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Male and Female Effort Levels: An Experimental Comparison

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Male and Female Effort Levels:

An Experimental Comparison
(TITLE)

BY

JoAnne E. Guennewig

THESIS

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ABSTRACT

This paper is an experimental economic study that
serves two main functions. The first of these is to provide
a replication of the findings of Schotter and Weigelt: that
when an equal opportunity or affirmative action program is
imposed, the effort levels of all employees tend to increase
and not just the effort of the parties discriminated
against. Secondly, this study looks into the differences
between the effort levels shown by men and women in similar
situations.

The hypothesis of this paper is that while the effort
of all individuals is lowered in the presence of
discrimination, the effort levels of the females drop more
than male effort levels.

Three experiments were conducted at Eastern Illinois
University. The first was a ten round tournament used to
measure effort levels in the absence of discrimination. The
second was a ten round unfair tournament with
discrimination. The final experiment was a twenty round
unfair tournament with discrimination.

The results of this set of experiments imply two
things. The first major result of this study is that the

work of Schotter and Weigelt was replicated. This provides
a basis from which to expand into an investigation of the
area of gender differences in effort levels. This leads to
the second major result of this research. The experiments
show that when no discrimination is present there is no
significant difference between the effort of males and
females. This research also shows that when a
discrimination factor is present, women exhibit less effort
than their male counterparts in some situations. This
difference is most significant when the women were in the
disadvantaged category.

The results of this study provide a good beginning for
research into the area of gender differences in effort
levels, which is an area that currently does not have much
empirical information available.

To my parents, John and Eileen,

and my sisters, Jennifer and Jacque

ACKNOWLEDGEMENTS

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INTRODUCTION

In the past thirty years, the use of experimental economics as a research method has increased in popularity and acceptance. However, it is still a relatively new method with many research topics still to be explored through laboratory analysis. Experiments have provided a way to replicate results that have not been available otherwise (Davis and Holt, 1993, p. 44). They also provide an inexpensive (relative to the real world) method for studying behavior. When conducting experiments it is important to first plan out every stage of the experiment and determine all that will be needed. This includes the experimental design, arranging for colleagues to assist, preparation of all the necessary materials, recruiting of subjects, and finally conducting the actual experiment (Davis and Holt, pp. 55-60).

This paper will be a replication and expansion of an experiment and research which was originally conducted by Andrew Schotter and Keith Weigelt at New York University (1992). Their purpose was to determine if affirmative action laws and equal opportunity laws lead to increases in the amount of effort exerted by the affected workers. They

examined the effects of equal opportunity and affirmative action programs through the use of game theory and tournaments.

Schotter and Weigelt theorized that increased effort will be displayed by all employees of the firm when either equal opportunity or affirmative action programs are imposed. If their theory is correct, then there is no trade-off between equity benefits and the supposed efficiency losses. This may occur because both equity and efficiency are improved (Schotter and Weigelt, 1992, p. 511).

This expansion of Schotter and Weigelt's research will compare the effort levels of males and females. Schotter and Weigelt did not break down their results by subject gender to investigate differences. It is expected that when faced with the discrimination situation, the females will tend to show a decreased level of effort (relative to a non-discriminatory situation), and their effort will be less than the effort that is shown by the males. This hypothesis is based on the notion that even though women continue to increase in number in the workforce, and receive increasing amounts of pay, they are still discriminated against in the workplace. This discrimination in turn may result in a lack of trying to overcome these obstacles, even when assistance is provided through government policy, such as affirmative action and equal opportunity laws.

There is much evidence of discrimination against women.

The most obvious is that of pay inequality. Barbara R. Bergman found that in the United States the difference in wages between white women and men is greater than the gap between white men and black men (Cited in Amsden, 1980, p. 275). Bergman goes on to note that any reduction in the discrimination would probably lead to lower wages for the men instead of increasing wages for the women (Amsden, p. 275). This same study also found that employers can either gain or lose financially through this type of discrimination. When women are discriminated against in this manner, their wages are lowered and at the same time the wages of men are increased (Amsden, p. 278). The pay inequality is shrinking, but the changes are occurring slowly. The ratios of women's to men's earnings can be seen in Figure 1.

In addition, there are many social myths regarding women in the workplace that are slow to disappear. For example, there is the Myth of Role Conflict. This is the belief that a "great" conflict will exist for any woman who seeks a career outside of her "true vocation" as a housewife and mother (Blaxall and Reagan, 1976, p. 33). Barbara Ann Stolz (1985) found that within the family environment there are many factors that contribute to women having a hard time defeating the status quo. For example, childrens' actions that, deliberate or not, were effective in keeping their mother at home, or the lack of adequate day care provided by
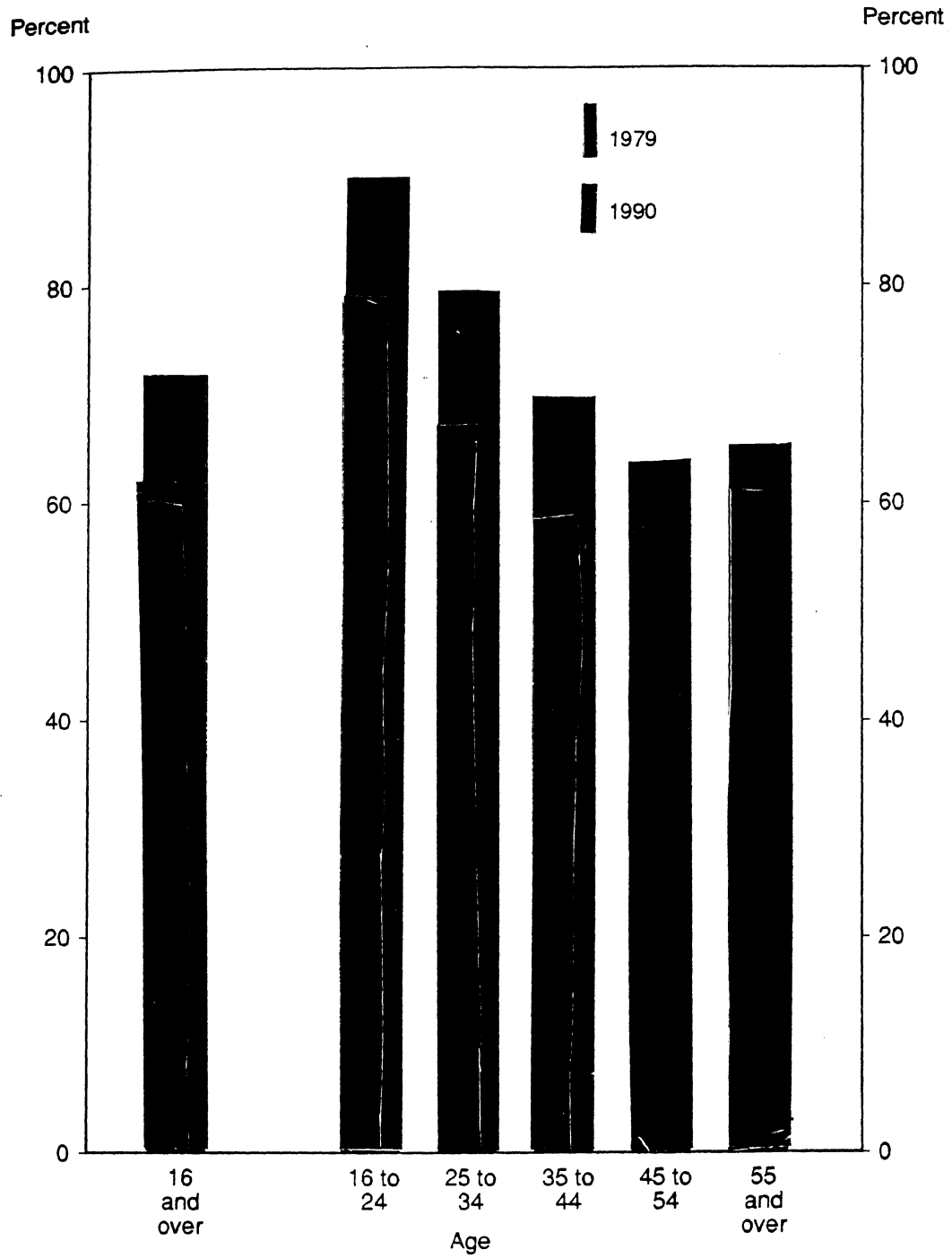
Figure 1. Ratio of women's-to-mens's median weekly earnings for full-time wage and salary workers by age (U.S. Department of Labor, 1991, p. 22)

society (Stolz, p. 123). Stolz also noted that usually women were faced with deliberate attempts by their husbands to keep them at home. Also, many responsibilities, such as school meetings and sick children, place demands on women that cannot be accommodated by the traditional job (Stolz, p. 124). These are reasons women may face discrimination in the workplace. This can occur in two ways. First, a female job candidate may be less likely to be hired than an equally (or even less) qualified male candidate because the employer may feel that a man is less likely to take time off to care for children. The assumption is made that the woman would miss more time from work, and therefore be less productive for the company. Secondly, a woman may feel penalized at work when they do need to take time off. This time off may be seen by their male co-workers and bosses as getting a break from work to take care of children, a break that the males would not take. As a result the women may be perceived as not as committed, responsible, or as hard working as the males. As a result women may be assigned tasks/jobs with lower responsibility, be paid less and receive fewer promotions than men do.

Another major myth is that females suffer from motivational deficit and have a lack of commitment to their chosen career (Blaxall and Reagan, 1976, p. 35). Jacquelyn B. James studied this area and discovered that women allow for career interruption (especially during the childrearing

years) when they are selecting a career (Cited in Grossman, 1990, p. 106). James found evidence that women who plan to interrupt their careers at some point tend to make their career choice based on how easy it will be to interrupt their career instead of choosing based upon their own interests and abilities (Grossman, p. 106). This may lead to discrimination situations. The women may be passed over for promotions, or not given responsibilities that are given to their equivalent male co-workers. As a result of being in a job which is not their first choice, women may not try as hard to do their best work or exert any extra effort to overcome the burdens of discrimination at the workplace.

Another explanation for any difference in the effort levels of men and women is the tendency for women to be externalizers (Wallace, 1982, p. 72). This means that they attribute things that affect them to luck or chance instead of their own actions. Men on the other hand have a tendency to be internalizers, which is, they tend to believe that events are the result of their own actions. Men are also more likely to attribute their success to their actions and failure to external events where as women attributed success to external factors and failure to their own actions (Wallace, p. 72).

