When fairness matters less than we expect

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Do those who allocate resources know how much fairness will matter to those who receive them? Across seven studies, allocators used either a fair or unfair procedure to determine which of two receivers would receive the most money. Allocators consistently overestimated the impact that the fairness of the allocation procedure would have on the happiness of receivers (studies 1–3). This happened because the differential fairness of allocation procedures is more salient before an allocation is made than it is afterward (studies 4 and 5). Contrary to allocators' predictions, the average receiver was happier when allocated more money by an unfair procedure than when allocated less money by a fair procedure (studies 6 and 7). These studies suggest that when allocators are unable to overcome their own preallocation perspectives and adopt the receivers' postallocation perspectives, they may allocate resources in ways that do not maximize the net happiness of receivers.

fairness | affective forecasting | decision-making

The kleroterion was the world's first vending machine, and what it dispensed was fairness. In the fourth century BCE, Athenian citizens inserted their *pinakia* or tokens into the machine, and out rolled dice that determined whether the citizen could sit on a jury or serve in the legislature. The Greeks designed this device because they believed that the identity of a person in power was less important than the fairness of the procedure that had empowered him (1). Twenty-five centuries later, human beings remain deeply concerned with the fairness of the procedures that are used to allocate things of value, such as power, wealth, and opportunity. These allocation procedures vary across domains—annual bonuses are allocated by merit, committee assignments by seniority, food stamps by need, and lottery prizes by chance—but in each domain, the fairness of the procedure matters quite a lot to the people who are affected by it (2, 3). Indeed, people typically report that the fairness of an allocation procedure is its single most important feature—more important than its speed, practicality, factuality, and sometimes even its consequences (4).

Fairness matters. But we suggest that in many cases it matters less than people expect. Specifically, we suggest that those who allocate resources often overestimate just how much the fairness of the allocation procedure will affect those who receive the resources. Why might this happen? When people compare alternatives, they tend to overestimate how much the difference between those alternatives will matter once one of them has been chosen (5–8). For example, when asked to consider two pieces of chocolate that differ by just a few grams, people predict that they will be happier eating the larger one; and yet, once they actually start eating, the small difference in weight makes no discernable difference to their satisfaction (6). Studies suggest that when faced with a choice, people explicitly compare alternatives and therefore the differences between those alternatives loom large; but once that choice has been made, the chosen alternative keeps looming, while the unchosen alternative fades into history.

This fact may have important consequences for allocators, who are in the business of choosing between procedures that differ in fairness. Allocators who are charged with deciding whether employees will be promoted by seniority or productivity, whether college students will be admitted by standardized test scores or race, or whether airline passengers will board by status or row number must explicitly compare procedures that differ in fairness, and may therefore tend to overestimate the importance of small differences. Receivers, however, are not in the business of choosing procedures. Rather, their role is to react to allocations once they have been made, and as such, the procedure that was actually enacted is likely to be more salient to them than the procedures that might have been enacted but were not (9). Because allocators and receivers play different roles at different times, they will naturally have different perspectives, and research shows that people typically find it difficult to transcend their own perspective and adopt someone else's. People tend to assume that others see the world as they themselves do (10), and as such, allocators who are explicitly comparing two procedures may mistakenly expect the differential fairness of those procedures to later seem as important to receivers as it now seems to the allocators themselves.

In summary, we suggest that allocators have a general tendency to overestimate how much the fairness of an allocation procedure will matter to receivers—a tendency that we call "the allocator's illusion"—and that this happens because the differential fairness of allocation procedures is more salient before an allocation is made than it is afterward. In the studies that follow, we provide evidence of this illusion (studies 1–3), its causes (studies 4 and 5), and its consequences (studies 6 and 7).

Study 1

Methods. The procedures for study 1 and all subsequent studies were approved by the Harvard University Committee for the Use of Human Subjects. All participants provided informed consent before participation. Complete methods and results for all studies may be found in *Supporting Information*.

In each session of study 1, three participants came to our laboratory, briefly met each other, and were then told that one of them would play the role of allocator and two would play the role of receiver. All participants were told that the allocator would be randomly assigned to allocate a $10 bonus to one and only one of

Significance

Human beings care a great deal about the fairness of the procedures that are used to allocate resources, such as wealth, opportunity, and power. But in a series of experiments, we show that those to whom resources are allocated often care less about fairness than those who allocate the resources expect them to. This "allocator's illusion" results from the fact that fairness seems more important before an allocation is made (when allocators are choosing a procedure) than afterward (when receivers are reacting to the procedure that allocators chose). This illusion has important consequences for policy-makers, managers, health care providers, judges, teachers, parents, and others who are charged with choosing the procedures by which things of value will be allocated.

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Data deposition: All data are available at https://github.com/guscooney/allocators_illusion.

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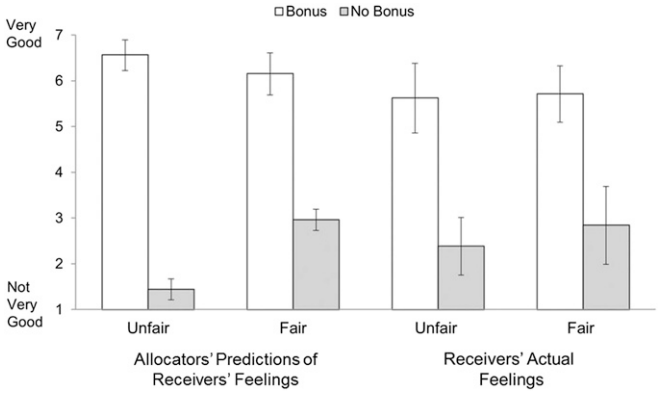

Fig. 1. Results of study 1. $n = 80$. Error bars show the 95% confidence intervals (CI) around each mean.

the receivers either by flipping a coin (a relatively fair procedure) or by personally selecting one of the receivers to receive the bonus (a relatively unfair procedure). We gave allocators a scale whose endpoints were labeled *not very good* (1) and *very good* (7), and asked them to predict how each of the receivers would feel if the allocation was made via each of these procedures. After allocators did this, we randomly assigned them to enact either the fair or the unfair procedure. We then measured how the receivers actually felt after either getting or not getting the bonus.

Results. As the left side of Fig. 1 shows, allocators expected the fairness of the procedure to matter to receivers. Specifically, allocators predicted that the outcome of the allocation (bonus or no bonus) would have a greater impact on receivers when the procedure was unfair than when it was fair. But as the right side of Fig. 1 shows, those predictions were wrong. Receivers naturally felt better when they received a bonus than when they did not, but the fairness of the allocation procedure had no detectable impact on them. It is important to note that all allocators and all receivers learned about both the fair and the unfair procedures, and as such, the differences between them were because of the roles they played and not because of the information with which we provided them.

Study 2

The allocation procedures used in study 1 differed in fairness, but they may have differed in another way as well. Unlike the fair procedure, the unfair procedure may have conveyed information about the allocator's personal opinion of the receiver, an opinion that could have been informed by the receiver's appearance, personality, race, gender, age, or any of the other things that the allocator had gleaned upon meeting the receiver at the beginning of the study. As such, receivers who did not receive a bonus might have felt unhappy either because the allocation procedure was unfair or because they thought the allocator disliked them. Allocators clearly overestimated how unhappy receivers would be if they were not selected to receive the bonus, but was that because allocators thought these receivers would take their allocation as evidence of an unfair procedure or as a personal indictment? To answer this question, we replicated study 1 using an unfair allocation procedure that did not convey any information about the allocator's opinion of the receiver.

