[[1]](#footnote-1)**RELEVANCE WITHOUT MINIMALITY**

S YABLO

1. INTRODUCTION[[2]](#footnote-2)

A notion that comes up everywhere in philosophy is that of a circumstance “contribut- ing” to, or “favoring,” a result or outcome—or being “helpful” to, or a “factor” in, or “relevant” to, the result or outcome.

Causes for instance should bear positively on what they cause. They should be free of material to which the effect is not beholden. An argument’s premises, or the assumptions employed in a proof, should help to make the case for its conclusion. If a premise can be

dropped without invalidating the argument, it probably shouldn’t have been there in the first place. Grounds should contribute to what they ground, both in toto and throughout. That it would be fair is a reason for ϕ-ing only if its fairness counts in favor of ϕ-ing. A data point does not confirm a hypothesis, or figure in the evidence for it, if it is irrelevant to whether the hypothesis is true.

This last example (of figuring in the evidence) helps us to clarify the kind of relevance at issue. Hempel distinguishes three progressively more complicated types of confirma- tion: absolute, comparative, and quantitative ([Hempel](#_bookmark19)[[1945](#_bookmark19)]). Quantitative confirmation theory tries to develop measures of the extent to which *Q* confirms *P*. Comparative confir- mation theory tries to make sense of *Q* confirming *P* more than *Q'* confirms *P*. Confirmation of the absolute type is a “binary” affair, both in involving only two elements—*Q* and *P*— and allowing only two verdicts—*Q* confirms *P* or it fails to confirm *P*. Hempel mentions comparative and quantitative confirmation only to set them aside for a later stage of the investigation.

Relevance in the sense of this paper is a binary affair too. *Z* contributes to *Y*, or it does not, period.[[3]](#footnote-3) Nothing much will be said about comparative helpfulness, or degrees of helpfulness. Various other subtleties will be set aside as well. Our focus will be on *actual* rather than potential helpfulness. *Z* is helpful to *Y* only if both obtain.[[4]](#footnote-4)A factor that normally works against *Y*—*Y* holds despite this factor—may yet be helpful to it on a particular occasion, and vice versa. A normally neutral *Z* may join forces with *Y*’s friends on some occasions and its enemies on others.

Plan of the paper: Relevance is standardly explained in terms of notions like *minimality*, *difference-making*, *essentiality*, and *non-redundancy*. The standard explanation is reviewed in the next two sections, first from an analytic and then a quasi-historical perspective. We will argue that this explanation does not get to the heart of things: *Z* can contribute to *Y* even if *Z* is not essential to the case for *Y* and even if minimality considerations do not apply. The problem is seen to have hyperintensional aspects. A hyperintensional diagnosis is suggested and a possible solution sketched. The solution is in terms of “focussed” minimality, or minimality where a certain subject matter is concerned. We sum up at the end and sketch some further issues and possible applications.

1. DEPENDENCE

One imagines to begin with that *Z* contributes to *Y* just if *Y* counterfactually depends on *Z*, that is, *Y* would not have obtained if not for *Z*.

[*C*1] *Z* contributes to *Y* just if: $\overbar{Z}$ $\gg $ $\overbar{Y}$

This is for a couple of reasons not a satisfactory answer. One is that *Z* and *Y* will in some applications (grounding, entailment,....) be necessary. $\overbar{Z}$ $\gg $ $\overbar{Y}$ will in that case be a counterpossible conditional. Counterpossible conditionals are as theoretically elusive as helpfulness, and raise some of the same problems, e.g. both are hyperintensional.

Another reason not to rest too much on counterfactuals is familiar from the theory of causation. *Z* can contribute to *Y* even if *Y* would still have obtained (on an alternative basis) in *Z*’s absence. The mismatch is often explained as follows.[[5]](#footnote-5) *Y depends* on *Z* if an *X* obtains with three properties:

1. it contains *Z*;
2. *X*$\$*Z* does not suffice for *Y*; and
3. *Y* is not overdetermined—it has no other basis (actual or counterfactual) that would do the job in *X*’s absence.

But, granted that *Y* does not *depend* on *Z* if *Y* is overdetermined, this seems irrelevant to the issue at hand. Why should it affect *Z*’s claim to be making a contribution that there are, or would be, other contributors about? This suggests our focus should not have been on dependence in the first place. We should be looking rather at a circumstance (defined by (i) and (ii)) that *underlies* dependence:

[*C*2] *Z* contributes to *Y* just if: an *X* obtains such that *X*⇒*Y*, but (*X*\*Z*) $⇏$*Y*.

Merely counterfactual bases drop out of the picture on this approach. Alternative actual bases are acknowledged, and seen as posing no threat. *X* need not be in any sense unique for *Z* to qualify as helpful to *Y* by figuring essentially in *X*.

The way *Z* achieves relevance on [*C*2] is by pulling an “almost” sufficient condition over

the finish line: *A* $⇏ $*Y* but (*A*+*Z*)⇒*Y*. But, *Z* could pull *A* over the finish line even if it was largely irrelevant to *Y*. Socrates did not die because he drank hemlock in a toga precisely at noon. But such a *Z* may well be helpful to his death by the lights of [*C*2]; adding hemlock-in-toga-at-noon to an insufficient condition may well make it sufficient. This and certain related problems suggest that *everything* in *X* (not merely *Z*) should be essential to it qua basis for *Y*:

 [*C*3] *Z* contributes to *Y* just if: an *X* obtains such that *Z*<*X*, *X*⇒*Y*, and ∀*U*<*X* (*U* $⇏$*Y*).

This, the *minimal sufficiency* model of relevance, is what I want to talk about in this paper. It admits, like any other philosophical model, of various refinements. But we will not bother too much about these, since they don’t affect the problem about to be developed. That problem runs deep and is not easily tweaked away.

The problem *formally* speaking is that not everything *has* a minimal basis. Surely we do not want to conclude from the fact that sufficient conditions for *Y* always contain smaller such conditions that none of these are wholly helpful to *Y*. Especially if nothing is even

*relevant* to *Y* except by relation to an *X* that *is* wholly helpful.

The problem intuitively speaking is that *X,* to be wholly helpful, need only be wholly *welcome* from *Y*’s perspective. So far is this from requiring *X* to be wholly essential that *X* can be in a good sense *wholly* *inessential*. It can be composed of elements that would none of them be missed, though of course large enough combinations of them would have been missed.

To see the problem more clearly, consider the notion of “extra help.” This utterly banal idea looks, on the minimal sufficiency model, to be a contradiction in terms. For if *Z* was extra—beyond what was needed—then the remainder sufficed; so *Z* plus that remainder was not minimally sufficient; so *Z* was not helpful. Which runs completely contrary to intuition. Suppose the winning team in a tug of war was larger than necessary. Did the team win without any help from its members? Apparently so, if *Z*, to be helpful, must push an otherwise insufficient condition over the top.

1. HISTORY

Let us now re-approach the question “historically” (note the scare quotes). When do minimality pressures first begin to make themselves felt? When do we first encounter the problem just noted: that a development, to be welcome from *Y*’s perspective, needn’t be a "sine qua non" of *Y,* even in the weak sense of being a that-without-which-*X-*would-not-suffice.

Sufficiency had a long run in philosophy before anyone got worked up about irrelevant

add-ons. There was the Principle of Sufficient Reason. Causes were events given which the effect was sure to follow. Classical validity was a matter of premise-truth sufficing for the truth of the conclusion. Grounds for such and such were and sometimes still are items or conditions prior to such and such and sufficient for it.

An obvious worry about these proposals is that they put a lower bound on, say, the cause, but not much of an upper bound, since *X*⇒*Y* is monotonic in *X* (*X*\* suffices if *X*

does) while causation, grounding, and the like are more discerning. Socrates died not because he drank the hemlock in a toga, but because he drank the hemlock. The existence of even primes is grounded in 2 being an even prime, not 2 being an even prime while 5 is odd.

If sufficiency allows causes to get too big, we might think of asking *Z* also to be *necessary* for *Y*. Hume considers this in the *Treatise* and rejects it, on the theory that effects need not have been caused at all, let alone by their actual causes.

If we define a ‘cause’ to be *An object precedent and contiguous to another, and where all the objects resembling the former are similarly precedent and contiguous to objects that resemble the latter*, we can easily grasp that there is no absolute or metaphysical necessity that every beginning of existence should be preceded

by such an object ([Hume](#_bookmark20)[[1740 /2003](#_bookmark20)], Bk I, section 14, “Of the Idea of

Necessary Connexion.”)

The issue for us concerns *natural* necessity, and *Y*’s specific cause rather than its being caused at all. But specific causes are not naturally necessary either, for Hume. From *objects resembling X are always succeeded by objects resembling Y,* it does not follow that *objects resembling Y are always preceded by objects resembling X.[[6]](#footnote-6)*

Hume does seem to appreciate, even in the *Treatise*, that causes as he officially defines them are liable to be overloaded with extraneous detail. For we find him in the very next section (*I*, *15*, “Rules by which to judge of causes and effects”) looking for ways to block this:

where several different objects produce the same effect, it must be by means of some quality, which we discover to be common amongst them...in order to arrive at the decisive point, we must carefully separate whatever is superfluous, and enquire by new experiments, if every particular circumstance of the first experiment was essential to it.

