To Each According to His Needs: Measuring Need-based Justice

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Abstract: Although need-based justice is a prominent kind of distributive justice, there exist hardly any considerations on how to measure it. To fill this gap, two qualitative conceptions of distributive justice are introduced which both have to come into their own. Applied to needs, the Aristotelian conception advocates *equal* need-satisfaction whereas the Platonic conception aims at *full* need-satisfaction. It is shown that neither Miller's tentative measure of need-based justice nor a straightforward application of Jasso's measure of distributive justice to needs capture both of these conceptions. Thus, a general recipe for designing measures marrying these conceptions and a specific measure developed after this recipe are entrusted to the reader. The proposed function measures the average deviation of the individual degrees of need-satisfaction from the ideal degrees prescribed by the given conceptions.

1   Introduction

Consider two German households, each living in a 90 m^2 flat. While one of these households comprises two adults and four children, the other one consists of just one person without any special need for housing space. It might be that the single person in a way deserves more space because she has a stiff job. But considering only the households' distinct need for space, the given distribution is unjust because one household is undersupplied according to German standards while the other one has more than it requires. That is, from the perspective of need-based justice, the distribution leaves much to be desired.

The present paper is concerned with need-based justice as a particular kind of distributive justice. It is neither assumed that distributive justice *reduces* to need-based justice nor that the latter is the *most important* kind of distributive justice. The question is rather how to specify need-based justice so much that we obtain a *measure* – or as economists say: an *index* – of need-based justice. A measure of need-based justice shows some resemblance to an index of poverty.[1] While the

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latter measures the poverty within a society by its members' incomes in comparison to a common poverty line, the former measures justice by the members' endowments in comparison to their needs.

A *full* theory of need-based justice calls for an elaborate explication of the concept of need. Obviously, needs are different from wishes or desires because of their intersubjective and thus normative nature. For example, needing a football club is different from desiring to own a football club because a desire in itself does not put any pressure on society to satisfy it. A need, on the other hand, carries a normative weight because it is acknowledged, or at least acknowledgeable, by a larger group of people. In this paper, needs are treated as exogenously given. That is, I will not try to spell out in more detail what a need is but just assume particular needs in order to ask how just a distribution of the corresponding good is with respect to their satisfaction. As a working definition, a need is taken to be an amount of a good which is necessary for a decent life. This does not exclude that different societies promote varying conceptions of what constitutes a decent life.[2]

Regardless of how needs should be defined in the end, the word 'need' contains a systematic ambiguity. Consider again a household of two adults and four children living in a 90 m² flat and assume that the threshold for such a household to live a decent life is 120 m². Then both this threshold of 120 m² and the missing space of 30 m² may be called the household's need. For the sake of disambiguation, I will use 'need' for the threshold and dub the missing amount of the corresponding good 'need gap'.

Let there be a set I of n individuals, whether they are persons, households, companies etc. Each individual $i \in I$ is endowed with a particular amount ω_i of a good and exhibits a certain need v_i of that good, the latter being the threshold from which there is satisfaction of the need. An individual i is undersupplied if and only if its need is not satisfied, viz. $\omega_i < v_i$; it is oversupplied if and only if $\omega_i > v_i$; and it is exactly supplied if and only if $\omega_i = v_i$. A measure of need-based justice is then defined as a function whose arguments are the individual endowments ω_1 to ω_n and the individual needs v_1 to v_n.

In the next section, two qualitative conceptions of distributive justice are introduced which have to be combined in order to obtain an adequate measure of need-based justice. Roughly, whereas the Aristotelian ideal is equal need-satisfaction, independently of whether the recipients get what they need or not, the Platonic ideal is that all needs are met, regardless of whether they are met to the same degree or not. Sections 3 and 4 discuss the pros and cons of David Miller's measure of need-based justice and the pros and cons of a straightforward application of Guillermina Jasso's measure of distributive justice to needs. The main diffi-

[1] Cf., among many others, Sen (1976), Forster et al. (1984) and Seidl (1988).
[2] The working definition is to be found in Braybrooke (1987), Miller (1999), Brock (2009) and White (2015). For more on needs and need-based justice, see Thomson (1987), Wiggins (1987) and Reader (2005).

culty with them is that they conform only to one of the given ideals thereby ignoring the second essential ingredient of need-based justice. In section 5, a general recipe for designing measures incorporating both ingredients and a specific measure developed after this recipe are entrusted to the reader. Section 6 highlights some advantages of this measure.[3] Perhaps surprisingly, these advantages include the measure's refusal of conforming to certain axioms of monotonicity, sensitivity and transfer usually associated with indexes of poverty. Section 7 provides a brief summary and outlook.

2   Aristotelian and Platonic justice

The conceptual background of the following considerations is due to Aristotle and Plato. In book V of the *Nicomachean Ethics*, Aristotle presents his famous proportionality conception of distributive justice:

> The just […] involves at least four terms; for the persons for whom it is in fact just are two, and the things in which it is manifested, the objects distributed, are two. And the same equality will exist between the persons and between the things concerned: just as the things are related, so must the persons be related. […] The just, then, is a species of the proportionate […]. For proportion is equality of ratios and involves four terms at least […], and the just, too, involves at least four terms, and the ratio between one pair is the same as that between the other pair; for there is a similar distinction between the persons and between the things. As the term *A*, then, is to *B*, so will *C* be to *D* […]. (Aristotle: *Nicomachean Ethics*, book V, section 3)

This appears to mean that a distribution among two persons is just if the ratio between what the one person receives (*A*) and what she should receive (*B*) is identical with the ratio between what the other person receives (*C*) and what she should receive (*D*). The Aristotelian ideal could also be formulated by saying that we are to ensure equal ratios between actual and legitimate endowments. This ideal is not restricted to distributions among two individuals but may easily be extended to cases of three or more participants.[4]

    In the passage just cited, it is left open where the legitimate endowments come from. To obtain a conception of *need*-based justice, the simplest way is to equate them with the *needs* of the recipients. In the notation introduced in the previous section, the qualitative Aristotelian conception thus reads as follows:

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[3] See also Traub et al. (2017) for a measure of need-based justice following poverty indexes and Springhorn (2017) for a measure implementing the idea that undersupply is the more unjust the more it could be mitigated or even removed. All of these measures were developed within the project 'Measures of Need-based Justice, Expertise and Coherence' as part of the research group *Need-based Justice and Distribution Procedures* (FOR 2104).

