part experiment with three treatments. In part one, subjects complete a survey designed to elicit attitudes towards different types of risk. In part two, subjects play a gamble exercise, and in part 3, subjects attempt to predict the part 2, gamble choice made by their fellow subjects based on: 1) only visual clues (Visual); 2) only responses to two survey statements (Information); and 3) both visual clues and survey statement responses (Combined).

Results for Visual suggest that in the absence of other information on which to base their predictions, subjects apply the stereotype that women are more risk averse than men. For

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<sup>13</sup> The PREDICTOR GAMBLE CHOICE coefficient in treatment one has the same positive sign but is only significant at the 10 percent level, one-tailed test.

Information, the results indicate that subjects, in the absence of visual clues, use the survey statement responses to inform their predictions. Interestingly, the one response that is negatively correlated with a target's actual gamble choices is positively correlated with predicted gamble choice. The more relevant survey statement response (i.e. the response that is significantly and positively correlated with target gamble choice) is being used correctly but has less impact on gamble predictions. Finally, for Combined, the results indicate that when provided with both visual clues and survey statement responses, subjects continued to apply the gender stereotype. They did not ignore the more relevant information, but the impact of target gender is not diminished when compared to Visual.

Stereotyping may improve one's forecasting accuracy relative to randomly guessing, assuming the stereotype contains some kernel of truth. However, it might be expected that stereotypes would give way when more individuating information relevant to the characteristic or action being predicted is available. Downplaying any stereotype in favor of the individuating information should improve the accuracy of predictions. A failure to incorporate this individuating information in place of the stereotype can adversely affect the economic choices of both men and women. Evidence of investment brokers offering women lower-risk/lower-expected-return investments than those offered to men is reported in Wang (1994). Grable and Lytton (1999) note the reliance of financial advisors on demographic characteristics to assess risk attitudes and that "This method assumes strong correlations between demographic and socioeconomic characteristics and financial risk tolerance.... In many cases heuristic judgments are little more than commonly accepted myths" (p. 165).

With respect to stereotyping's effect on wages and employment, Johnson and Powell (1994) argue that women, perceived to be less able to make risky decisions, are less likely to be

given corporate promotions. Babcock and Laschever (2003) document that “women don’t ask” for as much as men do in negotiations, and this difference in behavior alone accounts for substantial differences in earnings between the sexes in similar jobs. Asking for less, or failing to ask, is consistent with lower willingness to take on risk. In an attempt to explain the wage gap, Vesterlund (1997) shows that if, in a model with two types of workers with identical productivity, more risk-averse workers can be identified, then that group (women if the stereotype is applied) faces a distribution of wages that is stochastically dominated by the distribution for the less-risk-averse group.

Finally, the impact of stereotyping is not limited to financial and employment issues. Evidence suggests that physician’s stereotypes drive treatment differences. Schulman, et al. (1999), and other studies referenced therein, show that compared with men with the same symptoms, women patients are less likely to be prescribed aggressive treatment. Other research suggests that these differences are not due to the preferences of the patients (Saha, et al., 1999).

