18
Sorites on What Matters

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18.1 The Sorites Analogy

Ethics in the tradition of Derek Parfit's *Reasons and Persons* is riddled with sorites-like arguments, which lead us by what seem innocent steps to seemingly false conclusions.[1] One such argument goes as follows.[2]

Compared with the existence of ten billion people who all have a very high quality of life, there is some larger number of people whose existence would be better, even though these people all have a slightly lower quality of life. Better yet would be the existence of an even larger number of people, at a still lower—though again only slightly lower—quality of life. We can continue in this fashion. Assuming that at each step there is a sufficient gain in number and a merely slight drop in quality, each step seems one for the better. For some fixed precisification of 'slightly lower quality of life', there is a finite number of such steps that will lead us to a vast number of people, who all have lives that are barely worth living. Since each step is one for the better, all of them are. Therefore, compared with the existence of ten billion people who all have a very high quality of life, there is some larger number of people whose existence would be better, even though these people all have lives that are barely worth living. This seemingly false conclusion is what Parfit calls the *Repugnant Conclusion*.

This argument involves tradeoffs between quality of life and number of people. Not everyone believes that the existence of a larger number of people at a positive quality of life would be in one way better. Those who do not would reject every

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[2] See Parfit 1984, 1986, and 2016.

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step of the above argument.[3] But other structurally similar arguments involve tradeoffs between different evaluatively relevant dimensions, for example, intensity and duration of pain, severity and number of harms, pleasure and rational activity, and so on. Most of what I argue here applies to all these structurally similar arguments, which we can call *spectrum arguments*.[4]

Spectrum arguments are puzzling. Many of us find that, considered independently, their premises seem true and yet their conclusions seem false. Similarly, *sorites arguments* puzzlingly lead us by many small and seemingly innocent steps to seemingly false conclusions.[5] One goes as follows.

A collection of ten billion grains of sand is a heap. For any number of grains n, if a collection of n grains is a heap, then a collection of n-1 grains is a heap. Since a collection of 10,000,000,000 grains is a heap, a collection of 9,999,999,999 grains is a heap. Then, since a collection of 9,999,999,999 grains is a heap, a collection of 9,999,999,998 grains is a heap. Continuing in this fashion, we eventually reach the seemingly false conclusion that a collection of one grain is a heap.

This argument involves the property of being a heap. Other structurally similar arguments involve other properties, such as being hirsute, or being rich. In all cases, we begin with a finite series of items in which each differs only slightly from the previous along a single dimension (number of grains, number of hairs, or number of pennies) relevant to the instantiation of the property in question (being a heap, being hirsute, or being rich). Next we offer an 'initiation premise', that the first item in the series instantiates the property in question. We then offer a 'tolerance premise', that if any item in the series instantiates the property in question, then so does the next item. Finally, we reason as before from these premises to the conclusion that the last item in the series instantiates the property in question (for example, that a collection of only one grain is a heap, that a head with only one hair on it is hirsute, or that a person possessing only a penny is rich). Arguments with this structure are sorites arguments.

Given the respects in which sorites arguments appear structurally similar to spectrum arguments, we may suspect that any particular spectrum argument is 'just another sorites'. Several authors accept what I call the *sorites analogy*, according to which, since spectrum arguments are relevantly structurally analogous to sorites arguments, the correct response to spectrum arguments is

[3] Of course, several of Parfit's arguments for the Repugnant Conclusion do not presuppose that the existence of a larger number of people at a positive quality of life would be in one way better. See Parfit 1984 (chapter 19), 1986, and 2016.

[4] See, for example: Temkin 1996 and 2012; Norcross 1997; Rachels 1998 and 2004; Carlson 2000; Arrhenius and Rabinowicz 2005; Pummer 2017.

[5] See Hyde and Raffman 2018.

structurally analogous to the correct response to sorites arguments.[6] We may combine the sorites analogy with a particular view of the correct response to sorites arguments (for example, that there is a cutoff somewhere along the sorites series, so that a collection of n grains is a heap but a collection of n-1 grains is not). Or we may remain silent on how to solve the sorites, and claim that *whatever* the correct response to sorites arguments is, the correct response to spectrum arguments is structurally analogous.

The sorites analogy may inspire hope of resolving important debates in ethics at relatively low theoretical cost. For example, if the correct response to the sorites is one in which we reject one of its premises whilst explaining away its intuitive appeal, then, according to the sorites analogy, the correct response to spectrum arguments would be similarly sanguine. So perhaps, contrary to what Parfit and others sometimes suggest, it is not the case that, because there are no plausible solutions to the puzzles presented by spectrum arguments, the best we can do is to identify which solutions are the *least implausible*.[7]

In this chapter, I argue against the sorites analogy. I first consider some potential structural disanalogies between spectrum arguments and sorites arguments (section 18.2). Even if none of these provides an adequate response to the sorites analogy, there is another type of response. There are *content-based* disanalogies between spectrum arguments and sorites arguments. Even if these arguments are relevantly structurally analogous, they differ in their content in ways that show the sorites analogy to be implausible. I explore two content-based disanalogies—one is inspired by Parfit's work on reductionism (section 18.3), and the other involves what I call hypersensitivity (section 18.4). I conclude with a summary and a broader methodological lesson (section 18.5).

18.2 Structural Disanalogies

Parfit offers a brief response to the sorites analogy. He writes:

> It may be objected that my [spectrum] argument is like what are called *Sorites Arguments*, which are known to lead to false conclusions. Suppose we assume that removing any single grain of sand cannot turn a heap of sand into something that is not a heap. It can then be argued that, even if we remove every single grain, we must still have a heap . . . If my argument was like this, it could be referred to those who work on what is wrong with Sorites Arguments. But my argument is

[6] See, for example: Griffin 1986 (86–7); Qizilbash 2005; Voorhoeve and Binmore 2006; Knapp 2007; Katz 2015; Thomas 2016, 2018, and Chapter 17, this volume; Handfield and Rabinowicz 2018; Nebel 2018 and Chapter 8, this volume; Brink 2020; Wasserman ms; and Hare ms. Not all these authors accept the sorites analogy as I have stated it.

[7] See, for instance: Parfit 1984 and 2016; Temkin 2012; Kagan 2015; and Arrhenius ms.

> not like this. A Sorites Argument appeals to a series of steps, each of which is assumed to *make no difference*. My argument would be like this if it claimed that [B] is *not worse* than [A], [C] is not worse than [B], [D] is not worse than [C], and so on. But the argument claims that [B] is *better* than [A], [C] is better than [B], [D] is better than [C], and so on. The objections to Sorites Arguments are therefore irrelevant.[8]

Parfit is here claiming that there is a structural disanalogy between spectrum arguments and sorites arguments. In the sorites argument, each step is claimed to make no difference in that if a given collection of grains of sand is a heap, then that collection minus a single grain is also a heap. In the spectrum argument for the Repugnant Conclusion, each step—which involves both a slight drop in the quality of life and a large gain in the number of people who exist—is claimed to make a difference in that each population in the series is claimed to be better than its immediate predecessor. But the fact that each step of the spectrum argument is claimed to make such a difference is not enough to show that it is not *relevantly* structurally analogous to a sorites argument.