Hume suggests here a different way of keeping *X* within bounds. Rather than requiring causes to be necessary—so that *Y* no longer *holds* given just part of *X*—he asks them only to be non-redundant—so that *Y* is not *ensured* by just part of *X*. This becomes in the *Enquiry*

([Hume](#_bookmark21)[[1740 /2006](#_bookmark21)]) a full-blown proportionality requirement:

we must proportion the [cause] to the [effect] and can never be allowed to ascribe to the cause any qualities, but what are exactly sufficient to produce the effect.[[7]](#footnote-7)

A proportional cause is an *X* such that *X* suffices for *Y and nothing less suffices*.[[8]](#footnote-8)

[*P*] *X* is proportional to *Y* (*X→Y*) iff

1. *X* suffices for *Y* (*X*⇒*Y*)
2. for all *X'*<*X*, if *X'*⇒*Y*, then *X'=X*

Of course we are often interested in “contributory” causes which are not sufficient, and hence not proportional. But Hume has an easy way to bring these on board. *Z* contributes to *Y* if it is *contained* in some proportional cause *X* of *Y*:

[*H*] *Z* contributes to *Y* (*Z*↝*Y*) iff an *X* obtains such that *Z*<*X* and *X*→*Y*.

By the *Humean Package* (*HP*), we’ll mean these two ideas together. The first idea: *X* is proportional to *Y* iff it is minimally sufficient for *Y*. The second: *Z* contributes to, or is relevant or helpful to, *Y* iff *Z* is contained in a proportional *X*. What the two together offer is an account of relevance in terms of the prima facie much clearer notions of sufficiency and minimality.

The Humean Package has a lot to be said for it. It is powerful and illuminating and deals correctly with a great many cases. Also it is highly adaptable. [*P*] and [*H*], since they do not contain the word “cause,” offer a general template that is potentially of very wide application.

And indeed it is hard to think of an area of philosophical inquiry that hasn’t employed the template. The Hypothetico-Deductive model of confirmation is Humean in spirit; *E* confirms *H* just if *H* figures essentially in some suitable *E*-entailing body of information. An action’s right-making features, on one account, are those included in some condition that is minimally sufficient for its rightness. Current theories of presupposition projection emphasize the relevance of an embedded sentence’s truth-value to the truth-value of the whole.[[9]](#footnote-9) A recent paper defines “*P* is a difference-making ground for *Q*” like this:

for some scenario *S* which contains a full ground of *Q*, *S* minus {the fact that

*P*} does not contain a full ground of *Q* ([Kra¨mer and Roski](#_bookmark23)[[2017](#_bookmark23)]).

How can the fact *P* that 5 is odd (indivisible by 2) be relevant to the fact *Q* that there are primes, when that fact is fully assured independently? A scenario *S* consisting precisely of 5 and its indivisibility by 2, 3, and 4 contains thereby a full ground of *Q*. No lesser scenario contains a full ground, and in particular *S* minus the fact *P* of 5’s indivisibility by 2 does not fully ground *Q*. 5’s oddness contributes to the existence of primes because it makes the difference between a minimal ground for primes’ existence and a near-ground.

1. EXTRA HELP

The problem as already indicated that a *non*-minimal condition *X*—one with elements that it doesn’t need, to suffice for *Y*—can still be wholly, entirely helpful. Extra help is still help, and sometimes it is the only kind of help around.

One example of this sort comes from Zeno. A solid sphere takes up space. It has measure 1, say. The sphere’s component points are helpful, surely? Certainly they are helpful en masse—en masse they just *are* the sphere. And it is hard to see how they

could be helpful together if not individually. But since each point has measure 0, they would none of them be missed. None of the sphere’s component points lies in a minimal subregion of the same measure, simply because there *are* no minimal subregions of the same measure.[[10]](#footnote-10)

Hume would certainly have known of the Zeno puzzle. But he could not have known of the example to come, for it is based in events taking place in 1741, the year the *Enquiry* was published. God is pleased, let us stipulate, if and only if he is praised infinitely many days. Being praised *every* day should be pleasing, surely. But no, not if we go by the Humean Package. The reason was noted by John Newton, author of *Amazing Grace*:*[[11]](#footnote-11)*

When we’ve been here ten thousand years Bright shining like the sun

We’ve no less days to sing His praise Than when we’d just begun.

Singing *every* day is out of proportion with the effect, since God would still be pleased if we waited 10000 years before beginning. And of course the same is true for any other

set of days one might choose. There *is* no least infinite set of days. Every praise-day is helpful to the cause, but not because it figures in a minimal sufficer.

The moral so far is this. Minimality had better not be required for relevance, because

you can’t always get it. In fact minimality is not required even where you *can* get it.

The pope’s crown was once supposedly made of three smaller crowns. Suleiman the Magnificent, not to be outdone, had *four* crowns in his crown. Suleiman’s crown seems wholly relevant to *There are crowns*. But you could lop the upper sub-crowns off and still have a sufficient condition for the sentence’s truth. Here we *can* point to a minimal sufficient basis for *There are crowns*. But there is no reason to do so. Suleiman’s total crown is no less helpful for being four times larger than necessary.

The US Senate cannot conduct certain kinds of business unless 51 members are present (a quorum). Let us say the Senate is not “in order” without a quorum. Suppose that 52 senators are present on a given occasion. They all arrived at the same time and the situation is in other ways symmetrical. The presence of these senators—the Gang of 52, let’ s call them —seems wholly helpful to order obtaining. True, there is a Gang of 51 present as well which also suffices, in fact there are 52 such gangs. Somehow though this does not detract from our initial judgment. The Gang of 52 is wholly relevant despite the fact that not all its members had to be there.

1. PREVIOUS PROPOSALS

That *X* can still be wholly relevant to *Y*, even if not all of it is needed, has not gone unnoticed. Fine makes the point in connection with truthmaking (proportional truth- makers in his parlance are *exact* rather than *inexact*) ([Fine](#_bookmark14)[[2017](#_bookmark14)]).[[12]](#footnote-12) The Humean proposes in effect to

take the exact verifiers to be the minimal inexact verifiers, those that inexactly verify without properly containing an inexact verifier.

This precludes the possibility of extra help. But the possibility is reopened, if fusions of exact verifiers are allowed in as well.[[13]](#footnote-13)

Consider Kratzer’s theory of *exemplification*. The fact of two teapots exemplifies *There are teapots* despite its non-minimality. But the fact of two teapots and a dog does not. Why is the extra dog more of a problem than the extra teapot? Kratzer has an interesting idea about this: the parts of a *p*-exemplifying situation *s* must “earn their keep” by figuring essentially, not perhaps in *s* itself, but in a minimal *p*-verifying part of *s*.

*s* exemplifies *p* iff for all *s'* such that *s'* < *s* and *p* is not true in *s*', there is an

*s''* such that *s'* < *s''* < *s*, and *s'* is a minimal situation in which *p* is true. (A

minimal situation in which *p* is true is a situation that has no proper parts in which *p* is true.) ([Kratzer](#_bookmark24)[[2002](#_bookmark24)]: 660)

The fact of two teapots exemplifies *There are teapots* despite its non-minimality because everything in it is part of some minimal verifier or other. Here *s* and *p* are like our *X* and *Y* and exemplification is like being-sufficient-for-and-wholly-helpful-to.

Kratzer’s theory does indeed loosen the bonds between relevance and minimality. But

minimality is still playing its same old role one level down; a non-minimal verifier still needs to contain minimal verifiers. It’s a problem, then, if “a statement may have inexact verifiers without having any minimal verifiers” ([Fine](#_bookmark14)[[2017](#_bookmark14)]).[[14]](#footnote-14)

Similarly a cause might still be wholly helpful to an effect, even if all its sufficient parts contain smaller such parts all the way down. Imagine a detector that buzzes when presented with a line segment of any positive length.[[15]](#footnote-15)

Infinitary relevance can *sometimes* be dealt with as follows.[[16]](#footnote-16) Consider again Zeno's Paradox of Measure. How do the individual points in a sphere contribute to its volume, when each point is of measure zero? Well, the points are *collectively* relevant and none is more relevant than another. Perhaps *X* is wholly helpful to *Y* if

1. *X* subdivides into the *Xi*’s
2. *Y* fails if *all* the *Xi*’s fail
3. one *Xi* is as relevant to *Y* as another

Or, looking back at Amazing Grace, we might reason as follows. The *number* of praise- days does not shrink if we add one more day, but the *set* does shrink. And cardinality considered as a measure on sets is a coarsening of membership; size in the how-many sense is monotonically grounded in size in the membership sense. Perhaps *X* is wholly helpful to *Y* if

(1) *Y* is to the effect that *X* is at least so big by a certain measure

(2) that measure is monotonically grounded in another, finer measure

(3) *Xi* bears on *X*’s size by this finer measure

I don’t want to pursue these ideas here for two reasons. They seem insufficiently general. And they miss a crucial aspect of the problem, as we are about to see.

