CAMBRIDGE SERIES ON
JUDGMENT AND DECISION MAKING

PSYCHOLOGICAL PERSPECTIVES on JUSTICE

Theory and Applications

1993

Edited by
BARBARA A. MELLERS
JONATHAN BARON

---

4 Judgments of distributive justice

Maya Bar-Hillel and Menahem Yaari

Background

Consider three formulations of what is often referred to as the basic psychological rule of distributive justice, which were expressed over a time span ranging from antiquity to the present. "Justice involves at least four terms, namely two persons for whom it is just and two shares which are just. And there will be the same equality between the shares as between the persons, since the ratio between the shares will be equal to the ratio between the persons; for if the persons are not equal, they will not have equal shares" (Aristotle, 1967, p. 269). In a more contemporary formulation, Jouvenel (1957, p. 149) stated similarly that what people "find just is to preserve between men as regards whatever is in question the same relative positions as exist between the same men as regards something else." Homans (1961, p. 249) expressed this rule somewhat more formally, as follows: "Distributive justice involves a relationship between . . . two persons, P_1 and P_2, one of whom can be assessed as higher than, equal to, or lower than, the other; and their two shares, or . . . rewards, R_1 and R_2. The condition of distributive justice is satisfied when . . . : $P_1/P_2 = R_1/R_2$." Similar models were suggested by Adams (1965), Anderson (1976), and Walster, Berscheid, & Walster (1973).

Although these formulations are in agreement that distributive justice amounts to some sort of proportionality between "investments" and "rewards," they are silent on just what might be the dimensions or attributes that, when individuals are found to differ in them, justify giving these individuals unequal shares. This problem is still largely unresolved. There can be, and are, many standards – and therefore many empirical predic-

In one form or another, this essay has been around for several years, and has been presented in many forums. The list of people from whose comments it has benefited is too long to detail. We wish to thank them all.

tions – as to what constitute investments, or, for that matter, rewards. For some people or historical periods, for example, even "ancient lineage counted as a legitimate investment, . . . , [or] being a man rather than a woman . . . [or] a white rather than a black" (Homans, 1961, p. 245). The main goal of this chapter is to question the feasibility of having a single rule for all distribution-of-goods contexts, combined with an attempt to elucidate the nature of the inputs ("investments") and outputs ("rewards") that do preserve its form.

The characteristics that can provide a possible justification for departure from equality are discussed most extensively in philosophical writings (see, e.g., bibliographical listings in Rescher, 1966). The variables that might entitle different people to justly deserved differences in allocation can be classified in terms of the following six broad categories (Yaari & Bar-Hillel, 1984, p. 7):

i. differences in rights or in legitimate claims;
ii. differences in effort, in productivity, or in contribution;
iii. differences in endowments;
iv. differences in needs;
v. differences in tastes, or in the capacity to enjoy various goods;
vi. differences in beliefs.

Many discussions in social philosophy, political science, and the theory of jurisprudence are concerned with category i. Category ii has been the focus of *equity theory* (e.g., Adams, 1965; Walster et al., 1978). There, the proportionality rule is called "the contributions rule," stressing that justice in equity theory typically emphasizes proportionality to what individuals actually *do* toward deserving the reward (in contrast to the variables in the other categories, which focus on what people *are*). In the prototypical situation that is studied in equity theory, two people jointly perform a task, with one striving or contributing more to the completion of the task than the other, and the dependent variable is the manner in which the reward for successful task completion is divided between them.

Category iii encompasses a body of research regarding bargaining situations that has been conducted by experimental economists. In the simplest paradigm, recipients must bargain their way to a joint agreement on how to divide some reward or good between themselves, else risk losing it altogether (e.g., Camerer & Loewenstein, this volume; Guth, 1988; Selten, 1978). The observed results are then compared with normative predictions based on game theoretical considerations on the one hand, and with predictions derived from notions of justice or fairness, on the other. This tradition fits within category iii insofar as the difference between the bargaining powers and capabilities of the players can be construed as a difference in endowments. The present study addresses categories iv, v, and vi, as will presently be described.

