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What is fair? Experimental evidence

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ABSTRACT

There has been growing interest within the economics discipline in the role of equity concerns in the distribution of resources. This paper presents empirical evidence from controlled laboratory experiments where third-party decision makers allocate resources between two individuals. The experimental results indicate that subjects view a wide range of different allocations as the fair distribution of resources. However, regression analysis indicates that both treatment effects and a few demographic variables explain some of this variation in fairness concepts. Most significantly, decision makers rewarded subjects who earned their favorable positions, and the gender of the decision maker was an important predictor of the allocation chosen.

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1. Introduction

While economists have traditionally focused on efficiency, there has been a consistent, if not growing, interest within the discipline in the role of equity in the distribution of resources (e.g., Yaari and Bar-Hillel 1984; Rabin 1993; Gaertner 1994; Konow 1996, 2000; Fehr and Schmidt 1999; Bolton and Ockenfels 2000). Concerns about fairness are present in many different economic environments, and the desire to achieve a "fair" outcome has been offered as an explanation for many outcomes that do not support the theoretical predictions of purely self-interested utility maximization. In fact, a large body of experimental economic evidence has generated a significant literature regarding the nature of fairness in nonhypothetical environments since subjects are consistently willing to sacrifice personal cash payoffs for other (fair?) allocations (e.g., Guth, Schmittberger, and Schwarze 1982; Kahneman, Knetsch, and Thaler 1986; Forsythe et al. 1994; Andreoni 1995; Roth 1995; Clark 1998). Though most of the experim ental literature on fairness examines self-interested decision makers, this paper studies disinterested third-party decision makers as a way of removing the confounding effects of self-interest from much of the experimental data that explore fairness perceptions. (1)

While we are obviously not the first to concern ourselves with the issue of fairness perceptions, the research to date typically uses either survey methodology or controlled experiments in which individuals bargain over their own payoff allocations. We present results from experiments that focus exclusively on individual preferences over payoffs to other individuals, unlike the typical experimental bargaining game in which two individuals bargain over how to divide a monetary pie among themselves. (2) Additionally, our experiments actually consummate the subjects' resource allocation decision by having third-party decision maker allocations generate real cash payoffs for real subject beneficiaries, which is a key difference from this paper and the survey literature. (3) Specifically, the final cash payoff of two individuals (beneficiaries) in our experiments is determined by decision makers whose cash payoff is independent of the allocation of scarce tokens. These tokens are inputs that determine the benefici aries' cash payoffs via differing (and nonlinear) payoff functions. Therefore, a simple 50/50 split of the tokens is not necessarily evident since it leads to unequal cash payoffs for the recipients (see section 3 for more details). Our design ensures that the decision maker's notion of fairness is what motivates the division of tokens, and it also allows one to distinguish between multiple concepts of fairness in the data.

We also explore how fairness perceptions may be affected by effort--whether one recipient "merits" an advantageous position. Sometimes referred to as natural law or desert theories, the idea that higher effort merits a larger entitlement of resources is supported by existing research (e.g., Schokkaert and Lagrou 1983; Hoffman and Spitzer 1985; Mellers and Hartka 1989; Schokkaert and Overlaet 1989). We also collect demographic information on each subject so that we can investigate the demographic determinants of fairness beliefs, such as gender effects. Gender effects on perceptions of fairness and the role of effort have been previously explored in bargaining environments (e.g., Bolton and Katok 1995; Eckel and Grossman 1997; Andreoni and Vesterlund 2001) and in the household distribution of resources (Lundberg and

Pollak 1996). Our findings are largely consistent with results from survey and experimental research showing that gender significantly affects fairness perceptions.

These results have important policy implications. The fact that earning the right to a more favorable position may merit an individual a larger allocation of resources may explain many courtroom dialogues. Alternatively, if one can be cast as a victim who is undeserving of a less favorable position, an outsider's (i.e., judge's) perception of fairness is more likely to promote equal "payoff" outcomes--a topic of debate in many divorce settlements. Another implication stemming from our (and others') results is that men are significantly more likely to choose the most efficient (i.e., highest joint payoff) outcome than are women (see Andreoni and Vesterlund 2001). Given this, men and women are likely to view the justice of court decisions, transfer policies, and even the household distribution of resources differently.

2. Fairness in the Literature

What is fair? The theoretical literature on fairness has shown that there are many potential fair allocations with each meeting a different set (but not all) of widely accepted axioms (such as envy freeness, anonymity, and Pareto optimality). The theoretical literature on fairness makes it clear that in any situation there are many allocations that could be considered fair. However, which of these perceptions of fairness are actually held by real people? The general conclusion from the existing empirical literature (mostly survey data) is that one dominant fairness concept does not exist and that fairness concepts differ with the context of the situation and with the individual. Konow (1996) argues that the dispersion in fairness concepts is not that chaotic. His argument is that people are influenced by three key items--accountability, altruism, and efficiency--when determining a fair allocation. The dispersion in what people report as fair stems from people weighing these criteria differently when making th eir decisions. Other theoretical models define fairness on the basis of reciprocity (Rabin 1993) or comparative payoff outcomes (Fehr and Schmidt 1999; Bolton and Ockenfels 2000). Concerns for reciprocity should not affect third-party decision making, and concerns for egalitarian outcomes would imply equal outcomes as a focal point for third-party allocations.

