Merely Statistical Evidence: When and Why It Justifies Belief

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Forthcoming in Philosophical Studies

It is one thing to hold that merely statistical evidence is *sometimes* insufficient for rational belief, as in typical lottery and profiling cases. It is another thing to hold that merely statistical evidence is *always* insufficient for rational belief. Indeed, there are cases where statistical evidence plainly does justify belief. This project develops a dispositional account of the normativity of statistical evidence, where the dispositions that ground justifying statistical evidence are connected to the goals (=proper function) of objects. There are strong intuitive motivations for doing this. For we can turn almost any case of *non-justifying* merely statistical evidence into a case of *justifying* merely statistical evidence by adding information about the dispositions and goals of the objects involved. The resulting view not only helps us understand when and why merely statistical evidence is normatively significant, but it also helps us understand how statistical evidence relates to more standard forms of evidence (perceptual, testimonial). The emerging view also has surprising applications, as it imposes limitations on the epistemic value of fine-tuning arguments for theism as well as undermines a standard class of case-based arguments for moral encroachment.

1. Introduction

When we come to rationally believe p on the basis of evidence, we often do so by relying on undefeated evidence that *reliably but fallibly* supports p to a *strong* degree. Take eyewitness testimony. In typical circumstances, when I believe that you saw a dove fly over Downing Street because you sincerely said so, I am relying on reliable yet fallible testimonial evidence that strongly supports the claim that you saw a dove fly over Downing Street. It is *reliable* in that it is a kind of evidence that would not too frequently be misleading. But your evidence is *fallible* because you sometimes make visual identification mistakes and so unwittingly testify to falsehoods. It *strongly* supports p in that the probability that p is true given my total evidence is very high (but often less than maximal).[1]

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[1] For those, like me, who think that your evidence consists solely of the *facts* you have access to (Silva 2023), 'reliable *but fallible* evidential support for p' can be understood in terms of your ability to be responsive to reliability relations that obtain between your evidence (the set of facts you have access to) and what it supports. For example, the fact *that you seem to see that p* is a fact that can reliably indicate p

While reliable yet fallibly strong support is often treated as a suitable foundation for (ex ante) rational belief, cases of merely statistical evidence indicate that it is not always sufficient for rational belief. Here are two cases that will anchor the discussion to follow:

> *Lottery.* You have one ticket in a very large lottery. The winning lottery number has been selected in a completely random way so that each ticket had an equal chance of being selected. You know all of this, but you have not heard the results. Reflecting on the improbability of your ticket winning, you come to believe (L) *that you have a losing ticket.*

> *Seminar Room.* You leave the seminar room to get a drink, and you come back to find that your phone has been stolen. There were only two people in the room, Jake and Barbara. You have no specific evidence about who stole the phone (confessions, eyewitness testimony, discovery of the phone on one of them, etc.). While you don't know either party very well, you know that Jake and Barbara come from a crime-ridden community where men are regularly encouraged to steal small items (such as phones, jewelry, laptops, etc.) while women are not at all encouraged to steal. Additionally, you know that men in that community do steal such items at a much higher rate than women, i.e. you know that men in that community are at least 10 times more likely to steal phones than women. You know that this ensures that the probability that Jake stole your phone is greater than .9 (but shy of 1). On this basis you come to believe (J) *that Jake stole the phone.*[2]

An increasingly common response to such cases is to judge that they are not cases where it is rational to believe (J) or (L) despite the fact that your statistical evidence provides reliably strong support for each.[3]

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even though it is a fact that does not entail *p*. Similarly, the fact *that a typically honest and reliable person sincerely testifies to p* is a fact that can reliably indicate *p* even though it is a fact that does not entail *p*. See Silva and Bernecker (forth) for more on these issues.

[2] This case differs from Buchak's (2014) in that it includes information about men being encouraged to steal. This helps establish the reference class *men* as salient in a way that facilitates the justification of a high credence that a man stole your phone. See Colyvan, Ferson, & Regan (2001), Munton (2019), and Freitag & Zinke (2020) for discussion of ways in which high probabilities can fail to justify high credence.

[3] Nelkin (2000), Douven (2002), Sutton (2007), Smith (2010; 2016), Smithies (2012), Buchak (2014), Staffel (2016, forthcoming), Kelp (2018), Jackson (2020a), Jorgensen (forthcoming). The claim that one cannot *know* (J) and (L) is even more pervasive than the claim that one cannot rationally believe them. See, for example, Harman (1968: 166), Dretske (1971), Thomson (1986: 207), Williamson (2000), Hawthorne (2004), and Enoch, Spectre, & Fisher (2012). Of course, those who think that (J) and (L) cannot be known on the basis of merely statistical evidence and who also tie justification to knowledge or the possibility of knowledge will also deny that they are justified, e.g. Williamson (2014), Bird (2007),

On the supposition that this is the correct judgment, there is an epistemic asymmetry to be explained: in some cases reliance on reliable yet fallibly strong evidence is enough to form a rational belief (e.g. cases of eyewitness testimony) but in other cases it is not (e.g. Lottery and Seminar Room). Epistemologists who think (J) and (L) are not rational to believe owe us an explanation of this asymmetry. But they owe us more. For the fact that (J) and (L) are not justified in *some* cases of merely statistical evidence does not entail that *all* cases of merely statistical evidence are unable to justify claims like (J) and (L). So any complete epistemology of merely statistical evidence should justify and explain the extent to which merely statistical evidence is an (in)sufficient foundation for rational belief.

Here's the roadmap. I'll lay out some background assumptions, including some distinguishing features of 'merely statistical evidence' (Section 2). I'll provide two cases of merely statistical evidence where belief in (J) and (L) seem rational to believe despite the fact that one's evidence is merely statistical (Section 3). I'll then draw attention to a type of goal-directed disposition (=a disposition to function properly) that is present in these cases (Section 4) and show how such dispositions are present in standard cases of testimonial justification (Section 5). I'll then provide an account of when and why one's statistical evidence succeeds in justifying belief in terms of goal-directed dispositions (Section 6). The remaining section will explore some notable implications the dispositional theory has for fine-tuning arguments and moral encroachment (Section 7).

2. Background Assumptions

About Lottery and Seminar Room. As should now be clear, this project is conditional on one's evidence in Lottery and Seminar Room being unable to justify belief in (J) and (L). Many others, cited above, have held and defended this and I will assume that this is a datum to be explained.

About belief, credences, and rationality. I will assume that belief cannot be reduced to sufficiently high credence, that rational belief requires a sufficiently high rational credence, and that such a sufficiently high rational credence can fall shy of credence 1. If these views are not dominant in the literature on belief and credence, they are at the

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Ichikawa (2014), Simion (2019), and Kelp (2019). This is not without relevance to the present discussion. For typical cases of merely statistical evidence implicitly involve mature agents who recognize that they are not in a position to know, for example, the truth of (L). And knowing that one is not in a position to know *p* on one's evidence seems to *defeat* one's justification to believe *p* (Smith 2010, 2021a; Smithies 2010; Silva 2023). To deny this is to endorse the possibility of one rationally endorsing Moorean absurdities of the form '*p*, but I'm not in a position to know *p*'.

very least prominent and widely held views.[4] I will also make no distinction between justification and rationality in what follows.[5]

About merely statistical evidence. As is standard in discussions of merely statistical evidence, I won't provide an explicit definition of 'merely statistical evidence'. Rather, I'll follow the precedent set in the literature and fix the extension of that term by relying on similarity to paradigmatic cases like Lottery and Seminar Room. However, there are at least five distinguishing, or at least typical, features of cases of merely statistical evidence to bear in mind.

