

REPLY

The Significance of Tiny Contributions: Barnett and Beyond

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Abstract

In a discussion of Parfit's Drops of Water case, Zach Barnett has recently proposed a novel argument against "No Small Improvement"; that is, the claim that a single drop of water cannot affect the magnitude of a thirsty person's suffering. We first show that Barnett's argument can be significantly strengthened, and also that the fundamental idea behind it yields a straightforward argument for the transitivity of equal suffering (a much stronger and more important conclusion than Barnett's). We then suggest that defenders of No Small Improvement could reject a Pareto principle that is presupposed in Barnett's argument and our developments of it. However, this does not save No Small Improvement, since there is a convincing argument against this claim that does not presuppose the Pareto principle.

1. Introduction

Consider the following case, originating with Derek Parfit:

Drops of Water. There are 10,000 travellers in the desert, suffering from dehydration. In the nearest town, there are another 10,000 people, each of whom has a pint of water, which they do not need themselves, and which they can add to a water tank that will be transported to the desert. The water poured into the tank will be distributed evenly to the travellers. Hence, if all the townspeople add their pint to the tank, each traveller will get a pint of water. This will significantly relieve their suffering. (Cf. Parfit 1984: 76; Nefsky 2017: 2743–44.)

Surely, we are initially inclined to think, each of the townspeople has a moral reason to add her pint to the tank. Supposing that they act independently of each other, however, it may seem that no agent's contribution makes any difference for the travellers. A given agent's pouring her pint into the tank will cause each traveller to receive one extra ten-thousandth of a pint. This is no more than a single drop. Plausibly, a single drop makes no difference to a thirsty person's suffering. On reflection, it therefore seems that no agent has any moral reason to add her pint; or at least not any reason in

terms of her action's relieving suffering. The travellers will not suffer any less if she adds her pint than if she does not.

There seem to be important real-life cases with this structure. For example, an individual person's driving her car on a particular occasion seems unlikely to affect the earth's climate, but many people driving their cars on many occasions can have severe effects on the climate. One response to such cases is to reject the plausible-sounding claim that some contributions (of water, carbon dioxide, etc.) are too small to have any relevant effects. Following Zach Barnett, this claim can be put as follows in *Drops of Water*:

No Small Improvement: The addition or subtraction of a single drop of water cannot make a person's suffering smaller or greater. (Cf. Barnett 2018: 5.)¹

Most arguments that have been levelled against No Small Improvement and analogous claims maintain that these claims engender a sorites paradox (Arntzenius and McCarthy 1997; Norcross 1997; Kagan 2011). Repeated applications of the claim, it is argued, lead to an absurd conclusion. In *Drops of Water*, the conclusion is that no amount of water can relieve someone's suffering. Since this is manifestly false, No Small Improvement cannot be correct. However, the cogency of these arguments is contested (Nefsky 2011; Budolfson 2019). One objection is that they very controversially regard sorites paradoxes as direct and simple *reductios* of the relevant "tolerance principle"; in this case No Small Improvement (Nefsky 2011: 385).

Another way to argue against No Small Improvement is to insist that all "equally *F* as" relations are transitive, as a matter of conceptual necessity. If so, equal suffering (holding between states such as getting *i* drops and getting *j* drops) is transitive, and No Small Improvement implies, again, that no number of drops can relieve someone's suffering. This argument has recently been proposed by Brian Hedden (2020: 541–43). Hedden admits, though, that the dispute about whether all "equally *F* as" relations must be transitive "is difficult to settle" (2020: 544).

This dialectical situation may motivate critics of No Small Improvement to search for an argument that neither invokes sorites paradoxes, nor presupposes without argument that equal suffering is transitive. Barnett (2018: 7–9) has recently given two such arguments, which deserve more careful attention than they have so far received. Focusing on the "Staircase" argument, which Barnett himself and we consider to be the stronger argument, we shall first show how this argument can be further strengthened. Moreover, the fundamental idea underlying the Staircase argument yields a straightforward argument for the transitivity of equal suffering. The conclusion that this relation is transitive is much stronger than the conclusion of the Staircase argument.