## REFERENCES

- Babcock, L., and Laschever, S. 2003. *Women Don't Ask: Negotiation and the Gender Divide*. Princeton: Princeton University Press.
- Beckett, N. E., and Park, B. 1995. Use of category versus Individuating Information: making Base Rates Salient. *Personality and Social Psychology Bulletin* 21:21-31.
- Bodenhausen, G.V., Macrae, C. N., and Sherman, J.W. 1999. On the Dialectics of Discrimination: Dual processes in Social Stereotyping. In S. Chaiken and Y. Trope (eds.) *Dual-Process Theories in Social Psychology*. New York: Guilford Press.
- Eckel, C.C., and Grossman, P.J. Forthcoming. Forecasting Risk Attitudes: An Experimental Study of Actual and Forecast Risk Attitudes of Women and Men. *Journal of Economic Behavior and Organization*.
- Englestad, H., Grossman, P.J., and Lugovskyy, O. 2006. Predicting Gamble Choice Using a Domain-Specific Risk-Attitude Scale. St. Cloud state university Working Paper.
- Gill, M.J. 2004. When Information does not deter Stereotyping: Prescriptive Stereotyping can Foster Bias under Conditions that deter Descriptive Stereotyping. *Journal of Experimental Social Psychology* 40:619-632.
- Grable, J., and Lytton, R.H. 1999. Financial Risk Tolerance Revisited: the Development of a Risk Assessment Instrument. *Financial Services Review* 8:163-181.
- Johnson, J.E., and Powell, P.L. 1994. Decision Making, Risk and Gender: Are Managers Different? *British Journal of Management* 5:123-138.
- Kunda, Z., Sinclair, L., and Griffin, D. 1997. Equal Ratings but Separate Meanings: Stereotypes and the Construal of Traits. *Journal of Personality and Social Psychology* 72:720-734.
- Kunda, Z., and Thagard, P. 1996. Forming Impressions from Stereotypes, Traits, and Behaviors: A Parallel-Constraint-Satisfaction Theory. *Psychological Review* 103:284-308.
- Nisbett, R.E., Zukier, H. and Lemley, R.E. 1981. The Dilution of Effect: Nondiagnostic Information Weakens the Implications of Diagnostic Information. *Cognitive Psychology* 13:248-277.
- Ross, L., Greene, D., and House, P. 1977. The "False Consensus Effect: An Egocentric Bias in Social Perception and Attribution Processes. *Journal of Experimental Social Psychology* 13:279-301.
- Saha, S., Stettin, G. D., Redberg, R. F. 1999. Gender and Willingness to Undergo Invasive Cardiac Procedures. *Journal of General Internal Medicine* 14:122-5.

- Sherman, J.W. 1996. Development and Mental representation of Stereotypes. *Journal of Personality and Social Psychology* 70:1126-1141.
- Thaler, R., and Johnson, E. 1990. Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice. *Management Science* 36:643-660.
- Trope, Y., and Thompson, E.P. 1997. Looking for Truth in all the Wrong Places: Asymmetric Search of Individuating Information about Stereotyped Group Members.” *Journal of Personality and Social Psychology* 73:229-241.
- Vesterlund, L. 1997. The Effects of Risk Aversion on Job Matching: Can Differences in Risk Aversion Explain the Wage Gap? Unpublished manuscript, Iowa State University.
- Wang, P. 1994. Brokers Still Treat Men Better Than Women. *Money* 23:108-110.
- Weber, E.U., Blais, A., and Betz, N.E. 2002. A Domain-Specific Risk-Attitude Scale: Measuring Risk Perceptions and Risk Behaviors. *Journal of Behavioral Decision Making* 15:1-28.

**Table 1. Gamble Choices, Expected Payoffs and Risk**

<b>Choice</b>	<b>Event</b>	<b>Probability</b>	<b>Payoff</b>	<b>Expected Payoff</b>	<b>Risk</b>
1	A	50%	\$10	\$10	0.0
	B	50%	\$10		
2	A	50%	\$18	\$12	6.0
	B	50%	\$6		
3	A	50%	\$26	\$14	12.0
	B	50%	\$2		
4	A	50%	\$34	\$16	18.0
	B	50%	-\$2		
5	A	50%	\$42	\$18	24.0
	B	50%	-\$6		
6	A	50%	\$44	\$18	26.0
	B	50%	-\$8		

**Table 2: Gamble Choice by Treatment and by Sex**

	Gamble Choice						Mean (Std. Dev.) N	$\chi^2$ contingency table test statistic d.f. (p-value)
	1	2	3	4	5	6		
<b>Visual</b>	1	1	18	11	6	8	3.98 (1.25) 45	<b>7.17</b> 10 (0.71)
<b>Information</b>	1	2	13	9	7	8	4.08 (1.33) 40	
<b>Combined</b>	4	0	10	8	6	7	3.94 (1.53) 35	
<b>Male</b>	4	2	22	16	14	17	4.13 (1.41) 75	<b>4.07</b> 5 (0.54)
<b>Female</b>	2	1	19	12	5	6	3.78 (1.24) 45	
<b>All</b>	6	3	41	28	19	23	4.00 (1.35) 120	

**Table 3: Correlation Coefficients for Gamble Choice and Gamble Predictors**

	Correlation Coefficient z value (p-value)
Target Sex	0.128 1.39 (0.082)
Social Risk Statement	-0.117 1.27 (0.102)
Financial Risk Statement	0.196 2.15 (0.016)

