Sufficientarianism and incommensurability

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Abstract

This paper proposes a sufficientarian theory with an interval of sufficiency levels. I assume that there are upper and lower bounds of sufficiency and that all well-being levels in between can be considered sufficiency levels. This interval reflects the vagueness of the concept of sufficiency. According to the proposed principle, a distribution is morally better than another if and only if, for each threshold within the interval, the headcount of those below the threshold under the former distribution is smaller than that under the latter distribution. This necessarily leads to incommensurability in moral relations. I argue that such incommensurability makes sufficientarian principles invulnerable to some fundamental objections.

Keywords Sufficientarianism · Incompleteness · Transitivity · Incommensurability · Threshold intervals

1 Introduction

The class of theories of distributive justice called "sufficientarianism" has seen substantial development recently (Brown, 2005; Casal, 2007; Crisp, 2003; Frankfurt, 1987).[1] The central idea in these theories, which gives them their name, is to employ a threshold that represents "sufficiency," such that an individual whose well-being level is above or at the threshold is deemed to be sufficiently well-off. Although there are significant differences between sufficientarian theories, a distinguishing feature of this class of theories is that they give absolute priority to those below the

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[1] Shields (2016) provided a comprehensive overview of the literature on sufficientarianism. See also Shields (2012, 2020).

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threshold. This assignment of absolute priority is the very heart of sufficientarianism (Bossert et al., 2022a, b; Crisp, 2003; Hirose, 2016).[2]

Another common feature of current sufficientarian theories is that they require moral relations to be "complete." That is, for any two different distributions of well-being, w and v, completeness holds that either w is morally at least as good as v or v is morally better than w. One may wonder, however, whether this really should be such a strict requirement. The completeness requirement is related to the fundamental assumption in current sufficientarian theories that there is a sharp sufficiency threshold, but if the threshold is vague or fuzzy to some extent (and this does not seem an unreasonable assumption), then moral relations necessarily become incomplete in sufficientarianism. In this paper, I propose to incorporate indeterminacy into the concept of sufficiency by means of a sufficiency interval, and then formulate sufficientarian relations that involve incommensurable well-being distributions.[3] The result is a variety of sufficientarianism that is not vulnerable to certain fundamental objections to current sufficientarian theories.

In the next section, I propose a distributional principle with a sufficiency interval. This interval reflects the vagueness of the concept of sufficiency. I believe that a sufficiency interval is more plausible than a single threshold because there appears to be a truth-value gap with regards to the sufficiency of well-being. That is, even when it is not true that an individual's well-being is sufficient, this does not necessarily mean that it is false. I will also explain the normative implications of the proposed distributional principle with a sufficiency interval. Section 3 compares this sufficiency interval principle with sufficientarian principles with multiple thresholds, emphasizing the differences between them. Section 4 discusses an extension of my proposal. In particular, I examine how distributional concerns about those below the threshold can be introduced into the interval-based principle. The final Sect. 5 presents the conclusions of this study. All proofs of formal propositions are relegated to the appendix.

Before proceeding, I must emphasize that the primary purpose of this paper is to address the question of how to introduce incommensurability and incompleteness into sufficientarianism. For this reason, the paper does not aim to provide a philosophical justification for sufficientarianism per se. Furthermore, for the same reason, my argument is necessarily rather technical. Nevertheless, I believe that this kind

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[2] Although I emphasize the crucial role of absolute priority in sufficientarianism, it should be noted that this characteristic is not unique to sufficientarianism. Rather, there are many other theories that also give absolute priority to some individuals. For example, Rawls (1999) assigns absolute priority to the rights established by the first principle of justice. He wrote that "it is always those with the lesser liberty who must be compensated" (Rawls, 1999: 217–218). See Eyal (2005) for a critical argument of Rawls's prioritization. Furthermore, in his theory of capabilities, Sen (1980, 1982) emphasizes the role of basic capabilities, which are assumed to be satisfied by every individual. See also Nussbaum (2000). Assigning absolute priority to those who do not meet basic capabilities is a natural consideration in the capability approach.

[3] In this paper, I use the term "incommensurability" rather than "noncomparability." Indeed, as Chang (2015) correctly pointed out, incommensurability is inherently a problem limited to the lack of cardinality, while noncomparability captures a broader phenomenon. However, in this paper, which imposes the cardinality of individual well-being, I venture to use incommensurability primarily to examine how the cardinality of moral values is lost in the process of aggregating individual well-being levels.

of technical arguments can be philosophically significant. For example, the fundamental nature of prioritarianism has been explored through a technical argument that connects a class of prioritarian principles with the generalized Lorenz criterion, which constitutes incomplete judgments. Along similar lines, my arguments in this paper take advantage of a fundamental assumption of sufficientarianism, namely, the existence of a sufficiency threshold, to examine how thresholds can be used to establish incomplete social evaluations.[4]

2 Interval of sufficiency levels and incommensurability

In this paper, I assume that individual well-being (or utility) can be represented numerically and is interpersonally comparable. In other words, prudential goodness is characterized by a number, and all numbers in the following represent levels or amounts of well-being (or utility). The well-being level (or utility level) of individual i is represented by w_i. When there are n individuals, a well-being distribution is given by an n-dimensional vector, $w = (w_1, w_2, ..., w_n)$. This framework has been commonly used in theories of distributional justice since Parfit (1997).[5]

A *moral relation* is a binary relation over the set of distributions. The moral relation of one of the most common forms of sufficientarianism, introduced by Frankfurt (1987), is formally defined as follows:

Headcount sufficientarianism with threshold θ: A distribution is morally better than another if and only if the number of those below $θ$ under the former distribution is smaller than the number of those below $θ$ under the latter distribution.

This is stated in the form of a better-than relation for simplicity. (Two distributions are indifferent if and only if they have the *same* number of people below $θ$.[6]) This principle implies that the number of those $θ$ should be minimized. If the number of people is fixed, this is equivalent to a principle that directs to maximize the number of those above or at $θ$.[7] As plausibly shown by Crisp (2003), the fundamental concern is that it follows that a transfer from a super-rich individual to a rich individual may not be an issue for distributive justice (because they are both above the threshold), even if it is progressive. Furthermore, and more concerning, the headcount approach is not sensitive to inequality among those below the threshold either. In response to this concern, Crisp proposed another form of sufficientarianism

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[4] See Sen (1982, 1992, 2004, 2017) for an argument showing how technical arguments on incompleteness can be philosophically significant. In particular, the intersection approach of Sen is a quite natural way of incorporating incompleteness/incommensurability.