[4] More on Aristotle's conception of distributive justice is to be found in Keyt (1991). This conception was applied by sociologists as early as the 1950s. Cf. Sayles (1958), Homans (1961), Patchen (1961), Adams (1965) and Walster et al. (1976). Walster et al. (1976, 3f.) point out that equality of ratios leads astray if negative quantities are allowed, but this is unproblematic for the purposes of this paper because there is no negative endowment or need.

(AC1) A distribution among individuals I is just with respect to needs if and only if, for all $i \in I$, $\omega_1 / v_1 = \omega_2 / v_2 = \ldots = \omega_n / v_n$.

For example, if there are two families, one of them requiring 90 m² of housing space and the other one 120 m², then endowing both with 60 m² is unfair because the first one gets two-thirds of what it needs whereas the second one has to make do with a half. In other words, the need of the second family is satisfied to a lower degree than the need of the first one.

Since Aristotle's conception is *qualitative*, it does not answer the *quantitative* question how just or unjust a distribution is. Before proceeding to this issue, however, it has to be emphasised that the qualitative conception is debatable for at least two reasons. First, it is purely *comparative*, i.e. takes into account only how much the ratios of endowments and needs resemble each other. It thereby ignores the noncomparative issue of whether the recipients' needs are satisfied in the first place. Even if our two households have to live in flats all too small, a distribution is just according to the above-mentioned specification of Aristotle's conception if both of them have, say, only one-third of what they require (cf. Feinberg 1974, 300; Jasso 1978, 1402). Of course, if there is no more housing space available, such a distribution may be called 'as fair as possible given the circumstances'. But what this means is merely that the distribution is the least unjust.

The second difficulty with Aristotle's notion is that it rules goods to be distributed in proportion to needs not only under but also above the threshold. If there are 280 m² of space for two households needing 90 m² and 120 m², then the first household should get 120 m² and the second one 160 m², so that both have a third more than they need. This may sound reasonable when dealing with housing space. But what about food? If two people are sated, why should the one who required more because he is taller receive a greater amount of the food left? Or consider medication. It is often even fatal to give more to patients who are sufficiently medicated. One could argue that proportionality beyond the threshold is universally valid for *effort*-based justice: if all participants have got what they deserve on the basis of their effort, then a surplus is also to be distributed so as to attain equal ratios of endowments to efforts. But it is not obvious that the same holds for *need*-based justice.

A second way to address situations of excess is thus to impose no restrictions at all. If all needs are met, then other principles, such as effort or equality, might see to it that a distribution is unjust; but from the perspective of need-based justice there is nothing to complain. The corresponding Aristotelian conception states:

(AC2) A distribution among individuals I is just with respect to needs if and only if, for all $i \in I$, $\omega_i \geq v_i$ or $\omega_1 / v_1 = \omega_2 / v_2 = \ldots = \omega_n / v_n$.

For the sake of simplicity, however, the measure I will advocate is based on (AC1). I thus assume that we address cases in which both pleasure and harm vary in proportion to need. Then the profit parties draw from a surplus is the same if the ratios between endowment and need are identical.

The second conception of distributive justice can be sifted out from Plato's *Republic*:

> Simonides, then, after the manner of poets, would seem to have spoken darkly of the nature of justice; for he really meant to say that justice is the giving to each man what is proper to him, and this he termed a debt. […] Then on this view also justice will be admitted to be the having and doing what is a man's own and belongs to him. (Plato: *Republic*, 332, 433f.)

This idea was later boiled down to the phrase 'To each his own' ('Suum cuique') which was popularised by Cicero and abused at the gate of Buchenwald concentration camp. A straightforward application of the Platonic ideal to distributions would state that we have to ensure that everyone receives what she should receive. In the case of *need*-based justice, what one should receive, viz. the legitimate endowment, is nothing but the *need* of the given individual. The corresponding phrase is thus 'To each what he needs'.

However, just as in the case of Aristotle's account, so it is uncertain how Plato's account should treat oversupply. On the one hand, 'To each his own' could mean that neither more nor less is allowed. In other words, we have to see to it that there is neither oversupply nor undersupply. Then the qualitative Platonic conception states that endowments ω_i have to be identical with needs v_i. Or equivalently:

(PC1)   A distribution among individuals I is just with respect to needs if and only if, for all $i \in I$, $\omega_i / v_i = 1$.

On the other hand, this entails that the land of milk and honey is unjust because everyone receives *more* than she needs. Since this is odd in my view, I prefer to understand the need-variety of Cicero's phrase as saying 'To each his own – and not less' instead of 'To each his own – and neither more nor less'. In other words, endowments ω_i should be at least as high as needs v_i are:[5]

(PC2)   A distribution among individuals I is just with respect to needs if and only if, for all $i \in I$, $\omega_i / v_i \geq 1$.

The Platonic conception differs from the Aristotelian in being noncomparative in an essential sense. To be sure, both of them focus upon the individuals' degrees of need-satisfaction and therefore compare for each individual its endowment with its need. But only Aristotle proceeds by also comparing the *results*, that is, by examining whether there is equal *need-satisfaction*. Consequently, a distribution is just on the Aristotelian notions (AC1) and (AC2), but not on the Platonic ones (PC1) and (PC2), if all participants are undersupplied in the same proportion. Conversely, the definiens of (PC1) implies both the one of (AC1) and the one of (AC2): if all needs are exactly satisfied, they are satisfied to the same extent.

