

The zetetic turn and the procedural turn

Forthcoming in *Journal of Philosophy*. Please cite published version.

Abstract

Epistemology has taken a *zetetic turn* from the study of belief towards the study of inquiry. Several decades ago, theories of bounded rationality took a *procedural turn* from attitudes towards the processes of inquiry that produce them. What is the relationship between the zetetic and procedural turns? In this paper, I argue that we should treat the zetetic turn in epistemology as part of a broader procedural turn in the study of bounded rationality. I use this claim to motivate and clarify the zetetic turn in epistemology, as well as to reveal the need for a second zetetic turn within practical philosophy.

1 Introduction

Epistemology has taken a zetetic turn. On a traditional *doxastic paradigm*, epistemology is primarily concerned with doxastic attitudes:

According to the doxastic paradigm, epistemic norms are norms that bear almost exclusively on having, forming, revising, maintaining (etc.) beliefs and other belief-like attitudes. (Friedman forthcoming).

Taking the zetetic turn means shifting to a *zetetic paradigm* on which epistemology is concerned with “the entire process of inquiry” (Friedman forthcoming). For example, zetetic epistemologists ask how rational agents should gather evidence (Hall and Johnson 1998; Woodard and Flores forthcoming), double-check their beliefs (Christensen 2007; Friedman 2019) and allocate attention during inquiry (Siegel 2017; Sims 2003).

A similar turn has already occurred in the study of bounded rationality.¹ In 1976, Herbert Simon held that the fundamental turn in the study of bounded rationality is the *procedural turn* from substantive to procedural rationality (Simon 1976). Theories of substantive rationality ask normative questions about the attitudes that result from

¹Theories of bounded rationality ask what rationality demands of agents given the bounds placed on them by their cognitive and physical architecture, as well as by the structure of their environments (Simon 1956; Gigerenzer and Selten 2001; Todd and Gigerenzer 2012a).

inquiry, while theories of procedural rationality ask normative questions directly about the processes of inquiry that produce our attitudes:

We must give account not only of *substantive rationality* — the extent to which appropriate courses of action are chosen — but also *procedural rationality* — the effectiveness, in light of human cognitive powers and limitations, of the *procedures* used to choose actions. (Simon 1978, p. 9).

For many philosophers, it is attitudes and not actions that are the immediate outputs of inquiry. Then we might say that the procedural turn involves shifting away from normative questions about attitudes such as belief, intention, and preference, and towards normative questions about the processes of inquiry that produce them.

At first glance, the zetetic turn looks like a special case of the more general procedural turn. The procedural turn involves turning from attitudes towards the processes of inquiry that produce them. The zetetic turn involves turning from doxastic attitudes towards the processes of theoretical inquiry that produce them. In this paper, I argue that we should take the appearance of containment at face value. The zetetic turn in epistemology is a special case of the more general procedural turn in the study of bounded rationality.

My core argument has two parts. In Section 3, I argue that we should see the epistemology of inquiry as studying a type of bounded rationality. This ensures that it makes sense to treat the zetetic turn in epistemology as part of a turn within the study of bounded rationality. In Section 4, I argue that theories of bounded rationality must take a procedural turn from the study of attitudes towards the study of inquiry. This ensures that the procedural turn and its component zetetic turn are movements we have reason to make rather than resist.

Section 5 concludes by noting that the zetetic turn has a practical analog, turning practical philosophy away from the study of practical attitudes such as plans and intentions and towards the processes of practical inquiry that produce them. Completing the procedural turn requires taking this second zetetic turn within practical philosophy.

Before beginning, we will need to distinguish and decide between two ways in which the procedural turn, and hence the zetetic turn may be interpreted. I take up this project in Section 2.

2 Interpreting the procedural turn

2.1 Two interpretations of the procedural turn

The procedural turn can be interpreted in two ways (Thorstad 2021, forthcoming). On an *indirect* interpretation, taking the procedural turn involves taking the normative status of attitudes to reflect the normative status of the processes of inquiry that produce them. Attitudes are rational when they result from rational processes of inquiry and irrational when they result from irrational processes of inquiry.

Herbert Simon interpreted the notion of procedural rationality in just this way:

Behavior is procedurally rational when it is the outcome of appropriate deliberation. (Simon 1976, pp. 66-7).

Many bounded rationality theorists have extended Simon's indirect interpretation of procedural rationality by holding that not only behavior, but also attitudes such as intention, belief and preference are rational just in case they result from rational deliberation.²

On an indirect interpretation, substantive and procedural rationality agree in the objects they assess: the attitudes that result from inquiry. Substantive and procedural rationality disagree in what they say about the rationality of those attitudes. Theories of substantive rationality evaluate attitudes in their own right, whereas theories of procedural rationality let attitudes inherit the normative status of the inquiries that produce them. On an indirect interpretation, taking the procedural turn means treating theories of substantive rationality as false and replacing them with theories of procedural rationality.

²An indirect interpretation of the procedural turn may also underly many claims in recent epistemology, such as Jane Friedman's (2019; 2020) claim that evidentialism and other traditional doxastic norms clash with plausible norms of inquiry and Abelard Podgorski's (2017) claim that attitudinal norms are at most non-fundamental shadows of more fundamental procedural norms.

Alternatively, we can take a *direct* interpretation of the procedural turn (Kagan 2000; Parfit 1984; Thorstad 2021, forthcoming). On a direct interpretation, substantive and procedural rationality assess different objects. Theories of substantive rationality assess the rationality of attitudes, whereas theories of procedural rationality assess the rationality of processes of inquiry. Because attitudes are different objects from the processes of inquiry that produce them, we can in principle say different things about the rationality of processes and attitudes. Taking a direct interpretation of the procedural turn means treating processes and the attitudes they produce as distinct loci of normative evaluation.