1. HYPERINTENSIONALITY

One problem for the Humean package ([*H*] and [*P*]) is that minimality is not always avail- able, or even desirable. Now we turn to a second issue which seems at first unrelated.

Humean proportionality looks to be “intensional”: if *X* and *Y* are necessarily equivalent to *X*∗ and *Y*∗, then *X* is proportional to *Y* only if *X*∗ is proportional to *Y*∗. For it is defined by [*P*] in terms of sufficiency and minimality. which themselves look to be intensional.[[17]](#footnote-17)

Is *relevance* intensional? It is not. An example on the *Y* side: *His praise is sung infinitely many days* (*Y*) is true in the same worlds as *His praise is sung infinitely many days after 12*/*31*/*12017* (*Y*\*). Singing every day starting now (*X*) is wholly helpful to *Y* but overkill when it comes to *Y*\*. Singing today is absolutely beside the point when it comes to singing infinitely often in the distant future.

An example on the *X* side:[[18]](#footnote-18) In Alternative Eden, there are infinitely many apples on the tree of life but only one, *BadApple*, on the Tree of Knowledge of Good and Evil. Otherwise the story is much the same. Eve can’t recall what it was that God had commanded and decides to check it out with the serpent:

Eve: What did God allow me to do again?

Serpent: I remember it was equivalent to this: *You take infinitely many apples*. [Eve eats all the apples and is banished.]

Eve: Why did you say God had allowed me to take infinitely many apples?

Serpent: I said it was necessarily *equivalent* to that, and it was. *You take infinitely many apples v such that v* ≠ *BadApple* (*X*) holds in the same worlds as *You take infinitely many apples, period* (*X*\*). One apple cannot make the difference between an infinite set and a finite one.

Despite that they hold in the same worlds, it would seem that *X*’s truth is wholly helpful to *Eve did what she was told*, whereas *X*\*’s truth is not.

1. MEREOLOGY

What is it for *X'* to be < *X* in [*P*]? You might think that *X'*<*X* iff *X* implies *X'*. But although this is how content-parts are usually understood, the view quickly runs into problems.[[19]](#footnote-19) For one thing it allows *X* to be knocked out of proportion with *Y* by *X*∨*S*, provided that *S* too is sufficient for *Y*. Which is surely the wrong result.

Socrates’ drinking the hemlock (*X*) suffices, let’s assume, for his death (*Y*). *X* is propor-

tional to the death only if nothing less suffices. Yet something less is bound to suffice, if less-than is just the converse of implication. For consider any other sufficient basis for death, say. falling off a high cliff (*S*). *X*∨*S* is a weaker sufficient condition for *Y* than *X* is. *X*∨*S* knocks *X* out of proportion with *Y*, if < means is-true-in-more-worlds-than. So < had better mean more than that.

The answer we *want* to give is that *X*∨*S*, although *weaker* than *X*, is not *contained* in

1. To be proportional to *Y, X* should have no proper *parts* sufficient for *Y*. This notion of content-part is not available to the Humean, since it is pretty clearly hyperintensional. Our solution to hyperintensionality, looking ahead a bit, will be in terms of *ways*: statements true in the same worlds may not be true in the same ways in those worlds. Ways are the key as well to content-parts:

*X'* < *X* iff

* 1. every way for *X* to hold implies a way for *X'* to hold,
	2. every way for *X'* to hold is implied by a way for *X* to hold.[[20]](#footnote-20)

Ways bear also on the problem of minimality (the problem we are mainly concerned with in this paper) as we’ll be seeing shortly. Suffice it for now to say that although the Humean Package faces multiple challenges, they all push in a similar theoretical direction.

1. BOTTOMLESS KINDS

A fractal is a geometrical figure containing isomorphic copies of itself; these will then contain isomorphic copies of *them*selves, and so on all the way down. Fractals are counterexamples par excellence to the minimality requirement. The fact that tree ***t*** exists ([***t*** *exists*], for short) is as helpful as it could be to *There are fractals*. You are not going to find a better candidate for a proportional, discerning, basis for the truth of *There are fractals* than the existence of ***t***.



Compare a fact that is clearly out of proportion with *There are fractals*: [***t*** *exists and Sparky is a dog*]. What is the difference exactly? You can throw the Sparky conjunct out, of course, and still be left with a fact sufficient for the existence of fractals. But one can also throw out part of the fact that ***t*** exists. For the immediate right subtree ***u*** of ***t*** is also a fractal, and ***t***’s existence consists in the joint existence of ***u*** and ***v*** (***v*** is the rest of ***t***). It is not clear as yet why [***u*** *exists and* ***v*** *exists*] would be more proportional to *There are fractals* than [***t*** *exists and Sparky is a dog*], or for that matter [***u*** *exists and Sparky exists*], given that the second conjunct is in each case dispensable.

Call a kind *K* bottomless if to be a *K* is to contain smaller *K*s. Clearly if *K* is bottomless, then a minimal *K* is not to be expected. Are there other bottomless kinds, besides *fractal*?

A set is Dedekind infinite iff all of its members can be paired off 1-1 with its members other than *x*, for some *x* in the set. Suppose that *S* is equipotent in that sense with *S*1 = *S*\{*x*}, and let *y* be a member of *S*\{*x*}. Then if *y* ∈ *S*1, it follows on standard assumptions that *S*1 is equipotent with *S*2 = *S*1\{*y*}, and so on without limit. *Infinite set* is thus a bottomless kind.

A predicate *P* is *dissective* if a thing cannot instantiate it unless all its parts do.[[21]](#footnote-21) This does not ensure bottomlessness all by itself, but it does if we add that *P*s always have proper parts. Sellars draws on the notion of dissectiveness in his famous distinction between the “scientific” and “manifest” images of reality.

Color expanses in the manifest world consist of regions which are them- selves color expanses.[[22]](#footnote-22)

The manifestly colored “expanses” form a bottomless kind then for Sellars. (Of an espe- cially pure sort. Fractals can contain non- fractals, and infinite sets finite sets; but *no* part of a colored expanse can fail to be colored.) Aristotelian water is supposedly dissective, and a stretch of continuous motion subdivides into smaller stretches of continuous motion.

Why is minimality still insisted on, when the problem is so obvious? Compare another desideratum. Examples of a phenomenon should ideally be *visible*, so that people can see for themselves. But not if the phenomenon is invisibility! A visible example of that is impossible, and so the requirement seems silly.

A requirement can still retain its hold on us, to be sure, even after the problem is pointed out. A set of everything is impossible too, but that doesn’t make it any less “what we wanted.” Logicians tend to *regret* the unavailability of a universal set. They look for ways of approximating or simulating such a set.[[23]](#footnote-23) But, there is nothing to regret in the fact that we can’t lay our hands on a minimal fractal.

1. SCHEMATIZATION

The Humean Package is not a claim but a schema. *Z* is *causally* relevant to *Y* iff it figures in an *X* that *causally* suffices for *Y*, where nothing less causally suffices. *Z* is *ground*-relevant to *Y* (it is a difference-making ground, see section 3[)](#_bookmark1) iff it figures in a full ground *X* of *Y* such that nothing less than *X* fully grounds *Y*. *Z* helps to justify *Y* iff it figures in an *X* that fully justifies *Y*, but ceases to do so when anything is deleted. To make this clear, we take the “simple” notions of sufficiency (⇒), proportionality (→), and helpfulness (↝) in [*H*] and [*P*] and ramify them, plugging in particular flavors $⇒^{α}$, $\rightarrow ^{α}$, and $↝^{α}$ of these notions:

[ℍ] *Z* $↝^{α}$ *Y* iff *Z*<*X* for some (actual) *X* such that *X* $\rightarrow ^{α }$*Y*

[ℙ] *X* $\rightarrow ^{α }$*Y* iff (i) *X* ⇒α *Y*, (ii) for all *X'*≤*X*, if *X*' ⇒α *Y*, then *X*'=*X*.

The α-ized conditionals stand ambiguously for the modes of sufficiency and relevance with which philosophers have concerned themselves: causal, logical, modal, legal, nomo- logical, explanatory, evidential, and so on.

None of this gets us closer to solving the problem, but it reminds us of the problem’s shape and size. Take again *He is praised infinitely many days*. It has an unending chain of progressively weaker sufficers: he is praised every day from today on (*X*0),

every day from tomorrow on (*X*1),., every day from 12/31/12019 on (*Xn*), and so on. The

sufficiency in this case is ground-flavored. Writing $⇒^{γ}$ for “is sufficient in the manner characteristic of full grounds,” we have

*X*0 $⇒^{γ}$ *Y*,

*X*1 $⇒^{γ} $*Y*

*X*0 $⇒^{γ}$ *Y*,

*X*1 $⇒^{γ} $*Y*,

....

