**Is Epistemic Anxiety an Intellectual Virtue?**

**Abstract:** In this paper, I discuss the ways in which *epistemic anxiety* promotes well-being, specifically by examining the positive contributions that feelings of epistemic anxiety make toward intellectually virtuous inquiry. While the prospects for connecting the concept of epistemic anxiety to the two most prominent accounts of intellectual virtue, i.e., “virtue-reliabilism” and “virtue-responsibilism”, are promising, I primarily focus on whether the capacity for epistemic anxiety counts as an intellectual virtue in the reliabilist sense. As I argue, there is a close yet unexplored connection between feelings of epistemic anxiety and the form of inference commonly known as “Inference to the Best Explanation” (IBE). Specifically, I argue that both the recognition that some fact requires an explanation—a necessary first step in applying IBE—and the subsequent motivation to employ IBE are typically facilitated by feelings of epistemic anxiety. So, provided IBE is truth-conducive the capacity for epistemic anxiety should count as an intellectual virtue in the reliabilist sense. After outlining my main argument, I address the challenge that the capacity for epistemic anxiety has the potential to be misleading. To respond to this challenge, I discuss how our recognition that a fact requires an explanation must in part be a species of *practical knowledge*, rather than *theoretical knowledge*. For the agent to skillfully distinguish between facts that require an explanation and facts that do not, she must develop the virtuous disposition to feel the appropriate amount of epistemic anxiety. Despite the many negative aspects associated with anxiety, as I conclude, being disposed to feel the appropriate amount of epistemic anxiety is ultimately good for us.

**1. Introduction**

It is common to regard anxiety as a negative emotion. Experiences of anxiety are normally considered intrinsically uncomfortable, and intense episodes of anxiety can often impair one’s ability to act (Kurth 2018, p. 2). Indeed, the DSM-5 of the *American Psychiatric Association* lists several different kinds of “anxiety disorders”, and each year billions of dollars are spent in an attempt to treat and combat anxiety (Barlow 2004, p. 1). While investigations into the nature of anxiety are typically thought to fall under the province of psychology and psychiatry, historically, philosophers too have been interested in the nature and significance of anxiety (e.g., Kierkegaard 1844/1989). Despite the commonplace view that anxiety is harmful and best eliminated, recently a few philosophers have highlighted certain valuable aspects of anxiety. For example, in a book-length investigation of the nature of anxiety and its positive contributions to the good life, Kurth (2018, p. 2) defends the thesis that certain forms of anxiety can play an important role in “agency, virtue, and moral progress.” So too, Lacewing (2005) argues that being attuned to our feelings of anxiety is a crucial component of responsible ethical deliberation. Given the centrality of agency and deliberation in our lives, it is plausible then that some degree of anxiety positively impacts our wellbeing.

 In this paper, I aim to contribute to the project of showing that anxiety has a positive role to play in the good life by examining the ways in which feelings of anxiety promote epistemic success. In particular, I aim to show that a specific form of distinctively *epistemic* anxiety, as analyzed by theorists such as Nagel (2010) and Vazard (2019), helps to facilitate intellectually virtuous inquiry. After reviewing the two most prominent accounts of intellectual virtue, namely “virtue-reliabilism” and “virtue-responsibilism”, as well as the connection between intellectual virtue and well-being, I consider the question of whether epistemic anxiety should be regarded as an intellectual virtue. While the prospects for connecting the concept of epistemic anxiety to both accounts of intellectual virtue are promising, I primarily focus on whether the capacity for epistemic anxiety counts as an intellectual virtue in the *reliabilist* sense, i.e., whether it reliably promotes truth over error. My case that epistemic anxiety is truth-conducive rests chiefly on the close yet unexplored connection between feelings of epistemic anxiety and the inference method known as “Inference to the Best Explanation” (IBE). Crucially, there is good reason to think that IBE is truth-conducive, and as I argue, feelings of epistemic anxiety play a vital role in the application of IBE, specifically in the initial recognition that some fact requires an explanation. After outlining my main argument, I address the challenge that the capacity for epistemic anxiety has the potential to be misleading. To respond to this challenge, I argue that the recognition of whether a fact requires an explanation must be regarded as species of *practical knowledge*, rather than theoretical knowledge, and moreover, that this practical knowledge is mediated by the virtuous disposition to feel the appropriate amount of epistemic anxiety.

**2. Virtue Epistemology and the Good Life**

On all of the most prominent conceptions of well-being, cognitive achievements, such as knowledge, true belief, or understanding, play at least *some* role in the good life. This fact is most immediately evident in the “objective” theories of well-being, such as the Objective List theory (e.g., Kazez 2007; Fletcher 2013) or Aristotelian eudaimonic accounts (e.g., Kraut 2007; Hurka 1993). On objective theories of well-being, “at least some of the things that make our lives better do so independently of our particular interests, likes, and cares” (Heathwood 2014, p. 202). According to Objective List theories, our lives go well to the extent that certain objectively good objects, qualities, or conditions feature in our lives. Commonly cited items on objective lists include such things as: subjective pleasure, autonomy, loving relationships, achievements, self-expression, and knowledge. On eudaimonic accounts, the good life involves realizing one’s nature, and given that human beings are *rational* creatures, the good life, at least in part, involves the exercise of our rational capacities. As Aristotle claims in Book X of the *Nicomachean Ethics*, “those to whom contemplation more fully belongs are more truly happy” (1178b30).[[1]](#footnote-1) But even those philosophers who endorse one of the “subjective” accounts of well-being, such as hedonism (e.g., Feldman 2004; Crisp 2006) or the desire-satisfaction theory (e.g., Railton 1986; Heathwood 2019), must admit that often in practice knowledge of some form or another contributes to well-being. According to subjective theories of well-being, “something can benefit a person only if he wants it, likes it, or cares about it, or it otherwise connects up in some important way with some positive attitude of his” (Heathwood 2014, p. 202). But of course, one does not have to be a philosopher to derive subjective pleasure from knowledge. Someone whose life is devoted to purely practical pursuits, such as an artisan, an athlete, or a farmer, will still derive pleasure from the knowledge associated with their projects. Likewise, even if some version of the desire theory is true, the artisan, the athlete, and the farmer will still *desire* to know certain things, even if that knowledge is wholly confined to their crafts. Thus, on the most prominent accounts of well-being, knowledge is either partly *constitutive* of the good life, as objectivists often claim, or at least reliably though contingently *conducive* to the good life, as subjectivists must acknowledge.

If cognitive goals such as knowledge or understanding are intimately connected to the good life, then we will need to cultivate the sorts of character traits and dispositions that “foster effective and responsible inquiry” (Hookway 2003, p. 198). Typically, inquiry consists in the attempt to “find things out, to extend our knowledge by carrying out investigations directed at answering questions, and to refine our knowledge by considering questions about things we currently hold to be true” (Hookway 1994, p. 211). The character traits or dispositions that foster effective and responsible inquiry are often referred to as *intellectual* or *epistemic* virtues, the identification and analysis of which falls under the province of “virtue epistemology.” Virtue epistemologists are primarily interested in appealing to the concept of intellectual virtue to address traditional epistemological questions, such as “What is knowledge?”, “What makes a belief justified?”, “Why is knowledge more valuable than mere true belief?”, etc. For instance, a virtue epistemologist might analyze knowledge as true belief that is acquired via the exercise of intellectual virtue. In general, there are two main divisions in virtue epistemology, which derive from different general accounts of what constitutes an intellectual virtue (Axtell 1997). On the one hand, “virtue-reliabilists”, e.g., Sosa (1991), understand intellectual virtues as “truth-conducive belief-generating mechanisms” (p. 271), which includes capacities, faculties, or abilities like deductive reasoning, perception, memory, etc. On the other hand, “virtue-responsibilists”, e.g., Zagzebski (1996), understand intellectual virtues as praiseworthy intellectual character traits for which we are at least to some degree responsible, including traits such as carefulness, open-mindedness, intellectual humility, conscientiousness, intellectual courage, etc.