Wallace (1982) states that "women often assume that men are more apt to attain promotions and higher management positions because of the 'old boys' network' and bias that

exists against women " (p. 95). This factor may also contribute to the decrease in effort shown by women. If they believe that they will not be able to overcome the disadvantage, then they may not exert any extra effort to attain success in spite of equal opportunity and affirmative action programs.

In this study, tournaments are used to collect data on employee effort. In a tournament, subject payments depend on their performance relative to that of another subject in the experiment. Tournaments can be either symmetric or asymmetric. Symmetric tournaments exist when all subjects are relatively identical and are treated equally. According to O'Keefe, Viscusi, and Zekhauser, 1984, there are two types of asymmetric tournaments, uneven and unfair (Cited in Weigelt, Dukerich, and Schotter, 1989, p. 23). Tournaments are uneven when subjects differ in ability, and are unfair when the rules favor one subject over another (Cited in Weigelt et al., p. 23).

Clive Bull found that rank-order tournaments are good predictors of the behavior of effort levels of laboratory subjects (1987, p. 2). Bull found that disadvantaged subjects in uneven tournaments have higher effort levels than originally expected (p. 3). In his study, Bull designed an experiment that consisted of 10 separate sessions with different subjects and parameters for each. The results of these tournaments indicate that systematic behavior is shown

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by subjects in a tournament (Bull, p. 28). This finding is important to note for the current study because it allows for application and interpretation of the results of the current tournament to the outside world.

The experiments conducted for this paper will be a replication of the experiments that Schotter and Weigelt conducted. The purpose of this is to establish that Schotter and Weigelt's results are replicable and to extend their results. The current study will then expand on the original study in the interpretation and analysis of the data. This study will explore the theory that female workers tend to exert less effort than do their male counterparts in the same situation. There has been no experimental study found which investigates the existence of a difference in the effort levels exerted by men and women. If there is a notable difference, then a whole new area of investigation will be wide open.

SCHOTTER AND WEIGELT'S WORK

To perform their experiment, Schotter and Weigelt (1992) recruited subjects from economics courses. At the beginning of the experiment, subjects were told to select envelopes, were given the instructions, and were randomly assigned seats, subject numbers, and anonymous tournament pair members. Then to start each round, the subjects were asked to select a number between 0 and 100. This was

recorded on their sheet as their "decision number" (a proxy for their effort level). For each decision number there was a corresponding cost, listed on a table that was handed out to the subjects. After the subject had recorded his/her decision number, he/she opened one of the envelopes he/she selected upon entering the room. Each envelope contained a random number (a proxy for a random shock), and added it to the decision number which gave the subject a total number (a proxy for the subject's total output) for the round. This information was collected by the experimenter. The member of each tournament pair with the highest total number received a higher payment than the subject in the pair with the lower total number. In the event of a tie a coin was tossed to decide which pair member was to be designated as having the highest total number. The subjects then recorded their payoffs on their sheets. Subjects repeated this procedure for 20 rounds. The average duration of the experiments was about 75 minutes (p. 518). Seven experiments were conducted in all. The first was a baseline, symmetric tournament. The second and third were unfair tournaments in which one member of each subject pair had to exceed the other's output by 25 (or 45) before he/she could receive the higher payment. In these two experiments, the subject knew if he/she was the disadvantaged pair member. Experiments four and five were uneven tournaments which were identical to the baseline except that the costs

of one pair member is a multiple of the other's. Experiments six and seven examine the effects of affirmative action programs. This is achieved by combining the parameters of experiment 4 with a disadvantage factor of 25 (experiment 6), and, for experiment 7, the parameters of experiment 5 with a disadvantage factor of 45 (p. 522).

Schotter and Weigelt's results were consistent with the predictions of the tournament theory (discussed later in this chapter). For their baseline experiment, the mean effort level, 77.9, was not significantly different from the predicted level of 73.75. The unfair experiment showed that while effort levels fell relative to the symmetric tournament, they were higher than the theory predicted: the mean effort level of disadvantaged subjects was 58.65 (predicted level 58.39) and the mean effort level of advantaged subjects was 74.5 (predicted level 58.39) (Schotter and Weigelt, pp. 522-23). Noting the increase in mean effort levels (from the unfair tournament to the symmetric tournament), Schotter and Weigelt conclude that equal opportunity laws benefit the disadvantaged groups. Also, equal opportunity laws actually improve the overall tournament performance. These results further suggest that the effect of affirmative action programs on output depends upon the degree of discrimination that exists (p. 539).

As a final note Schotter and Weigelt observed two behavioral tendencies that were persistent in their

research; variance in behavior among the different subjects and the slight oversupply of effort. Schotter and Weigelt recommended that future research focus on these two areas.

The main focus of this paper will be in the expansion of the results of Schotter and Weigelt along the lines of the variance in subject behavior. This will be done to determine if men and women exert different levels of effort. For this study, some parts of Schotter and Weigelt's original work will be eliminated and others will be shortened or changed. These changes will be noted as they are discussed in the paper.

For this study there will be three basic null hypotheses and alternatives used to test these theories. The first null hypothesis is that the data from this study are not significantly different from the prediction of game theory. The second null hypothesis is that the data from this study are not significantly different from Schotter and Weigelt's data. The last null hypothesis is that the mean effort of males is equal to that of females.

This thesis will proceed as follows. The theory of tournaments will be discussed next. In Chapter 2 the experimental procedure and design for this study will be presented. Chapter 3 will present and discuss the results. Finally, in Chapter 4 conclusions will be drawn and suggestions will be made for further research in this area.

THE THEORY OF TOURNAMENTS

The following information deals with the theory behind subjects' expected behavior in tournaments, and also in the calculation of the payoff functions for the tournaments (Schotter and Weigelt, 1992, pp. 514-518):

Consider the following two-person tournament. Two identical agents i and j have the following utility functions that are separable in the payment received and the effort exerted:

$$u_i(p,e) = u(p)-c(e);$$

(1)

$$u_j(p,e) = u(p)-\alpha c(e),$$

where p denotes the nonnegative payment to the agent, e, a scaler, is the agent's nonnegative effort, and α >1 is a constant. Note that agent j's costs are α times those of agent i, α >1. The positive and increasing functions $u(.)$ and $c(.)$ are, respectively, concave and convex. Agent i provides a level of effort that is not observable and that generates an output y_i according to

$$y_i = f(e_i) + \epsilon_i, \tag{2}$$

where the production function $f(.)$ is concave and ϵ_i is a random shock. Agent j has a similar technology and simultaneously makes a similar decision. The payment to agent i is $M>0$, if $y_i > y_j + k$, and $m<M$ if $y_i < y_j + k$, where k is a constant. A positive k indicates that j is favored in the tournament, while a negative k indicates that i is favored. Agent j faces the same [actually similar, but mirror image] payment scheme. Given any pair of effort choices by agents, agent i's probability of winning M, $\pi^i(e_i, e_j, k)$, is just equal to the probability that $(\epsilon_i - \epsilon_j) > f(e_j) - f(e_i) + k$. Thus, i's expected payoff from such a choice is

$$Ez^i(e_i, e_j) = \pi^i(e_i, e_j, k)u(M) + [1 - \pi^i(e_i, e_j, k)]u(m) - c(e_i),$$

while agent j's is $\tag{3}$

$$Ez^j(e_i, e_j) = \pi^j(e_i, e_j, k)u(M) + [1 - \pi^j(e_i, e_j, k)]u(m) - \alpha c(e_j)$$

The above equations specify a game with payoffs given by (1) and a strategy set E given by the feasible set of effort choices. The theory of tournaments restricts

itself to the game's pure Nash equilibria. If the
distribution of $(\epsilon_i - \epsilon_j)$ is degenerate either because
there are no random shocks to output or because such
shocks are perfectly correlated across agents, and k is
not too large, then the game has no pure strategy Nash
equilibrium.

With suitable restrictions on the distribution of
random shocks and the utility functions, a unique, pure
strategy Nash equilibrium will exist. This is the
behavioral outcome predicted by the theory of
tournaments. The theory requires the specification of
the utility function, the production function, the
distribution of $(\epsilon_i - \epsilon_j)$, and prizes M and m. One
simple specification is the following:

$$U_i(p_i, e_i) = p_i - e_i^2/c$$
$$U_j(p_j, e_j) = p_j - \alpha e_j^2/c$$

$(1')$

$$y_l = e_l + \epsilon_l, \qquad l = i, j,$$

$(2')$

where $c > 0$ and ϵ_l is distributed uniformly over the
interval $[-a, +a]$, $a > 0$, and independently across the
agents. e_i and e_j are restricted to lie in $[0, 100]$.
In this particular case the agents' expected payoff in

the tournament is given by

$$Ez_i(e_i, e_j) = m + \pi^i(e_i, e_j, k)[M-m] - e_i^2/c.$$

(3′)

$$Ez_j(e_i, e_j) = m + \pi^j(e_i, e_j, k)[M-m] - \alpha e_j^2/c.$$

If a pure strategy Nash equilibrium exists and is in the interior of [0, 100], each agents first-order condition must be fulfilled:

$$\frac{\delta Ez_i}{\delta e_i} = \frac{\delta \pi(e_i^*, e_j^*, k)}{\delta e_i}[M-m] - \frac{2e_i^*}{c} = 0;$$

$$\frac{\delta Ez_j}{\delta e_j} = \frac{\delta \pi(e_i^*, e_j^*, k)}{\delta e_j}[M-m] - \frac{\alpha 2 e_j^*}{c} = 0.$$

(4)