There are various structural disanalogies between spectrum arguments and sorites arguments. The standard sorites argument involves a single dimension (number of grains) relevant to whether some item x (collection of grains) is an F (heap). Other arguments that appeal to a series of steps involve multiple dimensions (number of grains and distribution of grains) relevant to whether x is an F, or to whether x is F-er (heapier) than y. Spectrum arguments involve variation along multiple dimensions at each step, and they concern the instantiation of relations rather than monadic properties. These disanalogies notwithstanding, defenders of the sorites analogy might hold that spectrum arguments are relevantly structurally analogous to sorites arguments in that both make essential appeal to slight differences (along some dimension) between adjacent items x and x + 1 in support of a tolerance premise. A tolerance premise can be formulated in terms of monadic properties: if x is an F, then x + 1 is an F. But it can also be formulated in terms of relations: if x is F-er than y, then x + 1 is F-er than y. Parfit's disanalogy, underpinned by the fact that in a spectrum argument x + 1 is F-er (better) than x, may then be neither here nor there.

But these matters are somewhat delicate. The spectrum argument for the Repugnant Conclusion does not *itself* include a tolerance premise according to which if x is better than y, then x+1 is better than y. The argument, more precisely, is as follows.

[8] Parfit 1986 (footnote 12). Also see Rachels 1998 (74). Tenenbaum and Raffman 2012 (footnote 3) suggest a similar disanalogy between the sorites and Quinn's 1990 puzzle of the self-torturer. See Elson 2016 for a reply.

Finite Spectrum: There is a finite series of well-being levels (or levels of quality of life) $L_1, \ldots, L_k$ such that L_1 is a 'very high' positive well-being level, L_k is a 'very low' positive well-being level, and the difference between any two adjacent levels in the series is slight (for some fixed precisification of 'slight').[9]

Tradeoffs: For any positive well-being level L_i, and slightly lower positive level L_{i+1}, and any number of people n, there is some number of people n+ such that a population of n+ people at level L_{i+1} is better than a population of n people at level L_i (the difference between L_i and L_{i+1} is given by the fixed precisification of 'slight' in Finite Spectrum).[10]

Transitivity: The relation of being better than is transitive. (For any relation R, R is transitive if and only if for all x, y, and z, if xRy and yRz, then xRz.)

Therefore:

Conclusion: For any positive well-being level L_i, and any number of people n, there is some number of people n+ such that a population of n+ people at very low positive level L_k is better than a population of n people at level L_i. So, there is some number of people n+ such that a population of n+ people at very low positive level L_k is better than a population of ten billion people at very high positive level L_1. This is the Repugnant Conclusion.

We might thus claim that the fact that sorites arguments include a tolerance premise, whereas spectrum arguments do not, marks a crucial structural disanalogy between them.[11] But this may not constitute an adequate response to the sorites analogy. If we accept all the premises of the spectrum argument for the Repugnant Conclusion—Finite Spectrum, Tradeoffs, and Transitivity—then it is absurd not also to accept all the premises of the following 'transitivityless' spectrum argument.

Finite Spectrum: There is a finite series of well-being levels (or levels of quality of life) $L_1, \ldots, L_k$ such that L_1 is a 'very high' positive well-being level, L_k is a 'very low' positive well-being level, and the difference between any two adjacent levels in the series is slight (for some fixed precisification of 'slight').

[9] Some authors reject this claim (for example, see Nebel in Chapter 8, this volume, and Thomas 2018, who refers to what I call Finite Spectrum as 'Small Steps'). I believe, but will not show here, that the relevant spectrum arguments can replace Finite Spectrum with an analogous claim formulated in terms of slight natural (non-evaluative) differences, such as slight differences in pleasure intensity and/or duration. The content-based disanalogies between spectrum arguments and sorites arguments developed below in sections 18.3 and 18.4 would remain as effective against the sorites analogy.

[10] To appreciate the importance of using the same fixed precisification of 'slight' here as in Finite Spectrum, see Binmore and Voorhoeve 2003.

[11] See Temkin 1996 (section 5) and 2012 (chapter 9).

Initiation: There is some number of people n such that n people at very high positive level L_1 is better than X, a population of ten billion people at very high positive level L_1.

Tolerance: For any positive well-being level L_i, and slightly lower positive level L_{i+1}, and any number of people n, if a population of n people at level L_i is better than population X, then there is some number of people n+ such that a population of n+ people at level L_{i+1} is better than population X (the difference between L_i and L_{i+1} is given by the fixed precisification of 'slight' in Finite Spectrum).

Therefore:

Conclusion: There is some number of people n such that a population of n people at very low positive level L_k is better than X, a population of ten billion people at very high positive level L_1. This, again, is the Repugnant Conclusion.

Finite Spectrum is the same premise in both arguments. It is absurd to accept Tradeoffs but not Initiation. And Tradeoffs and Transitivity together entail Tolerance. According to Tradeoffs, for any positive well-being level L_i, and slightly lower positive level L_{i+1}, and any number of people n, there is some number of people n+ such that a population of n+ people at level L_{i+1} is better than a population of n people at level L_i. So, according to Transitivity, (for any positive well-being level L_i, and slightly lower positive level L_{i+1}, and any number of people n) if a population of n people at level L_i is better than population X, then a population of n+ people at level L_{i+1} is better than population X. This is Tolerance.

Defenders of the sorites analogy might then hold that, since the transitivityless spectrum argument is relevantly structurally analogous to a sorites argument in that both make essential appeal to a tolerance premise, if the correct response to a sorites argument is to reject its tolerance premise, then the correct response to the transitivityless spectrum argument is to reject Tolerance. This would in turn entail that the correct response to the original spectrum argument is to reject the conjunction of Tradeoffs and Transitivity. To those of us who cannot part with Transitivity, this would mean the correct response to the original spectrum argument is to reject Tradeoffs.[12]

We might appeal to a different structural disanalogy. According to a standard sorites argument, a collection of ten billion grains of sand is a heap, and, since for any number of grains n, if a collection of n grains is a heap, a collection of n-1 grains is a heap, it follows that one grain is a heap. We begin with an item that is intuitively a heap and end up with an item that is intuitively not a heap. We are also making things intuitively *less heapy* at each step (or at least at some of the

[12] Even setting aside any allegiance to Transitivity, it might seem plausible that if we ought to reject Tolerance, then we ought to reject Tradeoffs too. See Pummer 2018.

steps). Viewed purely from the relational perspective of being more or less heapy, then, there is no puzzle. Viewing things from the relational perspective of being better or worse clearly does nothing to take the puzzle out of spectrum arguments, as they come prepackaged in such relational terms—the first item is intuitively better than the last one even though each step is intuitively one for the better.