Equity theory and the behavioral theory of distributive justice, as often admitted by their own proponents, are at once too broad and too narrow. On the one hand, their interpretation of the basic rule of distributive justice is not specific enough. An example in equity theory is: Suppose that A and B jointly perform some task, and that A has invested twice as much effort as B, yet A's productivity was three times higher than B's. Should A's reward be three times or twice as high as B's – that is, proportional to effort or to productivity? Both of these possibilities are compatible with the contributions rule. An example in the behavioral theory of distributive justice is: Suppose that A and B, whose investments in some task are equal, are being paid for it in lottery tickets. However, in case of a winning ticket, A's prize is twice as high as B's (Roth & Murnighan, 1982). Would A and B be concerned with how to divide *probabilities to win* (i.e., should they get equal numbers of tickets), or with how to divide *monetary expectations* (i.e., should B get twice as many tickets as A)?

On the other hand, theories that have incorporated the basic rule of distributive justice have disregarded its potential generality. Homans (1976), for example, stated that there are "important cases in which the rule of distributive justice is . . . treated as wholly irrelevant. One of these is the case of need" (p. 237). He seems to have ignored the possibility that the selfsame rule – namely, proportionality – could serve as the appropriate rule of distributive justice just as well in the case of needs, except that the parameters characterizing the "ratio" between P_1 and P_2 would be parameters of need, rather than of contribution. Indeed, the proportionality rule is flexible enough to subsume even a rule of strict equality. One need only take "personhood" (or what Guth has called "the personal investment standard") to be the sole basis for determining the allocation of some goods – as it is, for example, in the case of certain political or legal rights.

The present study focuses on the last three categories (needs, tastes, and beliefs). What these categories roughly share with each other, and not with the other three categories, is that they characterize the recipients as differing in the value or utility they derive from the things being distributed. In other words, a given good is valued differently by A and by B either because A needs it more (iv), or because he likes it more (v) or because he entertains different beliefs about it (vi), than B. On the other hand, in categories i–iii, the good may have equal value to both recipients, but for various reasons one recipient claims entitlement to more of it than the other.[1]

As far as we know, ours is the first effort of its scale to collect systematic empirical data on the question of what is judged to be a just division of simple bundles of consumer goods between passive recipients who differ only in one variable, taken from categories iv–vi. We will test whether, insofar as variables within these three categories will be judged as justifying deviations from equal distributions, the distributions will be governed by the basic rule of distributive justice – that is, proportionality.

Methodology

Most of the empirical studies of distributive justice observe how people in the real world, or subjects in a psychological laboratory, actually divide a given bundle of goods between them. In contrast, this study elicited people's judgments of justice via their answers to a set of hypothetical, schematic questions, of the form: In such and such a situation, how ought a given bundle be divided for the division to be *just?* This approach can be labeled "empirical philosophy."[2] The scholars who proposed normative theories of distributive justice relied, after all, on their personal intuition. What we have done is increase the size of the sample of introspectors.

Besides its obvious pragmatic advantages, is this methodology viable? We believe that "justice" can usefully be studied via "judgments of justice," and that these judgments can justifiedly be elicited to hypothetical questions, for the following reasons.

A research strategy that has often been fruitful in psychology is to study people's subjective or intuitive judgments of variables whose ontological status is independent of such judgments, and which can be defined or measured in some objective fashion that does not rely on judgment. Comparisons of subjective judgments with their objective counterparts has led to interesting psychological insights. A notable example is Weber-Fechner's law, the psychophysical "law of diminishing returns." Other examples from perception are the phenomenon of the color wheel, uncovered by the study of color perceptions against wavelength, and the phenomenon of size constancy, uncovered by the study of color perceptions against wavelength, and the phenomenon of size constancy, uncovered by the study of perceived size of objects against retinal and real world size.

With respect to other constructs, the study of people's judgments can pay off not only by shedding light on the psychology of the judge, but also by modifying the conceptualization of the very construct being judged. Such, to some extent, has been the case of the concept of rationality in choice under uncertainty (see survey in Tversky & Kahneman, 1986).

For yet other constructs, the reliance of theories thereof on intuitive corroboration is even more pronounced. In the philosophy of language, for example, theories of meaning, of reference, or of truth have little hope if they come into serious conflict with people's intuitive judgments of meaning, reference, or truth. In other words, the facts of the matter that such theories need to meet seem to be not out there in the real world, but embedded in people's minds. Thus, in modern linguistics, grammaticality is actually defined via the grammatical intuitions of suitable speakers (Chomsky, 1957).