The concavity of the agent's payoff function ensures that (4) is sufficient for a maximum. (A corner solution must be checked for). Given distributional assumptions on ϵ_i and ϵ_j, the probability of winning functions with $k > 0$ is

$$\pi^i(e_i, e_j, k) = \begin{cases} \dfrac{1}{2} - \dfrac{e_i - k - e_j}{2a} - \dfrac{(e_i - k - e_j)^2}{8a^2}, & \text{if } e_i\text{-}k > e_j \\[4mm] 1 - \left(\dfrac{1}{2} - \dfrac{e_j - e_i - k}{2a} - \dfrac{(e_j - e_i - k)^2}{8a^2}\right) & \text{otherwise}, \end{cases}$$

$$(5)$$

$$\pi^j(e_i, e_j, k) = \begin{cases} \dfrac{1}{2} - \dfrac{e_j + k - e_i}{2a} - \dfrac{(e_j + k - e_i)^2}{8a^2}, & \text{if } e_j\text{+}k > e_i \\[4mm] 1 - \left(\dfrac{1}{2} - \dfrac{e_i - e_j - k}{2a} - \dfrac{(e_i - e_j - k)^2}{8a^2}\right) & \text{otherwise}; \end{cases}$$

with

$$\frac{\delta \pi^j(\bullet)}{\delta e_j} = \frac{1}{2a} - \frac{e_j - e_i + k}{4a^2} \quad \text{if } e_j\text{+}k > e_i,$$

$$\frac{\delta \pi^j(\bullet)}{\delta e_j} = \frac{1}{2a} - \frac{e_i - e_j + k}{4a^2} \quad \text{if } e_j\text{+}k < e_i,$$

$$(6)$$

and

$$\frac{\delta \pi^j(\bullet)}{\delta e_i} = \frac{1}{2a} - \frac{e_i - e_j - k}{4a^2} \quad \text{if } e_i\text{-}k > e_j,$$

$$(7)$$

$$\frac{\delta \pi^i(\bullet)}{\delta e_i} = \frac{1}{2a} - \frac{e_j - e_i - k}{4a^2} \quad \text{if } e_i\text{-}k < e_j.$$

Note that the marginal probability of winning is equal for both agents, regardless of the value of k, and this probability is a function only of the difference in effort levels (including k). It does not depend on *absolute* effort levels.

Plugging (6) and (7) into (4) and solving for e_i^* and e_j^*, we find that

$$e_j^* = \frac{[(1/2a) - (k/4a^2)](c(M-m)/2\alpha)}{1 + [(1-\alpha)/4a^2](c(M-m)/2a)} \qquad (8)$$

$$e_i^* = \alpha e_j.$$

When $k = 0$ and $\alpha = 1$, (8) defines the equilibrium of a symmetric tournament with

$$e_i^* = e_j^* = (c(M-m))/4a. \qquad (9)$$

When $\alpha = 1$ and $k > 0$, (8) defines the equilibrium of an unfair tournament with

$$e_i^* = e_j^* = \frac{1}{2a} - \frac{k}{4a^2} \quad \frac{c(M-m)}{2} \quad . \qquad (10)$$

Note in unfair tournaments, despite j's advantage,
at equilibrium both agents choose the same effort
level. The logic underlying this result is simple.
As noted in (6) and (7), the marginal probability of
winning function for any k and effort levels e_i and e_j
are equal for both advantaged and disadvantaged
subjects and depends only on the difference between
$e_j + k$ and e_i. Because their marginal probability
winning functions are equal at all e_i and e_j, and both
i and j have identical cost functions, the same
effort level that equates the marginal benefits of
increased effort to marginal costs for i, also does
so for j. Hence, at equilibrium both choose the same
effort level. Effort levels fall when k is increased
from 0 (i.e., the symmetric equilibrium) because such
an increase in k decreases the marginal probability
of winning for both agents at each e_i and e_j.

We compare equations (9) and (10) to investigate
the effect of equal opportunity laws. The ceteris
paribus removal of discrimination (k is reduced from
$k>0$ to $k=0$) increases the equilibrium effort levels of
both agents and hence the profits of the tournament
administrator. Again, the probability of winning for
agents who are discriminated against increases.
However, equal opportunity laws can decrease the

welfare of these agents because they are expected to exert more effort at equilibrium. A negative welfare gain results if the cost of this increased effort exceeds the expected benefits of winning. Welfare gain is, of course, always expected to be negative for previously favored agents.

The work in this paper should provide a contribution to the area of experimental economics as well as to the area of labor economics. This will be accomplished by first replicating Schotter and Weigelt's work to provide a basis for expanding this work into the area of gender differences. If the study shows a significant difference in the effort levels that are expended by males and females in various situations, the possibilities for further study in this area will be numerous.

CHAPTER 2

METHOD

EXPERIMENTAL PROCEDURES

All of the experiments for this study used subjects recruited from economics courses at Eastern Illinois University. The baseline experiment consisted of ten subjects, eight others participated in the first discrimination experiment, and a third set of ten subjects participated in the second discrimination experiment. When the subjects arrived at the laboratory (a standard 40-seat classroom) they were given a packet of information and asked to pick 10 envelopes from a container of 200. In the second discrimination experiment, subjects selected 20 envelopes from a pile of 240. Inside the envelopes was a number written on a slip of paper. The numbers were randomly selected from a uniform distribution over the range (-60, +60) and were generated using Lotus123 @functions. Each subject was randomly assigned a seat, a subject number, and a "pair member" for the duration of the experiment. The identity of the pair member was not revealed to the subject at any time.

The packets given to the subjects included written instructions, a decision number/costs table, a payoff record

sheet, and a set of small slips that were collected at the end of each round to determine who in the pair was to receive the high payment. The instructions and other sheets were those used by Schotter and Weigelt in their experiments, and were obtained from Dr. Schotter. Copies appear in the Appendix of this paper.

The subjects were told in the instructions that the amount of money they earned was a function of their decisions, their pair member's decisions, and the realization of a random variable. All parameters (including if they were the advantaged/disadvantaged member of their pairing) in the experiments were known to the subjects except for the identity of a subject's pair member.

The instructions and the format of the experiment was explained thoroughly to the subjects, and then the experiment began. In all three experiments, subjects were told to first select a number from the decision/cost sheet which listed numbers between 0 and 100 (inclusive) and then record this number on their payoff record sheet. This was their "decision number". Next to each decision number was the associated cost of that "effort". After a subject recorded his/her decision number and its cost on his/her payoff sheet, he/she was instructed to open one of the 10 envelopes with a random number enclosed. This number was then recorded on the payoff sheet and was added to the decision number to get a "total number" for that round.

This total number was then recorded on one of the small slips of paper that were then collected. The "total numbers" of each pair were then compared, the experimenter then indicated on each slip whether the subject received the high or low payment, and the slips were returned to the subjects. In the event of a tie (which did not occur in any of these experiments) a fair coin would be tossed to determine which subject in the pair received the high payment. Each subject then circled either the high or low payment on his/her payoff record sheet. He/she then subtracted the cost of his/her decision number from his/her payment amount. This amount is the subject's net payment for that round. The decision number in these experiments corresponds to effort, the random number corresponds to the random shock, the total number corresponds to output, and finally the decision cost corresponds to the disutility of effort. After this was completed, the next round began. The rounds were all identical and the subjects proceeded in this manner for 10 rounds in the first two experiments and for 20 rounds in the third experiment. After the last round was completed, subjects calculated their total payment by summing the payments for each round. This payment value was then divided by 2 (which the subjects knew was to occur) to determine their actual payment in dollars. In the third experiment, subjects also then subtracted a $2.00 "fixed cost" from the total to determine their actual total

payment.(The subtraction of the fixed cost more closely replicated Schotter and Weigelt's experiment.)

The first and second sessions lasted approximately 45 minutes from start to finish, and the third session lasted about 1 hour.

For the second and third experiments, which had a disadvantage factor of 25, the instructions differed slightly from those in the baseline experiment. The subjects all had identical cost functions, but in each subject pair, one person had to realize an output that was k units greater than that of his/her pair member in order to receive the higher payment. For the experiments, the subject in each pair with an even number was the disadvantaged subject. The value of the disadvantage factor, k (=25), was known to all of the subjects. Here, it is important to note a few things. Subjects that received the high payment were referred to as "high number subjects" instead of "winners". Also, M and m, the high and low payments, were not referred to as "prizes" but as "fixed payments". The reasoning behind this, according to Schotter and Weigelt (1992), was to "deemphasize the gamelike nature of the experiment and reduce the possibility that winning might affect the decision of subjects independently of payoffs" (p. 519). The second thing to note is that the subjects were only allowed to participate in one of the experiments, not all three. This was to avoid the subjects

from having carryover effects from one experiment to the other (p. 520).

EXPERIMENTAL DESIGN

Three experiments were conducted to investigate the effect of discrimination on the behavior of the subjects. The parameters of the experiments can be seen in Table 1.

The first, baseline, experiment was a symmetric tournament that had no disadvantaged members. This would be used to measure any changes that show up in the second and third experiments. Experiment 2 was to test the effect of unfairness, and so, the output of one member of each subject pair had to exceed the other member's by 25 before the subject could receive the higher fixed payment, M. Since this was the only parameter that was changed, the comparison with the baseline experiment will illustrate the effects of the discrimination treatment (equal opportunity laws). The third experiment was identical to the second, except that there were twenty rounds instead of ten.

TABLE 1
EXPERIMENTAL PARAMETERS

EXPERIMENT#	DECISION # RANGE	COST FUNCTION	RANDOM # RANGE	M	m	(M-m)	EQUILIBRIUM ADVANTAGED	DISADVANTAGED
1 k=0	(0-100)	$c_i^2/15000$	(-60,60)	2.04	.86	1.18	73.75	73.75
2 k=25	(0-100)	$c_i^2/15000$	(-60,60)	2.04	.86	1.18	58.39	58.39
3 k=25	(0-100)	$c_i^2/15000$	(-60,60)	2.04	.86	1.18	58.39	58.39

CHAPTER 3

RESULTS

COMPARISON TO THEORY

The data are summarized in Table 2. These data are
analyzed to determine if they agree with theory. The
Wilcoxon test is used for this determination. The Wilcoxon
test assumes the observations are drawn from a symmetric
distribution. To test the validity of this observation, the
Kolmogorov-Smirnov test is used to determine if the data
could have been drawn from a normal distribution. The K-S
test is applied to all observations to which the Wilcoxon
and Mann-Whitney tests are applied (below). As can be seen
in Table 3, the hypothesis that the observations are drawn
from a normal distribution cannot be rejected for any of the
sets of data. The results from the Wilcoxon test are
reported in columns 3 and 4 of Table 3. The hypothesis that
the observations are not significantly different from the
theoretical effort levels is rejected in three of the seven
treatments: the overall mean effort levels from the subjects
in Experiment 1, Experiment 2, and the mean effort level of
the advantaged subjects in Experiment 2. For the
disadvantaged subjects in Experiment 2 and all the subjects,

Table 2.