First, cases of merely statistical evidence are cases where there is a high probability on one's evidence that there is an object x that has some property F. Second, cases of merely statistical evidence are cases where the high probability that x is F on one's evidence justifies a high credence that x is F. This is not a given due to issues related to conflicting probability judgements arising from competing reference classes. Third, having merely statistical evidence in support of the claim that x is F is compatible with knowing some facts about x itself, e.g. facts about how x functions or how x is related to the functioning of other objects. For example, in Lottery you know (or can know) that the objective probability of your ticket winning is determined, at least in part, by *a ticket number selection mechanism* that has a disposition to randomly select a ticket number. Having such information about your ticket and the selection mechanism is consistent with being in a case of merely statistical evidence. Fourth, one does not have merely statistical evidence for p if one's statistical evidence justifies an extreme credence (1 or 0) in the claim that x is F. If one's evidence were extreme it would rule out all epistemic possibilities in which x is (not) F. No case of *merely* statistical evidence has this feature.

Finally, cases of merely statistical evidence should not be conflated with cases where deductive or abductive reasoning patterns justify belief in the statistically supported conclusion. We cannot, for example, in standard lottery cases reason as follows: *if this were a fair lottery (L) would be true, and this is a fair lottery, therefore (L) is true.* Similarly, we cannot reason our way to (L) because (L) is the best explanation of some set of data in need of an explanation. In Lottery, there is nothing to be explained. Seminar Room is different in this regard since in that case there is something to be explained, namely, why your phone is missing. But in that case an abductive argument is unavailable. For while the claim that Jake stole your phone seems like a *better explanation* than the claim Barbara stole your phone, it is not itself *the best explanation*. Best explanations require a sufficient degree of comprehensiveness and coverage of relevant open questions. For example, if Jake stole the phone, why would he steal it if he could so easily get caught? After all, it's either Jake or Barbara who did it and

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[4] See Jackson (2020b) for references.

[5] I want to remain as neutral as possible on the relation between rational credence and epistemic probabilities. For some relevant reflections on these issues see Buchak (2014) and Climenhaga (forthcoming).

identifying the thief shouldn't be too hard. So was Jake under duress of some sort, e.g. does he have an expensive addiction that he pays for with stolen goods? Does he strangely enjoy getting caught? Why would he risk expulsion or suspension from school by getting caught? Is he dull and generally bad at identifying good situations for stealing? And if Jake couldn't easily get caught, why is that? Is there any reason to think Barbara may have had motive to steal it in order to frame Jake? While these are open questions they don't, or needn't, significantly diminish the probability of (J). (J) can remain far more likely than not on your evidence even if your evidence leaves some relevant questions unanswered. But these open questions undermine the attempt to justify (J) on the basis of the fact that it is the best explanation for your missing phone.[6]

3. Mere Statistical Evidence *Can* Justify Belief

In Section 1 I drew attention to the fact that theorists tend to treat cases of eyewitness testimony differently from cases of merely statistical evidence like Lottery and Seminar Room. This epistemic asymmetry calls out for explanation. A common reaction is to lump *all* cases of merely statistical evidence together and say that there's always something epistemically defective about beliefs based on merely statistical evidence.

But consider the following case:

> *Against the Odds.* You have a lottery machine that works by scanning handwritten numbers on small slips of paper. Each paper is scanned and then placed into either a potential winner pile or a definite loser pile. But the machine is biased against odd numbers: it is programed to place *all* odd numbers in the definite loser pile. The winning number is chosen by randomly selecting a paper from the potential winner pile. Unfortunately, the machine is fallible because it sometimes, but very rarely, misreads handwritten numbers and so sometimes odd numbers are interpreted as even numbers and put into the potential winner pile. So it is possible, but exceptionally unlikely, that an odd number will be a winning number. You know all this, and you happen to have an odd numbered ticket. So you know that it is very likely that your ticket is a

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[6] One might think that in Seminar Room (J) must be *part* of *any* good explanation and, therefore, part of the best explanation–whatever exactly it is. If true, then one needn't have answers to salient open questions for (J) to be justified via abductive considerations. It is indeed plausible that we can rationally infer and come to rationally believe (J) when it is rational to believe (Any) *(J) will be part of any good explanation and thus part of the best explanation of the given data.* Even so, it is implausible that the details of Seminar Room provide anything close to sufficient reason to think that (J) must be part of the best explanation of the data provided in Seminar Room. There are just too many relevant open questions with answers that do not involve (J) for that to be plausible. There is also the question of *how* we could come to know such a thing. In Seminar Room where one's merely statistical evidence does not justify belief in (J), we cannot non-question-beggingly claim that (Any) is justified in Seminar Room by the high probability of (J) on our evidence. For to allow for that is to hold that (J) is justified by merely statistical evidence in Seminar Room, which is exactly the judgment we wish to avoid.

losing ticket. On just this basis you believe (L) *that your ticket is a losing ticket.*

This is a case where one's merely statistical evidence justifies belief in (L).

If you doubt it, reconstruct the case. Suppose *I* was the one doing the sorting by hand, and I told you that I had randomly selected the winner *only after first doing my best to sort out all the odds.* You know that despite my best efforts, I sometimes–albeit very, very rarely–make sorting errors due to fatigue or distraction. Notice that these facts alone seem like a rational basis for *me* to both *assert* and *believe* that your odd numbered ticket will not win. And if it is rational for me to believe (L) on this basis, then it is also rational for you to believe it on this same basis. Notice, further, that it would not undercut the rationality of believing (L) in these circumstances if you were to also learn that I could use an exceptionally reliable machine, like the one described in Against the Odds, to sometimes help with the sorting during periods of fatigue or distraction. So unlike Lottery, Against the Odds is a case where it is rational to believe that your odd-numbered ticket is a losing ticket even though it is a case of merely statistical evidence.[7]

Now take a case like Seminar Room:

> *Serial Thief.* You leave the seminar room to get a drink, and you come back to find that your phone has been stolen. There were only two people in the room: Jake and Barbara. You also know that Jake is a serial phone thief who has a long criminal history of stealing phones. Specifically, you know that he has regularly stolen phones over the last several years. You know that Barbara has no criminal record and you know nothing else about Barbara that suggests she was for some reason inclined to steal a phone on the particular occasion in question. Other things being equal, the probability that a phone thief stole a phone is far greater than the probability that a non-phone thief stole a phone, and you have no reason to think things are not equal. So you know that, on your evidence, the probability that Jake stole the phone is very high (but shy of 1). On this basis you believe (J) *that Jake stole your phone.*

It's worth noting that Serial Thief exemplifies a very common pattern of reasoning. For observing people's past behavior in various settings (like Jake's history of theft) and inferring from it that they have certain character traits (like being a thief) is how

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[7] Biased lotteries are nothing new. But readily available discussions of such lotteries are ones where the lottery was designed to give a *non-extreme* uneven chance to some set of numbers (e.g. Hawthorne 2004: 15). Against the Odds is unlike this it is designed to give an *extreme* uneven chance to the odds: it is supposed to rule out *all* the odds.

we gain first-hand knowledge of people's character traits.[8] And we regularly use information about peoples' character traits to form beliefs about what they've done in cases structurally similar to Serial Thief.

Here is a somewhat different example. I often forget whether I locked my car door. Even though I know that I sometimes fail to lock it I often reassure myself, and thereby sustain my belief, that I locked my car door because I know that *I'm in the habit of locking it and it is very unlikely that I failed to lock it on this occasion*. When the basis of my belief that my car door is locked shifts from my memory of doing so to statistical evidence grounded in my knowledge of my habits (=my character traits), the status of my belief does not shift from rational to irrational.