On a direct interpretation, taking the procedural turn does not involve rejecting theories of substantive rationality. Rather, taking the procedural turn amounts to claiming that normative theorizing should be *process focused*. To say that normative theorizing should be process focused is to say that although both substantive and procedural questions are well-defined and importantly distinct, normative theorists should place at least as much emphasis on procedural questions about rational inquiry as on substantive questions about the rationality of attitudes that result. We will see in Section 4 how thinking about bounded rationality motivates the claim that normative theorizing should be process focused.

It is important to decide between direct and indirect interpretations of the procedural turn because these interpretations differ in what they say about cases of apparent tension between the rational status of attitudes and the rational status of the inquiries that produce them (Thorstad 2021). We will see below that there are a number of cases in which apparently rational inquiry can produce apparently irrational attitudes, and apparently irrational inquiry can produce apparently rational attitudes. On an indirect interpretation, the rational status of inquiries must match the rational status of the attitudes they produce, so there will be pressure to revise traditional normative theories which generate the apparent tension. By contrast, on a direct interpretation there is no contradiction in saying different things about the rationality of processes and the attitudes that they produce, so no revision will be needed.

Cases of this sort were introduced to moral philosophers through the work of consequentialists such as Derek Parfit (1984) and Peter Railton (1984). More recently, these cases were reintroduced to epistemologists through the work of Jane Friedman (2019; 2020). But cases of apparent tension between the rational status of processes and their outcomes have also been known to bounded rationality theorists for some time. My aim in the remainder of this section is to think through two ways in which considerations of bounded rationality generate apparent tension between the rational status of attitudes and inquiries and to use these cases to put pressure against indirect interpretations of the procedural turn. Since many of my interlocutors are epistemologists, I will present cases of apparent tension between the rational status of theoretical inquiries and the doxastic attitudes that they produce. But similar cases can be constructed to illustrate apparent tension between the rational status of practical inquiries and the plans, preferences or intentions that they produce (Arkes et al. 2016; Tversky and Kahneman 1974; Thorstad forthcoming), and this parallelism between practical and theoretical inquiry will be important in Section 5.

2.2 Apparently irrational inquiry, apparently rational belief

To see how apparently irrational inquiry can lead to apparently rational belief, note that processes of inquiry consume cognitive resources such as attention and computational bandwidth as well as noncognitive resources such as time, money and the carbon cost of travel. Theories of bounded rationality have stressed the importance of inquiring in a resource-rational way, making efficient use of scarce resources during inquiry (Morton 2017; Lieder and Griffiths 2020; Johnson and Payne 1985; Shenhav et al. 2017). It is important to conserve scarce resources when those resources have value in their own right, or as inputs to further inquiries and activities.

The need for resource-rationality could be taken to ground any of a number of normative requirements on inquiry. Here is a minimal norm of resource-rationality:

(Minimal Resource-Rationality) For all processes of inquiry *I* and all valuable

resources R consumed by I , the fact that I consumes R is a reason against engaging in I .

Minimal Resource-Rationality is a weak norm because it does not specify the strength of our reason to conserve valuable resources during inquiry. Nevertheless, all but the weakest readings of Minimal Resource-Rationality will come into tension with traditional norms governing belief.

By way of illustration, consider a traditional evidentialist story about rational belief:

(Evidentialism) For all agents S and propositions p , if S believes that p , then S 's belief that p is rational just in case S 's total evidence supports p , and S 's belief that p is based on her evidence.

Because Minimal Resource-Rationality takes the consumption of scarce cognitive resources to bear on the rational status of inquiries, but Evidentialism does not take resource consumption to bear on the rational status of beliefs, we can generate apparent cases where the rational status of inquiry and the resulting beliefs come apart by thinking about the differential impact of resource scarcity on rational inquiry and rational belief.

To generate apparent cases of irrational inquiry leading to rational belief, consider agents who inquire in a wastefully extravagant manner. They select process of inquiry that consume a great deal of resources even though they could achieve comparable results with much less effort. Here most readings of Minimal Resource-Rationality will say that the agents inquire irrationally because they have reason to avoid wasting cognitive resources during inquiry. But wasting cognitive resources will not tend to make the agent's beliefs irrational by the lights of Evidentialism. If anything, inquiring in a wastefully extravagant manner may increase the likelihood of forming a rational belief by making it more likely that the resulting belief will be evidentially supported, at least if resources are spent in a broadly productive way.³

³While there is often an accuracy-effort tradeoff in cognition (Geman et al. 1992; Gigerenzer and Brighton 2009), this is not always the case, and even the accuracy-effort tradeoff does not imply that all ways of increasing expected effort during inquiry increase the expected accuracy of resulting beliefs. Thanks to a referee for pressing me to clarify these points.

For concreteness, consider:

(Long Video) Gertrude is in charge of security for a large retail store. She wants to know whether Bonnie has been stealing from her store. Gertrude has seventeen hours of video footage showing Bonnie's visits to the store during the past year. After reviewing one hour of footage, Gertrude has extremely convincing evidence that Bonnie has been shoplifting. But instead of closing her inquiry, Gertrude watches all seventeen hours of footage before closing inquiry with the judgment that Bonnie has been stealing.

Here all but the most miserly readings of Minimal Resource-Rationality will say that Gertrude's inquiry is wastefully irrational. The fact that Gertrude's inquiry consumes an additional sixteen hours of time, attention and cognitive bandwidth is a nontrivial reason not to engage in it. Since watching additional footage is relatively unlikely to increase the accuracy of Gertrude's belief or to make the belief a better candidate for knowledge, Gertrude's reason not to waste cognitive resources is unlikely to be outweighed except in unusual circumstances, for example if she has an especially burning curiosity about the case or the practical stakes are unusually high.