Konow's (1996) "accountability principle" states that an unequal distribution is fair if the individual with more has earned his superior position. Konow's (1996, 2000) original survey results and more recent experimental results support the accountability principle, as do results from a variety of other studies (e.g., Schokkaert and Lagrou 1983; Hoffman and Spitzer 1985; Clark 1998). In his more recent work, Konow (2000) finds that benevolent dictators (decision makers paid a fixed fee for participation in the experiment) allocated a fixed payout between two subjects in proportion to "credits" when credits were obtained through effort but ignored the distribution of credits between the subjects when credits were arbitrarily assigned. Experimental evidence from Hoffman and Spitzer (1985), Guth (1988), Burrows and Loomes (1994), and Hoffman et al. (1994) also support the notion that differential payoffs are seen as fair if linked to effort. Hochschild (1981) finds that effort is a key criterion in whether gov ernment interhousehold distribution policies are seen as fair by the American public. Schokkaert and Lagrou (1983) and Schokkaert and Overlaet (1989) find additional survey data support for effort-

based differences in payoffs. There is much less evidence on the importance of need and efficiency in forming fairness considerations. Need is offered as an important fairness criterion by the social psychology literature (Yaari and Bar-Hillel 1984; Gaertner 1994). The "needs rule" implies that those at the bottom be brought up at the expense of those at the top. Engle (1990) points out that need is likely to be a particularly important criterion when an individual is severely constrained. There is also some survey research evidence that efficiency concerns influence what people view as fair (e.g., Yaari and Bar-Hillel 1984; Konow 1996).

Fairness concepts (or the weight given to Konow's three criteria) may also differ across individuals. Culture, background, and other personal characteristics may influence an individual's morals and values and, therefore, his notion of fairness. Evidence from the interdisciplinary literature on fairness finds that gender, education, and cultural background affect what an individual thinks is fair. Harbert and Scandizzo (1982) find that education increases the likelihood that a mother splits resources equally among her children. In reviews of the social psychology literature, Engle (1990) and Engle and Nieves (1993) find that women are more likely to equally split resources than to allocate on the basis of effort, and equal split is a more likely norm in noncapitalistic cultures.

Experimental economics research has further substantiated gender effects. Croson and Buchan (1999) find that women reciprocate more than men in East Asian countries, and in the United States, Eckel and Grossman (in press) survey numerous studies that have shown somewhat mixed gender effects, but their results indicate that women are less selfish than men in double-anonymous (anonymous from counterpart and experimenter) dictator games. Andreoni and Vesterlund (2001) find that women are more likely to equalize payoffs and that men are more likely to maximize total payoffs in their modified dictator game. The weight of the evidence points toward women being more interested than men in equalizing payoffs.

Farmer and Tiefenthaler (1995) theoretically examine a third-party allocation problem of parents' allocating food among their children, and their paper motivates many of the details of our experimental design. The authors point out the fairness concepts that likely exist in this simple problem of dividing a single, perfectly divisible good. Standard possibilities for fairness include equal split, proportional split, and equal loss of the resource. Equal and proportional split refer to how the resource is divided between two parties, either equally or in proportion to the individual's needs (for maximum payoff), respectively. Equal loss applies when two parties each makes a claim for an item that cannot be simultaneously satisfied. It may then be fair to give each party equally less than the original claim (i.e., a loss). In environments where the allocated item is an intermediate good to the production of some final item of value, we actually have six fairness possibilities to consider. Equal split, proportio nal split, and equal loss can be applied to the allocation of outputs as well as inputs, as noted by Farmer and Tiefenthaler. Children, for example, all require food inputs, but how they turn the food into health varies, and, therefore, children given equal amounts of food will have different health outcomes. Is fairness then an equal plate of food or an equal final health outcome? While Farmer and Tiefenthaler make it clear that there are several plausible answers to this question, they do not provide any empirical evidence in support. The experiments we report generate empirical evidence to help contribute to this discussion.

As stated before, most of the existing research focuses on either fairness when decisions directly and explicitly affect the decision maker's payoff (economists), or it involves unaffected decision makers whose allocations are only hypothetical (psychology). Our study of nonhypothetical third-party allocations is of interest not only because chosen allocations are not purely hypothetical in this study but also because we remove the potentially confounding effect of self-interest present in typical bargaining experiments. Such an environment is perhaps quite important in understanding an individual's true perception of fairness. In existing experimental research, fairness perceptions are constrained to some extent by self-interest. A notable exception of this void in the literature is Konow's (2000) recent work. (4) In testing his "accountability principle," Konow undertakes variations of the dictator game--where one individual divides a sum of money between himself and a recipient who has no choice but to acc ept the allocation--including a version in which the dictator's stake in the game is removed. This version, the "benevolent dictator treatment," is similar in spirit to our third-party allocation experiments. The contribution of our approach is that we explore input allocations with asymmetric recipient payoff functions and private decision maker information, we explore earned rights (as does Konow), and we gather demographic data to statistically analyze characteristic effects on third-party notions of fairness.

3. Methodology

Experimental Design

Our experimental design captures the essential decision-making elements of the third-party allocation problem described in section 1. In addition, our design allows the distinction between concepts of fairness in the allocation of resources versus final outcomes. This is highlighted in Farmer and Tiefenthaler within the context of parent food allocation decisions, though in this paper we focus on the theoretically disinterested decision maker as opposed to the decisions of parents who are likely quite interested in the resource allocation. The essential elements of the design used to generate our data are as follows:

(i) A decision maker divides scarce resources between two beneficiaries, knowing their capacity to convert resources into output.