We shall then discuss two possible responses to the Staircase argument and our developments of it.² The second response has the attractive feature of reconciling No Small Improvement with the assertion that an individual agent can have a moral reason

¹Barnett uses the terms 'better' and 'worse' instead of 'smaller' and 'greater', but we find it clear from the context that it is simply the magnitude of suffering he has in mind. We have hence avoided potentially misleading evaluative terms. Further, we understand No Small Improvement as claiming that it is always *false* that a single drop makes a person's suffering smaller or greater. If there are propositions that are neither true nor false, this claim should be distinguished from the weaker claim that it is never *true* that a single drop makes a person's suffering smaller or greater. Although Barnett does not explicitly say so, it is clear that he too has the stronger claim in mind.

²These responses apply also to the other of Barnett's two arguments, the "Optimization" argument (2018: 7–8).

to contribute her pint in Drops of Water. In the end, however, this attractive feature turns out to be cold comfort for adherents of No Small Improvement. We shall present yet another argument against this claim, which is not vulnerable to the second response to the Staircase argument and our elaborations thereon.

2. Barnett's Staircase argument

Barnett (2018: 8–9) imagines the following case:

Staircase: The 10,000 travellers are suffering from intensely painful thirst. They come upon a massive, 10,000-step staircase. Each step contains a partially filled canteen. The canteen on Step 1 contains 1 drop; the canteen on Step 2 contains 2 drops; and so on.

The travellers manage to arrange themselves on the staircase, with one traveller per step. Just before they take a drink, the traveller on Step 1 proposes an idea: 'Wait! I was thinking. . . What if you all just moved down one step, and I moved up to the top?' She proceeds to explain that on this proposal, no one would be harmed (for all others forfeit only one drop), while she would benefit.

According to Barnett, No Small Improvement "seems to imply that shifting everyone as described would reduce the total suffering" (2018: 9). This conclusion is clearly false. Assuming that all the travellers are alike in the relevant aspects, the total suffering cannot be reduced by reshuffling them in this way. Hence, No Small Improvement should be rejected.

As Barnett notes (2018: 9), No Small Improvement implies that reshuffling leads to reduced total suffering only if we assume the following principle:

Pareto: If one person's suffering is reduced (increased) while no other person's suffering is affected, then the total suffering is reduced (increased).

Barnett finds it "hard to see how [Pareto] can be denied" (2018: 9).

If Pareto is correct, the Staircase argument is more forceful than Barnett himself seems to recognize. It is not only that the conjunction of No Small Improvement and Pareto implies very counterintuitive verdicts in particular cases. Worse still, this conjunction implies that the relation "contains less suffering than" is non-transitive among outcomes. This is perhaps most easily seen if we consider a variant of Staircase involving only three people, and assume (unrealistically) that whereas one drop of water makes no difference to an individual's suffering, two drops are enough to make a difference.³ Consider the following three outcomes:

O1	O2	O3
Alice: 3 drops	Carla: 3 drops	Bob: 3 drops
Bob: 2 drops	Alice: 2 drops	Carla: 2 drops
Carla: 1 drop	Bob: 1 drop	Alice: 1 drop

³Of course, this simplifying assumption is not essential to the argument. Those who prefer something more realistic may replace "two" with some greater amount, and modify the case accordingly.

No Small Improvement and Pareto together imply that O2 contains less suffering than O1, that O3 contains less suffering than O2, and that O1 contains less suffering than O3. If this is true, “contains less suffering than” is non-transitive.

In other words, the conjunction of No Small Improvement and Pareto is inconsistent with

Transitivity: If outcome *X* contains less suffering than outcome *Y*, and *Y* contains less suffering than outcome *Z*, then *X* contains less suffering than *Z*.