Consider a version of Long Video in which none of these unusual circumstances obtain. In this case, Gertrude's inquiry is irrational by the lights of Minimal Resource-Rationality. But in the likely event that Gertrude forms an evidentially-supported belief based on the video footage, that belief will count as rational by the lights of Evidentialism. Here we have an apparent case of irrational inquiry leading to rational belief.

2.3 Apparently rational inquiry, apparently irrational belief

We learned from reliabilists that it can be rational to engage in inquiries that are likely, but not certain to produce true beliefs. Even agents who are only concerned with truth may rationally accept small risks of producing false beliefs. One reason for this is that

there is often an accuracy-effort tradeoff in cognition (Johnson and Payne 1985).⁴ More reliable inquiries tend to be more effortful. Resource-rational inquirers need to balance the accuracy of their inquiries against the costs of employing them in order to save resources for other inquiries and activities. Often this means that rational inquirers must rest content with inquiries that, while highly reliable, may sometimes produce false beliefs.

The evidentialist analog of this lesson is the rationality of partial evidence examination. It is often impossible or prohibitively expensive for agents to examine more than a small part of their total evidence before making a judgment. In such cases, rational agents make up their minds by calling to mind sufficiently large samples of relevant evidence and using those samples as a proxy for the total evidence (Icard 2018; Stewart et al. 2006; Vul et al. 2014). Agents who make judgments based on part, rather than all of their total evidence will be likely, but not certain to form judgments supported by their total evidence.

The rationality of partial evidence examination yields a recipe for constructing cases of apparently rational inquiry leading to apparently irrational belief. First, take a rational process of inquiry that involves partial evidence examination. Many of the best-known heuristics used by bounded inquirers will do, since many heuristics examine only part of an agent's total evidence (Gigerenzer and Selten 2001; Gigerenzer and Gaissmaier 2011).⁵ Second, select any of the small number of cases in which this rational process of inquiry produces a judgment that is not supported by the agent's total evidence. In this case, the agent's inquiry may be rational, but by the lights of Evidentialism her belief cannot be rational since it is not supported by the agent's total evidence.

By way of illustration, consider an agent who inquires using a more stringent version of one of the most popular heuristics for binary judgment:⁶

⁴Sometimes the accuracy-effort tradeoff is non-existent, or even reversed (Geman et al. 1992; Gigerenzer and Brighton 2009).

⁵Indeed, Gigerenzer and Gaissmaier (2011, p. 453) go further and define heuristics as "strategies that ignore information to make decisions faster, more frugally, and/or more accurately than more complex methods." That is a bit stronger than my claim, although the difference may turn on how broadly we understand the notion of ignoring information.

⁶This is a more stringent version of the heuristic Take The Best (Gigerenzer et al. 1991; Gigerenzer and Goldstein 1996) which is often argued to work well in environments such as this one (Hogarth and Karelaia

(Two Cities) Loeb is mildly curious whether Mainz is more populous than Lübeck. He considers what he knows about both cities, and the first two-dozen facts he considers all suggest that Mainz is indeed more populous. For example, Mainz is a state capital whereas Lübeck is not, and state capitals tend to be larger than noncapitals. Having no reason to suspect that the information he has considered so far is biased, unrepresentative or underpowered, Loeb closes inquiry with the judgment that Mainz is more populous than Lübeck.

Loeb's inquiry may well be rational, striking a good balance between accuracy and effort in this and similar tasks (Hogarth and Karelaia 2006; Martignon 2001). But Loeb knew ahead of time that such inquiries could occasionally produce evidentially unsupported beliefs, and unfortunately (let us stipulate) that is what has happened here. Loeb's belief that Mainz is more populous than Lübeck cannot be rational for the evidentialist since the opposite judgment is supported by his total evidence.⁷ Here we have an apparent case of rational inquiry leading to irrational belief.

2.4 Three normative reactions

How should we react to these apparent tensions between the rational status of inquiries and the attitudes they produce? Indirect theorists must react in one of two ways.

First, indirect theorists can reject norms of inquiry such as Minimal Resource-Rationality which generate the tension. The cost of this strategy is that we must reject what many have taken to be paradigmatic and plausible constraints of bounded rationality. This cost is amplified when we turn our sights beyond bounded rationality. Recent work in zetetic epistemology has exhibited a number of plausible norms of inquiry which lead to a similar tension between the rational status of inquiry and belief (Friedman 2019, 2020),

2006; Martignon 2001). If any criticism is likely to be leveled at this example from bounded rationality theorists, it is that the agent's inquiry is *too* demanding. Readers with these views are encouraged to substitute the original heuristic Take The Best.

⁷Other factors that might be relevant are suggested by Gigerenzer and Goldstein's (1996) original study. Loeb might consider, for example, whether either city was a major exposition site, has a soccer team, lies on the intercity train line, has a university, or was formerly in East Germany.

and several decades ago consequentialists exhibited similar cases in the realm of practical inquiry (Parfit 1984; Railton 1984). As cases multiply, it becomes increasingly difficult to talk our way out of the tension by denying all of the relevant norms governing inquiry.⁸

A second option for indirect theorists is to reject norms of belief such as Evidentialism. Indeed, Jane Friedman has recently suggested that traditional epistemic norms such as Evidentialism may well be false, basing her argument on the need to reconcile the rationality of belief and inquiry (Friedman 2020). And many bounded rationality theorists have held that even weak attitudinal norms, such as the requirement to hold coherent beliefs, may fail because rational inquiries do not always produce coherent beliefs (Arkes et al. 2016; Gigerenzer and Selten 2001b). A cost of this strategy is that it is revisionary. We are asked to give up many of our most cherished norms governing belief in order to make room for plausible norms of inquiry.