Methods. We replicated the procedure of study 1 with one change. Whereas participants in study 1 met each other before the experiment began, participants in study 2 did not. As such, the decisions of allocators in study 2 could not possibly have conveyed the allocator's opinion of the receiver because the allocator could not possibly have had such an opinion.

Results. As Fig. 2 shows, the results of study 1 were replicated. Allocators once again expected the fairness of the procedure to matter to receivers, and once again it did not. Clearly, allocators did not mispredict receivers' reactions because they thought the unfair procedure would be seen by receivers as a personal indictment, but rather because they overestimated how much receivers would care about fairness.

Study 3

In study 3, we sought to generalize the results of studies 1 and 2 by using a different manipulation of fairness. People generally believe that when all else is equal, the amount of compensation a worker receives should reflect the amount of work he or she has performed (11). If one worker does more work than another, then fairness requires that the one who did the most work receive the most compensation. We used this basic principle to manipulate fairness in an online study.

Methods. In study 3, participants were told that they were participating with two other people, that one of them would be randomly assigned to play the role of allocator, and the others would be randomly assigned to play the roles of receivers. Participants were told that the receivers would do different amounts of work and that the allocator would then award a large bonus to one of the receivers and a small bonus to the other. Participants were then randomly assigned to the role of allocator or receiver. Allocators were asked to predict how each of the receivers would feel if the allocator awarded the bonuses fairly (by awarding the larger bonus to the receiver who did the most work) and how they would feel if the allocator awarded the bonuses unfairly (by awarding the larger bonus to the receiver who did the least work). Receivers were assigned to do either a large or small amount of work, and were then awarded bonuses either fairly or unfairly. Receivers were then asked how they felt.

Results. As Fig. 3 shows, allocators expected the fairness of the allocation procedure to matter to receivers. And it did–but not as much as allocators thought it would. In a subsequent study, we replicated the results for allocators using a between-participants design in which allocators made just one prediction and a within-participants design in which allocators made multiple predictions. The results were replicated with both designs and the type of design made no difference at all (see *SI Appendix*).

Studies 4 and 5

Why did allocators in studies 1–3 mispredict how much receivers would care about fairness? In everyday life, allocators and receivers play their roles at different points in time. As such,

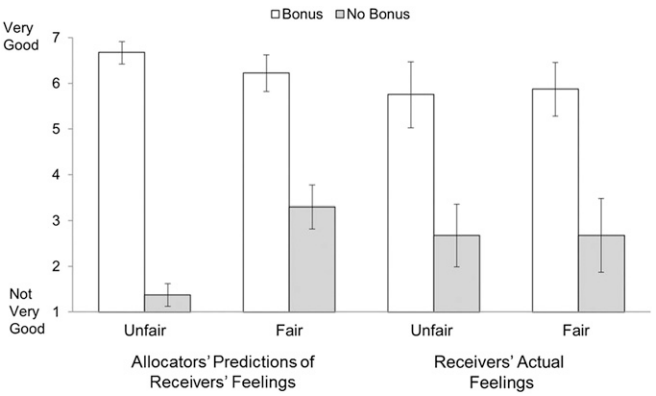

Fig. 2. Results of study 2. $n = 81$. Error bars show the 95% CI around each mean.

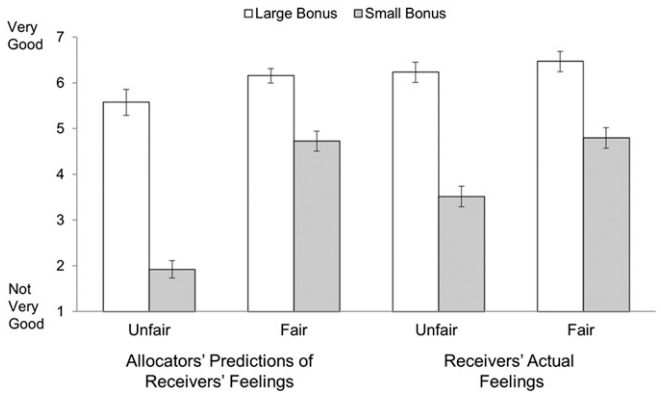

Fig. 3. Results of study 3. $n = 798$. Error bars show the 95% CI around each mean.

allocators naturally focus on the differences between possible allocation procedures and receivers naturally focus on the procedure that was enacted. When allocators try to predict before an allocation is made how receivers will feel afterward, they may have trouble overcoming their own preallocation perspectives and adopting the receiver's postallocation perspective (12). If this is the cause of the allocator's illusion, then two predictions follow. First, if allocators are asked after an allocation is made to estimate how receivers feel, then they (unlike the allocators in studies 1–3) should correctly estimate the impact that the fairness of the allocation procedure had on receivers' feelings. Second, if receivers are asked before an allocation is made to predict how they will feel afterward, then they (like the allocators in studies 1–3) should overestimate the impact of the fairness of the allocation procedure. Because the procedure for study 2 was the simplest, we adapted it for use online and tested these two predictions in studies 4 and 5, respectively.

Methods. In study 4, we asked allocators after they had made an allocation to estimate how receivers now felt. In study 5, we asked receivers before the allocation was made to predict how they would feel afterward.

Results. As the left side of Fig. 4 shows, allocators in study 4 did not think that the fairness of the allocation procedure had mattered to receivers. Indeed, their responses look very much like those of the receivers in study 2. As the right side of Fig. 4 shows, receivers in study 5 expected that the fairness of the allocation procedure would matter to them. Indeed, their responses look very much like those of the allocators in study 2. These results suggest that the different temporal positions of allocators and receivers are what causes them to have such different perspectives on the importance of fairness.

Studies 6 and 7

What are the consequences of the allocator's illusion? In everyday life, allocators must often balance fairness against others concerns. For example, allocators must often choose between a procedure that maximizes fairness and a procedure that maximizes economic efficiency (13). A procedure is economically efficient when it allocates resources so that no receiver can do better unless another receiver does worse. Efficient procedures make optimal use of the resource being allocated, but unfortunately, the most efficient procedures are not always the fairest (5, 6). For example, the procedure that most efficiently allocates organs to people in need of a transplant is not the procedure that people consider most fair because it penalizes people for being older and therefore having fewer years in which to use their new organ (14, 15). The procedure that most efficiently allocates opportunity to people who are waiting in line is not the procedure that people consider most fair because it penalizes those who are most patient (16).

Allocators often resolve these dilemmas by sacrificing efficiency to maximize fairness. Indeed, allocators sometimes destroy resources—that is, they allocate the resources to no one—to avoid allocating them unfairly (17, 18). If, as studies 1–3 suggest, allocators tend to overestimate how much fairness will matter to receivers, then not only are such sacrifices in vain, but they may actually produce less net happiness. For example, if policy-makers mistakenly assume that the victims of a natural disaster will be happier receiving less money that was allocated more fairly, they may devote half the budget to an elaborate compensation scheme that requires administrators and hearings rather than simply dividing twice as much money evenly among the victims. We sought to test the hypothesis that the allocator's illusion can lead allocators to mistakenly believe that receivers will be happier when efficiency is sacrificed for fairness.