But even if this marks a crucial structural disanalogy between *standard* sorites arguments and spectrum arguments, there remain the multidimensional sorites arguments alluded to earlier. One such multidimensional sorites argument goes as follows.

*Finite Spectrum**: There is a finite series of sand distribution patterns $D_1, \ldots, D_k$ such that D_1 is a perfectly heapy cone-shaped distribution, D_k is a perfectly flat and thin distribution, and the difference in flatness between any two adjacent distributions in the series is slight (for some fixed precisification of 'slight').

*Initiation**: There is some number of grains n such that n grains with distribution D_1 is heapier than X, a collection of ten billion grains with perfectly heapy cone-shaped distribution D_1.

*Tolerance**: For any sand distribution pattern D_i, and slightly flatter distribution D_{i+1}, and any number of grains n, if a collection of n grains with distribution D_i is heapier than collection X, then there is some number of grains n+ such that a collection of n+ grains with distribution D_{i+1} is heapier than collection X (the difference between D_i and D_{i+1} is given by the fixed precisification of 'slight' in Finite Spectrum*).

Therefore:

*Conclusion**: There is some number of grains n such that a collection of n grains with perfectly flat and thin distribution D_k is heapier than X, a collection of ten billion grains with perfectly heapy cone-shaped distribution D_1.

Truth be told, I am not sure Tolerance* is very compelling (it strikes me as far less intuitive than Tolerance or Tradeoffs). But, assuming that Tolerance* is compelling, we restore the analogy with the spectrum argument. That is, taking up the relational perspective of being more or less heapy fails to remove the puzzle, as the first item is intuitively heapier than the last one even if each step is intuitively one for the heapier.[13]

[13] There is a further potential structural disanalogy. In the multidimensional sorites argument, we begin with an item that is intuitively a heap, take a number of steps each claimed to be for the heapier, and end up with an item that is intuitively not a heap. In the spectrum argument, we begin with an item that is intuitively good, take a number of steps each claimed to be for the better, and end up with an item that is still intuitively good (at least, assuming the quality of life of those in the last population is not too low). But this difference seems an artefact of the particular examples chosen. It is plausible that,

In this section, I considered some potential structural disanalogies between spectrum arguments and sorites arguments. Even if there is a crucial structural disanalogy between standard (one-dimensional) sorites arguments and spectrum arguments, arguably spectrum arguments are relevantly structurally analogous to multidimensional sorites arguments. Moreover, even though the original spectrum argument does not itself contain a tolerance premise, the transitivityless spectrum argument does. Defenders of the sorites analogy might argue that, if the correct response to a sorites argument is to reject its tolerance premise, then the correct response to the transitivityless spectrum argument is to reject Tolerance, and thus the correct response to the original spectrum argument is to reject the conjunction of Tradeoffs and Transitivity.

18.3 Indeterminacy

In this section, I highlight a relatively sanguine response available for many sorites arguments that is unavailable for spectrum arguments. As this disanalogy holds even if sorites arguments and spectrum arguments are relevantly structurally analogous, it is a content-based disanalogy. This disanalogy draws inspiration from Parfit's work on reductionism, and the response to sorites arguments it suggests.

Parfit famously defends what he calls *reductionism* about personal identity, according to which the fact that person X at time t_1 is one and the same person as person Y at time t_2 just consists in the fact that X stands in some other, 'impersonal' relation or relations to Y, such as that X is sufficiently psychologically or physically connected to or continuous with Y.[14] This view is controversial. But it is relatively uncontroversial that the fact that country X at time t_1 is one and the same country as country Y at time t_2 just consists in the fact that X stands in some other relation to Y, involving membership, territory, culture, or government. It is also relatively uncontroversial that the fact that country X at time t is a country just consists in the fact that X has some other property or properties, involving membership, territory, culture, or government. Most of us are, in Parfit's sense of the term, reductionists both about being a country and about being one and the same country.

in some spectrum arguments, we begin with an item that is intuitively good, take a number of steps each claimed to be for the better, and end up with an item that is intuitively bad (see Nebel 2018). And it is plausible that, in some multidimensional sorites arguments, we begin with an item that is intuitively a heap, take a number of steps each claimed to be for the heapier, and end up with an item that is still intuitively a heap (though intuitively less heapy than the first item). For two recent relevant discussions of comparatives and vagueness, see: Constantinescu 2016 and Silk 2019.

[14] Parfit 1984 (210–11).

The following soritical story illustrates one way in which Parfitian reductionism about personal identity is controversial:

> Derek walks into an operating room at 9:12am, and a person Y walks out at 9:13am. During this minute, a scientist can slide her finger in a way that rapidly flips any number of one hundred (or one billion . . .) different switches. Each additional switch she flips would further slightly decrease the degree to which the relevant psychological and physical relations hold between Derek and Y. In the case in which one switch is flipped, Derek is one and the same person as Y. In the case in which all hundred (or billion . . .) switches are flipped, Derek is not one and the same person as Y—instead, Y is Greta.[15]

What happens in the cases in between? According to reductionism about personal identity, Derek and Y are one and the same person only if the relevant psychological or physical relations hold between Derek and Y to a *sufficient degree*. If we cannot say precisely what counts as sufficient, the view implies there is some n such that there is not a 'Yes or No' answer to the question 'Is Derek one and the same person as Y if n switches are flipped?'.[16] But according to Parfitian reductionists this would not present a deep puzzle. On their view, when n switches are flipped, there is in reality only *one* possible outcome: the relevant psychological and physical relations hold between Derek and Y to the precise degree that corresponds to n switches being flipped. Thus, 'Derek is Y' and 'Derek is not Y' are merely two ways of describing a single outcome. Alternatively, *if* we were 'tidy-minded' reductionists and precisified 'sufficient degree' in some arbitrary way, we would then find it relatively unpuzzling that there is some n for which Derek and Y are one and the same person, though for n + 1 Derek and Y are not one and the same person (that is, we would find it relatively unproblematic to reject the relevant tolerance premise).[17] Of course, many of us find both of these alternatives puzzling, even absurd. We could then view the choice between it being indeterminate what degree is sufficient and it being determinate what degree is sufficient as a fatal dilemma for Parfitian reductionism.

A lesson for sorites arguments is that, when it *is* true that whether x is an F relevantly just consists in whether x has gradable property P to a sufficient degree, it can be indeterminate whether x is an F, but in a relatively unpuzzling way.[18]

[15] This is a retelling of the *Combined Spectrum*, found in Parfit 1984 (section 86).

[16] See Parfit 1984 (206) on the antecedent of this conditional.

[17] Parfit 1984 (241) writes, 'By drawing our line, we have chosen to *give* an answer to this question. But, since our choice was arbitrary, it cannot justify any claim about what matters. If this is how we answer the question about my identity, we have made it true that, in this range of cases, personal identity is *not* what matters.' Also see Sider 2002 (63) on artificially sharpened boundaries.