Direct normative theories open up a third reaction: deny nothing. Once we decouple the rationality of inquiry from the rationality of the resulting beliefs, we can accommodate cases of rational inquiry leading to irrational belief and cases of irrational inquiry leading to rational belief. Indeed, it is precisely to make room for such cases that direct normative theories were developed.

One benefit of going direct is that we are not forced to revise traditional epistemic norms governing belief, nor are we forced to deny norms of bounded rationality and other norms governing inquiry. Another benefit of the direct approach is that it gives plausible verdicts in the examples considered above. Gertrude's evidentially-supported belief that Bonnie has been shoplifting appears to be rational, despite the wasteful irrationality of her inquiry. And inquiries such as Loeb's are often taken as paradigm cases of boundedly rational inquiry, despite their occasional vulnerability to forming irrational beliefs. A

⁸Evidentialists might pursue a variant of the first strategy, which does not reject proposed norms of inquiry but rather holds that they are not epistemic. For example, they might hold that there are no epistemic norms of inquiry (Feldman 2000; Thorstad 2022). However, there is no reason to take this result as an embarrassment for norms of inquiry. If anything, it may reveal the broad scope of phenomena falling outside the remit of evidentialist theorizing and the importance of developing theories that attend to them. Some readers may feel that this compromise cedes too much ground to evidentialists. Those readers are welcome to read this article alongside their favorite arguments against evidentialism.

direct interpretation of the procedural turn allows us to take these verdicts at face value without revising either the verdicts or the normative principles that generate them.

In this section, we compared direct and indirect interpretations of the procedural turn. On a direct interpretation, theories of substantive rationality ask normative questions about the rationality of attitudes, whereas theories of procedural rationality ask normative questions about the inquiries that produce them. On this view, taking the procedural turn means taking a process-focused approach to normative theorizing, giving substantial emphasis to questions about rational inquiry without denying traditional norms governing attitudes. With a direct interpretation of the procedural turn in hand, we can now revisit the connection between the zetetic and procedural turns.

3 From inquiry to bounded rationality

The headline claim of this paper is that the zetetic turn in epistemology should be regarded as part of a broader procedural turn within the study of bounded rationality. Making good on this claim requires showing two things. First, we must show that recent work in zetetic epistemology should be regarded as studying a type of bounded rationality. This will show that it makes sense to regard the zetetic turn as part of a broader procedural turn, as opposed to treating the zetetic and procedural turns as parallel movements in unrelated fields. And second, we must explain why it is important for theories of bounded rationality to take the procedural turn. This will show why the procedural turn, and hence the zetetic turn, is a turn we ought to take as opposed to an interesting chapter in academic sociology.

In this section, I tackle the first project, showing why recent work in zetetic epistemology should be understood as concerned with bounded rationality. In the next section, I take up the second project of explaining why it is important for theories of bounded rationality to take the procedural turn.

On some views, rationality comes in two types (Carr 2022; Smithies 2015; Richter 1990). Theories of bounded rationality take an agent's bounds for granted, then ask how it is

rational for her to cognize given her bounds. Theories of unbounded or ideal rationality abstract away from some or all of an agent's bounds, then ask how it is rational for her to cognize once those bounds are removed. Granting this distinction for the sake of argument, we can ask: should recent work on zetetic epistemology be seen as concerned with a type of bounded or unbounded rationality? In this section, I argue that recent work in zetetic epistemology studies a type of bounded rationality.

The argument, in brief, is this. Many of the most important challenges that we face as inquirers only arise in an interesting way because we are bounded. If the bounds generating these challenges were removed, the challenges would either fail to arise, or else become nearly unrecognizable. If that is right, then we must think of zetetic epistemology as concerned with bounded rationality unless we are prepared to radically change the challenges that we are concerned with, or the solutions that these challenges will receive.⁹

By way of illustration, consider three challenges facing rational inquirers. First, we sometimes have duties to gather evidence during inquiry (Hall and Johnson 1998; Smith 2014; Woodard and Flores forthcoming). When are agents rationally required to gather evidence, and what evidence must they gather? This challenge arises because we are informationally bounded: there is relevant information that we do not have. Because we lack relevant information, it is possible and sometimes rational to gather more information.¹⁰

Next, consider double-checking (Christensen 2007; Friedman 2019). Recent work has stressed that rational agents should sometimes double-check their beliefs in order to ensure that they have not made a mistake. When and how should agents double-check their beliefs? This question arises because we are fallible. We need to double-check our beliefs because we could have made a mistake the first time.

⁹A referee notes that virtue theorists have long stressed the importance of cognitive bounds to intellectual virtue (Baehr 2011; Morton 2013; Whitcomb et al. 2017). This provides an important sense in which many conclusions of this discussion may productively generalize from rationality to virtue, and may be a fruitful topic for future research.

¹⁰A referee notes that informational bounds may already be incorporated in many leading epistemological theories. This is quite correct, and I hope that in recognizing that leading epistemological theories already incorporate one paradigmatic cognitive bound, readers may be led to see their way towards incorporating other paradigmatic cognitive bounds as well. Some theories, such as truth norms and reliabilism, may make less space for the rational importance of informational bounds.

Finally, inquirers must choose how to allocate attention between competing internal and external stimuli (Siegel 2017; Sims 2003). For example, when counting windows on the Chrysler building you should attend to the windows and not to the birds outside them (Friedman 2020). How should rational agents allocate attention during inquiry? This question arises because we are attentionally bounded. We cannot attend to all phenomena at once. The problem of attentional allocation may also arise because we are computationally bounded, unable to process too many incoming stimuli at once.

What happens to these challenges once the generating bounds are removed? In some cases, the challenge simply does not arise. Consider evidence-gathering. When and how should an informationally unbounded agent gather evidence? This question rests on a presupposition failure since it is impossible for an informationally unbounded agent to gather evidence. Agents who have all relevant evidence in their possession cannot gather evidence, since they already have that evidence.