The successful history of theories of "hard" physical constructs such as mass or space set a model that other areas of inquiry have always hoped to emulate. It is far more likely, however, that "soft" constructs such as morality or beauty will prove ultimately to be in the eyes of the beholder, in the sense that a theory of these constructs will have no independent standing from a theory of judgments thereof. Such also, we believe, is the construct of distributive justice. At the very least, intuitions about specific cases serve alongside theoretical conceptions in a mutual process of self-correction that Rawls (1971) called "reflective equilibrium" (see also Yaari & Bar-Hillel, 1984).

Granting that judgments of justice are a legitimate topic of inquiry, there remains the question of how these judgments are to be elicited. One could ask people directly about various principles (e.g., "A distribution is not just if each of two recipients envies the other's share"), or describe situations and ask for an evaluation of how just the described distribution is (the approach chosen by Kahneman, Knetch, & Thaler, 1986a,b, in their study of fairness; see also Mellers, 1982). In the present study, we elected to give people hypothetical distribution problems, and asked them to solve them justly. We are not necessarily confident that were subjects actually given the goods and instructed to distribute them justly, the same distributions would have emerged (although by the time a real-world situation could be created that is as pure as the hypothetical one, it is hard to see why the actual distributions would differ from the hypothetical ones). Nonetheless, the focus of this research is precisely the ethical notions in people's minds – not their actual behavior. Actual behavior is inevitably contaminated by political, strategic, and other considerations. Likewise, "psychological experiments . . . are interpreted solely in terms of justice concerns, whereas one or more other motives are often involved such as politeness, fear of retaliation, status assertion, and impression management" (Furby, 1986, p. 161). Admittedly, hypothetical judgments are also subject to contamination, by demand characteristics, social desirability, and other factors. Yet hypothetical problems allow more control, and, moreover, it is people's expressed sentiments (namely what they say ought to be done) rather than their revealed ones (namely what they actually do) that primarily guides the search for a *normative* theory of justice, as well as the rhetoric of public debate on issues of distributive justice.

The problem set

Before we can spell out the rationale and motivation behind our choice of variables and questions, it is necessary to describe these in some detail. The questions used in the present study share some common structure. Each describes a bundle consisting of either one or two goods, and two recipients characterized by a single attribute on which they are said to differ. The respondents were each given a single question, and asked to indicate the way the bundle should be divided between the two recipients in order for the division to be *just*. No explanation was offered (or solicited) for what was meant by "just." An example follows:

A shipment containing 12 grapefruit and 12 avocadoes is to be distributed between Jones and Smith. You, the respondent, are asked to do the dividing. The following information is given:

- Jones's metabolism is such that his body derives 100 milligrams of vitamin F from each grapefruit consumed, while it derives no vitamin F whatsoever from avocado.
- Smith's metabolism is such that his body derives 50 milligrams of vitamin F from each grapefruit consumed, and also 50 milligrams vitamin F from each avocado.
- Both persons, Smith and Jones, are interested in the consumption of the fruits only insofar as they contain vitamin F (and the more the better). All the other traits of the two fruits such as taste, etc., are of no consequence to them.
- After the fruits are divided between them, Jones and Smith will not be able to trade, or to transfer fruits to any third person.
- The fruits are to be divided between Jones and Smith in a manner that is as *just* as possible. How would you do it?

The respondents were then asked to choose one of a number of suggested distributions, or to indicate any other distribution they wished. For the present question, which we denote N_{2a},[3] the response options were as follows:

_____a.	*Jones:*	12 grapefruit and 0 avocado	(yielding 1200 mg vitamin F)
	Smith:	0 grapefruit and 12 avocado	(yielding 600 mg vitamin F)
_____b.	*Jones:*	9 grapefruit and 0 avocado	(yielding 900 mg vitamin F)
	Smith:	3 grapefruit and 12 avocado	(yielding 750 mg vitamin F)
_____c.	*Jones:*	8 grapefruit and 0 avocado	(yielding 800 mg vitamin F)
	Smith:	4 grapefruit and 12 avocado	(yielding 800 mg vitamin F)
_____d.	*Jones:*	6 grapefruit and 0 avocado	(yielding 600 mg vitamin F)
	Smith:	6 grapefruit and 12 avocado	(yielding 900 mg vitamin F)
_____e.	*Jones:*	6 grapefruit and 6 avocado	(yielding 600 mg vitamin F)
	Smith:	6 grapefruit and 6 avocado	(yielding 600 mg vitamin F)