[18] By 'relevantly just consists in', I intend to highlight the specific meaning that Parfit gives to the words 'just consists in'. As he notes in Parfit 1995 (33), his brand of constitutive reductionism is 'partly conceptual'. Also see Parfit 1999.

For instance, it is plausible that, when other things (like the sand distribution pattern) are equal, whether a collection of grains of sand is a heap can just consist in whether this collection has a sufficient number of grains. Clearly ten billion is a sufficient number of grains, and one is not. For some number n, it is plausible that there is not a 'Yes or No' answer to the question, 'Is a collection of n grains of sand a heap?'. But we would not be deeply puzzled by our inability to say whether a collection of n grains of sand is a heap. 'Heap' and 'Not Heap' are merely two ways of describing a single outcome. Correlatively, if we precisified 'sufficient number' in some arbitrary way, it would then be relatively unpuzzling that there is some number n such that n grains make a heap but n-1 do not (that is, we would find it relatively unproblematic to reject the relevant tolerance premise).

I am sympathetic to Parfit's view that this relatively sanguine response is available for many sorites arguments.[19] In addition to the case of being a heap, it also seems available in the case of being hirsute, and in the case of being rich. When other things (like the hair distribution pattern) are equal, whether a head is hirsute can just consist in whether this head has a sufficient number of hairs. And, when other things are equal, whether one is rich can just consist in whether one has a sufficient number of pennies. There will be points along the relevant sorites series at which we cannot say whether an item has the property of being hirsute, or the property of being rich (there is not a 'Yes or No' answer to these questions). But we will not be deeply puzzled by our inability to say. Again, what we will have are merely different ways of describing a single outcome.

But as the case of being one and the same person suggests, the sanguine response may not be available for all sorites arguments.[20] For another example, consider the property of being conscious in the sense of there being *something it is like* to be an individual at a given time. It seems that, for any putative sorites series in which an individual is conscious at the beginning and non-conscious at the end, there will nonetheless be a 'Yes or No' answer to the question 'Is this individual conscious?' at each step along the way. Suppose, for example, that this individual is very gradually anesthetized. It may be hard to say where the individual goes from being conscious to being non-conscious, but intuitively there is at each step either *something* it is like to be this individual, or there is not.[21] Here we do not have a single outcome, and two ways of describing it. We have two different possible

[19] The word 'relatively' is important. I do not intend to claim that Parfit's response resolves *all* that is puzzling about the sorites arguments to which it applies. It may remain an independently implausible solution, even if it is the least implausible solution of those available.

[20] Parfit 1984 (232) writes: 'When it is applied to other subjects, such as phenomenal colour, the Sorites Argument cannot be so easily dismissed. Nor does this dismissal seem plausible when the argument is applied to personal identity. Most of us believe that our own continued existence is, in several ways, unlike the continued existence of a heap of sand.' Also see Alter and Rachels 2004.

[21] See, for example: Unger 1988; Antony 2006; and Simon 2017.

outcomes. Similar remarks may be true of sorites series concerning when collections of objects compose further objects.[22]

It would appear, then, that even if sorites arguments involving being a heap, being hirsute, being rich, being a person, being one and the same person, being conscious, and being a composite object are all relevantly structurally analogous, there is a content-based disanalogy between them. Whereas it seems the relatively sanguine Parfitian response is available in the cases of being a heap, being hirsute, and being rich, it is significantly more controversial that such a response is available in the case of being a person, being one and the same person, being conscious, and being a composite object. This is already enough to cast doubt on the underlying logic of the sorites analogy, that if two arguments are relevantly structurally analogous, the correct response to one is structurally analogous to the correct response to the other.

Just as there can be content-based disanalogies between structurally analogous one-dimensional sorites arguments, so too can there be such disanalogies between structurally analogous multidimensional sorites arguments. Earlier I presented a multidimensional sorites argument concerning the relation of being heapier than. I noted that a defender of the sorites analogy might argue that, if the correct response to this multidimensional sorites argument is to reject Tolerance*, then the correct response to the transitivityless spectrum argument is to reject Tolerance (and thus the correct response to the original spectrum argument is to reject the conjunction of Tradeoffs and Transitivity). Even if these arguments are relevantly structurally analogous, the relatively sanguine Parfitian response is available in the case of the multidimensional sorites argument but not in the case of the transitivityless spectrum argument. Or so I argue.

Recall that the sorites series of the multidimensional sorites argument begins with X, a collection of ten billion grains with perfectly heapy cone-shaped distribution D_1, and ends with a collection of a (much) larger number of grains with perfectly flat and thin distribution D_k. At each step along the series, the distribution of grains gets slightly flatter (and some arbitrarily large number of grains gets added). At each step, we ask, 'Is there some number of grains n with sand distribution pattern D_i such that this collection is heapier than collection X?'. For the step featuring distribution D_2, it seems the answer is Yes. For the step featuring distribution D_k, it seems the answer is No.

For the answer to be Yes, the difference between D_i and D_1 must be sufficiently small. Crucially, it is also plausible that when other things are equal, whether there is a number of grains n such that n grains with distribution D_i that is heapier than

[22] See, for example: Sider 2001; Barnes 2007; and Korman 2010. Sider 2001 (125) and others argue that the argument from vagueness for universalism about composition is not 'just another sorites', even though it has the structure of a sorites argument. That is, they hold that there is a content-based disanalogy between Sider's sorites argument and the more familiar ones involving being a heap or being hirsute.

collection X can relevantly *just consist in* whether the difference between D_i and D_1 is sufficiently small. For some step featuring D_i, it is plausible that there is not a 'Yes or No' answer to our question. But we would not be deeply puzzled by this indeterminacy. 'Heapier than X' and 'Not Heapier than X' are merely two ways of describing a single outcome. Correlatively, if we precisified 'sufficiently small' in some arbitrary way, it would then be relatively unpuzzling that there is a number of grains n such that n grains with distribution D_i is heapier than collection X, but no number of grains with slightly flatter distribution D_{i+1} that is heapier than collection X (that is, we would find it relatively unproblematic to reject Tolerance*).

Next recall that the sorites series of the transitivityless spectrum argument begins with X, a population of ten billion people at very high positive level L_1, and ends with a population of a (much) larger number of people at very low positive level L_k. At each step along the series, the quality of life drops slightly (and some arbitrarily large number of people gets added). At each step, we ask, 'Is there some number of people n at well-being level L_i such that this population is better than population X?'. For the step featuring well-being level L_2, it seems the answer is Yes. For the step featuring well-being level L_k, it seems the answer is No.