(ii) The decision maker's utility (associated with the decision) should depend only on the allocation made. That is, no postdecision transfers occur. Beneficiaries' utility depends on the amount of the resource received and their capacity to convert resource inputs into final outcomes.

(iii) Beneficiaries are heterogeneous in converting resources into final (utility) outcomes, and while beneficiaries know the resource allocation, final outcomes are private information.

(iv) The decision maker knows that beneficiaries will see his/her resource allocation, and he also knows that final outcomes are private information to each beneficiary.

Item (iv) allows us to examine twice the number of fairness concepts since the decision maker must unequally divide the resources in order to equalize final outcomes. Each beneficiary, on the other hand, sees only the resource allocation and not the final outcome of the other beneficiary (and the decision maker knows it). Fairness concepts may therefore be based on either input allocations or output determinations. (5)

The heart of the experiment is that a decision maker (Player A) makes a decision affecting the financial payoffs of two beneficiaries (Players B and C). The decision maker is asked to divide 60 hypothetical units between the two beneficiaries. The decision maker is given a payoff table (see Table 1) that shows how different allocations generate different outcomes for the beneficiaries, and the decision maker knows that these outcomes are used to determine the experimental cash payoff for the beneficiaries. The payoff tables are generated from the functions U = 30[f.sub.1] - .25[f.sup.2.sub.1] + 300 for Player B and U 40[f.sub.2] - .5[f.sup.2.sub.2] for Player C, where [f.sub.i] refers to units of the input allocated to the individual (payoffs are rounded to be whole numbers). While derived from the health production function of Farmer and Tiefenthaler (1995), our decision maker has a finer grid for allocations than in their paper--60 versus 30 tokens to allocate. We choose these payoff functions as the basis f or our experiments for two reasons. First, simpler linear payoff functions (e.g., those used in dictator game experiments) limit the number of fairness concepts we can identify from subject decisions. Second, potentially confused subjects (ultimately less than 5%) are identifiable with these payoff functions, as all allocations giving less than 20 tokens to Player B are Pareto inefficent--giving more to Player B increases both beneficiaries payoffs. (6)

The decision maker is paid a flat fee of $10 for participation in the experiment. So, unlike most experiments where there is a mapping of decisions to one's own monetary payoff, the only thing motivating the decision maker's behavior is the knowledge that his decision affects the payoff of each beneficiary. The decision maker's concept of fairness should therefore determine the payoffs of the beneficiaries.

In order to economize on experimental costs, we chose to utilize several decision makers per pair of recipients in the experimental sessions. While this has the potential to compromise the validity of the data, we note several features employed to counteract this possibility (sample instructions are given in the Appendix). First, each decision maker is told that his allocation will determine the payoff that he generates for each beneficiary. He is not told that other decision makers' allocations also generate a payoff for the same beneficiaries. Each decision maker is told that an exchange rate will be applied to the experimental payoffs generated for the beneficiaries. He is not informed of the specific payoff, only that higher payoff numbers correspond linearly to larger cash payoffs and similarly for lower payoff numbers. Additionally, subjects were all seated with their backs facing each other, and both instructions and questionnaires were handed Out to all subjects at the same time so that no one would b e able to deduce who or how many subjects were beneficiaries on the basis of observing differential experimenter treatment. As such, we feel that it is highly unlikely that allocations were any different than if there was only one decision maker per pair of beneficiaries and full information on payoffs generated to beneficiaries. (7)

The information given to each player on allocations and payoffs is also particular to each player. The decision maker is informed that beneficiaries are shown the division of inputs, but the beneficiaries do not see the payoff table or the payoffs received by the other beneficiaries. (8) After all decision makers have allocated the tokens (our sessions usually involved about 16 decision makers), each beneficiary is shown the input allocation of the decision maker, his own outcome, the experimental exchange rate, and his own monetary payoff. Player B never knows the outcome or the cash payoff to Player C (and vice versa). Rather, the only piece of information that each beneficiary knows, ex post, about the other is the input allocation decision of each decision maker. Note tat the beneficiaries make no decisions in the experiment. Finally, all subjects are paid in private and in cash at the end of the experiment.

Experimental Treatments

Two treatments are used in our experimental design in order to identify the effect of earned rights (or merit) on fairness perceptions. That is, when beneficiaries earn or deserve their initial positions (i.e., the capacity to turn resources into final outcomes), do decision makers exhibit different fairness concepts? Neutral language (i.e., generic context as opposed to using a "story" to describe the experiment) is used in the instructions for both treatments. Units are "tokens," and outcomes are "player payoffs." By doing this, we create a generic environment where decisions are made without the potentially confounding effects of a specific context. In one treatment, the decision makers are told that the beneficiaries are randomly assigned to Players B and C roles--this is, in fact, how they are assigned in this treatment. We refer to this treatment as No Earned Rights. (9)

To explore the effect of earned rights in the experimental environment, we also use a neutral-language set of instructions with nonrandom assignment of the two beneficiaries. Prior to assignment, the two beneficiaries (who are randomly chosen from among all subjects) are given a five-question quiz. The subject who scores higher on the quiz is designated as Player B and the other as Player C. (10) Players A (the decision makers) may view this particular environment as one in which Player B earned the right to the more favorable payoff function. We call this treatment Earned Rights (see also Hoffman and Spitzer 1985).

