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Getting Emotional: Wittgenstein, van Fraassen, and Making Sense of Revolution

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Abstract:

This paper aims to demonstrate the fecundity of pairing specific insights from *On Certainty* with research in the philosophy and history of the natural sciences. To do so, it discusses one set of related themes in the work that focus on the possibility of and nature of revolutionary change. Specifically, I argue that several of Wittgenstein's rather gnomic remarks presage van Fraassen's insistence on the need for decisions and emotions throughout scientific revolutions. Moreover, I argue that reading both together enriches each's individual account and helps further make sense of why and how conversion is not just a 'mad leap in the dark'.

Keywords: Philosophy of Science; Volunteerist epistemology; Emotion; van Fraassen; Wittgenstein.

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“Could Moore really *prove* his belief [that the world existed long before him] be the right one? I do not say that Moore could not *convert* the king [raised to believe that the world began existing when the king was born] to his view, but it would be a conversion of a special kind; the king would be brought to *look at the world in a different way*.” (Wittgenstein 1969, § 92 – emphasis mine)

“Neither side will grant all the *non-empirical assumptions* that the other needs in order to make its case... Though each may hope to *convert* the other to his *way of seeing his science* and its problems, *neither may hope to prove the case*.” (Kuhn 2010, 147 – emphasis mine)

“So here is the problem for epistemology: we take ourselves to have knowledge and to know what it is to be rational. Yet we also look back and see that in our past our presumed knowledge went into crisis, and the crisis was resolved in ways that *burst the very categories* of our then-putative knowledge and reason ... The epistemologist is confronted with *radical conversion*... There are times when epistemology itself needed to undergo radical changes and did so.” (van Fraassen 2002, 74 – emphasis mine)

Introduction

On Certainty is fascinating both because of its breadth and because of the inchoate status Wittgenstein assigned to it (for this status, see, e.g., Wittgenstein 1969 §§ 387, 400, 422, etc.).

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Indeed, targets in the book include – mocking feigned philosophical skepticism (e.g., Wittgenstein 1969 §§ 347, 467, 495, etc.), Cavell-esque points about the interdependence of words, concepts, practices, and objects (e.g., Wittgenstein 1969 §§ 61-64, 114, 126, etc.; Cavell 1991, 64-100), moves towards a contextualist conception of the verb “to know” (e.g., Wittgenstein 1969 §§ 237, 347-553, 407, etc.; DeRose 1995), and perhaps even hints at semantic externalism (e.g., Wittgenstein 1969 § 649).

This paper aims to demonstrate the fecundity of pairing specific insights from *On Certainty* with research in the philosophy and history of the natural sciences. To do so, it discusses one set of related themes in the work– the possibility of and nature of revolutionary change. Specifically, I argue that several of Wittgenstein’s rather gnomic remarks presage van Fraassen’s insistence on the need for decisions and emotions over the course of scientific revolutions. Moreover, I argue that reading both together enriches each’s individual account and helps further make sense of why and how conversion is not just a ‘mad leap in the dark.’

Section I sets the stage. I briefly discuss volunteerist epistemology and use Wittgenstein to adumbrate a taxonomy of types of beliefs. In section II, I discuss van Fraassen’s account of how and why decisions concerning what to believe are critical to scientific practices in revolutionary times as well as why emotion may be crucial for such decisions. I also begin to pair aspects of his account with Wittgenstein, showing that they fruitfully complement and supplement each other. Finally, in section three, I sketch out, far too briefly, how one might use Wittgenstein to enrich van Fraassen and van Fraassen to enhance Wittgenstein in such a way that the problem of conversion becomes more epistemically tractable.

I should make two notes at the outset. First, given that Wittgenstein 1969 is such an inchoate work, I discard the order of the remarks and pair them together in such a way that, I hope, helps shed light on what is afoot. Though this may not be the best purely exegetical strategy, I believe Wittgenstein might well have endorsed it as he notes that “[e]ven if I have hit the mark only rarely, he [a future reader] would recognize the targets I am constantly aiming at” (Wittgenstein 1969 § 387). Second, since the point of this essay is demonstrating the fecundity of reading Wittgenstein and van Fraassen together, I simply accept and assume all aspects of van Fraassen’s “new epistemology” (e.g., van Fraassen 1984, 1988, 1989, 1995, 1995, 2000, 2002). Of course, there have been criticisms of this on several grounds (e.g., Christensen 1991; Psillos 2007). However, such objections are tangential to my interest, and so I bracket them.