[5] See Broome (1993) and Holtug (2010) for this framework's foundation. Using the framework of social choice, Blackorby et al. (2005) showed how only prudential goodness matters to moral goodness.

[6] The morally-at-least-as-good-as relation is given as follows: A distribution is morally at least as good as another if and only if the number of those below $θ$ under the former distribution is smaller than or equal to the number of those below $θ$ under the latter distribution.

[7] While these principles are equivalent when the number of people is fixed, they imply different moral relations when populations with different sizes are compared. See Bossert et al. (2020a).

taking inequality below the threshold into account. It must be noted that many sufficientarians are especially interested in distribution among those below the threshold, but despite that, I will mainly focus on the headcount approach here, although I will return to this topic in Sect. 4. My proposal can be refined by incorporating strong distributional concerns similar to Crisp's, but I think that it is reasonable to start with an extension of Frankfurt's headcount sufficientarianism, which is more straightforward than Crisp's, and which will be more helpful in explaining the essence of the notion of a sufficiency interval.

At this point, it is worth emphasizing that Frankfurt's moral relation is an ordering. (It is a transitive and complete binary relation.) Hence, all pairs of distributions are comparable; there is no incommensurability in the moral relation. The reason for this is that, as long as there is no vagueness of the sufficiency threshold, the number of people below θ is always well-defined.

It has been pointed out that sufficientarianism faces a severe difficulty, as illustrated in the following:

$\theta = 10$.
Distribution α: $w_A = 9$; $w_B = 10000$.
Distribution β: $w_A = 11$; $w_B = 11$.

According to headcount sufficientarianism, distribution β is morally better than distribution α. However, B loses 9989 units of well-being by moving from α to β, while A's gain is only 2 units. That is, sufficientarianism could require an enormous sacrifice by rich individuals for a very small benefit for poor individuals. For critics of sufficientarianism, this extreme sacrifice makes the theory implausible.[8] This critique does not apply to prioritarianism, another theory of distributional justice, which uses diminishing marginal moral weights with respect to individual well-being levels. Because diminishingness is smooth, it would consider an extremely drastic transfer from the rich to the poor to be unacceptable. Indeed, the sacrifice required in case of the above example tends to make the outcome (i.e., the redistribution from α to β) worse from a prioritarian point of view.[9]

While giving absolute priority to a very poor individual is reasonable (according to sufficientarians, at least), the enormous sacrifice by rich people for such a small benefit for an individual below the threshold is not. Consequently, headcount sufficientarianism may face situations in which the required policy solution is simultaneously reasonable and not reasonable, which seems contradictory. This is a fundamental problem for sufficientarianism, but I believe it is a problem that can be

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[8] See, for example, Knight (2015) for criticism from the viewpoint of luck egalitarianism.

[9] See Adler (2012, 2018, 2019), Adler and Holtug (2019), and Weber (2014) for recent arguments on prioritarianism. Prioritarianism is closely related to the theory of inequality measures. Dalton (1920) and Atkinson (1970) indicated how inequality measures can be associated with moral goodness or social welfare.

solved by means of a moral relation with an interval of sufficiency thresholds (rather than a singular threshold), defined as follows:[10]

Headcount sufficientarianism with a sufficiency interval: There is an interval of sufficiency thresholds, $[\theta_L, \theta_H]$, such that a distribution is morally better than another if and only if, for all thresholds θ within the interval, the number of those below θ under the former distribution is smaller than the number of those below θ under the latter distribution.[11]

Note that θ_H is the highest sufficiency level and θ_L is the lowest.[12] All well-being levels between these constitute the sufficiency interval. This principle implies that, for an interval of sufficiency thresholds, a distribution is morally better than another if and only if, for all thresholds θ within the interval, the former is better than the latter for headcount sufficientarianism with threshold θ. That is, multiple Frankfurt relations corresponding to the interval are considered, and their agreement coincides with the better-than relation of the interval-based principle.

To illustrate the moral relation of the proposed principle, suppose that the lowest threshold θ_L is 10 and that θ_H is 50. As seen earlier, distribution α is better than distribution α if a threshold is set to 10. This is true for any threshold that is lower than or equal to 11. However, if the threshold is higher than 11, distribution α is better than distribution β because then one individual is below the threshold in distribution α and two individuals are below the threshold in distribution β. Hence, there is no agreement among the relations corresponding to the thresholds in the interval. As a result, neither is distribution α morally better than β, nor is distribution β morally better than α, and thus, incommensurability arises. Now, it should be stressed that α is *not* indifferent to β. In general, in the theory of binary relations, x is indifferent to y if and only if x is at least as good as y and y is at least as good as x (Sen, 2017: 47). Importantly, the fact that x is not morally better than y does not necessarily mean that y is at least as good as x. Indeed, it is plausible to say that α is *not* at least as good as β and β is *not* at least as good as α in this example. Therefore, the two distributions are not indifferent.

Next, let us consider a comparison between the following two distributions:

$[\theta_L, \theta_H] = [10, 50]$.
Distribution γ: $w_A = 9$; $w_B = 9$; $w_C = 15$; $w_D = 40$; $w_E = 10000$.
Distribution δ: $w_A = 9$; $w_B = 15$; $w_C = 25$; $w_D = 100$; $w_E = 150$.

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[10] Another expression of headcount sufficientarianism with a sufficiency interval ($\theta_L \leq \theta \leq \theta_H$) is as follows: a distribution is morally better than another if and only if for *any* θ ($\theta_L \leq \theta \leq \theta_H$), the number of those below θ under the former distribution is smaller than the number of those below θ under the latter distribution.

[11] The *indifference relation* is defined as follows: a distribution is morally better than another if and only if, for all thresholds θ within the interval, the number of those θ under the former distribution is equal to the number of those below θ under the latter distribution.

[12] Throughout this study, I require the sufficiency interval to be *closed*. That is, both θ_L and θ_H are included in the interval.

In case of this example, for any threshold between 10 and 50, the number of people below the threshold in distribution γ is larger than in δ. Therefore, distribution δ is morally better than distribution γ according to the interval-based principle. The moral relation for the interval-based principle is logically weaker than the moral relation for any headcount principle using a single threshold within the same interval.[13] Put differently, if the sufficiency-interval principle judges a distribution as being morally better than another, any headcount sufficiency principle associated with a threshold within the interval supports this judgment. This logical weakness is a fundamental aspect of the sufficiency-interval approach.

