

THE TRIPARTITE ROLE OF BELIEF: EVIDENCE, TRUTH, AND ACTION

Kenny Easwaran

Abstract: Belief and credence are often characterized in three different ways—they ought to govern our actions, they ought to be governed by our evidence, and they ought to aim at the truth. If one of these roles is to be central, we need to explain why the others should be features of the same mental state rather than separate ones. If multiple roles are equally central, then this may cause problems for some traditional arguments about what belief and credence must be like. I read the history of formal and traditional epistemology through the lens of these functional roles, and suggest that considerations from one literature might have a role in the other. The similarities and differences between these literatures may suggest some more general ideas about the nature of epistemology in abstraction from the details of credence and belief in particular.

This essay is an attempt at re-reading a certain portion of the history of epistemology. It may well be a misreading of much of that history, but if so, I hope that it is a productive misreading that might generate useful ways of thinking about old problems. My main idea is to look at particular developments in the history of formal epistemology and traditional epistemology through the lens of functionalism in the philosophy of mind. I hope that interpreting some of these literatures as I have will allow researchers in these fields to apply existing ideas from one to make progress on contemporary issues for the interaction of formal and traditional epistemology.

The particular topic in epistemology I am looking at is the nature of the doxastic attitudes—belief, credence, and their relatives. An important topic bridging traditional epistemology and formal epistemology involves the relation between these attitudes. Part of understanding the relation between these attitudes involves understanding each one on its own. In this paper, I propose that much literature in both traditional and formal epistemology has aimed at understanding these attitudes through the normative functional roles they play. I survey some of the history of these literatures and the roles that have been proposed, and suggest some ways that they can inform each other and some potential topics of investigation for future work in this area.

1 Functionalism about Belief

There may be purposes in epistemology for which it is necessary to understand what sort of mental state belief consists in. To take a view one might attribute to [Fodor \(1978\)](#), we might say that to have an attitude toward a proposition is just to have some mental representation of the proposition tokened in a particular mental module. As [Schiffer \(1981\)](#) caricatured it, to believe the proposition is just for this token to be in the “belief box,” while to desire it is for it to be in the “desire box,” and to imagine it is for it to be in the “imagination box.” To understand the nature of belief, we should figure out what it is that makes one module the belief box and another the desire box.

The usual way to characterize a mental state is functionally ([Levin 2013](#)). This functional characterization usually focuses on the causal role that the state plays. What makes a state “pain,” for instance, is (very roughly) that it’s the sort of state that tends to be triggered by bodily damage, and that tends to trigger behavior aimed at preventing that damage.¹ We might aim to characterize belief and credence similarly, in terms of their functional role.

This functional role may be taken to be a kind of descriptive characterization of the state, or may have various normative dimensions. Pain might be said to be any state that as a matter of fact tends to be triggered by bodily damage and tends to trigger behavior aimed at preventing that damage. Much literature in the philosophy of biology ([Millikan 1989](#); [Neander 1991](#)) has shown how to develop a more normative account of function in a naturalistically respectable way. Pain is that state that tended, in the evolutionary history of a type of organism, to promote survival and reproduction by being triggered by bodily damage and triggering behavior aimed at preventing that damage. Under these conditions, we can say that pain *ought* to have these upstream and downstream connections, whether or not a particular instance of pain in fact has the relevant triggers. The “Pittsburgh school” around Sellars, Brandom, Haugeland, and McDowell has made use of a type of functionalism on which many psychological states have functions not just to trigger mere behavior, but to trigger the applicability of a specific norm ([Maher 2012](#); [Reider 2012](#)). In this paper, I will often elide the distinction between the descriptive or normative aspects of philosophical views I discuss, because my goal here is to provide more of a historically illustrated sketch of logical space than to provide a fully

¹ [Lewis \(1980\)](#) suggests that by understanding “tends to be” in the right way, we can make sense both of “mad pain” and “Martian pain.” “Mad pain” is the state that occurs when the brain states that play the pain functional role in a neurotypical person happen to be hooked up to different causes and effects in a neuroatypical person. “Martian pain” is the state that occurs when a creature very different from a human has its own type of state that typically plays the pain functional role. While states like “Martian belief” are extensively discussed in the literature on artificial intelligence (among other places), I’m not aware of any discussion of states like “mad belief.”

precise historical characterization of the views of particular philosophers discussed. Even if a particular philosopher in fact proposed a descriptive view, it may be more useful for the development of new views to consider a parallel normative view (or vice versa).