Will-to-believe?

Wittgenstein 1969 raises the question of if, how far, and why, the volunteerist account of the belief propositional attitude might be necessary to make sense of our epistemic practices. By “volunteerism,” I mean any account that contends that one can form or modify distinct beliefs based on decision and the will. Thus, Wittgenstein asks, “[i]s it maybe in my power what I believe? Or what I unshakably believe?” (Wittgenstein 1969 § 173). Relatedly, he wonders if he “can... be in doubt at will?” (Wittgenstein 1969 § 221). He further queries, after an examination concerning how certain beliefs interdepend with forms of life, “[b]ut doesn’t it come out... that knowledge is related to a decision?” (Wittgenstein 1969 § 362).

However, his answers to these questions are decidedly mixed. Thus, on the one hand, he notes that “[t]his doubt isn’t one of the doubts in our game. (But not as if we chose this game!)” (Wittgenstein 1969 § 317). Further, “[w]hat is a telling ground for something is not anything I decide” (Wittgenstein 1969 § 271). On the other, he notes that “in the end we can only adduce such grounds as we hold to be grounds, is to say nothing at all” (Wittgenstein 1969 § 599). He also points out that “[i]f someone says that he will recognize no experience as proof of the opposite, that is after all a decision” (Wittgenstein 1969 § 368). Further,

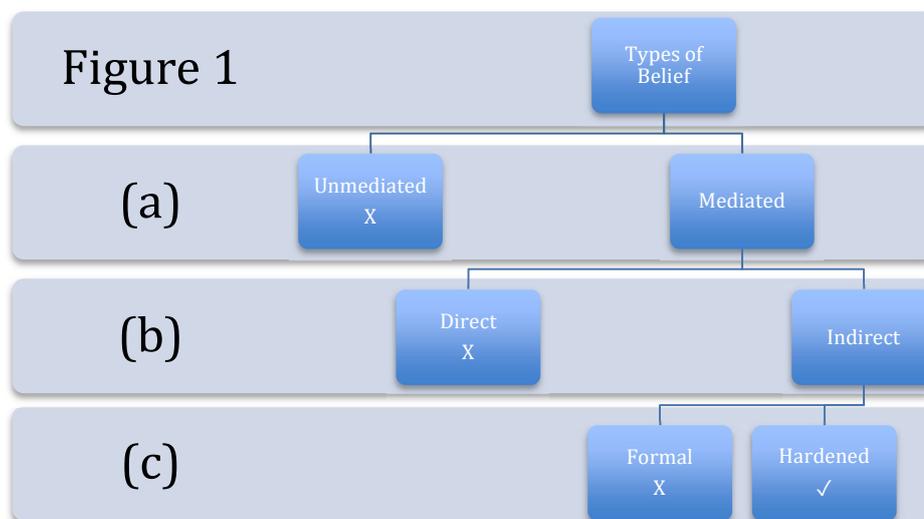


“the questions that we raise, and our doubts depend on the fact that propositions are exempted from doubt, are as it were like hinges on which those turn” (Wittgenstein 1969 § 341) and “it belongs to the logic of our scientific investigations that certain things are indeed not doubted” (Wittgenstein 1969 § 342).

One way to make sense of these varied answers is to distill from Wittgenstein 1969 a taxonomy of types of beliefs. Indeed, should a taxonomy be viable, the apparent inconsistencies would dissolve, as Wittgenstein would be addressing different kinds of beliefs with each remark. Moreover, such a taxonomy would help clarify precisely where, how, and why decisions and the will might have to enter into epistemic practices. And, indeed, Wittgenstein insists that “[o]ur empirical propositions do not form a uniform class” (Wittgenstein 1969 § 213). Further, he notes that

[i]t might be imagined that some propositions, of the form of empirical propositions, were hardened and functioned as channels for such empirical propositions that were not hardened but fluid; and this relation altered with time, in that fluid propositions hardened and the hard ones became fluid. (Wittgenstein 1969 § 96)

Given this, let us read Wittgenstein as offering, admittedly implicitly, a taxonomy of beliefs based not on their semantic content, but based on their varied roles in our epistemic practices (e.g., Wittgenstein 1969 §§ 654-658). Such a taxonomy will be pragmatic in that “there is no sharp division of one from the other [kinds of belief]” (Wittgenstein 1969 § 97). Nevertheless, it will bring into view exactly where volunteerism might be an apt account for a particular subtype of belief. See Figure 1 for the taxonomy. Let us discuss each type and subtype in turn.