_____f. Some other distribution (specify): ____________

These distributions are the respective "solutions" to problem N_{2a} provided by the most prominent distribution mechanisms that have been studied in the economic literature on axiomatic distributive justice (see Yaari and Bar-Hillel, 1984).[4] For present purposes, it suffices to note that these distributions roughly correspond to several simple arguments or considerations that might guide intuitions about distributive justice. Two dichotomies are of particular interest: whether it is the fruits themselves or their vitamin content that should be divided equally, and whether the conflict between the two recipients extends to the entire bundle, or only to the part desired by both. Option e is the simplest division possible – to split the shipment straight down the middle and give each recipient exactly identical shares. Since, however, Jones has no interest in avocado, and Smith is indifferent between avocado and grapefruit, it is also possible to equalize their *total number* of fruits, if not the fruits themselves, thereby bettering the lot of Jones without detracting from that of Smith, as in a. Now, however, vitamin content is no longer equally divided. Option c restores equality of vitamin F allotment, while bettering the position of both recipients as compared with e. Option d is the result of giving Smith all of the avocado, in which Jones is not interested at all, and splitting the disputed grapefruit down the middle. Option b cannot be as simply argued for (and indeed, we shall see in the Results, was hardly ever chosen).

N_{2a} is one of the more complicated questions we used. Other questions differed from it on one or more of the following dimensions (though not in a complete factorial design):

1. The shipment consisted of but one good (e.g., grapefruit).
2. The numerical parameters characterizing Jones and Smith were altered (e.g., "50 milligrams" was replaced by "20 milligrams").
3. Jones and Smith were said to differ not in their metabolic capacity, but rather in other attributes (to be elaborated below).
4. The distribution is to be carried out not by the respondent, but by the recipients themselves, with the respondent asked to predict its outcome.

There were other minor variations in problem formulation, which will be spelled out as their results are presented.

Rationale and motivation

This study was an exploratory one, and at its inception was not guided by any well-defined set of hypotheses. The questionnaires were administered over some time, and later questions were often prompted by the responses to earlier questions. Readers may find, as they read through the tables of results, that they wish a certain question had been included that wasn't, or that they can think of a testable explanation for some result, or that they would like to take some notion a step further. We often encounter suggestions like that when presenting this study in lectures, as well as in some of the reviews this chapter underwent. Indeed, one of the exciting possibilities we see in this line of research is the ease with which new hypotheses can be tested by appropriate modifications of the problems. The results reported here represent a large body of data, but it is somewhat arbitrary in nature and scope. Our conclusions should be seen as interim, with no pretence to closure or completeness. Here, nonetheless, is the rationale behind the major choices and manipulations.

Though problems were set in a concrete context, it was deliberately schematic. In the problems we called Needs problems, calling the good "vitamin" was intended to induce respondents to think of it as answering a physiological need (though the vitamin is F, for "fictitious"), and to think of the recipients as differing only with respect to this need. In other problems, the recipients were portrayed as differing on other dimensions. One was their liking for the fruits (e.g., when operationalized by their willingness to spend money on them: "Jones likes grapefruit very much, and is willing to pay up to $1.00 per pound for them; he detests avocado, and never buys it. Smith likes both equally, though they are not his favorite fruits, and is willing to pay up to $.50 per pound for them"). We called these Tastes problems, and in them, the good was said to be consumed solely for its taste. This, of course, is the kind of stipulation that can only be asserted in artificial problems such as ours. Another was their beliefs about the vitamin F content of the fruits (e.g., "Jones believes that each grapefruit contains 100 milligrams vitamin F, whereas the vitamin F content of avocado is nil; Smith believes that each grapefruit and each avocado contain 50 milligrams of vitamin F"). We called these Beliefs problems.