For the answer to be Yes, the difference between L_i and L_1 must be sufficiently small. Crucially, it is also plausible that, whether there is a number of people n such that n people at well-being level L_i is better than population X *cannot* just consist in whether the difference between L_i and L_1 is sufficiently small.[23] For each step featuring L_i, it is plausible that there *is* a 'Yes or No' answer to our question. 'Better than X' and 'Not Better than X' are *not* merely two ways of describing a single outcome. Instead, what we have here are two different possible ways for things to be ('Not Better than X' covers a range of more specific possibilities, such as 'Worse than X', 'As Good as X', 'On a Par with X', 'Imprecisely as Good as X', or 'Incomparable with X').[24] Correlatively, if we precisified 'sufficiently small' in some arbitrary way, it would *remain* puzzling that there is a number of people n such that n people at well-being level L_i is better than population X, but no number of people at slightly lower well-being level L_{i+1} that is better than population X (that is, we would continue to find it difficult to reject Tolerance).

It is important to recognize that the content-based disanalogy I have just drawn between the multidimensional sorites argument and the transitivityless spectrum argument is not that we can appeal to indeterminacy in response to the former

[23] Note that this claim does not imply that such evaluative properties are irreducible to *any* other properties. Some hold that, while certain evaluative properties are reducible to other evaluative properties, evaluative properties are irreducible to non-evaluative properties. This is Parfit's view (see Parfit 2011, chapters 25 through 27). Others, such as naturalists, hold that evaluative properties are reducible to non-evaluative properties.

[24] Several of these 'more specific possibilities' I have parenthetically listed here are discussed by others in this volume, including Nebel (Chapter 8); Chang (Chapter 14); Rabinowicz (Chapter 15); Arrhenius (Chapter 16); and Thomas (Chapter 17).

only. It is that, while sometimes there is no 'Yes or No' answer to the question 'Is there some number of grains n with sand distribution pattern D_i such that this collection is heapier than collection X?', there is always a 'Yes or No' answer to the question, 'Is there some number of people n at well-being level L_i such that this population is better than population X?'. It is compatible with the claim that there is a 'Yes or No' answer to a question that it is indeterminate whether the answer is Yes or is instead No (it can be determinate that [either there will be a sea battle tomorrow, or there will not] even if it is indeterminate whether [there will be a sea battle tomorrow]). Yes and No correspond to *two* different possible ways for things to be, even if it is unsettled which way things actually are.[25] When there is no 'Yes or No' answer to the question 'Is there some number of grains n with sand distribution pattern D_i such that this collection is heapier than collection X?', this is because, while there is only *one* way for things to be, there are different (equally good) ways to describe it. This sort of indeterminacy is far less puzzling.[26]

18.4 Hypersensitivity

Recall that defenders of the sorites analogy might hold that, since the transitivityless spectrum argument is relevantly structurally analogous to a sorites argument in that both make essential appeal to a tolerance premise, if the correct response to a sorites argument is to reject its tolerance premise, then the correct response to the transitivityless spectrum argument is to reject Tolerance. This would in turn entail that the correct response to the original spectrum argument is to reject the conjunction of Tradeoffs and Transitivity. To those of us who cannot part with Transitivity, this would mean the correct response to the original spectrum argument is to reject Tradeoffs.

In this section, I respond to this variant of the sorites analogy by offering another content-based disanalogy between sorites arguments and spectrum arguments. In particular, I argue that, while rejecting Tradeoffs of the spectrum argument yields what I call hypersensitivity, rejecting the structurally analogous premise of a structurally analogous multidimensional sorites argument does not.

I will say there is *hypersensitivity* when a slight difference in one sort of property makes a radical difference in another sort of property.[27] Equivalently, A-properties

[25] For discussion of this sort of metaphysical indeterminacy, see: Williams 2008; Barnes and Cameron 2009; Barnes and Williams 2011a and 2011b; and Eklund 2011.

[26] According to a further content-based disanalogy, the conclusions of sorites arguments are *more implausible* than the conclusions of structurally analogous spectrum arguments. For instance, we might argue that accepting the claim that a very flat collection of sand with enough grains is heapier than a paradigmatically very heapy collection of sand involves a conceptual mistake, whereas accepting the Repugnant Conclusion does not. For discussion of this kind of content-based disanalogy, see Campbell ms.

[27] I explore hypersensitivity and its significance for ethics in Pummer ms.

are hypersensitive to B-properties when a slight difference in B-properties makes a radical difference in A-properties. I assume for now that we have a decent enough intuitive grasp of 'slight' and 'radical' to understand what hypersensitivity is, but at the end of this section I offer a more precise definition of hypersensitivity, which does not appeal to the notions of 'slight' or 'radical' differences. One intuitive example would be deserving hell rather than heaven merely in virtue of uttering one additional mild obscenity.[28] Here a slight difference in one's conduct makes a radical difference to what one deserves. Another example of hypersensitivity would be that one life is radically better than an otherwise exactly similar life, merely in virtue of containing one fewer stubbed toe.[29] Such hypersensitivity is deeply puzzling, and views that entail that it exists bear a significant theoretical cost.

The hypersensitivity of A-properties to B-properties entails the existence of a cutoff somewhere along a relatively smooth spectrum of B-properties. But it is not the existence of a cutoff per se that makes hypersensitivity so puzzling. There are plenty of cutoffs and threshold phenomena that have nothing to do with hypersensitivity.

Some properties come with built in cutoffs. Consider the property of having at least a hundred grains. Clearly, a collection of ninety-nine grains does not have this property. There is no hypersensitivity here, as the difference between having this property and not can just consist in the slight difference of one grain. Next consider three lines on a Euclidean plane. Lines q and r are parallel, and line s is perpendicular to them. If the interior angle formed between q and s were not 90-degrees, but 89-degrees, q and r would no longer be parallel. That is, q and r would eventually intersect. Does the slight difference of a single degree make the large difference of q and r intersecting rather than running parallel? In some sense it does. But this is not the sort of difference-making involved in hypersensitivity. This is not a case of one difference that makes some further difference. Whether q and r are parallel *just consists in* whether q and r form 90-degree angles with s. If the difference between q and r intersecting rather than running parallel is large, so too is the difference between q forming a 90-degree angle with s rather than q forming an 89-degree angle with s.

Other properties are such that we can build cutoffs into them. For instance, the law often draws cutoffs in somewhat arbitrary ways, to avoid issues with borderline cases.[30] In some countries, only those who are at least 18 years old are legally permitted to vote. Someone a day younger does not have this legal property. It may thus seem that a slight difference in one's age makes a large difference in the legal properties one has. But a slight difference in age is not enough. What makes the large difference in one's legal properties is the non-slight difference between

[28] Sider 2002. [29] Pummer 2017. [30] See Glover's 1977 (166) discussion of speed limits.

[being under 18 *and* it being the law that those who are under 18 cannot vote] and [being at least 18 *and* it being the law that those who are at least 18 can vote].[31]

Some cutoffs involve slight differences in B-properties that make big differences in A-properties *by* causally triggering other, larger differences in B-properties. Take the case of placing a feather on one side of a perfectly balanced scale, which then knocks over the first in a series of dominos, or flips on a Rube Goldberg machine. Or the case of releasing a drop of water at the top of a snowy hill. Or the butterfly effect. Slight differences in B-properties can cause countless other differences in B-properties, often progressively larger ones, and often very rapidly (at the subatomic level very complex causal sequences can unfold seemingly instantaneously).[32] There is no hypersensitivity here. In each of these examples, we do not have a slight difference in B-properties that is *itself* making a large difference in A-properties. Instead, we have a slight difference in B-properties that is causing other differences in B-properties which are together making a large difference in A-properties.