If you hesitate to accept the rationality of belief in cases like Serial Thief, perhaps it is because of high-stakes effects associated with believing Jake committed a crime. But we can easily transform this into a low-stakes case. Suppose the events described in Serial Thief took place 100 years ago and everyone involved is dead and you're just reading the details of this 100 year old case and drawing conclusions from the information available. Alternatively, if you hesitate to accept the rationality of believing (J) in cases like Serial Thief perhaps it is because of its similarity to Seminar Room and you can't quite see how belief in (J) could be rational in the one case but not the other. An explanation of just how to explain this asymmetrical judgment is to follow.

4. Parsing Dispositions

Dispositions play a role in all four of the cases of merely statistical evidence considered so far. In Lottery and Against the Odds it is the disposition of these lotteries to select numbers in ways that make the selection of your number exceedingly unlikely. In Seminar Room and Serial Thief it is the disposition of men to steal phones that make it highly likely that Jake is guilty. We will later see that dispositions also play a role in understanding the evidential value of eyewitness testimony for belief.

So when looked at in this very general way all the cases seem structurally analogous. But if we zoom-in we will observe subtle differences in just how dispositions function in these cases. These differences hold the key to solving the puzzle of merely statistical evidence. So first I'll say a bit more about dispositions and the specific kind of dispositions that separate cases like Against the Odds and Serial Thief from cases like Lottery and Seminar Room, and then in Section 6 I'll spell out

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[8] The mode of inference here is often abductive since having a character trait is often the best explanation of a person's actions. But it could also be deductive since we sometimes know that: one wouldn't have so often performed actions of type T unless they had character trait C. If we further knew that the one often did perform such actions, we could deduce that they have trait C. In contrast to abductive and deductive arguments, a mere probabilistic inference to a person's character traits involving non-extreme probabilities will have to conform to the Goal-directed Dispositions Principle on the account to be explored below.

general necessary and sufficient conditions for when merely statistical evidence justifies belief.

4.1 Goal-Directed Dispositions

What it is for a glass vase to be *fragile* is for it to have a disposition to shatter when struck. An irascible person has a disposition to be angered when provoked. A leading approach to the metaphysics of dispositions is to treat them as modal properties of objects.[9] For example, on Manley and Wasserman's (2008: 76ff) influential view, x has a *disposition* to F when c iff x Fs in a sufficiently high proportion of c-worlds. Importantly, the c-worlds are restricted to worlds where the laws of nature remain the same, x's intrinsic properties remain the same, and the stimulus condition, c, for x's disposition to F obtains.

There is a close connection between the dispositions of objects and objective probabilities. Some have argued that it's so close that we ought to understand objective probability in terms of dispositions.[10] This interpretation of objective probability is controversial and nothing to follow depends on it. All that matters for present purposes is that objects can have dispositions and that dispositions can *help* fix probabilities involving these objects. In the first, dispositions help fix *objective* probabilities, for example: if one glass vase, g1, has a much stronger disposition to break than another glass vase, g2, then other things being equal g1 will have a much higher objective probability of breaking if struck than g2. In the second, our knowledge of (rational belief about) dispositions can help fix *epistemic* probabilities, for example: if you knew the previously mentioned fact about the comparative dispositions of g1 and g2, then other things being equal the probability *on your evidence* that g1 will break when struck will be higher than the probability *on your evidence* that g2 will break when struck. I will not here assume any theory of evidential probabilities and what follows will be compatible with different views.

There are principled distinctions to be drawn regarding the dispositions of objects. First, for some kinds K, having certain dispositions is constitutive of being a *good* (=properly functioning, non-defective) member of K. For instance, a *good toaster* is one that has a disposition to toast bread in certain circumstances; a *good heart* is a heart that has a disposition to pump blood in certain circumstances. Some organisms are such that being non-defective members of their kind involve having dispositions to behave in health-promoting ways. Cats that don't have a disposition to eat, to sleep, or to avoid predators are in some sense defective members of their kind.

It will help us to have some terms to track these ideas. When having a disposition to F is part of being a good (=non-defective, properly functioning) K, and x is a member of K, we can say that F-ing is a **goal** of x. Thus, toasting in certain

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[9] Manley and Wasserman (2007, 2008, 2011), Vetter (2014), and Aimar (2018).

[10] Popper (1957) and Gillies (2000).

conditions is a goal of toasters, pumping blood in certain conditions is a goal of hearts, and so on. And if *F*-ing is a goal of *x* and if *x* indeed has a disposition to *F,* then we can say that *x* has a **goal-directed disposition** to *F*.

The idea that some objects are such that having certain dispositions is tied to being good (=non-defective, proper functioning) instances of their kind is not unfamiliar. It is a part of our common sense way of thinking about the world. It is also, as Dretske (1988) observed, part of our scientific worldview:

> We are accustomed to hearing about biological functions for various bodily organs. The heart, the kidneys, and the pituitary gland, we are told, have functions—things they are, in this sense *supposed to do.* The fact that these organs are supposed to do these things, the fact that they have their functions, is quite independent of what we think they are supposed to do. Biologists *discovered* these functions; they didn't invent or assign them. We cannot, by agreeing among ourselves, *change* the functions of these organs. . . . The same seems true for sensory systems, those organs by means of which highly sensitive and continuous dependencies are maintained between external, public events and internal, neural processes. *Can there be a serious question* about whether, in the same sense in which it is the heart's function to pump the blood, it is, say, the task or function of the noctuid moth's auditory system to detect the whereabouts and movements of its archenemy, the bat? (Dretske 1988: 91)

There are difficult questions to be asked about the nature and foundations of proper functions (goals) and the disposition to function properly (the disposition of an object to satisfy its goals). But here is not the place to explore that. Others have done this, and they have influentially, or infamously, argued that such properties can help explain such things as linguistic meaning, mental content, normativity, knowledge, warranted belief, and non-statistically justified belief.[11] I here extend this research program by showing how proper functions can help us to understand when and why statistical evidence justifies belief.

4.2 Sorting The Cases of Merely Statistical Evidence

The cases of merely statistical evidence detailed above are all of a kind: they are all cases where it is highly probable on your evidence that some *x* is *F* due (at least in part) to your knowledge of the dispositions of *x*. But it is only in Against the Odds and Serial Thief where the relevant object, *x,* has a goal-directed disposition to be *F*.

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[11] Millikan (1984, 1989, 1996, 2010), Plantinga (1993), Thomson (2008), Graham (2012, 2014, 2019, 2020), Papineau (2001, 2022), Neander (1996, 2017), Kelp (2019), Simion (2019), and Boyce & Moon (2016, forthcoming).

Let's have a look at Lottery and Against the Odds. Notice that in Against the Odds the ticket number selection mechanism has a goal-directed disposition *to reject all odd ticket numbers and to only randomly select an even ticket number*. This is in virtue of the way the ticket selection mechanism was designed and the fact that it is functioning properly in Against the Odds. But in Lottery the corresponding disposition is different: the selection mechanism works by deploying a goal-directed disposition *to randomly select any ticket number*. Notice that this mechanism's goal-directed disposition does not involve a disposition to reject all odd numbers, much less a goal-directed one.

To visualize this, imagine an old-style random selection mechanism that involves a spinning sphere of numbered balls where a person reaches into it and blindly pulls out one ball at a time. This kind of number selection mechanism is *goal-directed*: it functions properly only if it randomly selects a sequence of numbers that will constitute the winning number. But it does not have a disposition, much less a goal-directed one, to screen out odd numbers since the number on each ball does not figure into the number selection process whatsoever–odds and evens have an equal chance of being selected.