To begin, Wittgenstein distinguishes between what I term unmediated and mediated pragmatic roles for beliefs within our justificatory practices. To do so, he asks, “what is the difference between my treating it [an error] as a mistake and my treating it as a mental disturbance?” (Wittgenstein 1969 § 74). And the critical difference is that an unmediated belief is a belief such that “I cannot depart from it without toppling all other judgments with it” (Wittgenstein 1969 § 419). For example, consider a situation where I look out my window, see that it is raining and then see that the rain stops. I utter, “it was raining”. In turn, someone might ask, “why do you believe that it was raining?” and I retort, “I saw it”. To carry on doubting my belief that it was raining, the person I am speaking with might accuse me of being disingenuous or else begin to entertain philosophical skepticism. Let us assume she does the latter. To sustain her skepticism, the person doubting my belief may invoke, e.g.,

demons that trick me. However, this quickly pulls in not just my belief about the rain, but all of my beliefs and the justificatory practices that underwrite them. This is partly because the very idea of “evidence” itself seems to have been called into question (cf. Cavell 1979, 49-86).

To this form of skepticism, Wittgenstein asks “why not [doubt]... the meaning of these words as well?” (Wittgenstein 1969 § 456). In other words, if a person seriously entertains that a demon has tricked me into the belief that I saw rain, why cannot she further maintain that the self-same demon has tricked me with respect to the semantic content that the sentence I utter, “I saw rain”, expresses. Indeed, why should she believe that the English type-sentence “I saw rain”, in my mouth, expresses anything more than, e.g., mere sound and fury that signifies nothing? Given this, Wittgenstein notes that “[a] doubt without an end is not even a doubt” (Wittgenstein 1969 § 625). And this is because, if the semantic content of an answer to a doubt is, itself, rendered doubtful, then it becomes unclear how to reply to the doubt. Moreover, assuming, as Wittgenstein seemed to (cf. Wittgenstein 2009, e.g., §§ 243-315), that there is some relationship between natural language and the supposed language of thought, this can easily be internalized. If I seriously entertain the possibility that a demon is tricking me about basic perceptual capabilities, why not push this further and doubt the propositional content that the doubting/believing attitude is directed towards? And this sort of doubt would betoken a mental disturbance as, quite literally, the propositions that our attitudes are directed towards no longer have any clear content. Given this, it is simply unclear what the semantic content of the supposed doubt is. Notice, however, that this does not so much refute skepticism as insist that, if one wants to continue to be an epistemic subject, such a position becomes pragmatically untenable. We return to this in section II.

By contrast, mediated beliefs have a different role in our justificatory practice. Specifically, a mediated belief’s role is to allow us to form beliefs about some situation via factors that are signs of, or evidence for, it. Given this, Wittgenstein asks if “only a certain regularity in occurrence makes induction [logically] possible?” (Wittgenstein 1969 § 619). And Wittgenstein, it seems to me, gives two distinct answers that reflect direct or indirect mediated beliefs.

For direct mediated beliefs, Wittgenstein treats the question of induction, and amplifying inferences more generally, practically. To do so, Wittgenstein notes that he “want[s] to treat man here as an animal; as a primitive being to which one grants instinct but not ratiocination. As a creature in a primitive state” (Wittgenstein 1969 § 475). Given this, he points out that “[t]he squirrel does not infer by induction that it is going to need stores next winter as well. And no more do we need a law of induction to justify our actions or our predictions” (Wittgenstein 1969 § 286).