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[5] This approach shows some resemblance to Sen's (1981, 186) *focus axiom* for the measurement of poverty. Just as the focus axiom states that poverty is not influenced by income changes among the nonpoor (as long as they do not become poor), so (PC2) implies that justice is not influenced by endowment changes among the oversupplied (as long as they do not become undersupplied).

The same holds for (PC2) and (AC2): if all needs are fulfilled or overfulfilled, the first disjunct of (AC2)'s definiens is made true. But there is no inference from (PC2) to (AC1) because needs can be overfulfilled to a variable extent.

3   Miller's measure

Surprisingly, there exist hardly any considerations on how to measure need-based justice. David Miller headed a chapter of his widely read book *Principles of Social Justice* with the slogan 'To each according to his needs'. In this connection, he tentatively introduced a measure of need-based injustice in order to clarify some issues. This measure is based on the Aristotelian principle that a distribution is the more unjust the more variety there is in unmet need (cf. Miller 1999: 217f.). Conversely, "injustice is reduced to zero when people end up at the same relative point on the scale of need" (Miller 1999: 219). In contrast to Aristotle, however, Miller measures unmet need by the *difference* between the individual's endowment and its need-threshold and thus obtains a negative quantity (cf. Miller 1999: 320, fn. 27). Likewise, the divergence between two unsatisfied needs is given by the absolute value of the difference between these need gaps. Consider two households both needing 90 m^2 of housing space while one of them is endowed with 60 m^2 and the other one with 80 m^2. Then the unmet need of the first one is –30 m^2 and the unmet need of the second one –10 m^2, with the result that their need gaps differ by 20 m^2.

The overall injustice of a distribution is then calculated simply by adding all of the latter quantities, namely the difference between individual 1's need gap and individual 2's need gap, the difference between individual 1's and individual 3's need gap, the difference between 2's and 3's gaps, and so on. Strictly speaking, there is no need gap if a need is satisfied right to the money. But Miller's examples show that he includes this as a border case with a need gap of 0. In other words, only oversupplied participants do not enter into the calculation:

$$JM1 = \sum_{i=1}^{n} \sum_{j=i+1}^{n} \left| (\omega_i - v_i) - (\omega_j - v_j) \right|, \text{ where } \omega_i \leq v_i \text{ and } \omega_j \leq v_j$$

Hence, if there are three households needing 90 m^2 each, and household 1 gets 90 m^2 (need gap 0 m^2), household 2 60 m^2 (need gap –30 m^2) and household 3 30 m^2 (need gap –60 m^2), then the injustice is $|0 \text{ m}^2 - -30 \text{ m}^2| + |0 \text{ m}^2 - -60 \text{ m}^2| + |-30 \text{ m}^2 - -60 \text{ m}^2|$ and thus 120 m^2.

Miller is well aware that his measure is not without shortcomings. Among other things, he mentions that it allows for reaching perfect justice by decreasing the endowment of a recipient because such a decrease may equalise unmet need (cf. Miller 1999: 219). If there are the same three households again, and we reduce the housing space of 1 and 2 to 30 m^2, i.e. household 3's space, then the differences in unmet need fall to 0 m^2, entailing that the new distribution is perfectly just. As Miller (1999: 220) himself diagnoses, the problem here is that, although such a behaviour complies with the principle that need gaps should not differ, it violates

a second principle seeming to be essential for need-based justice, namely that unmet need is to be reduced.

The latter principle is the one introduced in the previous section by reference to Plato. Miller's diagnosis could thus be reformulated by saying that his index captures the comparative conception of Aristotle to the exclusion of Plato's noncomparative conception. Note, however, that Nicole Hassoun (2009: 262) ascribes recognition of the Platonic ideal to Miller. In her view, Miller does not simply equate need-based injustice with inequality in need gaps but "adds the total amount of remaining need to this inequality to give a score for need improvement".[6] Miller's index would then read as follows:

$$JM2 = JM1 + \sum_{i=1}^{n} |(\omega_i - v_i)|, \text{ where } \omega_i \leq v_i \text{ and } \omega_j \leq v_j$$

For the three-households scenario, the injustice value thus increases by the unsatisfied needs of households 2 and 3, i.e. 90 m².

Hassoun's interpretation is in conflict with most of what Miller writes about his measure. Among other things, it does not dovetail with the already cited remark that, on his account, "injustice is reduced to zero when people end up at the same relative point on the scale of need" (Miller 1999: 219). On the other hand, Hassoun is able to explain the injustice values assigned by Miller (1999: 218) when he discusses a concrete example. In one of his scenarios, there is one person lacking 100 units and nine persons lacking nothing. The overall inequality in need-fulfilment is thus 9 × 100 (= 900), but Miller offers 1000. Similarly, the other scenario has six individuals lacking 50 units and four lacking nothing, with the result that the overall inequality is 6 × 4 × 50 (= 1200) whereas Miller assigns 1500. Miller's values make sense, however, if we add unsatisfied need because the latter is 100 in the first and 300 in the second scenario.

More important than the hermeneutic question is whether Hassoun's Miller-like index *JM2* solves the above-mentioned problem. Unfortunately, it does not (cf. Hassoun 2009: 263f.). Just consider the three households needing 90 m² each. If one of them has 90 m², the second 60 m² and the third 30 m², *JM2* offers an injustice value of 210 m². But if we downgrade households 2 and 3 to 30 m², there is no inequality in need gaps anymore, with the result that the remaining injustice is due to nothing but unmet need and thus amounts to only 180 m².