*Xn* $⇒^{γ} $*Y*,

.....

 It follows from [ℙ] that *X* $\rightarrow ^{γ} $*Y* (*X* is proportional in the manner characteristic of grounds to *Y*) iff *X* has no proper parts *X'* such that *X'* $⇒^{γ} $*Y*. But then it holds of no *Xi* on the list that *Xi* $\rightarrow ^{γ}$*Y*, since each *Xi* has a proper part *Xi*+1 such that *Xi*+1 $⇒^{γ} $ *Y*. Lacking a better candidate for proportional-ground-hood than these, we had better give up as well on locating a difference-making ground *Z* for *Y*; these by [*H*] will have to be parts of proportional grounds, a category we just declared to be empty. And so it is never true that *Z* $↝^{γ}$ *Y*— *Z* is never ground-relevant to *Y*—and in particular it is irrelevant to the sought-after outcome of infinitely many praise days that we sing on any particular occasion(s) whatever.

This may seem old news. The point to distinguish it from a different problem, to do with causation. To obtain this other problem, let *Y* be *God is pleased at the amount of praise he gets,* and let the sufficiency be cause-and-effect-flavored (putting $⇒^{ϵ}$ for $⇒^{γ}$). It holds of no *Xi* on the above list that *Xi* $⇒^{ϵ} $*Y*, since each *Xi* has a proper part *Xi*+1 such that *Xi*+1$⇒^{ϵ}$ *Y*. It is never true, by the same reasoning as before, that *Z* $↝^{ϵ}$ *Y*. God does wind up pleased if praised every day, but not, it seems, on account of the singing on any particular day(s).

A case with fewer distractions: A buzzer sounds at the weigh station when a truck enters weighing over 70,000 pounds. The buzzer goes off “for no particular reason,” to go by [ℙ] and [ℍ]. Reasons—factors relevant to the effect—have to be drawn from conditions minimally causally sufficient for the effect, and there are no numbers minimally larger than 70,000.

Examples of the same general sort can be given for almost any mode of relevance: moral, evidential, nomological, and so on. Once again, then, the Humean Package—a theory ℍ of relevance built on the back of a theory ℙ of proportionality—needs fixing. Our focus has been, and will continue to be, on ℙ. But ℍ has issues of its own which will come up briefly at the end.

1. CONCERN

Take again *He is praised infinitely many days*. It has an unending chain of progressively weaker sufficers: every day from today, every day from tomorrow, ..., every day from 12/31/12017, and so on. The weaker ones are *no better*, though. There *might* be something to regret in the sequence never terminating, if each new reduction brought a feeling of progress. But it doesn’t.

Cantor was disappointed, it is said, with what we now call the infinite numbers. No ℵβ could satisfy him, because there was always a bigger one down the road, and bigger, in the infinity department, is better. A *truly* infinite number would be unsurpassable. This supposedly is why he called the ℵβs “transfinite,” reserving “infinite” for n a (putative) number too big for his system.[[24]](#footnote-24)

Cantor had good reason to prefer higher ℵβs to lower ones. The larger had more of what he wanted: size. Reasoning in the other direction, if we perceive no advantage in *X' =* “singing every day from 12/31/12017,” as the ground of God’s pleasure, over *X =*  “singing every day from today,” then first does NOT have more of what we wanted.

Sonce the first is genuinely smaller, smaller is not necessarily better when it comes to proportionally causing *Y =*  God’s pleasure. *X'*  may have an advantage over *X* with respect to some other outcome *Y'*. But they are “the same to *Y*,” in symbols, *X'*≡*YX*. Or, more carefully, since they could conceivably be the same to *Y as causes*, but different as, say, *grounds*, or *reasons*, *X'*$≡\_{Y}^{α}$ *X*.

Of course, we don’t know what "same to *Y*" means as yet. If we did, we would take our existing account of proportionality,

[ℙ1] *X* →α *Y* iff

1. *X* ⇒α *Y*,
2. for all *X'*<*X*, if *X'* ⇒α *Y*, then *X'=X*

and replace *X'=X* in (ii) with *X'*$≡\_{Y}^{α}$ *X* to obtain

[ℙ2] *X* →α *Y* iff

1. *X* ⇒α *Y*,
2. for all *X'*<*X*, if *X'* ⇒α *Y*, then *X'*$≡\_{Y}^{α}$*X.*

*There are infinitely many so and so’s* is about size in the *how-many* sense, not the *membership* sense. That is why there is nothing to be gained proportionality-wise by knocking out one of the so and so’s. *Y* doesn’t *care* about, it’s not *concerned* with, the kind of size where subsets are smaller.

1. WAYS AND WORLDS

Parthood, proportionality, concern, and the like are hyperintensional notions. So we will have to expand our toolkit, for “The possible worlds apparatus can only draw intensional, not hyperintensional, distinctions.”[[25]](#footnote-25) As we began to see in section 7[,](#_bookmark3) the role traditionally played by worlds is better played anyway by *ways*.[[26]](#footnote-26) And ways are hyperintensional right out of the box. *P* is true in the same worlds as (*P*≡*Q*) ∨(*P*≡¬*Q*), but the latter has different ways of being true.[[27]](#footnote-27) A solid figure occupies most of the open sphere {<*x*, *y*, *z*> | *x*2+*y*2+*z*2 < 1} in a world *w* just if it occupies most of the closed sphere

{<*x*, *y*, *z*> | *x*2+*y*2+*z*2 < 1}. But while to occupy all of the closed sphere is a way of occupying most of the closed sphere, it is not a way of occupying most of the open sphere.[[28]](#footnote-28)

What is meant by a “way for *P* to hold”? I do not know how to define this relation and will not even try. Do not be scandalized for this is standard practice in semantics. Lewis for instance does not attempt to define “world where *P* holds.” He divides the problem into two parts:

1. what is a “world in which a proposition P is true”? and
2. what is the “proposition P expressed by *P*”?

The first sub-problem is trivial, if propositions are sets of worlds; P is true in *w* iff

*W* ϵ P. The second, associating propositions with sentences, is a problem for everyone. It

is nothing special to do with worlds, and it is not made more difficult by the worldly conception. One approach is to let the intensions of atomic expressions be given outright; the intensions of complex expressions are then determined compositionally. Or we could

determine atomic intensions using some kind of covariational metasemantics. Or we could approach the matter holistically, as Lewis does himself, using reference magnetism as a tie-breaker.[[29]](#footnote-29)

If propositions are sets of truth-supporting circumstances, then *S* is true in a given circumstance just if those circumstances belong to the proposition that *S*. One can work with the first notion today while leaving until tomorrow the problem of explaining how a sentence comes to express this proposition rather than that. This is again a common strategy in semantics. Propositions for Kratzer are sets of situations. Propositions for Humberstone are sets of possibilities. Propositions for new-style expressivists like Yalcin are sets of probability- measures. Propositions for truthmaker semanticists are sets of ways.

1. WHICH WAYS

Suppose I am right that way-for-it-to-be-that-*P* is on a par methodologically speaking with world-in-which-*P*. There still remains the question of *which* unanalyzed relation is intended. Here my job is in one respect easier than Lewis’s: “ways for something to be the case” is a more familiar and commonsensical notion than “worlds where *P* is true.” But it’s in another respect harder, for ways are a miscellaneous lot and I need to direct your attention to a particular subspecies. Our target in the end is ways for it to be that *P*, but it helps to look more generally at ways for a thing *x* to ϕ. (Ways for it to be that *P* fall out as the case where *x* is a world and to ϕ is to be a *P*-world.)

So, let’s try it. To begin it would be good to have some *paradigms* of ways for *x* to be thus and so.

Disjuncts: For *x* to sing is a way for *x* to sing or dance.

Instances: For *x* to sing is a way for something to sing.

Determinates: For *x* to yodel is a way for *x* to sing.

And here are some foils, that is, paradigms of *failure* to be a way.

Conjunctions: To sing and dance is a way of singing.

Generalizations: For everything to sing is a way for *x* to sing.

Manners: To yodel badly is a way of singing.

Prequels: To dance is a (good) way of failing the course.[[30]](#footnote-30)

Preconditions: To dance is a way of persisting over time.[[31]](#footnote-31)

A few simple principles will help us to sort these cases out, and to see to a first approxi- mation why the line is drawn where it is.

BY-WAY For *x* to ψ is a way for *x* to ϕ only if: *x* ϕ’s *by* ψ-ing.

So, for instance, *x* sings by yodeling, and sings or dances by singing; and *something* sings, by way of *x* singing. But *x* does not sing by singing and dancing, or persist over time by dancing.

This is only part of the story, however, for one can fail the course by dancing (when one ought to be paying attention); and to dance is not in the relevant sense a way of failing the course. If, as the story goes, one can get to Carnegie Hall by practicing, still practicing is not for us a way of getting to Carnegie Hall. Rather the practicing and singing are causes, or prequels. Here is a second principle aimed at prequels:

WAY-IN For *x* to ψ is a way for *x* to ϕ only if: *x* ϕ’s *in* ψ-ing.