In many cases, challenges facing inquirers still arise once the generating bounds are removed, but these challenges become almost unrecognizable. Consider double-checking. When and how should an infallible agent double-check her beliefs? It might be possible for infallible agents to double-check their beliefs. But infallible agents could never be rationally required to double-check their beliefs.¹¹ If they could not have been wrong the first time, there would be no point to checking their answers again.

The story is much the same with attentional allocation. Consider an agent who is attentionally unbounded, able to attend to any number of phenomena at once. Suppose that she is also computationally unbounded, able to process all incoming information without difficulty. How should such an agent allocate her attention during inquiry? There is a genuine question here, but the answer is surprisingly simple: she should attend to everything at once. Since the agent is computationally unbounded, she expects that she will correctly update on each item of information she attends to. Since she is

¹¹We might back off a bit from this in cases where agents fail to know that they know they are infallible (Friedman 2019). That still leaves much less room for rational double-checking than we expected to recover.

attentionally unbounded, attending to additional information is costless, and it is neither instrumentally (Blackwell 1953; Good 1966) nor epistemically (Maher 1990) rational for agents to turn down cost-free information unless they suspect they may update incorrectly on that information.¹²

What do we learn from this discussion? At least this much. The study of rational inquiry, insofar as it is concerned with the types of challenges discussed by zetetic epistemologists and expects to return recognizable solutions to those challenges, should be seen as studying a type of bounded rationality. Zetetic epistemology studies agents who are limited in their capacity to gather, store and process information. Could there be a separate type of ideal zetetic epistemology, concerned with the structure of rational inquiry for agents who are unconstrained in their capacity to gather, store and process information? I am not sure about the prospects for this discussion. But I think we should conclude at the very least that this discussion would not track the types of challenges and conclusions at issue in recent work on zetetic epistemology.

4 From bounded rationality to inquiry

Why take the zetetic turn? Existing work has provided at least three reasons to take the zetetic turn. First, philosophers throughout history have been concerned with the nature and norms of inquiry (Friedman 2017; Misak 1987; Striker 2001), so the study of inquiry is a natural continuation of their project. Second, rational inquiry may be an important component of theoretical rationality (Kelly 2003; Sylvan manuscript; Thorstad 2021), and the study of theoretical rationality is a task for epistemologists. And third, a belief-focused epistemology risks the charge of temporal parochialism (Friedman 2020), being focused on attitudes held at a moment rather than the temporally extended processes of inquiry through which our attitudes are produced.

These are good arguments, and they help us to see the importance of taking the zetetic

¹²This may fail on some views of risk-weighted decisionmaking, although that is sometimes taken as a strike against such theories (Campbell-Moore and Salow 2020).

turn. But viewing zetetic epistemology as concerned with bounded rationality opens up a powerful new motivation for taking the zetetic turn. The fundamental turn in the study of bounded rationality is the procedural turn from attitudes to inquiry. Taking the zetetic turn from doxastic attitudes to theoretical inquiry is just what it means to take the procedural turn in epistemology. Hence the zetetic turn in epistemology is an essential component of the fundamental turn in the study of bounded rationality and its goal of developing a humanly adequate epistemology.

But just why have bounded rationality scholars regarded the procedural turn as essential to the study of bounded rationality? In this section, I give two arguments for the fundamentality of the procedural turn: the Argument from Differential Impacts and the Argument from Level Tension. Together, these arguments will motivate the claim that the procedural turn is an essential part of the study of bounded rationality. Insofar as recent work in zetetic epistemology is to be regarded as concerned with bounded rationality, this will also provide motivation for taking the zetetic turn.

4.1 The Argument from Differential Impacts

The first argument for taking the procedural turn is the Argument from Differential Impacts. This argument holds that many of our most central cognitive bounds are felt more strongly as bounds on processes of inquiry than as bounds on the attitudes produced by inquiry. As a result, theories of bounded rationality must ask detailed questions about rational inquiry in order to reflect the full rational importance of central cognitive bounds. We can get a grip on the differential impact of bounds on inquiry and the resulting attitudes by considering two examples.

First, consider computational costs. Economizing on computational costs is a central part of resource rationality, which we met in Section 2. Computations made during inquiry consume valuable resources such as time, working memory and computational bandwidth. If these resources were not spent on one inquiry, they could be spent on another inquiry or activity. For this reason, bounded agents must strive to manage the

computational costs of inquiry.

But notice that computational costs are not bounds on attitudes at all. It is not attitudes, but rather computational processes of inquiry which incur computational costs. On a direct approach to normative assessment, this means that computational costs are entirely irrelevant to the rationality of belief. Hence if we only ask normative questions about belief, we will learn nothing about the normative relevance of computational costs to human cognition. For example, we saw in Section 2 that theories of rational belief such as Evidentialism make no mention of computational costs. It is only by studying constraints on inquiry such as Minimal Resource Rationality that the normative importance of computational costs is revealed.

For a second example, consider an agent's limited cognitive abilities. To ask whether something is within an agent's ability is distinct from asking what it will cost her. Something is within an agent's ability if she can do it at some cost, and otherwise it is beyond her ability. Limited cognitive abilities matter insofar as we think that in cognitive matters, ought implies can: if an agent cannot do something, then it cannot be the case that she ought to do it.¹³ This contrasts to the rational importance of computational costs, which goes through norms such as Minimal Resource Rationality.

Cognitive abilities, unlike computational costs, may sometimes be felt as bounds on belief. There are perhaps some propositions so complex or heinous that we cannot believe them. But usually the problem is not that we lack the ability to believe something. It is rather that we lack the ability to execute any process of inquiry that would lead us to believe it.