Note that Transitivity does not presuppose that “contains equally much suffering as” is transitive.⁴ We believe that Transitivity is a very compelling principle, and that examples with the Staircase structure hence show that the cost of accepting No Small Improvement and Pareto is great indeed.⁵

3. An argument for the transitivity of equal suffering

As noted in section 1, No Small Improvement implies that equal suffering is non-transitive. Thus, there are numbers of drops, $k > j > i$, such that getting *k* drops means equal suffering to getting *j* drops, and getting *j* drops means equal suffering to getting *i* drops, but getting *k* drops means less suffering than getting *i* drops. Assuming Pareto and Transitivity, this cannot be the case. To see this, we may simply repeat the example from the last section, substituting the variables *k*, *j* and *i* for 3, 2 and 1, respectively:

O1	O2	O3
Alice: <i>k</i> drops	Carla: <i>k</i> drops	Bob: <i>k</i> drops
Bob: <i>j</i> drops	Alice: <i>j</i> drops	Carla: <i>j</i> drops
Carla: <i>i</i> drops	Bob: <i>i</i> drops	Alice: <i>i</i> drops

Under the assumptions that getting *k* drops means equal suffering to getting *j* drops, and getting *j* drops means equal suffering to getting *i* drops, but getting *k* drops means less suffering than getting *i* drops, Pareto again implies that O2 contains less suffering than O1, that O3 contains less suffering than O2, and that O1 contains less suffering than O3. The conjunction of these implications is ruled out by Transitivity.

Let a *threshold* be a pair of adjacent natural numbers *k* and *k* + 1, such that receiving *k* + 1 drops means less suffering than receiving *k* drops. Whereas the Staircase argument only shows that there is at least one threshold (implying that No Small Improvement is

⁴This relation, with outcomes as *relata*, is not to be confused with the “equal suffering” relation, with states of persons, or possibly of groups of persons (see section 4), as *relata*.

⁵Larry Temkin (1996) and Stuart Rachels (1998) have proposed well-known alleged counterexamples to the transitivity of “better than”. These examples may be thought to cast doubt also on the general transitivity of “contains less suffering than”. We doubt this, but even if they do, they do not indicate that this relation fails to be transitive in Drops of Water. Rachels’ and Temkin’s examples crucially involve two different aspects, which together determine the amount of pain or suffering in a certain outcome. This is not the case in Drops of Water. (Luke Elson has pointed out that if the *value* of an outcome is determined not only by the total amount of suffering, but also by how the suffering is distributed among individuals, this might give rise to plausible counterexamples to the transitivity of “better than” among outcomes. But this would not threaten Transitivity, since this principle does not concern betterness.)

false), transitivity of equal suffering implies a considerably stronger and more important result. Transitivity of equal suffering implies that every interval $[j, m]$, such that getting m drops means less suffering than getting j drops, includes at least one threshold. As an example, suppose that a thirsty person's suffering is at least slightly relieved by receiving 100 drops. Transitivity of equal suffering then implies that there is at least one point, say 77 drops, at which an extra drop does make a difference in suffering.

4. Two possible defenses of No Small Improvement

A defender of No Small Improvement could respond to our arguments by slightly revising her claim. So far, we have understood No Small Improvement as stating that, for all natural numbers n , a traveller will suffer *equally much* if she receives n drops of water, as if she receives $n + 1$ drops. This is a stronger claim than that she will *not* suffer *less* if she receives $n + 1$ drops than if she receives n drops. It is a logical possibility that her level of suffering at n drops is incomparable to, or on a par with, her level of suffering at $n + 1$ drops. If No Small Improvement is understood as making such a claim of incomparability or parity, it does not, together with Pareto, contradict Transitivity. Moreover, this version of No Small Improvement is compatible with transitivity of equal suffering.⁶

This revision of No Small Improvement does not strike us as very plausible, however. The intuition behind No Small Improvement is that a single drop *makes no difference* to a person's suffering. This implies that the level of suffering is the same at $n + 1$ drops as at n drops. And if an extra drop does make a difference, it seems that it should lead to decreased suffering, rather than to an incomparable level of suffering. Alleged examples of incomparability or parity typically involve comparisons between outcomes that differ in more than one respect. In contrast, receiving n drops differs in only one respect (and differs very little) from receiving $n + 1$ drops.