Taken together, these quotes suggest that Wittgenstein believes that, practically speaking, our instincts rest on a uniformity not necessarily in nature per se, but in our reactions. In other words, there is a regularity of responses, but this need not be taken to imply some sort of deep uniformity in nature (cf., e.g., van Fraassen 1989, e.g., 151-215; van Fraassen 1994, esp. 120-124). Indeed, “[t]he child... learns to react in such and such a way; and in so reacting it doesn’t so far know anything. Knowing only begins at a later level” (Wittgenstein 1969 § 538). Moreover, Wittgenstein also notes that our ascriptive practices concerning beliefs change for direct mediated beliefs. Thus, “we can see from their [primitive humans’] actions that they believe certain things definitely, whether they express this belief or not” (Wittgenstein 1969 § 284). In other words, we ascribe to squirrels, primitive humans, etc., the belief that winter is coming, even if they cannot express this. And though these sorts of direct mediated beliefs are logically open to worries about induction, they do not interest Wittgenstein, as his focus in *On Certainty* tends to be on avowed beliefs rather than ascribed beliefs.

In contrast, indirect mediated beliefs enable inferences from some feature(s) of the world to some uniform type, regularity, etc., rather than relying on an inflexibility in our instinctual responses. Thus, Wittgenstein notes that

It is clear that our empirical propositions do not all have the same status, since one can lay down such a proposition and turn it from an empirical proposition into a norm of description.

Think of chemical investigations. Lavoisier makes experiments with substances in his laboratory and now he concludes that this and that takes place when there is burning.... He has got hold of a definite world-picture... I say world-picture and not hypothesis because it is the matter-of-course foundation for his research and as such also goes unmentioned. (Wittgenstein 1969 § 167)

Notice, first, that Wittgenstein's focus has clearly changed. Indirect mediated beliefs are not straightforward instinctual extensions of reactions. Instead, here we have a far more cognitively strenuous sort of inference from a state-of-affairs being such-and-so to, e.g., some theoretically posited entity – one imagines, given the case, the presence of (and so the existence of) oxygen. Second, Wittgenstein is bringing into view something like a paradigm or a conceptual schema. Indeed, to rehearse precisely this case, it seems clear that Lavoisier did not simply read off the existence of oxygen from experiments, for the simple reason that Priestley would have demurred and taken them as a sign of dephlogisticated air (Kuhn 1977, 169-173; Kuhn 2010, 52-91. For a reply see Kitcher 1978). Third, and most critically, Wittgenstein's conception of the propositions that constitute the framework has nothing whatever to do with their supposedly 'analytic' status (cf. Glock 1996 for a helpful elaboration). We return to this in a moment.

In any case, Wittgenstein further breaks indirect mediated beliefs into two subtypes, each of which plays a different role in a scientific research program (cf. Lakatos 1978, 8-101). The first subtype is what I term formal. By this, I mean, roughly, mathematics, and various applications of mathematics, that a research program uses. Wittgenstein distinguishes this subtype by entertaining the thought that "[i]f the proposition 12×12 is exempt from doubt, then so too must non-mathematical propositions be" (Wittgenstein 1969 § 653). He replies, "[b]ut against this there are plenty of objections– In the first place there is the fact that '12 x 12 etc.' is a *mathematical* proposition, and from this one may infer that only mathematical propositions are in this situation [i.e., being exempted from doubt]" (Wittgenstein 1969 § 654). Partly, Wittgenstein highlights the fact that formal beliefs form a unique class insofar as one can only infer from one mathematical proposition to another, but not to the empirical world per se (see Wittgenstein 1969 §§ 651-657 for further comment). Of course, the rule-following issue's inventor is aware that the supposed rails to infinity are far less evident than one might think (e.g., Wittgenstein 2009, esp. § 201, Wittgenstein 1964, Part I, e.g., §§ 111-113. See, e.g., Kripke 1982, 7-54, for a forceful elaboration of the issue. See, e.g., Wright 1982, *passim*, for a more general account of Wittgenstein's discussions of mathematics). Nevertheless, the sort of doubts and beliefs Wittgenstein is after here are different in that they relate, however indirectly, to empirical states-of-affairs (cf. Wittgenstein 1969, e.g., § 563). Thus, though volunteerism (or 'bolshevism', cf. Dummett 1978) in mathematics may be an open question, it is not the central focus of Wittgenstein 1969 and so can be bracketed off.