Figure 1 further illustrates how the sufficiency-interval headcount principle works in general. It shows three distributions for populations of 400 individuals each. In P, 100 individuals are below the lowest threshold θ_L, while 300 individuals are above the highest θ_H. On the other hand, Q has 200 individuals below θ_L, and 200 individuals above θ_H. In a comparison between those two, the sufficiency-interval headcount principle implies that P is morally better than Q. However, this is not the case for a comparison of P and Q', which has 200 individuals *between* θ_L and θ_H. Notably, P is better from the viewpoint of higher thresholds, but Q' is better from the viewpoint of lower ones. Therefore, P and Q' are non-comparable.

In the following, I will explain how the sufficiency-interval headcount principle can be a resolution to the aforementioned objection to sufficientarianism.

Proposition 1. *Consider a threshold $\hat{\theta}$ and assume that an individual below $\hat{\theta}$ obtains a small gain such that they will be slightly above $\hat{\theta}$ as a result, and another individual above $\hat{\theta}$ experiences a huge loss but will still be above $\hat{\theta}$. The resulting distribution is morally better than the original distribution according to headcount sufficientarianism with threshold $\hat{\theta}$. There is a sufficiency interval $[\theta_L, \theta_H]$, which includes $\hat{\theta}$, such that the resulting distribution is not morally better than the original distribution according to headcount sufficientarianism with threshold interval $[\theta_L, \theta_H]$.*

Although incommensurability arises, absolute priority, the distinctive property of sufficientarianism, is plausibly preserved, and for that reason, advocates of sufficientarianism have no reason to reject the sufficiency-interval principle. To see that absolute priority holds, let us consider distribution α and a transfer from the rich to the poor. The highest and lowest thresholds are 50 and 10 within the sufficiency interval. As seen earlier, the transfer is unacceptable if the resulting distribution is β. However, if after the redistribution both end up with 51, the transfer

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[13] I define logical weakness as follows: principle X is logically weaker than principle Y if and only if, for all situations x, y, situation x is morally better than situation y according to Y as long as x is morally better than y according to X. This is because the antecedent of X is "stronger" than that of Y. More intuitively, X makes a coarser moral judgment than Y when X is weaker than Y. In the argument in Sen (2017), the concept of a subrelation is used; X is said to be a subrelation of Y if and only if X makes a coarser moral judgment than Y. That is, it must be correct that X is weaker than Y if and only if X is a subrelation of Y. From the viewpoint of a theory of relations, my way of defining logical weakness is natural.

is acceptable by the sufficiency-interval principle. That is, as long as the gain of the poor is not small (and the loss of the rich does not imply dropping below θ_H), absolute priority is given to the poor. Indeed, this is "absolute" because as long as the poor get a gain that makes them jump from the lower bound to the upper bound of the interval, the poor's gain is prioritized over whatever loss the rich may suffer.

However, there are restrictions to absolute priority in interval-based sufficientarianism. In contrast, Frankfurt's proposal assigns absolute priority to all of those below a single threshold. Notice that a tiny jump across the threshold yields a significant increase in moral value (i.e., a change from a to b, with $a < \theta < b$). Our interval-based approach admits such an increase in moral value only when a well-being level jumps from below the lower bound of the interval to above its higher bound (i.e., a change from c to d, with $c < \theta_L < \theta_H < d$). This means that the well-being of the rich is protected, because if their well-being after redistribution drops below θ_H it is not assumed to be morally relevant. In this way, my proposal defeats one common criticism of sufficientarian theories, provided that the highest threshold θ_H is appropriately high.

An important implication of the sufficiency-interval principle is that the moral relation is incomplete. That is, there might be indeterminacy in the determination of moral relations. This is a consequence of the threshold interval. If θ_L is equal to θ_H, then the interval disappears in the sense that $[\theta_L, \theta_H]$ becomes a single point that represents the sufficiency threshold. In that case the interval-based principle becomes identical to Frankfurt's proposal, in which moral relations are always complete. The interval principle can be regarded as a generalization of Frankfurt's sufficientarianism, such that Frankfurt's principle can be obtained as a "limit" of the interval principle when the upper and lower bounds of the interval approach each other.

It must also be noted that the width of the interval has important (and obvious) implications for the incompleteness of the moral relations: the wider the interval, the more incomplete they become. In other words, more pairs of distributions become incommensurable with respect to the morally better-than relation. This implies that the "degree" of incommensurability is essentially increasing with the width of the sufficiency interval, as formally stated in the following:

Proposition 2. *Consider two sufficiency intervals, $[\theta_L, \theta_H]$ and $[\theta'_L, \theta'_H]$, such that $[\theta_L, \theta_H]$ is wider than $[\theta'_L, \theta'_H]$ in the sense that $\theta_L < \theta'_L$ and $\theta'_H < \theta_H$. Then, a distribution is better than another according to headcount sufficientarianism with $[\theta_L, \theta_H]$ only if it is better according to headcount sufficientarianism with $[\theta'_L, \theta'_H]$. However, the converse is not true. That is, there are distributions that are non-comparable under headcount sufficientarianism with $[\theta_L, \theta_H]$ but comparable under headcount sufficientarianism with $[\theta'_L, \theta'_H]$.*

