CRITERIA FOR JUSTICE

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Criteria for justice today are mostly discussed within the formal framework of social welfare functions (SWF) developed by K. Arrow in (51). [1] This is also what I shall do in this paper.

Let Z be a set of states, $I=\{1,\ldots,n\}$ a set of persons, and let there be defined a utility function u_i for each of these persons on Z.[2] If u is the n-tuple $(u_1, \ldots, u_n)$, a SWF is a function that assignes to each u on Z a quasi-ordering R(u) on Z.[3] If x,y,z, . . . are states in Z we read "xR(u)y" as "x is socially not better than y", and set $xP(u)y := xR(u)y \wedge \neg(yR(u)x)$ – "y is socially better than x" – and $xG(u)y := xR(u)y \wedge yR(u)x$ – "x and y are equally good socially".[4]

Besides the postulates of *unrestricted domain* (R(u) is to be defined for all possible u's on Z) and of *invariance with respect to common positive linear transformations of the* u_i,[5] the minimum requirements for such SWF's are:

Anonymity: R(u) is to be invariant with respect to permutations of the indices $1, \ldots, n$,

and the (strong)

Pareto Conditions: $\Lambda i\,(u_i(x)=u_i(y)) \supset xG(u)y$

$$\Lambda i\,(u_i(x) \leqslant u_i(y)) \wedge Vk(u_k(x) < u_k(y)) \supset xP(u)y.$$

Both conditions seem to me essentially unproblematic, but do not

1. A good exposition of this theory is Sen (70).

2. Such utility functions are metrisations of subjective preferences on Z; they are uniquely determined up to positive linear transformations.

3. R(u) need not be a total ordering, though that is mostly stipulated.

4. For simplicity we only discuss SWF's here that are defined on utility functions, not on preference relations. The latter are devoid of deeper interest anyhow.

5. We shall not go into the problem of interpersonal comparisons of utilities here. Cf. Harsanyi (55), (75) and Sen (70), ch. 7.

suffice to determine one single SWF[6], and all further postulates are hotly disputed.

In moral philosophy SWF's are mostly employed in the setting of ethical subjectivism to define a comprehensive ordering of moral values from individual preferences. Against such a conception there are, however, serious objections which I shall mention only briefly here:[7]

1. In order to make morally prescribed actions rational one has to adapt one's individual preferences to the moral one, expressed by a SWF R(u). But since the original utility functions u are the basis of the moral ranking R(u), and adapting one's preferences to R(u) means going over to some u', R(u') may contradict R(u), so that orienting one's preferences towards moral criteria may upset the social ordering of the states. If, however, the individual preferences from which the social one is defined are only to express the *Eigen-interests* of the participants, i.e. the interests they would have on the assumption that all the other people concerned were indifferent between the states in Z, one does not take factual altruistic interests of the participants into account but only their egoistic ones. It would be forbidden then to forgo advantages in favor of others.

2. Not all factual interests are to be respected from a moral point of view. Even if somebody has the ardent desire to exploit another person, suppress or torment him, this has not to be reckoned up against legitimate interests of others.

3. R. Nozick has emphasized in (74) that criteria of *structural justice* like SWF's measuring the justness of a state only by how the people concerned are situated in it are inadequate at least as general criteria for justice. His main argument is this: Such principles would eliminate all freedom: the freedom of control over one's property, the

6. Harsanyi has shown in (55) that the utilitarian SWF $xR(u)y :- \sum_i u_i(x) \leq \sum_i u_i(y)$ is the only one to satisfy the postulates stated above, if the u_i and R(u) are not only defined on Z, but on the power set of Z according to the principle $u_i(X) = \frac{1}{w(X)} \sum_{x \in X} u_i(x) w(x)$ for $X \subset Z$. To assign probabilities to the states of Z, however, is problematic, for the states of Z are generally results of actions. While assigning probalities to one's own actions in decision problems is not pro blematic, as Jeffrey has shown – the decision criteria do not depend on these probabilities –, this is not true for games in which several persons are acting.

7. For a more detailed discussion cf. Kutschera (77).

freedom to enjoy the fruits of one's own work or talents. For passing from a structurally just state to another state by giving something of my property to others or by earning something by additional work without sharing it with others will mostly lead to a structurally unjust state, and is therefore forbidden.