One key difference between virtue-responsibilism and virtue-reliabilism is that the responsibilist account of virtue includes distinctively *motivational* and *affective* components. As Zagzebski argues (1996), the responsibilist virtues “are all based in the motivation for knowledge”, or more generally, for “cognitive contact with reality” (p. 167), where this includes related epistemic goals like understanding. In addition, the intellectually virtuous person is disposed to be *pleased* by their exercise of intellectual virtue (Battaly 2016, p. 164). By contrast, one does not need to care about or have any sort of emotional reaction to the truth to be good at deductive reasoning, i.e., a reliabilist virtue. One might cultivate and exercise one’s skills in deductive reasoning solely for the purpose of achieving high marks in a logic class, for instance. For this reason, the responsibilist account of intellectual virtue is similar to the traditional Aristotelian account of moral virtues such as courage and temperance, which also possess affective and motivational dimensions. The person with the virtue of courage is both motivated and pleased to stand firm in the face of danger for a noble end.

Despite their differences, the reliabilist and the responsibilist accounts of intellectual virtue need not stand starkly opposed but can work together to provide mutual support for each other. Plausibly, having the responsibilist virtues can foster the development of the reliabilist virtues (Battaly 2016, p. 171). For example, someone who cares about the truth may be motivated to develop their deductive and inductive reasoning skills, both of which are reliabilist virtues. Indeed, perhaps then we should say that many of the responsibilist virtues even *count* as reliabilist virtues.[[2]](#footnote-2) In any case, given that cognitive achievements are closely connected to the good life, we should cultivate the intellectual virtues as part of “ensuring our epistemic well being” (Hookway 2003, p. 79).

In addition to cultivating the intellectual virtues, agents should also attempt to rid themselves of any intellectual *vices*. According to “vice epistemologists” (e.g., Cassam 2016), intellectually vicious traits exist as genuine, stable dispositions; such intellectual vices impede responsible and effective inquiry; and finally, sometimes an appeal to an intellectual vice is the best explanation for why a person believes some demonstrably false proposition, such as the claim that the Apollo 11 Moon Landing was faked. In an analogous fashion, we can conceptualize intellectual vices in a reliabilist way, as cognitive processes, abilities, or faculties that are not truth-conducive, e.g., wishful thinking, hasty generalization, etc., or in a responsibilist way as blameworthy intellectual character traits, e.g., gullibility, carelessness, or dogmatism, etc. Unlike in the case of intellectual virtues, if well-being is at least partly a function of a thriving cognitive life, then the agent would do well to *avoid* acquiring intellectual vices. While virtue and vice epistemologists have shed much light on the qualities that agents must possess if they are to be responsible and effective inquirers, still there are other significant aspects of our cognitive lives relevant to well-being that remain under-discussed. One of these aspects, which I will explore at length in the next section, is the experience of *anxiety*.

**3. Epistemic Anxiety and the Intellectual Virtues**

*3.1 Extant Analyses of Epistemic Anxiety*

Even though feelings of anxiety are often considered to be intrinsically undesirable, a few theorists have highlighted a particular form of anxiety that seems significantly related to responsible and effective inquiry, namely *epistemic anxiety* (Nagel 2010; Hookway 2011; Vazard 2019). According to Nagel, epistemic anxiety is “the inclination or desire for increased cognitive activity” (2010, p. 414). For example, I might feel epistemic anxiety if I realize that I do not know whether the bank is open today. Normally, we feel epistemic anxiety when we realize that we lack knowledge or understanding about some matter of interest. The primary role of epistemic anxiety then is that it “alerts us to salient problems, or salient weaknesses in our epistemic position” (Hookway 2011, p. 36). Importantly, the degree of epistemic anxiety that arises is partly a matter of whether the epistemic situation is one that is high-stakes or low-stakes. As Nagel notes, “where the expected costs of inaccuracy are high, we typically feel more of the epistemic anxiety” (2010, p. 408). Thus, I will feel *more* epistemic anxiety about whether the bank is open if I need to pay an important bill by the end of the day than if I am simply interested in checking my account balance. When epistemic anxiety increases, we tend to gather more evidence, or shift from some quick, heuristic “System-1” process to a slower, more analytic “System-2” process (Nagel 2010, pp. 411-12). Here Nagel is referring to the popular model of cognition in psychology often referred to as the “dual process theory”, according to which some mental processes can be classified as quick, heuristic, associative, and intuitive, i.e., “System-1, whereas other mental processes can be classified as slow, deliberate, analytic, and logical, i.e., “System-2” (Frederick & Kahneman 2005, pp. 267-8). Once incited by epistemic anxiety to increase our cognitive effort, e.g., by transitioning to some System-2 cognitive process, we are better equipped to deal with the problem, and thereby to quell any unpleasant feelings of epistemic anxiety.

In a discussion of the relationship between epistemic anxiety and obsessive-compulsive disorder (OCD), Vazard (2019, pp. 3-4) connects the concept of epistemic anxiety to C.S. Peirce’s notion of “real doubt.” For Peirce, doubt in general is a kind of *irritation*, “an uneasy and dissatisfied state from which we struggle to free ourselves” (1877, p. 5). When we are in a state of doubt, we are motivated to transition into the “calm and satisfactory” state of belief. Crucially for Peirce, doubt does not arise *merely* because we lack knowledge *tout court*. There are many things that we do not know, but which we do not typically care very much to know, e.g., how many grains of sands there are in New Rochelle. This lack of knowledge normally does not engender the psychological state that concerns Peirce. Only those questions that speak to our practical interests are liable to lead to a state of doubt in the relevant sense. As Peirce insists: “the mere putting of a proposition into the interrogative form does not stimulate the mind to any struggle after belief. There must be a real and living doubt, and without this all discussion is idle” (1877, p. 6). With this in mind, on Vazard’s view epistemic anxiety is to be regarded as an *emotion*, “which provides motivational power to real doubt” (2019, p. 2).[[3]](#footnote-3) For Vazard, epistemic anxiety usually manifests itself as distinct “emotional episodes which have as object a certain state of affairs which can be expressed by a proposition *p*…where this possibility is evaluated as implying a possible threat (2019, p. 6). The function of epistemic anxiety then, as with anxiety in general, is to alert us to the fact that the truth or falsity of *p* may threaten us or frustrate our desires. [[4]](#footnote-4) And because we have the capacity for this emotion, we are liable to pass into the state of real doubt.

*3.2 Toward a Virtue-Theoretic Account of Epistemic Anxiety*

How should the virtue epistemologist think about epistemic anxiety? Should one regard epistemic anxiety as an intellectual virtue, or should one classify epistemic anxiety as an intellectual vice? Or does epistemic anxiety fall into neither category? Let’s consider virtue-responsibilism first.

One obstacle to identifying epistemic anxiety as a virtue in the responsibilist sense is that epistemic anxiety does not seem to be a *character trait*. Normally, virtue-responsibilists regard virtues and vices as stable, integrated, robust trait-dispositions of a person that manifest themselves in relevantly similar situations.[[5]](#footnote-5) For example, the open-minded person does not merely act in an open-minded way on a few isolated occasions; rather, they behave in an open-minded way as if it were “second nature” and in most, if not all, situations in which open-mindedness should manifest itself. However, epistemic anxiety on Nagel’s view consists in an occurrent desire to increase one’s cognitive effort with respect to some question; likewise, Vazard explicitly identifies epistemic anxiety as an occurrent emotional episode that leads to real doubt. These analyses of the concept of epistemic anxiety do *not* suggest that epistemic anxiety might consist in some stable, robust *character trait*. In short then, epistemic anxiety belongs to an ontological category distinct from that of character traits, e.g., emotions or desires, ultimately rendering it neither a virtue nor a vice in the responsibilist sense.

A similar problem arises if we try to conceptualize epistemic anxiety as a reliabilist virtue. Recall that for the virtue-reliabilists, intellectual virtues are regarded as “cognitive abilities rather than character traits” (Greco 2002, p. 295), where these cognitive abilities consist of truth-conducive processes, such as memory, logical reasoning, introspection, etc. Typically, these capacities are regarded by virtue-reliabilists as “input-output devices” (Sosa 1991, p. 227), whose output when virtuous tends to consist of true beliefs. But clearly epistemic anxiety, construed either as a desire to employ more cognitive effort or as an emotional episode motivating real doubt, is not *itself* an input-output device. It would be awkward to describe a feeling of epistemic anxiety as a capacity or ability. Instead, we should regard such feelings as the *output* of some capacity, ability, or mechanism. But then epistemic anxiety also belongs to an ontological category distinct from that of cognitive capacities, e.g. emotions or desires, ultimately rendering it neither a virtue nor a vice in the reliabilist sense.