Methods. In studies 6 and 7, as in studies 4 and 5, we adapted the procedure from study 2 for use online. In study 6, we asked allocators to predict how receivers would feel if a large bonus was allocated unfairly (the unfair-but-efficient procedure) and how receivers would feel if a smaller bonus was allocated fairly (the fair-but-inefficient procedure). In study 7, we enacted these two procedures and then measured how receivers felt.

Results. As the left side of Fig. 5 shows, allocators in study 6 expected that relative to the unfair-but-efficient procedure, the fair-but-inefficient procedure would augment the happiness of those receivers who received a small bonus more than it would diminish the happiness of those receivers who received a large bonus, thereby producing more net happiness among receivers. But as the right side of Fig. 5 shows, the happiness of receivers in study 7 was essentially a function of the size of their bonuses, and those who received a small bonus were just as happy when the procedure was unfair as when it was fair (19). Contrary to the predictions of allocators then, the unfair-but-efficient procedure produced more net happiness—and not less net happiness—than the fair-but-inefficient procedure did.

Discussion

Allocators must decide how to allocate things of value to people who value many things, including efficiency and fairness. To balance these concerns, allocators must look forward in time and try to imagine what the world will look like to people who are looking backward. As our studies show, this is a challenge to which allocators do not always rise. Allocators in our studies

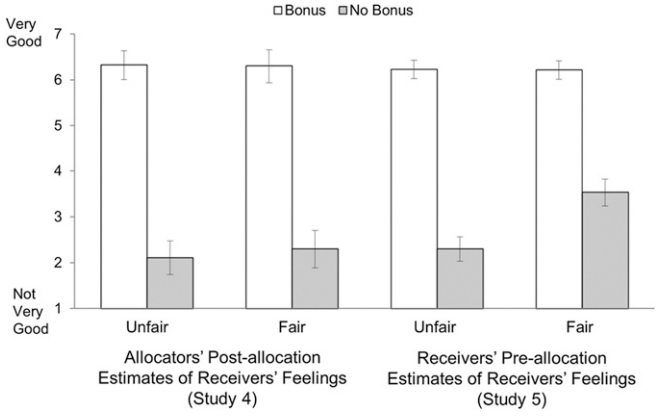

Fig. 4. Results of studies 4 and 5. $n = 64$ (study 4, *Left*) and 120 (study 5, *Right* side). Error bars show the 95% CI around each mean.

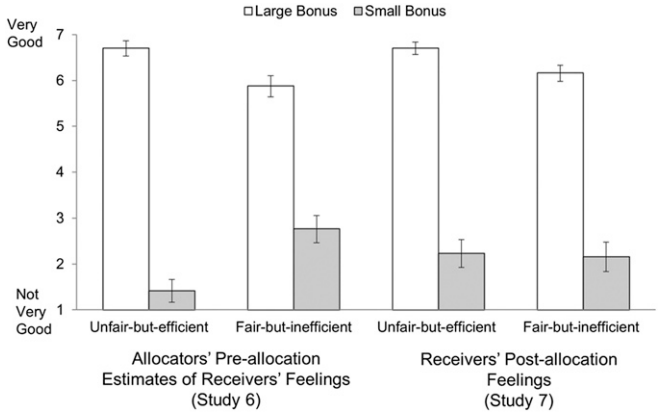

Fig. 5. Results of studies 6 and 7. $n = 63$ (study 6, *Left*) and 394 (study 7, *Right*). Error bars show the 95% CI around each mean.

consistently overestimated how much the fairness of a procedure would impact receivers' happiness (studies 1–3), and thus mistakenly concluded that receivers would be happier with less money that was allocated fairly when receivers were actually happier with more money that was allocated unfairly (studies 6 and 7). When allocators and receivers swapped temporal perspectives, allocators avoided this mistake (study 4) and receivers made it (study 5).

Before discussing what these results mean it is important to say what they do not mean. These results do not mean that receivers care little or nothing about fairness. Indeed, literatures across several social sciences show that fairness is often of great importance to receivers (20, 21). Rather, our studies merely suggest that however much receivers care about the fairness of a particular allocation procedure in a particular instance, the allocator's perspective is likely to lead him or her to overestimate the magnitude of that concern. In everyday life, the importance of the resources being allocated will vary and so the importance of fairness will vary as well. What is less likely to vary, however, is the perspectival difference between the allocator and the receiver. Allocators must always choose allocation procedures before receivers react to the results of those procedures (22), and as such, the allocator's illusion is likely to be a problem across a wide range of circumstances.

That range is wide indeed. From dividing food and estates to awarding jobs and reparations, the problem of allocating resources is ubiquitous in social life. In the last half century, mathematicians have devised numerous solutions whose colorful names—the cake-cutting algorithm, the sliding knife scheme, the ham sandwich theorem—reveal both their origins and purpose (23, 24). These procedures are complex and varied, but all have two goals: fairness and efficiency. When these goals are at odds, it is up to the allocator to determine the so-called "price of fairness" (25), which is the amount of efficiency that should be sacrificed to ensure a fair allocation. The problem with all of the mathematically ingenious solutions to this conundrum—and indeed, with many of the less ingenious solutions that people deploy in government, business, and daily life—is that they naively assume that allocators can correctly estimate how much receivers will care about fairness once the allocation is made. As our studies show, allocators often cannot make these estimates correctly. Even when allocators and receivers have identical beliefs about which procedures are most and least fair, those beliefs inform their judgments at different points in time—before the allocation is made for allocators, and after it is made for receivers—and time changes how much fairness matters. Our studies suggest that when allocators fail to recognize this basic fact, they may pay too high a price for fairness.

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Supporting Information

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Study 1

Method.

Participants. For study 1, 81 people reported to the Harvard Decision Science Laboratory and participated in exchange for $10.00. The computer failed to record the responses of one participant, leaving 80 participants in the dataset (46 male, 34 female, M_{age} = 20.77 y, SD = 1.34 y).

Procedure for all participants. Each session involved three participants. After arriving at the laboratory, the three participants were seated together at a table by an experimenter who explained that two of the participants had been randomly assigned to be "receivers" and that the remaining participant had been assigned to be a "decider." (In this and all of the studies that follow, we used the word "decider" instead of "allocator" in our experimental materials because we feared that the word "allocator" might be unfamiliar to participants). Participants were told that the decider's job would be to allocate a bonus to the receivers, who would be allowed to keep it. The experimenter then gave each participant a nametag that read either "Decider" or "Receiver 1" or "Receiver 2." The experimenter made sure that participants wore their nametags while sitting at the table so that the decider would know which participant was Receiver 1 and which participant was Receiver 2. Participants were then escorted to individual cubicles, each of which was equipped with a computer, where they remained for the duration of the study.

Once participants were seated in their cubicles, the computer presented them with all further information. All participants were told that the decider would be given a $10 bill which he or she would then allocate to one of the receivers as a bonus. Participants were told that the decider would be required to allocate the bonus either (*i*) by "picking," which involved selecting one of the receivers to receive $10 and the other to receive nothing, or (*ii*) by "flipping," which involved flipping a coin to determine which of the receivers would receive $10 and which would receive nothing. A coin flip is, of course, the canonically fair allocation procedure because there is no possibility that it is biased in favor of one receiver, whereas human decisions always have the potential for such bias (26). Although coin flips are properly referred to as "completely fair procedures" and human decisions as "potentially less than completely fair procedures," for the sake of exposition we will simply refer to them as "fair" and "unfair" procedures, respectively. At this point, the procedures for deciders and receivers diverged.