As a second challenge, Miller (1999: 219) mentions that his index "is sensitive to changes in the number of people who are not themselves in need". By way of illustration, take the previous example and let there be a further household whose need is satisfied. Then, according to both *JM1* and *JM2*, the injustice increases: from 120 m² to 210 m², or from 210 m² to 300 m². Miller argues that this is how it should be because the undersupplied can make another complaint about being treated worse than other participants. I agree with Miller on allowing such

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[6] Hassoun's summand corresponds to a poverty index developed by the US Social Security Administration. The so-called *aggregate poverty gap* simply adds the sum of the differences between the incomes of the poor and the poverty line (cf. Seidl 1988: 90).

changes to have an *influence* on the justice evaluation. But his specific argument for a *decrease* of justice works only within a purely Aristotelian framework. After all, under the terms of the Platonic ideal, the situation could be regarded as becoming better because the average amount of unmet need grows.

There are further difficulties not mentioned by Miller. Remember that, to measure unmet need, he makes use of the *difference* between what the person has and what she needs. On the other hand, when later recapitulating his considerations, he formulates the underlying principle in terms of the corresponding *ratio*: "if my needs are half-satisfied, so should yours be" (Miller 1999: 221). These notions are equivalent if the individuals have homogenous needs, but they drift apart for heterogenous needs. Just consider two households requiring 45 m^2 and 90 m^2 of housing space. The first one is endowed with 30 m^2 and the second one with 60 m^2. Then the gap for the first one is 15 m^2 and thus smaller than the 30 m^2 gap for the second one; but both of them have two-thirds of what they need. Hence, on Miller's original difference-based calculation the inequality in unmet need would be 15 m^2 while on Aristotle's ratio-based calculation there is no inequality.

Since Miller utilises the difference between endowment and need, his index provides values in the unit by which the corresponding good is measured. If the good is, say, housing space measured in m^2, then justice will also be measured in m^2; and if the good is vitamin C measured in mg, then justice will be measured in mg. This is odd in itself because neither m^2 nor mg seem to be meaningful justice units (cf. Jasso 1978: 1403). In addition, it has the unwelcome result that Miller's measure is not scale-invariant, i.e. immune to changes in the unit in which the good is measured. For example, its values are different depending on whether we measure housing space in m^2 or in in^2.

These difficulties would not arise if unmet need were computed by Aristotle's *ratio* of endowment to need. First, the particular unit cancels out then so as to provide a bare number for injustice. Secondly, unmet need will be scale-invariant because, if endowment and need are multiplied by the same quantity, this quantity cancels out and the ratio remains the same.

For a final drawback, note that Miller (1999: 213) restricts the scope of his index to "situations of scarcity, when the resources we have cannot meet everyone's need in full" (cf. 214, 217, 221). This description does not only include situations with undersupplied and exactly supplied individuals but also situations with oversupplied recipients. For example, if the total amount of housing space is 250 m^2 but there are three families needing 90 m^2 each, then we have a situation of scarcity because it is not possible to satisfy all needs. Nonetheless, one of the families might be oversupplied because it has got 120 m^2 while the remaining two are undersupplied because one of them has got 70 m^2 and the other one 60 m^2. But if we set *JM1* or *JM2* onto scenarios of this type, they both fail. For no matter how strong the oversupply is, it will not enter into the calculation. Based on the two need gaps of 20 m^2 and 30 m^2, *JM1* will offer an injustice of 10 m^2 and *JM2* 60 m^2, regardless of whether the third family has 120 m^2 or, say, 240 m^2. But the

latter situation is more unfair with respect to needs because all requirements could easily be met.

Since Miller applies his measure merely to distributions with no oversupply, one may speculate that this is what he meant when constraining it to "situations of scarcity". However, to restrict a measure of need-based justice in this way means to substantially reduce its usability. For this and the former reasons, I prescind from Miller's approach and give my attention to an account from sociology.

4 Jasso's measure

Guillermina Jasso proposed a general theory of justice which may smoothly be transformed into a theory of the need-based variety.[7] Her theory includes a so-called "justice evaluation function" on which an index is based. The justice evaluation function gives the degree of justice pertaining to the endowment of a single individual. This degree results from comparing the *actual* endowment ω_i with the *just* endowment, viz. what the individual should get if the distribution were fair. In close proximity to Aristotle, Jasso argues that the degree of justice is to be identified with the natural logarithm of the ratio between actual and just endowment.

The justice evaluation function leaves open how the just endowment is to be determined. To obtain a measure of *need*-based justice, however, it seems that we merely have to identify it with the *need* v_i of the individual at hand:

$$JEF_i = \ln (\omega_i / v_i)$$

This measure emits the value 0, standing for perfect justice, if endowment and need are identical; it provides negative numbers in case of undersupply and positive numbers in case of oversupply. Secondly, it is monotonic both in ω_i and v_i: the higher the endowment, the greater the justice value; and the higher the need, the lower the justice value. Thirdly, it is scale-invariant, i.e. immune to changes in the unit in which the good is measured. For example, it gives the same value regardless of whether we are talking about a person who needs 100 g and gets 80 g of a substance or a person who needs 0,2205 lbs and gets 0,1764 lbs. Fourthly, the logarithm function sees to it that undersupply is more unjust than oversupply of equal absolute value. If a person needs 100 g, then giving 80 g is more unfair than giving 120 g.

But how to aggregate the values given by the justice evaluation function in order to arrive at a value for a whole distribution? Jasso (1999: 144) discusses two candidates, the arithmetic mean of the individual degrees of justice and the arithmetic mean of their absolute values:

$$JJ1 = \Sigma_i \ln (\omega_i / v_i) / n$$
$$JJ2 = \Sigma_i |\ln (\omega_i / v_i)| / n$$

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[7] Cf., inter alia, Jasso 1978, 1980, 1990, 1999, 2007, Jasso and Wegener 1997.

Jasso (1999: 143) herself points out a serious difficulty with *JJ1*: it merges positive values for oversupply and negative values for undersupply and thereby allows for unfortunate compensation. Just compare a distribution exactly satisfying the needs of two persons with a distribution in which one of them gets half of what she needs and the other one twice as much. Since ln 1/2 = –ln 2, the mean will be the same, namely 0. But the latter distribution is obviously not as just as the former.

