The Self-Serving Bias and Beliefs about Rationality

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Abstract

Most previous experiments attempting to establish the existence of the self-serving bias have confounded it with strategic behavior. We design an experiment that controls for strategic behavior (Haman effects), and isolates the bias itself. The self-serving bias that we measure concerns beliefs about the rationality of others. We find very limited support for the existence of the bias.

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1 Introduction

Now Haman had just entered the outer court of the king's palace to speak to the king about having Mordecai hanged on the gallows that he had prepared for him. So the king's servants told him, "Haman is there, standing in the court." And the king said, "Let him come in." So Haman came in, and the king said to him, "What shall be done to the man whom the king delights to honor?" And Haman said to himself, "Whom would the king delight to honor more than me?" and Haman said to the king, "For the man whom the king delights to honor, let royal robes be brought which the king has worn, and the horse which the king has ridden, and on whose head a royal crown is set; and let the robes and the horse be handed over to one of the king's most noble princes; let him array the man whom the king delights to honor, and let him conduct the man on horseback through the open square of the city, proclaiming before him: 'Thus shall it be done to the man whom the king delights to honor.'" Then the king said to Haman, "Make haste, take the robes and the horse, as you have said, and do so to Mordecai the Jew who sits at the king's gate. Leave out nothing that you have mentioned." The Old Testament, Ester 6:4-10.

On the Jewish holiday of Purim, the book of Ester is read to celebrate the foiling of Haman's plans to destroy the Jewish people. In the passage above, the villain Haman responds to the king's question with the belief that he is the one the king wishes to honor. The passage illustrates the difficulty in eliciting a person's true beliefs: the person may be responding in his own strategic self-interest.

Similarly, experiments in economics and psychology designed to elicit participants' true beliefs or true preference for fairness are confronted with the same challenge, to control for Haman effects. The use of sequential and interdependent decisions, repeated games, or contextually rich settings in which context has not been introduced one variable at a time are all sources of difficulty in the interpretation of observed behavior. More generally, the inability to control completely for strategic considerations often opens up the data to alternative hypotheses unintended by the researchers.

In the economics literature, self-serving biases are used to explain unusually high rejection rates in two-player and three-player ultimatum games with differential outside

options (Knez and Camerer, 1995), the high disagreement rates in bargaining games (Babcock and Loewenstein, 1997), the discrepancy between plaintiffs' and defendants' assessments of fair settlements in tort cases (Babcock et al., 1995) and the frequency of strikes among public school teachers (Babcock et al., 1996).

All of these examples concern individuals' differing perceptions about what constitutes a fair outcome in settings where multiple focal points exist. Yet as we explain in the next section, the domain of the self-serving bias need not be restricted to perceptions of fairness. Equally important, past experimental studies that explain their findings by the self-serving bias have not been able to separate out the unconscious alteration of beliefs from the conscious calculation for gain. We suggest that the former constitutes the self-serving bias while the latter is a form of strategy (Haman effect) not to be included as part of the bias.

In this paper, we introduce a simple experiment that controls for Haman effects, thereby focusing on the self-serving bias. In addition, our experimental design, a modified one-shot version of the p-beauty contest game, is unrelated to fairness perceptions. Instead, we test whether individuals hold self-serving beliefs about the rationality of others.

In the next section we discuss previous evidence of the self-serving bias. Section 3 describes our experimental design, procedure, and hypotheses associated with the design. We present our results in section 4 followed by a discussion in section 5. Section 6 concludes.

2 Self-Serving Biases

Elsewhere (Kaplan and Ruffle, 1998) we have expressed our reservations about previous experimental results that claim to have found support for the self-serving bias. There, we offer alternative explanations that cannot be ruled out and may explain the data in the two-player and three-player ultimatum games reported by Knez and Camerer (1995),

and the bargaining game results of Roth and Murnighan (1982) interpreted as evidence of the bias by Babcock and Loewenstein (1997). To avoid repetition and to save space, we refer the interested reader to this reference (or to the more detailed exposition available for download at either of our websites).