The manipulation of the dimension on which the recipients were said to differ is the major manipulation of this study. Recall the formulations of the proportionality rule with which we opened. All three of them were context neutral, suggesting that the basic rule of distributive justice is determined by form rather than content. This is a very strong assumption, and one shared by economic theories of distributive justice as well, but it is by no means obvious. Clearly, some differences between people might justify a deviation from equal split in the allocation of goods while others might not (e.g., Needs seem more compelling than Beliefs). Also, the direction or the extent of the deviation might differ from context to context (e.g., when vitamins are extracted from fruit, less efficient extractors might be compensated by more fruit, but when pleasure is extracted, perhaps less efficient extractors ought to expect less fruit). Moreover, people might exhibit context sensitivity even to problems that lend themselves to the same abstraction in terms of utility. For example, it might matter to people whether Smith actually derives just as much vitamin F from a grapefruit as from an avocado, or whether Smith only thinks he does, and is in fact wrong. In both cases, Smith values the grapefruit and the avocado the same, though they really differ. Would people generally advocate a distribution based on the actual facts of the matter, even though it might appear unjust to Smith, or would they advocate the distribution that appears just to Smith? Insofar as they prefer "justice seen" to "justice done," they might advocate different distributions under different beliefs, even when the facts of the matter are unchanged. Alternatively, if they prefer "justice done" to "justice seen," they might advocate the same share for Smith even when Smith's subjective value for his share changes.

Most of the other manipulations were for purposes of control. The parametric manipulations were intended largely to test the robustness of particular quantitative aspects of the distribution rule. For example, it is reasonable in problem N_{2a} to expect that it is the ratio of the metabolic capacities of the two recipients that matters, rather than the absolute numbers themselves, which represent arbitrary units in this fictitious context. By altering the numbers in a manner that either does or does not maintain the ratio, this expectation can be tested. Moreover, altering some parameters allows us to infer which properties of a particular distribution caused it to be chosen (e.g., is a chosen because it results in the maximum combined vitamin intake, or the maximum for Jones?), or to test the limits to which subjects will deviate from equal split when there seems to be cause for doing so. These things will be spelled out explicitly in the appropriate place in the Results section.

The decision to use no more than two-goods bundles was dictated by considerations of simplicity. Single-good bundles are the simplest there are, but they are so simple that they don't allow for certain tests. For example, in comparing any two divisions of a single good, the gain of one recipient is almost always accompanied by the loss of the other. Such divisions are known in the economics literature as "Pareto optimal." Two-goods bundles, on the other hand, allow for pairs of divisions in which both recipients are better off in one than in the other (e.g., c versus e in N_{2a}). Is the appeal of the equal split (which is the prima facie contender for embodying distributive justice) stronger when it is Pareto optimal than when it is not? This question cannot be studied with bundles consisting of a single good. Of course, there are research opportunities that are only provided by complicating the bundles even further, which we declined in this study.

The total number of minihypotheses that are tested in this study almost equals the large number of problems reported. It would be easier to discuss these alongside and in sequence with the corresponding results.

Method

Subjects and procedure

The respondents were mostly applicants for admission to the Hebrew University of Jerusalem over a number of years. This population consists of roughly equal numbers of men and women, most between 18 and 24 years of age, of different socioeconomic and ethnic backgrounds, but all with a high school level education. They received the question (in Hebrew) in the context of their university entrance exams,[5] though it was clearly set apart from the rest of the exam. Each respondent received a single question, and was given just a few minutes to answer. (A pilot study determined that this time was amply sufficient, since the necessary computations were already done for the subjects. We also have data showing that respondents with no time limitations give essentially the same answers.[6]) Some of the subjects were given open-ended questions, but over 90% of their answers coincided with one of the options given in the closed versions, and most of the other 10% were computational errors. The number of respondents to each question ranged widely, but is typically between 60 and 80.

Results and discussion

It is suggested that the readers peruse the appropriate table while reading this section, as tables will be discussed and explained practically row by row.

Needs, one good

We start by seeing whether differences in needs are considered sufficient grounds for departure from equality, and – if so – whether the basic rule of distributive justice will govern the pattern of the departure. For this purpose, it is simplest to consider a one-good problem. Subjects were told, "Jones's metabolism is such that his body derives 100 milligrams vitamin F from each grapefruit, whereas Smith derives 20 milligrams from each grapefruit."

Of 73 respondents, 16% chose the equal split 6:6, and 82% chose the distribution 2:10 (see row a in Table 1). This distribution can readily be considered proportional: In order to extract a given amount of vitamin F Smith both needs (input) and gets (output) five times as many grapefruit as Jones.

Several others of the questions jointly support an estimate that close to 90% of people take "distributive justice" in such a problem to mean that the goods are to be divided in proportion to metabolic need, even if this leads to a deviation from equality. This was replicated when the parameters were doubled (to 200 mg and 40 mg, respectively, b); when only Smith's parameter was altered (from 20 mg to 50 mg, c); when subjects were asked to predict how Jones and Smith themselves would divide the grapefruit (d). (Similarly, p and r, to be described shortly, also differ only on the dividing agency, with little effect on their respective response distributions, although when we manipulated the dividing agency from the respondent to the recipients *within* subjects, as in t and u, the popularity of 6:6 rose quite a bit.) It also made no difference if the question was explicit on whether Jones and Smith know and like each other (e) or not (f).