Table 1. Player Payoff Tables (Condensed Version)[a]

Payoffs Given Contingent to Monetary Payoffs to Player B and Player C[b]			
Tokens to Player B	Tokens to Player C	Payoff to Player B	Payoff to Player C
0	60	300	600
4	56	416	672
8	52	524	728
12	48	624	768
16	44	716	792
20	40	800	800
24	36	876	792
28	32	944	768
31	30	975	750
34	26	1031	702
38	22	1079	638
42	18	1119	558
46	14	1151	462
50	10	1175	350
54	6	1191	222
58	2	1199	78
60	0	1200	0

[a] For space considerations, not all token combinations and payoffs are shown here, but subjects' experiment payoff tables show all combinations. See payoff functions in the *Experimental Design* section for full mapping of tokens to payoffs.

[b] Total tokens distributed must equal 60.

Demographic Data

In order to investigate the determinants of an individual's notion of fairness, we asked the subjects to fill out a demographic questionnaire (see the Appendix) after the completion of the experiment. In a review of the social psychology literature, Engle (1990) notes that the relevant fairness concept may depend not only on the resource being distributed but also on the characteristics and values of the decision maker (see also Schokkaert and Overlaet 1989). Therefore, regression analysis of the determinants of the allocation chosen should include both treatment effects and demographic characteristics of the subjects as independent variables. Demographic information was collected on gender, year in college, residence (regional and urban/rural), college major, work status, receipt of financial aid, number of economics courses taken, attendance at religious services, race, number of siblings, performance of volunteer work, and affiliation with a fraternity or sorority.

4. Results

Our experiments were conducted at Colgate University during the fall 1998 and spring 1999 semesters. Our subjects were undergraduate students recruited from a wide variety of courses. We attempted to elicit as wide a subject pool as possible within the limitations of the university, and we specifically limited the extent to which we recruited subjects from economics courses. (11) Decision makers earned a flat fee of $10 for participation, and beneficiaries received about $10 on average, varying from a low of $8 to a high of $10.75. The experiments lasted approximately 25 minutes, and so subjects were paid well relative to other earnings opportunities. We gathered 157 total observations, which were roughly equally divided between the two treatments.

Based on our earlier discussion of multiple fairness concepts, we can identify the hypothesis for each of the six previously mentioned concepts of fairness within the context of the experimental design that uses token inputs and payoff outputs. Proportional split of inputs implies a 36/24 allocation to Player B/Player C, proportional output = 35/25, equal loss of inputs = 40/20, and equal loss of output = 37/23. Note that each of these four possibilities implies allocating more than half the tokens to Player B since each concept of fairness is based on the needs of each beneficiary to attain his maximum payoff. Two other allocations, equal split of inputs (30/30) and equal output (20/40), are more simple to calculate and are therefore likely to be more focal allocations. We hypothesize that a 20/40 allocation will be the dominant concept of fairness in No Earned Rights, whereas we hypothesize that 30/30 will be a more focal outcome with Earned Rights since this allocation generates a higher payoff for the pl ayer earning the right to the better payoff function (Player B). Strictly speaking, any allocation giving Player B more than 20 tokens is consistent with the hypothesis that Player B will be given some entitlement rights in what is viewed as a fair allocation.

Fairness Outcomes: What Are the Dominant Choices?

Table 2 shows the summary data from our experiments. Decision makers could choose any token allocation from 0/60 to 60/0 in one token increments, although Table 2 aggregates some of the data for simplicity of presentation. Decision makers chose a wide variety of different token allocations, as 28 of the possible 61 token allocations were chosen by at least one subject. The hypothesized modal allocations, 20/40 and 30/30, are chosen by 53.5% and 3.82% of the decision makers, respectively. Though 20/40 is clearly the modal allocation across both treatments, it is chosen less frequently in the Earned Rights treatment. It is also the case that almost 50% of the chosen allocations in Earned Rights give more than 20 tokens to Player B versus about 34% in No Earned Rights. Of the other allocations highlighted by Farmer and Tiefenthaler (not shown explicitly in Table 2), none was chosen by more than 2.5% of the decision makers. One allocation we have yet to examine is the allocation that maximized the beneficiaries' joint payoff, which is 34/26 in our experiment. This allocation is chosen by nearly 11% of the decision makers and is further examined in the regression analysis we present next.

Statistical Results

Given that notions of fairness differ across individuals, it is interesting to examine whether this variation is in any way systematic. Do allocations differ by gender, race, or undergraduate major, for example? In order to estimate the determinants of our subjects' allocations, multinomial logit analysis is performed. The dependent variable is coded as 1, 2, or 0 representing the two modal choices (equal outcome and maximum output) and all other allocations, respectively. Although equal split was also considered to be a focal allocation, we could not include it as a separate choice in the analysis because there were not a sufficient number of observations (only 3.8%, or six observations). Therefore, equal split is included among all "other" allocations. Several alternative specifications of the dependent variable were tried, and the results were robust across these specifications. (12) The multinomial logit results are presented in Table 3. The marginal effect of each variable (evaluated at the sample mean) is presented for each of the three categories. The model correctly predicted 60% of the cases.