So in both Lottery and Against the Odds the number selection mechanisms have a goal-directed disposition to select ticket numbers in some way, and the operation of both mechanisms guarantee a very low probability of any particular number being drawn. So in both lotteries your ticket is highly likely to lose. But only in Against the Odds is it highly likely to lose *because the ticket selection mechanism has a goal-directed disposition to not select odd numbered tickets as a winning ticket*. So there is a *qualitative difference* in the evidence you have concerning the dispositions of the selection mechanisms. This is a difference that can be used to explain the differential epistemic judgments we make about these two kinds of lottery case (we'll come back to this in Section 6).

Now take Serial Thief. Jake has a disposition to steal phones. And this disposition Jake has is owed to *a further goal-directed disposition*. For the disposition to act on one's choices is a goal-directed disposition for agents. Agents who, for example, regularly choose to act in some way but fail to so act are not functioning properly in that moment. Imagine choosing to move your computer from your study to the living room. But then, without making any alternative choice and nothing external preventing you from acting, you nevertheless fail to move your computer. Something has gone wrong. For part of what it is to be a properly functioning agent is to have a goal-directed disposition to act on, or in accord with, one's choices. Likely, the goal-directed disposition relating choice to action is complex in ways that require further specification. But the main point I will rely on is that in typical conditions there is a connection between being a properly functioning agent and acting in accord with one's choices to act. I will assume that Jake is in such typical conditions.

So we have the following information given in Serial Thief:

(i) Jake has a goal-directed disposition to perform an action A when he chooses to perform action A.

(ii) Jake has a disposition to choose to steal phones.

And because (i) and (ii) obtain Jake also has a further disposition:

(iii) Jake has a disposition to steal phones.[12]

Let's call this type of disposition that Jake has in (iii) a **discharged goal-directed disposition**. Very roughly, discharged goal-directed dispositions are dispositions one has in virtue of having a disposition to trigger a goal-directed disposition.

It will help to further illustrate the phenomenon. Take an espresso machine designed in such a way that it has a disposition *to quickly shut off when water is absent*. This is a goal-directed disposition of the machine. Now suppose this machine later acquired a further disposition *to not contain any water*, e.g. perhaps I drilled a very large hole in the base of its water tank. The hole in the tank ensures the machine now has a disposition to not contain water and thus to ensure that water is absent. In this condition the espresso machine will have a further disposition to quickly shut off. This is because of (a) its goal-directed disposition to quickly shut off when water is absent and (b) its newly acquired disposition to not contain water. This disposition to quickly shut off is a discharged goal-directed disposition.

Discharged goal-directed dispositions are a kind of goal-directed disposition. This can sound odd since it is *a defect* of the espresso machine that it has a very large hole in its water tank and thus will not make espresso in normal conditions–as when one pours water in the tank, fills the filter with coffee, and then hits the start button. While that is indeed a defect, it is not a defect of the machine to quickly shut off when water is absent. So relative to *that* goal, the disposition to quickly shut off is a goal-directed disposition.

The primary observation I want to draw your attention to here is that Jake's (discharged) goal-directed disposition to steal phones plays an important role in explaining why in Serial Thief it's probable on your evidence that Jake stole your phone. For people with a disposition to steal phones are, other things being equal, objectively much more likely to steal than people who do not have a disposition to steal phones.

But Seminar Room is unlike Serial Thief in this regard. In Seminar Room it is an open question whether *Jake* has a goal-directed disposition to steal phones. It is also an open question whether or not *Jake* has stronger goal-directed disposition to steal

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[12] The 'because of' claim just made does not imply that (i) and (ii) *entail* (iii). It is an explanatory claim to the effect that (i) and (ii) explain why (iii) obtains against further assumed background conditions.

phones than the average woman's disposition to steal phones in that community. For Jake is a man and men, let us suppose, have a disposition to do what they are systematically encouraged to do by their community. And because Jake is a man his community encourages him to steal phones. But it doesn't follow from all this that *Jake* has a disposition to steal phones. Put differently, in Seminar Room our evidence at most supports the claim that Jake has *a disposition to have a goal-directed disposition to steal phones*. But we do not know whether Jake has *a goal-directed disposition to steal phones*. An object can have *a disposition to have a disposition to F* without having *a disposition to F*. Children who live in a smoking-positive environment have a disposition to acquire a disposition to smoke. But not every child from such an environment acquires a disposition to smoke. There are non-smokers who come from smoking-positive environments.

It is only in Serial Thief where we get the further information that Jake has a disposition to steal phones from his history of stealing phones. So in Seminar Room while Jake's being a man might make it more likely on your evidence that Jake stole your phone, it doesn't make it more likely on your evidence *because* you know that Jake has a goal-directed disposition to steal phones. So there is a *qualitative difference* in the evidence you have about Jake's dispositions that in turn provides you with your statistical evidence in Seminar Room versus Serial Thief. For it is only in Serial Thief that you are given information about Jake's goal-directed disposition to steal phones.

At this point, one might wonder whether information about Jake's *disposition to steal* is alone sufficient to draw the needed difference between Seminar Room and Serial Thief, and thus that the further detail about Jake having a *goal-directed* disposition is irrelevant. No. This further information about the type of disposition is crucial, and Lottery cases teach us why. Recall what it takes to have a disposition: x has a *disposition to F* when c iff x Fs in a sufficiently high proportion of c-worlds (Manley & Wasserman 2007, 2008, 2011). In standard Lottery cases the winning ticket number is randomly determined from the total set of tickets in a very large lottery. From these details it follows that the proportion of relevant worlds where your ticket is a losing ticket is so much greater than the proportion of worlds where your ticket is a winning ticket. Thus, by the above theory of dispositions, it will follow that *the ticket selection mechanism* that determines the winning ticket has a disposition to not select your ticket number. In which case, if knowledge of dispositions was enough to differentiate cases of rational belief on statistical evidence from cases of irrational belief on statistical evidence, then Lottery cases would be cases of rational belief. Accordingly, if we were only looking at dispositions generally then there will not be an important difference between Lottery and Against the Odds. It is only when we look at the goal-directedness of the

dispositions that we are able to draw a principled difference between the two lottery cases, and it is a difference that also separates Seminar Room from Serial Thief.[13]

5. Explaining the Evidential Asymmetry

Before attempting to identify general principles that explain when and why some cases of merely statistical evidence justify belief while others do not, let's return to the epistemic asymmetry that the introduction began with between testimonial evidence and standard cases of merely statistical evidence (Lottery, Seminar Room). Why is it that the evidence provided by testimony is able to justify belief while the statistical evidence in Lottery and Seminar Room cannot? Since both kinds of evidence provide fallibly strong support for their respective conclusions, what reason could we have for thinking they differ in their ability to justify beliefs? If we are to maintain this epistemic asymmetry we need to identify a non-epistemic asymmetry that grounds it.

We are now in a position to do this. For testimonial evidence is typically evidence that implicates facts about the goal-directed dispositions of *the agents doing the testifying* (the testifiers). This is because the testifiers in typical cases have *abilities to acquire knowledge* in various ways (by perception, by introspection, by intuition, by remembering, by reasoning from known premises, etc.). Leading accounts of abilities have it that abilities are, or are at least partially constituted by, dispositions (Maier 2020). It follows that testifiers have a disposition to know in various ways, and mature recipients of testimony are typically aware of this fact.