Bossert and Suzumura (2010) distinguished two classes of properties of moral relations. The first is the class of *richness properties,* which require that the moral relation holds for at least some pairs of distributions. Completeness
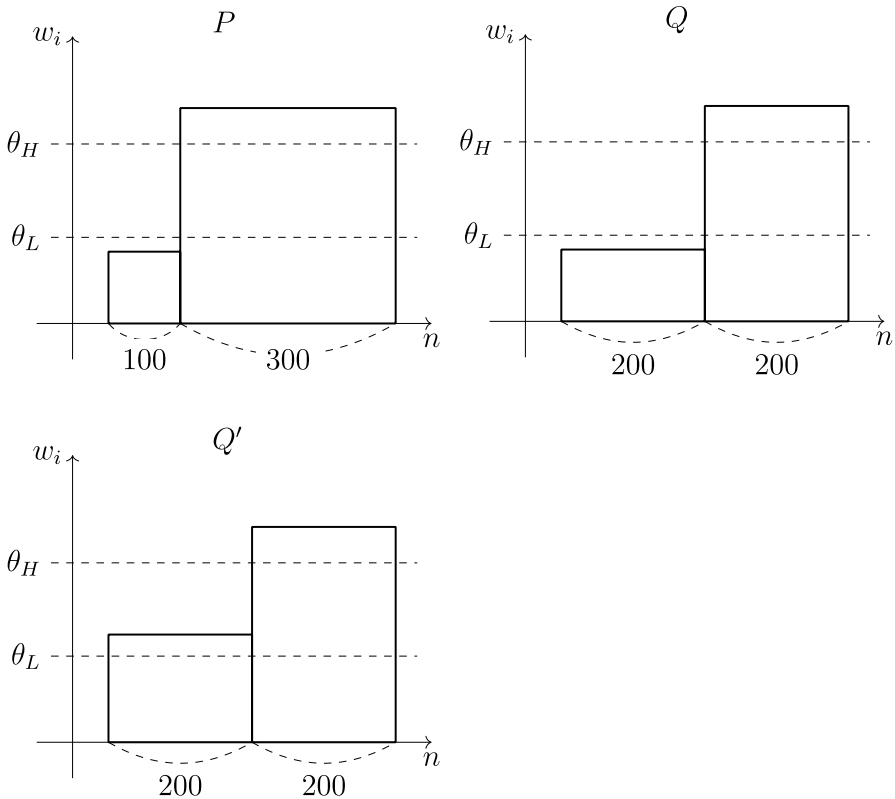
Fig. 1 P is better than Q, but P and Q′ are non-comparable

and reflexivity belong to this class. The second is the class of *coherence properties,* which require the moral relation to hold or not to hold for some pair of distributions when the moral relation holds for a set of pairs of distributions in a certain way. Examples of the (many) properties that belong to this class include acyclicity, (quasi-) transitivity, and Suzumura consistency. Transitivity is one of the strongest properties in this class. Notably, decision-making under transitivity becomes path-independent and, moreover, precludes "money-pumps." Although completeness of moral relations is not satisfied by the interval principle, this principle can always generate a transitive morally better-than relation, formally stated as follows:[14]

Proposition 3. *For any sufficiency interval* $[\theta_L, \theta_H]$*, headcount sufficientarianism with* $[\theta_L, \theta_H]$ *generates a transitive moral relation.*

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[14] This is the fundamental observation of the intersection approach of Sen (1992). See also Cato (2020).

I have shown above that the sufficiency-interval approach addresses one fundamental objection to sufficientarianism, and I have discussed several key properties and implications of this approach, but, I have not yet addressed the question whether it is actually plausible to have a threshold interval rather than a single threshold. Nor have I elaborated on what having such an interval means. As mentioned above, there is some indeterminacy involved in sufficiency in the sense that someone's well-being level being *not* sufficient does not necessarily mean that their well-being level is *insufficient*. Or to put this in other terms, even if it is *not true* that someone's well-being level is sufficient, it might *not* be *false* that their well-being level is sufficient. Hence, there is a truth-value gap, which causes indeterminacy of sufficiency. It is not always determinate whether someone has enough. There are some important aspects of this indeterminacy that need to be considered, however. First, if the well-being of an individual is sufficient under state x, it seems plausible to assume that their well-being will still be sufficient when they get some gain (x^+), and second, if the well-being of an individual is insufficient under state x, their well-being will still be insufficient when their well-being decreases (x^-). The first implies that there is a greatest lower bound of well-being such that any higher well-being is always considered to be sufficient. The second implies that there is a least upper bound of well-being such that any lower well-being is always considered to be insufficient. These two bounds create an interval of sufficiency: outside these bounds, well-being will either be sufficient or insufficient, and thus, determinate, but between these bounds sufficiency is indeterminate. This is how indeterminacy leads to the sufficiency interval.

A second argument in favor of an interval has to do with the fundamental problem of determining a threshold for sufficientarianism (Casal, 2007; Huseby, 2010, 2020).[15] One could, for example, set the threshold to correspond to the well-being level in which all basic needs are satisfied.[16] Or it could be set to take things like friendship, respect, or flourishing into account.[17] The former corresponds to a lower threshold; the latter to a higher one. There are many different ways to set a sufficiency threshold, and many different arguments to support those settings. Furthermore, there may be multiple types of thresholds that have their relevance in particular contexts, and therefore, it is not unreasonable to assume that there are various plausible thresholds.[18] Some of these multiple thresholds are close to indistinguishable at the level of well-being. Moreover, there is the relative vagueness of the concept of sufficiency, which is reflected in an ongoing debate on the concept. If one accepts a certain level of well-being, say θ, as a threshold for sufficiency, then is it reasonable to deny that $\theta - 0.1$ is insufficient? Or what if someone reaches $\theta - 0.01$? Because thresholds (can) call for fairly extreme judgments about distributional concerns, it is not implausible for the concept of sufficiency to be vague or fuzzy, and a threshold interval is a

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[15] Casal (2007, p. 306) wrote, "It is… unsurprising that sufficientarians should find great difficulty in defining a threshold. Conversely, it is surprising that they attach such importance to a threshold when they are so uncertain about its location.".

[16] For example, Widerquist (2010) argued that the threshold corresponds to the social minimum level.

[17] It would be interesting to associate this with Maslow's hierarchy of needs, according to which human needs can be categorized in different stages (Maslow, 1943).

[18] Notably, a recent development shows that it is not easy to determine a unique threshold; see, for example, Huseby (2020).

reasonable way to deal with and express that vagueness. The layers of thresholds are overlapped by the relative vagueness to constitute this interval.

A related problem is that thresholds ignore differences in individual circumstances and may seem to be morally arbitrary. It is difficult to impose a unique threshold that can be universally applied to all people in society. Even if people share cultural views and values, there can be a plurality of ideas about what the threshold is (and should be), and such heterogeneity among people may lead to (apparently) arbitrary thresholds. Of course, cognitive dissonance among people can easily cause heterogeneity, but, the problem is compounded by a more essential difference. Even if cognitive dissonance is completely resolved (for example, by publicly providing the relevant information), there can be heterogeneity among people with regards to what the threshold is (indeed, heterogeneity of interpretations of a threshold by well-informed sufficientarians underlines this very point). In the presence of such (apparent) arbitrariness, it is reasonable to assume an interval of thresholds instead of a single, unique threshold.