As expected, the treatment has a significant impact on the allocation in several cases. Relative to the No Earned Rights treatment, an allocation that results in equal outcomes is 14 percentage points less likely if the scenario is framed as if the beneficiaries earned their positions. This is in support of our earned-rights hypothesis and is consistent with existing research (e.g., Hoffman and Spitzer 1985; Guth 1988; Burrows and Loomes 1994; Konow 2000). Subjects were 19 percentage points more likely to choose an "other" allocation when the beneficiaries appeared to earn their positions, and maximum output was equally likely to be chosen across the two treatments, ceteris paribus.

The results indicate that very few of the demographic variables are systematically related to individuals' notions of fairness. This is an important result. While notions of fairness obviously differ across individuals, it appears that standard demographic variables are not good predictors of these differences. Most demographic variables do not appear to be good proxies for the morals and values that determine an individual's fairness concept. However, there are a few exceptions. Most notable, gender is a strong and significant predictor. In our sample, 55% of the decision makers are female, and they are significantly more likely (by 13 percentage points) to choose the allocation resulting in equal outcomes, while men are 9 percentage points more likely to choose the allocation resulting in maximum output (see also Andreoni and Vesterlund 2001).

The result that the gender dummy variable is a significant predictor of the fairness concept chosen brings up the question of whether men and women responded to the treatment effect in the same way. While data limitations prevent us from running the multinomial regressions for men and women separately, Table 4 shows the fairness concepts chosen by gender and treatment for comparison. The frequencies in Table 4 suggest that men and women may view the importance of merit differently when distributing resources. When the payoff functions were randomly assigned, there was no significant difference between the percentages of men and women who chose an equal outcome as fair. However, in Earned Rights, men were much less likely to view equal outcomes as fair--58% of women chose equal outcomes once merit was introduced compared with only 35% of men. There was no significant difference in the percentage of women who chose the three modal choices between the Earned Rights and No Earned Rights treatments, suggesting tha t the distinction between a random and merit-based assignment of payoff functions had no impact on women's choices.

While we will not speculate on the explanations for these gender differences, we do point out that the notion that women and men have systematically different ideas about what is fair has important policy implications. If they have different notions of fairness, women and men are likely to view the justice of social transfers, court decisions, and family allocations of resources very differently.

Another interesting result is that the number of economics courses taken has a significant impact on the allocation chosen. Students in our sample who have taken economics courses are more likely to choose an allocation that maximizes total output. Specifically, taking five economics courses makes an individual 7 percentage points more likely to choose the maximum output allocation. This highlights the potential importance of economics training on

perceptions of fairness, though these results are not definitive. Whether the relationship we find is the result of economics training or sample selection is not completely clear, but this particular topic merits its own systematic investigation.

Membership in fraternities or sororities also appears to significantly impact an individual's notion of fairness. In our experiments, students who identified themselves as members of fraternity or sorority organizations were 22 percentage points less likely than other students to allocate to equalize outcomes and slightly more likely to choose some "other" allocation. This result is somewhat surprising given the importance placed on community and brotherhood/sisterhood in these organizations. Perhaps the selection into these organizations explains this result. A few other variables have marginally significant impacts on the allocation chosen. Subjects from rural areas and those who regularly attend religious services are less likely to allocate to maximize efficiency.

5. Conclusions and Policy Implications

Economists recognize people's concerns for fairness as an explanation for. a variety of outcomes that are inconsistent with purely self-interested theoretical predictions. A goal of this paper is to focus attention on an interesting and commonly occurring environment in which perceptions of fairness play a particularly important role. Bankruptcy settlements, estate division, intrahousehold resource allocation, and conventional arbitration are all examples of naturally occurring environments in which a decision maker chooses an allocation of scarce resources that determines a payoff for two typically heterogeneous individuals. The lack of field data that are free from confounding factors has been at least partially responsible for the lack of empirical work on fairness perceptions in such environments.

We have used controlled laboratory experimentation to identify the most relevant fairness concepts and to study the effects of both earned status and demographic characteristics on perceived fairness. The results from our experiments indicate that fairness concepts differ significantly across individuals. Of the 60 possible allocations in our experiments, 28 were chosen. However, despite the dispersion in fairness concepts chosen, our results do point to three dominant fairness concepts: (i) an equal split of resources that results in unequal payoffs, (ii) an egalitarian outcome achieved by an unequal split of resources, and (iii) an unequal split of resources that also results in unequal outcomes but does maximize the total outcome. A resource allocation by the government or the courts that relies on one of these methods is most likely to generate popular support.

Table 2. Frequency of Subject Choices (Allocations Chosen at Least Once Are Listed)

(Categories of A Tokens to B/Tokens to C	Aggregate Frequency (%)	Frequency by Treatment	
		No Earned Rights Frequency (%)	*Earned Rights* Frequency (%)
0/60 to 19/41	9 (5.73)	4 (5.13)	5 (6.33)
20/40 (equal outcomes)	84 (53.50)	48 (61.54)	36 (45.57)
21/39 to 29/31	17 (10.83)	5 (6.41)	12 (15.19)
30/30 (equal inputs [unequal outcomes])	6 (3.82)	3 (3.85)	3 (3.80)
31/29 to 33/27	8 (5.10)	1 (1.28)	7 (8.86)
34/26 (maximum joint outcome)	17 (10.83)	9 (11.54)	8 (10.13)
35/25 to 60/0	16 (10.20)	8 (10.26)	8 (10.13)
Total observations	157	78	79

The theoretical literature on fairness proposes that accountability or effort is an important criterion considered by individuals trying to make a fair allocation. It is seen as fair for an individual who earns a dominant position to enjoy the rewards. Our results join other empirical studies in support of this notion. In the experiment that framed Player B as having been randomly assigned her superior payoff function, the majority of subjects thought that it was fair to generate equal final outcomes even though this implied an unequal allocation of the inputs between Players B and C. However, when Player B earned her superior payoff function, subjects were less likely to equalize outcomes.