Furthermore, it is not only the case that testifiers *have dispositions to know*, it's also the case that *knowing is a goal* of these testifying agents. For example, take a human agent who looks directly at a red ball in utterly normal visual circumstances. This is an

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[13] Against this last point, one might argue that any disposition needed to have a goal-directed disposition is itself a goal-directed disposition. Were this true, one could object as follows: in Lottery the ticket selection mechanism has a goal-directed disposition to randomly select any number from an exceptionally large set of numbers, and that requires having a disposition to not select any specific number, e.g. number 3 (this can be verified on the modal account of dispositions that is assumed for present purposes). So in Lottery, the mechanism has a goal-directed disposition to not select the number 3. If correct, there would be no significant difference between Lottery and Against the Odds along the lines of goal-directed dispositions. Thanks to Olle Risberg and Jim Pryor for raising this issue.

The problem with this is that goal-directedness does not distribute in this way. For it is a goal of the selection mechanism in Against the Odds to not select any odd number. Thus, to select the number 3 is to *malfunction* and be *defective* as it fails to fulfill its goal of not selecting any odd number. But there is no defect in Lottery should the mechanism select the number 3. Consider another example from Karen Neander (2017: 1151-2): it is a goal of hearts to pump blood, and hearts that pump blood make a whooshing sound. So hearts that have a disposition to pump blood also have a disposition to make a whooshing sound. But making a whooshing sound is not a goal (proper function) of the heart. So, should a heart somehow fail to make a whooshing sound while pumping blood it would not be in any way defective or malfunctioning (cf. Plantinga 1993: 25-26).

agent who is in a position to know a range of facts about the red ball. If this agent fails to come to know *that a red ball is nearby* solely because they stubbornly want to disbelieve it, that agent is responding to their circumstances in an improper way. And if that agent systematically fails to acquire relevant perceptual knowledge when in a position to easily do so simply because they are stubborn they are deeply intellectually defective.

Take another example. Think of someone who knows English fluently, who can read English at the college-level, and who fails to believe that this paragraph is written in English when considering the question in utterly normal circumstances. For such an agent, failing to know that this paragraph is written in English is a defective response to their epistemic situation. And systematically failing to know similar claims in similar circumstances, again, represents a deep intellectual defect.

So what is implicated in typical cases of eyewitness testimony is not just the facts testified to, but that these facts are testified to *because of* the testifier's exercises of goal-directed dispositions to know the fact they testify to. So typical cases of testimony are metaphysically akin Against the Odds and Serial Thief in that they are cases where goal-directed dispositions are in play. So the idea that we should search for a distinctively goal-directed dispositional account of the normativity of statistical evidence is, in part, motivated by reflection on the metaphysical *difference* between Lottery/Seminar Room and Against the Odds/Serial Thief (Section 4.2). However, it is also motivated by the metaphysical *similarity* between Against the Odds/Serial Thief and typical cases of testimonial justification.

6. The Goal-directed Dispositions Principle

Inspired by the observations above, here are conditions for when it is rational to believe that *x* is *F* when *x* has a high probability of being *F* on your evidence.

> **Goal-directed Dispositions Principle (GDP).** For any agent *S*, object *x*, property *F,* stimulus condition *c*, and total body of evidence *e*: [Preamble] when *S*'s total evidence *e* supports the claim *that x is F* only by supporting the claim *that the probability that x is F is high* (but less than 1):
>
> (**GDP-Suf**) it is rational for *S* to believe that *x* is *F* **if** it is rational for *S* to believe that *x* has a goal-directed disposition to be *F* when *c* and this together with *e* justifies a sufficiently high credence that *x* has (will have) manifested its disposition to be *F* when *c*, **and**
>
> (**GDP-Nec**) it is rational for *S* to believe that *x* is *F* **only if** it is rational for *S* to believe that *x* has a goal-directed disposition to be *F* when *c* and this together with *e* justifies a sufficiently high credence that *x* has (will have) manifested its disposition to be *F* when *c*.

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The GDP has been separated into necessary and sufficient conditions to help us identify the work that each direction of the biconditional does.

The GDP has a preamble that limits its application to a proper subset of cases where one might have statistical evidence in support of the claim that x is F. This is needed because non-statistical evidence can often bring statistical evidence in its wake. For example, having perceptual evidence sufficient to justify believing *that x is F* will, other things being equal, also justify believing *that it is very probable that x is F*. But perceptual evidence is not evidence that justifies believing that x is F *only by* supporting the probabilistic claim, as one can acquire justified perceptual beliefs just on the basis of the perceptual experience itself.[14] Similarly, sometimes a body of evidence provides probabilistic support for a conclusion because it first provides deductive support or abductive support for it. For one example, the fact that q deductively follows from p ensures that p is highly probable for those agents who recognize this deductive relation and also know that p. Such cases are meant to be ruled out by the preamble as they are not cases of merely statistical evidence.

Notice that the principle explains rational belief that x is F on one's evidence only when one's evidence justifies a sufficiently high credence that x has manifested its disposition to be F when c. To say that *x has manifested a disposition to be F when c* is to say at least four things: x has the disposition to be F when c, x is F, c obtains, and x is F *because of* its disposition to be F when c. In this way the GDP only predicts rational belief that x is F in cases where x's being F is connected in the right kind of way to its disposition to be F when c.[15]

That one must have a justified *sufficiently high credence* that x has manifested the relevant disposition is owed to the fact that it would be counterintuitive to allow one's evidence to justify belief that x is F in cases where one's evidence justified only a very low credence that x is F. That said, this condition is vague since it specifies no threshold for how high one's credence must be. Some readers will prefer high thresholds, while others will prefer lower thresholds. Some readers will prefer contextually inflexible thresholds, while others will prefer contextually flexible thresholds.[16] This is an issue readers may settle for themselves.

Let's turn to the explanatory power of the GDP. First, notice that GDP-Nec explains why it is not rational to believe (L) or (J) in Lottery and Seminar Room. For, as described in Section 4, in neither case is it rational for you to believe that goal-

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[14] Liberal views of perceptual justification explicitly entail this, and the most plausible conservative views of perceptual justification also entail this. See Silva (2013) for a discussion of conservatism.

[15] Thanks to Jamie Fritz for prompting me to reflect on the role that disposition-manifestation might play in the GDP.

[16] Adopting a flexible threshold is one way that advocates of pragmatic and moral encroachment might seek to retain the GDP in light of concerns about its predictions in cases of encroachment: the higher the stakes the higher the threshold. See the final section for more on how the GDP, in fact, undermines some standard arguments for moral encroachment.

directed dispositions play a role in justifying a sufficiently high credence in (L) or (J). Without that you cannot have rational belief in (L) or (J) in those cases.

Second, notice that GDP-Suf explains why it is rational to believe (L) and (J) in Against the Odds and Serial Thief. For in Against the Odds you know that the lottery has a goal-directed disposition to not choose *any* odd number, and hence it has a goal-directed disposition to not choose *your* odd number. And since it is rational on your evidence in Against the Odds to be highly confident that the lottery manifested its relevant goal-directed disposition, it follows from GDP-Suf that it is rational for you to believe that your ticket is a loser.

Similarly, consider Serial Thief. In that case you know that Jake has a goal-directed disposition to steal phones. And this in connection with the rest of your evidence justified a high credence in the claim that Jake manifested that disposition to steal phones by stealing your phone. So the antecedent of GDP-Suf is satisfied. So GDP-Suf has the right implications for Serial Thief: it is a case of rational belief.

Let's turn to some potential problems. One concerns how GDP-Nec relates to good cases of enumerative induction where objects have known dispositions but lack goal-directed dispositions:

> *Defective Machine.* You have a broken washing machine. It does not work when you switch it on. But it does work when you switch it on and kick it twice. Indeed over the last two years it has always worked after being turned on and kicked twice. You plan to do your laundry tomorrow. On this basis you rationally believe (K) *that it will work tomorrow when you turn it on and kick it twice.*

Part of what it means to say that (K) is rational to believe is that it's rational to believe that some object (the washing machine) has a property (being such that it will work tomorrow when you turn it on after kicking it twice). So here we have an inference to a claim that some particular x has some property F just as we have in the cases of merely statistical evidence discussed above.