Consider a further illustration of this last distinction. Suppose that, were I to carefully remove a single topmost brick from a brick building, this would leave all the other bricks unperturbed. However, were I to remove a middle brick, this would cause adjacent bricks to wobble, leading the whole building to shake and topple over. The removal of a brick is itself a slight difference in B-properties, but if it is a middle brick, its removal triggers many other differences in B-properties, which together make a large difference to the A-property of being a building. It is more puzzling that I could make a large difference to the A-property of being a building merely by removing a single topmost brick.

The case of repeatedly removing topmost brick after topmost brick is another version of the original sorites case.[33] Suppose that in response to the sorites argument we reject its tolerance premise, and draw a cutoff for being a heap (or building) at some precise number of grains (or bricks). Suppose reductionism about being a heap is correct, so that when other things (like the sand distribution pattern) are equal, whether a collection of grains of sand is a heap can just consist in whether this collection has a sufficient number of grains. Then the difference between being a heap and not can be slight. But suppose instead that whether a collection of grains of sand is a heap does not just consist in whether this collection has a sufficient number of grains—that is, suppose that the former

[31] Similar remarks apply to the creation of cutoffs with desires and promises. Suppose I desire at least a hundred grains of sand. It may seem that the slight difference of a single grain could then make a large difference in desire satisfaction. But a slight difference in grains is not enough. What makes the large difference in desire satisfaction is the non-slight difference between [having ninety-nine grains *and* not desiring them] and [having a hundred grains *and* desiring them].

[32] Other examples include Sorensen 1988 (251–2) on the drop of rocket fuel needed to achieve escape velocity and Chang 2002 (136–7) on the straw that broke the camel's back.

[33] In the case of heaps of sand, the relevant structure is not as differentially affected by taking individual grains from the middle rather than from the top.

difference is some further difference, distinct from the latter one. This would at least pave the way for the view that the cutoff between being a heap and not being a heap entails the existence of hypersensitivity. But it is not clear that the slight difference in grain-properties would here be making a *radical* difference in heap-properties. Arguably the difference in heapiness between a collection of n grains that is not a heap and a collection of n+1 grains that is a heap is much less than the difference in heapiness between a collection of just one grain and a collection of n+10,000,000,000 grains. (At any rate, I say more below about how we could precisify 'radical'.)

Before returning to spectrum arguments, we need to observe a further point about what hypersensitivity can consist in. Large differences in properties include large differences in relations as well as in monadic properties. An item x can be *somewhat* A-er than another item y, or it can be *much* A-er than y. Hypersensitivity can accordingly be formulated in terms of relations: it occurs when a slight difference in B-properties between items x and y makes it the case that, while x is radically A-er than z, y is not A-er than z.

Now recall the spectrum argument for the Repugnant Conclusion, which involves tradeoffs between quality of life and number of people. The rejection of Tradeoffs in this argument entails that there is hypersensitivity, if the following two claims hold: (1) for any positive well-being level L_i, and slightly lower positive level L_{i+1}, and any number of people n, the difference between a population of n people at level L_i and a population of n people at level L_{i+1} is slight; (2) a radically larger number of people at the same positive quality of life is radically better. It is controversial that either (1) or (2) holds. Below I consider an objection to (1). Parfit defends (2) by arguing that, unless we accept it, we face what he calls the *Absurd Conclusion*.[34] Not everyone is convinced. Not everyone believes that the existence of a larger number of people at the same positive quality of life would be better, let alone that the existence of a radically larger number of such people would be radically better. Those who doubt (2) might wish to instead consider the 'negative' analogue of the spectrum argument, the conclusion of which is the *Negative Repugnant Conclusion* (that there is some number of people n, such that n people at a barely negative well-being level is worse than ten billion people at a vastly lower level).[35] It seems hard to deny that the existence of a radically larger number of people at the same *negative* quality of life would be radically *worse*. For simplicity, I assume that (2) holds.

Given (1) and (2), the rejection of Tradeoffs entails that there is hypersensitivity. If we reject Tradeoffs, we claim that there is some well-being level L_i and some number of people n, such that there is *no* number of people at slightly lower level

[34] Parfit 1984 (chapter 18). Also see Parfit 2016 (112).

[35] See Broome 2004 (213). Mulgan 2002 and others refer to this conclusion as the 'Reverse Repugnant Conclusion'.

L_{i+1} that is better than n people at level L_i. From (2), if n+ is radically larger than n, then n+ people at level L_i [population X] is radically better than n people at level L_i [population Z]. From the rejection of Tradeoffs, n+ people at level L_{i+1} [population Y] is not better than n people at level L_i [population Z]. From (1), the difference between n+ people at level L_i [population X] and n+ people at level L_{i+1} [population Y] is slight. Thus, we have a slight difference in B-properties (well-being levels) between population X and population Y that makes it the case that, while population X is radically A-er (better) than population Z, population Y is not A-er (better) than population Z. This is hypersensitivity.

While rejecting Tradeoffs of the spectrum argument yields hypersensitivity, rejecting the structurally analogous premise of a structurally analogous multidimensional sorites argument does not. I call the latter the 'toleranceless' sorites argument. It goes as follows.[36]

> *Finite Spectrum**: There is a finite series of sand distribution patterns $D_1, \ldots, D_k$ such that D_1 is a perfectly heapy cone-shaped distribution, D_k is a perfectly flat and thin distribution, and the difference in flatness between any two adjacent distributions in the series is slight (for some fixed precisification of 'slight').
>
> *Tradeoffs**: For any sand distribution pattern D_i, and slightly flatter distribution D_{i+1}, and any number of grains n, there is some number of grains n+ such that a collection of n+ grains with distribution D_{i+1} is heapier than a collection of n grains with distribution D_i (the difference between D_i and D_{i+1} is given by the fixed precisification of 'slight' in Finite Spectrum*).
>
> *Transitivity**: The relation of being heapier than is transitive.

Therefore:

> *Conclusion**: There is some number of grains n such that a collection of n grains with perfectly flat and thin distribution D_k is heapier than X, a collection of ten billion grains with perfectly heapy cone-shaped distribution D_1.