While existing research has shown a difference between men's and women's perceptions of fairness in environments where their own payoffs are at stake--for example, bargaining and public goods environments--our research substantiates this difference even when own monetary payoffs are independent of the allocation. Men are less likely than women to choose equal outcomes but more likely to choose the most efficient outcome. In addition, descriptive analysis suggests that men are more influenced by whether an individual earned his favorable position than women are. These results have implications for business practices, court decisions, intrahousehold resource allocation, and government transfer policy. Men in positions to allocate resources, such as judges, legislators, fathers, and managers, may be more likely to allocate scarce resources in order to maximize efficiency. Women in the same positions may be more inclined to divide resources in an effort to equalize outcomes across the affected individuals. Thoug h some naturally occurring environments that motivate this study involve decision makers with at least some self-interest, it is important to identify the pure (no-self-interest) effects of key variables (e.g., merit and gender) to illuminate further research on fair allocations.

It is hoped that the results from these experiments will provide fuel for further discussion and research. The perception of whether individuals earned their favorable positions mattered in our results. Also, while we do capture some determinants of behavior in our demographic variables, it is clear that what would be the most obvious demographic controls (other than gender) predict only a small amount of allocation behavior. An interesting extension of this study would use a more diverse subject pool to further explore the effects of demographic variables on fairness notions. There is little variance in race, age, educational status, or income in our subject pool. It would also be interesting to examine the effects of living in a more capitalist versus a more socialist country on perceptions of fairness. While more research is needed in this area, the results from our somewhat homogeneous subject pool clearly indicate that people view fairness differently and that some of the differences can be categorized.

Appendix: Experimental Instructions (for No Earned Rights) and Postexperiment Questionnaire

Instructions for No Earned Rights (Random Assignment of Players B and C) (Bold Type in Instructions Is in Originals That Subjects See)

This is an experiment in decision making. There will be 3 different types of players in today's experiment: Players A, B, and C. You will be a Player A for this experiment As a Player A, you will be paid $10 for your participation in this experiment You will be asked to make one decision in this experiment (it will be explained to you shortly). The decision that you make in this experiment will not affect your $10 payoff at all. Your decision will, however, affect the payoffs of the Player B and Player C that you are matched with.

Table 3. Multinomial Logit Results ($N = 314$)[a]

	Equal Outcome	Maximum Output	Other
Constant	0.274	−0.054	−0.220
Experiment 2: *Earned Rights*	−0.142*	−0.046	0.187**
Financial aid	−0.316	−0.006	0.038
Minority	−0.214	0.017	0.004
Fraternity/sorority membership	−0.219**	0.010	0.021**
Majoring in a social science	−0.223	0.001	0.022
Majoring in a natural science	−0.124	0.074	0.050
Number of siblings	0.057	0.002	−0.058
Attends religious services	0.167	−0.111*	−0.055
Urban	−0.047	−0.022	0.070
Rural	−0.101	−0.089	0.189*
Works >5 hours per week	0.050	−0.059	0.008
Years at Colgate University	0.036	−0.022	−0.014
Male	−0.130*	0.094**	0.036
Number of economics classes	0.004	0.014**	−0.018
Northeast	−0.056	−0.025	0.081
Volunteers	0.005	0.027	−0.032
Percentage correctly predicted	60%		
Chi-squared	43.197		

[a] Marginal effects presented.
*Significant at the 10% level.
**Significant at the 5% level.

You will be asked to allocate 60 tokens to 2 other players in this experiment, a Player B and a Player C. The decision that you must make is how to allocate these 60 tokens between players B and C. All 60 tokens must be allocated, but the precise way in which they are allocated is completely up to you. You have been given a Payoff Table for Players B and C which describes how different token allocations will determine the payoff that you generate for Players B and C. Please look carefully at the similarities and differences in the payoffs for Players B and C given different token allocations. For example, if you were to allocate 60 tokens to Player B and zero tokens to Player C, then the payoff you generate to Player B would be 1200 and the payoff to Player C would be 0. If you were to allocate zero tokens to Player B and 60 tokens to Player C, then the payoff that you generate to Player B would be 300 and the payoff to Player C would be

600. As a final example, if you were to allocate 13 tokens to Player B and 47 tokens to Player C, then the payoff you generate to Player B would be 647 and the payoff to Player C would be 775.

These payoff numbers do not represent dollar amounts, but they will be used to determine the dollar payoff that you generate for Players B and C. After your decision has been made, an exchange rate will be applied to each unit of payoff, and Players B and C will then be paid in cash. In other words, each unit of payoff that a player (B or C) receives will be worth a certain amount of cash to that player. It is important for you to realize that higher payoffs for a player mean more money for that player and lower payoffs for a player mean less money for that player.