Here we demonstrate the potential role of the Haman effect in tort case studies conducted by Babcock, Loewenstein, Issacharoff and Camerer (1995) (BLIC hereafter). BLIC presented subjects with material from an actual court case involving an injured motorcyclist who sued the driver that collided with him. The subjects were told that the motorcyclist was suing for $100,000. The experiment involves two parts. In the first part, subjects are asked to estimate the judge's award from the case. A subject whose estimate is within $5,000 of the actual judge's award receives a $1 bonus at the end of the experiment. In the second part of the experiment, subjects, assigned to the role of either plaintiff or defendant, negotiate on a settlement for the plaintiff. The defendant is given $10 and subjects are informed that $1 is meant to represent $10,000 in the actual court case. The negotiation takes place for a maximum of six five-minute rounds or until a settlement is reached. For each round that a settlement is not reached the subsequent round of negotiations begins with $0.50 less to divide.

BLIC conduct two treatments that differ in the sequence of events. In one treatment (intended to measure the bias and its impact on the subsequent bargaining outcomes), each subject is first assigned to his role as plaintiff or defendant. Next the subject reads the case materials, estimates the judge's award, and negotiates over the division of the $10 to be paid in damages to the defendant. In the second treatment, subjects learn their roles only *after* they read the case materials and estimate the judge's award. That is, only before they begin the negotiation stage do subjects learn whether they are to represent the plaintiff or the defendant. This treatment thus serves as a control treatment for the bias.

BLIC find plaintiffs' estimates of the judge's award to be significantly higher ($18,555 higher, on average) than those of the defendants. The difference they attribute to a self-serving bias in the processing of the facts of the case by the two sides.

We offer the Haman effect as an alternative explanation. More precisely, subjects are asked to give their estimates of the judge's award *knowing* that the bargaining stage comes next. Subjects may therefore offer estimates intended to avoid cognitive dissonance with their subsequent bargaining strategy. For example, how can a subject, say a plaintiff, who pursues an aggressive bargaining strategy, say demands $90,000 in round 1 of the negotiation stage, $88,000 in round 2, and so forth indicate a fair settlement (namely, the judge's award) of $30,000. He can't without feeling some inner conflict. Therefore, he gives a (consciously or unconsciously) manipulated estimate of the judge's award intended to coincide more closely with his bargaining stance.[1]

In addition to the ubiquity of cognitive dissonance and tactics to avoid it, two features of BLIC's experimental design make this hypothesis more than a remote possibility. Individual subjects' decisions were observable by the experimenter and thus the possibility of experimenter effects. A subject, say a plaintiff, who pursues an aggressive bargaining strategy, like the one in the above example in which the plaintiff demands $90,000 in round 1, may be concerned about being perceived as "greedy" by the experimenter if he previously estimated $30,000 as the judge's award. Secondly, the subjects' monetary incentives ($1 in the case that their estimates of the judge's award are within $5,000 of the actual award) may encourage them to forego the chance to win the dollar, choosing instead to alter their estimates of the judge's award in a way that permits them to proceed to the more lucrative bargaining stage with a cleaner conscience.[2]

[1]The estimate may be a self-strategy, in the sense that the subject may be playing a game with himself, i.e. attempting to convince himself that his inflated estimate is fair so as to avoid subsequent inner conflict.

[2]The solution to the concerns raised here would, of course, be to conduct the first stage of their experiment (estimates of the judge's award) as a separate experiment. Then, having established the existence and magnitude of the bias, conduct a second, two-stage experiment to assess its impact on bargaining outcomes, ideally double blind, and preferably with the award for guessing the judge's award as a continuous or multi-step function of the distance of the estimate from the actual award.

All of the above-cited examples concern individuals' differing perceptions about what constitutes a fair outcome in settings where multiple focal points exist. In fact, Babcock and Loewenstein (1997, p. 110) refer to the self-serving bias as a tendency "to conflate what is fair with what benefits oneself." In Kaplan and Ruffle (1998) we suggest that this definition is too restrictive, that the self-serving bias need not be related to fairness.[3] We offer the following more general definition of the self-serving bias which captures the numerous examples of the bias in the social psychology and economics literatures as well as the setting examined in this paper.