All these are no objections against the usefulness of SWF's in defining criteria for justice, but only objections against defining moral criteria by SWF's alone, and in this way by subjective preferences only, and against searching for one SWF as a general moral criterion for all cases. We shall evade them by admitting some objective moral judgments that do not depend on subjective preferences, and by formulating different SWF's as criteria for justice in different situations. Following Aristotle we shall distinguish between problems of distributive and those of commutative justice.

Assuming objective moral facts is only justified if methods are described by which they can be ascertained. I cannot go into this here, and so I just have to presuppose that we can at least make some moral judgments without referring to subjective preferences. What is needed for the following, more exactly, is that we can make judgments about a person a's obligation (from moral or legal reasons) to respect another person's, b's, interest in certain states; that b, conversely, has a *claim* against a to attend to his interests in what he does. (Such interests are then always legitimate interests, but not all legitimate interests involve a claim against others to cooperate in their pursuit). In the narrower sense of the word a *claim* of b on a doing F is an obligation of a to do F. But in the wider sense of the word in which we use it here a claim of b against a involves only an obligation of a to do something in so far as he can do so under the given circumstances and in view of other obligations that he has. Claims in this sense do not imply categorial obligations (conditional or prima-facie ones) of a to do something. They can be compared as to strength; they admit of different degrees.

On the presupposition that such claims are defined I shall now propose criteria for distributive and commutative justice.

Criteria of distributive justice are relevant in cases, where the people concerned have a claim against a single person or a group of persons – we shall call him, or it, D (the distributor) – to consider their interest in some specific commodity G.[8] G can be some material good, like food, but it can also be chances or tasks, for there is also a just distribution of burdens. D is to have the control over the distribution. D can be some outside instance, for example a public office, or some or all of the people in I.[9] A distribution may be called *just* if it satisfies the claims of the different people concerned as equally as possible. Since the claims are against D it cannot concern him whether somebody is willing to forego his claim in favor of some third party. Therefore the interests are to be considered as Eigen-interests. Whether someone is willing to donate something of his share to another or to give it to him in fulfillment of some prior obligation is of no concern to the distributor or to the justness of the distribution.

Let v_i (x) be a measure for the utility of the person i in state x resulting from his Eigen-interests on which his claim against D is based in the specific situation considered. v_i (x) is then a measure for the degree in which the claim of i against D if fulfilled in x.[10] Then we can designate a state of Z as just, in which

a) those who are worst off with respect of G are situated as well as possible, and moreover
b) the claims of all with respect to G are satisfied as far as that is possible without bringing somebody into a worse position.

The first postulate (a) is the *Maximin-criterion* or *Difference-principle*, as Rawls terms it in (72). It expresses the idea that the claims of all are to be considered equally. According to this idea the claims of all are to be satisfied up to the maximum that can be distributed to all. The claims that go beyond are also legitimate, but it would not be justified to let somebody pay for another's better posi-

8. For simplicity I only consider the distribution of one commodity here.

9. A claim against oneself to something is a right to pursue it as far as no conflicting obligations are violated.

10. Each person assesses the states under certain aspects F. If $u_i^F(x)$ is the (subjective) value of x for i under aspect F $u_i(x)$, the total utility of x for i, is a weighted mean of the $u_i^F(x)$'s. If $u_i^G(x)$ is the value of x for i under the aspect of the commodity G and if i's interest in G involves a claim of i against D, $v_i(x)=v_i^G$-(x).

tion. Further choices are therefore restricted to criteria of effectivity. This is the postulate of *Pareto-Optimality* (b).[11]

We can then say:

DC: A state is *distributively just* iff the minimum of the degrees in which the individual claims are met is maximal in it and if – given this restriction – it is most effective.[12]

Since this concept of distributive justness essentially follows the difference principle – the Pareto-condition is very weak – one could raise the usual objections against this principle also against DC, namely:

1. Minimal advantages for the least advantaged may be bought by considerable losses to the better situated. The total utility for all concerned is not maximal; some of the good may be squandered just for reasons of equality.
2. That somebody is worse off is considered twice: firstly in that the same amount of the good still means a lower total utility for him, and secondly in the orientation of the difference principle on the least advantaged.[13]
3. The criterion does not preclude big utility-differences and therefore does not come up to the ideal of an equal distribution.