Table 4. Frequency of Subject Choices by Gender and Treatment (% Choice by Males/% Choice by Females)

	Equal Outcomes	Equal Split	Maximum Efficiency	Other
No Earned Rights	58/63	0/6	17/8	24/22
Earned Rights	35/58	5/3	16/3	44/36

After you have made your decision, Players B and C will get to see the number of tokens allocated to each Player (B and C) (they will never know your identity, however). Further, the Players B and C know that their monetary payoff will be determined in some way by these allocations of tokens. But, Players B and C will never see the Payoff Table. Players B and C will only be told how many tokens there were, and how these tokens were divided up between Player B and Player C, and then Players B and C will each receive his/her monetary payoff in private. Neither Player B nor C will know the actual monetary payoff of the other. Each Player B and C will only know what the division of tokens is and his/her personal monetary payoff.

It is important for you to realize that two other individuals are assigned to be Player B and Player C for you in this experiment These individuals do not choose which Player they get to be in the experiment, but rather it is randomly chosen which individual is Player B and which is Player C.

Your decision is only made once, and no one will know the identity of anyone else in the experiment Once you have completed your decision in the apace below, a monitor will pick up your decisions. You will then be asked to fill out a brief information sheet that will provide valuable information to the researcher. This information will be kept anonymous and confidential and will not affect your payment or future selection for any experiment in any way. Please raise your hand if you have any questions! Otherwise, please make your allocation decision now in the space below.

TOKENS ALLOCATED TO PLAYER B ___

TOKENS ALLOCATED TO PLAYER C ___

Thank you, and when all participants are ready, you will be handed a brief information sheet that we would like for you to take a few minutes to fill out.

Identification Number:___

Answer each of the following questions:

1. Sex: MALE FEMALE

2. Graduation year: 1999 2000 2001 2002

3. Region you are from: Northeast South Midwest West Foreign

4. What is your declared or anticipated major at Colgate? ___

5. Location that best describes your home: RURAL URBAN SUBURBAN

6. During the academic year, do you have a regular (5 or more hours per week) job? YES NO

7. Do you regularly attend religious services? YES NO

8. How many economics courses have you taken at Colgate?

9. Do you receive financial aid at Colgate? YES NO

If so, how much per year? ___

If you don't know the amount, is it more or less than 50% of Colgate's annual cost? MORE LESS

10. Race: WHITE BLACK ASIAN HISPANIC

11. How many siblings do you have? ___

How many of your siblings are older than you are? ___

12. Do you do some type of volunteer work on a monthly basis? YES NO

13. Are you a member of a fraternity or sorority? YES NO

TABLES

Table 1

Player Payoff Tables (Condensed Version) (a)

Payoffs Given Correspond to Monetary Payoffs to Palyoer B and Player C (b)

Tokens to Player B	Tokens to Player C	Payoff to Player B	Payoff to Player C
0	60	300	600
4	56	416	672
8	52	524	728
12	48	624	768
16	44	716	792
20	40	800	800
24	36	876	792
28	32	944	768
30	30	975	750
34	26	1031	702
38	22	1079	638
42	18	1119	558
46	14	1151	462
50	10	1175	350
54	6	1191	222
58	2	1199	78
60	0	1200	0

(a) For space considerations, not all token combinations and payoffs are shown here, but subjects' experiment payoff tables show all combinations. See payoff functions in the Experiment Design section for full mapping of tokens to payoffs.

(b) Total tokens distributed must equal 60.

Table 2

Frequency of Subject Choices (Allocations Chosen at Least Once Are Listed)

		Frequency by Treatment	
(Categories of) Tokens to B/Tokens to C	Aggregate Frequency (%)	No Earned Rights Frequency (%)	Earned Rights Frequency (%)
0/60 to 19/41	9 (5.73)	4 (5.13)	5 (6.33)
20/40 (equal outcomes)	84 (53.50)	48 (61.54)	36 (45.57)
21/39 to 29/31	17 (10.83)	5 (6.41)	12 (15.19)
30/30 (equal inputs [unequal outcomes])	6 (3.82)	3 (3.85)	3 (3.80)
31/29 to 33/27	8 (5.10)	1 (1.28)	7 (8.86)
34/26 (maximum joint outcome)	17 (10.83)	9 (11.54)	8 (10.13)
35/25 to 60/0	16 (10.20)	8 (10.26)	8 (10.13)
Total observations	157	78	79

Table 3

Multinomial Logit Results (N = 314) (a)

	Equal Outcome	Maximum Output	Other
Constant	0.274	-0.054	-0.220
Experiment 2: Earned Rights	-0.142 *	-0.046	0.187 **
Financial aid	-0.316	-0.006	0.038
Minority	-0.214	0.017	0.004
Fraternity/sorority membership	-0.219 **	0.010	0.021 **
Majoring in a social science	-0.223	0.001	0.022
Majoring in a natural science	-0.124	0.074	0.050
Number of siblings	0.057	0.002	-0.058
Attends religious services	0.167	-0.111 *	-0.055
Urban	-0.047	-0.022	0.070
Rural	-0.101	-0.089	0.189 *
Works > 5 hours per week	0.050	-0.059	0.008
Years at Colgate University	0.036	-0.022	-0.014
Male	-0.130 *	0.094 *	0.036
Number of economics classes	0.004	0.014 *	-0.018
Northeast	-0.056	-0.025	0.081
Volunteers	0.005	0.027	-0.032
Percentage correctly predicted	60%		
Chi-squared	43.197		

(a) Marginal effects presented.