While epistemic anxiety as currently discussed in the literature cannot in principle constitute a virtue either in the reliabilist or the responsibilist sense, it is possible to distinguish virtues involving epistemic anxiety that avoids these conceptual difficulties. First, it is worth pointing out that epistemic anxiety is not a rare occurrence; rather, it appears to be a common yet under-theorized component of our cognitive lives. Second, people can feel epistemic anxiety to different degrees, about different objects, and on different occasions.[[6]](#footnote-6) Plausibly, distinct individuals can be disposed to feel varying degrees of epistemic anxiety in response to similar situations. So, although both Nagel and Vazard primarily discuss epistemic anxiety as an *occurrent* state of some form, i.e., an emotional episode or a desire, it is possible to talk about a person’s *capacity* to feel epistemic anxiety, or *character traits* associated with the tendency to feel epistemic anxiety. Indeed, Vazard notes that, although she is in interested epistemic anxiety “as an occurrent state, or a relatively short-lived emotional episode”, it is possible to think of epistemic anxiety “as a trait, which refers to an individual’s stable tendency to experience this emotion” (2019, p. 6, fn. 2). By making this shift, we can solve the above conceptual difficulties that arise when analyzing epistemic anxiety from the virtue-theoretic perspective.

In general, each character virtue, including those discussed by virtue-responsibilists, corresponds to and is individuated by some specific “sphere of life with which all human beings regularly and more or less necessarily have dealings” (Nussbaum 1988, p. 35). So for instance, the sphere of human life with which courage is connected is “fear of important damages, esp. death”, whereas the sphere of human life with which temperance is connected is “bodily appetites and their pleasures” (Nussbaum 1988, p. 35). To have the virtue of courage consists in responding well with respect to fear, and to have the virtue of temperance consists in responding well with respect to the bodily appetites. The sphere of life with which we are concerned here is epistemic anxiety. With this in mind, let us refer to the character trait which disposes one to respond well with respect to epistemic anxiety, as “cognitive concern.” The person with the responsibilist virtue of cognitive concern feels epistemic anxiety at the right *times*, toward the right *objects*, to the right *degree*, and in the right *way*. Here, cognitive concern looks to be a responsibilist virtue of *some sort*, either moral or intellectual, having the same Aristotelian structure as other character virtues, such as open-mindedness or courage. In keeping with Aristotle’s Doctrine of the Mean, the vice of deficiency associated with cognitive concern is what I will call “cognitive insouciance”, and the vice of excess is what I will call “cognitive angst.” One who has the vice of insouciance might be someone who, for example, is disposed to feel an *insufficient* amount of epistemic anxiety, or someone who has the tendency to *not* feel epistemic anxiety during the appropriate situations. By contrast, one who has the vice of cognitive angst might be someone who, for example, is disposed to feel *too much* epistemic anxiety, or someone who tends to feel epistemic anxiety during inappropriate situations. While cognitive concern has some similarities to other intellectual virtues such as “thoroughness” and “carefulness” (Baehr 2011, pp. 105-6), because of its specific connection to *epistemic* anxiety, cognitive concern should be regarded as an independent virtue of its own.[[7]](#footnote-7) In sum then, although epistemic anxiety is not itself a virtue, in principle there *could* be a responsibilist virtue, i.e., a *character trait*, which concerns responding well to epistemic anxiety.

Likewise, if we focus on the *capacity* or *ability* to feel epistemic anxiety, then in principle this capacity or ability could count as a virtue in the reliabilist sense. Character traits are, of course, connected to capacities or abilities. Often capacities are the raw ingredients out of which character traits are forged. For instance, the capacity to feel fear is the basis of the character trait of courage, which involves the stable tendency to choose well with respect to fear. Rather than focusing on character traits with distinctively motivational and affective aspects, as the virtue-responsibilist does, the virtue-reliabilist focuses instead on the more basic capacities or abilities that humans possess. As mentioned above, epistemic anxiety seems to be a common feature of our cognitive lives, and so it is plausible to speak of a general *capacity* to feel epistemic anxiety. Now then, if the capacity to feel epistemic anxiety tends to promote truth over falsehood, then it would count as a reliabilist virtue. If the capacity tends to promote falsehood over truth, then it would count as a reliabilist vice. And finally, if the capacity tends to produce a roughly equal number of true and false beliefs, then it would constitute neither a virtue nor a vice in the reliabilist sense. In sum then, although epistemic anxiety is not itself a virtue, there could in principle be a reliabilist virtue in the *capacity* to feel epistemic anxiety, provided that capacity is sufficiently truth-conducive.

*3.3 Intrinsic vs. Extrinsic Motivations for Truth*

One might think that cognitive concern, construed as a stable tendency to feel epistemic anxiety should count as an *intellectual* virtue for the responsibilist, since it seems to share the motivation for truth. According to Zagzebski, a virtue is “a deep and enduring excellence of a person, involving a characteristic motivation to produce a certain desired end and reliable success in bringing about that end” (1996, p. 137). As discussed in section 2, the “certain desired end” that distinguishes intellectual virtues from moral virtues is the desire for truth, or at least some related cognitive goal such as knowledge or understanding. If we regard occurrent feelings of epistemic anxiety as desires for increased cognitive activity, such as the desire to amass more evidence for some hypothesis of interest, then cognitive concern seems to possess the correct motivational aspect. Ultimately, this desire for greater cognitive effort stems from a desire to know whether that hypothesis is true. Likewise, if we think of epistemic anxiety as the feeling or emotion that motivates real doubt, then again, the appropriate motivational dimension appears to be present in the trait of cognitive concern. Real doubt, as Peirce claims, is a state from which we ultimately strive to free ourselves, and which hopefully leads to *belief*, a state that is standardly regarded as one that *aims at* truth (Chan 2013).

A clear difference between cognitive concern and the responsibilist virtues, however, is that the motivation for truth associated with epistemic anxiety is inextricably connected to practical interests, whereas virtue-responsibilists insist that a precondition for acquiring the intellectual virtues is having an *intrinsic* motivation for truth.As Battaly remarks, “Responsibilist virtues require caring about truth for its own sake—they require intrinsic motivation, rather than extrinsic motivation” (2016, p. 181). Presumably, the intellectually virtuous person cares about truth *as such*, even truths in which they lack personal stakes. But such cases are ones in which the disposition to feel epistemic anxiety will not manifest itself. The difficulty then is that even if cognitive concern is a virtue of some sort—perhaps a moral or prudential virtue—it seems that it cannot be an *intellectual* virtue in the responsibilist sense because of its necessary connection to practical interests.

The case of epistemic anxiety is an interesting one for the virtue-responsibilist to consider because either the virtue-responsibilist must reject the claim that cognitive concern is an intellectual virtue, or else give up the idea that all intellectual virtues necessarily stem from the motivation to care about truth *for its own sake.* Opting for the first horn of this dilemma is on its surface implausible. For one thing, as mentioned above, cognitive concern should count as a virtue of *some* *sort*, since it has the same Aristotelian structure as other virtues. For Aristotle, all virtues, e.g., courage, have an associated vice of deficiency, e.g., cowardice, and a vice of excess, e.g., rashness. So too, there is both a vice of deficiency and a vice of excess associated with cognitive concern. Moreover, cognitive concern certainly *seems* to be an intellectual rather than a moral virtue, given that it typically involves the disposition to seek out evidence for the truth of some proposition or to answer some question, albeit one that speaks to the agent’s practical interests. And certainly, such a trait is not only conducive to a good life but is also admirable and praiseworthy. It is better to be the person who manifests cognitive concern, seeking out the right amount of evidence on the right occasions, than it is to be the person who fails to do so, either by manifesting cognitive insouciance or cognitive angst. The person with the virtue of cognitive concern is better equipped to deal with potentially threatening situations, focusing neither too much nor too little cognitive effort on answering salient questions. Thus, the person with cognitive concern appears to possess a kind of wisdom lacking in their vicious counterparts.