Definition A self-serving bias exists where an individual's preferences affect his beliefs in an optimistic direction, one favoring his own payoff.

Beliefs may be about one's own ability, the environment, another player's type, or about what constitutes a fair outcome. An individual's payoff in the above definition is intended to be as broad as possible and may refer to his psychological or monetary payoff.

Our more general definition of the self-serving bias suggests scope for the bias to operate in additional settings, settings void of fairness issues. Wishful thinking is a specific type of self-serving bias. It occurs when an individual overweights the likelihood of a favorable event or underweights the likelihood of an unfavorable one. Extending the domain of wishful thinking beyond favorable events to include beliefs about ability, player type or a fair outcome would equate wishful thinking with the self-serving bias. Forsythe, Rietz, and Ross (1999) find evidence of wishful thinking in a market in which traders increase the prices of state-contingent claims associated with their preferred outcomes. The next section describes the experiments we conduct and the experimental hypotheses.

[3]Babcock and Loewenstein (1998) recognize explicitly that the self-serving bias "extends beyond biased considerations of fairness" (p. 244) and implicitly through the numerous examples of the bias they cite from the psychology literature (Babcock and Loewenstein, 1997).

3 Experimental Design, Procedure and Hypotheses

3.1 Experimental Design

In the guessing game (Moulin, 1986), or p-beauty contest game as it is more frequently called, players simultaneously choose a number in the closed interval $[0, 100]$. The player whose number is closest to p times the mean of all numbers chosen (where p is a parameter that is common knowledge to all players) wins a predetermined cash prize. All other players earn zero. The unique Nash equilibrium of this game, for $p \in [0, 1)$, is for all players to choose zero. Nagel (1995) first tested this game experimentally to investigate players' depth of reasoning. A player will choose a number greater than zero if he is irrational (zero-order beliefs), if he is rational but believes others are irrational (first-order beliefs), or, more generally, if at some level in his infinite hierarchy of beliefs, he specifies some irrationality.

We modify the guessing game in a way that allows us to test for biased beliefs about the rationality of others.[4] In addition to paying a fixed prize of 400 new Israeli shekels (NIS) (approximately \$100 US)[5] to the subject whose guess is closest to 2/3 times the average of all guesses, our design pays a variable payoff to each subject. There are 30 subjects in each session, each subject with an identity number from 1 to 30. Those subjects with an odd identity number (hereafter to be frequently referred to as odd subjects, for brevity) receive as a variable payoff the mean guess of all 29 other chosen numbers divided by four. All even-numbered subjects (henceforth even subjects) receive 100 minus the mean guess of all 29 other subjects, this number divided by four.[6] Dividing by four renders our subject payments affordable while at the same time worthwhile for the student subjects.

[4]With the intent of studying learning behavior, Nagel and Duffy (1997) have tested experimentally variations of the p-beauty game in which the winner is the person who chooses the number closest to 1/2 the median, mean or maximum of all numbers chosen.

[5]At the time the experiments were conducted the exchange rate ranged from \$1 US = 3.5 NIS to \$1 US = 4.09 NIS.

[6]Appendix A contains the instructions. The actual instructions used were translated to Hebrew and

The payoff structure implies an average variable payoff of 12.5 shekels. Our intention was to set the expected variable payoff of the same order of magnitude as the expected fixed payoff. This balance was struck in order that subjects' elicited preferences as a function of their identity numbers are over non-trivial amounts of money and so that the incentive to win the fixed prize is meaningful.

By excluding a subject's guess from his variable payoff, we control for strategically manipulated guesses. Furthermore, by playing the game only once, there is no room to manipulate one's guess in order to influence guesses in the subsequent period. Instead, a subject's guess summarizes his beliefs about everyone else's guesses.