Experimental Results: Means and standard deviations

		Mean Decision Numbers			Mean Standard Deviations			
Experiment Number	Predicted Effort	Round 1-10	Round 11-20	Round 1-20	Round 1-10	Round 11-20	Round 1-20	Number of Subjects
1 k=0	73.75	63.95	-----	-----	30.77	-----	-----	10
Male	73.75	66.1	-----	-----	33.735	-----	-----	6
Female	73.75	60.775	-----	-----	25.376	-----	-----	4
2 k=25	58.39	47.0	-----	-----	34.73	-----	-----	8
Male	58.39	62.925	-----	-----	34.027	-----	-----	4
Adv.	58.39	41.1	-----	-----	27.276	-----	-----	2
Dis.	58.39	84.30	-----	-----	24.881	-----	-----	2
Female	58.39	31.08	-----	-----	27.327	-----	-----	4
Adv.	58.39	27.85	-----	-----	24.164	-----	-----	2
Dis.	58.39	34.3	-----	-----	29.813	-----	-----	2
3 k=25	58.39	58.96	55.34	57.15	29.78	28.85	29.31	10
Male	58.39	55.94	55.56	55.75	28.114	27.84	27.97	9
Adv.	58.39	54.54	62.76	58.65	26.61	20.93	23.77	5
Dis.	58.39	57.7	46.55	52.13	29.79	32.42	31.10	4
Female	58.39	86.1	53.4	69.75	29.44	43.52	36.48	1
Adv.	58.39	-----	-----	-----	------	-----	-----	0
Dis.	58.39	86.1	53.4	69.75	29.44	43.52	36.48	1

Table 3.

Statistical Test Results

Experiment Number	K-S Test K_{cal}	Wilcoxon(JG-T) Sum of Ranks		Mann-Whitney z_{cal}	(JG vs S&W)		Wilcoxon(M-F) Sum of Ranks
		Pos.	Neg.		Pos.	Neg.	
1 k=0	.1429*	5	50	2.95*	35	20*	
2 k=25	.1486*	0	55	4.35*	53	2	
Adv.	.1292*	0	55	4.34*	32	13**	
Dis.	.1306*	31	24*	-0.19	54	1	
3 k=25	.1132*	107	103*	3.83*	77	133	
Adv.	.1186*	125	85*	1.66*	----	----	
Dis.	.1186*	170	40*	4.34*	47	163	

* indicates a failure to reject the null hypothesis at the .05 level

** indicates a failure to reject the null hypothesis at the .10 level

in experiment 3, collectively and separately by
advantaged/disadvantaged group, the mean effort levels are
not significantly different from the predicted level.

THE REPLICATION

　　　To determine if the results of this study did in fact
replicate that of Schotter and Weigelt, the Mann-Whitney
test was performed on the data. This test is used to
compare data from independent random samples from two
populations. This is used here to determine if the data
from the replication experiments are not significantly
different from the data that was reported by Schotter and
Weigelt. The test was conducted on the overall mean effort
levels from all three subject pools and on the mean effort
levels of the disadvantaged, then advantaged subjects in
Experiments 2 and 3. In all cases except the disadvantaged
subjects in Experiment 2, the null hypothesis that the two
sets of data are not significantly different cannot be
rejected. The test statistics from the comparison of the
data from this study with the data of Schotter and Weigelt,
can be seen in column 5 of Table 3. Figures 2 through 5
depict the mean effort levels generated by subjects in these
experiments (JG), Schotter and Weigelt's experiments (SW),
and the theoretical effort levels. Figure 2 compares the
mean effort levels for the baseline experiments, and Figure
3 gives a comparison of mean effort levels of the subjects
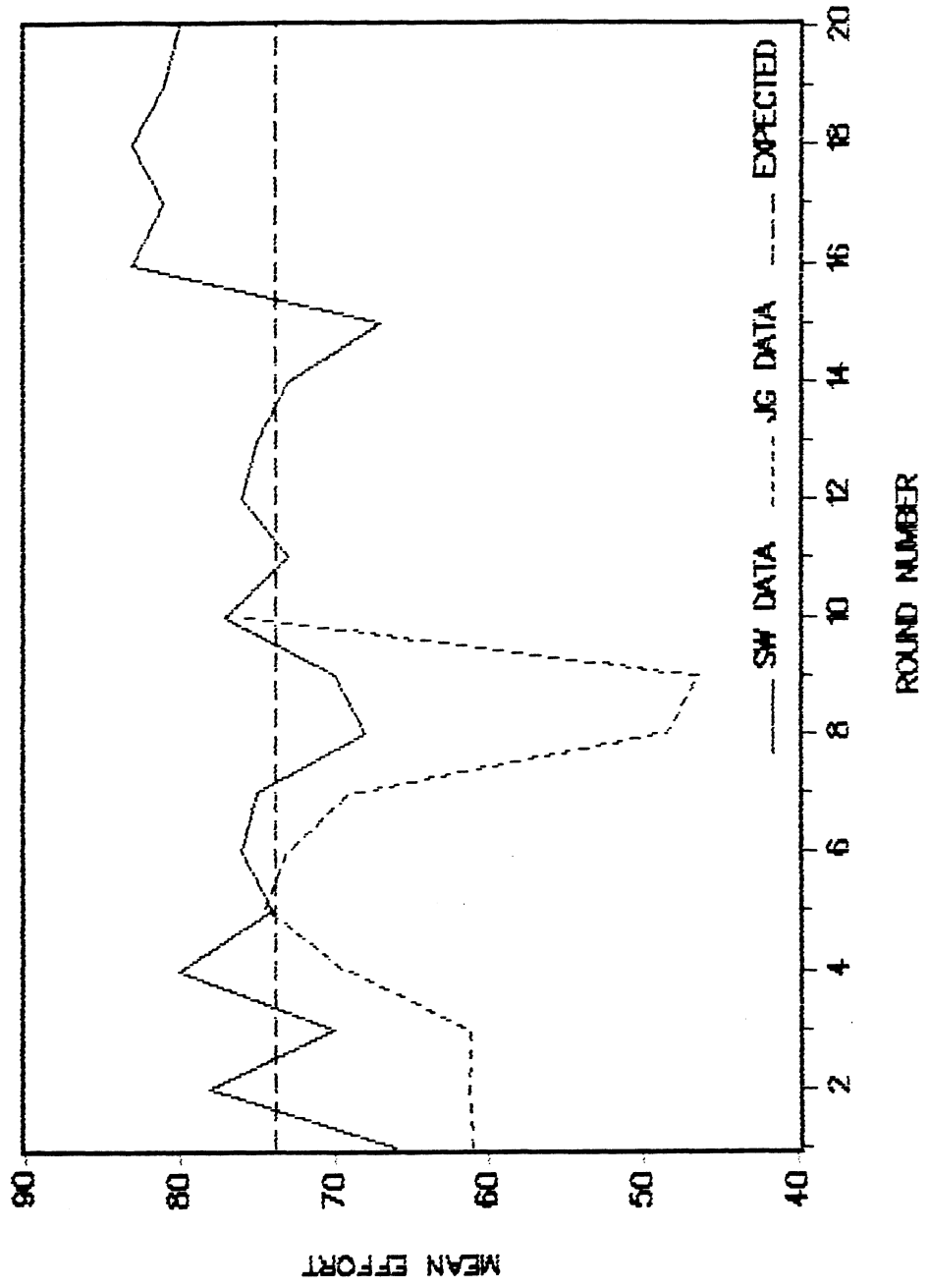
COMPARISON OF BASELINE EXPERIMENTS