Procedure for deciders. Before learning which procedure they would use to allocate the bonus, deciders were asked to predict how the receivers would feel if they did or did not receive the bonus via each procedure. Specifically, deciders were asked to answer the question "How will each of the receivers feel if you are asked to flip a coin to determine which of them will receive the $10 bill (and which will receive nothing)?" as well as the question "How will each of the receivers feel if you are asked to choose one of them to receive the $10 bill (and the other to receive nothing)?" Deciders made these predictions with regard to "the receiver who gets $10" and also with regard to "the receiver who gets nothing." Deciders answered these four questions by clicking on a series of 7-point Likert scales whose endpoints were labeled *not very good* (1) and *very good* (7). After deciders made these predictions, they were randomly assigned to one of two conditions. Deciders in the "fair" condition were told that they would allocate the bonus by flipping a coin. They were instructed to use a coin that had been placed on their desk and were told that if the coin came up heads, then Receiver 1 would receive the $10 bill, and that if the coin came up tails, then Receiver 2 would receive the $10 bill. Deciders in the "unfair" condition were told that they would allocate the bonus by selecting one of the receivers whom they had met earlier to receive it. Deciders then used the procedure to which they had been assigned to make their allocations. Once the allocation had been made, the deciders verbally reported the results to the experimenter by saying which receiver had been allocated the $10. Finally, deciders completed a series of exploratory measures that were never analyzed, provided demographic information, and were debriefed and dismissed.

Procedure for receivers. After deciders were assigned to conditions, receivers were told about those assignments. Specifically, receivers in the unfair condition were told "The decider will be asked to pick which receiver gets the resource" and receivers in the fair condition were told "The decider will be asked to flip a coin to determine which receiver gets the resource." Receivers then saw a ticking clock accompanied by the instruction: "Please wait for the decider to distribute the resource. It may take a moment. Thank you for your patience." After ∼1 min, the experimenter approached the receiver's cubicle, put an envelope on the desk, and then departed before the receiver opened the envelope. For half the receivers, the envelope contained a $10 bill, and for the remainder it contained nothing. Next, to ensure that receivers opened the envelope, they were asked, "How much money was in your envelope?" They answered this question by clicking either on the word "$10" or the word "nothing." Next, receivers were asked, "How do you feel right now?" which they answered by clicking on a 7-point Likert scale whose endpoints were labeled *not very good* (1) and *very good* (7). Finally, receivers completed a series of exploratory measures that were never analyzed, provided demographic information, and were debriefed and dismissed.

Data Analyses. We did not exclude any participants from any analyses. We used a within-participants analysis of variance (ANOVA) to analyze deciders' responses, a between-participants ANOVA to analyze receivers' responses, and a mixed linear model to compare the deciders' and receivers' responses.

How did deciders expect receivers to feel? We submitted deciders' predictions about how receivers would feel to a 2 (Procedure: fair or unfair) × 2 (Outcome: bonus or no bonus) ANOVA. The analysis revealed a main effect of Outcome such that deciders expected receivers to feel much better when they received the bonus (M = 6.35, SD = 1.03) than when they did not (M = 2.20, SD = 0.96), $F(1, 26) = 322.92$, $P < 0.001$, $\eta_p^2 = 0.925$. The analysis also revealed a main effect of Procedure such that deciders expected receivers to feel much better when the procedure was fair (M = 4.56, SD = 1.85) than when it was unfair (M = 4.00, SD = 2.68), $F(1, 26) = 28.261$, $P < 0.001$, $\eta_p^2 = 0.521$. Importantly, these main effects were qualified by an Outcome × Procedure interaction, $F(1, 26) = 59.378$, $P < 0.001$, $\eta_p^2 = 0.695$. As the left side of Fig. 1 shows, deciders expected the outcome of the allocation to have a greater impact on receivers' feelings when the allocation was made unfairly than when it was made fairly. In short, deciders expected the fairness of the procedure to influence receivers' feelings. Did it?

How did receivers actually feel? We submitted receivers' reports of their actual feelings to a 2 × 2 ANOVA (as above), which revealed only a main effect of Outcome such that receivers felt better when they received a bonus (M = 5.66, SD = 1.14) than when they did not (M = 2.62, SD = 1.24), $F(1, 49) = 85.304$, $P < 0.001$, $\eta_p^2 = 0.635$. The analysis revealed no main effect of Procedure [$M_{fair} = 4.33$, $SD = 1.90$; $M_{unfair} = 4.00$, SD = 2.00; $F(1,49) = 0.72$, $P = 0.400$, $\eta_p^2 = 0.014$] and more importantly, it revealed no Outcome × Procedure interaction, $F(1,49) = 0.435$, $P = 0.585$, $\eta_p^2 =$

0.006. As the right side of Fig. 1 shows, receivers felt better when they received a bonus than when they did not, but the fairness of the allocation procedure had no detectable impact on their feelings.

How accurate were deciders' predictions? We used a mixed linear model to compare receivers' actual feelings and deciders' predictions of those feelings. Because participants were nested within groups and deciders' predictions were nested within participants within groups, we fit a mixed linear model to the data in R (27) using the lme4 package (28). The independent variables were Outcome (bonus or no bonus), Procedure (fair or unfair), and Role (decider or receiver), and the dependent variable was receivers' feelings (predicted or actual). We included all independent variables and their interactions as fixed effects, and we included an intercept for group and an intercept for participant nested within group as random effects. We did not include random slopes because the total number of observations did not permit these additional parameters. We used the lmerTest package (29) to derive P values and degrees of freedom.

The analysis revealed that the Outcome × Procedure × Role interaction was a significant predictor of receivers' feelings (predicted or actual), $b = -1.564$, SE = 0.625, $t = -2.502$, $P = 0.0136$ using the Satterthwaite approximation. (In this study and in study 2, the Satterthwhaite approximation and the Kenward–Rogers approximation produced nearly identical results and so we report only the former). The BC_a 95% CI (−2.927, −0.384) was derived from a bootstrapping procedure using 1,000 bootstrap samples. As a comparison of the left and right sides of Fig. 1 shows, deciders correctly estimated the impact of the receivers' outcomes, but overestimated the impact of the fairness by which those outcomes were produced.

Study 2

Method.

Participants. For study 2, 81 people (34 male, 47 female, M_{age} = 20.88 y, SD = 1.75 y) reported to the Harvard Decision Science Laboratory and participated in exchange for $10.00.

Procedure. The procedure for study 2 was the same as the procedure for study 1 with one exception: whereas participants in study 1 met each other before being escorted to their individual cubicles, participants in study 2 did not.

Data Analyses. We did not exclude any participants from any analyses. As in study 1, we used a within-participants ANOVA to analyze deciders' responses, a between-participants ANOVA to analyze receivers' responses, and a mixed linear model to compare the deciders' and receivers' responses.

How did deciders expect receivers to feel? We submitted deciders' predictions about how receivers would feel to a 2 (Outcome: bonus or no bonus) × 2 (Procedure: fair or unfair) ANOVA. The analysis revealed a main effect of Outcome such that deciders expected receivers to feel much better when they received a bonus (M = 6.44, SD = 0.86) than when they did not (M = 2.33, SD = 1.35), $F(1, 26) = 368.9$, $P < 0.001$, $\eta_p^2 = 0.934$. The analysis also revealed a main effect of Procedure such that deciders expected receivers to feel much better when the procedure was fair (i = 1.84) than when it as unfair (M = 4.02, SD = 2.74), $F(1, 26)$ = 24.56, $P < 0.001$, $\eta_p^2 = 0.486$. Importantly, these main effects were qualified by an Outcome × Procedure interaction, $F(1, 26)$ = 45.71, $P < 0.001$, $\eta_p^2 = 0.637$. As the left side of Fig. 2 shows, deciders expected the amount of the allocation to have a greater impact on receivers' feelings when that allocation was made unfairly than when it was made fairly. In short, deciders expected the fairness of the procedure to influence receivers' feelings. Did it?