**Table 4: Gamble Predictions by Treatment and Sex of Predictor**

Treatment	Gamble predictions						Mean (Std. Dev.) N	$\chi^2$ contingency table test statistic (p-value) d.f.
	1	2	3	4	5	6		
<b>Visual</b>	43	71	179	141	90	103	3.75 (1.44) 627	14.7 (0.144) 10
<b>Information</b>	32	78	120	119	67	64	3.68 (1.44) 494	
<b>Combined</b>	25	37	114	86	60	68	3.83 (1.44) 390	
Sex of Predictor	1	2	3	4	5	6	Mean (Std. Dev.) N	
<b>Men</b>	62	124	234	219	141	157	3.77 (1.46) 937	7.90 (0.162) 5
<b>Women</b>	38	62	179	127	83	85	3.71 (1.41) 574	
<b>All</b>	100	186	413	346	217	235	3.75 (1.45) 1511	

**Table 5: Predictions by Treatment and by Sex of both Predictor and Target**

Treatment (1)	Predictor (2)	Target (3)	Gamble Prediction						Mean (Std. Dev.) N (10)	X <sup>2</sup> contingency table test statistic (p-value) d.f. = 15 (11)	Predictor Target (12)	χ <sup>2</sup> contingency table test statistic (p-value) d.f. = 5 (13)
			1 (4)	2 (5)	3 (6)	4 (7)	5 (8)	6 (9)				
Visual	Male	Male	6	22	56	56	40	53	4.12 (1.39) 233	110.0 (0.000)	All M vs. F	86.9 (0.000)
	Male	Female	20	35	45	31	15	11	3.12 (1.39) 157			
	Female	Male	6	5	36	44	31	35	4.24 (1.32) 157			
	Female	Female	11	9	42	10	4	4	2.99 (1.21) 80			
Information	Male	Male	11	26	33	40	31	25	3.78 (1.47) 166	19.2 (0.203)	All M vs. F	6.84 (0.233)
	Male	Female	5	17	27	39	21	15	3.80 (1.33) 124			
	Female	Male	9	22	36	29	13	23	3.64 (1.49) 132			
	Female	Female	7	13	24	11	9	8	3.36 (1.46) 72			
Combined	Male	Male	6	10	39	35	30	42	4.23 (1.42) 162	65.2 (0.000)	All M vs. F	50.9 (0.000)
	Male	Female	14	14	34	18	4	11	3.18 (1.46) 95			
	Female	Male	3	6	22	26	24	14	4.09 (1.27) 95			
	Female	Female	2	7	19	7	2	1	3.08 (1.02) 38			

**Table 6:  $\chi^2$  Contingency Table Test Results – Visual vs. Combined**

<b>Predictor</b>	<b>Target</b>	<b><math>\chi^2</math> statistic</b>	<b>p-value</b>
<b>All</b>	<b>All</b>	<b>1.21</b>	<b>0.944</b>
<b>All</b>	<b>Male</b>	<b>1.10</b>	<b>0.954</b>
<b>All</b>	<b>Female</b>	<b>3.17</b>	<b>0.673</b>
<b>Male</b>	<b>All</b>	<b>5.89</b>	<b>0.317</b>
<b>Female</b>	<b>All</b>	<b>6.43</b>	<b>0.267</b>
<b>Male</b>	<b>Male</b>	<b>2.41</b>	<b>0.791</b>
<b>Male</b>	<b>Female</b>	<b>6.55</b>	<b>0.256</b>
<b>Female</b>	<b>Male</b>	<b>3.98</b>	<b>0.553</b>
<b>Female</b>	<b>Female</b>	<b>3.66</b>	<b>0.599</b>

**Table 7: Mean Prediction Error – Visual vs. Combined**

<b>Predictor</b>	<b>Target</b>	<b>Mean Error (std. dev.)</b>		<b>Means Test t-statistic (p-value)</b>
		<b>Visual</b>	<b>Combined</b>	
Male	Male	-0.090 (1.90) 233	0.222 (1.87) 162	1.62 (0.11)
Male	Female	-0.465 (1.85) 157	-0.726 (1.65) 95	1.13 (0.26)
Female	Male	0.013 (1.89) 157	0.200 (1.86) 95	0.77 (0.44)
Female	Female	-0.600 (1.76) 80	-0.789 (1.74) 38	0.55 (0.58)