JJ2 is superior in this respect because the arithmetic mean of the absolute justice values is 0 only if there is neither undersupply nor oversupply. On the other hand, *JJ2*'s value may be the same regardless of whether there is only undersupply or only oversupply. For example, the injustice emerging from two individuals endowed with half of what they need is identical with the injustice given by two individuals possessing twice as much.

Secondly, just as Miller's index *JM1* is purely Aristotelian in not factoring in whether needs are satisfied in the first place, so Jasso's indexes are purely Platonic in just aggregating, but not comparing, the individual amounts of need-satisfaction. Let there be 130 m^2 of space for two households, one of them being quite child-rich and therefore needing 150 m^2 and the other one consisting of only one person needing 45 m^2. If the large household receives 100 m^2 and the single person 30 m^2, the justice value is –0.41. If the former receives 85 m^2 and the latter 45 m^2, the value is –0.28, meaning that this distribution is less unfair. But this is odd because, within the first distribution, the households' needs are both satisfied to the same degree whereas, within the second distribution, one of them gets what it needs while the other one is sitting worse than within the first distribution.

Thirdly, the individual values of the justice evaluation function are subject to a similar problem (cf. Springhorn 2017). If the child-rich family does not get out of its scarce flat while the oversupply of the single person rises, the family's situation gets more and more unjust. But the value of *JEF* remains the same because it depends on nothing but the family's endowment and need and is thus thoroughly noncomparative. To sum up, although Jasso's theory has some advantages over Miller's because it does not start with the difference but the ratio of endowment and need, it is insufficient, too, because it ignores the comparative dimension attached to the Aristotelian conception of justice.

5   The Plaristonic measure

The measure I would like to propose combines the Platonic and the Aristotelian conception and will therefore be called *Plaristonic*. The underlying idea is that need-based *justice* is different from need-*satisfaction*. It is surely relevant whether and how much needs are met. This is the Platonic part of the measure. But need-based justice does not exhaust itself in need-satisfaction because it also includes *equality*, with 'equality' not meaning sameness of endowments in the sense of naive egalitarianism but equal need-satisfaction. This is the Aristotelian part of the

measure. Briefly, a distribution is just if and only if it conforms to both the Platonic and the Aristotelian ideal by (i) satisfying the needs of all participants and (ii) satisfying them to the same degree.

To convert this *qualitative* conception into a *measure*, deviations from the given ideals have to be quantified. That is, the notion that a distribution is the more unjust the more it diverges from these ideals has to be casted in a mathematical mould. My proposal is twofold. It consists, first, of a *general recipe* for designing measures incorporating both the Platonic and the Aristotelian ideal and, secondly, a *specific measure* developed after this recipe. The recipe lists six ingredients:

(1) We need a function S_i for measuring need-satisfaction. This function provides numbers representing how much an individual i's need is satisfied. Its arguments are i's endowment ω_i and its need v_i.

(2) There must be a function P_i saying how much the need of an individual should be satisfied according to the Platonic ideal.

(3) Likewise, we need a function A_i for the need-satisfaction prescribed by the Aristotelian ideal.

(4) The next step consists in finding a function DP for measuring how much, on average, the individual degrees of need-satisfaction diverge from the satisfaction advocated by the Platonic ideal. The arguments of this function are the values of S_i and P_i for all i.

(5) The same holds for the Aristotelian part: there must be a function DA telling us how much, on average, the need-satisfaction within the whole group deviates from the Aristotelian ideal. The arguments of this function are the values of S_i and A_i for all i.

(6) Finally, to combine both kinds of deviation, a function is needed merging the values of DP and DA. Since its output is the deviation from both ideals, this function is nothing but the wanted Plaristonic measure of need-based justice JPA.

So much about the recipe. In what follows, I propose concrete specifications of the ingredients.

Ad (1). What could be an adequate function for measuring need-satisfaction? Although Jasso's logarithm of the ratio between endowment and need is not geared for measuring need-based *justice*, it proves suitable for measuring need-*satisfaction*. First of all, it is unit- and scale-invariant. Since endowment and need are measured in the same unit, the unit cancels out; and if endowment and need are multiplied by the same factor, then this factor also cancels out. Secondly, the function's values are intuitively accessible because they are negative in the case of undersupply and positive in the case of oversupply. Thirdly, this function is monotonically increasing in the endowment and monotonically decreasing in the need. That means, if an individual receives more, then its need is satisfied stronger; and if it needs more, then there is less need-satisfaction. Fourthly, the

logarithm arranges it so that having half (one third, a quarter etc.) of what one needs is directly on a par with having twice (three times, four times etc.) as much as one needs. For example, if a person needs 100 g of a substance, then giving 50 g leads to a need-satisfaction of –0.69 whereas giving 200 g results in a need-satisfaction of +0.69. For these reasons, my measure of need-satisfaction will be Jasso's logarithm: $S_i = \ln(\omega_i / v_i)$.[8] Since division by 0 is not allowed, this means restricting the measure to cases in which every individual requires at least a small amount of the corresponding good. Furthermore, an endowment of 0 will be captured by the limit $\ln(\omega_i / v_i)$ strives towards when ω_i is getting smaller and smaller, i.e. $-\infty$.

Ad (2). After a measure of need-satisfaction is given, the question is how to compute the degree of need-satisfaction prescribed by the Platonic ideal. Remember that there are two Platonic conceptions. According to (PC1), the ideal is to ensure exact need-satisfaction, i.e. neither undersupply nor oversupply. Hence, (PC1) regards identity of endowment ω_i and need v_i as the ideal, entailing that the perfect degree of need-satisfaction is ln 1 and thus 0. (PC2), on the other hand, is more generous in only ruling that there should be no undersupply, with the consequence that oversupply is just as fine as need-satisfaction right on the money. Consequently, ω_i may be identical with or greater than v_i, so that the ideal is a degree of need-satisfaction of at least 0. For the reasons given in section 2, I prefer (PC2) and thus $P_i \geq 0$ for all individuals i.