These objections, however, become pointless in our case, in which the difference principle is just applied to distribution problems. Objection (1) is based on the utilitarian idea that bigger advantages always have precedence over smaller disadvantages. But this idea is not applicable in our problem, since the aim is not to get a maximal total untility, but to give to each "his own", to fulfill the claims of all concerned impartially. A distribution of a cake is not just if it

11. In the usual formulations of these principles the utility functions u_i are to be replaced by v_i, of course.

12. The order in which the two criteria (a) (difference principle) and (b) (Pareto-optimality) are applied does not matter. If for $X \subset Z$ we set $P(X) := \{x: x \epsilon X \wedge \bigwedge y(y \epsilon X \wedge \bigvee i(x <_i y) \supset \bigvee k(y <_k x))\}$ and $M(X) := \{x: x \epsilon X \wedge \bigwedge y(y \epsilon X \supset \min_i u_i(y) \leqslant \min_i u_i(x)))\}$, we have $P(M(X)) = M(P(X))$. Since the Pareto conditions do not define a total quasi-ordering on Z, neither does DC. But although $P(M(X))$ defines only a partial ordering of the states in Z, it is a suitable choice function for social decisions.

13. Cf. Harsanyi (75).

gives those most who like it best; if it transforms the cake, so to speak, in a maximal total subjective gain, but only if everyone gets the same according to the claim he has against the distributor.

Objection (2) is off the point in our case, since only interests in one specific good are considered. Somebody does not get more in a just distribution of the cake if he is shortsighted. The values v_i (x) do not express the degree to which all interests of i – not even all legitimate ones – are fulfilled in x, but only the degree to which i's claim against D on G is satisfied.

Objection (3) is not applicable here, since it would be patently absurd to give the least advantaged less only in order to achieve a higher degree of overall equality. The basis of such egalitarianism is envy, and envy is no moral criterion.

One of the most important cases is the distribution of an arbitrarily divisible commodity like money or food. Here everyone will get such a share that all claims are satisfied in the same degree. If the people have the same claims, i.e. if the functions v_i coincide, DC will result in everybody getting the same share of G. A just distribution often is simply an equal distribution, and this is adequate if all the people have equal claims on G. But an equal distribution would be inadequate, if equal parts of G would not satisfy the claims equally. What somebody can regard as "his own" depends on the claims he and the others have. Therefore not equality alone, but equality in proportion to the strength of everybody's claim on G renders a distribution just.

If the people concerned have claims on the distributor to get a share of the commodity G, he may not leave somebody worse off than it would be possible without putting somebody else in a position at least as bad as the one the first is in now. Every other distribution would consider the claim of someone less than that of other people, and cannot therefore be justified morally, since all the moral criteria relevant for the case on hand are incorporated in the claims. It can be easily seen, that this postulate is equivalent to the difference principle. If, further on, it is possible for D to give a better position to some without impairing the position of others, D is obliged to do so, since the first have a claim against D which he can fulfill in the given circumstances without violating the claims of others. This is the Pareto condition.

DC, therefore, is just an explication of D's obligations in view of the claims the differnent persons have against him. It tells us how to satisfy conflicting claims.[14]

Criteria for commutative justice are to be applied in cases of free cooperation between several persons. A typical example is the sale of an object. If for the seller it has a value equivalent to an amount e_1 of money, to the buyer a monetary equivalent of e_2, a sale will result only if $e_1 < e_2$. The problem is: What price in the interval (e_1, e_2) is a fair or just price for the object? To give a general formulation for the problem we have to use some simple concepts of game theory.

Let $I = \{1, \ldots, n\}$ again be a group of persons, all of which may, in a situation S, choose between the actions in $F = \{f_1, \ldots, f_n\}$.[15] Z is to be the set of results which arise from the possible combinations of the actions of the players. We can then represent the states x,y,z, . . . of Z as n-tuples $(f_{j_1}, \ldots, f_{j_n})$ with $j_i = 1, \ldots, m$. On Z an utility-function u_i is to be defined for all players $i \epsilon I$.