The second subtype is what I term a hardened belief. These are beliefs that have

the form of empirical propositions [i.e., not 'analytic,' assuming there is such a thing], were hardened and function as channels for such empirical propositions as were not

hardened but fluid; and that this relation altered with time, in that the fluid propositions hardened and the hard one's became fluid. (Wittgenstein 1969 § 96)

Notice two things. First, again, it is clear that hardened beliefs have nothing whatever to do with 'analyticity', meaning-stipulations, and so on. For Wittgenstein, the hard-core of a research program is *not* something a logician can simply read off and then (re-) (de-) construct² into a sanitized framework for the research program in question (cf. Carnap 1958). Second, critically, it seems to me that these hardened beliefs are deeply akin to functional a priori judgments, quasi-analytic judgments, or, perhaps, conditions for positivity (see, e.g., Stump 2011, Kuhn 2000, 33-57 & 176-195, or Hacking 2002, 159-199, respectively). In effect, these hardened beliefs, though empirical in the sense both that they seem to make claims about the world and that they are, to some extent, confirmed or disconfirmed by experiments, are exempted from doubt (at least during normal science) in such a way that they function as inferential bridges and yardsticks whose truth is not usually doubted. A classical physicist believes that force is mass times acceleration. This belief certainly appears to be a claim about the world. However, it is different from a belief about, e.g., when a falling rock will hit the ground. And this is precisely because the force belief functions as a prerequisite for constructing a Newtonian model of a targeted system (cf. Giere 2006, 59-95). In other words, the force belief (and others like it) sets out both how to parameterize and model a target and what connections and transformations these parameters can undergo. It constitutes a scientific representation exactly because it proffers us the conditions that must be met for a model of a target to count as Newtonian. Again, this procedure is worlds (perhaps even possible worlds?) apart from 'analytical entailments' and such.

These sorts of hardened beliefs, beliefs that we exempt from doubt in such a way that they can serve as prerequisites for representations of a target in terms of a model, that volunteerism begins to get a grip. Indeed, Wittgenstein makes the straightforward point that we chose to exempt certain beliefs in this manner because "[w]e just *can't* investigate everything, and for that reason, we are forced to rest content with assumptions. If I want the door to turn, the hinges must stay put" (Wittgenstein 1969 § 343). Indeed, to seriously entertain doubts about the force belief is to stop doing classical physics. However, what is critical about this is *not* that such beliefs are somehow apodictic, that they track something built into the fabric of the world, or even that such beliefs are necessary for being epistemic agents. Instead, their certain status reflects the fact that, for this subtype of beliefs, our eyes are closed to doubt (cf. Wittgenstein 2009, II xi § 331). This exception is needed to begin studying, learning, modeling, thinking in terms of, etc., classical physics. However, "[i]f someone says that he will recognize no experience as proof of the opposite, that is after all a *decision*" (Wittgenstein 1969 § 368).

In sum, for Wittgenstein, the beliefs that are subject to the will are precisely hardened beliefs that, e.g., the physics community has *chosen* to exempt from doubt. This choice is required for the simple reason that such beliefs are preconditions for abstraction, idealization, modeling, etc. Moreover, in further support of this contention, it does seem as though neophyte students first studying physics *need* to will themselves to believe statements like "an object in motion remains in motion", *in spite* of both their 'default' framework (e.g., DiSessa 1982) and their 'intuitions' (e.g., Chi 1992). And this choice to will certain beliefs turns on the fact that "[t]he schoolboy *believes* his teacher and his textbook"

² As van Fraassen rightly points out, one of the odd things about such reconstructions are that they are, often, deconstructions. In effect, to explicate a research program is to distort it and discard certain linkages that may appear 'logically ambiguous' but are required for research practices (cf., e.g., van Fraassen 2002, 113-114). Given this, such reconstructions are deconstructions in precisely the sense that they are a 'misreading' of what is afoot.

(Wittgenstein 1969 § 263). Indeed, his “learning [science] is based on believing” (Wittgenstein 1969 § 170). Without this, working to make sense of the claim that objects in motion remaining in motion are moot. After all, balls around here always stop rolling!

However, Wittgenstein’s analysis of this type of belief does not clarify when and why we might revoke our decision to believe. Indeed, though Wittgenstein clearly thinks such a shift, and a subsequent conversion/revolution, is not only possible but may sometimes occur, he does not discuss what might engender it. To fill in this lacuna, let us turn to van Fraassen.