Ad (3). The next issue up on the agenda is perfect need-satisfaction within the Aristotelian framework. The Aristotelian ideal also comes in two varieties differing in their treatment of oversupply. (AC1) is more demanding insofar as it states that degrees of need-satisfaction should be equal independently of whether participants have less or more than they require. In contrast, (AC2) asks for equally fulfilled needs only in the case of undersupply. If all individuals are endowed with more than they need, (AC2) is satisfied with any distribution whatsoever. As pointed out in section 2, my starting point are cases in which both pleasure and harm vary in proportion to need. I therefore assume (AC1), entailing

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[8] One may also try Miller's difference between endowment and need or Aristotle's ratio of these values. However, the difference does not satisfy the first and the fourth requirement while the ratio does not satisfy the second and the fourth requirement. – Eriksson (2012) examines whether the difference, the ratio or the natural logarithm of the ratio better fits experimental data on justice evaluations. – Perhaps surprisingly, analogous proposals have been discussed in the literature on probabilistic (or Bayesian) measures of confirmation. The qualitative idea behind these measures is given by the so-called relevance criterion stating that data B confirms hypothesis A if B's truth increases the probability of A's truth, i.e. $P(A|B) > P(A)$, while B disconfirms A if B's truth lowers the probability of A's truth, i.e. $P(A|B) < P(A)$. The resultant quantitative question is how to measure such a change in probability, and here we find answers analogous to the measures of need-satisfaction just mentioned: Gillies (1986) and Jeffrey (1992) rely on the difference $P(A|B) - P(A)$; Horwich (1998) and Schlesinger (1995) prefer the ratio $P(A|B) / P(A)$; and Milne (1996) advocates the logarithm of this ratio. The place of the endowment is here taken by the posterior probability and the place of the need by the prior probability.

that, for both scarcity and excess, everyone should be subjected to the same degree of need-satisfaction.

But how to calculate this degree? Fortunately, this can be done by comparing the total amount of the good $\sum_i \omega_i$ with the total need of the recipients $\sum_i v_i$. For the logarithms of the ratios between individual endowments and needs are identical just in case the imbedded ratios equal $\sum_i \omega_i / \sum_i v_i$. For example, if there are three families requiring a housing space of 60, 90 and 120 m^2 each and therefore 270 m^2 in total, but there are only 180 m^2 to distribute, then equal need-satisfaction is given through the ratio 180 m^2 / 270 m^2, viz. 2/3. The first family should therefore receive 40 m^2, the second 60 m^2 and the third 80 m^2. According to (AC1), the best possible distribution is thus the one in which all needs are met to the degree $\ln(\sum_i \omega_i / \sum_i v_i)$. Hence, the wanted function A_i is $\ln(\sum_i \omega_i / \sum_i v_i)$ for all individuals i.

Ad (4). The next steps consist in measuring how much, on average, the actual degrees of need-satisfaction diverge from the Platonic ideal. I will utilise a standard formula for computing how much actual values a_i deviate from a reference value r by applying the *mean absolute deviation*:

$$\frac{1}{n} \sum_{i=1}^{n} |a_i - r|$$

According to the Platonic conception (PC2), an individual should receive at least as much as it needs, so that the ideal is a need-satisfaction of 0 or more. Consequently, there is deviation from the ideal only if the need-satisfaction of an individual is smaller than 0. This may be captured by using a minimum function for individual deviations: $|a_i - r| = |\min(S_i - 0, 0)| = |\min(\ln(\omega_i / v_i), 0)|$. For if i's endowment ω_i is smaller than its need v_i, then $\ln(\omega_i / v_i)$ is smaller than 0; and if ω_i is higher than v_i, then 0 is smaller than $\ln(\omega_i / v_i)$. The average deviation from the Platonic ideal thus reads as follows:

$$DP = \frac{1}{n} \sum_{i=1}^{n} \left| \min\left(\ln \frac{\omega_i}{v_i}, 0 \right) \right|$$

Ad (5). The same must be done for the average deviation from the Aristotelian ideal. Since I see no reason for using a different function here, I deploy the means absolute deviation again. The Aristotelian conception (AC1) states that all individuals are perfectly supplied just in case the degree of need-satisfaction is the same for all. Since this degree is given by the logarithm of the ratio between total amount of the good to total need of the recipients, we have to measure how much the actual degrees of need-satisfaction differ from $\ln(\sum_i \omega_i / \sum_i v_i)$. By making use of the mean absolute deviation, we arrive at:

$$DA = \frac{1}{n} \sum_{i=1}^{n} \left| \ln \frac{\omega_i}{v_i} - \ln \frac{\sum_j \omega_j}{\sum_j v_j} \right|$$

Ad (6). Finally, the two measures of average deviation from the ideal have to be merged in order to obtain a measure of average deviation from both ideals. I propose to follow the standard procedure by making use of a weighting function with a weight a such that $0 \leq a \leq 1$. Additionally, I prefix a minus sign in order to obtain a negative number in case of a deviation:

$$JPA = -\left[a\,DP + (1-a)\,DA\right]$$

The higher the weight a is, the more the degree of need-based justice depends on deviation from the Platonic ideal. If a is greater than 0.5, then need-based justice is dominated by the Platonic ideal; smaller values mean dominance of the Aristotelian ideal. For the sake of simplicity, I will use the value 0.5, entailing that deviations from both ideals have the same influence. Fully spelled out, the Plaristonic measure of need-based justice reads as follows:

$$JPA = -\left[\frac{1}{n}\sum_{i=1}^{n}\left|\min\left(\ln\frac{\omega_i}{v_i}, 0\right)\right| + \frac{1}{n}\sum_{i=1}^{n}\left|\ln\frac{\omega_i}{v_i} - \ln\frac{\sum_j \omega_j}{\sum_j v_j}\right|\right]/2$$

This function gives the mean of the average deviation from the Platonic and the average deviation from the Aristotelian ideal.