It is worthwhile to compare this issue to the notion of a critical level in population ethics, which is the well-being level for which the addition to the population of one more individual at that well-being level is indifferent; see Parfit (1982, 1984), Ng (1989), Arrhenius (2000), and Bossert et al. (2022c) for the arguments on population ethics. That is, the addition of an individual whose well-being level is higher than the critical level is preferable, while the addition of an individual with a lower well-being level is not. Recently, the importance of incommensurability has been increasingly recognized because of the repugnant conclusion. One promising way to incorporate incommensurability is to have a critical band, which is an interval of critical levels. Arguably, the critical band works very similar to the sufficiency threshold interval. This is because a sufficiency threshold tends to coincide with a critical level (Bossert et al., 2022a, b).

It is worth noting that the interval approach also resolves the *threshold objection* raised by Arneson (2007) and Casal (2007), which is one of the most fundamental criticisms of sufficientarianism (see Huseby, 2020). According to the threshold objection, it is hard to defend the claim that there is a threshold such that (re-) distribution is crucially important below that threshold and completely irrelevant above it.[19] In my proposal, there is an interval of thresholds and redistribution is morally significant below the lowest threshold, irrelevant above the highest, and indeterminate in between. Notably, even in the case of the interval-based principle, there is the issue of choosing the highest and lowest thresholds, and in this sense, my proposal is not entirely immune from this kind of objection to sufficientarianism. However, it is more defensible because one does not have to choose a unique threshold from multiple candidates. Moreover, by taking a sufficiently wide interval, this kind of sufficientarianism can stand up to the objections made by Arneson (2007) and Casal (2007). However, I still need to compare my approach to another proposed solution of

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[19] This issue is closely related to the so-called positive and negative theses; see Casal (2007). The positive thesis states that improving the well-being of people below the threshold is morally significant; the negative thesis states that improving the well-being of people above the threshold is morally irrelevant.

their objection. That is, many sufficientarians currently employ a multiple-threshold approach, which is different from my proposal. This is the topic of the next section.

3 Comparison with the existing multiple-threshold approach

Since the work of Casal (2007), approaches to sufficientarianism with multiple thresholds have been proposed. While there are several varieties of such theories, my interval-approach, as outlined in the previous section, differs from all of those. An example of a sufficientarian theory with multiple thresholds is the following:[20]

> *Headcount sufficientarianism with two thresholds*: There are two sufficiency thresholds θ_H and θ_L ($\theta_H > \theta_L$) such that a distribution is morally better than another if and only if (i) the number of those below θ_L under the former distribution is smaller than the number of those below θ_L under the latter distribution, or (ii) the number of those below θ_L under the former distribution is equal to the number of those below θ_L under the latter distribution and the number of those below θ_H under the former distribution is smaller than the number of those below θ_H under the latter distribution.

In relation to condition (ii) of this principle, the following should be noted. Given that the number of people below θ_L under the former distribution is equal to the number of those below θ_L under the latter, the number of people below θ_H under the former distribution is smaller than the number of those below θ_H under the latter distribution if and only if the number of people who are below θ_H but above or at θ_L under the former distribution is smaller than the number of those below θ_H but above or at θ_L under the latter distribution. That is, this principle sequentially prioritizes those who are below the lower threshold and those who are between the lower and higher thresholds. In other words, absolute priority is given lexicographically. Casal (2007) and Huseby (2012, 2020) consider different versions of sufficientarianism with two thresholds, but both attach absolute priority to only one of the two thresholds (see Casal, 2007 and Huseby, 2020), and the version given above suffices for showing what differs between my proposal and theirs.[21]

Importantly, a very small well-being increase such that those who are just below the lower threshold end up just above it is morally significant. By implication, this principle (and most other variants) will accept an immense sacrifice like that by individual B in the redistribution from α to β (under the assumption that θ_L is equal to 10 and θ_H is equal to 50), which was also described above.

$\theta_L = 10$; $\theta_H = 50$.
Distribution α : $w_A = 9$; $w_B = 10000$.
Distribution β : $w_A = 11$; $w_B = 11$.

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[20] Huseby (2012, 2020) provided arguments that support the two-threshold approach.

[21] For example, Casal's version employs the following principle: "the multilevel view grants absolute priority to individuals below a low threshold and then grants them some priority until they exceed a higher threshold" (2007, p. 371).

Here, I also want to consider the following variant of these distributions:

Distribution α': $w_A = 49$; $w_B = 10000$.
Distribution β': $w_A = 51$; $w_B = 51$.

It is easy to see that distribution β is morally better than distribution α and that β' is better than α' according to headcount sufficientarianism with two thresholds. This implies that headcount sufficientarianism with two thresholds is vulnerable to the objection that it may require an immense sacrifice of the rich for the poor. Notably, the multiple-threshold theories of Casal (2007) and Huseby (2012, 2020) are subject to the same objection.[22] Since my proposal is not vulnerable to this objection, it is reasonable to say that the two-threshold principle differs from the sufficiency-interval approach. A key difference is that the existing multiple-threshold approach does not accommodate threshold vagueness. It offers complete comparisons of distributions, while my approach allows incomparability based on the vagueness of thresholds.

While my proposal assigns absolute priority to those who do not have enough, a significant improvement is required. In the previous examples, a move from α to β' is accepted by the sufficiency-interval approach, but neither a move from α to β nor one from α' to β' is accepted as an improvement.[23] The individual below the threshold gains 42 units of well-being in the move from α to β'. At least 40 units of gains by an individual below the threshold are required. In general, the minimal gain to be accepted coincides with the width of the sufficiency interval. That is, the sufficiency-interval approach requires that a change in distribution is morally acceptable only if it is acceptable for any reasonable interpretation or determination of thresholds.

There is another possible variety of sufficientarianism with two thresholds that needs to be considered, however. This variety makes a positive judgment when headcount sufficientarianism with one threshold agrees with headcount sufficientarianism with the other threshold. The unanimous agreement of the two Frankfurt-type sufficientarian principles using two different thresholds is respected. More formally, it can be stated as follows:

Two-threshold intersection headcount sufficientarianism: There are two sufficiency thresholds θ_H and θ_L ($\theta_H > \theta_L$) such that a distribution is morally better than another if and only if (i) the number of those below θ_L under the former distribution is smaller than the number of those below θ_L under the latter dis-

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[22] This objection does not apply to the multiple-threshold principle proposed by Benbaji (2005, 2006), who rejects absolute priority. According to his proposal, moral weights representing relative priority change along with a finite set of thresholds. This is essentially a non-differentiable or non-continuous version of prioritarianism. More precisely, a change of moral values with respect to utility discontinuously changes at different thresholds. Obviously, Benbaji's theory has distributional implications almost akin to prioritarianism. The plausibility of his theory is outside the scope of this paper.