A second response to our arguments involves rejecting Pareto. Before stating this principle, Barnett makes the "important clarification" that if "the suffering is the same for each person, their total suffering [. . .] is also unchanged" (2018: 7). In other words, he assumes

Individualism: A group's suffering cannot be reduced (increased) unless some individual's suffering is reduced (increased).⁷

Rather than a clarification, Individualism is a substantial assumption that may be questioned. A defender of No Small Improvement could argue along the following lines. It is true that when each of the people on steps 2 to 10,000 is moved down one step, none of those individuals' suffering is increased. However, the suffering of this *group* of 9,999 people is nevertheless increased. Under reasonable aggregation assumptions, we will then get the desired result that the total suffering in the whole group of 10,000 is unaffected by the reshuffling. If Individualism is false, Pareto is highly questionable. A defender of No Small Improvement can, instead of accepting Pareto, propose the following, logically weaker principle:

⁶We are grateful to Elliott Thornley for suggesting this defense of No Small Improvement.

⁷By "a group's suffering" we simply mean the suffering of the relevant individuals taken together. The phrase is not intended to involve a commitment to some collective entity with a consciousness of its own. Note that the group's degree of suffering need not thereby equal the sum of the individuals' respective degrees of suffering.

Revised Pareto: If one person's suffering is reduced (increased), while no other person's or disjoint subgroup's suffering is affected, then the suffering of the group is reduced (increased).⁸

Revised Pareto does not imply that Transitivity is violated in any of the cases we have considered.

To see how Individualism can plausibly be doubted, note that there are several mental states other than suffering, of which it seems true that the extent to which a group has the state can change without a change in the extent to which any individual has the state. One example is the mental state of understanding a certain phenomenon, such as the university system. Suppose that both Alice and Bob start out understanding some aspects of the university system, A, B, and C, and that Alice later loses her understanding of C, but instead acquires an understanding of yet another aspect of the university system, D. Plausibly, the group consisting of Alice and Bob can thereby get an increased understanding of the university system, even if neither Alice nor Bob does. Confusion provides another example. Suppose that a committee is confused, at least partly in virtue of the strongly diverging beliefs among its members. After a while, one of them, Carla, becomes even more confident in her own beliefs. This need not make Carla or any other individual member more confused, but could arguably still constitute an increase in the confusion of the committee.

The relevance of these examples may of course be disputed. In particular, it may be objected that a change in suffering, unlike changes in certain other mental states, must be felt or somehow perceived by the sufferer(s). Since no individual can perceive the addition or subtraction of a single drop of water, the objector might continue, it is very implausible to claim that a *group* can perceive the addition or subtraction of a single drop from each of its members. But this objection is inconsistent with the rejection of No Small Improvement. Rejecting this claim amounts precisely to asserting that the addition or subtraction of a single drop *can* affect how much an individual suffers. Hence, a critic of No Small Improvement must accept either that there are imperceptible differences in suffering, or that a one-drop difference can be perceived.

If contributing a pint of water can reduce the suffering of the travellers as a group, without reducing the suffering of any individual, there may be a straightforward moral reason to contribute even if No Small Improvement is true. Since many people find No Small Improvement, as well as the claim that there is a moral reason to contribute in Drops of Water, intuitively plausible, this is a potentially appealing implication of rejecting Individualism.⁹

5. Another argument against No Small Improvement

There is, however, another way to establish that No Small Improvement conflicts with Transitivity. This new argument does not presuppose Individualism (nor does it presuppose its falsity). Note, first, that Pareto and Revised Pareto are equivalent in two-person cases. Next, let the *individual limit*, *l*, stand for the smallest number of drops that ever affects an individual's suffering. Although the following principle is stronger than what is necessary for our argument, we find it very plausible:

⁸By a "disjoint" subgroup, we mean a subgroup not including the individual whose suffering is relieved.

⁹Of course, the implication is not appealing to those who would want to argue, on the basis of No Small Improvement, *against* the claim that there is a moral reason to contribute. See, e.g., Sinnott-Armstrong (2005).

Diffusion: A group of individuals suffers less in outcome X than in outcome Y only if the members of some (proper or non-proper) subgroup together receive at least l drops more in X than in Y .¹⁰

Diffusion is clearly true if Individualism is true or No Small Improvement is false. (Supposing that water cannot be distributed in quantities smaller than a drop, the negation of No Small Improvement is simply the claim that $l = 1$ drop.)