Figure 2. Comparison of baseline experiments.
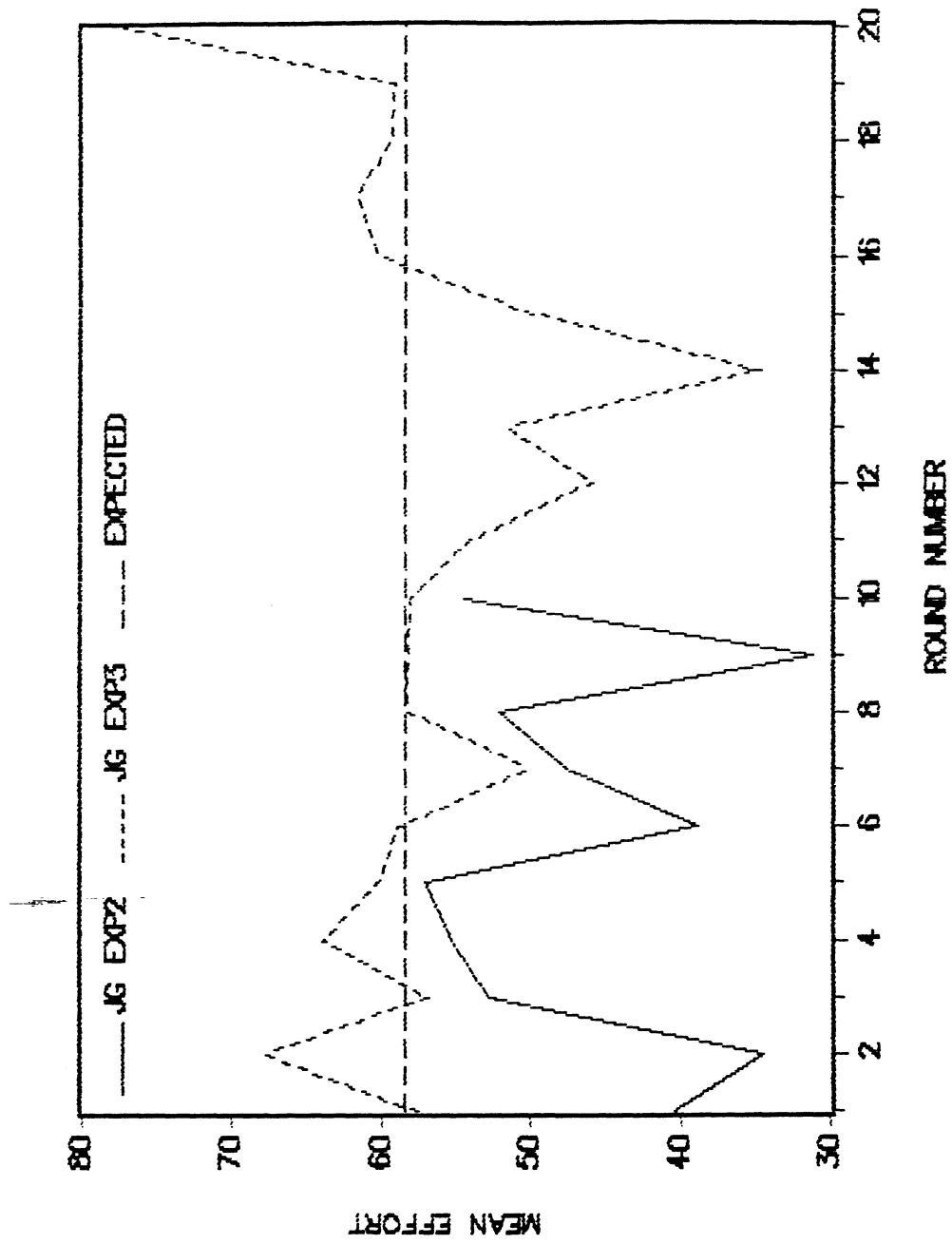
Figure 3. Experiments 2 and 3 mean effort.
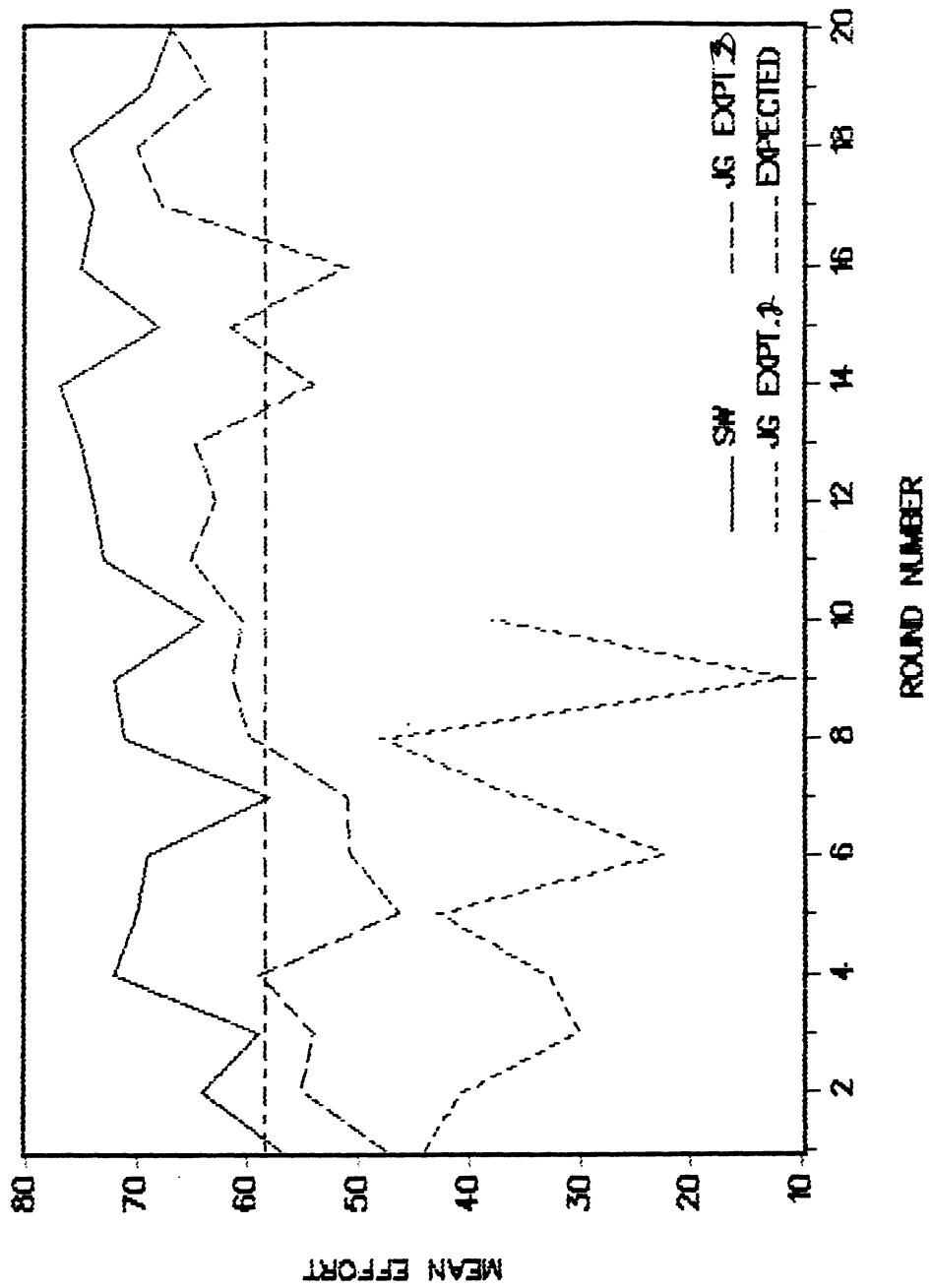
Figure 4. Advantaged subjects effort levels.
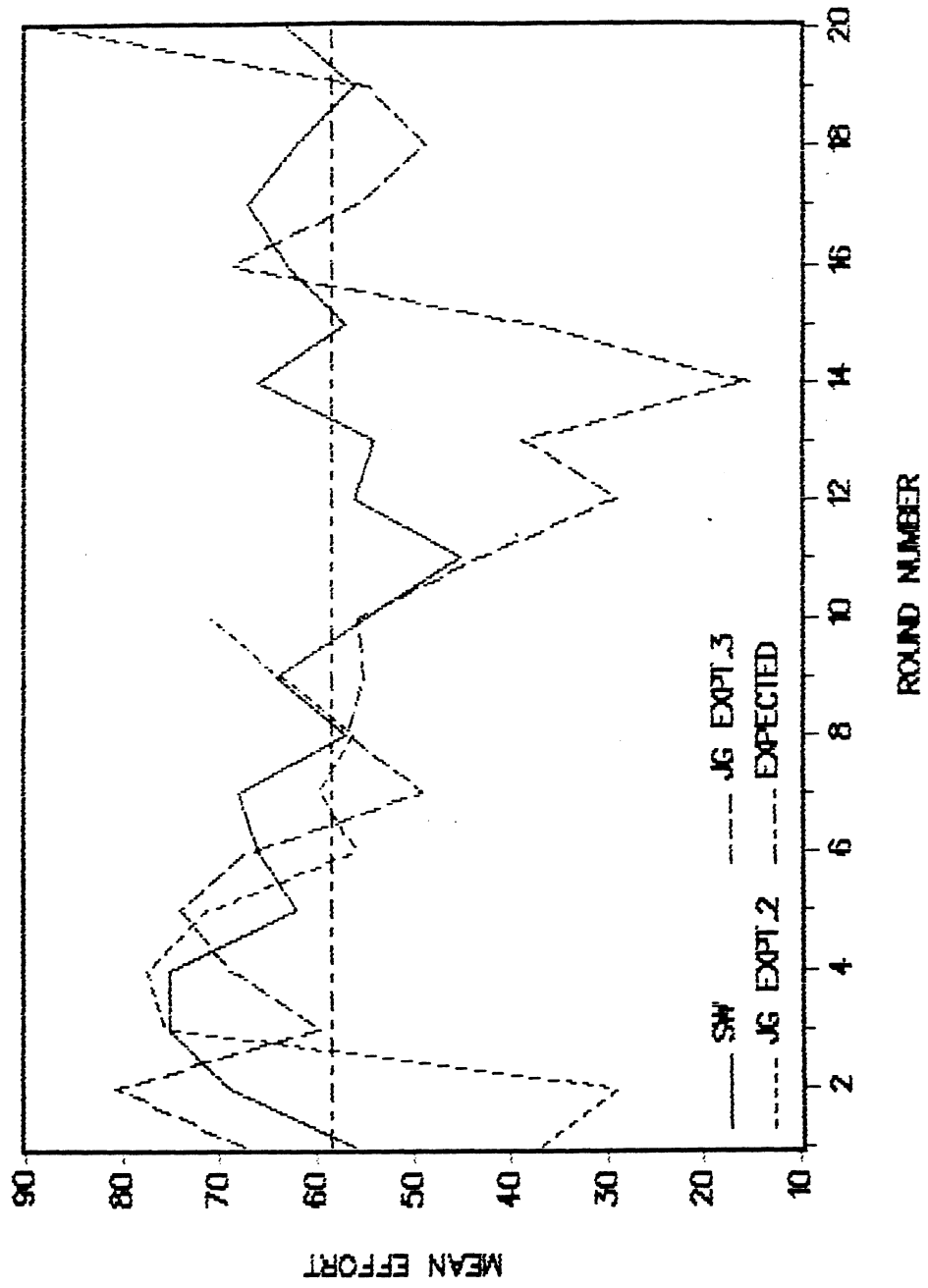
Figure 5. Disadvantaged subjects effort levels.

in the discrimination experiments. Figure 4 presents the comparison of mean effort levels of the advantaged subjects and Figure 5 the disadvantaged.

As the statistical tests indicate, this replication of Schotter and Weigelt's study proved to be successful and will provide a good base from which to expand an investigation of the area of the gender differences.

GENDER COMPARISON

To see if the differences in effort between the male and female groups were significant, the Wilcoxon Test is again used. For this test the null hypothesis was that the effort of males was not significantly different than that shown by the females. As the data recorded in columns 6 and 7 of Table 3 indicate, this hypothesis fails to be rejected in Experiment 1 overall, and for Experiment 2 disadvantaged subjects.

These experiments provide only slight support for the theory that males display greater amounts of effort than are displayed by females in the face of discrimination. When the three sets of experimental results are reviewed independently, and with all their individual components, the differences in effort between males and females becomes obvious. These differences can be seen graphically in Figures 6, 7, and 8. Figure 6 depicts a comparison of male/female effort levels across all three experiments. In

COMPARISON OF EFFORT BY EXPERIMENT

MEAN EFFORT LEVEL

☐ MALE EFFORT
☑ FEMALE EFFORT

Figure 6. Comparison of effort by experiment.