[23] A move from α to β is not considered an improvement, not because is α morally better than β, but because there is no moral ranking between the two. The same is true for the case of α' and β'. Therefore, in a sense, the reason behind my argument is not affirmative, but passive.

tribution, and (ii) the number of those below θ_H under the former distribution is equal to the number of those below θ_H under the latter distribution.

This version is different from the existing multiple-threshold approaches for sufficientarianism, while it is somewhat similar to my interval proposal. Nevertheless, it must be emphasized that my proposal may lead to different moral judgments than this two-threshold variety.[24] Let us consider and compare the following distributions:

$[\theta_L, \theta_H] = [10, 50]$.
Distribution γ': $w_A = 9$; $w_B = 9$; $w_C = 40$; $w_D = 40$; $w_E = 10000$.
Distribution δ: $w_A = 9$; $w_B = 15$; $w_C = 25$; $w_D = 100$; $w_E = 150$.

To begin with, notice that if θ_H is set at 50 and θ_L at 10, then δ is judged to be morally better than γ', because for θ_H and θ_L, the number of people below the threshold under δ is smaller than that under γ'. However, this judgment is not supported by the sufficiency-interval principle, as there is a threshold within the interval that yields the opposite judgment. For example, when the threshold is set at 35, the number of those below the threshold under δ is larger than under γ'. This shows that these two approaches can reach different judgments, especially in cases where there is a large difference in the distributional structure in the middle range between the highest and lowest thresholds between the distributions in question.

The two-threshold-intersection method is, of course, computationally simpler than the interval-based principle. It is sufficient to check the two cases corresponding to the two thresholds, while the interval-based principle has a continuum of thresholds, and technically, one must, therefore, check an infinite number of comparisons of distributions, which is computationally difficult (if not impossible) to implement. It should be noted that the two-threshold-intersection method can be extended to a k-threshold intersection method by setting k thresholds within the interval. If k is sufficiently large, the moral relation using the finite-number-threshold method becomes close to the interval-based approach. In this sense, the two-threshold intersection or its extension can yield a reasonable approximate measure for the valuation of the interval-based principle. Therefore, it can be used as a proxy.

4 Incorporating distributionally sensitive sufficientarian concerns

Thus far, the focus of this study has been the headcount sufficientarian principle. Even if incompleteness is introduced, this approach's fundamental neglect of inequalities below the threshold(s) remains the same. In fact, the sufficiency principle with an interval discussed thus far is completely insensitive to the distribution of well-being below the lowest threshold as well. To see this, let us consider the following example:

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[24] Note that, for any two distributions, if one is morally better than the other according to the interval-based approach, then it is morally better according to this intersection version. That is, the interval-based approach generates a "coarser" moral relation.

$[\theta_L, \theta_H] = [10, 50]$.
Distribution ζ: $w_A = -8$; $w_B = 8$.
Distribution η: $w_A = 0$; $w_B = 0$.

According to the headcount principle with interval [10, 50], these two distributions are indifferent. However, both individuals have the same well-being level under distribution η, but not under distribution ζ. Notably, by reducing the well-being level of individual B by 8 units and increasing the well-being level of individual A by the same amount, distribution η can be obtained from distribution ζ. This means that, below the lowest threshold, headcount sufficientarianism with a sufficiency interval violates the Pigou-Dalton principle, which holds that transferring some benefit from a better-off to a worse-off individual makes the outcome better as long as the total size of the benefits, $\sum_{i=1}^{n} w_i$, does not change.

However, I do not believe that it is necessarily the case that using a sufficiency interval makes sufficientarianism insensitive to distribution problems below the lowest threshold, because it is possible to incorporate distributional sensitivity by using prioritarianism below the lowest threshold. In other words, our method of introducing incompleteness is applicable to a class of distributionally sensitive sufficientarian principles, which has been developed since Crisp's work.[25] According to Crisp (2003), a progressive transfer among those below the threshold is reasonable. He wrote:

> *Distributional sensitive sufficientarianism*: "absolute priority is to be given to benefits to those below the threshold at which compassion enters. Below the threshold, benefiting people matters more the worse off those people are, the more people there are, and the greater the size of the benefit in question. Above the threshold, or in cases concerning only trivial benefits below the threshold, no priority is to be given." (Crisp, 2003, p. 758)

The headcount approach, which has been the focus of this study, does not consider any kind of progressive transfer below the (lowest) threshold since such a transfer does not change the number of people below that threshold; it is not distributionally sensitive to such a transfer. However, it is reasonable to say that it is morally better that people below the (lowest) threshold are relatively more advantaged than less so. Indeed, this idea has been incorporated in many sufficientarian theories since Crisp's work.

The difficulty, of course, is combining the sufficiency interval with distributional sensitivity. A general approach to achieve this is the two-step procedure described as follows. First, take a distributionally sensitive principle defined for each threshold θ in the interval $[\theta_L, \theta_H]$. Second, considering an interval of sufficiency levels, a distribution is judged as morally better than another if and only if, for each threshold θ in the sufficiency interval, the sufficientarian principle with θ judges that the former is better than the latter. That is, moral relations are established if and only if the same

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[25] See Brown (2005), Hirose (2016), and Bossert et al. (2022a, b) for formal representations of distributionally sensitive sufficientarian theories.

judgments are suggested by *all* distributionally sensitive sufficientarian principles in the interval.

To be more precise, let us use formal expressions to represent the principle that I am considering here. After choosing the sufficiency interval, take an increasing, backward bending function g as in the case of prioritarianism. Recall that prioritarianism is defined by summing $g(w_i)$ across all individuals. A typical distributionally sensitive principle is defined by using $\min\{g(w_i), g(\theta)\}$ instead of $g(w_i)$.[26] According to the distributionally sensitive sufficientarian principle with θ, w is better than v (i.e., $w >_{\theta}^{d} v$) if and only if $\sum_{i=1}^{n} \min\{g(w_i), g(\theta)\} > \sum_{i=1}^{n} \min\{g(v_i), g(\theta)\}$. This principle is similar to prioritarianism below the threshold. That is, it exhibits the anti-inequality nature below the threshold.