\* - two-tailed test

**Table 8:  $\chi^2$  Contingency Table Test Results – Information vs. Combined**

<b>Predictor</b>	<b>Target</b>	<b><math>\chi^2</math> statistic</b>	<b>p-value</b>
All	All	10.4	0.065
All	Male	19.9	0.001
All	Female	18.6	0.002
Male	All	15.9	0.007
Female	All	11.5	0.042
Male	Male	13.7	0.018
Male	Female	21.8	0.001
Female	Male	15.5	0.008
Female	Female	6.01	0.305

**Table 9: Mean Prediction Error – Information vs. Combined**

<b>Predictor</b>	<b>Target</b>	<b>Mean Error (std. dev.)</b>		<b>Means Test t-statistic p-value</b>
		<b>Information</b>	<b>Combined</b>	
Male	Male	-0.554 (2.12) 166	0.222 (1.87) 162	3.52 (0.000)
Male	Female	-0.339 (1.26) 124	-0.726 (1.65) 95	1.90 (0.059)
Female	Male	-0.682 (2.09) 132	0.200 (1.86) 95	3.34 (0.001)
Female	Female	-0.556 (1.74) 72	-0.789 (1.74) 38	0.67 (0.505)

\* - two-tailed test

**Table 10: Random Effects Ordered Probit Results**

**(Dependent variable = Gamble Prediction)**

Variable	Coefficient (t-statistic)					
	Visual		Information		Combined	
MALE TARGET	0.926* (11.08)	0.931* (11.05)	0.214 (1.63)	0.218 (1.52)	0.932* (7.83)	0.938* (7.51)
MINORITY TARGET	-0.381* (3.29)	-0.382* (3.22)	0.235 (1.72)	0.237 (1.73)	-0.210 (1.54)	-0.186 (1.30)
TSOCIAL	0.007 (0.13)	0.005 (0.09)	0.396* (9.80)	0.402* (10.09)	0.236* (2.86)	0.222* (2.52)
TINVEST	0.026 (0.60)	0.027 (0.60)	0.125* (2.20)	0.129* (2.21)	0.219* (2.76)	0.236* (2.99)
PREDICTOR GAMBLE CHOICE		0.160 (1.67)		0.334* (4.46)		0.515* (4.67)
MALE PREDICTOR		-0.138 (0.52)		0.040 (0.21)		0.164 (0.46)
MINORITY PREDICTOR		0.301 (1.10)		0.98* (2.10)		-0.188 (0.63)
CONSTANT	1.315* (3.69)	0.822 (1.97)	-0.345 (1.25)	-1.616* (3.69)	-0.181 (0.42)	-1.577* (2.26)
Log LF	-949.5	-946.4	-778.3	-764.2	-563.5	-550.6
N	627		494		390	
Individuals	45		39		35	

\* - significant at the 5 percent level or better, two-tailed test

## APPENDIX

### INSTRUCTIONS

You are asked to participate in a study of economic decision making. The study will take approximately one hour to complete. The study is comprised of three parts to be described at the appropriate time. You will be paid \$8 for completing Part 1. You will be paid in cash in private at the end of the session.

From this point on, with the exception of procedural questions addressed to the proctors, we request that there be no talking.

You have been designated Player # .

#### **Part 1**

For each of the following statements, please indicate the **likelihood** of engaging in each activity. Provide a rating from 1 to 5, using the following scale:

1	2	3	4	5
<b>Extremely Unlikely</b>		<b>Not Sure</b>		<b>Extremely Likely</b>

1. \_\_\_\_\_ Admitting that your tastes are different from those of your friends.
2. \_\_\_\_\_ Arguing with a friend, who has a very different opinion on an issue.
3. \_\_\_\_\_ Asking your boss for a raise.
4. \_\_\_\_\_ Betting a day's income at the horse races.
5. \_\_\_\_\_ Buying an illegal drug for your own use.
6. \_\_\_\_\_ Chasing a tornado by car to take photos that you can sell to the press.
7. \_\_\_\_\_ Cheating a fair amount on your income tax.
8. \_\_\_\_\_ Cheating on an exam.
9. \_\_\_\_\_ Co-signing a new car loan for a friend.
10. \_\_\_\_\_ Dating someone that you are working with.
11. \_\_\_\_\_ Deciding to share an apartment with someone you don't know well.