Perhaps then the virtue-responsibilist ought to opt for the latter horn of the dilemma and give up the idea that intellectual virtue requires being motivated by the truth for its own sake. Recently, Montmarquet (2018) has criticized some fellow virtue-responsibilists, including Zagzebski (1996) and Baehr (2011), for suggesting that “one is less epistemically virtuous for not pursuing truth *ultimately* for its own sake” (2018, p. 40).[[8]](#footnote-8) According to Montmarquet, we should not think of Copernicus as any less intellectually virtuous, if for instance he was motivated to discover scientific truths ultimately in order to “glorify God”, or even if he had patently careerist motivations. Although our hypothetical Copernicus’ long-term goals are not ultimately truth-oriented, “the immediate structure of what he is doing remains virtuous and well-motivated; for he acts…in the immediate interests of truth” (2018, p. 40). Perhaps the virtue-responsibilist should say something similar about virtues that are associated with the disposition to feel the appropriate amount of epistemic anxiety. Although when the agent feels the appropriate degree of epistemic anxiety in a given situation, she is not ultimately motivated by the truth *for its own sake* but only truths that speak to her practical interests, perhaps her “immediate interests” in the truth, as Montmarquet suggests, are sufficient to render the agent’s subsequent acts, which are motivated by epistemic anxiety, intellectually virtuous. By extension then, perhaps the virtue-responsibilist can make sense of cognitive concern as an *intellectual* virtue.

Of course, in attempting to classify the *capacity* to feel epistemic anxiety as a reliabilist virtue, one avoids the difficulties faced by the virtue-responsibilist. This is because virtue-reliabilists do not claim that being motivated by truth for its own sake is a necessary condition for intellectual virtue. Provided the capacity or ability in question reliably leads a surplus of true beliefs, it will count as an intellectual virtue according to reliabilists. While I share Montmarquet’s suspicion that an ultimate motivation for truth or knowledge might be too strong of a requirement to place on intellectual virtue—and that therefore the responsibilist should consider cognitive concern to be an intellectual virtue—in order to avoid these thorny questions about proper motivations, it seems a more fruitful route, at least at first, to investigate the potentially beneficial role that epistemic anxiety plays in our cognitive lives and in the good life as a whole from the standpoint of virtue-reliabilism. Thus, in sections 4-5, I will only be concerned the question of whether the capacity for epistemic anxiety counts as a reliabilist virtue. But, as discussed in section 2, the responsibilist and reliabilist accounts of intellectual virtue are not only compatible but also complementary. Accordingly, I will return to the responsibilist virtue of cognitive concern and highlight its significance for my argument in section 6.

**4. Evolutionary Epistemology and the Capacity for Epistemic Anxiety**

Clearly, to complete the argument that the capacity for epistemic anxiety is a reliabilist virtue, we will need to show that the underlying capacity tends to promote truth over error. Rigorously demonstrating that the capacity for epistemic anxiety is sufficiently truth-conducive on balance may prove a formidable task, but on its surface, this seems a plausible hypothesis.

Normally, occurrent feelings of epistemic anxiety propel us to gather more evidence or employ more cognitively sophisticated tools, motivating us to transition from quick, heuristic System-1 processing, to slower, more analytic System-2 processing. And generally, such behaviors certainly seem to be truth-conducive. While the kinds of heuristics that are included in System-1 processing “are surprisingly accurate in some ordinary circumstances…they can easily lead to gross error” (Alfano 2014, p. 110). Consider the “availability heuristic”, a common mental shortcut whereby judgments about the probability or frequency of events are made on the basis of availability, i.e., “the ease with which relevant instances come to mind” (Tversky & Kahneman 1973, p. 207). Reliance on the availability heuristic may explain unjustified fears of air travel (Kahneman 2011, p. 130) and even increased incidence of vaccine hesitancy (Omer et al. 2017). In both cases, the occurrence or reported occurrence of some memorable adverse event illicitly influences one’s judgments about the probability of that *type* of event. As Kahneman indicates: “multiple lines of evidence converge on the conclusion that people who let themselves be guided by System 1 are more strongly susceptible to availability biases than others who are in a state of higher vigilance” (2011, p. 135). To be sure, System-1 processing has the virtue of being quicker and less cognitively demanding. In some cases, it will amount to wasted cognitive effort to shift to System-2 thinking, e.g., to prove that 2+2=4 from Peano’s axioms. Nevertheless, there is a clear sense in which System-2 thinking is more *reliable* than System-1 thinking. As Alfano remarks, “If you input truths to *modus ponens*, [i.e., System-2 thinking], it outputs truths…If you input triggering conditions into a heuristic – well, it depends” (2014, p. 116).[[9]](#footnote-9)

Furthermore, given that epistemic anxiety is a widespread feature of our cognitive lives, it is plausible that the capacity to feel epistemic anxiety is a “natural aspect of the regulation of our thinking” (Nagel 2010, p. 408). Although feelings of excessive anxiety can become debilitating and constitute a disorder, as psychologists by and large agree “at moderate and mild levels, anxiety is normal and in fact adaptive” (Hughes et al. 2014, p. 132). Furthermore, as Vazard points out, “it is now widely acknowledged that anxiety is a valuable emotion shaped by natural selection which grants us protection from a wide range of potential threats” (2019, pp. 5-6). So, if the capacity for anxiety in general is an adaptation, then perhaps the specific capacity for epistemic anxiety is likewise. Accordingly, in view of the plausible connection between anxiety in general and natural selection, one might try to give an evolutionary argument for the truth-conduciveness of epistemic anxiety.

Since the publication of Plantinga’s (1993, 2000) famous argument that the reliability of our cognitive faculties is improbable given the truth of a naturalistic worldview, much has been written attempting to show that natural selection would favor the evolution of cognitive faculties that reliably track the truth.[[10]](#footnote-10) Roughly, Plantinga’s argument is that natural selection is concerned with *fitness*, which consists in the ability to survive and reproduce; however, with respect to the truth, natural selection is indifferent. Thus, says Plantinga, we have no reason to suppose our cognitive faculties to be reliable if they evolved by natural selection in a purely naturalistic way, e.g., without the intervention of a benevolent God. A popular response leveled by critics is that natural selection will favor the evolution of mechanisms that are truth-conducive because in general an organism with true beliefs will be better equipped to respond to threats posed by the environment (e.g., Fales 1996). Consequently, organisms with reliable cognitive faculties will tend to have higher levels of fitness than their less cognitively competent rivals and will thus, on balance, tend to have greater levels of reproductive success. In remarking upon this response to Plantinga’s challenge, McKay and Dennett write: “Although survival is the only hard currency of natural selection, the exchange rate with truth is likely to be fair in most circumstances” (2009, p. 509). On the assumption that the cognitive capacities that evolve by natural selection can be justifiably regarded as reliable, one might try to defend a particular version of an evolutionary argument whose conclusion is that the capacity for epistemic anxiety is truth-conducive.

While I am sympathetic to the above approach, I will not attempt to argue on evolutionary grounds that the capacity for epistemic anxiety reliably tracks the truth. Doing so would require a much more thorough engagement with the empirical literature concerning the psychology, neurology, and biology of anxiety in general and epistemic anxiety in particular. Instead, I will attempt to provide some measure of support for the hypothesis that the capacity for epistemic anxiety is truth-conducive, and thus should count as a reliabilist virtue, by showing that epistemic anxiety seems to play an important role in triggering us to apply the method of non-demonstrative inference commonly known as “Inference to the Best Explanation” (IBE). As I will argue, if IBE is a method of inference that is truth-conducive and if epistemic anxiety plays an important role in the actual application of IBE, then this provides support for the hypothesis that the capacity for epistemic anxiety is likewise truth-conducive, and thus should be regarded as an intellectual virtue in the reliabilist sense.