Note that this distributionally sensitive principle $>_{\theta}^{d}$ is dependent on θ. We can construct an incomplete relation by taking the intersection of all $>_{\theta}^{d}$ associated with an interval $[\theta_L, \theta_H]$. More formally, we can define the following principle:

> *Distributional sensitive sufficientarianism with a sufficiency interval*: There is an interval of sufficiency thresholds, $[\theta_L, \theta_H]$, such that a distribution w is morally better than another distribution v if and only if, for all thresholds θ within the interval, $\sum_{i=1}^{n} \min\{g(w_i), g(\theta)\} > \sum_{i=1}^{n} \min\{g(v_i), g(\theta)\}$, or equivalently, $w >_{\theta}^{d} v$.

Contrary to headcount sufficientarianism with a sufficiency interval, this satisfies the Pigou-Dalton principle below the lower bound of the threshold interval.[27] To see this point, let us consider two individuals, i and j, below the lowest threshold θ_L. Their well-being levels are denoted by v_i and v_j, respectively, such that $v_i > v_j$ Now, assume that a progressive transfer from the relatively richer individual i to the relatively poor individual j is made in such a way that their rank order is preserved, and such that the total well-being remains the same (i.e., for the well-being levels of the two individuals after transfer, w_i and w_j, it holds that $w_i + w_j = v_i + v_j$). The resulting order of the four well-being levels is as follows: $v_i > w_i > w_j > v_j$ and $w_k = v_k$ for all $k \neq i, j$. As well known, the convexity of g guarantees that $g(w_i) + g(w_j) > g(v_i) + g(v_j)$. Since $w_i < \theta$ for all $\theta \in [\theta_L, \theta_H]$, it holds that $\sum_{i=1}^{n} \min\{g(w_i), g(\theta)\} > \sum_{i=1}^{n} \min\{g(v_i), g(\theta)\}$ for all $\theta \in [\theta_L, \theta_H]$. This implies that the distribution w obtained by this progressive transfer is morally better than the original distribution v. This essentially shows that this principle is distributionally sensitive below the lowest threshold.

In the above argument, I considered only transfers below the lowest threshold. This corresponds to case (i) in Fig. 2. In general, there are various types of progressive transfers between the two individuals. The rest of Fig. 2 shows other important kinds of progressive transfers. For example, case (ii) illustrates that the relatively richer individual, i, has a well-being level in the middle of the interval before the

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[26] According to prioritarianism, w is better than v if and only if $\sum_{i=1}^{n} g(w_i) > \sum_{i=1}^{n} g(v_i)$.

[27] This principle does not satisfy Pareto, according to which the outcome is better if all individuals are better off. The violation of Pareto is often considered problematic. It is noteworthy that distributional sensitive sufficientarianism with a sufficiency interval can be extended to be compatible with Pareto. Such an extension is not trivial, however, so I relegated it to the Appendix.

transfer but ends up with a well-being level below the threshold. To show why this transfer is preferable, I divide the interval into two sub-intervals, $[v_i, \theta_H]$ and $[\theta_L, v_i)$. It is easy to see that $w \succ_\theta^d v$ for all $\theta \in [v_i, \theta_H]$. This follows from the same argument as in the case of transfers below the threshold since it is indeed a transfer below the thresholds from the viewpoint of θ in $[v_i, \theta_H]$. For the second sub-interval, $[\theta_L, v_i)$, one needs a different argument. Take any θ in $[\theta_L, v_i)$. The transfer is preferable from the viewpoint of this threshold if and only if $g(w_i) + g(w_j) > \min\{g(v_i), g(\theta)\} + g(v_j) \Leftrightarrow g(w_i) + g(w_j) > g(\theta) + g(v_j)$. As shown in Bossert et al. (2022a: 453, Fig. 2), this inequality holds if g is backward bending. Since θ can be any number in $[\theta_L, v_i)$, the transfer is preferable. In sum, the distribution w obtained by the progressive transfer is morally better than the original distribution v since the transfer is preferable for any threshold in $[\theta_L, \theta_H]$.

Similar arguments to those for cases (i) and (ii) apply to all of the other cases, and thus, the interval principle can naturally incorporate the Pigou-Dalton principle. It is noteworthy that if a recipient is below the lower bound of the interval before a transfer, the transfer is morally preferable according to distributionally sensitive sufficientarianism with a sufficiency interval. This suggests that this approach offers a wide range of possibilities for sufficientarianism. In sum, incommensurability based on a threshold interval can be plausibly incorporated into distributionally sensitive sufficientarianism since Crisp (2003).

5 Concluding remarks

This paper introduced the ideas of incompleteness and incommensurability into the theory of sufficientarianism by means of a sufficiency interval. My arguments show that such a refinement of sufficientarian theories may lead to a wide range of possibilities that help make them less (or even in-) vulnerable to some fundamental objections. In particular, sufficientarianism with a sufficiency interval has more plausible normative features than sufficientarianism with a single threshold. As in the case of sufficientarianism with multiple thresholds, the fundamental problem is determining the upper and lower bounds of the sufficiency interval. That is, a method is needed to set the width of the sufficiency interval and its position with normative plausibility. One possible method is to take the lowest possible threshold that we can imagine as the lower bound and the highest possible threshold that we can imagine as the upper bound. However, there may be a more natural way to narrow down the interval.

As a remaining issue, it is still important to examine the axiological compatibility between sufficientarianism and prioritarianism. Although these are different theories of distributive justice, they have much in common. For example, Benbaji (2005, 2006) proposed eliminating absolute priority from sufficientarianism by introducing multiple thresholds. Examining the compatibility of sufficientarianism and prioritarianism is worthwhile since prioritarianism is not vulnerable to some objections to sufficientarianism. Indeed, prioritarians often argue against absolute priority. While this may seem to suggest that the two theories cannot be perfectly compatible, there
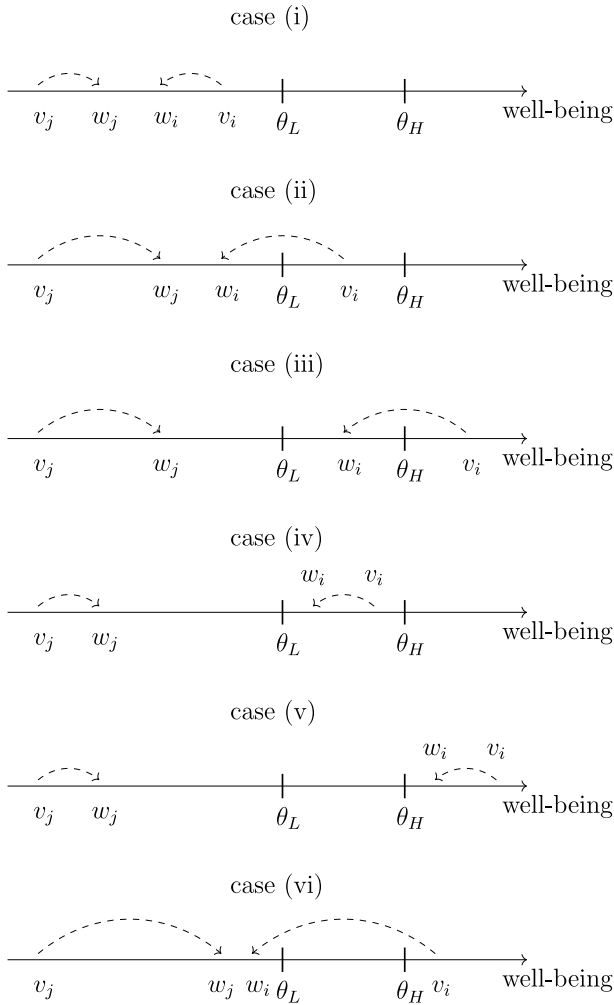
Fig. 2 Six cases for transfers