6   Characteristics of the Plaristonic measure

The Plaristonic index of need-based justice enjoys many advantages. First of all, it is both unit- and scale-invariant because the underlying measure of need-satisfaction is based on the ratio of endowment to need, entailing that units cancel out.

Secondly, the Plaristonic measure has a maximum of 0 which is taken to stand for justice while numbers below 0 represent growing injustice. Feinberg (1974, 297) wrote in a footnote of his 'Noncomparative Justice':

> As many writers have observed, it is much more convenient, when doing moral philosophy, to speak of injustice than to keep to the positive term, justice. That greater convenience is an undeniable fact, but I shall not speculate here whether it has any theoretical significance.

I think it has theoretical significance. There are clearly different degrees of *injustice*, and we refer to them by stating, e.g., that a distribution is 'more', 'less', 'only slightly' or 'highly unjust'. But such gradations do not make sense in the case of *justice* because a distribution cannot be more just than just. Of course, we use formulations such as 'This is more just' or 'This is less just'. A closer look reveals, however, that 'more just' means *less unjust* and 'less just' *more unjust*. For example, if an undersupplied family receives more housing space but still remains below its need-threshold, this endowment is more just in the sense of being less unjust. The negative term 'injustice' is more convenient than the positive term 'justice' because it allows for gradations to be taken literally.

Thirdly, if at least one of the recipients is undersupplied, it is not possible to reach the maximum. For even if the other recipients are equally undersupplied, in order that *DA* (the average deviation from the Aristotelian ideal) is 0, *DP* (the

average deviation from the Platonic ideal) is higher than 0. Furthermore, the stronger the undersupply is, or the more undersupplied there are, the lower is the highest possible justice value.

Fourthly, the measure *JPA* is monotonically increasing in the endowment of the worst-equipped individual, provided that it remains worst-equipped. That means, if the endowment of this individual increases but its need is still satisfied worst, then the distribution becomes less unjust. For, on the one hand, if the individual starts undersupplied, then its degree of need-satisfaction grows, and thus the average deviation from full need-satisfaction, i.e. *DP*, gets smaller. On the other hand, if the individual starts supplied, then the deviation from the Platonic ideal, i.e. *DP*, cannot improve anymore. However, in both cases, the degrees of need-satisfaction move together, entailing that the deviation from equal need-satisfaction, i.e. *DA*, gets smaller. Taken together, since at least the Aristotelian part of the measure registers a smaller deviation from the ideal, justice increases.

Fifthly, it is almost universally assumed that an index of *poverty* has to conform to the following monotonicity axiom: if the income of a poor individual increases without crossing the poverty line, there is less poverty (cf. Seidl 1988: 92f.). Applied to need-based justice, this would mean: if the endowment of an undersupplied recipient increases without crossing the need-threshold, there is less injustice. This is a different kind of monotonicity than the one previously discussed because it holds for *all* undersupplied individuals, whether worst-equipped or not, until their endowment reaches the *need-threshold*.

The *Platonic* part of *JPA* satisfies this axiom. If the endowment of an undersupplied individual grows without resulting in satisfaction of its need, then *DP* registers less injustice because there is higher need-satisfaction. If the individual's need is satisfied, there is no further increase because the corresponding deviation from the ideal stays at 0.

However, the *whole* measure *JPA* does not show this type of monotonicity, the reason being that *more* need-satisfaction may be accompanied by *less equal* need-satisfaction. Let there be two individuals with a need of 10 units. The endowment of the first individual is fixed at 5 units so that it is undersupplied throughout. The endowment of the second individual starts from 0 units and then grows more and more (see figure 1 where the x-axis displays the endowment of the second individual and the y-axis the degree of need-based justice given by *JPA*). The degree of need-based justice increases until the second individual also receives 5 units because both need-satisfaction and equality of need-satisfaction rise. Now both recipients' needs are satisfied to the same degree. Afterwards, justice remains constant because, although the second individual's degree of need-satisfaction still improves, this is cancelled out by decreasing equality in need-satisfaction. In other words, even though the distribution continues to converge to the *Platonic* ideal of *full* need-satisfaction, it diverges from the *Aristotelian* ideal of *equal* need-satisfaction. When the second individual receives 10 units, she has what she needs, with the consequence that need-satisfaction does not rise anymore. However, since inequality of need-satisfaction still grows, justice starts to

decrease.[9] I take it as an advantage of *JPA* that it does not display the type of monotonicity in question. For although it is quite tempting when it comes to poverty, it does not suit need-based justice because the latter has to be sensitive not only to how much needs are satisfied but also to how equal need-satisfaction is.
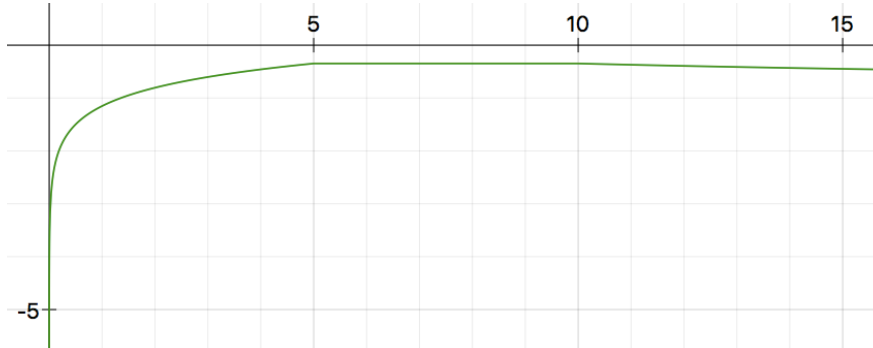
Figure 1: Need-based justice for $v_1 = v_2 = 10$, $\omega_1 = 5$, $\omega_2 = x$.