**5. Epistemic Anxiety and Inference to the Best Explanation**

*5.1 IBE, the Anomaly Stage, and Explanatory Requirement*

According to IBE, sometimes called “abduction”[[11]](#footnote-11), many scientific and everyday inferences manifest the taking of an “explanatory detour” (Lipton 2004, p. 65). Often, a hypothesis H is upheld as rationally justified by showing how well H would, if true, explain some set of facts. That H would explain these facts better than its competitors is taken to ground our justification for believing H to be true. Frequently, IBE is formalized as a four-step argument pattern (e.g., Lycan 2002), such as:

1. F is some fact or collection of facts that requires an explanation
2. Hypothesis H1, if true, would explain F
3. H1 is a better explanation of F than its competitors H2, H3,...,Hn
4. Therefore, probably, H1 is true

Whether H is the better explanation depends on how well H does with respect to certain explanatory virtues, e.g., *simplicity*, *unification*, *fit with background knowledge*, etc. While we may not always consciously go through these steps, IBE is an extremely common way of reasoning. According to Douven (2017), our use of IBE in everyday life is “so routine and automatic that it easily goes unnoticed.”[[12]](#footnote-12)

Much more can be said about each of the four steps of the IBE schema,[[13]](#footnote-13) but my focus here is merely on the first. In the first stage of IBE there must be some item that is given—some data, phenomena, facts etc. —which are already known, or at least provisionally accepted, and which act as the springboard for the inference. In some statements of IBE, such as that of Lycan (2002, p. 413), these facts are said to be “in need of an explanation.” In this stage, the agent has encountered some fact that is anomalous given her background knowledge, and so for convenience, I will refer to this stage as the *Anomaly Stage*. Moreover, I will refer to the phenomena, facts, data, etc. that constitute the anomaly as the *explanatory trigger*.[[14]](#footnote-14) In calling this step of IBE the “Anomaly Stage”, I do not mean to suggest that IBE only applies in “abnormal” or “unusual” circumstances. Perfectly ordinary facts, such as the fact that it rained today, can serve as explanatory triggers. If I had every reason to expect that it would *not* rain, then the fact that it rained today is “anomalous” given my background knowledge and so in need of an explanation. Thus, in this perfectly ordinary case I should employ IBE.[[15]](#footnote-15)

Although Harman (1965), who coined the term “inference to the best explanation,” makes no mention of the caveat that F requires an explanation, and indeed some schematizations of IBE exclude it (e.g., Psillos 2002), I maintain that this qualification is necessary. If F did not require an explanation, then explaining F by means of some hypothesis H should have no bearing on whether H is true. If F does not require an explanation, then to conclude that H is true because H explains F better than its rivals would be a non-sequitur. The intuition behind IBE is that H ought to be given some justificatory “credit” for relieving the epistemic “burden” imposed by the unexplained fact F. But if F does not actually require an explanation, then it seems unwarranted to “reward” H for providing a superfluous explanation. This is a point that is seldom emphasized in discussions of IBE, but the very success of IBE depends on a prior commitment to F’s requiring an explanation. Thus, IBE is wedded to the concept of an “explanatory trigger”, and so the nature of this concept must be spelled out.

 Now according to Lycan (2002, p. 413), although it would be interesting to investigate with more depth the conditions under which a fact requires an explanation, doing so is not necessary for proponents of IBE because “substantive disagreements about what does or does not need explaining are rare.” The implicit argument seems to be that disputants almost always agree on the extension of the concept, and so we can leave the concept intuitive. If Lycan is right that people almost always agree about whether F requires an explanation, then perhaps there is little philosophical need to give an account of F’s “requiring an explanation.” To be sure, disputes concerning whether some instance of IBE is successful are usually located elsewhere. Often two parties agree that F requires an explanation, but one favors H1 as the best explanation of F and the other favors H2. Even so, in my view, Lycan underestimates the extent to which there is disagreement at the Anomaly Stage.

Aside from being common in philosophy and in science,[[16]](#footnote-16) disputes over whether some fact requires an explanation crop up in ordinary life fairly frequently. In general, when one party demands an explanation for a series of events—such as the fact that Evelyn Adams won the New Jersey Lottery in 1985 and then again in 1986 (Sober 2012)—and the other party is willing to accept such a series of events as a coincidence, then it seems accurate to describe their dispute as one over whether a fact requires an explanation. We could easily multiply mundane examples of *prima facie* “meaningful connections”, where what is being disputed is whether those connections require an explanation or are best written off as a coincidence—e.g., twins, Jim Springer and Jim Lewis, separated at birth, twice married different women with the same name. [[17]](#footnote-17) Such cases from everyday life suggest that disputes over whether some fact requires an explanation are an important feature of our ordinary explanatory practices. Given that it is common for there to be disputes of this sort, we should attempt to further analyze the Anomaly Stage, which often receives scant attention in the literature on IBE.[[18]](#footnote-18)

*5.2 The Role of Epistemic Anxiety in IBE*

As Hookway remarks, “a satisfactory response to central problems of epistemology can and should make use of facts about emotions and traits of character or habits” (2003, p. 81). With this in mind, one interesting and unexplored idea is that there is a close connection between feelings of epistemic anxiety and the beginning stage of IBE. Normally, for an agent to be motivated to apply IBE and infer some hypothesis as the best explanation, the agent must first *experience* a fact F as in some way problematic, specifically, as something in need of an explanation; moreover, the agent must then be possessed of the desire to employ more sophisticated cognitive tools to make sense of F, thereby resolving a troubling anomaly in her system of beliefs. In many cases, the source of the fact that serves as the explanatory trigger is derived from some quick, intuitive System-1 process, such as perception or memory. For instance, I might observe via a simple act of perception that the lock to my front door is broken, the door is wide open, and many of my valuables are missing. But the subsequent application of IBE, including the complex process of applying various explanatory virtues to multiple rival hypotheses, constitutes a shift to a slower, more controlled System-2 process.

 For example, I might consider the comparative explanatory merit of the following hypotheses: i) my home was burglarized by one burglar; ii) the police mistakenly broke into my house looking for contraband; iii) my friends are playing a joke on me; and iv) extraterrestrials swooped down to collect material for a scientific study on Earthlings. After applying the explanatory virtues to the set of hypotheses and determining which hypothesis does best overall with respect to the explanatory virtues, I infer one hypothesis as the best explanation. Moreover, when I reconsider the original set of facts with which I began, the phenomenology is quite different. Specifically, I no longer regard those facts as ones requiring an explanation, and thus the question, at least for now, remains settled.

Crucially then, it is precisely the capacity for epistemic anxiety that undergirds the agent’s motivation to employ IBE. Plausibly, it is the capacity for epistemic anxiety, identified by Nagel, Vazard, and others that contributes to the process by which the agent comes to realize that some fact or set of facts requires an explanation, and it is this feeling that eventually subsides in the final stage of inferring the best explanation. It is easy to miss that what precedes the use of IBE is a desire (or an emotion generating such a desire) to increase one’s cognitive effort in response to some problem. Formulating and comparing various explanations for some set of facts amounts to an instance of increasing one’s cognitive effort, a shift from a System-1 to a System-2 cognitive process, which is just one of the ways in which epistemic anxiety might be realized. Importantly, an agent who had no capacity for epistemic anxiety might very well never regard any phenomenon as constituting an explanatory trigger. But then such an agent will never, by their own lights, have an occasion to employ IBE. Thus, in human agents at least, epistemic anxiety typically facilitates the actual mechanics of IBE.