Consider, for example, Fermat's Last Theorem. This says that the equation $a^n + b^n = c^n$ has no positive integer solutions with $n > 2$. It is well within many humans' ability to believe Fermat's Last Theorem, and indeed many of us believe it today. But at least

¹³Some theorists have questioned whether ought implies can principles hold with full generality, but many allow them to hold in a large number of cases (Graham 2011; King 2019; Martin 2009; Vranas 2007). It has sometimes been suggested that theories of unbounded rationality should abandon ought implies can principles wholesale (Carr 2022), but this is rarely suggested for theories of bounded rationality.

until the first proof of Fermat's Last Theorem was produced, it was beyond most humans' ability to prove Fermat's Last Theorem, and there were no other processes, such as seeking the testimony of professional mathematicians, which could make up for our incapacity. In such a situation, many theories of rational belief, including any theory requiring logical omniscience, would require suitably-educated agents to believe Fermat's Last Theorem. But no theory of rational inquiry worth its salt would require those agents to initiate a process of inquiry terminating in a proof of Fermat's Last Theorem. Here we have a case where the relevant ability bound, namely many agents' inability to prove rather than believe a mathematical claim, is best-reflected in claims about rational inquiry rather than in claims about rational belief.

Together, these examples illustrate the Argument from Differential Impacts. Central cognitive bounds such as limited abilities and computational costs are felt most strongly, or even entirely as bounds on inquiry rather than as bounds on the attitudes produced by inquiry. Theories of bounded rationality must be concerned with inquiry in order to manifest the rational importance of these cognitive bounds. Below, I offer a second motivation for the procedural turn: the Argument from Level Tension.

4.2 The Argument from Level Tension

Sometimes the rationality of an agent's attitudes coincides with the rationality of the inquiries that produce them. These cases tell us little about the importance of taking the procedural turn, since we would get the same answer if we asked after the rationality of the agent's attitudes or the rationality of her inquiries. To assess the need for the procedural turn, we need to look at cases of level tension in which the rationality of an agent's attitudes comes apart from the rationality of the inquiries that produce them (Thorstad 2021).¹⁴

¹⁴Following Thorstad, I understand level tension to arise when an agent's theoretical inquiries produce beliefs with a different normative status along the same normative dimension. For example, an agent may form an irrational belief through a rational inquiry, or inquire as she ought not but thereby form a belief she ought to hold.

In these cases, the Argument from Level Tension claims that judgments about rational inquiry are often the most complete, helpful and charitable guides to the underlying normative reality, whereas by contrast judgments about rational belief often give an incomplete, misleading or uncharitable picture of that same reality. If that is right, then we need to take a procedural turn in order to deliver complete, helpful and charitable descriptions of the normative situation of bounded agents who may find themselves caught in level tension.

To see how judgments about rational belief can be misleading in cases of level tension, consider the psychology of poverty (Morton 2017). Material poverty significantly impairs agents' performance on tasks measuring reasoning (Deck and Jahedi 2015; Mani et al. 2013), attention (Shah et al. 2012), memory (Evans and Schamberg 2009) and executive control (Mani et al. 2013; Vohs 2013). These impairments can be quite severe, equivalent to a full night spent without sleep (Linde and Bergström 1992; Mani et al. 2013). These cognitive impairments perpetuate poverty traps by contributing to behaviors such as overborrowing (Shah et al. 2012), undersaving (Bernheim et al. 2015), and noncompliance with medical instructions (Kaplan et al. 2004). Do these findings show that poverty breeds irrational inquiry? That seems an uncharitably mean-spirited conclusion to draw without qualification, but how can it be avoided?

To see what is going on here, suppose I ask you to imagine that your car has broken down and requires a \$1,500 repair. Then I assign you a reasoning task. If you are financially well-off, your performance on the reasoning task will be unimpaired (Mani et al. 2013). But if you struggle financially, the story of the broken-down car dominates your cognition. How will you pay for the repair? If you cannot pay, will you lose your job? Your home? Your ability to reason, attend, remember and control cognition in matters unrelated to the car will be substantially impaired because you are busy thinking about the broken-down car.¹⁵ But that is not irrational. You are correctly focusing on what matters most: the

¹⁵In this case, let us stipulate that you are inquiring into the question of what might be done to fix the broken down car. The inquiry is genuine inquiry, and not mind-wandering, and is conducted in a fruitful way that could be reasonably expected to resolve the focal question in a reliable and cognitively efficient

broken-down car.¹⁶

Now we can see one significant way in which poverty impairs cognition.¹⁷ Poverty creates a number of immediately pressing cognitive challenges, and agents respond by rationally reallocating the bulk of their cognitive resources towards these focal challenges while economizing on the rest. Here is how a leading study puts the point.

The human cognitive system has limited capacity. Preoccupations with pressing budgetary concerns leave fewer cognitive resources available to guide choice and action. Just as an air traffic controller focusing on a potential collision course is prone to neglect other planes in the air, the poor, when attending to monetary concerns, lose their capacity to give other problems full consideration. (Mani et al. 2013, p. 976).

The rational response to poverty, like the rational response to an impending collision, often involves a short-termist reallocation of cognitive resources towards the most pressing immediate concerns (Mani et al. 2013; Morton 2017; Shah et al. 2012).

Now suppose that Fatima is a working mother. Her car is nearly out of gas; her bills are past due; and she has no idea how she will heat her house during the impending winter. Fatima goes to the supermarket and makes quick, hurried inquiries while she is there. For example, she judges that one brand of beans is a better value than another by employing the *recognition heuristic* of favoring brands that she recognizes (Goldstein and Gigerenzer 2002; Gigerenzer and Goldstein 2011; Pachur et al. 2011). Fatima does this deliberately and in a resource-rational way.¹⁸ Given Fatima's need to conserve cognitive resources,

way. Thanks to a referee for pressing me to clarify the structure of this example.