It is not plausible that rejecting Tradeoffs* yields hypersensitivity. The analogue of claim (2) is claim (2*): a radically larger number of grains with the same sand distribution pattern is radically heapier. While (2) is controversial, it is defensible. But (2*) is very implausible. First, if we have a perfectly cone-shaped distribution D_1, it is plausible enough that a radically larger number of grains with distribution D_1 is heapier, but it is not clear that it is *radically* heapier. Second, (2*) seems even less plausible for flatter distributions. When considering nearly flat distributions, (2*) seems absurd. Relative to such distributions, radically more grains may not

[36] From Wasserman ms and Temkin 2012 (chapter 9).

even make things heapier at all. If we reject Tradeoffs*, we claim that there is some sand distribution pattern D_i and some number of grains n, such that there is no number of grains with slightly flatter distribution D_{i+1} that is heapier than n grains with distribution D_i. But if n+ grains with D_i is not significantly heapier than n grains with D_i—let alone radically so—we do not get hypersensitivity of the form in question (in which a slight difference in B-properties between items x and y makes it the case that, while x is radically A-er than item z, y is not A-er than z). So, there is a content-based disanalogy between the spectrum argument and the toleranceless sorites argument.[37]

Let us now consider three objections to the above argument for this content-based disanalogy. The first objection is that the derivation of hypersensitivity from the rejection of Tradeoffs assumes that, if we reject Tradeoffs, we claim that there is some *determinate* well-being level L_i, and some number of people n, such that there is no number of people at slightly lower level L_{i+1} that is better than n people at level L_i. But this assumption is unwarranted. We can instead reject Tradeoffs by claiming that it is indeterminate which well-being level L_i is such that for some number of people n there is no number of people at slightly lower level L_{i+1} that is better than n people at level L_i.

Response to the first objection: The derivation of hypersensitivity from the rejection of Tradeoffs does not make the assumption in question. I *do* assume that there is always a 'Yes or No' answer to the question, 'For each well-being level L_i and each number n, is there some number of people n+ such that n+ people at slightly lower level L_{i+1} is better than n people at level L_i?' And hypersensitivity can be derived if for *some* level L_i the answer is No, even if it is indeterminate which particular L_i this is. Incorporating such indeterminacy does not block the derivation of hypersensitivity, though it can make it indeterminate *where* the hypersensitivity is located. And while incorporating such indeterminacy about the location of hypersensitivity can remove the arbitrariness of hypersensitivity being determinately located at one well-being level rather than another, it does nothing to mitigate the implausibility of hypersensitivity itself. Take a comparison with supervenience failures. The A-properties are said to supervene on the B-properties when there cannot be a difference in A-properties unless there is a difference in B-properties.[38] Many hold, for instance, that mental properties supervene on physical properties, and that evaluative properties supervene on natural properties. Suppose we have a hundred possible worlds that are exactly

[37] I take it this disanalogy is not restricted to the subject matter of grains and heaps of sand. For example, it is also implausible that for any hair distribution pattern D_i, a radically larger number of hairs with distribution D_i is radically more hirsute. Rejecting the analogue of Tradeoffs* in such relevantly analogous toleranceless sorites arguments would not yield hypersensitivity.

[38] Hypersensitivity does not yield supervenience failure. However, it does yield a failure of what Kim 1987 (324–5) calls 'similarity-based' supervenience, according to which there cannot be a large difference in A-properties unless there is a large difference in B-properties (also see Constantinescu 2014 (182)). Hypersensitivity yields a failure of similarity-based supervenience, but not vice versa.

similar with respect to their natural properties. If ninety-nine of them are very good, and one of them is not good at all, we have one kind of supervenience failure. Claiming that it is indeterminate which of these worlds is not good allows us to avoid the arbitrariness of the supervenience failure being determinately located at one of these worlds rather than another, but it does nothing to mitigate the implausibility of the supervenience failure itself.

The second objection is an objection to claim (1). (According to claim (1), for any well-being level L_i, and slightly lower level L_{i+1}, and any number of people n, the difference between a population of n people at level L_i and a population of n people at level L_{i+1} is slight.) The objection is that the sum of many individually slight differences might not itself be a slight difference. As Parfit writes, 'The greatest mass of milk might be found in a heap of bottles each containing only a single drop'.[39] Even if the mass of each drop tended to zero, we could arguably retain the same great total mass of milk with a supply of bottles that tended to infinity.[40]

Response to the second objection: It is indeed plausible that we should reject (1). But while (1), (2), and the rejection of Tradeoffs are together sufficient for hypersensitivity, (1) is not necessary. We can instead appeal to (3): for any well-being level L_i, and slightly lower level L_{i+1}, and any number of people n, if the only difference between two populations is that one contains n people at level L_i and the other contains n-1 people at level L_i & one person at level L_{i+1}, then the difference between them is slight. Claim (3) avoids the controversial implication that many individually slight differences collectively constitute a slight difference. Instead, (3) very modestly says that *one* individual slight difference between two populations constitutes a slight difference between them.

The conjunction of (2), (3), Transitivity, and the rejection of Tradeoffs, entails that there is hypersensitivity. To see this, consider the following sub-spectrum argument for Tradeoffs. At each succeeding step of this argument, there is only ever *one fewer* person who is at the slightly higher well-being level:

> For any well-being level L_i, and slightly lower level L_{i+1}, and any number of people n, there is some number m such that n-1 people at L_i & one person at L_{i+1} & another m people at L_{i+1} is better than n people all at L_i. And, for any m, there is some m+ such that n-2 people at L_i & two people at L_{i+1} & another m+ people at L_{i+1} is better than n-1 people at L_i & one person at L_{i+1} & another m people at L_{i+1}. . . . and so on . . . And, for any m+ . . . +, there is some m+ . . . ++ such that n-n people (0 people) at L_i & n people at L_{i+1} & another m+ . . . ++ people at L_{i+1} is better than n-(n-1) people (1 person) at L_i & n-1 people at L_{i+1} & another m+ . . . + people at L_{i+1}.

[39] Parfit 1984 (388).
[40] For relevant discussion, see: Arntzenius and Hawthorne 2005; Russell 2008; and Chen 2020.

The claims of this sub-spectrum argument together with Transitivity entail that, for any well-being level L_i, and slightly lower level L_{i+1}, and any number of people n, there is some number m such that m people all at L_{i+1} is better than n people all at L_i. But this just is Tradeoffs. So, Transitivity together with the rejection of Tradeoffs entails the rejection of at least one of the claims of this sub-spectrum argument.

But, given (2) and (3), the rejection of any of the claims of this sub-spectrum argument entails that there is hypersensitivity. If we reject any of the claims of the sub-spectrum argument, we claim that there is some well-being level L_i some number of people n, and some number of people m, such that there is no number of people at slightly lower level L_{i+1}, together with n-1 people at level L_i, that is better than n people at level L_i & m people at level L_{i+1}. From (2), if m+ is radically larger than m, then n people at level L_i & m+ people at level L_{i+1} [population X*] is radically better than n people at level L_i & m people at level L_{i+1} [population Z*]. From the rejection of any of the claims of the sub-spectrum argument, n-1 people at level L_i & one person at L_{i+1} & m+ people at level L_{i+1} [population Y*] is not better than n people at level L_i & m people at level L_{i+1} [population Z*]. From (3), the difference between n people at level L_i & m+ people at level L_{i+1} [population X*] and n-1 people at level L_i & one person at L_{i+1} & m+ people at level L_{i+1} [population Y*] is slight. Thus, we have a slight difference in B-properties (well-being levels) between population X* and population Y* that makes it the case that, while population X* is radically A-er (better) than population Z*, population Y* is not A-er (better) than population Z*. This is hypersensitivity.[41]

The third objection is that the vagueness of terms like 'slight' and 'radical' make it impossible to tell whether and when hypersensitivity occurs. Relatedly, what will seem a slight or radical difference in one context may not seem so in another. The difference between stubbing one's toe and not, for instance, might seem a slight difference in the context of one's whole life, but a radical one in the context of a single moment.