Let us examine now how the self-serving bias comes into play. Recall that the definition of the bias says that preferences influence beliefs in a way that favors one's own payoff. Odd subjects have a preference for a high average to obtain a high variable payoff. Therefore, according to the bias, they should believe that others will choose high numbers (i.e. exhibit a relatively low level of rationality). Thus, an odd subject should guess high in order to maximize his chance of winning the fixed prize. Conversely, the lower the average, the higher the payoffs to the even subjects. Thus, an even subject who makes a self-serving guess should assume a higher level of rationality and guess low. Therefore, the self-serving bias predicts that the guesses of the subjects with odd identity numbers will be greater than those with even identity numbers.

It is important to emphasize the nature of the psychological mechanism that underlies the self-serving bias in this design. Previous experiments have confounded the conscious calculation for gain with the unconscious alteration of beliefs. The former we do not consider to be a part of a cognitive self-serving bias, but rather a form of (self-)strategy, as exemplified by Haman in the book of Ester. By excluding a subject's own guess from his variable payoff and by conducting this game one shot, we have controlled for such Haman effects. The bias in our design operates through the unconscious alteration of beliefs.

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are available upon request from the authors.

3.2 Remarks on the Experimental Design

The subject's strategy space in this experiment is very simple, namely, choose, one time, a single number between 0 and 100 inclusive. In comparison to market experiments that are much richer in institutional detail and require the assimilation of many more game variables or many individual choice experiments that require the subject to optimize a payoff function, relatively little information processing is asked of the subjects in these experiments. On the other hand, the psychological mechanism required for the self-serving bias to operate here is rather subtle. In fact, one might argue that even though subjects may be able to understand the simple algebra underlying the payoff calculations,[7] they may still be unable to fashion a guess based on some reasoned process about the numbers others choose. In this sense, guesses are likely to be somewhat random. One might think that random guesses make it unlikely to obtain the bias. Let us demonstrate that this concern is unfounded.

Suppose someone uses his date of birth to choose "randomly" a number. While to us it may appear to be a random and therefore ill-advised choice, his choice warrants further inspection. If he chooses the day he was born (say for example 21), this may seem to him a reasonable measure. In arriving at the day he was born, the subject may have eliminated as unreasonable the possibility of choosing the year in which he was born (say for example 76). Another example of an unconscious calculation may be choosing a random number on the calculator and then deciding whether to keep the number or draw a new one. Such methods of choosing a number can still lead to self-serving biases, in that discarding "unsuitable" numbers may be done subjectively depending upon whether one's identity number is odd or even. So, even if numbers are not chosen in the most systematic or sophisticated manner, the self-serving bias can occur as long as the seemingly ad hoc procedures used by the odd and even subjects to arrive at their choices of numbers differ.

[7] In the next section we discuss the use of two examples based on randomly drawn numbers used to illustrate to subjects the logic and payoff calculations of the experiment.

3.3 Experimental Procedure

We took a few measures to clarify the workings of the experiment to subjects. First, after reading the instructions, but before making their choice of number, subjects were presented two examples based on randomly chosen numbers. In both examples, a number from 0 to 100 was drawn from a plastic bag for each of four imaginary subjects. The first example was solved explicitly on the board so that all subjects could observe how subject payments are calculated.[8] Clarifying questions were permitted before proceeding to the second example. For the second example, we again drew four numbers randomly, but now asked the subjects to solve for the payoffs to the four imaginary subjects. This required subjects to think through the design and allowed us to test for their understanding by the correctness of their answers. We provided subjects with calculators to minimize the chance of arithmetic errors and motivated them by using the most number of correctly answered questions (payoffs) as a tie-breaker in case two or more subjects in the experiment chose numbers equidistant from 2/3 of the average.

After writing the four numbers from the second example on the board, subjects calculated the imaginary subjects' payoffs. Questions were answered and subjects were given ample time to choose a number. Upon completion the instruction sheets with the subjects' choice of number (and their answers to the payments to the four imaginary subjects) were collected. While waiting for their payments to be computed, each subject explained on a cue card why he chose the number he did. Subjects were subsequently called one at a time to collect their payments and submit their cue cards.