Even when self-interest was introduced, this pattern persisted. When asked to imagine that they themselves were one of the recipients, 95% of those put in place of Jones (g), and 79% of those put in place of Smith (h), chose 2:10. Compared with the typical 90% favoring 2:10 over 6:6, it seems that the introduction of self-interest into this problem promoted generosity rather than greed. The combination of hypothetical questions, low stakes, and social desirability may render this tendency suspect, yet it is in line with the everyday courtesy of choosing the smaller of two pieces when one gets first choice, as well as with studies (e.g., Guth, Schmittberger, & Schwarze, 1982) which found that subjects, when put in a position where they alone determine how some reward is to be distributed between themselves and another, "nearly never ask for more than their fair share . . . and if the rewards are rather low, they even deviate . . . to their own disadvantage" (Guth, 1988, pp. 6–7)

Table 1 *Needs, one good*

Fruits (Jones: Smith):		6:6	2:10	12:0	0:12	
Vitamin content:	Jones	600	200	1,200	0	
	Smith	120	200	0	240	N[a]
a. Prototype.[b]		16	82	0	1	73
b. Both parameters are doubled.[c]		14	86	0	0	88
c. 20 mg is changed to 50 mg.[c]		5	94	0	1	80
d. Like a, but the recipients divide.		10	90	0	0	136
e. The recipients like each other.[d]		8	92	—	—	63
f. The recipients don't know each other.[d]		8	92	—	—	73
g. You, the divider, are Jones.		3	95	3	0	74
h. You, the divider, are Smith.		17	79	1	3	70
i. The parameters are self-reported.		22	77	0	1	74
j. The reported parameters are doubted.		43	55	2	0	49
k. Smith's parameters are doubted.		45	52	2	0	44
l. Minimum 100 mg.		8	92	0	0	73
m. Minimum 200 mg.		8	91	1	0	65
n. Maximum 200 mg.		8	91	0	1	85
o. Minimum 240 mg.		11	53	11	25	64
p. Minimum 600 mg.		38	20	42	0	65
q. Minimum 1,200 mg.		16	26	59	0	70
r. Minimum 600 mg, recipients divide.		30	29	41	0	73
s. Vitamin F is easy to get elsewhere.		25	75	0	0	65
t. Part 1 like a;		15	83	2	0	60
Part 2 like d[e] (the recipients divide).		36	63	2	0	56
u. Part 1 like q;		4	25	69	0	72
Part 2 (the recipients divide).		27	39	34	0	70
v. Part 1 like q;		9	27	64	0	82
Part 2 like n.		15	82	3	0	74
w. Part 1 like c + p[e];		39	51	9	0	58
Part 2: There are 18 grapefruits.[c]		0	100	0	0	60
x. Smith needs 5 times more vitamin than Jones.		10	90	0	0	31

[a] The Ns do not include the subjects who gave some other answer. This number exceeded 5 for only two questions (k and o), and had an overall median of 1.5.

[b] "12 grapefruit are to be distributed between Jones and Smith. Jones derives 100 milligrams of vitamin F from each one, while Smith derives 50 milligrams."

[c] Whenever a change in the problem parameters necessitated a change in the answer parameters, the required change was naturally made.

[d] A dash indicates that this option was not spelled out for the subjects.

[e] A few subjects answered only one part of these questions, hence the N for the two parts may differ.

Of the manipulations attempted, only two altered the 90%:10% preference for proportionality. First, in three problems (i, j, and k), the information about the difference in metabolism between Jones and Smith was attributed to self-report by the recipients, and the problems hinted, more or less strongly, that such reports might be self-serving. The questions added: "You have no way of verifying Jones's and Smith's real metabolism," and then went on to say one of the following: "but neither do you have any reason to doubt their report" (i); or "but you have grounds for doubting their report" (j); or "but you have grounds for doubting Smith's report" (k). The popularity of the equal split 6:6 rose from the usual 10% to 22%, 43%, and 45%, respectively. (It is not surprising that there was so little difference between j and k, given that only Smith's report, if doubted, is self-serving.) This result supports a tenet of Guth's behavioral theory of distributive justice: "To qualify for an investment . . . a variable must be generally observable and measurable." Otherwise, "people would start to pretend." So "one will often rely on the personal standard [i.e., equality] if . . . inputs . . . cannot be easily observed" (p. 7).