How did receivers actually feel? We submitted receivers' reports of their feelings to ANOVA (as above), which revealed only a main effect of Outcome such that receivers felt much better when they received a bonus (M = 5.81, SD = 1.14) than when they did not (M = 2.67, SD = 1.08), $F(1, 50) = 665.21$, $P < 0.001$, $\eta_p^2 = 0.93$. The analysis revealed no main effect of Procedure [M_{fair} = 4.27, SD = 2.050; M_{unfair} = 4.21, SD = 1.911; $F(1, 50) = 0.032$, P = 0.860, $\eta_p^2 = 0.001$], and more importantly, no Outcome × Procedure interaction, $F(1, 50) = 0.032$, $P = 0.860$, $\eta_p^2 = 0.001$. As the right side of Fig. 2 shows, receivers felt better when they received a bonus than when they did not, but the fairness of the allocation procedure had no detectable impact on their feelings.

How accurate were deciders' predictions? As in study 1, we used a mixed linear model to compare receivers' actual feelings with deciders' predictions of those feelings. The model for study 2 was the same as study 1, with one exception: we did not include an intercept for group and an intercept for participant nested within group as random effects because there was no reason to believe that groups of people who had not met shared group-level variance. The analysis revealed that the Outcome × Procedure × Role interaction was a significant predictor of the dependent measure, $b = -2.487$, SE = 0.658, $t = -3.78$, $P < 0.001$ using the Satterthwaite approximation. The BC_a 95% CI (−3.781, −1.231) was derived from a bootstrapping procedure using 1,000 bootstrap samples. As comparison of the left and right sides of Fig. 2 shows, deciders correctly estimated the impact of the allocation amount, but overestimated the impact of the allocation procedure.

Study 3

Method.

Participants. For study 3, 799 people (474 male, 318 female, 3 other; M_{age} = 33.96 y, SD = 11.10 y) were recruited via Amazon Mechanical Turk and participated in exchange for $0.50 plus the opportunity to earn an additional bonus of $0.25 or $0.50.

Procedure for all participants. After agreeing to participate, participants were told that "this survey involves two other participants. Please wait for two other participants to join your group." A ticking clock then appeared on the screen, and after 8 s the page automatically advanced, ostensibly indicating that the other participants had joined and were ready to begin. In fact, there were no other participants. To ensure that participants believed that they were interacting with other participants, at various points in the study participants were asked to wait so that the other participants could "catch up." Participants were told that one of them would be assigned to play the role of decider and that the others would be assigned to play the roles of receivers.

All participants were told that they would learn "about the ways resources can be distributed," that receivers would then "do some work," and that deciders would then "distribute resources to the receivers." Participants were told that the resource to be distributed was a single $0.50 bonus and a single $0.25 bonus. Participants were told that the work receivers would do involved solving CAPTCHAs (Completely Automated Public Turing test to tell Computers and Humans Apart), which are a set of visually distorted letters and numbers that a person is required to decode and report. Anecdotal evidence suggests that people find solving CAPTCHAs to be aversive (30). Participants were shown an example of a CAPTCHA to make sure they understood what it was. Participants were told that there were two blocks of CAPTCHAs to be solved and that "the types of captchas in each block are of a similar difficulty, but one block is twice as long because we are looking at error rates over time." Participants were told that one block contained 10 CAPTCHAs and the other two contained 20 CAPTCHAs. At this point, the procedures for deciders and receivers diverged.

Procedure for deciders. Deciders were told that there were two ways in which bonuses could be allocated: either they could allocate $0.25 to the receiver who solved 10 CAPTCHAs and $0.50 to the receiver who solved 20 CAPTCHAs (the fair condition), or they could allocate $0.50 to the receiver who solved 10 CAPTCHAs and $0.25 to the receiver who solved 20 CAPTCHAs (the unfair condition). Deciders were then asked, "How will each of the receivers feel if you choose to allocate the $0.50 and $0.25 bonus

in the following way?" Deciders made these predictions with regard to "the receiver who does 10 captchas and gets $0.25"; "the receiver who does 20 captchas and gets $0.50"; "the receiver who does 10 captchas and gets $0.50"; and "the receiver who does 20 captchas and gets $0.25." Deciders answered these four questions by clicking on a four 7-point Likert scales whose endpoints were labeled *not very good* (1) and *very good* (7). Deciders then allocated the bonuses to the two receivers, provided demographic information, and were dismissed.

Procedure for receivers. Receivers were randomly assigned to solve either the block that contained 10 CAPTCHAs or the block that contained 20 CAPTCHAs. After receivers finished the work, they were told to wait while the decider allocated the bonuses. Receivers were then told that the decider had awarded them either the $0.25 bonus or the $0.50 bonus. Receivers in the fair condition received $0.25 if they solved 10 CAPTCHAs and $0.50 if they solved 20 CAPTCHAs, and receivers in the unfair condition received $0.25 if they solved 20 CAPTCHAs and $0.50 if they solved 10 CAPTCHAs. Next, receivers were asked, "How do you feel right now?" They answered this question by clicking on a 7-point Likert scale whose endpoints were labeled *not very good* (1) and *very good* (7). Finally, receivers completed an open-ended question about their experience, provided demographic information, and were dismissed.

Data Analyses. We did not exclude any participants from any analyses. We used a within-participants ANOVA to analyze deciders' responses, a between-participants ANOVA to analyze receivers' responses, and a mixed linear model to compare the deciders' and receivers' responses.

How did deciders expect receivers to feel? We submitted deciders' predictions about how receivers would feel to a 2 (Procedure: fair or unfair) × 2 (Outcome: large bonus or small bonus) ANOVA. The analysis revealed a main effect of Outcome such that deciders expected receivers to feel much better when they received a large bonus (M = 5.86, SD = 1.69) than when they received a small bonus (M = 3.32, SD = 2.04), $F(1, 201) = 407.14$, $P < 0.001$, $\eta_p^2 = 0.669$. The analysis also revealed a main effect of Procedure such that deciders expected receivers to feel much better when the procedure was fair (M = 5.44, SD = 1.56) than when it was unfair (M = 3.75, SD = 2.53), $F(1, 201) = 208.57$, $P < 0.001$, $\eta_p^2 = 0.509$. Importantly, these main effects were qualified by an Outcome × Procedure interaction, $F(1, 201) = 130.84$, $P < 0.001$, $\eta_p^2 = 0.394$. As the left side of Fig. 3 shows, deciders expected the outcome of the allocation to have a greater impact on receivers' feelings when the allocation was made unfairly than when it was made fairly. In short, deciders expected the fairness of the procedure to influence receivers' feelings. Did it?