But the similarity to typical cases of merely statistical evidence runs deeper. For the fact that the machine has worked every time it has been turned on and kicked twice *doesn't entail* that it will work next time; at most it seems to make it highly probable that it will work next time. Indeed, two relevant hallmarks of cases of merely statistical evidence noted in Section 2 are satisfied here: (a) Defective Machine is a case where an agent knows that there is a high probability on their evidence that some x is F, and (b) Defective Machine is a case where the high probability that x is F on their evidence justifies a high credence that x is F because it will have manifested a relevant disposition to be F. So it is arguable that here is a case of merely statistical evidence, and it is a case where not only high credence is justified but belief is also justified.

The threat is that GDP-Nec seems inconsistent with this idea. For the machine is *defective*: it is not a goal of the machine to work only after being kicked twice. And it is also not a discharged goal-directed disposition that works only after being kicked twice. While it is possible to add details to the case so that this disposition of the machine is a discharged goal-directed disposition, this is not the intended reading of the case. Accordingly, GDP-Nec might seem like a mistaken necessary condition.[17]

The answer to this problem is relatively straightforward: the preamble to GDP-Nec makes GDP-Nec inapplicable to this case. For Defective Machine is not a case where your total evidence e strongly supports the claim that x is F *only by* supporting the claim that it is highly probable that x is F. For if you know that the machine has worked on every occasion after being turned on and kicked twice over the last two years, then you have extremely strong evidence that there is a *causal process* in place that makes the machine work in that way – at least when there's no interference. This is much like the fact that the observed past behavior of many series of dominos collapsing in a standard set up is strong evidence of a causal process involving the future collapse of dominos in a standard set up.

But when we have this kind of causal information we typically have justification to believe various counterfactual claims. In particular, in Defective Machine your evidence seems to justify the following:

(a) If you were to switch the machine on and kick it twice tomorrow, then the machine would work tomorrow.
(b) You will switch the machine on and kick it twice tomorrow.

From which you could deduce:

(c) The machine will work tomorrow.

In contrast, notice that you could not make use of a similar pattern of reasoning in lottery-like cases since the relevant counterfactual premise is not justified. It has been widely appreciated that in lottery cases *it could easily have been the case that your ticket is a winner*.[18] In which case it is false that (a*) *if you were to play the lottery, you would lose.* Similarly, in a case like Seminar Room, you are not justified in believing the following counterfactual: (a**) *if your phone were to be stolen and men are 10 times more likely to steal phones than women by virtue of their disposition to do as they're encouraged, then your phone would have been stolen by a man.* The fact that men are 10 times as likely to steal phones as women does not justify that counterfactual. Indeed, if knowledge of the high objective probability of your ticket being a loser cannot justify the counterfactual (a*) then

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[17] I am grateful to a referee for drawing my attention to this objection.

[18] See, for example, Williamson (2000), Pritchard (2005), and Smith (2016).

corresponding knowledge of the high probability that men are far more likely to steal phones than women cannot justify counterfactual (a**). So the thing to observe is that while Defective Machine may be a case that has some of the hallmarks of cases of merely statistical evidence, it remains a different kind of case, and the preamble of the GDP sets it aside as a case where the GDP is not intended to apply.

Another issue concerns the potential of explanatory shortfall should GDP-Nec turn out to be true. For in Serial Thief it was assumed that we could rationally believe (Thief) *that Jake is a phone thief* given our knowledge of (Thefts) *that Jake has often stolen phones in the past*. At most, our knowledge of (Thefts) justifies (Thief) non-deductively since one cannot deduce (Thief) from (Thefts) without further information that is not given in Serial Thief. But, according to GDP-Nec, if one is to justifiably believe (Thief) partially on the basis of (Thefts) and the high probability of (Thief), one would need *further* information about Jake's goal-directed dispositions. But that further information is lacking in Serial Thief. So GDP-Nec may have untoward skeptical implications.[19]

While we should be open to thinking we justifiably believe less than we think we do, we should not think that we cannot in principle have knowledge of people's character traits. Fortunately, GDP-Nec allows for other ways of acquiring knowledge of people's character traits in the absence of prior knowledge of relevant dispositions. For example, *testimony* is one source. Jake could straight-out admit to being a serial phone thief. Alternatively, there is the testimony of the legal system that Jake is a thief given repeated convictions for stealing. Another source is *abduction*. For we often use information like that presupposed in (Thefts) – repeated, evidence-based legal convictions of theft – in abductive inferences to claims like (Thief). For part of the best explanation of the fact that Jake has been repeatedly convicted of thefts is that Jake is a thief. GDP-Nec places no constraints on abductive inference to the effect that one can only make an abductive inference if one has pre-existing information about the goal-directed dispositions of the relevant objects involved. Further, we might also have *deductive* routes available for the justification of the belief that someone has some character trait or other. For example, it is not implausible that we know that: if Jake were not a phone thief, then he wouldn't have so often stolen phones. Given that we know that he did so often steal phones, we can deduce that he is a phone thief.

Here is another issue to mention. Take a case just like Against the Odds except that the mechanism that sorts out the odds is not the product of intentional design, but is rather the product of an accident: the ticket selection mechanism came into existence from a random series of quantum events. Suppose this accidental ticket selection mechanism functions in the same way as the mechanism in the original case, i.e. it excludes the odds. It seems strange to think that only in Against the Odds you could have a rational belief that your odd ticket was not selected. But this is what the

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[19] I'm grateful to Alex Worsnip for drawing my attention to this problem.

GDP implies because only in Against the Odds is it a goal of the lottery to sort out the odds.[20]

In response, there are three things to keep in mind here. First, this objection is a version of the familiar and widely discussed "swampman-style" objection that applies to *all* theories that rely on teleological factors to explain phenomena, and it is a style of objection that is familiar and well-explored.[21] Second, high credence is not constrained by information about goal-directedness (proper function). So the GDP does not prohibit a justified *high credence* that one's odd numbered ticket will lose in this lottery. Arguably, this high credence is justified just by one's knowledge of the high objective chance that "swamp-lottery" will not select an odd. This would be an implication of the highly attractive Principal Principle. Lastly, it does not seem strange upon further reflection that one might have good reason for withholding belief – though not a high credence – about the behavior of a ticket selection mechanism that came into existence from a random series of quantum events.

Another concern has been raised about the GDP. According to the GDP in Against the Odds you can rationally believe:

(L) Your odd numbered ticket is a loser.

We know that: (L) would not be true unless the following were also true:

(No Oddity) There was no quantum event that caused your odd numbered ticket to transform into an even numbered ticket unbeknownst to you at the moment you submitted your ticket to the machine.

While the GDP implies that (L) is rational in Against the Odds it does not imply that (No Oddity) is rational because we don't – or at least don't clearly – have information about relevant goal-directed dispositions for the sub-atomic objects implicated in (No Oddity). But wait! Clearly, if (L) is rational to believe then (No Oddity) is also rational to believe. So we have a prospective counterexample to GDP-Nec.

To understand why this objection fails we need only appreciate the fact that the GDP helps explain why belief in (No Oddity) is justified. For the GDP explains why belief in (L) is justified and, once we have that, usual closure principles for justification will do the rest of the work. For according to standard closure principles our evidence will support belief in (No Oddity) because it is obviously entailed by (L) together with the counterfactual relation between (L) and (No Oddity), i.e. if (L) were true then (No Oddity) would also be true. So we can have justification for believing

(No Oddity) even though the GDP does not *itself* imply that we have justification to believe (No Oddity). So there is no counterexample here. The problem arises only if one thinks that the GDP is being put forward as a perfectly general principle that is supposed to explain all cases where one's total evidence provides justification for some conclusion. But it is not. The preamble of the GDP makes it explicit that the scope of the principle is limited and permits one's evidence to provide justification in other ways.