DISADVANTAGED SUBJECTS COMPARISON
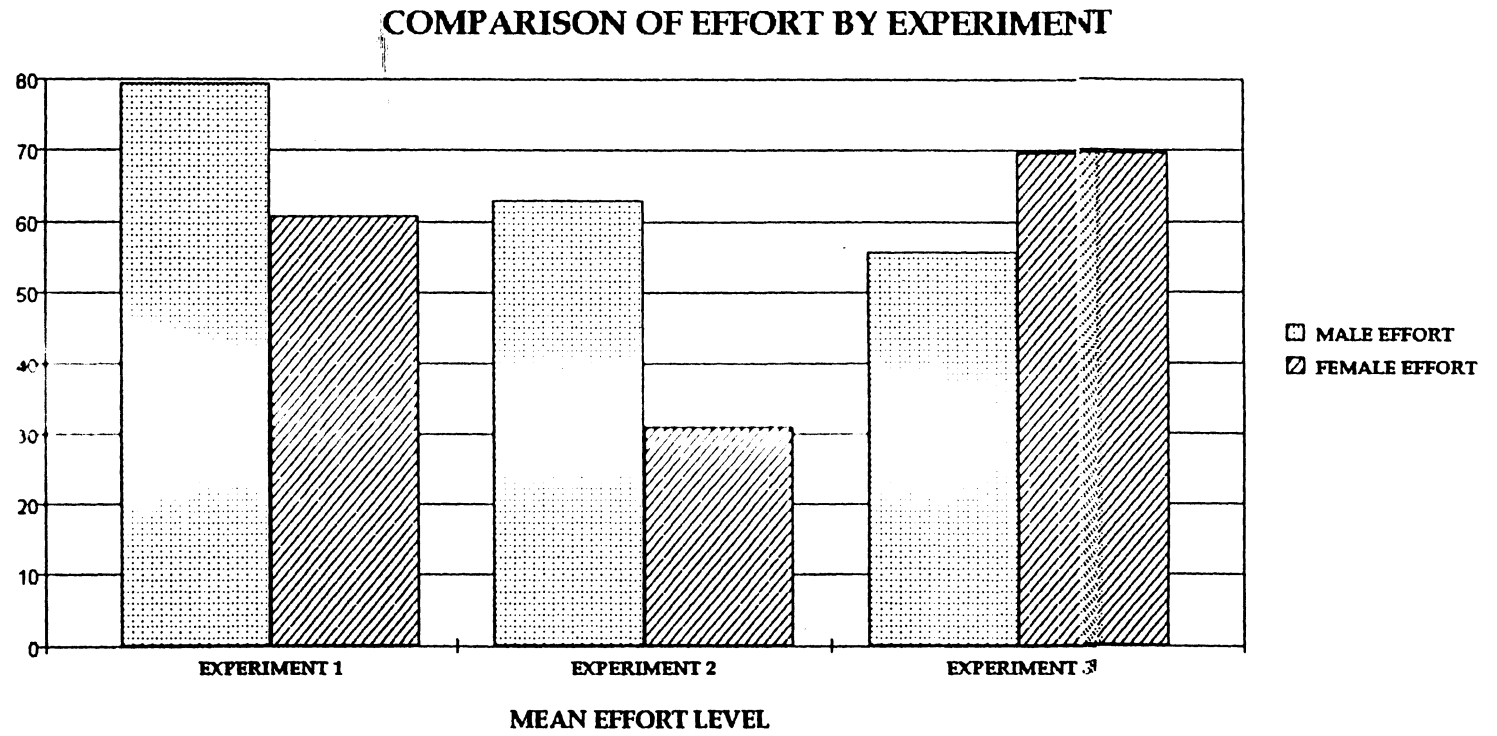
Figure 7. Disadvantaged subjects comparison.

ADVANTAGED SUBJECTS COMPARISON
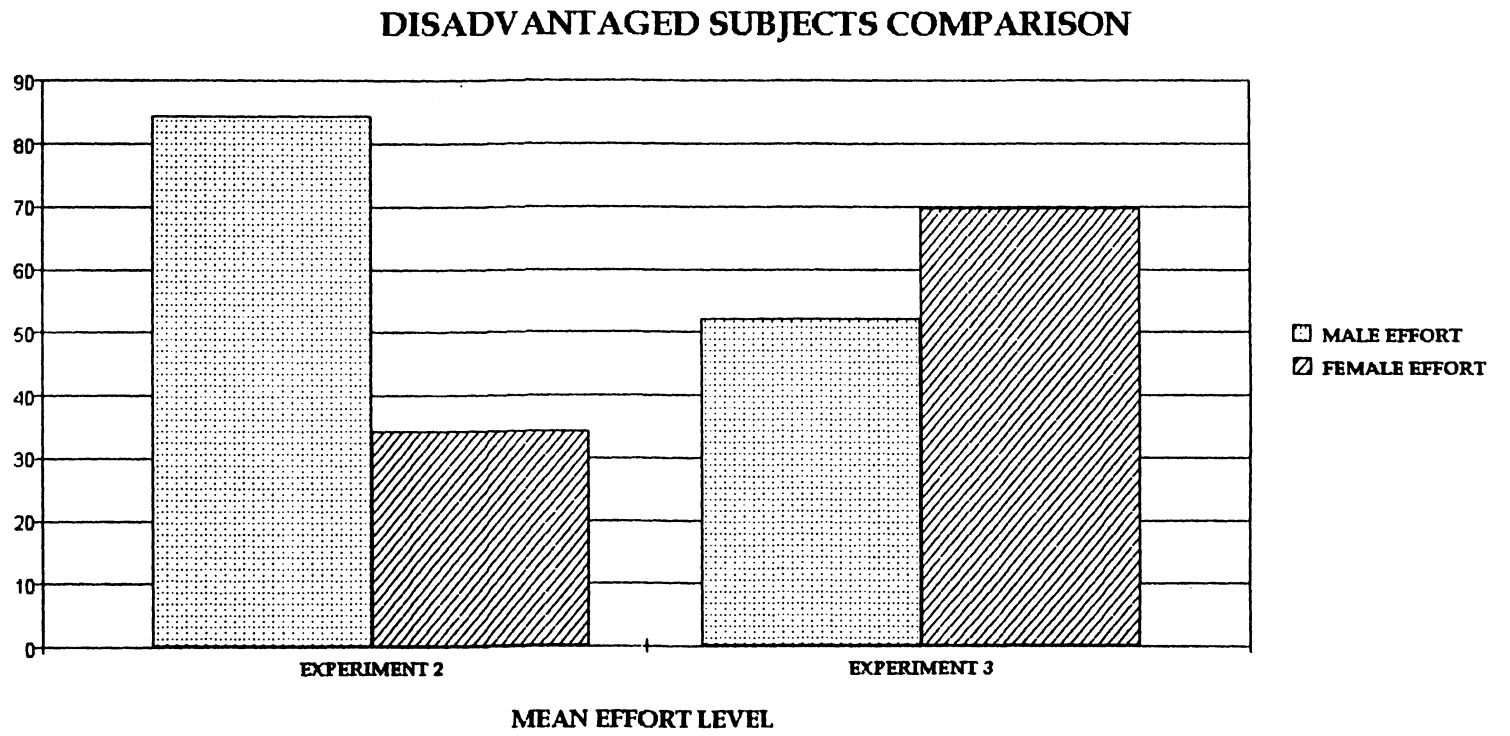
Figure 8. Advantaged subjects comparison.
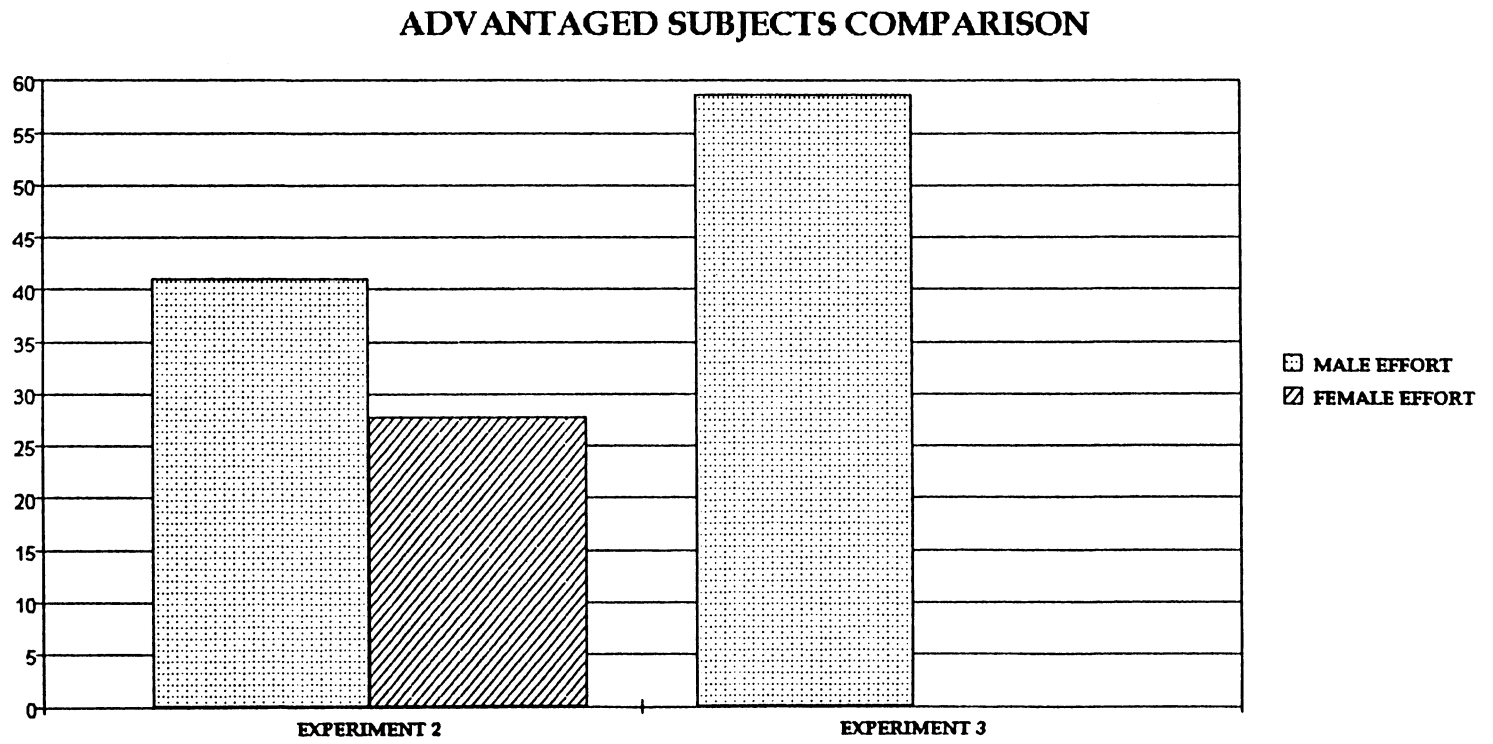
Figure 7, the effort levels of the disadvantaged subjects
are compared, and in Figure 8 the advantaged.