How did receivers actually feel? We submitted receivers' reports of their actual feelings to a 2 × 2 ANOVA (as above), which revealed a main effect of Outcome such that receivers felt better when they received a large bonus (M = 6.35, SD = 0.98) than when they received a small bonus (M = 4.14, SD = 1.81), $F(1, 594) = 378.07$, $P < 0.001$, $\eta_p^2 = 0.389$. In contrast to studies 1 and 2, the analysis also revealed a main effect of Procedure such that receivers felt better when the procedure was fair (M = 5.61, SD = 1.52) than when it was unfair (M = 4.86, SD = 2.03), $F(1, 594) = 42.52$, $P < 0.001$, $\eta_p^2 = 0.067$. These main effects were qualified by an Outcome × Procedure interaction, $F(1, 594) = 19.83$, $P < 0.001$, $\eta_p^2 = 0.032$. As the right side of Fig. 3 shows, the outcome of the allocation had a greater impact on receivers' feelings when the allocation was made unfairly than when it was made fairly. Does that mean that deciders got it right?

How accurate were deciders' predictions? We used a mixed linear model to compare receivers' actual feelings and deciders' predictions of those feelings. Because deciders' predictions were nested within participants, we fit a mixed linear model to the data (as in studies 1 and 2). The independent variables were Outcome (large bonus or small bonus), Procedure (fair or unfair), and Role (decider or receiver), and the dependent variable was receivers' feelings (predicted or actual). We included all independent variables and their interactions as fixed effects, and we included an intercept for participant as a random effect.

The analysis revealed that the Outcome × Procedure × Role interaction was a significant predictor of receivers' feelings (predicted or actual), $b = 1.21$, SE = 0.32, $t = 3.74$, $P < 0.001$. The BC_a 95% CI (0.64, 1.78) was derived from a bootstrapping procedure using 10,000 bootstrap samples. As a comparison of the left and right sides of Fig. 3 shows, deciders expected receivers to care about fairness, and receivers did care about fairness, but not as much as deciders expected them to.

Study 4

Method.

Participants. For study 4, 64 people (41 male, 22 female, 1 other; M_{age} = 24.76 y, SD = 3.52 y were recruited via Amazon Mechanical Turk and participated in exchange for $0.50.

Procedure. The procedure from study 2 was adapted for use online. After agreeing to participate, participants were told that "this survey involves interactions with two other participants. Please wait for two other participants to join your group." A ticking clock then appeared on the screen, and after 15 s the page automatically advanced, ostensibly indicating that the other participants had joined and were ready to begin. In fact, there were no other participants. To ensure that participants believed that they were interacting with other participants, bogus participant identification numbers were presented at the beginning of the study and at various other points during the study. In addition, at various points in the study participants were asked to wait so that the other participants could "catch up." Participants were told that one of them would be randomly assigned to play the role of decider and that the others would be assigned to play the roles of receivers.

Participants were told that the decider would be assigned to use one of two procedures to allocate a bonus to one and only one of the two receivers. Specifically, they were told that deciders would be required to allocate the bonus either (*i*) by "picking," which involved selecting one of the receivers to receive the bonus and the other to receive nothing, or (*ii*) by "flipping," which involved flipping a "digital coin" to determine which of the receivers would receive the bonus and which would receive nothing. The bonus was set at $0.25.

Next, all participants were told that they had been randomly assigned to play the role of decider. Deciders were randomly assigned to use one of the two allocation procedures. Specifically, half the deciders were asked to select one of the receivers (designated as Receiver A and Receiver B) to receive the bonus and the remaining deciders were asked to flip a "digital coin" to determine which receiver would receive the bonus. The digital coin was simply an image of a spinning coin. Participants were told to click a button which stopped the coin from spinning. When they did so, the spinning coin was replaced by a still image of either the coin's head (which meant that Receiver A would get the bonus) or the coin's tail (which meant that Receiver B would get the bonus). Deciders were led to believe that their allocations were enacted as soon as they were made.

After deciders made their allocations, they were asked to answer the question "How do you think each of the receivers feels right now?" Deciders in the unfair condition answered this question about both "the receiver you picked to receive the $0.25 bonus" and "the receiver you picked to receive nothing." Deciders in the fair condition answered this question for both "the receiver who won the coin flip and received $0.25 bonus" and "the receiver who lost the coin flip and received nothing." Deciders made these estimates by clicking on a pair of 7-point Likert scales whose endpoints were labeled *not very good* (1) and *very good* (7). Deciders then completed a series of demographic questions and the study was concluded.

Data Analyses. We did not exclude any participants from any analyses. We submitted deciders' estimates of how the receivers felt to a 2 (Outcome: bonus or no bonus) × 2 (Procedure: fair or unfair) mixed-effects ANOVA. The analysis revealed a main effect of Outcome such that deciders estimated that receivers felt much better when they had received a bonus (M = 6.31, SD = 0.92) than when they had not (M = 2.19, SD = 1.07), $F(1, 63) = 350.73$, $P < 0.001$, $\eta_p^2 = 0.850$. Importantly, the analysis revealed no main effect of Procedure [$M_{fair} = 4.30$, SD = 2.24; $M_{unfair} = 4.22$, SD = 2.35; $F(1, 63) = 0.390$, $P < 0.534$, $\eta_p^2 = 0.006$], and no Outcome × Procedure interaction, $F(1, 63) = 0.243$, $P < 0.624$, $\eta_p^2 = 0.004$. As the left side of Fig. 4 shows, when deciders were asked after they had made an allocation to estimate how receivers felt, they did not think that the fairness of the allocation procedure had mattered.

Study 5

Method.

Participants. For study 5, 120 people (70 male, 50 female; M_{age} = 24.85 y, SD = 3.39 y) were recruited via Amazon Mechanical Turk and participated in exchange for $0.50.

Procedure. Participants in study 5 were given the same introductory information that was given to participants in study 4 and, once again, the bonus was set at $0.25. Next, all participants were told that they had been randomly assigned to play the role of receiver. Before the allocation was made, we asked receivers to answer the questions "How would you feel if the decider is asked to pick to determine who will receive $0.25 and who will receive nothing?" and "How would you feel if the decider is asked to flip a coin to determine who will receive $0.25 and who will receive nothing?" Receivers answered two versions of each question: one that was followed by the phrase "if you receive $0.25" and one that was followed by the phrase "if you receive nothing." Receivers answered these four questions by clicking on a series of 7-point Likert scales whose endpoints were labeled *not very good* (1) and *very good* (7). After receivers made their predictions, we informed them that the study was actually over and we awarded them $0.25 as "a thank you for your time." Receivers then completed a series of demographic questions and the study was concluded.

Data Analyses. We did not exclude any participants from any analyses. We submitted receivers' predictions of how they would feel to a 2 (Outcome: bonus or no bonus) × 2 (Procedure: fair or unfair) ANOVA. The analysis revealed a main effect of Outcome such receivers expected to feel much better when they received a bonus (M = 6.22, SD = 1.11) than when they did not (M = 2.91, SD = 1.67), $F(1, 119) = 388.16$, $P < 0.001$, $\eta_p^2 = 0.765$; and a main effect of Procedure such that receivers expected to feel better when the procedure was fair (M = 4.87, SD = 1.94) than when it was unfair (M = 4.26, SD = 2.36), $F(1, 119) = 52.15$, $P < 0.001$, $\eta_p^2 = 0.305$. Importantly, these main effects were qualified by an Outcome × Procedure interaction, $F(1, 119) = 54.23$, $P < 0.001$, $\eta_p^2 = 0.313$. As the right side of Fig. 4 shows, when receivers were asked before the allocation was made to predict how they would feel afterward, they expected the fairness of the procedure to matter.