From examining subjects' calculations of the four imaginary subjects' payoffs, at least 58% of the 210 student subjects demonstrated a full comprehension of the design by writing down the correct payoffs for all four. Among those subjects who did not write down the correct payoffs for all four subjects, the most benign error was not dividing the

[8] Only multiples of 10 from 0 to 100 were in the plastic bag. The subjects were told that this was to simplify the payment calculations and that they were free to choose any real number from 0 to 100 inclusive.

winner's payoff by 4 (2.8% of the subjects); 2.4% forgot to include the winner's variable payoff; 17.6% did not indicate a winner at all; 10% of the subjects wrote down the right formulae for the odd and even variable payoffs but made a single arithmetic error; two (0.95%) subjects simply did not fill in the payoffs to the imaginary subjects. The remaining 9.5% of the subjects made a systematic error in calculating the variable payoffs of either the two odd or the two even imaginary subjects.[9] These latter subjects (9.5%) provide a lower bound on the percentage of total subjects whose lack of understanding of the payoff structure may inhibit them from making a well-informed guess.

3.4 Controlling for Alternative Hypotheses

We settled on this design and the particular variable payoff structure both for the relative simplicity of the variable payoff structure and its ability to control for alternative hypotheses and thus give the self-serving bias its highest probability of detection. By conducting only one round of this game and by not including one's own guess in the calculation of a subject's variable payoff, strategic play and Haman effects are eliminated. Additional hypotheses of concern to us were altruism and beliefs about altruism. Overall altruism is nullified in this design: increasing one's guess improves the variable payoff of the odd subjects by the same measure that it reduces that of the evens. Furthermore, beliefs that others are altruistic should not cause a subject to alter his guess since, as shown above, the altruistic motive does not affect others' guesses and therefore need not affect one's own. On the other hand, group altruism may cause odd subjects to guess high and even subjects to guess low to increase the variable payoffs to those subjects of the same type.[10] Because group altruism pushes guesses in the same directions as the self-serving bias, we

[9]Three subjects in this group made an additional error associated with the winner, thereby explaining the fact that the percentages above sum to 101.25.

[10]The minimalist conditions under which subjects form in-group, out-group distinctions are well documented in the social psychology literature. Consult Tajfel et al. (1971) for the classic reference on the minimal group paradigm.

Identity Number	Hypothesis						
	self-serving bias (ssb)	beliefs about ssb	overall altruism	beliefs about overall altr.	group altruism	beliefs about group altr.	insurance
odd	↑	—	—	—	↑	—	↓
even	↓	—	—	—	↓	—	↑

Table 1: The table lists the possible experimental hypotheses and their theoretical effects on the direction of subjects' guesses with odd and even identity numbers. The possible effects are: "↑" (increase), "↓" (decrease), or "—" (no effect or effect cancels out).

take several measures to minimize its likelihood and effect. In this way, in the event that odd guesses are greater than even guesses, the confounding is minimal. First, we chose a relatively large group size of 30 subjects, in part, so that the impact of an individual subject's guess on group averages is diffuse. Second, by seating subjects well apart from one another, subject anonymity was maintained. Third, we feel that subjects randomly assigned odd or even identity number is quite hollow as a symbol of group identity. Finally, explicit calculation of payoffs on the blackboard for the first example presents a sterile, calculating environment for the arousal of any such in-group sentiments.

Even if a subject does not exhibit group altruism, he may believe others do. Yet beliefs about group altruism leave one's own guess unaffected, assuming one believes the odds are equally as likely to exhibit group altruism as the evens. Similar reasoning holds for beliefs about the self-serving bias: if you believe others may be biased in their beliefs about the rationality of others in a way that is self-serving, then you believe the odd subjects will guess high and the evens low. Assuming you believe the self-serving bias to be equally likely among the odds and the evens (and there is no apparent reason why you should believe one group more susceptible to the bias than the other), then your own guess should remain unchanged.

The only remaining hypothesis is the insurance motive. The insurance motive works in the opposite direction as the bias. If an odd subject fears his variable payoff will be

low (a low average of numbers), he will guess low to try to win the fixed prize and if an even subject fears a low variable payoff due to a high average, he will guess high. Table 1 summarizes the various possible motives and their directions.