Sixthly, the Aristotelian side of the measure, viz. *DA*, is monotonically decreasing in the endowment of the best-equipped participant. For if this individual gets more, its degree of need-satisfaction further departs from the other degrees, with the result that equality of need-satisfaction decreases. Again, this does not hold for *JPA* as a whole, because, if the best-equipped recipient is undersupplied, then the decline in equality may be compensated for by the growth in undersupply.

Seventhly, in the context of poverty measurement, it is often assumed that an index should satisfy the following sensitivity axiom: if the income of a poor individual is increased by a fixed amount, then poverty is reduced more the poorer the individual was (cf. Seidl 1988: 95f.). The analogue of this axiom in the field of need-based justice is: if the endowment of an undersupplied individual is increased by a fixed amount, then injustice is reduced the more the more serious the individual was undersupplied.[10]

Again, although the Platonic part of *JPA* fulfils this condition, the measure as a whole does not. If an endowment is boosted, then the corresponding degree of need-satisfaction increases according to $\ln(\omega_i / v_i)$. Since the logarithm is a concave function, the lower ω_i, the higher the increase of the function value. Hence, the average deviation *DP* from the ideal value of 0 will be reduced more if the

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[9] This particular behaviour results, among other things, from using the mean *absolute* deviation for measuring the average divergence from the ideal. The mean *square* deviation, viz. the *variance*, would result in an increase up to an endowment of about 8 units and then a decrease. The reason for this curve is that, when the second individual's need is satisfied to the same degree as the need of the first individual, the growth of its endowment results in an increase in need-satisfaction being *different* from the concurrent decrease in equality of need-satisfaction. Up to 8 units, the increase in need-satisfaction is higher, while afterwards the decrease in equality is higher.

[10] This sensitivity axiom shows some resemblance to the "Priority View" supported by Parfit (1997: 213) and Crisp (2003: 751): "benefiting people matters more the worse off these people are."

endowment is smaller. However, the case depicted in figure 1 shows that the axiom is not satisfied by *JPA* for the reason alone that a boost in the endowment of an undersupplied recipient need not reduce injustice as measured by this formula. If there are two people needing 10 units, and the first one is stuck at 5 units while the second one's endowment is raised starting from 0 units, then injustice is reduced only until the second person also receives 5 units. In the range from 5 to 10 units, injustice remains the same because the diminishing divergence from the Platonic ideal is cancelled out by the growing divergence from the Aristotelian ideal. While an analogous behaviour may be deemed unacceptable in the case of poverty, it goes well with need-based justice because the latter combines degree and equality of need-satisfaction.

Finally, the same holds for a further axiom from poverty measurement. It is assumed that a *progressive transfer*, i.e. a transfer from a richer to a poorer individual, causes less poverty (cf. Seidl 1988: 93-95). Applied to need-based justice, if an individual cedes part of its endowment to an individual whose need is less satisfied, then there is less injustice. Again, this does not hold for the Plaristonic measure. Consider the following endowments and needs:

$$\omega_1 = 50 \text{ units} \qquad v_1 = 100 \text{ units}$$
$$\omega_2 = 100 \text{ units} \qquad v_2 = 1000 \text{ units}$$
$$\omega_3 = 1000 \text{ units} \qquad v_3 = 1000 \text{ units}$$
$$\omega_4 = 1000 \text{ units} \qquad v_4 = 1000 \text{ units}$$

Both the Platonic and the Aristotelian part of *JPA* register a deviation from the ideal of 0.75, entailing that the overall justice is –0.75. Individual 1's need is better satisfied than the one of individual 2 because the former has at least half of what she needs whereas the latter has only one-tenth. However, if individual 1 donates 20 units to individual 2, then both the Platonic and the Aristotelian deviation goes up to 0.83. Hence, there is a justice value of –0.83, so that the progressive transfer results in a less just distribution.

This example also proves that not only the whole index *JPA* but also its parts *DP* and *DA* evade the given transfer axiom. But this is fine given what these parts measure. Since the decrease in need-satisfaction of individual 1 is higher than the increase in need-satisfaction of individual 2, needs are less satisfied on average. And there is more divergence in need-satisfaction through the transfer because, although individual 2 comes closer to the exact need-satisfaction of 3 and 4, individual 1 departs from it to a much higher extent.

7 Summary and outlook

It was argued that a measure of need-based justice should incorporate both the Platonic ideal of *fully* satisfied needs and the Aristotelian ideal of *equally* satisfied needs. Neither Miller's measure nor a straightforward specification of Jasso's measure was able to meet this constraint. Thus, a general recipe for developing indexes taking both ideals into account was proposed. The underlying idea is to

measure the average divergence of the actual degrees of need-satisfaction from the perfect degrees prescribed by the given ideals. By measuring need-satisfaction with the help of Jasso's logarithm of the ratio between endowment and need and by taking the average divergence to be the mean absolute deviation, a specific measure was prepared after this recipe. The Plaristonic measure of need-based justice has many advantages, among them (i) unit and scale invariance, (ii) a maximum of 0 representing justice while values below 0 stand for growing injustice and (iii) refusal of following certain axioms of monotonicity, sensitivity and transfer frequently attributed to indexes of poverty.

Future research will include subjecting the measure to further theoretical and empirical tests. The studies by Weiß et al. (2017) provide judgements on need-based justice to be compared with the corresponding values of the Plaristonic measure. It will also be examined how this measure can be adjusted in order to conform to the Aristotelian conception (AC2) instead of (AC1). While (AC1) states that a distribution is just with respect to needs if and only if all needs are satisfied to the same degree, no matter whether there is under- or oversupply, (AC2) waters down this requirement by not putting any restrictions on cases of general oversupply. It remains to be seen how deviations from this weaker ideal could be mathematised.

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