The results of the Wilcoxon test, showed that the
effort levels of the males and females were not
significantly different in Experiment 1. Perhaps this is
because in this experiment there was no discrimination
factor, all subjects were treated equally. For Experiment
2, the mean effort levels of the male subjects were shown to
be significantly higher than those exhibited by the female
subjects. The greatest difference in male/female effort
levels is seen among the disadvantaged subjects. Among the
disadvantaged subjects, mean male effort was 84.30 and the
mean female effort was 34.30.

For Experiment 3, the Wilcoxon test showed that the
overall mean effort levels of the males and females were not
significantly different. This may be partially explained by
the fact that there was only one female subject
participating in this experiment (in the disadvantaged
group). For this reason a gender comparison could not be
made among the advantaged subjects in Experiment 3. This
also partially explains why for the disadvantaged subjects,
the Wilcoxon test found that the effort levels of the males
and females was not significantly different. The results of
this experiment are shown in Figures 6 and 7 which compare
the mean effort level of the disadvantaged subjects, male
and female, and the advantaged subjects, male and female.

To better incorporate the data of the third experiment, the data were combined with that of Experiment 2. The Wilcoxon test was run for the combined data (rounds 1-10 were used) and the null hypotheis that there is no significant difference between the effort levels of the males and females was rejected. This was tested using the .05 level of significance (critical value = 11). This showed that in all three cases (male/female overall, male/female disadvantaged, and male/female advantaged) that there were significant differences in the male and female effort levels. When this was completed, the overall mean effort levels were 50.93 for males and 43.96 for females. For the advantaged males the mean effort level was 41.10 and for the females in this category the mean effort level was 27.85. The large differences are again evident in the means for the disadvantaged group. For the males, the mean effort level was 84.75, and for the females 34.30. This is shown graphically in Figure 9.

PAYMENTS

The average payment to the subjects for the first Experiment was $5.61. Experiment 2 average payment was $6.13, and Experiment 3 was $9.96. The reason that the payments are higher for Experiment 3 is because the number of rounds was doubled to 20. The average payment for the whole set of experiments was $9.84.

EXPERIMENTS 2 & 3 COMBINED

MALE EFFORT
FEMALE EFFORT

MEAN EFFORT LEVELS

OVERALL   ADVANTAGED   DISADVANTAGED
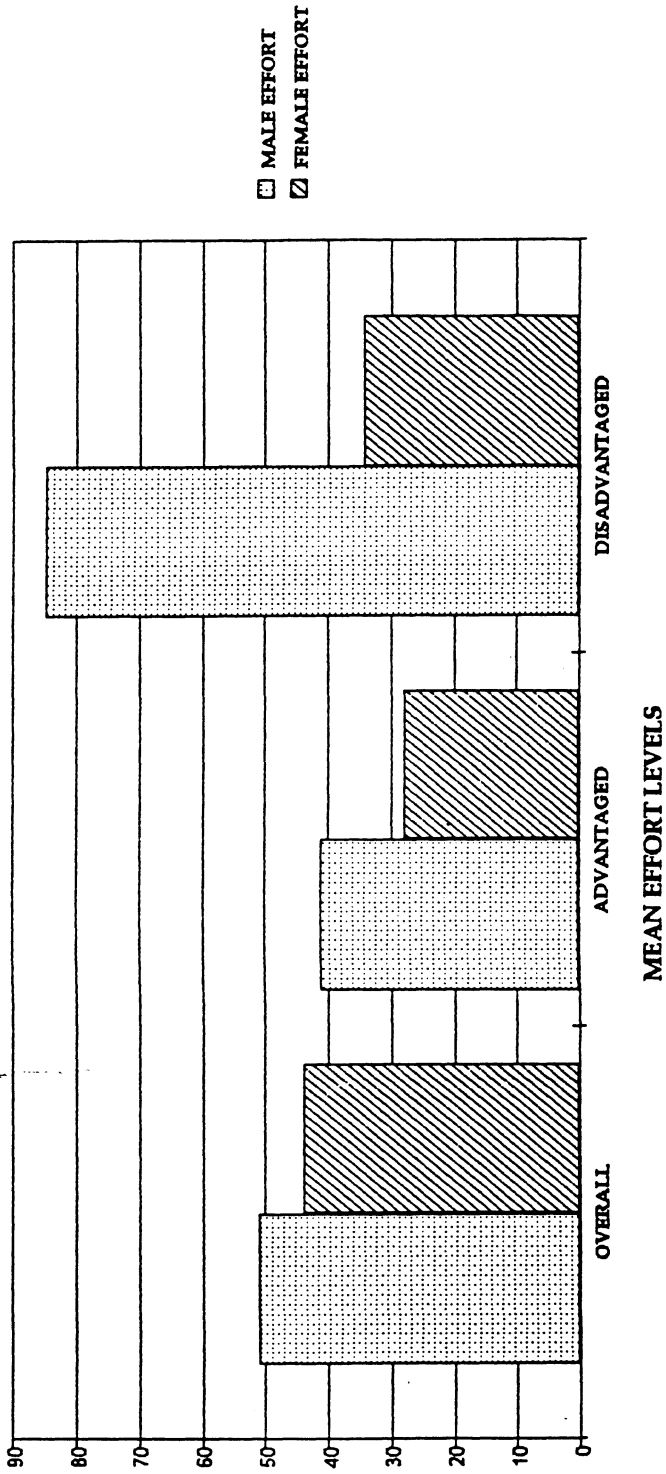
Figure 9. Experiments 2 and 3 combined.

CHAPTER 4

DISCUSSION

DISCUSSION

The replication of Schotter and Weigelt was successful and provided a base for an investigation into the area of gender differences. The study of gender differences gives some support to the theory that male effort levels are greater than female effort levels when faced with discrimination.

The success of this study occurred in spite of a few weaknesses. First of all, due to limited funding the number of subjects and the number of rounds for each experiment had to remain low. This should not affect the results as far as the replication of the work of Schotter and Weigelt, however it may have prevented the generation of effort levels that matched the predicted levels and therefore, it is a reason for caution in the interpretation of the results for the comparison of the male/female effort level. Subjects may be just learning the game in the first 10 rounds as Schotter and Weigelt suggested (1992). It is also important to note that all subjects were recruited from economics courses, a factor that could cause a slight amount of selection bias in the data. This is because females are usually the minority

in the field of Economics and those that choose this field
as a major have already shown a willingness to compete in a
male dominated area. The results of this set of
experiments were also affected by the attitudes of the
subjects themselves. In reading the post experiment
comments of the subjects, it was found that several of the
subjects just picked any decision number without giving the
choice any thought because they figured that they were going
to make money no matter what number they picked. However,
none of these subjects decided to "drop out" (choose zero
effort level) for the duration of the tournament.

Another factor to consider is the lower payoffs in this
study compared to Schotter and Weigelt's study. In spite of
this, most subjects were happy to participate in the study
and commented that they were receiving more than (in the
majority of cases twice as much as) the minimum wage for the
amount of time that the experiments took. This appeared to
be an adequate incentive for the subjects. All of these
factors, individually and in combination, may have had an
effect on the results with respect to Schotter and Weigelt's
theory and study. Nevertheless, in the end, this
replication supports of the work of Schotter and Weigelt.

In the case of the gender differences in the effort
levels, this study weakly supports the theory that females
have lower effort levels when faced with a discrimination
factor but not when treated equally. The fact that the

workforce is changing, becoming more accepting of and more fair to, women may cause the effort levels of men and women to equalize, but it may take a long time before all the myths and stereotypes which lead to discrimination can be eliminated from the minds of workers and employers.

RECOMMENDATIONS

It is recommended that further research be conducted in this area. The findings here are a good start for an investigation into the comparison of male and female effort levels. It should prove to be an important area in Labor Economics.

A key point to mention is that if experiments such as these are conducted, the research should be done as closely to the original methods that were used by Schotter and Weigelt for their study.

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APPENDIX

This appendix contains all the forms that were used to complete all three experiments in this study. They are based upon those that were used and provided by Dr. Schotter for his original study.

The order of the forms is as follows:

> Instructions for Baseline
>
> Instructions for Unfair Experiments
>
> Sheet 1 : Decision Cost Table
>
> Sheet 2 : Payoff Record Sheet
>
> Payout Record Sheet
>
> Post Experiment Survey

INSTRUCTIONS

This is an experiment in decision making. The instructions are simple, and if you follow them carefully and make good decisions, you could earn money which will be paid to you in cash.

As you read these instructions, you will be in a room with a number of other subjects. Each subject has been randomly assigned a subject number, which is located on the top right of this sheet. The experiment consists of a number of decision rounds. In each decision round, you will be paired with another subject by a random drawing of subject numbers. This will be called your pair member. Note that your pair member will be the same subject throughout the entire experiment. The identity of your pair member will not be revealed to you, nor will your identity be revealed to your pair member.

EXPERIMENTAL PROCEDURE

In the experiment you will perform a simple task. Attached to these instruction sheets are two other sheets, labelled sheet 1 and sheet 2. Sheet 1 shows 101 numbers, from 0 to 100 in column A. These are your decision numbers. Associated with each number is a decision cost, which is listed in column B. Note that the higher the decision number chosen the greater is the associated cost.

Your pair member has an identical sheet. In each round of the

experiment, you and your pair member will each select a decision number separately. Record your number in column 1 of sheet 2 and record its associated cost in column 5 of sheet 2. Upon entering this room, all subjects randomly selected 10 envelopes from a container holding hundreds of envelopes. Each envelope contains a written number, whose value will fall between -60 and +60. A series of numbers between -60 and +60 was randomly selected by a computer program, with each number having an equal probability of being selected. Each of these numbers was then written on a sheet of paper, and put into an envelope. After you have selected your decision number, and recorded it AND its cost on sheet 2, select one of your envelopes, open it, and record its enclosed number in column 2 of sheet 2. Then write this information on the slips of paper that were provided to you. These will then be collected.