In game theory cooperative and non-cooperative games are distinguished. A game is *cooperative*, if the players can have pre-play communication and can agree, which action everybody is to perform. Such agreements are to be binding. We only consider such cooperative games in what follows. In our problem of commutative justice we shall assume, that the players have no obligations to effect or prevent certain states in Z independent of their problem to achieve a just result, and that none of them has an independent claim on others regarding his interests in the game; otherwise criteria of disstributive justice would be prevalent.

If $O := \{x: \Lambda yi\ (u_i(y) \leqslant u_i(x))\}$ is the set of results that are optimal for all players, the game is completely trivial in case O=Z; no cooperation is then necessary to achieve results that are optimal for all players. If $O \neq \Lambda$ the game is still trivial in the sense, that all players will agree on some result of O – which is no matter of concern to

14. If the claims do not conflict, there are elements of Z which are optimal for all concerned (with respect to their interests in G), and D then has to realize one of those states according to DC.

15. For simplicity we only consider choices between finitely many alternatives. That all players can choose between the *same* alternatives can be assumed without loss of generality: If i $(i=1, \ldots, n)$ has a choice between $f_{i1}, \ldots, f_{im_i}$, the $f_1, \ldots, f_m$ can be so defined, that for i doing f_1 is the same as doing f_{i1}, etc.

them; there still is no competition between the players. The relevant cases are games in which the interests of the players partly coincide, so that cooperation is to their advantage, and partly diverge, so that there is a problem of a fair compromise. We shall however formulate our criterion for commutative justice in such a way that it also covers the trivial cases.

The *security level* of i is $u_i^o := \max \min u_i(x)\ f\ x:(x)_i = f$, where $(x)_i$ is to be the i th member of x, i.e. f_{ji} for $f=(f_{ji}, \ldots, f_{jn})$. u_i^o is the value i can secure for himself without cooperation, no matter what the other players do.

Now x is a reasonable compromise of the players only if $x \epsilon P$ and if x does not give anyone less than his security level. The set $N := P \cap \{x: \Lambda i\ (u_i^o \leqslant u_i\ (x))\}$, where P is the set of Pareto-optimal results,[16] is the *negotiation set*. N is never empty. $x \epsilon N$ is a necessary condition for reasonable compromises, and the question is only: On which result in N should the players agree; which results in N are fair compromises?

This question is hotly disputed in game theory even for the simplest case of two-person games, and it has often been doubted whether there are purely rational criteria, by which subsets of N may be determined. If we don't ask for *rational*, but for *fair* solutions, however, the following criterion suggests itself (for n=2):

CC: A result x is *commutatively just* iff it belongs to the negotiation set, and if it maximizes the minimal gains of the participants as measured against their security levels.

The postulate to distribute the gains from a cooperation equally in this sense is also recommended by rationality considerations: For the incentive for cooperation depends on the gain, and a compromise is the likelier (and also the stabler) the greater the common incitement for it is, i.e. the minimum of the individual incitements.

In game theory, however, there are considerations according to which CC-solutions are not always rational. In the game

16. $P := \{x: \Lambda y(Vi(u_i(x) < u_i\ (y)) \supset Vk(u_k(y) < u_k(x)))\}$.

1 \ 2	f_1	f_2
f_1	4 0	-4 -1
f_2	-1 -4	1 4

where 1 has the choice between the rows and 2 between the columns, and the utilities of 1 are the lower left-hand values in the fields, those of 2 the upper right-hand ones, we have $u_1^o = u_2^o = -1$, $N = \{(1,1), (2,2)\}$. CC therefore singles out result (2,2). But here 2 can threaten 1 to do f_1. For 1 it would then be best also to do f_1, so that 2 achieves the result optimal for him. A threat of 1 to do f_2 would be unrealistic, for 1 will suffer a considerable loss if 2 does not yield to the threat. 2 then has a greater "threat potential" in this game, and therefore (1,1) might be considered as the rational solution. Such considerations, however, degenerate into rather naive psychological arguments. A threat of 1 to do f_2 can be quite realistic if 1 proceeds after the motto "Everything or nothing". Rational considerations of the players would have to be based on probability assignments to the other's reactions to their own actions and threats. But first, there are no general principles available for that, and second, the players cannot refer to such probabilities in their negotiation since the other can always say: "I'm going to refute your expectations". The only thing they can rely on in the negotiations is what the other has no influence on, and this is only their security levels.