Although epistemologists haven't often used the language of "functional roles," much of the historical discussion of the norms on credence, belief, and other doxastic attitudes can be interpreted in this light. However, while the functional roles of most mental states have been characterized in terms of both their causes and effects, in epistemology it has been somewhat different. The three sorts of role that have been most often discussed include a sort of responsiveness to evidence, a disposition to govern action, and an aim of being true. I will often generalize from these three roles to talk more generally of any "upstream" cause rather than just evidence and any "downstream" effect rather than just action. Roles that are neither upstream nor downstream, like being true, I will call "static," to indicate that the role is a role for the state and not for any transition that it might produce or be produced by. The history I outline in this paper is a history of the use of upstream, downstream, and static roles in functionally characterizing doxastic attitudes.

Clifford (1877) considered downstream and upstream causal roles, as became typical for functionalists in philosophy of mind. A shipowner who believes that a ship is seaworthy when it is not may allow it to sail with hundreds of passengers on board, resulting in their tragic death. Furthermore, even if a believer herself doesn't act on her belief, she is likely to transmit it to others who might. And even if a belief is not itself relevant to such important actions, "Habitual want of care about what I believe leads to habitual want of care in others about the truth of what is told to me." Thus, he argued that we as believers have a very strong ethical duty to form our beliefs only in line with the evidence (an important upstream role). "It is wrong always, everywhere, and for anyone to believe anything upon insufficient evidence."

However, James (1896) focused on what I call *static roles*. In particular, he said that we have two main aims in having beliefs: to "seek truth" and to "shun error." Beliefs might not directly govern action, or respond to evidence, but they still have these two aims. He argued that many social propositions, and perhaps religious and even some scientific ones, are of a sort for which we can't get evidence until we believe. (In some cases this is because "faith in a fact can help create the fact," and in others because one can't actually persevere to run the experiments, or be open to the cosmos in the right way, unless one already believes.) Thus, we must sometimes believe a claim, even in the absence of evidence, in order to achieve the truth.

These three particular roles—responding to evidence, aiming toward truth and away from falsehood, and guiding action—have served as the prototypical upstream, static, and downstream functional roles for doxastic states for most epistemologists since this exchange between Clifford and

James. However, unlike most functional analyses in philosophy of mind, I will suggest that most epistemologists have taken the idea that one of these three types of functional roles is primary, with the others derivable from it if they exist at all. [Nolfi \(2015\)](#) explicitly considers the issue of which if any roles are fundamental, but others appear to presuppose it.

In the next two sections, I trace some of the history of these three types of roles in characterizing, respectively, credence and belief. In the remainder of the paper I consider the question of whether one role can be considered primary with the others being derived, or whether multiple roles must be taken as equally fundamental, as is more traditional in philosophy of mind. In discussing the history, I show that some familiar arguments in these different strands of epistemology can be understood as showing that a state that is fundamentally aimed at one of these three roles will be in some sense well suited for the others. Thus, one might be able to argue that different types of epistemic agents (whether human, animal, alien, or artificial) might have states for which different roles are fundamental, but still end up behaving similarly enough to all count as doxastic. If the distinctions between the behavior of states governed by these different roles are significant enough, it is also conceivable that individual agents have multiple types of doxastic states functionally characterized in terms of these different roles.²

2 Formal Epistemology

The modern history of formal epistemology begins with [Ramsey \(1926\)](#) and [de Finetti \(1931\)](#). Perhaps inspired by the notions of behaviorism, positivism, and pragmatism that were popular at the time, they argued that belief should be characterized in terms of its observable effects on the actions of agents. Furthermore, their interpretation of how belief guides action depends essentially on its degree of certainty. Thus, rather than talking about belief, they talk about confidence, credence, or degree of belief. This state's fundamental role is to govern action, but only in combination with a separate graded state of desire, value, or "utility."