The second manipulation involved stating alleged minimal or maximal vitamin F levels required by the body, "according to scientific studies." When this level was specified as being 200 mg (or 100 mg), then 2:10 – which provides each recipient with exactly 200 mg of the vitamin – was still the favorite of about 90% of the subjects (l, m, n). Opinions diverged considerably, however, with higher minimum levels (o, p, q, r). Between 36% and 59% of the respondents chose 12:0 (or 0:12), which is the ultimate departure from either equality or proportionality – presumably since any other distribution is useless for one or both recipients. Nonetheless, there was concurrently an increase in the popularity of the equal split 6:6, despite its wastefulness. Perhaps the subjects opting for 6:6 reasoned that if no good were done to the recipients by deviating from equality to proportionality, then such a deviation should not be condoned. Note that if proportionality *is* useful (as in w part 2, where the number of grapefruit was increased to 18) its appeal is restored – and with a vengeance (*all* subjects chose it!).

Finally, if the need is made less acute, as when subjects are told that "vitamin F is plentiful in many common foods, and can be bought cheaply in pill form in any drug store" (s), the percentage of subjects who favor proportionality over equality drops somewhat to 75%.

The results reported in Table 1 establish that Needs matter, in that they bestow on recipients an entitlement for a share that is, where feasible, proportionately responsive to their need. Thus, when two recipients of some medically required homogeneous good differ in the extent to which they need the good, approximately 90% of subjects endorse a departure from equality to meet this need. However, these problems fail to distinguish between two senses of proportionality: (1) that *fruits* are divided in proportion to how much of them one needs to extract a given amount of vitamin (i.e., in inverse proportion to metabolic efficiency), or (2) that *vitamins* are divided in proportion to how much of them one needs (in these problems, recipients needed, and got, the same amount of vitamin). The final question, x, put this to the test. Smith was not less efficient in his metabolic capacity for extracting vitamin F, but he was said to require five times as much of it as Jones. If distribution were according to metabolic efficiency, 6:6 would thus have been the favored distribution. However, 90% of our respondents opted to give Smith five times as many grapefruit, in proportion to his vitamin requirements. We shall call this *N-proportionality:* The division gives each recipient the same proportion of the total needed to achieve a given welfare level.

Table 2 *Needs, two goods*

Grapefruit (Jones: Smith)	6:6	8:0	6:0	9:0	12:0	
Avocado (Jones: Smith)	6:6	4:12	6:12	3:12	0:12	
Vitamin content: Jones	600	800	600	900	1,200	N[a]
Smith	600	800	900	750	600	
a. Prototype (see text).	11	80	1	6	2	84
b. Like a, but the recipients divide.	5	84	0	10	1	81
c. 50 mg is changed to 20 mg.[b]	4	82	6	6	1	83
d. Like c, but the recipients divide.[b]	5	80	3	8	5	64
e. 50 mg is changed to 9.1 mg.[b]	17	38	27	6	12	52

[a] The Ns do not include the subjects who gave some other answer. These numbers were 0, 2, 3, 4, 0, respectively.

[b] Whenever a change in the problem parameters necessitated a change in the answer parameters, the required change was naturally made.

Needs, two goods

The case for N-proportionality. In the set to which we now turn, the shipment is said to contain not one good but two – grapefruit and avocado. The prototype for this set is N_{2a} (above). Of 84 respondents, 80% chose to give Jones 8 grapefruit, and Smith all the rest (a). This distribution gives each recipient an unequal share of the bundle, but one that ensures them an equal amount – 800 mg – of the vitamin F. Recall that in the single-good case, the favored distribution typically divided the fruits in inverse proportion to the recipients' metabolic efficiency: Smith, who extracts *less* vitamin from each fruit than Jones, was judged entitled to proportionately *more* fruits. Here, however, the fruits are no longer divided in inverse proportion to metabolic efficiency. Thus, although Jones metabolizes avocados more efficiently than Smith, he gets *more* than half of them. Clearly, it is vitamins rather than fruits that are divided in direct proportion to need, in