* Significant at the 10% level.

** Significant at the 5% level.

Table 4

Frequency of Subject Choices by Gender and Treatment (% Choice by Males/% Choice by Females)

	Equal Outcomes	Equal Split	Maximum Efficiency	Other
No Earned Rights	58/63	0/6	17/8	24/22
Earned Rights	35/58	5/3	16/3	44/36

ENDNOTES

(1.) Examples of environments that may be enlightened by studying disinterested third-party allocations include conventional arbitration, bankruptcy settlements, divorce settlements, and estate division.

(2.) The two most common single-round bargaining games in the experimental economics literature are the ultimatum and dictator games. In the ultimatum game, an individual proposes a division of the monetary pie, and the second mover either accepts or rejects (which leads to zero payoffs so both) the proposal, and the game is over. In the dictator game, the second mover cannot reject any proposal--the dictator simply dictates the proposed division.

(3.) A recent paper by Konow (2000) includes experiments with non-self-interested "dictators." As for the importance of a nonhypothetical experiment, Davis and Holt (1993, p. 24) note that a central premise of experimental economics is that "participants receive salient rewards that correspond to the incentives assumed in the relevant theory or applications." In the current context, this highlights the distinction between a hypothetical survey approach versus the experimental application we develop. In both cases, allocation choices of a third-party decision maker do not affect her payoffs in the experiment. However, since the relevant application assumes that allocations choices are meaningful, the incentives we use include the knowledge that allocation choices generate a real (corresponding) cash outcome to actual recipient subjects--this is known by all decision makers in our experiments.

(4.) Rawls (1971) is also notable in its method of exploring true fairness perceptions by use of the "veil of ignorance."

(5.) See also Roth and Murnighan (1982), where subject private token values are altered in a bargaining experiment (with interested decision makers, however). The authors found that subjects tended to unequally divide tottery tickets when both individuals knew that prizes were unequal, as if to equalized expected payoffs. Otherwise, a 50/50 split of the tottery tickets was much more likely.

(6.) Farmer and Tiefenthaler note that several of their alternative fairness concepts would have no meaning unless the payoff functions reach a maximum. A quadratic function is therefore chosen as the simplest function to attain a maximum. One drawback, however, of the chosen functions is that when Players B and C's payoffs are equalized, it is also the allocation that maximizes Player C's payoffs. This may limit our ability to examine whether decision makers wish to equalize payoffs or merely maximize Player C's payoffs. Nevertheless, since players were all anonymous in the experiment, we strongly believe that such allocations are payoff-equalizing allocations as opposed to trying to maximize the payoff of an unknown individual. Besides, less than 2% of decisions maximize Player B's payoff, and so one would expect many more such allocations if individuals were somehow systematically trying to maximize payoffs of a particular individual. The weight of the evidence suggests that decision makers equalize benefi ciaries' payoffs by intent and not as a by-product of attempting to maximize Player C's payoffs.

(7.) Nevertheless, we also generated a much smaller sample of data (N = 15 for one of the treatments described in the Experimental Treatments section of this paper) in which there was only one decision maker per pair of beneficiaries. The distribution of allocations from these data is statistically no different than the corresponding treatment's distribution from our larger sample ($p > .20$ using the Kolmogorov-Simrnov nonparametric full-distribution test for two samples). This confirms our belief that our particular design does not significantly alter subject decisions. All data from these additional experiments as well as comparison tests are available from the authors on request.

(8.) The payoff table is not shown to the beneficiaries in order to identify those decision makers who view an equal division of inputs as fair even though the resulting payoffs would be unequal. In other words, if beneficiaries see the payoff table, the decision maker then knows that the beneficiaries are aware that an unequal division of inputs is required to equalize cash payoffs. Without seeing the payoff table, beneficiaries may perceive that same unequal division of the inputs as unfair, and this may affect how the decision maker chooses to allocate.

(9.) All experimental instructions are available from the authors by request, add some are included in the Appendix.

(10.) To avoid a selection problem among subjects (and, consequently, cash payoffs), we employ the procedure developed by Ball and Eckel (1998). Even though the recipients make no decisions in the experiment, we create the quiz so that all answers are numeric, and the final quiz score is merely the sum of all answers. As such, all subjects (Players A, B, and C) are told that the subject (from Player B and C candidates) scoring highest on the quiz is Player B. Note, however, that this "highest score" has nothing to do with intelligence, unbeknownst to the subjects, and so ex post subject payoffs are not biased on the basis of intelligence.

(11.) Economics is, however, one or the most popular majors at Colgate University. As such, many of the subjects recruited from other courses may still list economies as their intended major on our demographic questionnaire.

(12.) Six alternative specifications of the dependent variables were estimated. Initially, the dependent variable was coded from 0 to 5 with Pareto-inefficient allocations and equal loss (20, 40) represented as separate categories. However, all right-hand-side variables were insignificant in predicting the choice of these two categories and were, therefore, folded into the "other" category. None of the results for the three remaining modal choices were significantly affected by this change. Another specification included allocations around the modal choices with the modal choice categories. Again, this change in the dependent variable did not significantly alter the results.

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