Ramsey and de Finetti propose different ways to measure degree of belief, but for both, one paradigmatic way is to see at what odds an agent will take a bet that they will win if the belief is true and lose otherwise. They both note that if an agent's degrees of belief fail to satisfy the axioms of probability theory, then there is a set of bets that they are willing to take, but that together guarantee a loss for the agent. Conversely, if an agent's degrees of belief do satisfy the axioms of probability theory, then the acts these

² See [Pettigrew 2015](#) for a proposal that there are distinct belief states characterized in terms of distinct downstream roles (governing assertion, governing short-term actions, governing temporally extended actions, and governing moral judgments, the last inspired by considerations from [Buchak 2014](#)). See [Wedgwood 2012](#) for a proposal that there are distinct credal states characterized in terms of following evidence and guiding actions.

degrees of belief lead to will always preserve some possibility of a good outcome. Thus, the representation of degrees of belief as probabilities is justified by the idea that degrees of belief fundamentally represent coherent means of guiding one's actions toward outcomes that one prefers.

Starting at least with [Savage \(1954\)](#), some decision theorists have gone even further. Rather than saying that credence and utility are two separate states whose primary role is to jointly guide one's actions, this tradition takes preference among actions to precede credence or utility. Assuming a certain type of coherence for an agent's preferences, Savage shows that preference can be factored into credences and utilities. Fundamentally, these doxastic and bouletic (desire-like) states are not separate, but are mixed together as aspects of one fundamental action-guiding mental state. Further refinement of this project has been carried out by [Jeffrey \(1965\)](#) and [Joyce \(1999\)](#), and versions of it have guided much work in psychology and economics.

However, in recent years, many formal epistemologists have been unhappy with the idea that preference, or any such action-guiding role, could be central to the nature of belief. [Eriksson and Hájek \(2007\)](#) give a typical argument: "credences and preferences are certainly separable in thought, and sometimes in practice. Imagine a Zen Buddhist monk who has credences but no preferences. . . . If the monk is conceptually possible, then any account that conceptually ties credences to preferences is refuted" (195–196). One might similarly imagine an agent with credences but no action, so that credences can't fundamentally guide actions. The idea is that any downstream-focused account of the role of beliefs (or at least, any such account where the downstream role is that of guiding preference or action or anything of the sort) gives only a *pragmatic* conception of belief rather than a properly epistemic one. While Ramsey, and especially de Finetti, might be happy with a pragmatic conception of belief, some epistemologists have thought this unacceptable.

Instead, starting with [Joyce \(1998\)](#), a new program has arisen that focuses on a different role for belief.

This overemphasis on the pragmatic dimension of partial beliefs tends to obscure the fact that they have properties that can be understood independently of their role in the production of action. Indeed, probabilists have tended to pay little heed to the one aspect of partial beliefs that would be of most interest to epistemologists: namely, their role in representing the world's state. My strong hunch is that this neglect is a large part of what has led so many epistemologists to relegate partial beliefs to a second-class status. (576)

In a sense, Joyce aims to formalize James's idea that belief aims at the truth, within the framework of degree of belief. In my earlier terminology, this is

to privilege a static role over the downstream-focused role privileged by the earlier formal epistemologists.³

In this paper, Joyce shows that under certain assumptions about how to measure the overall accuracy of a set of degrees of belief in representing the world, for any set of degrees of belief that *don't* satisfy the classical probability axioms, there is another set of degrees of belief that *do* satisfy the probability axioms, which are *guaranteed* to be more accurate, regardless of what the world is like. Thus, the representation of degrees of belief as probabilities is justified by the idea that degrees of belief fundamentally aim to represent the world accurately. This project has been developed further by a number of authors, including Greaves and Wallace (2006), Leitgab and Pettigrew (2010a; 2010b), Easwaran (2013), and particularly Pettigrew (2016).

However, in the past few years, this accuracy-focused project has also spawned its own set of critiques. Greaves (2013) and Berker (2013) have noted some similarities between this project and consequentialist ethics, and brought over some of the problems traditionally raised against that view.⁴ In particular, they note that if one knows that high credence in one proposition against which one has strong evidence will result in the truth of many other propositions in which one has high credence, then aiming at overall truth will support believing against the evidence. Caie (2013) and Carr (Forthcoming) have shown that for beliefs that make themselves true or make themselves false (some of which are the ones that James even used to motivate the idea of belief as aiming at the truth rather than being guided by the evidence), the accuracy-focused project actually recommends *violations* of the probability axioms. An upshot of this is that many formal epistemologists are now interested in analyzing a more purely evidential role for credence, or in some other way bringing in an upstream role.