12. \_\_\_\_\_ Disagreeing with your father on a major issue.
13. \_\_\_\_\_ Driving home after you had three drinks in the last two hours.
14. \_\_\_\_\_ Eating “expired” food products that still “look okay.”
15. \_\_\_\_\_ Exploring an unknown city or section of town.
16. \_\_\_\_\_ Forging somebody’s signature.
17. \_\_\_\_\_ Frequent binge drinking.
18. \_\_\_\_\_ Going camping in the wild.
19. \_\_\_\_\_ Going down a ski run that is too hard or closed.
20. \_\_\_\_\_ Going on a safari in Kenya.
21. \_\_\_\_\_ Going on a two-week vacation in a foreign country without booking accommodations ahead.
22. \_\_\_\_\_ Going white-water rafting at high water in the spring.
23. \_\_\_\_\_ Ignoring some persistent physical pain by not going to the doctor.
24. \_\_\_\_\_ Illegally copying a piece of software.
25. \_\_\_\_\_ Taking a medical drug that has a high likelihood of negative side effects.
26. \_\_\_\_\_ Traveling on a commercial airplane.
27. \_\_\_\_\_ Plagiarizing a term paper.
28. \_\_\_\_\_ Engaging in unprotected sex.
29. \_\_\_\_\_ Investing 10% of your annual income in blue chip stock.
30. \_\_\_\_\_ Investing 10% of your annual income in a very speculative stock.
31. \_\_\_\_\_ Investing 10% of your annual income in government bonds (treasury bills).
32. \_\_\_\_\_ Investing in a business that has a good chance of failing.
33. \_\_\_\_\_ Lending a friend an amount of money equivalent to one month’s income.
34. \_\_\_\_\_ Moving to a new city.
35. \_\_\_\_\_ Never using sun screen when you sunbathe.
36. \_\_\_\_\_ Never wearing a seatbelt.
37. \_\_\_\_\_ Not having a smoke alarm in or outside of your bedroom.
38. \_\_\_\_\_ Openly disagreeing with your boss in front of your coworkers.
39. \_\_\_\_\_ Periodically engaging in a dangerous sport (e.g., mountain climbing or sky diving).
40. \_\_\_\_\_ Regularly riding your bicycle without a helmet.
41. \_\_\_\_\_ Shoplifting a small item (e.g., a lipstick or a pen).

- 42. \_\_\_\_\_ Smoking a pack of cigarettes per day.
- 43. \_\_\_\_\_ Speaking your mind about an unpopular issue at a social occasion.
- 44. \_\_\_\_\_ Spending money impulsively without thinking about the consequences.
- 45. \_\_\_\_\_ Stealing an additional TV cable connection.
- 46. \_\_\_\_\_ Taking a day's income to play the slot-machines at a casino.
- 47. \_\_\_\_\_ Taking a job where you get paid exclusively on a commission basis.
- 48. \_\_\_\_\_ Trying bungee jumping.
- 49. \_\_\_\_\_ Using office supplies for your personal business.
- 50. \_\_\_\_\_ Wearing unconventional clothes.

For each of the following statements, please indicate **how risky you perceive** each situation. Provide a rating from 1 to 5, using the following scale:

1	2	3	4	5
Not at all risky		Moderately risky		Extremely risky

- 1. \_\_\_\_\_ Exploring an unknown city or section of town
- 2. \_\_\_\_\_ Cheating on an exam
- 3. \_\_\_\_\_ Going on a safari in Kenya
- 4. \_\_\_\_\_ Investing 10% of your annual income in a very speculative stock
- 5. \_\_\_\_\_ Asking your boss for a raise
- 6. \_\_\_\_\_ Shoplifting a small item (e.g., a lipstick or a pen)
- 7. \_\_\_\_\_ Traveling on a commercial airplane
- 8. \_\_\_\_\_ Buying an illegal drug for your own use
- 9. \_\_\_\_\_ Betting a day's income at the horse races
- 10. \_\_\_\_\_ Speaking your mind about an unpopular issue at a social occasion
- 11. \_\_\_\_\_ Deciding to share an apartment with someone you don't know well
- 12. \_\_\_\_\_ Going on a two-week vacation in a foreign country without booking accommodations ahead
- 13. \_\_\_\_\_ Openly disagreeing with your boss in front of your coworkers
- 14. \_\_\_\_\_ Never using sun screen when you sunbathe