Furthermore we are not interested here in what is *rational*, but in what is *fair*, and for this question threats of refusing to cooperate are irrelevant. Our question is: how is the legitimate interest of all players to derive as big an advantage as possible from the cooperation to be satisfied in an impartial manner? In this case the natural advantages can only be measured by what the players already have independently of a cooperation, and that is their security level.[17]

17. Measuring gains from cooperation with respect to what everybody has for sure if results of N are chosen would not be just. Such results are already the fruit of cooperation, and since NCP, some people may already have given con-

n-person games, for n>2, are much more complicated in that coalitions may form in which the participants agree on a common strategy, and thereby act like an individual against outsiders. Coalitions

siderable advantages to others. These should then not be disregarded in further considerations. In the game

6 3	1 9	0 -6
3 8	0 0	0 -6
0 -6	0 0	0 0

we have $P=N=\{(1,1),(1,2),(2,1)\}$, $u_1^0=-6$, $u_2^0=0$, $u_1^0(N)=3$, $u_2^0(N)=1$. CC singles out 1, but the criterion of maximizing gains measured against what everyone has for sure in N would single out (2,1). By going over to N, 2 loses his natural advantage, and now 1 is advantaged and gets a result, that is almost optimal for him. Furthermore, decisions for cooperation cannot be partitioned into two steps: one decision for cooperation with the aim of realizing a result from N, and after that a decision for some specific result in N. Cooperation from the very beginning is an agreement on a certain result. In our example the 2-step argument would result in forgetting in the second step what 2 has done for 1 in the first one. – According to Nash's criterion $\prod_i (u_i(x)-u_i^0)$ is to be maximized on N. In our example this would also single out (1,1), but in the case of the game

83 2	1 0
0 1	10 10

Nash's criterion singles out (1,1), CC however (2,2), which seems more appropriate since in (1,1) the gains are distributed very unequally. Nash, however, was discussing repeated games, which we don't.

are (non-empty) subsets $K \subset I$. A strategy of K may be represented by a result $x^{\smile}$, such that $(x)_j$ for all $j \epsilon K$ is what j does according to this strategy. Since the members of K agree on a strategy x without conferring with outsiders they will choose x in the sense of a decision under uncertainty. (Only for K=I there is a decision under certainty.) The value of K and $x^{\smile}$ for a member $j \epsilon K$ may be estimated as the minimum of the u_i (y) for all y that are compatible with x: $U_i (K,x) = \min_{y:y \overset{K}{=} x^{\smile}} u_i(y)$ for $(x^{\smile} := \Lambda j\, (j \epsilon K \supset (y)_j = (x)_j)$. We then have
$U_i (I,x) = u_i\ (x^{\smile})$ and $u_i^o = \max\, U_i\, (\{ i\} ,x)$.

Since the interests of the members of K may diverge, K cannot agree on a strategy x without referring to the strategies of other coalitions. A member of K may, for instance, insist on a common strategy that is advantegeous for him by pointing out, that he may also enter other coalitions which offer a good strategy to him. Therefore we cannot assign a reasonable strategy to a coalition for itself.

In searching for rational solutions of n-person games we will try to generalize the ideas for 2-person games. There the first rationality condition was that a solution be in the negotiation set N. The concept of a negotiation set may be defined for n-person games in the following way: We set $V_K := \{x: \Lambda y(Vi(i \epsilon K \wedge u_i (x) < U_i (K,y)) \supset Vk(k \epsilon K \wedge U_k (K,y) < u_k(x)))\}$,
and

$$V := \bigcap_K V_K$$

V_K is the negotiation set for the coalition K with respect to I-K. For K only such results x are acceptable, for which there is no strategy y of K, which has higher value for some members without leaving other members worse off. We have $V_{\{i\}} = \{ x: \Lambda y(U_i (\{ i\} ,y) \leqslant u_i (x)\} = \{x: u_i^o \leqslant u_i (x) \}$ and $V_I = P$. For n=2 we have $V = P \cap \{x: \Lambda i\, (u_i^o \leqslant u_i(x)) \}$, and that is the negotiation set discussed above.