Although there has not yet been a project in the mainstream of formal epistemology that focuses on such an upstream role for degree of belief, these ideas have been pursued by some physicists and statisticians. For instance, the Dempster-Shafer theory of upper and lower probabilities was developed partially as a way to represent the ways that evidence can guide belief without specifying precise numerical probabilities (Shafer 1976). And much of the theory of Objective Bayesianism is justified as an attempt to

³ An interestingly different truth-oriented role for credence is given by Sophie Horowitz (2016). She suggests that credences are good if they license accurate guesses, and guesses are accurate if they are true. In my terminology, this is a downstream role for credence, evaluating it on the basis of the states it leads to. But it has some important connections to the static idea of aiming at the truth without regard to the downstream consequences.

⁴ I thank Daniel Nolan for bringing to my attention Jenkins (2007), which raised a similar worry for consequentialist views in traditional epistemology, though these ideas appear to have developed independently. In all cases, the issue is whether a bad attitude to one proposition can be justified on the basis of the good it will lead to in one's attitude to other propositions, parallel to the question raised by trolley problems for consequentialist ethics: Can an action harming one person be justified on the basis of the good it will lead to for others?

spell out a theory of belief as an appropriate response to evidence. Jaynes (2003) attempts to derive probability theory—using the theorem of Cox (1946), which has been corrected by Halpern (1999)—as well as additional principles of statistical reasoning, from the idea that every body of evidence makes only one set of degrees of belief rational. While this idea has been very controversial in epistemology (Horowitz 2016; Schoenfield 2014; Kopec and Titelbaum 2016), this would be a natural place to begin with a response to the worries for the downstream and static roles for degree of belief.

3 Traditional Epistemology

Upstream, downstream, and static roles for belief have also been discussed in the history of traditional epistemology. However, while formal epistemology started with the downstream role, moved to a static one, and now has growing calls for attention to the upstream role, the historical trajectory in traditional epistemology appears to have been the reverse.

For better or for worse, much of the mainstream of analytic epistemology for several decades was in some way responding to Gettier (1963), who argued convincingly that knowledge is not the same as justified belief that happens to be true. Although epistemologists have denied this analysis, much of the early post-Gettier history consisted of attempts to supplement the justification condition, strengthen it, or analyze it further in contrast to the truth condition. The first response to this paper, by Michael Clark (1963), claims that what is missing is that for a belief that is true to constitute knowledge, it must not be grounded in any beliefs that are themselves false. Another early response, by Alvin Goldman (1967), involved the idea that knowledge is true belief that is caused in the appropriate way by the truth of the proposition believed. In many of these early responses, what is said to be important about belief is the way it comes about, or its causal basis, or some other sort of upstream factor.⁵

Although these particular responses to the Gettier problem run into their own problems, many further responses in this time period also look to the grounds on which beliefs are based. Many of the central topics of epistemology in the 1970s and 1980s (foundationalism/coherentism, internalism/externalism) are strongly interested in this sort of basing of belief in appropriate support. A major culmination of this line of thinking is the evidentialism of Feldman and Conee (1985): “the view that the epistemic justification of a belief is determined by the quality of the believer’s

⁵ These proposals and many others I discuss later are, strictly speaking, proposals about the nature of knowledge. Since my main concern is the functional characterization of belief, these are slightly off topic, although they naturally suggest functional roles for belief if we assume that belief must always aim at being knowledge. However, since my main goal is to draw parallels between the history of formal and traditional epistemology that might suggest ideas from one to use in thinking about the other, suggestive connections may be good enough.

evidence for the belief" (15). They stress in various ways that what is epistemically important about belief is that one should believe in line with the evidence and not that one should be "trying for the truth" (20), and that "it is a mistake to think that what is . . . epistemically justified . . . has the overall best epistemic consequences" (23). They are centrally focused on upstream considerations in characterizing epistemic justification.

However, evidentialism was developed partly as a response to other currents in epistemology that were beginning to stir. Alvin Goldman (1979) eventually argued that the process by which a belief is formed is relevant to its status, but that this is not a purely upstream condition. Although the process itself is upstream from the belief, the processes that justify belief are the ones that reliably lead to true beliefs. The upstream condition of being caused by a reliable process is relevant only to the extent that it helps the belief meet the static condition of being true. Roderick Firth (1981) drew an explicit parallel between this sort of idea and rule-utilitarian ethics, which has become more important in recent literature. This sort of idea has been pursued even further by some epistemologists in the virtue reliabilist tradition, such as Ernest Sosa (2007).