Study 6

Method.

Participants. For study 6, 63 people (43 male, 20 female; M_{age} = 24.50 y, SD = 3.28 y) were recruited via Amazon Mechanical Turk and participated in exchange for $0.50.

Procedure. After agreeing to participate in an online survey, participants were given the same introductory information as was given to participants in studies 4 and 5. Next, all participants were told that they had been randomly assigned to play the role of decider. Deciders were told that they would be randomly assigned to use one of the two allocation procedures. In this study, unlike our previous studies, the size of the bonus varied with the allocation procedure. Specifically, deciders learned that they would be asked either to (*i*) select one of the receivers (designated as Receiver 1 and Receiver 2) to receive a bonus of $1 and the other to receive nothing (the unfair-but-efficient condition), or (*ii*) flip a "digital coin" to determine which receiver would receive a bonus of $0.50 and which would receive nothing (the fair-but-inefficient condition). Deciders were led to believe that their allocation would be enacted as soon as it was made.

Next, deciders were asked to predict how the receivers would feel about each of the four possible outcomes. Specifically, deciders were asked to answer the questions "How will each of the receivers feel if you are randomly assigned to pick one of them to receive a $1.00 bonus (and the other to receive nothing)?" and "How will each of the receivers feel if you are randomly assigned to flip a coin to determine which of them will receive $0.50 (and which will receive nothing)?" Deciders answered each of these questions with regard to the receiver who would receive the bonus and the receiver who would receive nothing by clicking on four 7-point Likert scales whose endpoints were labeled *not very good* (1) and *very good* (7). Next, to preserve our cover story, deciders were randomly assigned to one of the two conditions and were allowed to determine which of the two receivers would ostensibly receive the bonus. Finally, deciders completed a series of demographic questions and the study was concluded.

Data Analyses. We did not exclude any participants from any analyses. We submitted deciders' predictions about how receivers would feel to a 2 (Procedure: fair-but-inefficient or unfair-but-efficient) × 2 (Outcome: bonus or no bonus) ANOVA. The analysis revealed a main effect of Procedure such that deciders expected receivers to feel better when the procedure was fair-but-inefficient (M = 4.32, SD = 1.88) than when it was unfair-but-efficient (M = 4.06, SD = 2.78), $F(1, 62) = 7.78$, $P < 0.01$, $\eta_p^2 = 0.112$; a main effect of Outcome such that deciders expected receivers to feel better when they received a bonus (M = 6.29, SD = 0.90) than when they did not (M = 2.09, SD = 1.28), $F(1, 62) = 607.84$, $P < 0.001$, $\eta_p^2 = 0.907$; and most importantly, a Procedure × Outcome interaction, $F(1, 62) = 99.80$, $P < 0.001$, $\eta_p^2 = 0.617$. As the left side of Fig. 5 shows, deciders expected that relative to the unfair-but-efficient procedure, the fair-but-inefficient procedure would augment the happiness of those who did not receive a bonus more than it would diminish the happiness of those who did receive a bonus, thereby providing more net happiness to the receivers.

Study 7

Methods.

Participants. For study 7, 427 people (256 male, 168 female, 4 other; M_{age} = 32.66 y, SD = 10.75 y) were recruited via Amazon Mechanical Turk and participated in exchange for $0.50.

Procedure. After agreeing to participate in an online survey, participants were given the same introductory information that was given to participants in Study 6. Next, all participants were told that they had been randomly assigned to play the role of receiver. Receivers were told that the deciders would be randomly assigned either (*i*) to select one of the receivers to receive a bonus of $1 and the other to receive nothing (the unfair-but-efficient condition), or (*ii*) to flip a "digital coin" to determine which receiver would receive a bonus of $0.50 and which would receive nothing (the fair-but-inefficient condition).

Next, receivers were asked to wait while the decider made the allocation. While they waited, receivers saw a screen that listed the four possible outcomes of the two procedures as well as a digital clock that ostensibly represented the time it was taking the decider to make the allocation. Receivers were randomly assigned to one of four conditions and, after 25 s, a new screen appeared that either said (*i*) "you were picked to receive $1.00," or (*ii*) "the

decider picked the other receiver to get $1.00," or (*iii*) "you won the coin flip and received $0.50," or (*iv*) "you lost the coin flip and received nothing."

Next, receivers answered the question "How do you feel right now?" by clicking on a 7-point Likert scale whose endpoints were labeled *not very good* (1) and *very good* (7). Because the conditions in study 6 were somewhat more complex than the conditions in our previous studies, we included a manipulation check. Specifically, receivers were asked to answer the question "Which method of distributing resources was the decider assigned to use in this survey?" by clicking on either the word "picking" or the word "flipping." Finally, receivers completed a series of demographic questions and the study was concluded.

Data Analyses. Thirty-three participants failed the manipulation check and their data were removed from the dataset before analysis, which left 394 participants in the data set (237 male, 154 female, 4 other; M_{age} = 32.85 y, SD = 10.81 y). These exclusions did not change the results. We submitted these receivers' reports of their actual feelings to a 2 (Procedure: fair-but-inefficient or unfair-but-efficient) × 2 (Outcome: bonus or no bonus) ANOVA. The analysis revealed a main effect of Outcome such that receivers felt better when they received a bonus (M = 6.43, SD = 0.85) than when they did not (M = 2.20, SD = 1.53), $F(1, 393) = 607.84$, $P < 0.001$, $\eta_p^2 = 0.907$. The analysis also revealed a main effect of Procedure such that receivers felt better when the procedure was unfair-but-efficient (M = 4.51, SD = 2.54) than when it was fair-but-inefficient (M = 4.28, SD = 2.34), $F(1, 393) = 6.37$, $P = 0.012$, $\eta_p^2 = 0.016$. Finally, the analysis revealed a Procedure × Outcome interaction, $F(1, 393) = 5.44$, $P = 0.055$, $\eta_p^2 = 0.009$. As the right side of Fig. 5 shows, the happiness of receivers was essentially a function of the size of their bonuses, and those who received nothing were just as happy when the procedure was unfair as when it was fair (19). Contrary to the predictions of deciders in study 6, the unfair-but-efficient procedure produced more net happiness—and not less net happiness—than the fair-but-inefficient procedure did.

Other Supporting Information Files

SI Appendix (PDF)

SUPPLEMENTAL STUDY

In our studies, we used a within-participants design to measure deciders' predictions. For example, in Study 3, each decider predicted how receivers would feel if they were: (a) treated fairly and received a large bonus; (b) treated fairly and received a small bonus; (c) treated unfairly and received a large bonus; and (d) treated unfairly and received a small bonus. Is it possible that by asking deciders to make all of these predictions at the same time, we artificially focused them on the differences between these conditions? To find out, we replicated the procedure we used for deciders in Study 3 with a design that allowed us to perform both a between-participants analysis and a within-participants analysis of deciders' predictions.

Participants. Four hundred people (241 male, 158 female, 1 other; Mage = 33.41 years, SD = 10.82 years) were recruited via Amazon Mechanical Turk and participated in exchange for $0.75.