15. \_\_\_\_\_ Co-signing a new car loan for a friend
16. \_\_\_\_\_ Taking a day's income to play the slot-machines at a casino
17. \_\_\_\_\_ Plagiarizing a term paper
18. \_\_\_\_\_ Taking a job where you get paid exclusively on a commission basis
19. \_\_\_\_\_ Stealing an additional TV cable connection
20. \_\_\_\_\_ Forging somebody's signature
21. \_\_\_\_\_ Regularly riding your bicycle without a helmet
22. \_\_\_\_\_ Dating someone that you are working with
23. \_\_\_\_\_ Periodically engaging in a dangerous sport (e.g., mountain climbing or sky diving)
24. \_\_\_\_\_ Disagreeing with your father on a major issue
25. \_\_\_\_\_ Lending a friend an amount of money equivalent to one month's income
26. \_\_\_\_\_ Chasing a tornado by car to take photos that you can sell to the press
27. \_\_\_\_\_ Arguing with a friend, who has a very different opinion on an issue
28. \_\_\_\_\_ Going white-water rafting at high water in the spring
29. \_\_\_\_\_ Cheating a fair amount on your income tax
30. \_\_\_\_\_ Going down a ski run that is too hard or closed
31. \_\_\_\_\_ Driving home after you had three drinks in the last two hours
32. \_\_\_\_\_ Going camping in the wild
33. \_\_\_\_\_ Wearing unconventional clothes
34. \_\_\_\_\_ Engaging in unprotected sex
35. \_\_\_\_\_ Never wearing a seatbelt
36. \_\_\_\_\_ Not having a smoke alarm in or outside of your bedroom
37. \_\_\_\_\_ Illegally copying a piece of software
38. \_\_\_\_\_ Trying bungee jumping
39. \_\_\_\_\_ Investing 10% of your annual income in blue chip stock
40. \_\_\_\_\_ Spending money impulsively without thinking about the consequences
41. \_\_\_\_\_ Smoking a pack of cigarettes per day
42. \_\_\_\_\_ Investing 10% of your annual income in government bonds (treasury bills)
43. \_\_\_\_\_ Ignoring some persistent physical pain by not going to the doctor
44. \_\_\_\_\_ Moving to a new city

- 45. \_\_\_\_\_ Taking a medical drug that has a high likelihood of negative side effects
- 46. \_\_\_\_\_ Using office supplies for your personal business
- 47. \_\_\_\_\_ Investing in a business that has a good chance of failing
- 48. \_\_\_\_\_ Frequent binge drinking
- 49. \_\_\_\_\_ Eating “expired” food products that still “look okay
- 50. \_\_\_\_\_ Admitting that your tastes are different from those of your friends

## Part 2

In this part of the study you will select from among six different gambles the one gamble you would like to play. The six different gambles are listed on your **GAMBLE SELECTION SHEET**. You must select one and only one of these gambles. To select a gamble place an **X** in the appropriate box. Each gamble has two possible outcomes (Event A or Event B) with the indicated probabilities of occurring. Your compensation for this part of the study will be determined by: 1) which of the six gambles you select; and 2) which of the two possible events occur.

***Please note that if you should select gamble 4, gamble 5, or gamble 6 and Event B occurs, your losses will be deducted from your \$8.00 initial earnings.***

For example. If you select gamble 4 and Event A occurs, you will be paid \$34. If Event B occurs, you will have \$2 deducted from your \$8 survey completion fee.

For every gamble, each event has a 50% chance of occurring.

After you have selected your gamble the **GAMBLE SELECTION SHEET** will be collected by the proctor.

At the end of the study, you will roll a six-sided die to determine which event will occur. If you roll a 1, 2, or 3, Event A will occur. If you roll a 4, 5, or 6, Event B will occur.

There will be a separate roll of the die for each Player.

## GAMBLE SELECTION SHEET

Player #

Mark your gamble selection with an **X** in the last column across from your preferred gamble.

Gamble	Event	Payoff	Probabilities	Your Selection
1	A	\$10	50%	
	B	\$10	50%	
2	A	\$18	50%	
	B	\$6	50%	
3	A	\$26	50%	
	B	\$2	50%	
4	A	\$34	50%	
	B	-\$2	50%	
5	A	\$42	50%	
	B	-\$6	50%	
6	A	\$44	50%	
	B	-\$8	50%	