4 Results

4.1 Subject Pool and Payments

We conducted seven sessions, each with 30 subjects. Three sessions consisted of economics students and four sessions consisted of psychology students. The experiment itself required about 25 minutes with an additional 15 minutes to calculate and count out subjects' payments. In each session, one subject earned 400 shekels plus his variable payoff. The remaining 29 subjects earned their variable payoff only. Variable payoffs ranged from 7 shekels to 19 shekels.[11]

4.2 Data Analysis

A visual representation of the data can be found in Appendix B, Figures 1 and 2. We choose to display our data in circle plots. The location of a circle indicates the value of the sample observation. The size of each circle indicates the number of observations at that value. The diagrams are a compact way of accurately representing a sample. For our purposes, they provide a quick and accurate impression of the data and enable us to display many more sample distributions on a single page than is possible with more standard histograms. The triplet to the right of each circle plot in Figure 2 indicates the (mean, median, sample size) for that sample. In Figure 1, the sample size is omitted since

[11] Note that the minimum wage in Israel at the time – the wage earned by most students who work part-time – was 13 shekels an hour.

there are 15 observations of odd and even guesses in each session. The paper's first main result follows from a comparison of the last two circle plots in Figure 1.

Observation 1 *Subjects with odd identity numbers did not guess significantly higher than those with even identity numbers. That is, the aggregate data does not support the existence of the self-serving bias.*

The mean (median) guess of the odd subjects is 33.3 (33.0) (N=105) compared to 32.7 (27.0) (N=105) for the even subjects. We cannot reject the null hypothesis that the sample distributions are the same (p-value from Mann-Whitney test=.213).[12]

The difference between the mean and median guesses of the even subjects suggests the possible presence of outliers. One might argue that it is reasonable to exclude all guesses above 66.66 from the sample on the basis that they are irrational: numbers above 66.66 are weakly dominated by guessing exactly 66.66.

Observation 2 *By excluding outliers from the sample (irrational guesses greater than 66.66), the self-serving bias turns up significant.*

If we reconduct the Mann-Whitney test on the data minus the 13 irrational guesses, then the odd subjects' guesses are significantly higher than those of the even subjects (p=.039).[13]

[12]Our data do not approximate functional distributions required for parametric techniques. The non-parametric Mann-Whitney test is the appropriate test for our data. As a rank-sum test, the Mann-Whitney tests for differences in the locations of the distributions and most closely resembles a test of equal medians. Thus, all p-values reported in parentheses in this section are results from the Mann-Whitney test and refer to 1 − probability that we can reject the null hypothesis that the two (odd and even) sample distributions are drawn from the same underlying population distribution.

[13]It turns out that 9/13 guesses above 66.66 were made by even subjects. Furthermore, the seven highest guesses (above 80) were all made by even subjects. (See Figure 1.) One explanation for these

The absence of unequivocal support for the existence of the bias led us to examine the data on a finer level. With three sessions involving economics students and four made up of psychology students, it may be the case that the subjects from one field of study significantly display the bias while the students from the other field display no bias at all or even a reverse bias, thereby dampening the bias in the aggregate data. Field of study has been shown to matter in a variety of other contexts.[14] We believe it may matter here as well. For instance, economists may have an easier time ignoring the variable payoff over which they have no control. The other observable variable that may be a determinant of the existence of the bias is the subject's gender. Elsewhere gender often plays a role in risk-taking behavior, altruism, fairness and trust.[15]

Observation 3 *Among the four subgroups (female economists, male economists, female psychologists, male psychologists), only female psychologists exhibit the bias.*

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findings is that the number "100" that appears in the calculation of the even subjects' variable payoff of "100 minus the average" provides an anchor upon which some evens based their guesses. The processing of the number "100" unconsciously pushes upward some even subjects' guesses, in the opposite direction of the bias.

[14] Frank, Gilovich and Regan (1993) survey the evidence from public goods experiments, ultimatum games and prisoner's dilemma experiments in support of the view that economics students act in a more self-interested and less cooperative way than non-economics students. Yezer et al. (1996) show that economics students are more honest than non-economists in a lost-letter experiment. Ruffle and Tykocinski (2000) find that psychologists estimate more accurately the costs of identical gift items than economists.