¹⁶Of course, it would be irrational to inquire fruitlessly. This reveals the importance of our stipulation that the agent inquires in a reliable and cognitively efficient way.

¹⁷There is another way in which poverty impairs cognition, namely by decreasing the stock of available cognitive resources through challenges such as sleep deprivation (Patel et al. 2010), stress (Cohen et al. 2006), and malnutrition (Gailliot et al. 2007) and increasing the total number of cognitive problems to be solved (Mani et al. 2013).

¹⁸Need Fatima be consciously aware of her cognitive strategies and the reasons why she chooses them? On my view this is not necessary, but readers who disagree are welcome to read the Fatima case as involving conscious awareness.

such inquiries may well be rational, delivering in expectation acceptable accuracy at a reasonable cost.¹⁹ But in some cases, Fatima will form judgments plainly contradicted by her total evidence. For example, we may suppose that Fatima has noticed the cost and weight of each can, but does not explicitly calculate the cost-per-weight of each. Then it may well be that Fatima judges one brand to be a better value than another, even though her evidence supports the conclusion that the second is much cheaper per unit weight, and even if value for Fatima is strongly connected to price-per-unit.

In this case, Evidentialism and most traditional theories of rational belief will say that Fatima's belief is irrational: she ought to believe that the second brand is a better value than the first. On direct normative theories, it may well be right to say that Fatima's belief is irrational. But this judgment obscures the essential point of the example: Fatima could only have formed a rational belief in this case through the irrationally wasteful process of explicitly calculating per-unit-weights, instead of saving cognitive resources for more important problems like heating her home. Fatima's belief is irrational only because facts about rational belief are imperfectly sensitive to the bounds which Fatima's inquiry correctly and rationally respects. Because of this, it would be uncharitable, misleading and downright mean-spirited to put more than a passing emphasis on the irrationality of Fatima's belief. The most charitable, helpful and complete picture of Fatima's situation is given by the judgment that she has inquired rationally, and it is this judgment that theories of bounded rationality must stress.²⁰

In this section, we explored the case for thinking that the procedural turn is an essential part of the study of bounded rationality. We looked at two arguments for the centrality of the procedural turn. The Argument from Differential Impacts holds that theories

¹⁹And in some situations, recognition may outperform more complex methods, even ignoring cognitive costs (Smithson 2010).

²⁰How far can such rationalizing explanations extend? Many hold out hope that such explanations can be extended to rationalize a wide range of seeming irrationalities in the psychology of poverty (Mani et al. 2013; Morton 2017; Shah et al. 2012) and beyond (Icard 2018; Lieder and Griffiths 2020; Todd and Gigerenzer 2012b), though some readers may disagree. However, it is important to note that the argument of this paper does not turn on an extensive scope for such rationalizing explanations. Giving the correct verdict about Fatima will do for now.

of bounded rationality should be concerned with inquiry because many of our most important bounds are felt most strongly as bounds on inquiry rather than attitudes. And the Argument from Level Tension holds that in cases of level tension, the most helpful, complete and charitable normative picture is often found by posing normative questions about belief rather than inquiry. Together, these arguments help us to see why theories of bounded rationality have taken the procedural turn from attitudes to inquiry. And insofar as recent work in zetetic epistemology aims to characterize a type of bounded rationality, we should see the zetetic turn as part of the more general procedural turn from attitudes to inquiry.

5 The other zetetic turn

Inquiries come in two types: theoretical and practical. On many views, theoretical inquiry addresses the question of what to believe, whereas practical inquiry addresses the question of what to do. Theoretical inquiries terminate, at least often, in the formation of doxastic attitudes such as belief (Holton 2014; Peirce 1877).²¹ And perhaps theoretical inquiries originate with the formation of a special type of interrogative attitude such as curiosity or wondering (Friedman 2013; Whitcomb 2010). Practical inquiries terminate, at least often, in the formation of practical attitudes such as plans, intentions and preferences (Bratman 1987). Perhaps practical inquiries begin with the formation of an intention, such as the intention to decide which of a set of options to take, although I do not mean to commit to any particular view on the matter.

The procedural turn is a turn from the study of attitudes towards the study of inquiry. One half of the procedural turn is the zetetic turn in epistemology from doxastic attitudes to theoretical inquiry. But our practical attitudes such as plans and intentions are no less the product of inquiry than our doxastic attitudes are. For this reason, taking the procedural turn also involves a second zetetic turn in practical philosophy, from practical

²¹Perhaps this does not always happen (Lee forthcoming; Sapir and van Elswyk 2021; Wagner forthcoming).

attitudes to practical inquiry.

Simon himself was led to the study of bounded rationality in large part by reflection on practical rationality. In the 1940s, Simon began to study managers whose behavior deviated from the predictions of neoclassical economic models (Simon 1947). Simon explained these deviations by noticing that the plans and intentions formed by managers result from costly and limited processes of deliberation. Because neoclassical economic models at the time incorporated neither cognitive bounds nor the deliberative processes on which these bounds are most strongly felt, existing models failed to adequately describe the rational reaction of managers to the problems they faced as bounded agents. Simon held that we could get a more accurate picture of rational management by studying the heuristic processes of inquiry which managers use to make effective decisions given their bounds (Simon 1959).

One way to see the need for a zetetic turn in practical philosophy is to revisit the arguments from Section 4 for taking the zetetic turn in epistemology. Section 4 gave two reasons why concern for bounded rationality should lead us to take the zetetic turn in epistemology, and in fact both of these arguments work equally well in the practical domain.