We also have
$x \epsilon V = \Lambda Ky(Vi(i \epsilon K \wedge u_i (x) < U_i (K,y)) \supset Vk(k \epsilon K \wedge U_k (K,y) < u_k(x)))$
A result $x \epsilon V$ is therefore *stable* in the sense that there is no coalition K and no strategy y of K such that K could offer to some of its

members, by pursuing y, an advantage against the result x, while the others would not be worse off than in x.

We can, however, not say, as for n=2, that only results of V are rational, since V can be empty for n>2. This is wellknown from the paradox of voting. In such cases there will then be no non-trivial coalitions containing more than one player, for they would be unstable.[18] If $V=\Lambda$, we can only say then, that a result of $P \cap \{x: \Lambda i\ (u_i^o \leqslant u_i(x))\}$ is to be effected. If we set

$$N = \begin{cases} V & \text{for } V \neq \Lambda \\ V_I \cap \bigcap_i V\ \{i\} & \text{for } V = \Lambda \end{cases}$$

N is never empty, and we can designate N as the *generalised negotiation set.*

How are rational or fair results to be picked out from N?[19] Applying the idea of CC seems to be difficult at first glance, since besides the individual security levels u_i^o we now also have securtiy levels $U_i(K,x)$ in coalitions. On what coalition would the players fall back if no comprehensive cooperation resulted?

For our purposes we need not go into that, however. Since all results of N are stable, there is no coalition which they could point out as their possible alternative. The advantage of forming coalitions for them is already exhausted in the determination of N. Finding a fair compromise in N is no matter for coalitions anymore,but for the single players.[20] Therefore it seems reasonable to take over CC also for n-person games, with N as the negotiation set.

This definition of commutative justice can be justified thus: The cases of free cooperation, to which CC is to be applied only, were characterized as games in which there are no independent obligations

18. It may still be the case, of course, that coalitions form. This depends however on the psychology of the players, and is no topic for a rational theory of games.

19. In case of $O \neq \Lambda$ there is no problem again, since we then have N=O, and nobody cares about what specific result of O is chosen.

20. A cooperation among all is never worse for anybody than a cooperation only in some coalition K, since for all x,K,i: $U_i(K,x) \leqslant u_i(x^{\sim})$.– If the agreement is made between given coalitions, however, which go into the negotations like individuals, and are, for instance, interested in maximizing their total advantage, we have another problem as that of commutative justice.

of the players among themselves or against third parties to realize or prevent certain results. Everyone, therefore, has the right to do what is best for him. He has then also a right on the advantages the situations gives to him. He has no claim against the others to cooperate with him in securing a good result, besides the minimum requirement to give others advantages that cost him nothing.[21] Therefore everybody will have to accept that for a cooperation only results of the negotiation set are eligible. Entering into cooperation with others means that I expect them to consider my interests, and that I, on my part, am willing to consider theirs. By cooperating, therefore, all involved acquire a claim against the others to consider their interests. But then a problem of distributive justice arises for them: the problem to distribute the gains from the cooperation in a just way. Since the gain of a person i in a cooperatively effected state x against what he already had independently is measured by $u_i(x)-u_i^o$, these gains have to be distributed justly according to DC. And this is what CC says.

We have then – retributive justice aside – a general concept of material justice based on the idea of equal treatment of all according to their legitimate claims. This idea is, in fact, so simple that it is almost unobjectinable. It is practically tautological to say that somebody is treated justly if his legitimate claims cannot be satisfied to a higher degree without satisfying the legitimate claims of another less. Any other response to the conflicting claims would be partial, and impartiality is an undeniable component of justice.

The question what distributions or what cooperative agreements are just is not completely answered by our criteria DC and CC, of course. It has just been reduced to the problem of who has what claims on others and what states are permitted independently of conflicting interests. But we have tried to show in the beginning of this paper that we cannot expect more from a theory of justice. Such a theory cannot be the whole of moral philosophy. Therefore we can't expect that it defines a comprehensive moral ordering. Reasonably we can only expect a theory of justice to answer the question "What is just?" with respect to a prior definition of claims, since the concern of justice is only with the fulfillment of conflicting claims.

21. Since all the results in Z are permitted, the interests of all players are legitimate. It is not morally justifiable to obstruct others in the pursuit of legitimate interests as long as they may be obtained without loss to oneself.

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