[15] Eckel and Grossman (2000) survey the experimental results that test for a gender effect in public goods games, ultimatum games and dictator games. In trust games, both Croson and Buchan (1999) and Chaudhuri and Gangadharan (2001) find that women responders return significantly higher amounts of money to the proposers than men do. Chaudhuri and Gangadharan's results show that men are more trusting than women, while Croson and Buchan find no difference between men and women proposers.

The average (median) guess of odd-numbered female psychologists was 37.7 (34.5), N=42, compared to 33.9 (28.0), N=42, for their even counterparts. We can reject the equality of these two distributions at the 3% level (p=.025). This finding is all the more striking when contrasted with the female economists who show no sign of a bias whatsoever (p=.992). The mean (median) guess of odd-numbered female economists was 30.3 (33.0), N=24, compared with 33.5, (27.0), N=23, for even-numbered female economists. Male psychologists similarly show little sign of the bias: while odd, male psychologists guessed on average 31.1 compared to 27.5 for their even counterparts, the median guess of odd, male psychologists is actually lower (22.0) than that of the even, male psychologists (27.0); although the difference is not significant (p=.777).

Finally, male economists' guesses also display no evidence of the bias: on the contrary, mean (median) guesses of the even-numbered male economists exceed those of the odds by 30.1 to 27.0 (26 to 25.5), respectively, p=.620.

5 Discussion of Field of Study and Gender Effects

Psychologists on the whole made significantly higher guesses than those of economists: the average (median) number chosen by psychologists was 34.8 (33.0) compared to 30.7 (28.5) by economists. Also, 8/13 guesses above 66.66 were made by psychologists. These observations are not surprising: economists have a greater familiarity with the inductive reasoning involved in the p-beauty contest game. The fact that psychology students made a disproportionate number of the errors in calculating the four hypothetical payoffs testifies to economists better understanding of the game. This better understanding allowed economists to penetrate the game more deeply and ignore the addition of the variable payoff. Psychologists allowed the variable payoff to enter their decision making process in arriving at a guess and thus the appearance of the bias.

However, to conclude that the existence of the bias is a function of field of study would be to miss its source, namely, the female psychologists. Our results suggest that,

in some contexts, focusing solely on either gender or field of study differences may not go far enough to pinpoint the true source of the phenomenon observed. There may be a significant interaction between the two. For instance, we find that females who choose to study economics exhibit behavior similar to male economics students; whereas female psychologists exhibit behavior substantially different from male psychology students. Since male and female psychology students receive the same training our results suggest that the bias among female psychologists only may be a result of self-selection rather than differences in training; that is, the reasons females choose to study psychology are different from those of males.

6 Conclusion

We motivated this paper by stating that we wanted to design an experimental test for the self-serving bias that controls for alternative hypotheses. We chose a contextually sterile environment to serve this purpose. Such an environment provides a harsh test for the self-serving bias since it offers little opportunity for subjects to retrieve in subjective ways previous experiences that are relevant to their play of the p-beauty contest game. Indeed we find only limited support for the bias; only one out of four subgroups exhibited the bias.

Even in contextually rich environments, widespread pervasiveness of the bias remains to be shown. Aside from difficulties in ruling out alternative hypotheses when context is not introduced into the experimental design one variable at a time, other research in contextually rich settings does not find broad support for the bias. Dahl and Ransom (1999) find very limited evidence of a financially motivated self-serving bias among Mormons in their own determination of what constitutes income for the purpose of tithing. Bar-Hillel and Budescu (1995) conduct a battery of experiments in contextually rich and contextually sterile environments and find little to no evidence of the bias in any of their experiments. They attribute previous evidence of the bias in the psychology literature

to elicitation effects or the inability to rule out the alternative explanation that subjects have access to limited (biased) information and evaluate this information in an unbiased way.

In summary, the conflicting evidence concerning the existence of the self-serving bias in decision problems calls for further research to delineate the boundaries of the bias' role as a motivational source in decision making.