Let us now show that Diffusion, No Small Improvement, and Revised Pareto together contradict Transitivity. Assume that $l = 100$ drops, that 100 drops would suffice to make a difference to Dee's and Ed's suffering, and that they are the only sufferers. Consider these three outcomes:

O1	O2	O3
Dee: 500 drops	Dee: 600 drops	Dee: 501 drops
Ed: 500 drops	Ed: 401 drops	Ed: 501 drops

Dee suffers less in O2 than in O1 (since she gets 100 drops more), while Ed suffers equally in O2 as in O1 (since he only gets 99 drops less). Hence, by Revised Pareto, O2 contains less suffering than O1.¹¹ Further, Ed suffers less in O3 than in O2, whereas Dee suffers equally in O2 and O3. Hence, Revised Pareto implies that O3 contains less suffering than O2. By Transitivity, then, O3 contains less suffering than O1. This contradicts Diffusion.

Actually, our argument only requires a much weaker assumption than Diffusion, viz., that if $l = 100$ drops, giving one drop each to two people does not reduce the suffering of the group consisting of these two people. Denying this weaker assumption would border on the absurd. Even if Diffusion is false, therefore, it is not credible that O3 contains less suffering than O1. And if it does not, No Small Improvement and Revised Pareto together contradict Transitivity.

As stated, our argument assumes that the individual limit is precise. Defenders of No Small Improvement may insist that this limit is vague. There may be an interval, such that if a thirsty person receives a number of drops in this interval, it is indeterminate whether her suffering is reduced. Our argument is easily amended, so as to take this possibility into account. Let us thus assume that if a person receives fewer than 90 drops it is false that her suffering is reduced, and that if she receives more than 110 drops it is true that her suffering is reduced. If she receives between 90 and 110 drops it is indeterminate whether her suffering is reduced. (For the sake of simplicity we ignore the possibility of second order indeterminacy.) Let the number l in Diffusion be the upper bound of the interval of indeterminacy; that is, 110. We can then modify our example above as follows:

O1*	O2*	O3*
Dee: 500 drops	Dee: 611 drops	Dee: 522 drops
Ed: 500 drops	Ed: 411 drops	Ed: 522 drops

¹⁰That the group as a whole receives more water in X than in Y may not be a necessary condition for it to suffer less in X than in Y .

¹¹Gunnar Björnsson has objected that he finds it unclear whether O2 contains less suffering than O1, even granted that Dee suffers less in O2 and that Ed suffers equally in the two outcomes. In our view, however, Pareto (and hence Revised Pareto) is compelling in two-person cases.

The conclusion is, again, that Revised Pareto and Diffusion are incompatible with Transitivity.¹²

6. Concluding remarks

To sum up, we first argued that equal suffering is transitive in Drops of Water, provided that Barnett's Pareto principle is correct. This is a significantly stronger result than the mere disproof of No Small Improvement. We then suggested that a defender of No Small Improvement could question Pareto. However, this move is of no avail, since No Small Improvement can, as shown in the last section, be refuted by an argument that does not invoke Pareto.

Finally, a remark on what rejecting No Small Improvement implies when it comes to moral reasons. According to Barnett, the falsity of No Small Improvement means that we can explain why one has a moral reason to pour in one's pint: "If I refrain, the travellers will suffer more" (2018: 9). However, this conclusion is too strong. As we noted in section 3, the denial of No Small Improvement merely implies that there is a threshold somewhere between receiving 0 drops of water and receiving 10,000 drops. If no such threshold is hit exactly by one's act, the sufferers will not suffer more if one refrains to add one's pint. In fact, Barnett's conclusion is too strong even if equal suffering is transitive. It cannot be ruled out on *a priori* grounds that the interval from 0 to 10,000 drops contains non-unit equivalence classes under this relation. Unless further empirical assumptions are made, therefore, it cannot be shown that *each* added pint will reduce the travellers' suffering.¹³

Competing interests

The authors declare none.

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¹²Our argument presupposes, however, that the interval of indeterminacy is smaller than the distance between 0 and its lower bound.

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