An even more static characterization came from Nozick (1981), who presented a "tracking" account of knowledge. *S*'s belief that *p* counts as knowledge only if, were *p* false, *S* wouldn't have believed it (the belief is *sensitive*), and were *p* true, *S* would believe it (the belief is *adherent*). Although sensitivity and adherence may hold of a belief because of the basis on which it is formed, it is this modal connection to the truth that is important for Nozick more so than the actual origin itself (although some of his responses to challenges do focus on the process by which the belief was formed). Some other authors focused on the related condition of a belief being *safe*, meaning that *S* couldn't easily have believed *p* falsely.

At around this time, there was also work in philosophy of mind on the nature of mental representation that similarly rejected upstream characterization of belief in favor of something more like what I am calling a static characterization. As noted by Fodor, a simple theory on which a mental state counts as belief that *p* iff it is the type of state that is caused by the fact that *p* makes it hard to explain how it is possible for belief to be false. Instead, we need to individuate mental states by the ways they are *usually* or *normally* or *typically* or *correctly* caused. Fred Dretske (1981; 1986) argues that instead, a state counts as a belief (or at least a representation) that *p* only if it is the sort of state that has the *function* of indicating that *p*, which involves being likely to be true, regardless of how the state is in fact produced. This idea is further pursued by Ruth Millikan (1984), who helps to clarify the notion of biological function involved. Millikan also stresses the importance of the connection of doxastic systems to downstream "consumer" systems (i.e., other bodily systems that make use of doxastic representations, either for governing action or for other purposes).

In recent years, downstream conditions have become even more important in epistemology. Starting with [Fantl and McGrath \(2002\)](#), many epistemologists have noted that whether a belief counts as knowledge seems in many cases to depend not just on the amount of evidence the believer has, or the reliability of the belief, but also on the types of actions that might depend on the belief. If one is about to board a train, and just wants to get to the end of the line, one can know that it is the local train by means of overhearing a random person saying that it is. But if one absolutely needs to get to one of the local stops, and it's vitally important to get on a local train rather than accidentally boarding an express when a local will pass by within the next hour, then this overhearing doesn't seem sufficient to come to know that the train that just entered the station is a local. This phenomenon has been termed "pragmatic encroachment," following comments by Jonathan Kvanvig on the blog *Certain Doubts*.⁶

In the following years, many epistemologists have discussed the phenomenon, arguing about whether it is really a feature of belief or knowledge, or rather of our language, and trying to explain whether it arises at the level of belief itself, justification, or knowledge. Jennifer Nagel (2008) has argued that competition between a "need for closure" and the importance of potential actions governed by a belief explain the changing standards in cases of pragmatic encroachment. Rima Basu and Jessie Munton are working on projects arguing that not merely the practical upshot of action based on a belief is relevant, but also the moral significance of the belief.

An interesting precursor to this recent work on pragmatic encroachment is some work in philosophy of science about the idea of scientific inquiry as value-free. Starting at least with [Rudner \(1953\)](#), and developed in various ways later by [Maher \(2008\)](#), [Kaplan \(1995\)](#), and [Douglas \(2000\)](#), philosophers of science have pointed out that moving from a probability to a belief, or perhaps a related type of state known as "acceptance," involves a value judgment. One must decide just how to trade off the risk of incorrectly believing something against the risk of incorrectly failing to believe it, which in many cases depends on the use to which the belief will be put. However, although formal epistemologists responded to this work ([Jeffrey 1956](#); [Levi 1960](#)), mainstream epistemologists ignored much of this work until the issue of pragmatic encroachment brought it to their attention.

Thus, all three types of roles for belief—upstream, static, and downstream—have eventually been investigated in both traditions, though with very different emphasis. Formal epistemology has focused on the pragmatic role, with recent development of the alethic role and very little to say about real evidential basing. Traditional epistemology has focused on evidential

⁶ <http://certaindoubts.com/test/>. Date accessed, 11/1/2016.

basing, with some development of the alethic role, and very little to say until recently about the pragmatic role for belief.⁷

4 Interaction of the Three Roles

As mentioned earlier, functionalist analyses in the philosophy of mind often characterize a mental state in terms of both its upstream and downstream roles. However, the views I have described from the history of both formal and traditional epistemology mostly privilege one role over the others. In this section, I discuss the relations of these roles, and try to explain why it may be that one role is privileged over others. As I will show, much of the history of both formal and traditional epistemology can be seen as showing how a state for which one role is privileged will end up acting like it is partially governed by the other roles.