Hank Williams sang sometimes by yodeling, and, what is more, *in the act of* yodeling. But one does not fail the course in the act of dancing, or get in the act of practicing to Carnegie Hall.

One of the foils (Manners) remains to be dealt with. A beginning yodeler does on the face of it sing by yodeling badly, and also *in* yodeling badly. Why then is yodeling badly not a way of singing? One is tempted to say that, as long as Bert is yodeling, how well he does it is *irrelevant* to whether he sings. But relevance is what we are attempting to explain, so this does not get us very far.

Arguably this particular type of irrelevance can be identified independently, without getting into grander issues about relevance as such. For ways are intimately related to *parts*, and relevance has a counterpart virtue on the side of parts that is easier to get a grip on. This is illustrated in (1)-(6)[[32]](#footnote-32).

1. To be $\left(\genfrac{}{}{0pt}{}{R}{\overbar{R}}\right)$ is $\left(\genfrac{}{}{0pt}{}{part}{a way}\right)$ of being $\left(\genfrac{}{}{0pt}{}{R∧S}{\overbar{R}∨\overbar{S}}\right)$
2. To be $\left(\genfrac{}{}{0pt}{}{R∨S}{\overbar{R}∧\overbar{S}}\right)$ is NOT $\left(\genfrac{}{}{0pt}{}{part}{a way}\right)$ of being $\left(\genfrac{}{}{0pt}{}{S}{\overbar{S}}\right)$
3. To be $\left(\genfrac{}{}{0pt}{}{R∨S}{\overbar{R}∧\overbar{S}}\right)$ is $\left(\genfrac{}{}{0pt}{}{part}{a way}\right)$ of being $\left(\genfrac{}{}{0pt}{}{R⊻S}{R≡S}\right)$
4. To be $\left(\genfrac{}{}{0pt}{}{R⊃S}{R∧\overbar{S}}\right)$ is NOT $\left(\genfrac{}{}{0pt}{}{part}{a way}\right)$ of being $\left(\genfrac{}{}{0pt}{}{R∧S}{\overbar{R}∨\overbar{S}}\right)$
5. To be $\left(\genfrac{}{}{0pt}{}{R⊃S}{R∧\overbar{S}}\right)$ is $\left(\genfrac{}{}{0pt}{}{part}{a way}\right)$ of being $\left(\genfrac{}{}{0pt}{}{R≡S}{R≢S}\right)$
6. To be $\left(\genfrac{}{}{0pt}{}{R≡S}{R≢S}\right)$ is NOT $\left(\genfrac{}{}{0pt}{}{part}{a way}\right)$ of being $\left(\genfrac{}{}{0pt}{}{R∧S}{\overbar{R}∨\overbar{S}}\right)$.

We see from (1)-(6) is that parts and ways are \ *dual* to one another: to ψ is part of ϕ-ing just if $\overbar{ψ }$ is a way of $\overbar{ϕ }$-ing. Turning this around and focussing on the direction of interest,

PART-WAY To ψ is a way of ϕ-ing only if: to if $\overbar{ψ }$ is part of what is involved in $\overbar{ϕ }$-ing.

The thought is that irrelevancies that prevent ψ from being a way of ϕ-ing will show up under negation as “extrusions” that prevent $\overbar{ψ }$ from being a part of $\overbar{ϕ }$.

How does yodeling badly fare by this test, as a way of singing? It is a way of singing only if part of what is involved in *not* singing is to either not yodel at all, or else yodel well. To avoid yodeling may indeed be part of what it takes not to sing. But is yodelling well part of what it takes not to sing? No, it *conflicts* with not-singing! It cannot be part of *H*-ing to *F* or *G*, if to *G* prevents one from *H*-ing. Hence to yodel badly is not, by our test, a way of singing.

 A test attuned to so fine a distinction might seem in danger of being *too* sensitive. But it is looks favorably on our paradigms. To sing remains a way of singing or dancing, since to do neither is in part not to sing. To yodel remains a way of singing, since not to sing is in part not to yodel. For Al to sing remains a way for someone to sing, since part of what is involved in no one’s singing is for Al in particular not to sing.

 Three principles have been suggested: BY-WAY, WAY-IN, and PART-WAY. Though guidelines at best---they do not pretend to get at "what ways are''--- they correctly classify between them all the cases presented in this paper. A number of questions suggest themselves about the principles, and there are other principles that might be considered. But this will have to be left for another occasion. Our topic is relevance and it is time to get back to it.

1. ABOUTNESS

Here is where we left things: *Z* contributesα (or is relevantα) to *Y* if *Z* is part of an *X* that is proportionalα to *Y*. *X* is proportionalα to *Y* if *Y* does not *care about* the difference between *X* and those of its proper parts *X'* that also sufficeα for *Y*. (Our notation for this was *X'*$≡\_{Y}^{α}$ *X.*) *X* is minimal, one might say, in the respects that matter.

The “caring” is of course metaphorical. But the “about” and the “mattering” can be cashed out to some extent in terms of *ways of being true*. How is it that *P*∨¬*P* is on a different topic than *Q*∨¬*Q*, when they are true in the same worlds? Well, they are true in

different ways in those worlds. Why does the subject matter of *P*&*Q* include the subject matter of *P*, but not that of (*P*&*Q*)∨*R*, when (writing |*S*| for the set of *S*-worlds), |*P*&*Q*| is a subset both of |*P*| and |(*P*&*Q*)∨*R*|? Well, (*P*&*Q*)∨*R* holds, in certain worlds, in ways not

implied by any way for *P*&*Q* to hold; while the same cannot be said of *P* in comparison to *P*&*Q*.

This section attempts to make the notion of subject matter precise enough for the proposed application (which comes later) to “minimality in the respects that matter” and to relevance. We ask, first, what are subject matters considered as entities in their own right, and second, what is *the* subject matter of a particular sentence?

A subject matter **m**, the number of stars, for instance, is given by specifying the ways matters can stand where m is concerned: the ways, in this case, are for there to be no stars, or one star, or etc. Formally m is a collection of set-of-worlds propositions. If **m** = {A,

B, C ,....} then A, B, C,... constitute between them the ways matters can stand **m**-wise.

Subject matters can be more or less fine-grained, for instance, the number of stars is coarser-grained than which stars exist (aka **the stars**) and finer-grained than whether the number of stars is prime:

**the stars** =

{|*Nothing is a star*|, |*The only star is Sol*|,... |*The stars are Sol, Polaris, Vega,..*|,...}

**the # of stars** =

{|∃0*x star*(*x*)|, ∃1*x star*(*x*)|, .....|∃*kx star*(*x*)|,...}

**whether the # of stars is prime** =

{$∪$*prime*(*k*) |∃*kx star*(*x*)|, $∪\_{\overbar{prime}\{k)}$ |∃*kx star*(*x*)|}

The subject matter **s** of a particular sentence *S* is made up of *S*’s ways of being true; it is the set of all set-of-worlds propositions S such that *S* is true in way S in some world

*w*. *Stars exist* has a way of being true for each possible nonempty ensemble of stars; so its subject matter is what above we called **the stars**, except the first, star-less, cell must be

dropped since *Stars exist* is false in that cell.

1. “EVERY BIT AS SUFFICIENT”

Let’s review. *Z* is relevantα to *Y* just if *Z* is part of an *X* that is proportional to *Y*—an *X* no proper part *X'* of which “undercuts” *X* by sufficingα for *Y* on a more economical basis. When *does* a still-sufficient proper part *X'* of *X* undercut *X* in this way? How can *X* NOT be undercut by *X'*, if *X'* is every bit as sufficient for *Y*?

 Normally, for *X'* to be “every bit as sufficient” as *X* is for *Y* would mean that *Y* holds as high a proportion of *X'*-worlds as *X*-worlds, viz. all of them. But another reading

 is possible if statements hold, not only in worlds, but in ways.

Suppose that Alice has three children and Bert has two. Is Alice any more of a parent than Bert? One is pulled both ways on this. Certainly it is no more *true* of Alice that she is a parent. But she is *some* sort of advantage parental-status-wise; for the truth of *Alice is a parent* is more often *witnessed* than that of *Bert is a parent*. The advantage is clearest if the witnesses to the one truth form a proper subset of the witnesses to the other; Alice has two children with Bert, and one not with Bert. Now she is more of a parent than Bert in a further sense. She is, in addition to being more often a parent, more *richly* or *comprehensively* a parent than Bert is, since her status is witnessed by those who witness Bert’s status and another besides.

Now we begin to see how *X* can avoid being undercut by *X'*, though *Y* is no less definitely true in *X'*-worlds than *X*-worlds: *Y* is not as *richly provided for* in *X'*-worlds as in *X*-worlds.