might be a plausible compromise, or perhaps, hybrids can be developed offering a new (and seemingly very reasonable) approach to distributive justice.

Appendix

***Proof of Proposition* 1.** Consider two distributions, $(w_1, w_2, ..., w_n)$ and $(v_1, v_2, ..., v_n)$ such that there exist i and j such that $w_i < \hat{\theta} < v_i$, $\hat{\theta} < v_j < w_j$ and $w_k = v_k$ for all other individuals $(k \neq i, j)$ This describes the two distributions in the statement of this proposition. That is, individual i is the one who gets the gain and individual j is the one who experiences the loss; $(w_1, w_2, ..., w_n)$ is the original distribution and

$(v_1, v_2, ..., v_n)$ is the resulting distribution. Note that the number of individuals who are above $\hat{\theta}$ is larger under $(v_1, v_2, ..., v_n)$. Thus, the resulting distribution is morally better than the original distribution $(w_1, w_2, ..., w_n)$ according to headcount sufficientarianism with $\hat{\theta}$. Now, consider an interval $[\theta_L, \theta_H]$ such that θ_H is higher than v_i and v_j. Under this interval, the resulting distribution is *not* morally better than the original distribution according to headcount sufficientarianism with $[\theta_L, \theta_H]$. **Q.E.D.**

Proof of Proposition 2. Now, assume that a distribution $(w_1, w_2, ..., w_n)$ is better than another $(v_1, v_2, ..., v_n)$ according to headcount sufficientarianism with $[\theta_L, \theta_H]$. By definition, for all thresholds θ within $[\theta_L, \theta_H]$, the number of those below θ under the former distribution is smaller than the number of those below θ under the latter distribution. Since $[\theta_L, \theta_H]$ is wider than $[\theta'_L, \theta'_H]$, all thresholds in $[\theta'_L, \theta'_H]$ are included in $[\theta_L, \theta_H]$. For all thresholds θ within $[\theta'_L, \theta'_H]$, the number of those below θ under the former distribution is smaller than the number of those below θ under the latter distribution. It holds that $(w_1, w_2, ..., w_n)$ is better than $(v_1, v_2, ..., v_n)$ according to headcount sufficientarianism with $[\theta_L, \theta_H]$. This completes the proof. Next, we consider the statement about the converse. Let us focus on the two-individual case for simplicity. (we can easily extend this to the *n*-individual case.) Take four well-being level $w'_1 < v'_1 < v'_2 < w'_2$ that are in $[\theta_L, \theta_H]$ but *not* in $[\theta'_L, \theta'_H]$. Let us consider two distributions (w'_1, w'_2) and (v'_1, v'_2). These are comparable under headcount sufficientarianism with $[\theta'_L, \theta'_H]$, but not under headcount sufficientarianism with $[\theta_L, \theta_H]$. **Q.E.D.**

Proof of Proposition 3. Consider any three distributions, w, v, and u. Assume that distribution w is better than distribution v and distribution v is better than distribution u under headcount sufficientarianism with $[\theta_L, \theta_H]$. By definition, (i) for all thresholds θ within $[\theta_L, \theta_H]$ the number of those below θ under distribution w is smaller than the number of those below θ under distribution v, and (ii) for all thresholds θ within $[\theta_L, \theta_H]$, the number of those below θ under distribution v is smaller than the number of those below under distribution u. Take any θ' within $[\theta_L, \theta_H]$. It follows that the number of those below θ' under distribution w is smaller than the number of those below θ' under distribution u. Since this holds for any θ' within $[\theta_L, \theta_H]$, distribution w is better than distribution u under headcount sufficientarianism with $[\theta_L, \theta_H]$. Transitivity is established. **Q.E.D.**

Critical-level sufficientarian principle with a sufficiency interval. As mentioned above, the distributionally sensitive principle in the main text does not satisfy Pareto, which requires that a distribution w is morally better than another v if w_i is higher than v_i for every individual i. I offer an extended version of our distributionally sensitive principle with a sufficiency interval. To do so, I first define a critical-level sufficientarian principle as follows:

Critical-level sufficientarian principle with θ: w is better than v (i.e., $w \succ^c_\theta v$) if and only if

$$\sum_{i=1}^{n} \min\{g(w_i), g(\theta)\} > \sum_{i=1}^{n} \min\{g(v_i), g(\theta)\}$$

or

$$\sum_{i=1}^{n} \min\{g(w_i), g(\theta)\} = \sum_{i=1}^{n} \min\{g(v_i), g(\theta)\} \text{ and } \sum_{i=1}^{n} \max\{g(w_i), g(\theta)\} > \sum_{i=1}^{n} \max\{g(v_i), g(\theta)\}.$$

This principle, which uses a single threshold, is introduced by Brown (2005) and Bossert et al., (2022a, b). Note that it satisfies Pareto. By combining a sufficiency interval with it, one can define:

Critical-level sufficientarianism with a sufficiency interval: There is an interval of sufficiency thresholds, $[\theta_L, \theta_H]$, such that a distribution w is morally better than another v if and only if, for all thresholds θ within the interval, $w \succ_\theta^c v$ for all $\theta \in [\theta_L, \theta_H]$.

This is distributionally sensitive and satisfies Pareto.

Declarations

Conflict of interests None.

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