As an example of how a related discussion has played out, consider the question of the meanings of logical connectives. There are two traditional ways to give these meanings—by stipulating truth conditions for complex sentences built out of these connectives, or by stipulating inference rules involving the connectives, traditionally including both introduction and elimination rules. We can think of truth conditions as a sort of static role, introduction rules as an upstream role, and elimination rules as a downstream role. On perhaps the most familiar picture, the static role (truth conditions) is taken to be primary, and the soundness and completeness theorems for classical logic then show that this role can ground the use of these connectives in certain upstream and downstream roles.

However, Michael Dummett (1974) has argued that the notion of truth involved here is beyond the capacity of language users to learn from our experience in the world. Instead, all we see are the practices of using the connectives, and their relation to evidence, inference, assertion, and other upstream and downstream roles. Thus, he argues that we must take the upstream and downstream roles to be primary, and give the meanings of the connectives in terms of their introduction and elimination rules.

However, as Arthur Prior (1960) showed, attaching arbitrary introduction and elimination rules to a single connective can lead to problematic inferences. If we create a connective called “tonk” with the introduction rules of disjunction and the elimination rules of conjunction, then anything can be derived from anything! Nuel Belnap (1961) suggested that the introduction and elimination rules for a single connective must instead be related in an appropriate way. Working out the details of this notion of “harmony” became a major theme in the work of Dag Prawitz and Michael Dummett. On this conception of inferential semantics, once we specify the introduction rules for a connective (its upstream role), it automatically

⁷ There are some other earlier downstream-focused accounts in traditional epistemology. Daniel Nolan has pointed out to me that Craig (1991) provides an account of knowledge on which it is a state aimed at producing good testimony, rather than producing good actions.

inherits the harmonious set of elimination rules, and vice versa. Although we could take either to be fundamental, it doesn't matter which; they are two aspects of one role, rather than two different roles. However, the rules that satisfy Dummett's notion of harmony are only the rules that are valid in *intuitionistic* logic and not classical logic. There is no truth-conditional semantics that corresponds to these rules.⁸

Although the meaning of a connective is quite a different thing from the nature of a mental state, there are still some morals to draw from this analogy. If a mental state plays multiple roles, it may be that one of these roles is primary and the others are in some sense derivable from it, as the introduction and elimination rules of classical logic are derivable from its truth conditions. Or it may be that these roles are equally fundamental, but in this case there are likely to be some constraints on what these roles must be like so that they fit together well, like the harmony requirements on introduction and elimination rules for intuitionistic logic.

Since mental states of actual physical beings are the result of historical processes in all their messiness, we might not expect the roles they actually play to line up quite as nicely as the ideal constraints require—surely the causes of love and lust don't perfectly line up with the conditions they aim to represent or the reproductive fitness that they serve to promote. But we might hope to say something about the conceptual priority relations and connections among these roles from the perspective of epistemology as a study of possible doxastic agents, in abstraction from the particular physical instances we have encountered. Humans may have doxastic states with one particular set of roles to play, dolphins or squid may have other sets of roles, artificial intelligences yet others, and extraterrestrial intelligences still others. Nevertheless, we may be able to characterize some of these roles in the abstract in a way that helps us understand how these diverse systems with diverse structures can all in some sense count as epistemic.

4.1 Formal Epistemology

From the perspective of degree of belief as a state that is inherently aimed at guiding actions, Ramsey, de Finetti, and the decision theorists are all able to derive the traditional mathematics of probability theory. Much of the history of this strand of formal epistemology (and related fields) can be seen as a series of derivations of how probability theory incorporates evidence and accuracy, even when it is based purely on pragmatic considerations.

[Savage \(1954\)](#) aimed to show that the full theory of traditional statistical inference could be justified from the assumption that probability just is the quantity abstracted from the preferences of a rational agent. Although Savage himself in later editions of his book recognized that his project was not as successful as he thought, much of the field of Bayesian statistics is a working out of the sort of inference that can in fact be justified in this way.

⁸ Slightly different conceptions of the problem allow for harmonious rules to give rise to classical truth conditions as a byproduct as well ([Rumfit 2000](#)).