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Appendix A: Instructions for Participants

There are 30 participants in this experiment. You are to choose a number between 0 and 100 inclusive. The participant whose number is closest to 2/3 the average of all numbers chosen wins 400 shekels. In the case of a tie, the prize is divided equally among the winners who answer correctly the most number of questions from the example explained below.

In addition, each participant has an identity number which is either even or odd. There are an equal number of even and odd numbers. Your identity number is written at the top of this page. Participants with odd numbers receive in shekels the average of **all 29 other** chosen numbers

divided by four. Participants with even numbers receive in shekels 100 minus the average of **all 29 other** chosen numbers, this amount divided by four.

To help you to understand the experiment, the monitor will begin with two examples each consisting of four numbers drawn randomly from the bin at the front of the room. The payments of the first example will be calculated by the monitor and written on the board to demonstrate how the experiment works. For the second example, the monitor will again draw four numbers randomly from the bin. You are asked to indicate the payments to the four imaginary participants at the bottom of this page. This is in order to verify your understanding of the experiment. Also, in the case that two or more participants' numbers are equally close to 2/3 the overall average of the chosen numbers, the prize will be divided equally among the winners with the most number of correctly answered questions in example 2.

After answering the example, please indicate your own choice of number below. After 10 minutes you will be asked to hand in this form and to return to your seat in order to complete the attached explanation card. When your identity number is called, hand the card to the monitor in order to receive your payment.

If you have any questions, please raise your hand and a monitor will come to assist you.

Please fill in the blank with your choice of number __________

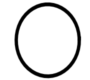
From example 2, indicate the payments to participants:

31 _____ , 32 _____ , 33 _____ , 34 _____

Appendix B: Circle Plots

Figure 1: **Distribution of Guesses by Session**: Each horizontal line displays the distribution of guesses from 0 to 100. The location of a circle indicates the value of a guess. The circle's size reveals the number of guesses at that value according to the legend at the bottom of the graph. Within each of the three economics sessions (Econ 1, Econ 2, Econ 3) and each of the four psychology sessions (Psych 1, Psych 2, Psych 3, Psych 4), the guesses of the odd-numbered subjects are compared to those of the even-numbered subjects. The pair of numbers to the right of each distribution indicates the mean and median guess, respectively. There are 15 odd-numbered and 15 even-numbered subjects in each session.

Figure 2: **Distribution of Guesses by Gender and Field of Study**: The distribution of guesses of the odd-numbered and even-numbered subjects are displayed according to the four subpopulations, female psychologists, male psychologists, female economists, and male economists. The triplet to the right of each distribution reveals the mean, median, and sample size of the distribution, respectively. The gender of six subjects (4 psychology students and 2 economics students) could not be determined from their first names nor from their written answers in Hebrew, a language in which certain verb conjugations indicate the author's gender. Thus, n=204.



Econ 1 odd
Econ 1 even
Econ 2 odd
Econ 2 even
Econ 3 odd
Econ 3 even
All Econ odd
All Econ even
Psych 1 odd
Psych 1 even
Psych 2 odd
Psych 2 even
Psych 3 odd
Psych 3 even
Psych 4 odd
Psych 4 even
All Psych odd
All Psych even
All odd
All even
26.8, 30
30.6, 32
20.7, 22
33.9, 26
37.5, 37
35.1, 27
28.3, 30
33.2, 27
33.1, 33
41.9, 30
38.2, 37
34.6, 33
41.4, 34
28.8, 26
35.3, 33
24.2, 23
37.0, 33
32.4, 27
33.3, 33
32.7, 27
1
2
3
4
5
6
7
8
9
16

Psych female odd	37.7,	34,	42
Psych female even	33.9,	28,	42
Psych male odd	31.1,	22,	15
Psych male even	27.5,	27,	17
Econ female odd	30.3,	33,	24
Econ female even	33.5,	27,	23
Econ male odd	27.0,	25.5,	20
Econ male even	30.1,	26,	21
All female odd	35.0,	33,	66
All female even	33.8,	27,	65
All male odd	28.7,	22,	35
All male even	28.9,	26,	38