Now, as discussed in section 3.1, epistemic anxiety is inextricably connected to the agent’s *practical* interests, and to be sure, the four-step IBE schema makes no mention of anything pragmatic as such. But importantly, when we are inclined to apply IBE to make sense of some anomalous facts, we are almost always motivated, at least partly, by practical interests. This is because explanatory knowledge is particularly useful. For example, if we know that *A* (causally) explains *B*, and not just that *A* and *B* are correlated, then we can potentially intervene on *A* and thereby influence *B* in order to achieve our non-epistemic goals. In the hypothetical situation involving my missing valuables, ultimately, I am motivated to engage in the more theoretically complex exercise of applying and weighing various explanatory virtues in order to figure out how to avoid the loss of my valuables in the future. It is for this reason that I feel some degree of epistemic anxiety.[[19]](#footnote-19)

What is most significant for our purposes though is the fact that a feeling of epistemic anxiety appears to contribute to the process of applying IBE. So, if we can show that IBE is a truth-conducive method of inference, and is thus a reliabilist virtue, then it seems that we should say that the capacity to feel epistemic anxiety is likewise a reliabilist virtue. Of course, many proponents of IBE have argued that IBE is *in fact* a reliable method of inference (e.g. Psillos 1999; Lipton 2004), in which case the prospects for identifying the capacity for epistemic anxiety as a reliabilist virtue look promising. For one thing, IBE has been dubbed “the inference that makes science” (McMullin 1992), a tool without which “it is hard to see how intellectual inquiry could proceed” (Boyd 1983, p. 74). Accordingly, there is a long list of prominent episodes from the history of science in which philosophers of science have argued that IBE was the central form of reasoning at play.[[20]](#footnote-20) It is widely taken for granted that science is the paradigm of an epistemically successful enterprise, and so if IBE really does capture the logic of science, then we should take IBE to be justified. In addition, it is fairly common for philosophers to rely on IBE to defend distinctively philosophical conclusions.[[21]](#footnote-21) Indeed, it is becomingly increasingly common to argue that IBE is an indispensable tool for philosophical theorizing (e.g., Williamson 2016; Biggs & Wilson 2017). So, if IBE is necessary to do philosophy, then clearly there would be something self-defeating about attempting to argue against IBE on *philosophical grounds*.

The foregoing considerations amount to a promising argument that the capacity for epistemic anxiety is truth-conducive, but it needs mentioning that IBE also has its fair share of critics (e.g., van Fraassen 1989; Roche and Sober 2013). It is beyond the scope of the present inquiry to address all the criticisms that have been levelled against IBE[[22]](#footnote-22), and so we will not be able to definitively settle the question of whether IBE should be regarded as truth-conducive here. Nevertheless, in light of the arguments I briefly canvassed above, it seems more than reasonable to assume that IBE is in fact a truth-conducive method of inference. If those arguments are cogent, then relying on IBE should count as a reliabilist virtue. Furthermore, in typical applications of IBE, it is epistemic anxiety that seems to be the triggering mechanism for employing IBE in the first place. Thus, provided IBE is a reliabilist virtue, we should regard the capacity for epistemic anxiety as a reliabilist virtue as well.

**6.** **Practical Knowledge and the Virtue of Cognitive Concern**

 Now, it is certainly *conceptually possible* to employ IBE without some temporally prior experience of epistemic anxiety. To illustrate this possibility, consider a hypothetical agent who is constitutionally incapable of experiencing epistemic anxiety. This agent will not be motivated by feelings of epistemic anxiety to recognize, say, a broken lock and missing valuables as a set of facts that requires an explanation. However, an agent who lacks the capacity for epistemic anxiety still *could* be motivated to successfully apply IBE in the burglary case to infer the correct hypothesis. Suppose that the agent learns the relevant fact, perhaps from some reliable testifier, that this is a situation in which one *ought* to apply IBE and suppose further that the agent wants to abide by the correct rational principles. With this set of beliefs and desires, we should expect our hypothetical agent to employ IBE in the burglary case. Thus, we should admit that there could be instances in which IBE will be triggered without some previous state of epistemic anxiety. Still, as I have suggested in section 5, because the IBE argument pattern begins with the recognition that a fact requires an explanation, the typical triggering mechanism for instances of IBE seems to involve the experience of epistemic anxiety. So, even if there could be cases where an agent performs IBE without experiencing epistemic anxiety, such cases wouldn’t preclude the triggering mechanism of epistemic anxiety from counting as a reliabilist virtue.[[23]](#footnote-23)

There is another more worrisome problem that one might raise to the idea that epistemic anxiety is a reliabilist virtue, however. Suppose it is granted that occurrent episodes of epistemic anxiety normally play a role in the Anomaly Stage of IBE. Still, one might argue that we should not expect the capacity for epistemic anxiety to immediately count as a reliabilist virtue. This is because the mere capacity for epistemic anxiety does not determine *how much* epistemic anxiety the agent feels, nor does it determine *what*, for the agent, becomes an object of epistemic anxiety. In a discussion of ultimate explanations of the universe, Worrall (1996, p. 13) raises this sort of worry:

[T]he worst of all possible worlds is one in which, by insisting that some feature of the universe cannot just be accepted as “brute fact”, we cover up our inability to achieve any deeper, testable description in some sort of pseudo-explanation – appealing without any independent warrant to alleged a priori considerations or to designers, creators and the rest. That way lies Hegel and therefore perdition.

The situation that Worrall imagines here is naturally described, at least from the perspective of non-Hegelians, as a case of epistemic anxiety run amok. Instead of realizing that some facts are brute, and thus do not require an explanation, the agent never ceases to see facts as explanatory triggers and the subsequent sequence of inferences to the best explanation continues unabated. As a result, the capacity for epistemic anxiety manifests itself in a way that is *not* truth-conducive.

To address this challenge that the capacity for epistemic anxiety has the potential to be misleading, I wish to consider again the responsibilist account of epistemic anxiety discussed in sections 3.2 and 3.3. Recall that on the responsibilist conception of intellectual virtue, we can identify a character virtue associated with the capacity to feel epistemic anxiety, i.e., cognitive concern, which roughly-speaking involves feeling the appropriate amount of epistemic anxiety. In accordance with Aristotle’s Doctrine of the Mean, the vice of deficiency that corresponds to cognitive concern is cognitive insouciance, i.e., feeling an insufficient amount of epistemic anxiety, and the vice of excess that corresponds to cognitive concern is cognitive angst, i.e., feeling too much epistemic anxiety. Now then, since the agent with the trait of cognitive angst is disposed to feel epistemic anxiety in situations in which that feeling is unwarranted, she may therefore be disposed to view certain facts as explanatory triggers, when really such facts do not require an explanation. Likewise, since the agent with the trait of cognitive insouciance typically fails to feel epistemic anxiety in situations in which it is warranted, she may therefore fail to view certain facts as explanatory triggers, when really such facts dorequire an explanation. Thus, as we have just seen, the capacity for epistemic anxiety has the potential to manifest itself in a way that is *not* truth-conducive, i.e., when the agent has the corresponding vices.

In general, this is a problem that virtue-reliabilists readily acknowledge, and which they attempt to solve by relativizing reliabilist virtues to particular circumstances. We really should not speak of the reliability of capacities or faculties *tout court*. Instead, reliabilist virtues need to be qualified and restricted to certain conditions. Even perception is liable to be misleading when viewing conditions are sub-optimal. For this reason, Sosa (1991, p. 138), further specifies that a reliabilist virtue is some capacity that allows us to “mostly attain the truth and avoid error in a certain field of propositions F, when in certain conditions C.” With this strategy in mind, plausibly the conditions under which the capacity for epistemic anxiety will be truth-conducive, and thus constitute a reliabilist virtue, will be precisely the conditions under which the agent possesses the responsibilist virtue of cognitive concern. Thus, ultimately, the responsibilist virtue of cognitive concern, which consists in feeling the appropriate amount of epistemic anxiety, counts as a reliabilist virtue. This should not be terribly surprising, given the point raised in section 2 that many of the responsibilist virtues seem to count as reliabilist virtues.[[24]](#footnote-24) The agent with the virtue of cognitive concern will, when applying IBE, be able to reliably distinguish those facts that require an explanation from those that do not. In this way, the worry that the capacity for epistemic anxiety will sometimes misfire in the context of IBE can be avoided.