The central evidential rule that is considered in formal epistemology is the rule of updating one's degrees of belief by the rule of conditionalization, and some results in formal epistemology are said to show that even if governing action is the primary role for degree of belief, there can be a derived role for this sort of responsiveness to evidence. Famously, I. J. Good (1967) showed that a rational agent will always prefer to update her credences by conditionalizing on evidence before acting, rather than doing the action she antecedently thinks to be best (provided that the information and update aren't themselves costly). More centrally in the philosophical literature, Teller (1973) presents a Dutch book argument by David Lewis for conditionalization that is analogous to some of the original arguments that degrees of belief should obey the laws of probability. Similar arguments have also been provided for how to respond to evidence that is more equivocal so that it can't be conditionalized on directly (Skyrms 1987).

There has been somewhat less investigation into the sense in which degrees of belief that govern action must aim at the truth. However, this is a natural way to think of certain Bayesian convergence results. There are a series of theorems called "Bernstein-von Mises theorems" (since Sergei Bernstein and Richard von Mises proved two early versions of them, although they were importantly generalized and qualified by Joseph Doob, David Freedman, and others) showing that under certain reasonable assumptions, agents that satisfy the rules of probability theory and update by conditionalization will eventually get close to the truth. In particular, these results show that if some unknown parameter controls the generation of some observations, then for any initial set of degrees of belief about this parameter, and any degree of accuracy in estimation of this parameter, one will eventually (after enough observations) estimate that parameter to within that degree of accuracy. These results may be thought to provide some sense in which degrees of belief whose sole fundamental purpose is to govern action will nevertheless have some obligation to respond to evidence in particular ways that eventually make sure that they are close to the truth.

Formal epistemology based on the static role of aiming at the truth has not been worked out in such great detail yet, but some similar results apply. Joyce (1998) and Leitgeb and Pettigrew (2010a) show that degrees of belief aiming at the truth must satisfy the mathematics of probability theory. Greaves and Wallace (2006) and Easwaran (2013) argue that they should respond to evidence in line with conditionalization and related principles. Schoenfield (2016) shows that this sort of way of thinking of first-order evidence leads to some unexpected results about higher-order evidence, which may have parallels on the pragmatic conception as well. Leitgeb and Pettigrew (2010b) develop an odd rule for responding to evidence in other situations, but Levinstein (2012) shows that a more plausible rule follows from the appropriate way of measuring accuracy. Campbell-Moore and Salow (Forthcoming) show that much of this justification of conditionalization depends on the details of how an agent responds to risk.

As for showing why degrees of belief with a fundamental goal of aiming at the truth should be taken as a guide to action, there has been less progress. In some sense this is to be expected. One central motivation for putting the static role of degree of belief at the center of epistemology is the idea that there could well be epistemic agents that *don't* have preferences or engage in action. For such agents, there would not obviously be any relevant downstream role. However, for agents who *do* have preferences or engage in action, we may be able to argue that they ought to be responsive to states that are estimates of the truth, at least in that an agent should prefer actions that lead to better outcomes in states that are taken as more likely to be true, rather than less likely. Given this sort of assumption, [Easwaran \(2014\)](#) aims to then justify full standard expected utility theory as the norm for action.

Many of the worries for both of these accounts have focused on the sort of upstream evidential role that can really be justified. [Berker \(2013\)](#) and [Carr \(Forthcoming\)](#) point out that consequentialist considerations (like accuracy and action-guidance are taken to be) can at best justify a rule that says that one should update one's degrees of belief in line with the rule of conditionalization. They *don't* give any obvious reason for saying that the new degrees of belief should actually be *based* in the evidence in the sort of way that evidentialists in traditional epistemology say that they should. There have been relatively few attempts to use a fundamental evidential role to justify the other roles of degree of belief, but [Easwaran and Fitelson \(2012\)](#) show that if the evidential role is taken to be equally fundamental with another, it may lead to implausible requirements on degree of belief, unless there is some prior coherence between the evidential and other values.

4.2 Traditional Epistemology

As a result of its lack of formalization, the literature in traditional epistemology has not worked out in such great detail any theory of how a conception of belief based on one role would end up playing the others well. However, there has been some work aimed at doing just this. [Nishi Shah \(2003\)](#) and [Ralph Wedgwood \(2002\)](#) take very seriously the contention that truth is the aim of belief, and try to show how this would justify various sorts of evidential roles for belief.