CALCULATION OF PAYOFFS

Your payment in each round of the experiment will be computed as follows. You will add your decision number, and random draw number, and record this sum in column 3 of sheet 2. Your pair member will do the same.

Since all subjects have worked in privacy, the experimenter will then compare the totals of you and your pair member (which are on the slips of paper collected). If you have an even subject number, then your pair member will always have an odd subject number, and vice versa.

Your payoff (which is expressed in experimental dollars, E$)
is then determined.

Note: to convert experimental dollars to US dollars,
simply divide the experimental dollar value by 2.

PAYOFF DETERMINATION

If your column 3 total is greater than your pair member's, you
receive fixed payment "X" (E$2.04).

If your column 3 total is less than your pair member's, you
receive fixed payment "Y" (E$0.86)

If your column 3 total is equal to your pair member's, your
fixed payment will be either "X" (E$2.04) or "Y" (E$0.86).
Which payment you receive will be determined by the flip of a
fair coin. Circle the appropriate fixed payment in column 4,
and subtract from column 4 the cost associated with your
decision number listed in column 5. Record this difference in
column 6. This amount in column 6 is your earnings for the
round. The earnings of your pair member are calculated in
exactly the same way. After round one is completed, you will
perform the same procedure. That is, you will choose a
decision number again (though of course, you may pick the same
one), you will open another envelope and record your random
draw number for the round, and you will calculate a new
payoff. When round 10 is completed, add your earnings from
each of the rounds and record the total earnings at the bottom
of sheet 2. Then divide by 2 and this will be the amount that
will be paid to you, in cash, at the end of the experiment.

<u>INSTRUCTIONS</u>

This is an experiment in decision making. The instructions are simple, and if you follow them carefully and make good decisions, you could earn money which will be paid to you in cash. As you read these instructions, you will be in a room with a number of other subjects. Each subject has been randomly assigned a subject number, which is located on the top right of this sheet.

The experiment consists of a number of decision rounds. In each decision round, you will be paired with another subject by a random drawing of subject numbers. This will be called your pair member. Note that your pair member will be the same subject throughout the entire experiment. The identity of your pair member will not be revealed to you, nor will your identity be revealed to your pair member.

<u>EXPERIMENTAL PROCEDURE</u>

In the experiment you will perform a simple task. Attached to these instruction sheets are two other sheets, labelled sheet 1 and sheet 2. Sheet 1 shows 101 numbers, from 0 to 100 in column A. These are your **decision numbers**. Associated with each number is a decision cost, which is listed in column B. Note that the higher the decision number chosen the greater is the associated cost. Your pair member has an identical sheet. In each round of the experiment, you and your pair member will each select a decision number separately.

Record your number in column 1 of sheet 2 and record its associated cost in column 5 of sheet 2.

Upon entering this room, all subjects randomly selected 10 envelopes from a container holding hundreds of envelopes. Each envelope contains a written number, whose value will fall between -60 and +60. A series of numbers between -60 and +60 was randomly selected by a computer program, with each number having an equal probability of being selected. Each of these numbers was then written on a sheet of paper, and put into an envelope. After you have selected your decision number, and recorded it AND its cost on sheet 2, select one of your envelopes, open it, and record its enclosed number in column 2 of sheet 2. Then write this information on the slips of paper that were provided to you. These slips will then be collected along with the randomly drawn number and its envelope.

CALCULATION OF PAYOFFS

Your payment in each round of the experiment will be computed as follows. You will add your decision number and random draw number, and record this sum in column 3 of sheet 2. Your pair member will do the same. Since all subjects have worked in privacy, the experimenter will then compare the totals of you and your pair member (which are on the slips of paper collected). If you have an even subject number, then your pair member will always have an odd subject number, and vice versa. Your payoff (which is expressed in experimental

dollars, E$) is then determined.

   Note: to convert experimental dollars to US dollars, simply divide the experimental dollar value by 2.

IF YOUR SUBJECT NUMBER IS ODD

If your column 3 total is greater than your pair member's, you receive fixed payment "X" (E$2.04).

If your column 3 total is not more than 24 less than your pair member's, you receive fixed payment "X" (E$2.04).

If your column 3 total is 25 less than your pair member's, a fair coin will be flipped to determine whether you receive fixed payment "X" (E$2.04) or "Y" (E$0.86).

If your column 3 total is less than your pair member's by 26 or more, you receive fixed payment "Y" (E$0.86).

NOTE: Your column 3 total can be up to 25 less than your pair member's, and you will still receive the fixed payment "X" (E$2.04).

IF YOUR SUBJECT NUMBER IS EVEN

If your column 3 total is greater than your pair member's by 26 or more, your receive fixed payment "X" (E$2.04).

If your column 3 total is greater than your pair member's by 25, a fair coin will be flipped to determine whether you receive fixed payment "X" (E$2.04) or "Y" (E$0.86).

If your column 3 total is greater than your pair member's by

24 or less, you receive fixed payment "Y" (E$0.86).

If your column 3 total is less than your pair member's you receive fixed payment "Y" (E$0.86).

NOTE: You will receive fixed payment "Y" (E$0.86) unless your column 3 total is 25 or more greater than your pair member's column 3 total. Circle the appropriate fixed payment in column 4, and subtract from column 4 the cost associated with your decision number listed in column 5. Record this difference in column 6. This amount in column 6 is your earnings for the round. The earnings of your pair member are calculated in exactly the same way. After round one is completed, you will perform the same procedure. That is, you will choose a decision number again (though of course, you may pick the same one), you will open another envelope and record your random draw number for the round, and you will calculate a new payoff. When round 10 is completed, add your earnings from each of the rounds and record the total earnings at the bottom of sheet 2. Then divide by 2 and this will be the amount that will be paid to you, in cash, at the end of the experiment.

SHEET 1 -- DECISION COSTS TABLE

Column A Decision Number	Column B Cost of Decision	Column A Decision Number	Column B Cost of Decision	Column A Decision Number	Column B Cost of Decision
0	$0.0000	36	$0.086	72	$0.346
1	$0.0001	37	$0.091	73	$0.355
2	$0.0003	38	$0.096	74	$0.365
3	$0.0006	39	$0.101	75	$0.375
4	$0.001	40	$0.107	76	$0.385
5	$0.002	41	$0.112	77	$0.395
6	$0.003	42	$0.118	78	$0.406
7	$0.004	43	$0.123	79	$0.416
8	$0.005	44	$0.129	80	$0.427
9	$0.006	45	$0.135	81	$0.437
10	$0.007	46	$0.141	82	$0.448
11	$0.008	47	$0.147	83	$0.459
12	$0.010	48	$0.154	84	$0.470
13	$0.011	49	$0.160	85	$0.482
14	$0.013	50	$0.167	86	$0.493
15	$0.015	51	$0.173	87	$0.505
16	$0.017	52	$0.180	88	$0.516
17	$0.019	53	$0.187	89	$0.528
18	$0.022	54	$0.194	90	$0.540
19	$0.024	55	$0.202	91	$0.552
20	$0.027	56	$0.209	92	$0.564
21	$0.029	57	$0.217	93	$0.577
22	$0.032	58	$0.224	94	$0.589
23	$0.035	59	$0.232	95	$0.602
24	$0.038	60	$0.240	96	$0.614
25	$0.042	61	$0.248	97	$0.627
26	$0.045	62	$0.256	98	$0.640
27	$0.049	63	$0.265	99	$0.653
28	$0.052	64	$0.273	100	$0.667
29	$0.056	65	$0.282		
30	$0.060	66	$0.290		
31	$0.064	67	$0.299		
32	$0.068	68	$0.308		
33	$0.073	69	$0.317		
34	$0.077	70	$0.327		
35	$0.082	71	$0.336		

SHEET 2 -- PAYOFF RECORD SHEET

<u>ROUND 1</u>

Col. 1	Col.2	Col.3	Col.4	Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

____ + ____ = ____   E$2.04 E$0.86 - ____ = ____

<u>ROUND 2</u>

Col. 1	Col.2	Col.3	Col.4	Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

____ + ____ = ____   E$2.04 E$0.86 - ____ = ____

<u>ROUND 3</u>

Col. 1	Col.2	Col.3	Col.4	Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

____ + ____ = ____   E$2.04 E$0.86 - ____ = ____

<u>ROUND 4</u>

Col. 1	Col.2	Col.3	Col.4	Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

____ + ____ = ____   E$2.04 E$0.86 - ____ = ____

<u>ROUND 5</u>

Col. 1	Col.2	Col.3	Col.4	Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

____ + ____ = ____   E$2.04 E$0.86 - ____ = ____

55

ROUND 6

Col. 1	Col.2	Col.3	Col.4		Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

___ + ___ = ___   E$2.04 E$0.86 - ___ = ___

ROUND 7

Col. 1	Col.2	Col.3	Col.4		Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

___ + ___ = ___   E$2.04 E$0.86 - ___ = ___

ROUND 8

Col. 1	Col.2	Col.3	Col.4		Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

___ + ___ = ___   E$2.04 E$0.86 - ___ = ___

ROUND 9

Col. 1	Col.2	Col.3	Col.4		Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

___ + ___ = ___   E$2.04 E$0.86 - ___ = ___

ROUND 10

Col. 1	Col.2	Col.3	Col.4		Col.5	Col.6
Decision	Random	Total	X	Y	Minus	Total
Number	Number	1 + 2	Amt.	Amt.	Cost	Earned

___ + ___ = ___   E$2.04 E$0.86 - ___ = ___

Sum of Total Earnings Rounds 1-10 E$____

Divide by 2 to get Net Earnings $____

56

Subject payments for experiments
conducted by JoAnne E. Guennewig
Faculty Advisor: Tim Mason

PAYOUT RECORD SHEET

	NAME (PRINT)	SS or Student ID #	Payment	Signature
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

POST EXPERIMENT SURVEY

Thank you for participating in this study. Please feel free to make any comments you have about the experiment, both good and bad, so that adjustments may be made and it can be improved for future use. Once again, thank you for your participation.