Readers might wonder how the GDP relates to Martin Smith's (2010, 2016, 2021a) innovative approach to questions of justification that seeks to understand when evidence justifies belief in terms of normic support. On Smith's view, a body of evidence E justifies believing p only if the evidence normically supports p in the following sense: the situation in which <E is true and p is false> requires *more explanation* than the situation in which <E and p are both true>.[22] The GDP is consistent with Smith's normic support requirement on justification since it is consistent with the idea that proper functions (goal-directed dispositions) are *one source of normic support*. For example, take the lottery ticket selection mechanism in Against the Odds. If it is functioning properly it will exclude your odd numbered ticket. Accordingly, if you later learn that your ticket was selected as a winner that would be abnormal and call out for more explanation than a situation in which your ticket was a loser. Consider also Serial Thief. It is a situation in which a phone was stolen and either a serial phone thief stole it, or it was stolen by someone who your evidence suggests is not a phone thief. A situation in which <your evidence is as stated in that case, and your phone was stolen by the apparently honest person rather than the serial phone thief> would certainly require more explanation than one in which <your evidence is as stated in that case, and your phone was stolen by a serial phone thief rather than an apparently honest person>. Again, it was explained above how Serial Thief involved considerations of goal-directed dispositions. All of this points to the fact that the GDP provides a way of understanding why Smith's constraint can be satisfied in some – but not all – cases of merely statistical evidence. This is exactly what the normic support account needs if it is to be consistent with the existence of justified belief in Against the Odds and Serial Thief. There is, of course, much more to say about the connection between normic support and goal-directed dispositions. This is something to be explored elsewhere.

A final complication is worth pointing out. The GDP has as a constraint that one have *beliefs about* goal-directed dispositions. But to have beliefs about that one would have to have the concept DISPOSITION as well as the concept GOAL-DIRECTED DISPOSITION. That may be more demanding than we desire. Fortunately, the problem can be addressed in various ways. One way is to argue that

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[22] Smith has also extended his normic support constraint to legal cases of conviction. For more on this see Smith (2018, 2021b). For critical comments on Smith's work see Di Bello (2020) and Blome-Tillmann (2020).

propositional (ex ante) rationality is not conceptually demanding and thus the failure to possess a concept C does not thwart one's evidence from justifying attitudes involving propositions that contain C. An alternative to this is to weaken the GDP so that one need only be sensitive to facts about goal-directed dispositions. One way this can happen is by having rational beliefs about *what would (not) be (ab)normal in a given condition.* For example, one might not believe that in Serial Thief Jake has a goal-directed disposition to steal simply because one lacks the concept GOAL-DIRECTED DISPOSITION. But even so one might rationally believe that *it would not be abnormal for Jake to steal in such conditions.* For even though we cannot easily analyze dispositions in terms of counterfactuals there remains a widely acknowledged connection between them. And given, as suggested in the previous paragraph, that facts about proper function can ground facts about normality it seems promising to suggest that one can manifest a sensitivity to facts about goal-directed dispositions by having rational beliefs about what would be normal in a given case.[23]

7. Applications: Fine-Tuning & Moral Encroachment

The GDP has notable implications for a range of cases where statistical evidence is in play. Here are two such cases.

Fine-Tuning for Theism. Fine-tuning arguments for theism have come a long way since Paley. After defending fine-tuning arguments against a wide array of objections, Hawthorne and Isaacs (2018) conclude:

> The laws of physics are unexpectedly inhospitable to life. Scientists did not expect to discover that life depends on seemingly improbable values in the fundamental constants of physics. Scientists expected to discover that life would be possible given a wide variety of values in the fundamental constants. ... If this unexpected inhospitability were equally unexpected with or without the existence of God, then the fine-tuning of the fundamental constants would be irrelevant to the philosophy of religion. But the fine-tuning of the fundamental constants is *substantially more likely* given the existence of God than it is given the non-existence of God. Thus the fine-tuning of the fundamental constants is strong evidence that there is a God. There are some real complexities to the fine-tuning argument, complexities regarding which controversy is appropriate. But the fine-tuning argument is more controversial than it

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[23] I lack substantial empirical data for how early children are capable of having thoughts about what would (not) be normal in various conditions. But, anecdotally, I have a six year old and she manifests a competence with such thoughts even though she does not yet seem to have a grip on the language of dispositions (inclinations, propensities, tendencies) and proper functions.

ought to be. The basic idea of the fine-tuning argument is simple. It's as legitimate an argument as one comes across in philosophy. (Hawthorne and Isaacs 2018: 136ff)

Let us assume the stronger claim that our total evidence plus the evidence of fine-tuning from physics makes it unconditionally highly probable that the universe was created by God. Provided the probability of this is not 1, we can ask whether or not it would be rational to believe that God created the universe just on the basis of this unconditional high probability.

In answer, GDP-Nec implies that it would be irrational to believe that God exists *just* on this evidence. For in order for this to be a case that satisfies GDP-Nec one would have to rationally believe that God has a goal-directed disposition to create a life-hospitable universe. But to rationally believe that one would need *other evidence* that justifies believing that God exists – as you cannot rationally believe something has a disposition unless it is first rational to believe that it exists. So while fine-tuning arguments can – as far as the GDP is concerned – justify a high credence in the existence of God, the use of a fine-tuning argument to justify belief in God's existence is in some sense question-begging according to the GDP.

A referee suggested the following worry with this application of GDP-Nec:

> Suppose I'm not sure whether there exists a mouse living in my house. But cheese keeps disappearing from my kitchen, and I think that it is statistically much more likely that cheese would keep disappearing if there is a mouse in my house than if there is not. In order for me to rationally form the belief that there is a mouse in my house on this basis, does GDP-Nec require me to first rationally believe that the mouse in my house has a goal-directed disposition to eat cheese, which in turn requires me to already believe that there exists a mouse in my house? If so, that strikes me as a very implausible requirement.

This is an intriguing point. But the example that undergirds it is not directly analogous to the cases of fine-tuning I have in mind. For in the referee's suggested analogical case we have implicit background 'mouseological' information: we know that mice exist, that mice often infest houses, that mice really like cheese, and many other details about mice. This background 'mouseological' information is implicitly being brought to bear on the question: why does my cheese keep disappearing? So a directly analogous fine-tuning case would be one where we have similar background theological information. For example, suppose we know that gods exist, and that gods often create universes, and that gods like to create fine-tuned universes. Suppose one had such background theological information that they could bring to bear on the question of whether our universe has been fine-tuned by a god. With such background

information it would seem rational to believe that our finely-tuned universe was created by a god just as it is rational to believe a mouse is taking your cheese. But having that kind of theological background information provides one with a strong *abductive argument* for the conclusion that a god created our finely-tuned universe just as we seem to have a strong abductive argument for the conclusion that a mouse is taking your cheese. For in both imagined cases the additional background information makes the claim *that a god (/a mouse) exists* part of the best explanation for why our universe is finely tuned (/our cheese is missing).[24]

To pursue this point a bit further, suppose you had some rare substance you created in your home laboratory: schmeese. Suppose that schmeese is very hard to detect, suppose that you always hide your schemeese in different places, and suppose that your schmeese keeps disappearing. Suppose that, to your knowledge, no known animal or human knows of or desires schmeese and that you have various live hypotheses about your missing schmeese: (a) your schmeese quantum tunnels out of your home, (b) people come to your home when you're absent and, for whatever reason, are able to find and steal your schemeese neither knowing what it is nor having a desire for it, and (c) there exists a hitherto unknown schmeese-loving creature who can detect and will steal schmeese. Suppose (c) is very likely to be true on your evidence. Could you believe on just this probabilistic basis that a schmeese-detecting-and-loving creature exists? I suspect not. Perhaps you will think otherwise. We can disagree about that. My point is comparative: it is far less intuitive to think that (c) is rational to believe just on the basis of its high probability than it is to believe that a mouse is stealing your cheese in the original case which tacitly involved a substantial amount of mouseological information. At the very least this comparative insight diminishes the force of the alleged counterexample.