However, [Kate Nolfi \(2015\)](#) argues that although a “truth privileging account” (one on which the fundamental norm on belief is to aim at the truth) can explain why the package of essential roles for belief includes upstream roles (because these are the best ways to get true beliefs), it can't explain why it includes downstream roles. She says this is because “how we employ our beliefs in forming intentions, for example, simply does not have an impact on whether or not our beliefs conform to the truth norm” (196). Instead, she says “the proper function of belief is to inform our decisions

to act by serving as a kind of map of the way things are so that we achieve whichever ends our actions aim to achieve” (197). She seems to endorse the downstream role as primary, with the others derived from it.

I suspect that there may be a way around her worry. Just as degrees of belief aimed at the truth don’t justify any norms on action without a further assumption that there are states directed at action, we might say the same for full beliefs. However, although the proper function of belief would have nothing to do with action, any states like intentions or preferences would have their own proper functions. If these proper functions include both upstream roles such as being guided by truth-aiming states, and the downstream role of governing action, then we could derive a connection between belief and action. Alternatively, even if intentions and preferences have a proper function that is primarily downstream, we might be able to follow a strategy like the one by which she derives an evidential role for belief, in order to derive a belief-connected role for intentions and preferences. It would be the interaction of intention and belief that generates the connection, rather than the nature of belief itself, as Nolfi (2015) proposes. A truth-privileging account would fail to generate the phenomenon of pragmatic encroachment, but if Nolfi is right, she may be able to provide an explanation. The question would thus become whether the connection between belief and action is entirely due to the nature of one type of mental state as she proposes, or the interaction of two as I suggest.

Much of the literature in formal epistemology connecting the different roles for degree of belief proceeded by way of establishing a rule of probabilistic coherence. There have also been some attempts to derive analogous rules of coherence for full belief from functional considerations. As just one example (though earlier examples exist), Sharon Ryan (1996) has argued that a concern for the truth means that agents ought at least to have consistent beliefs. Considering the lottery and preface paradoxes, she says that “if denying the conjunction principle is the best solution to this paradox, we are forced to accept that a person can be epistemically justified in believing a set of statements she knows cannot possibly all be true. That, it seems to me, is still quite paradoxical” (125–126). Instead, she describes ways that agents should aim at the truth in ways that avoid skepticism but preserve not just the avoidance of contradictions, but any inconsistency among their beliefs.

Niko Kolodny (2007) also aims to give a justification of a similar coherence principle, but he aims to show that it is derived from a simple evidential rule rather than being a fundamental feature of how we aim at the truth. Rather than noting that contradictory propositions can’t both be true, Kolodny instead focuses on the claim that they can’t both be supported by the evidence. He gives a long defense of this claim, and then points out that as a consequence, if one’s beliefs are properly based in one’s evidence, then one’s beliefs will as a matter of fact be consistent. He doesn’t require consistency as a separate epistemic principle.

Easwaran and Fitelson (2014) bring some of the tools of formal epistemology to bear on this question. We argue that consistency is not actually an epistemic requirement at all, either in the way that Ryan or Kolodny defend it. Instead, we devise a weaker notion of coherence and show that it can be justified on both an account of belief as aiming at the truth and an account of belief as aiming to follow the evidence. Inconsistent sets of beliefs can be coherent, as long as there is no alternative set of beliefs that is guaranteed to contain more truths. This turns out to be the same requirement that one believes whatever propositions are made sufficiently probable by the evidence, if evidence is cashed out in terms of some sort of probability. One can never be justified in believing a pair of inconsistent propositions, but one can have larger inconsistent sets, as in the preface and lottery paradoxes.

5 Further Questions

Hopefully, considering the history of epistemology through the lens of these three sorts of roles that doxastic states might play has helped illuminate some issues that were less clear before. At any rate, it raises some new questions that may be fruitful to pursue, and may suggest new moves in either formal or traditional epistemology parallel to established ones in the other field. I have at times talked as though evidence is the only upstream consideration, action is the only downstream consideration, and truth is the only static consideration. Are there others that can fit in well to epistemology? How are these roles to be evaluated? Since the work of Timothy Williamson (2002), many epistemologists have thought of knowledge as a distinctive state that may provide its own sort of value—can this be derived from a concern for evidence, truth, and action, or conversely can it be taken as a fundamental static role for belief that provides justifications of these others? Is there a fundamental clash between the sort of basing we normally assume the upstream role for belief must play, and the traditionally consequentialist ways of treating truth and the outcomes of action? Does this motivate something more like the weaker reliabilist idea of an upstream role?

Kenny Easwaran
E-mail : easwaran@gmail.com

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