Consider again *God is praised every day from now on*. It is better proportioned to *God is pleased* than *God is praised and dogs bark every day from now on*, because it doesn’t matter to God whether dogs bark. Why would *God is praised every day from tomorrow on* not be better proportioned to *God is pleased* than *God is praised every day from now on*? *God is pleased* is still guaranteed if the praise starts tomorrow, but it is not as richly guaranteed as in worlds where the praise starts today. In worlds with less barking but as much praise, *God is pleased* is every bit as richly guaranteed.

Given two statements *P* and *Q* both of which are true in *w*, let us say that *P* is as richly true in *w* as *Q* if every way *Q* holds in *w* is a way as well that *P* holds there. So for instance *A∨B∨C* is as richly true (as true, for short) as *A∨B* in all worlds, since it is true, when *A∨B* is true, in a (possibly proper) superset of the ways in which *A∨B* is true.

Writing ⃦ *P* ⃦ *u* for *P*’s ways of being true in *u*, we can say that *P* is as true in *u*

as *Q* is in *v* just if ⃦ *Q* ⃦*v* ⊆ ⃦*P* ⃦*u*. For *X'* to suffice as fully as *X* does for *Y* is a matter of ∃*W*(*W*⇒α*Y*) being as true in *X'*-worlds as *X*-worlds.

[𝕊] *X'* suffices as fully as *X* for *Y* — *X'*/*X* ⇒α *Y* — iff

* 1. *X* ⇒α*Y*,
	2. *X'* ⇒α*Y*, and
	3. (∀*X'*-worlds *u*) (∃*X*-world *v*) [∃*W*(*W*⇒α*Y*) is as true in *u* as in *v*]
1. SUPER-HUMEANISM

Return now to the idea of proportionality as minimal sufficiency. Perhaps there is something right about it after all, *if* we are careful about what is being minimized subject to which constraints. *X'* is in a position to undercut *X* if (but only if) it suffices for *Y* as fully as *X* does.

[ℙ3] *X* is proportionalα to *Y* (*X* →α *Y*) iff

* + 1. *X* suffices for *Y* (*X* ⇒α *Y*),
		2. (∀*X'*<*X*) [if *X'* suffices as fully as *X* does for *Y* (if *X'*/*X* ⇒α *Y*), then *X'=X*]*[[33]](#footnote-33)*.

The super-Humean package ([ℙ3] and [ℍ]) — recall that

[ℍ] *Z* is helpfulα to *Y* (*Z↝* α *Y*) iff an *X* obtains such that *Z*<*X* and *X* →α *Y*

— deals rather well with our puzzle cases. Let us work through an example. Alice wins a prize (*Y*) if she moves for at least one hour between noon and two. Let *X* be her moving from 12.30 to 1.30 inclusive: her moving through the closed interval [12.30, 1.30]. How can *X* be proportional to *Y*, when *X'* — her moving through the open interval (12.30, 1.30) — is a proper part of *X* that also suffices?

The answer is that *X* suffices *better*. For there are *X'*-worlds, like the world *w* where she moves precisely at times later than 12.30 and before 1.30, where *Y* is not as well provided for as it is in *X*-worlds. Here are some of the ways it is true in *w* that Alice moves so as to win the prize: she moves at all times *t* such that

|  |  |
| --- | --- |
| ... 12.30 < *t* < 1.30 |  |
| ... 12.30 < *t* < 1.30 & *t* ≠ 1.00  |  |  |
| ... 12.30 < *t* < 1.30 & *t* ≠ 12.45 & *t* ≠ 1.00 & *t* ≠ 1.15 |
| ... 12.30 < *t* < 1.30 & *t∉*S (for some countable set S of times | ) |  |

What is nice about *X*-worlds is that Alice moves, not only in *these* prize-winning ways in them, but a bunch of additional prize-winning ways: for instance, at all times *t* such that

|  |  |
| --- | --- |
| ... 12.30 < *t* < 1.30 |  |
| ... 12.30 < *t* < 1.30 & *t* ≠ 1.00  |
| ... 12.30 < *t* < 1.30 & *t* ≠ 12.45 & *t* ≠ 1.00 &  *t* ≠ 1.15 |
| ... 12.30 < *t* < 1.30 & *t∉*S (for some countable set S of times) |

Similar reasoning shows that T-motion — moving at all times in T — is proportional to winning the prize just if T is a subset of [12.00, 2.00] of measure ≥ 1. It follows by [ℍ] that T -motion *contributes* to winning the prize just if T is a non-empty (possibly measure 0) subset of [12.00, 2.00].

1. FORMS OF RELEVANCE

Our primary question has been, what can proportionality mean if every *X* has a proper part that is still sufficient? That question has now been addressed. *X* is proportional

to *Y* if *X*, in addition to being sufficient for *Y*, lacks proper parts that are *as* sufficient. Equivalently *X* is the least *X'*<*X* such that *X'* is no less sufficient for *Y* than is *X*.[[34]](#footnote-34)

Mention was made at the beginning of certain *further* questions that were going to be set aside, about pro tanto relevance for instance. These were to do not with proportionality, but the explanation of helpfulness in *terms* of proportionality:[[35]](#footnote-35)

[ℍ] *Z*↝*Y* iff a fact *X* obtains such that *Z*<*X* and *X*→*Y*.

Helpfulness so understood is *in-situ*: *Z* is helpful to *Y* only if *Z* is the case, and its helpfulness depends very sensitively on what else is the case. It is holistic and situational in a way by moral or epistemological particularists. A *Z* that is helpful to *Y* qua part of *X*1 may be helpful to $\overbar{Y}$qua part of *X*2. If one thinks, for instance, that the party was good because it was fun— fun is by nature a good-maker—rather than fun being a good-maker derivatively, on this occasion—because of featuring essentially in a sufficient condition for goodness that happens to obtain— then [ℍ] is not going to satisfy you.

That was the first subtlety. A distinction obviously exists between in-situ helpfulness, on the one hand, and per se or presumptive helpfulness on the other. And we have not seen how to draw it. Second, helpfulness of the sort defined by [ℍ] is *factive*: *Z* is helpful to *Y* only if *Y* is really the case. But then, what of the idea of *U* holding *despite Z*? *Z* favors $\overbar{U}$here—otherwise why say “despite”?— but the favoring cannot be factive, since $\overbar{U} $must fail, if *U* holds despite *Z*. This is the second subtlety: *Z* can fight in a losing cause. Nothing has been said here about non-factive, defeated helpfulness.

A lot has been written on these distinctions, especially in moral philosophy, by people like Ross, McDowell, and Dancy. I have no theory to offer, but just a suggestion: people interested in considerations pro and con should be talking to people working on ways and subject matter (and vice versa). For we can tease apart various flavors of relevance with pretty much our existing machinery.

 Recall that *Z* is helpful *in situ* to *Y* iff an *X* holds that contains *Z* and is proportional to *Y*—that is, letting $\vec{Y}$range over conditions proportional to *Y*, a $\vec{Y}$ holds that contains *Z*. But now, $\vec{Y}$isstill available to be quantified over whether it holds in this world or not. We can look then at the relation *Z* bears to *Y* if, for instance,

1. all $\vec{Y}$scontain *Z*
2. some $\vec{Y}$s contain *Z,* and no $\vec{Y}$contains $\overbar{Z}$
3. in every *Z*-world, a $\vec{Y}$holds that contains *Z*
4. in every world whatsoever, a $\vec{Y} or \vec{\overbar{Y}}$ holds that contains *Z* or $\overbar{Z}$

A *Z*  of the first type is, if you like, indispensably helpful to *Y;* a type-(b) *Z* is intrinsically helpful; a type-(c) *Z* is essentially helpful; a type-(d) *Z* is essentially pertinent to *Y.* We can distinguish as well various sorts of relative helpfulness:

1. $\vec{Y}$s containing *Z* are more numerous than $\vec{Y}$s containing *Z'*

1. $\vec{Y}$s containing *Z* are likelier than $\vec{Y}$s containing *Z'*

1. $\vec{Y}$s containing *Z* hold in closer worlds than $\vec{Y}$s containing *Z'*
2. *Z* constitutes a larger part of $\vec{Y}s $ containing *Z* than *Z'* doesof $\vec{Y}s $ containing *Z'.*

*Z*  in the first case is more often helpful than *Z'*; in the others it is more likely helpful, or more readily helpful, or more helpful simpliciter.