Now one might rightly wonder how the agent develops the responsibilist virtue of cognitive concern and thereby successfully identifies those facts that are in need of an explanation. Perhaps, one might argue, there is some abstract, general principle that distinguishes those facts that require an explanation from those facts that do not, and to manifest the virtue of cognitive concern in this context just amounts to having and abiding by this principle. I suspect, however, that there is no general principle that plays this role.[[25]](#footnote-25) Rather than regard the agent’s recognition that some fact F is an explanatory trigger as a piece of *theoretical knowledge* mediated by some general principle, we ought to instead regard the agent’s recognition that F is an explanatory trigger as a piece of *practical knowledge*.[[26]](#footnote-26)

As with other virtues or skills, the way in which the agent develops the requisite practical knowledge is precisely through *practice*. Famously, Aristotle wrote in Book II of the *Nicomachean Ethics* that “we become just by doing just acts, temperate by doing temperate acts, brave by doing brave acts” (1103b1-2), and so in general a person becomes virtuous by doing virtuous acts. Having adopted the virtue-theoretic perspective with regard to epistemic anxiety, we should say then that a person develops the virtue of cognitive concern partly by successfully distinguishing in practice between facts that do and facts that do not require an explanation. This task is not as difficult as it might sound, given that we know already from experience that countless facts require an explanation. In fact, one might think that the default position that we ought to adopt with regard to any given fact is that it requires an explanation, unless we have good reason to believe otherwise. Crucially, this is not a judgment that is true *a priori*; rather, the reason that this claim seems so compelling is that we have already trained ourselves to develop this skill by successfully identifying many facts that are in need of an explanation. So, given our past training, we already have enough “good sense”—to borrow a term from Duhem[[27]](#footnote-27)—to successfully determine in many situations when epistemic anxiety is warranted in the context of IBE.

 In the other direction, we also have enough good sense, again based on past training, to identify facts that do *not* require an explanation in many situations. Consider for instance the “deluge” of spurious correlations uncovered in recent years because of our newfound ability to gather, process, and analyze massive quantities of data (Calude and Longo 2017). Clearly, the intellectually virtuous response to the fact that Nicholas Cage movies are highly correlated with people drowning is that this fact is a coincidence which is not in need of an explanation.[[28]](#footnote-28) This judgement is not entirely inexplicable or inarticulable. If asked, we may provide some rationale for it. For instance, we might say that there is no plausible causal connection between such facts given our background knowledge, and so we ought to regard this correlation as lacking an explanation (Cabrera 2020), and thus as not requiring one. Crucially though, this *ex post* rationale is *particularistic* and depends on a complex set of contextual and highly contingent background factors. At bottom, the initial judgment is not a piece of theoretical knowledge, derived from applying some general principle, but a species of *practical knowledge*.

To be sure, there will still be cases over which relatively intellectually virtuous agents disagree. Even for agents who have had much practice identifying facts that require an explanation, or much practice managing epistemic anxiety in general, there will still be instances where no clear verdict is possible at present. For example, consider the position that Williamson (2000) takes concerning our concept of knowledge, which serves as the basis of his “Knowledge-First” epistemology. Because of decades of failure to come up with an analysis of knowledge free from problems, Williamson argues via a kind of pessimistic induction that the project that Gettier (1963) launched in his seminal paper is misconceived. Knowledge does not admit of a reductive analysis in terms of informative individually necessary and jointly sufficient conditions. For Williamson, knowledge is a primitive relation. If S knows that *p*, there are no further, more basic conditions in virtue of which S knows that *p.* In this sense then, why it is the case that S knows that *p*, in all the cases that S does, lacks an explanation, and therefore does not require one. Presumably, for knowledge-firsters, the lack of a reductive explanation of the concept of knowledge does not engender epistemic anxiety. More traditional epistemologists of course disagree; the concept of “S knows that *p*” requires a constitutive explanation in terms of more basic concepts. On their view, presumably, this is a case where epistemic anxiety *is* warranted.

Which party is intellectually virtuous in this case—whether it’s the knowledge-firsters, or their critics—perhaps remains to be seen. We should recognize, however, that it is not a problem for a virtue-theoretic account of the disposition or capacity to feel epistemic anxiety if there are cases in which it is unclear whether some fact warrants epistemic anxiety. More specifically, it is not a problem if there are cases in which it is unclear whether some fact requires an explanation. Indeed, this is precisely what is to be expected if it is the case that such knowledge is practical in nature, stemming from the virtue of cognitive concern. As Aristotle reminds us at the beginning of the *Nicomachean Ethics*, we should “look for precision in each class of things just so far as the nature of the subject admits” (1094b24-25). When trying to find the virtuous mean, there is no substitute for *phronesis*, or practical wisdom. This is a point that virtue ethicists have emphasized in their critiques of principle-based approaches to ethics (e.g., Hursthouse 1996), and the case of epistemic anxiety in the context of IBE illustrates that it is a point that holds for the virtue epistemologist as well.

**7. Concluding Remarks**

In this paper, I have aimed to examine the positive role that feelings of epistemic anxiety might play in the good life, by considering the extent to which epistemic anxiety facilitates or promotes intellectually virtuous inquiry. Specifically, I have aimed to investigate whether the *capacity* for epistemic anxiety or the *character trait* associated with the dispositionto feel epistemic anxiety, counts as an intellectual virtue. As I have pointed out, the virtue-responsibilist might wish to deny that the character trait that I called “cognitive concern”—which consists in the stable tendency to feel the appropriate amount of epistemic anxiety—counts as a responsibilist virtue, because of the close connection between epistemic anxiety and practical interests. But, as I suggested, perhaps the responsibilist requirement that the intellectually virtuous person should be motivated by truth for its own sake ought to be rejected as overly demanding. If cognitive concern doesn’t count as a pure intellectual virtue, because of the pragmatic nature of epistemic anxiety, at the very least, cognitive concern should be regarded as a virtue of *some sort*, perhaps something in between an intellectual and a moral virtue, or a hybrid virtue with an intellectual component. As I argued, we do not run into these thorny motivational questions when considering whether the capacity for epistemic anxiety is a reliabilist virtue; instead, the crucial question is whether the capacity for epistemic anxiety is truth-conducive.

 While I suggested that one could make a plausible evolutionary argument that the capacity for epistemic anxiety reliably promotes truth over error, I considered the more modest question of whether the capacity for epistemic anxiety plays a role in the application of IBE, an argument form widely regarded to be truth-conducive and indispensable to our everyday inductive practices. As I argued, the capacity for epistemic anxiety is that mechanism which typically initiates and facilitates the first stage of IBE, wherein the agent recognizes that some fact requires an explanation; and what’s more, it is the feeling of epistemic anxiety that typically motivates the agent to transition from the quick, heuristic System-1 process of observing some phenomenon, to the slower, more controlled System-2 process of applying the various explanatory virtues to an array of rival hypotheses.

 To be sure, it is possible for epistemic anxiety to lead us astray, and so we must regiment our capacity for epistemic anxiety such that we are disposed to feel neither too much, nor too little of the emotion. To successfully apply IBE then, we must cultivate the virtue of cognitive concern, and avoid the corresponding vices, which lead agents either to feel too much epistemic anxiety (i.e., cognitive angst), or too little epistemic anxiety (i.e., cognitive insouciance). Such vices might compel agents to believe that a fact requires an explanation, when really it does not, or vice versa. Having adopted the virtue-theoretic perspective with regard to epistemic anxiety, I suggested that we likely will not be able to discover, as a piece of theoretical knowledge, some substantive, general principle that distinguishes those facts that require an explanation from those facts which do not. Instead, the only way for the agent to reach the virtuous mean with respect to epistemic anxiety is through *practice*. As I have argued, the sort of practical knowledge that one attains by cultivating the virtue of cognitive concern serves to foster effective and responsible inquiry by helping us to know better when applications of IBE are warranted. Given the central role that inquiry plays in our lives, feelings of epistemic anxiety thus positively contribute to our well-being. Despite the many negative aspects associated with anxiety, being disposed to feel the appropriate amount of *epistemic* anxiety is ultimately good for us.