The first argument for taking a zetetic turn was the Argument from Differential Impacts. This held that central cognitive bounds such as limited abilities and computational costs are felt most strongly, or in some cases perhaps even entirely as bounds on inquiry rather than as bounds on the attitudes produced by inquiry. And that is no less the case in the practical domain than in the theoretical domain. The computational costs of practical inquiry are incurred by processes of inquiry rather than the attitudes that they produce, so on a direct interpretation they are felt entirely as bounds on inquiry. And although there are some intentions too complex or heinous to hold, quite often the problem is not that we lack the ability to hold an intention, but that we cannot execute any process of practical inquiry that would lead us to hold it. For example, it may be that my goals together with my total evidence strongly favor investing in an up-and-coming company and that

I am fully capable of investing in that company and intending to do so, but unable to sort through the evidence well enough to determine that this investment would tend to satisfy my goals. Because cognitive bounds such as limited abilities and computational costs are felt most strongly as bounds on practical inquiry rather than as bounds on practical attitudes, it is important to study practical inquiry in order to get a full picture of the normative impact of cognitive bounds.

The second argument for taking a zetetic turn was the Argument from Level Tension. This held that when the rationality of inquiries comes apart from the rationality of the attitudes they produce, facts about rational inquiry are often the most complete, helpful and charitable guides to the underlying normative reality. I illustrated the Argument from Level Tension using a case study from the psychology of poverty. We saw that the rational response to material poverty may be a short-termist allocation of attention, computational bandwidth and other resources directed at managing the short-term consequences of the most pressing cognitive challenges. This has the tragic result that rational agents will sometimes overborrow or undersave as a direct result of rational inquiry. Although I went on to draw out a structurally analogous case involving doxastic attitudes, the intentions to overborrow and undersave are practical attitudes and the inquiries they result from are practical inquiries.

Let us think again about Fatima. Fatima is a working mother. Her car is nearly out of gas; her bills are past due; and she has no idea how she will heat her house during the impending winter. She spends what resources she can spare deciding how to heat her house, and she decides to take a small payday loan. Tragically, Fatima cannot pay back the loan and as a result the bank forecloses on her house. One reason why Fatima was led to take this ruinous loan is that rational patterns of short-termist inquiry did not put adequate stress on the long-term consequences of taking out a loan compounding at annual interest rates of several hundred percent.

What would we like to say about Fatima? We can and should say that her intention to take the loan was irrational, bordering on ruinous. There is no getting around this

verdict, for Fatima had ample reason to turn down the loan. But we should also stress that Fatima came to take the loan as a result of rational patterns of inquiry and could only have avoided it by adopting irrational patterns of inquiry that would, in expectation and perhaps in reality, have left her much worse off. By taking a zetetic turn and emphasizing the rationality of Fatima's inquiry, we recover a perspective that is much more complete, charitable and helpful as a guide to Fatima's normative situation.

So far, I have argued that thinking about bounded rationality requires us to take a second zetetic turn in practical philosophy, from practical attitudes to practical inquiry. The reason for this is that all of the arguments given in Section 4 for taking a zetetic turn in epistemology apply equally well in practical philosophy. Section 3 made roughly the converse claim: that the study of theoretical inquiry should be conceived as a bounded rationality project. Can the same be said for the study of practical inquiry? Indeed, it can.

The argument of Section 3 was that many of the most important challenges that we face as inquirers only arise in an interesting way because we are bounded. If the bounds generating these challenges were removed, the challenges would either fail to arise, or else become nearly unrecognizable. By way of illustration, I showed how the problems of evidence-gathering, double-checking and attentional allocation arise from bounds such as fallibility, informational, computational and attentional bounds. If those bounds were removed, these problems would either fail to arise, or look very different from the challenges studied by zetetic epistemologists.

Exactly the same thing can be said of practical inquiry, for practical inquirers face all of the challenges just mentioned. Practical inquirers must often gather evidence to guide decisionmaking (Smith 2014; Lee-Stronach 2019). They sometimes need to double-check that they have not formed a mistaken intention (Bratman 1987). And they need to decide which of many features of decision environments to attend to during decisionmaking (Sims 2003). If we removed the bounds generating these challenges, the challenges would either fail to arise, or else would take exactly the same flatfooted solutions as in the theoretical case. It would be impossible for informationally unbounded agents to gather

evidence, irrational for infallible agents to double-check their beliefs, and rationally required for attentionally- and computationally-unbounded agents to attend to everything at once. These are not the sort of answers we expected to recover, and these answers provide evidence that the study of practical inquiry as commonly conceived is concerned with a type of bounded rationality.

Suppose we accept the need for a second zetetic turn from practical attitudes to practical inquiry, conceived as a bounded rationality program. What would the zetetic turn in practical philosophy involve? On a direct interpretation, taking the zetetic turn in practical philosophy does not involve denying or replacing traditional theories of rational attitudes. Instead, it involves supplementing these theories with detailed attention to the processes of inquiry through which our attitudes are produced and to the ways in which the rationality of inquiry is shaped by our bounds.

There is, at present, an established literature on practical inquiry (Audi 1989; Bratman 1987; Broome 2013; Harman 1976), some of it explicitly concerned with bounded rationality (Bratman 1988; Morton 2017; Icard 2018). But practical philosophy does not find itself in the midst of anything like the full-blown zetetic turn that has gripped epistemology. Taking the zetetic turn in practical philosophy would involve coming to grips with questions such as these: what sorts of heuristic and nonheuristic processes of practical inquiry are available to us, and when are these processes rational to use (Karlan 2021; Rysiew 2008)? How does the structure of agents' cognitive environments affect the rational response to their bounded situation (Gigerenzer and Sturm 2012)? And to what extent can careful consideration of the cognitive and environment situation of bounded agents such as Fatima reveal a sense in which they are responding rationally to the constraints under which they are placed (Morton 2017; Icard 2018)?

The arguments of this paper, if sound, give practical philosophers ample reason to take a zetetic turn towards the study of practical inquiry. By grappling with questions such as the above, we will complete the procedural turn from attitudes to inquiry and open up important new areas of normative research.

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