Response to the third objection: There is a definition of hypersensitivity which avoids the non-comparative notions of 'slight' and 'radical' differences, and which holds that hypersensitivity is a matter of degree. Here it is.

> Take two types of difference in B-properties, a 'B_1-difference' and a 'B_2-difference'. There is *some* degree of hypersensitivity of A-properties to B-properties when, while a B_1-difference is no greater than a B_2-difference, just *one* token B_1-difference makes an A-difference that is at least as large as the A-difference that *any* number of token B_2-differences could collectively make. This degree of

[41] I believe, but will not show here, that this argument can be reformulated so that the relevant differences in B-properties are strictly natural (non-evaluative) differences, such as slight differences in pleasure intensity and/or duration.

hypersensitivity is *greater*, the smaller a B_1-difference is relative to a B_2-difference, and the larger the A-difference that any number of token B_2-differences could collectively make.

Consider the sub-spectrum argument. Let a B_1-difference be the difference between someone being at positive well-being level L_i and someone being at adjacent lower positive level L_{i+1}. Let a B_2-difference be the difference of there being an additional person at positive level L_{i+1}. In the sub-spectrum argument, population X* differs from population Z* by some number of token B_2-differences—that is, X* contains some number of additional people at level L_{i+1}. The larger this number, the larger the degree to which population X* is better than population Z*. But, no matter how much larger this number is, population Y* is not better than population Z*, even though population Y* differs from population X* by one token B_1-difference. That is, the difference in betterness that one token B_1-difference makes is at least as large as the difference in betterness (the A-difference) that any number of token B_2-differences could collectively make. We have some degree of hypersensitivity here, if a B_1-difference is no greater than a B_2-difference. Token B_2-differences are smaller, the lower the level L_{i+1} is. So, to ensure that a B_1-difference is never any greater than a B_2-difference, we can set up Finite Spectrum with a precisification of 'slight' so that the difference between someone being at level L_i and someone being at slightly lower level L_{i+1} is no greater than the difference of there being an additional person at even the very lowest positive level in the series, level L_k.[42] Indeed, we can set up Finite Spectrum with a precisification of 'slight' so that our B_1-difference is as tiny a fraction of our B_2-difference as we like. Depending on the precisification of 'slight' we use in setting up Finite Spectrum, the rejection of any of the claims of the sub-spectrum argument will yield hypersensitivity to various degrees. So, given Transitivity, the rejection of Tradeoffs will likewise yield various degrees of hypersensitivity. But any degree of hypersensitivity seems deeply puzzling.[43]

[42] One might object that, since B_1-differences involve only quality of life whereas B_2-differences involve number of people as well, we cannot meaningfully compare the size of one difference with that of another. While there are difficult questions concerning the comparison of difference-size when a difference is larger along one dimension and smaller along another, B_1-differences are smaller than B_2-differences *both* in quality of life and in number of people (B_1-differences involve no difference in number of people).

[43] It is plausible that the difference in betterness (the A-difference) that any number of token B_2-differences could collectively make is greater, the higher level L_{i+1} is. For example, consider a pair of populations in which everyone in each is at a very low positive level, and consider another pair of populations in which everyone in each is at a very high positive level. The difference in betterness that any difference in population size between the second pair of populations could make seems greater than the difference in betterness that any difference in population size between the first pair of populations could make. There may accordingly be more or less hypersensitivity depending on where along the spectrum the rejection of Tradeoffs occurs.

18.5 Conclusion

Ethics in the tradition of Derek Parfit's *Reasons and Persons* is riddled with spectrum arguments. These arguments, such as the spectrum argument for the Repugnant Conclusion that I focused on here, have important theoretical and practical implications. According to the *sorites analogy*, since spectrum arguments are relevantly structurally analogous to sorites arguments, the correct response to spectrum arguments is structurally analogous to the correct response to sorites arguments.

I first considered some potential *structural disanalogies* between spectrum arguments and sorites arguments, including one according to which, while sorites arguments appeal to a tolerance premise, spectrum arguments do not. I showed how a transitivityless spectrum argument is structurally analogous to a multidimensional sorites argument—among other things, both appeal to a tolerance premise. This structural analogy invites defenders of the sorites analogy to argue that, if the correct response to the multidimensional argument is to reject Tolerance*, then the correct response to the transitivityless spectrum argument is to reject Tolerance. And, if we ought to reject Tolerance, then we also ought to reject the conjunction of Tradeoffs and Transitivity (of the original spectrum argument).

I then turned to two *content-based* disanalogies between spectrum arguments and sorites arguments. According to these disanalogies, even if these arguments are relevantly structurally analogous, they differ in their content in ways that show the sorites analogy to be implausible. I argued that, while we can offer a relatively *sanguine response* to the multidimensional sorites argument featuring the relation of being heapier than, we cannot offer such a response to the transitivityless spectrum argument. And I argued that, while rejecting Tradeoffs of the original spectrum argument yields *hypersensitivity*, rejecting Tradeoffs* of a relevantly structurally analogous sorites argument does not. Despite their structural similarities, it can be deeply distorting to think of a spectrum argument as 'just another sorites'.

There is a broader methodological lesson here. The logic underlying the sorites analogy is flawed. That is, it is dubious that if two arguments are relevantly structurally analogous, the correct response to one is structurally analogous to the correct response to the other. We should expect to see content-based disanalogies not just between spectrum arguments and sorites arguments, but also within the class of sorites arguments, and within the class of spectrum arguments.[44] While I have focused here on spectrum arguments involving tradeoffs

[44] In section 18.3, I highlighted a content-based disanalogy within the class of sorites arguments, and in section 18.4, I suggested a potential content-based disanalogy between the spectrum argument for the Repugnant Conclusion and the spectrum argument for the Negative Repugnant Conclusion.

between quality of life and number of people, others involve tradeoffs between different evaluatively relevant dimensions, for example, intensity and duration of pain, severity and number of harms, pleasure and rational activity, and so on. We should not ignore structural similarities between these arguments, but equally we should not ignore dissimilarities in their content.

The most puzzling spectrum arguments do not admit of sanguine solutions. They leave us with the humbler task of identifying which solutions are the least implausible. Solutions that avoid the repugnant conclusions of these spectrum arguments are far more implausible than most of us would like to believe.

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