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1. Here and throughout, I rely on W.D. Ross’s (1941) translation of the *Nicomachean Ethics*. [↑](#footnote-ref-1)
2. In light of the broad definition of “intellectual virtue” provided by virtue-reliabilists, Baehr (2006) has argued for precisely this point: many of the responsibilist virtues are also truth-conducive qualities of a person. [↑](#footnote-ref-2)
3. Hookway (2003) also connects epistemic anxiety to the notion of “real doubt” but suggests the slightly different thesis that “real doubt should be viewed as a *kind* of anxiety” (p. 86; emphasis added). [↑](#footnote-ref-3)
4. While Nagel (2010) does not explicitly conceptualize epistemic anxiety as an emotion, according to Vazard, “understanding it as an emotion helps to explain how epistemic anxiety fills such a function” (2019, p. 6). [↑](#footnote-ref-4)
5. Indeed, it is for this reason that certain results from empirical psychology are supposed to be a problem for virtue ethics, as these results are supposed to cast doubt on the claim that people behave in ways that are cross-situationally consistent (e.g., Doris 2002). [↑](#footnote-ref-5)
6. Vazard (2019) explores at length the hypothesis that those who suffer from OCD do so partly because they have a tendency to feel excessive amounts of epistemic anxiety. [↑](#footnote-ref-6)
7. The intellectual virtue of cognitive concern is also similar to the moral virtue that Kurth calls “moral concern”, which involves the disposition “to defend what’s valuable and to be sensitive to uncertainty” (2018, p. 128). In his book, Kurth argues for the value of anxiety, but he is concerned mostly with “practical anxiety”, an “emotion that both automatically signals that we face a difficult or novel choice and engages the genuine reasoning that helps bring good practical judgment” (2018, p. 166). Although Kurth (2018) primarily discusses *moral* virtue, rather than *intellectual* virtue and makes no mention of “epistemic anxiety”, it would be an interesting project to try to connect epistemic anxiety, as it is analyzed by Nagel (2010), Hookway (2011), Vazard (2019), etc., to these other forms of anxiety that Kurth examines. I will not explore this theme here, however. [↑](#footnote-ref-7)
8. See also Crerar (2020) for a critique of the strong motivational requirement. [↑](#footnote-ref-8)
9. Alfano also helpfully distinguishes between *reliability* and *adaptiveness*: “adaptiveness of a belief-formation process isn’t just its reliability; it’s reliability *when it matters*” (2014, p. 119). To say that System-2 thinking is truth-conducive does not entail that shifting to System-2 thinking is always adaptive. [↑](#footnote-ref-9)
10. See, for instance, the edited volume by Beilby (2002), which contains several critical responses. For a more recent critical response, see Boudry and Vlerick (2014). [↑](#footnote-ref-10)
11. According to Harman (1965, pp. 88-9), IBE often goes by many names one of which is “abduction”, a term coined by C.S. Peirce. But despite similarities between Peirce’s abduction and IBE, it has been argued that viewing abduction as the forbearer of IBE is not historically accurate, e.g., Minnameier (2004), Campos (2011). [↑](#footnote-ref-11)
12. See Douven and Mirabile (2018) and the references therein for empirical evidence showing that the use of IBE is extremely common. [↑](#footnote-ref-12)
13. See, for example, Lipton (2004) for a book-length defense of IBE and the edited volume by McCain and Poston (2017) for a collection of recent essays, many of which also argue for IBE. [↑](#footnote-ref-13)
14. This derives from the term “abductive trigger”, which Aliseda (2006) uses to refer to the “surprising fact *C*” in Peirce’s formulation of abduction. [↑](#footnote-ref-14)
15. We can compare my use of “anomaly” here in the context of IBE to Kuhn’s use of the term. For Kuhn, anomalies are cases where “nature has somehow violated the paradigm-induced expectations that govern normal science” (1970, pp. 52-3). [↑](#footnote-ref-15)
16. In discussions of the metaphysics of laws of nature, disagreements between Humeans (e.g., Lewis 1973) and non-Humeans (e.g., Armstrong 1983) partly turn on whether the fundamental, universal patterns that we observe in nature *require* an explanation. Non-Humeans claim that they do and are thus motivated to posit ontologically robust laws of nature to explain the patterns that we observe, whereas Humeans deny that this is an explanatory requirement (e.g., Swartz 1985, p. 204). In science, sometimes physicists disagree with each other over whether the “Past Hypothesis”, i.e., the fact that shortly after the Big Bang the universe was in a state of very low entropy, requires an explanation (Baras and Shenker 2020). [↑](#footnote-ref-16)
17. Here I am committed to the claim that “the joint occurrence of X and Y is a coincidence” implies that “the joint occurrence of X and Y has no explanation.” Although this entailment is consonant with ordinary language usage—indeed, Lando (2016, p. 152) calls it a “truism”—and is sometimes made explicit, in for instance Lange’s (2016) account of “mathematical coincidence”, it is not entirely uncontroversial (e.g., Sober 2012). [↑](#footnote-ref-17)
18. Here and throughout, I presuppose the falsity of the Principle of Sufficient Reason (PSR), a principle which states, roughly, that all facts require an explanation. The truth of the PSR would render the *Anomaly Stage* in my formulation of IBE redundant, as all facts would automatically require an explanation. Despite its venerable history, the PSR has fallen out of favor in contemporary philosophy for a wide variety of reasons that I will not rehearse here. However, see Pruss (2009) and Della Roca (2010) for defenses of the PSR. [↑](#footnote-ref-18)
19. To be sure, we could conceive of agents, such as pure Cartesian egos or the gods that Aristotle discusses in Book X of the *Nicomachean Ethics* that lack almost all of the practical interests that human beings typically have. Such agents could still feel epistemic anxiety, however, if they retained a desire for truth. In this case, even these agents might respond with epistemic anxiety to anomalous facts and thus be motivated to apply IBE. [↑](#footnote-ref-19)
20. This list includes the Copernican argument for the heliocentric model of the solar system (Gauch 2012), Darwin’s theory of natural selection and common ancestry (Okasha 2000), and Huygens’ argument for the wave theory of light over Newton’s particle theory (Thagard 1978). [↑](#footnote-ref-20)
21. See, for instance, Psillos (1999), who employs IBE to defend scientific realism, Vogel (1990), who appeals to IBE to combat world skepticism, and Baker (2009), who appeals to IBE to defend mathematical Platonism. [↑](#footnote-ref-21)
22. Although for criticism of Roche and Sober (2013), perhaps the most recent prominent argument against IBE, see McCain and Poston (2014, 2018), Climenhaga (2017), and Lange (2017). [↑](#footnote-ref-22)
23. Many thanks to an anonymous reviewer for helping me to refine and clarify this section. [↑](#footnote-ref-23)
24. Indeed, in more recent work, Sosa (2015), a leading virtue-reliabilist, has conceded this point and has attempted to incorporate the responsibilist virtues in his reliabilist epistemology, writing that “reliabilist, competence-based virtue epistemology must be understood broadly, in a more positively ecumenical way, with responsibilist agential intellectual virtues at its core” (p. 11). [↑](#footnote-ref-24)
25. See Baras (2019, 2020), who has criticized the few existing attempts to specify just such a principle. Often in attempts to explicate what it means for some fact F to require an explanation, philosophers propose analyses such as F requires an explanation if and only if F is “surprising”, or “unexpected”, or “striking”, given our background knowledge (e.g., Horwich 1982; White 2005; Jakobsen 2020). However, such locutions by themselves do not do much clarificatory work. One might think then that we should regard the facts that require an explanation as simply those facts that are sufficiently improbable given our background knowledge. But this simple and elegant analysis quickly runs afoul of counterexamples. For example, my winning the lottery is improbable given my background knowledge, but *somebody* must win, and so the mere fact that I won does not entail that this fact requires an explanation. Because of cases such as these, “the improbability thesis is a non-starter” (Baras & Shenker 2020, p. 36, fn. 26). [↑](#footnote-ref-25)
26. Certainly, one might think that practical knowledge in some sense *reduces* to theoretical knowledge, a view often called “intellectualism.” Here, however, I concur with the commonsense view and with the “majority opinion in academic philosophy… that there is a considerable degree of independence” (Fantl 2012) between practical knowledge and theoretical knowledge. For more discussion, see Bengson and Moffett (2012). [↑](#footnote-ref-26)
27. Duhem (1915/1991, pp. 23-25) writes, regarding the limits of deductive and inductive logic in scientific practice: “[The rules of syllogistic logic are not adequate. They must be assisted by a certain sense of soundness that is one of the forms of good sense… What a delicate task, concerning which no precise rule can guide the mind! It is essentially a matter of insight and ingenuity!” See Stump (2007) and Kidd (2011), both of whom argue that Duhem, given his notion of good sense, is best understood as a virtue epistemologist. [↑](#footnote-ref-27)
28. See: https://www.tylervigen.com/spurious-correlations [↑](#footnote-ref-28)