Moral Encroachment. There has been an explosion of literature on the question of whether moral factors can play a role in fixing the epistemic status of one's beliefs. The thesis of moral encroachment is that moral factors can play such a role. Here is a prominent case that has been taken as evidence for this view:

> *Cosmos Club.* The night before he is to be presented with the Presidential Medal of Freedom, John Hope Franklin hosts a celebratory dinner party at the Cosmos Club, at which he is a member. All the other black men in the club are uniformed attendants. While walking through the club, a woman sees him, calls him over, presents her coat check ticket and orders him to bring her coat.

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[24] It is important to keep in mind that the GDP's preamble limits its application in a way that allows for probabilistic information together with explanatory considerations to come together to abductively justify beliefs. So while the GDP does not itself imply justification in these abductive cases, it does not prohibit justification in these cases either.

Many have treated it as a datum that the woman's belief in Cosmos Club is irrational.[25] As Bolinger (2020: 6) writes:

> [(A)] *The woman shouldn't have believed on the basis of his race that Franklin was an attendant.* But at least on a standard conception of evidence, this isn't because it doesn't evidentially support her belief: [(B)] *given that a person is a black man in that particular club, it is exceptionally probable that they are an attendant.*

Advocates of moral encroachment have pointed out the difficulty of reconciling (A) and (B) on common views in epistemology where strong undefeated evidential support is sufficient for rational belief.[26] However, if moral factors can impact epistemic status in cases like this, then an explanation for (A) and (B) is to hand.

But we can explain (A) and (B) without moral encroachment. For we have already found a good independent reason to endorse a general constraint on epistemic justification in cases like this: GDP-Nec. And GDP-Nec is not satisfied in cases like this. This is because the woman has no reason to believe that black people have a disposition – much less a goal-directed disposition – to be staff members at this or any other club. Even if we were to introduce the absurd assumption that black people have such a disposition, it would not follow that *Franklin* himself has such a disposition anymore than it follows from the details of Seminar Room that *Jake* has a disposition to be a thief in virtue of being a man and that men are encouraged to be thieves. As we saw in Section 4, at most Jake has a disposition to have a disposition to steal. But that is not enough to satisfy GDP-Nec in Seminar Room. In this way Cosmos Club is like Seminar Room and unlike Serial Thief.

Take another case that has been leveraged in support of moral encroachment from Basu and Schroeder (2019):

> *Apparently Off the Wagon–Irrational.* Suppose that you have struggled with an alcohol problem for many years, but have been sober for eight months. Tonight you attend a departmental reception for a visiting colloquium speaker, and are proud of withstanding the temptation to have a drink. But when you get home, your spouse smells the wine that the colloquium speaker spilled on your sleeve while gesticulating to make a point, and you can see from her eyes that she thinks you have [once again] fallen off of the wagon. (Basu and Schroeder 2019: 159)

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[25] Basu (2019), Basu and Schroeder (2019), Bolinger (2020), and Moss (2018).

[26] For purely epistemic challenges to this see Silva (2018), Silva and Tal (2020), and Silva and Bernecker (forth).

It is irrational for your spouse to believe that you fell off the wagon just on the basis of the evidence provided. But to explain this we needn't appeal to facts about what your spouse owes you as a person, or as their spouse, or for any other moral reason. GDP-Nec shows us why. For although having a disposition to drink is a goal-directed disposition just as Jake's having a disposition to steal is a goal-directed disposition, if you have been sober for 8 months you have demonstrated that: you have *a disposition to mask your disposition to drink*. And if it is rational for your spouse to believe that you have a disposition to mask your disposition to drink, then it is not rational for your spouse to have a high degree of confidence that you have manifested your disposition to drink. The fact that you now smell of wine does not obviously change this. Consider the following reasoning:

> D1. You have a disposition to drink to excess when alcohol is readily available.
> D2. You have often fallen off the wagon in the past.
> D3. You have been sober for the last 8 months. So you have demonstrated (or at least provided significant evidence): that you have a disposition to mask your disposition to drink by choosing not to drink, and that you also have a disposition to choose not to drink.
> D4. The smell of wine is coming off you.
> C. You have fallen off the wagon tonight (=tonight you have manifested your disposition to drink).

I think that considerations D1-D4 are woefully inadequate to justify having a high confidence in C. This is so even if C is the *most* probable explanation of D4 given D1 and D2. For if your spouse really does know, or at least has significant evidence, that you have a disposition to mask your disposition to drink, then D1-D4 seem insufficient to make C *sufficiently* probable for your spouse to have a rational high credence that you have manifested your disposition to drink. What information might turn the trick? Perhaps your spouse learns of witnesses to your drinking, or notices altered behavior or speech patterns, or recognizes a failure or hesitance to outright deny drinking when you are asked about it, or sees you exhibiting your 'tells' when denying drinking, etc.

So GDP-Nec can explain why your spouse's attitude is irrational in Apparently Off the Wagon–Irrational and it has nothing to do with moral considerations.

The explanatory power of the GDP goes further. Take the following revision to Apparently Off the Wagon–Irrational:

> *Apparently Off the Wagon–Rational.* Just like the previous case except that your spouse gets a call from a reliable confidant of yours, Hal. Hal tells your spouse that you said you were very likely going to cheat tonight and drink at the colloquium. Unfortunately, unknown to your spouse, Hal was lying.

Given Hal's testimony, your history of falling off the wagon, and the smell of alcohol *it would be rational* for your spouse to believe that you did not manifest your disposition to mask your disposition to drink, but rather manifested your disposition to drink. GDP-Suf can explain this too for its conditions are all satisfied. For in virtue of knowing your drinking addiction your spouse knows that you have a goal-directed disposition to drink, and given Hal's testimony and the smell of alcohol it is rational for her to have a high degree of confidence that you manifested your disposition to drink tonight rather than manifesting your disposition to mask it. For this reason the GDP implies that your spouse can come to rationally believe that you manifested your disposition to drink. This is just the implication we should want from a theory of the epistemic significance of merely statistical evidence.

In defense of moral encroachment some advocates might try to leverage revisions to Cosmos Club or Apparently Off the Wagon–Irrational. But even should such a case-based defense of moral encroachment be successful, the GDP can be recovered. Arguably, one need only adopt a contextually variable threshold for how high one's rational credence must be in the claim that *x has (will have) manifested its disposition to F*. One could then argue that moral factors play a role in fixing that threshold and thereby accommodate the force of whatever arguments remain for endorsing moral encroachment. The important thing to keep in mind is that doing this would not alter the ability of the GDP to help us explain the asymmetry between eyewitness testimony and merely statistical evidence (Section 5) as well as the ability of the GDP to provide an illuminating explanation of the following two epistemic facts: (1) it is rational to believe in Against the Odds, Serial Thief, and Apparently Off the Wagon–Rational, and (2) it is irrational to believe in Lottery, Seminar Room, Cosmos Club, and Apparently Off the Wagon–Irrational.

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