 Sketchy as these analyses are, we have enough to try them out in a toy logical model. Outcomes *Y* are sentences of propositional logic. Sufficiency is logical implication. Ways for things to be are conjunctions of literals (negated and unnegated atoms). A way $\vec{Y}$ for *Y* to be true is a conjunction of literals that implies *Y* and has no subconjunctions that imply *Y*.[[36]](#footnote-36) One can show that

* 1. *p* is indispensably helpful to *p&q*, but not to *p*∨*q* or *p*≡*q*
	2. *p* is intrinsically helpful to *p*∨*q* and *p*&*q*, but not to *p*≡*q*
	3. *p* is essentially helpful to *p*∨*q,* but not to *p*&*q* or *p*≡*q*
	4. *p* is essentially pertinent to *p*≡*q*, but not to *p*∨*q* or *p*&*q*
	5. *p* is more often helpful than $\overbar{p}$ to *p*&*q*&*r* ∨ $\overbar{p}$&$\overbar{q}$∨ *p*&$\overbar{q}$&*s[[37]](#footnote-37)*
	6. neither of *p**,* $\overbar{p}$is more likely helpful to *p*&*q*&*r* ∨ $\overbar{p}$&$\overbar{q}$∨ *p*&$\overbar{q}$&*s[[38]](#footnote-38)*
	7. $\overbar{p}$is more readily helpful than $\overbar{p} $to *p*&*q*&*r* ∨ $\overbar{p}$&$\overbar{q}$∨ *p*&$\overbar{q}$&*s[[39]](#footnote-39)*
	8. *p is* morehelpful than $\overbar{p} to $*p*&*q*&*r* ∨ $\overbar{p}$&$\overbar{q}$∨ *p*&$\overbar{q}$&*s[[40]](#footnote-40)*

One can do at least *some* justice, then, to presumptive helpfulness in the present framework. Indeed one can pull apart different flavors of the notion. But other subtleties remain out of reach.

The elements of a proportional *X* must be in some broad sense relevantto *Y*. Helpfulness is a *kind* of relevance, but it is not the only kind. *X* may need to contain also facts which ensure of the helpful bits that they *are* helpful.[[41]](#footnote-41) It may need to contain facts to ensure that the helpful bits *suffice*.[[42]](#footnote-42) It may need to specify of potential spoilers that they did not materialize. (That my promise was not coerced is not a reason for lending you my car. Rather it is part of why it is not the case that the reason — my promise — was defeated.[[43]](#footnote-43)) It may need to contain also threats to *Y*, if the events that blocked them were triggered by those very threats.[[44]](#footnote-44) *X* may need to contain “intensifiers,” trumps, switches, and other spin-control devices. All of this is fascinating and important but beyond the reach of the present paper. (See [Hawthorne[](#_bookmark18)2002[],](#_bookmark18) Dancy[[](#_bookmark9)2004[],](#_bookmark9) Sartorio[[2005](#_bookmark31)], [Sartorio[](#_bookmark32)2006[],](#_bookmark32) Sartorio[[](#_bookmark34)2008[],](#_bookmark34) Leuenber[ger[2014](#_bookmark25)], [Skiles](#_bookmark25)[[2015],](#_bookmark37) [Skow](#_bookmark37)[2016[],](#_bookmark39) [Baron-Schmitt](#_bookmark6)[[2017](#_bookmark6)], Mu[n˜oz](#_bookmark28)[[2017](#_bookmark28)].)

1. SUMMING UP

Helpfulness is important. Hume thought he’d explained it with minimality, but the explanation doesn’t work. A variant using *focussed* minimality—minimality where a certain subject matter is concerned— seems to do better.

 Subject matter relies on *ways of holding*, a notion with some of the features we were trying to explain, for instance, worlds being *relevantly* alike: alike on the score of how something is true in them.

But we can in good conscience treat ways as primitive, by analogy with worlds (section [12](#_bookmark4))---especially since a lot of the work traditionally assigned to worlds is better done by ways ([Fine](#_bookmark12)[[2015b,](#_bookmark12)c],Y[ablo[](#_bookmark47)2017b[]).](#_bookmark47) (Something needs of course to be said about *which* primitive is intended.) *Z* is helpful to *Y* iff it is part of an *X* that is proportional to *Y*---an *X* whose still sufficient parts *X'* are not *as* sufficient as *X* itself.

APPENDIX

If proportionality is explained as in [ℙ3], then we see in principle how *X* can defend its claim to proportionality with *Y* against a still-sufficient proper part *X'*. But does this really lay the problem to rest? If it can happen that every *X* that is sufficientα for *Y* has a proper part that is still sufficientα for *Y*, perhaps it can happen too that every *X* that is sufficientα *Y* has a proper part that is *as* sufficientα for *Y* as *X* is.

How would that work exactly? A proper part *X'* of *X* that was as sufficientα for *Y* as *X*

was would have to hold in a certain kind of $\overbar{X}$-world *u*: one in which ∃*W*(*W*⇒α*Y*) was as richly true as in *v*, for some *X*-world *v*. It is not clear why a world like *u* should always exist. It might be possible to load *X* up in advance with all worlds of the relevant type—all worlds where *Y* is richly enough provided for. Indeed we know by Zorn’s Lemma that this always is possible under certain conditions.

Suppose we are given a partially ordered set (**K**, ≼). A subset **C** of **K** is a chain iff **C** is totally ordered by ≼, and bounded below iff ∃**x**∈**K** ∀**y**∈**C y**≼**x. K** has a minimal element just if ∃**k**∈**K ∀j**∈**K** (**j**≼**k** ⊃ **j**=**k**). We know by Zorn's Lemma that

(ZL) **K** has a minimal element if all **K**-chains are bounded below.

 But then, an *X* exists that is minimal among proper parts of *X*0 no less sufficient (than *X*0) for *Y*, provided that (\*) holds:

(\*) if *X*0≥*X*1≥*X*2...., and *Xi* is no less sufficientα for *Y* than *X*0, then the *Xi*s have a common part *X*ω such that *X*ω is no less sufficientα for *Y* than *X*0.

This is not implausible. It follows from two assumptions.

1. If X0⊆X1⊆... are ways for things to be, then ∪*k* X*k* is a way for things to be
2. If A, B, C,... are ways for things to be, ∃*S* (A, B, C,... are *S*’s ways of being true)

Proof of (\*) from (1) and (2).

Let *X*0≥*X*1≥*X*2..... and let Xω be ∪*k* |*Xk*|. By definition of ≥, Xω is the union of all unions  X$\begin{matrix}C\\ω\end{matrix}$of chains of truthmakers X0, X1,... for *X*0, *X*1,.... respectively. X$\begin{matrix}C\\ω\end{matrix}$ is a way for things to be by (1); and an *X*ω exists with the X$\begin{matrix}C\\ω\end{matrix}$s as its truthmakers by (2). *X*ω is part of each *Xk* since each truthmaker X$\begin{matrix}C\\ω\end{matrix}$for *X*ω contains an X*i*. We need to show that *X*ω is as sufficientα for *Y* as *X*0. This is immediate from the facts that

1. each *X*ω-world is an *Xk*-world for some *k*, and
2. ∃*W*(*W*⇒α*Y*) is, for each *Xk*-world *u,* as true in *u* as in some *X*0-world *v*. □

Since from (1) and (2) it follows that (\*), *X*0 has a part *X*ω that cannot be further weakened without making it less sufficientα for *Y*.

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1. [↑](#footnote-ref-1)
2. Versions of this material were presented at Harvard (as the 2016 Whitehead Lectures), Rutgers (at the 2017 Unstructured Conference), Sydney, Monash, ANU, Otago, Toronto, Amsterdam, UNAM, and elsewhere. I owe thanks to Lloyd Humberstone, Tim Williamson, Nathaniel Baron-Schmitt, Daniel Mun˜oz, Brad Skow, Sally Haslanger, Kit Fine, Andy Egan, Dirk Kindermann, Sam Carter, Cian Dorr, Danie¨l Hoek, Friederike Moltmann, Agust´ın Rayo, Melisa Vivanco, Axel Barcelo´, Katrin Shulz, Robert van Rooy, Francesco Berto, Ivano Ciardelli, Floris Roelofsen, Kenny Easwaran, Roxanne Kurtz, Ned Hall, Christine Korsgaard, Laura Schroeter, Greg Restall, Frank Jackson, and David Chalmers. [↑](#footnote-ref-2)
3. Helpfulness may, of course, be *contingent* on other facts. [↑](#footnote-ref-3)
4. Much as both need to obtain for *Y* to hold *despite Z*. Helpfulness in our sense is roughly the opposite of despiteness. [↑](#footnote-ref-4)
5. [Kment](#_bookmark22)[[2014](#_bookmark22)], Str[evens[](#_bookmark40)2007[].](#_bookmark40) [↑](#footnote-ref-5)
6. Similarly a truth does not have only one possible truthmaker, and there is more than one possible reason for doing a thing [↑](#footnote-ref-6)
7. “A body of ten ounces raised in any scale may serve as a proof, that the counterbalancing weight exceeds ten ounces; but can never afford a reason that it exceeds a hundred” ([Hume](#_bookmark20)[[1740 /2003](#_bookmark20)]). [↑](#footnote-ref-7)
8. “Proportionality” in the sense of this paper is analogous but not identical to the notion at work in Y[ablo](#_bookmark42) [[1992b](#_bookmark42)] and [Yablo[1992a].](#_bookmark41) [↑](#footnote-ref-8)
9. [Schlenker](#_bookmark33)[[2008](#_bookmark33)]. A close cousin of the minimality problem is raised in [Schlenker[](#_bookmark35)2009[],](#_bookmark35) p. 52-3. [↑](#footnote-ref-9)
10. See Skyrms[1983]. "Zeno's paradox of measure rests on the following premises:

	1. Partition: [the sphere] can be partitioned into an infinite number of parts such that
	2. Measurability: the concept of magnitude applies to the parts.
	3. Invariance: the parts all have equal positive magnitude, or zero magnitude.
	4. Archimedean Axiom: there are no infinitesimal magnitudes.
	5. Ultra-Additivity: the magnitude of the whole is the sum of the magnitudes of the parts."Ancient attempts to answer Zeno focused largely on (I) and (II). Doctrines of finite indivisible magnitudes (certainly Epicurus and probably Democritus and Leucippus) rejected (I). Aristotle rejected (I) and (II). It is possible that a doctrine of infinitesimal indivisible magnitudes was also current (possibly held by Xenocrates, possibly by Democritus) which rejected (IV). (III) could have also been challenged by a holder of a doctrine of infinitesimal magnitudes. (V), Ultra-Additivity appears to have been accepted without question by every party to the dispute. It is ironic that it is just here that the standard modern theory of measure finds the fallacy" (235). [↑](#footnote-ref-10)
11. Watson's religious phase began when, returning from Africa in 1741, he had a shipboard conversion in a storm off the coast of Ireland [↑](#footnote-ref-11)
12. “With inexact verification, the state should be at least partially relevant to the statement; and with exact verification, it should be wholly relevant. Thus the presence of rain will be an exact verifier for the statement ‘it is rainy’; the presence of wind and rain will be an inexact verifier for the statement ‘it is rainy’, though not an exact verifier ([Fine](#_bookmark14)[[2017](#_bookmark14)]) [↑](#footnote-ref-12)
13. As fusions of grounds are grounds. according to the principle of Amalgamation (Fine[2012]). [↑](#footnote-ref-13)
14. Kratzer considers this; her example is *There are infinitely many stars* (numbered (7) in her paper).

If the proposition expressed by (7) is the proposition *p* that is true in any possible situation in which there are infinitely many stars, we are in trouble. [The] definition would predict that there couldn’t be a fact that makes *p* true, .... Situations with five or six stars, for example, ... are not part of any minimal situation in which *p* is true (ibid., 662)

Her response, interestingly enough, appeals to subject matter

As for (7), there is a reading that the German sentence (8) brings out more clearly.

(8) Sterne gibt es unendlich viele. Stars are there infinitely many.

As for stars, there are infinitely many of them.

In (8), the common noun “Stern” has been topicalized. The proposition expressed by (8) might now be taken to be the proposition *q* that is true in a situation *s* iff (i) *s* contains all the stars in the world of *s*, and (ii) there are infinitely many stars in *s*. Consequently, if *q* is true in a world at all, there is always a minimal situation in which it is true, hence there is always a fact that exemplifies it (Ibid., 662).

 But, although (7) can be understood so that it comes out with minimal verifiers, this is not the only way of understanding it. And there might be other examples where topicalization is not an option. [↑](#footnote-ref-14)
15. [Yablo](#_bookmark46)[[2017a](#_bookmark46)]. [↑](#footnote-ref-15)
16. These ideas were prompted by an observation of Williamson's about minimal models. *B* is analytically contained in *A*, I had suggested, if ∀α ∃β β⊆α and ∀β ∃α β⊆α, where the Greek letters range over minimal models of *A* and *B*. Williamson pointed out (p.c., 2006) that containment *appears* to make sense in infinitary settings where A's models are always non-minimal. (For analytic containment see [Angell](#_bookmark5)[[1989],](#_bookmark5) Correia[2004]. Y[ablo[](#_bookmark43)2014]:59, and [Fine](#_bookmark10)[[2015a](#_bookmark10)]). [↑](#footnote-ref-16)
17. I say “look to be” because the less-than relation < remains to be discussed. It could turn out that *U*<*X* but *U*$≰$*X*\*. See section 7[.](#_bookmark3) [↑](#footnote-ref-17)
18. [Fine](#_bookmark14)[[2017]](#_bookmark14) [↑](#footnote-ref-18)
19. [Gemes](#_bookmark15)[[1994,](#_bookmark15)[1997],](#_bookmark16)Fine[[](#_bookmark11)2013[],Y](#_bookmark11)ablo[[](#_bookmark43)2014[],](#_bookmark43)Fine[[](#_bookmark10)2015a[].](#_bookmark10) [↑](#footnote-ref-19)
20. [Gemes](#_bookmark15)[[1994,](#_bookmark15)[1997],](#_bookmark16)Y[ablo[](#_bookmark43)2014[],](#_bookmark43)Fine[[](#_bookmark10)2015a[],Y](#_bookmark10)ablo[[2016],Fine](#_bookmark45)[[2017](#_bookmark14)], [↑](#footnote-ref-20)
21. [Goodman](#_bookmark17)[[1966]](#_bookmark17) [↑](#footnote-ref-21)
22. [Sellars](#_bookmark36)[[1963]](#_bookmark36) [↑](#footnote-ref-22)
23. This is part of the attraction of plural quantification. [↑](#footnote-ref-23)
24. Hallett[1986]. Cantor was hospitalized for depression in 1899. *That Obscure Object of Desire*, or rather the novel it is based on, appeared in 1898. This is probably a coincidence. [↑](#footnote-ref-24)
25. [Berto](#_bookmark7)[[2017]](#_bookmark7) [↑](#footnote-ref-25)
26. See also [Yablo[](#_bookmark47)2014, [2017b].](#_bookmark47) [↑](#footnote-ref-26)
27. Assuming that the second can be true by way of *P*’s truth and *Q*’s falsity. This will be so on most accounts of truthmaking.  [↑](#footnote-ref-27)
28. Continuous motion occurs in the same worlds as discrete continuous motion*s*. But if a particle moves continuously from noon to one and then three to four, that is more of a way for continuous motion*s* to occur than continuous motion. (Thanks here to Kit Fine.) [↑](#footnote-ref-28)
29. [Lewis](#_bookmark26)[[1974](#_bookmark26)],[Lewis[](#_bookmark27)1983[]](#_bookmark27) [↑](#footnote-ref-29)
30. The instructor disapproves of dancing; or, to dance cuts into your study time. [↑](#footnote-ref-30)
31. Assuming here that an instaneous entity cannot dance. [↑](#footnote-ref-31)
32. *R* and *S* could be, for instance, *red* and *square*. ⊻ is exclusive disjunction. [↑](#footnote-ref-32)
33. This is obtainable from [ℙ2] by unpacking “*X'*$≡\_{Y}^{α}$ *X*” as “*X'≠X* ⊃ *X'*/*X* ⇏*Y* .” [↑](#footnote-ref-33)
34. If it can happen that every *X* that is sufficientα for *Y* has a proper part that is still sufficientα for *Y*, can it can happen too that every *X* that is sufficientα for *Y* has a proper part that is *as* sufficientα for *Y* as *X* is? An argument from Zorn's Lemma (given in the Appendix) makes this unlikely. [↑](#footnote-ref-34)
35. The superscripted α's are suppressed for readability. [↑](#footnote-ref-35)
36. $\vec{Y}$is in Quine’s terms a *prime implicant* of *Y* ([Quine](#_bookmark30)[[1955](#_bookmark30)]). [↑](#footnote-ref-36)
37. Since *p* figures in two ways for the disjunction to hold, while $\overbar{p}$ figures just in $\overbar{p}$&$\overbar{q}.$ [↑](#footnote-ref-37)
38. Since *p*&*q*&*r* ∨ *p*&$\overbar{q}$&*s* and $\overbar{p}$&$\overbar{q}$are both 25% likely, if probabilities are assigned in the obvious way. [↑](#footnote-ref-38)
39. Assuming that the middle disjunct would hold, were it the case that *p*&*q*&*r* ∨ $\overbar{p}$&$\overbar{q}$∨ *p*&$\overbar{q}$&*s*. [↑](#footnote-ref-39)
40. Since *p* takes up a third of *p*&*q*&*r* and *p*&$\overbar{q}$&*s*, while $\overbar{p}$ takes up a half of $\overbar{p}$&$\overbar{q}$*.* [↑](#footnote-ref-40)
41. Say, by noting that another potential route to *Y* was blocked ([Yablo](#_bookmark44)[[2002](#_bookmark44)]). [↑](#footnote-ref-41)
42. Say, by clarifying the nature of *Y*’s demands: that Elsie is not a raven helps make the case for *All ravens are black* by showing it does not require Elsie to be black ([Yablo](#_bookmark43)[[2014](#_bookmark43)]:61ff , [Skiles[2015](#_bookmark37)]). [↑](#footnote-ref-42)
43. [Dancy](#_bookmark8)[[1983]](#_bookmark8) [↑](#footnote-ref-43)
44. [Paul and Hall](#_bookmark29)[[2013]](#_bookmark29) [↑](#footnote-ref-44)