Procedure. The procedure was the same as the procedure for deciders in Study 3 except that instead of being asked to make all four of the following predictions, deciders were asked to make just one of the following predictions: (a) how receivers would feel if they were treated fairly and received a large bonus ("If you allocate $0.50 to the receiver who did 20 Captchas, how will the receiver feel?"); (b) how receivers would feel if they were treated fairly and received a small bonus ("If you allocate $0.25 to the receiver who did 10 Captchas, how will the receiver feel?"); (c) how receivers would feel if they were treated unfairly and received a large bonus ("If you allocate $0.50 to the receiver who did 10 Captchas, how will the receiver feel?"); and (d) how receivers would feel if they were treated unfairly and received a small bonus ("If you allocate $0.25 to the receiver who did 10 Captchas, how will the receiver feel?"). Deciders made these predictions by clicking on a 7-point Likert scale whose endpoints were labeled not

very good (1) and very good (7). These predictions constituted a fully between-participants replication of the procedure for deciders in Study 3.

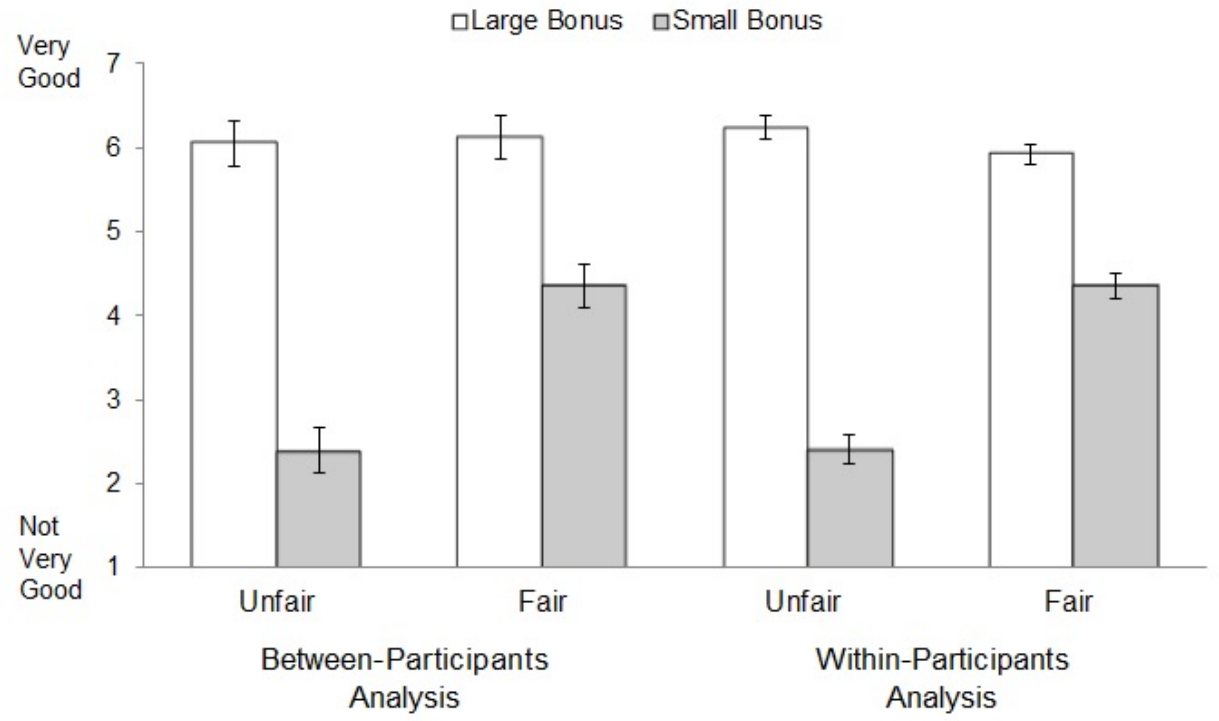
After deciders made their first prediction, we then surprised them by asking them to make the three predictions that they had not already made. The order in which they made these three predictions was randomized. It is crucial to note that when deciders made their first prediction, they did not know that they would later be asked to make three more predictions. These last three predictions constituted a within-participants replication of the procedure for deciders in Study 3. After making their fourth and final prediction, deciders provided demographic information and were dismissed.

Data Analyses

We did not exclude any participants from any analyses. We performed two analyses: a between-participants analysis of the first prediction made by each decider, and a within-participants analysis of the second, third, and fourth predictions made by each decider. We then used a mixed linear model to compare the between-participants analysis and the within-participants analysis.

Between-participants analysis. We submitted deciders' first predictions about how receivers would feel to a 2 (Procedure: Fair or Unfair) X 2 (Outcome: Large Bonus or Small Bonus) ANOVA. The analysis revealed a main effect of Outcome such that deciders expected receivers to feel much better when they received a large bonus (M = 6.09, SD = 1.26) than when they received a small bonus (M = 3.45, SD = 1.69), $F(1, 386) = 407.70$, $p < .001$, $\eta_p^2 = .514$. The analysis also revealed a main effect of Procedure such that deciders expected receivers to feel much better when the procedure was fair (M = 5.24, SD = 1.45) than when it was unfair (M = 4.26, SD = 1.99), $F(1, 386) = 57.20$, $p < .001$, $\eta_p^2 = .129$. Importantly, these main effects were

qualified by an Outcome X Procedure interaction, $F(1, 386) = 49.46$, $p < .001$, $\eta_p^2 = .114$. As the left panel of the figure below shows, deciders expected the outcome of the allocation to have a greater impact on receivers' feelings when the allocation was made unfairly than when it was made fairly. In short, the results for deciders in Study 3 were replicated in a between-participants design.



Within-participants analysis. Next, we submitted deciders' second, third, and fourth predictions about how receivers would feel to a 2 (Procedure: Fair or Unfair) X 2 (Outcome: Large Bonus or Small Bonus) ANOVA. The analysis revealed a main effect of Outcome such that deciders expected receivers to feel much better when they received a large bonus ($M = 6.08$, $SD = 1.15$) than when they received a small bonus ($M = 3.32$, $SD = 1.70$), $F(1, 285) = 1216.05$, $p < .001$, $\eta_p^2 = .810$. The analysis also revealed a main effect of Procedure such that deciders expected receivers to feel much better when the procedure was fair ($M = 5.14$, $SD = 1.41$) than

when it was unfair (M = 4.29, SD = 2.36), $F(1, 285) = 134.25$, $p < .001$, $\eta_p^2 = .320$. Importantly, these main effects were qualified by an Outcome X Procedure interaction, $F(1, 285) = 218.12$, $p < .001$, $\eta_p^2 = .434$. As the right panel of the figure above shows, deciders expected the outcome of the allocation to have a greater impact on receivers' feelings when the allocation was made unfairly than when it was made fairly. In short, the results for deciders in Study 3 were replicated in a within-participants design.

Comparing analyses. Next, we compared the between-participants analysis with the within-participants analysis. Because predictions were nested within participants, we fit a mixed linear model to the data (as in Studies 1-3). The independent variables were Outcome (large bonus or small bonus), Procedure (fair or unfair), and Analysis Type (within-participants or between-participants), and the dependent variable was deciders' predictions of receivers' feelings. We included all independent variables and their interactions as fixed effects, and we included an intercept for participant as a random effect. The analysis revealed that the Outcome X Procedure X Analysis Type interaction was *not* a significant predictor of deciders' predictions, b = -0.37, SE=0.30, t = -1.23, p = 0.22. The BC_a 95% CI (-0.95, 0.25) was derived from a bootstrapping procedure using 10000 bootstrap samples. In short, whether deciders made one prediction or many predictions had no significant effect on the predictions they made.