Taking it Personally and Getting Emotional

In the last section, I argued that Wittgenstein identified a particular sort of belief, a hardened belief, such that its role rests on a willed decision to exempt it from doubt. I further argued that such a willed exemption might well be a critical precondition for scientific learning and practice. However, it remains unclear what might lead a person to revoke this decision and so doubt, and ultimately change, a hardened belief. To begin to address this, let us turn to van Fraassen’s elaboration of a volunteerist epistemology in revolutionary times (e.g., van Fraassen 1984, 1988, 1989, 1995, 1995, 2000, 2002).

To begin, such a revocation of a hardened belief would have radical ramifications. And, indeed, van Fraassen’s discussion of scientific revolutions and conversions stresses precisely this point. Thus,

[w]hen we come to the sorts of decision involved there [in a scientific revolution wherein we entertain the thought of revoking the hardened status of a mediated, indirect, hardened belief], the contemplated outcomes *make no sense* from the anterior [pre-revolutionary] point of view (van Fraassen 2002, 101).

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Indeed, from the pre-revolutionary point of view, the proposed revolutionary belief is “literally absurd, incoherent, inconsistent, obviously false, or worse – meaningless, unintelligible – within the older view” (van Fraassen 2002, 72). Let us unpack this.

Notice, first, that this sense of a radical epistemic rupture makes good sense. As mentioned above, to seriously doubt one of Newton’s laws is to begin to stop doing Newtonian physics. And, in a world where Newton’s physics is physics, such a doubt seems to be almost nonsense, or else an all-out attack on physics itself (see Kuhn 2010, *passim*, for examples of how stark such breaks are). Let us call such proposed beliefs that ‘liquify’ hardened beliefs and replace them with a different hardened belief, a revolutionary belief.

Second, elaborating on this, van Fraassen notes that the devil here is clearly seen by the fact that the proposed revolutionary belief is simply not a live-option for a person trying to contemplate it, given her priors. Indeed, spelling this out in a related context, van Fraassen claims that

A person faced with a decision has first of all an *opinion* [or belief³] about the current state of nature: what the relevant facts are like. Second, he *imagines* a set of alternative actions. Unfortunately, his imagination is limited, so some possible actions open to him may fail to be included. The opinion above may also have such limits: he imagines various ways the world may be, and these may not exhaust all possibilities, logically speaking. Thus, imagination enters in two ways. Let $S_1 \dots S_n$ be the states of nature he imagines as possible; his opinion consists in judgments of the form “ S_k is Q(k, m) as likely as S_m ”; the number Q(k,m) is called his *odds* for S_k against S_m . In addition, let the

³ It seems to me that van Fraassen is rather unclear about what, if anything distinguishes opinions from beliefs. This may stem from the fact that he tends to treat both in decision theoretic terms (e.g., van Fraassen 1984). Given this framework, it may be that there really is not a relevant difference.

set of actions he imagines as possible be $A_1 \dots A_q$. His imagination steps in to supply possible outcomes of these actions; let these be $C_1 \dots C_l$. His opinion [or belief] contains further judgments of the form ‘if the actual state of nature is S_n and I do action A_m , then C_n is $Q(k, m, n, p)$ as likely to occur as C_p ,’ thus entering further odds... [In an unbearable situation, like when one is faced with a proposed revolutionary belief and an increasingly degenerate research program], the limits of these three imagined sets, *sub specie* his opinion, are such that he has ‘nowhere to turn.’ (Van Fraassen 1988, 142)

Unpacking this a bit, a vital problem for a proposed revolutionary belief is that it is taken as “absurd”, where this means it might be logically possible but, against one’s priors, is assigned an extremely low credence. Notice that this is markedly different from non-revolutionary belief formation. For the latter, one might accommodate a new belief by, e.g., eliminating possibilities and re-jiggering probability distributions (cf. van Fraassen 1995, 13-14). In marked contrast, a proposed revolutionary belief has such a problematic status precisely because “[t]he transition to the new view of nature [that the proposed revolutionary belief entails] was to a view that was literally and logically incapable of being accommodated in any way with the previous view” (van Fraassen 2002, 70). Crudely put, there is no way to accommodate the proposed revolutionary belief, given one’s priors.

Third, according to van Fraassen, one cause of adopting revolutionary beliefs is a crisis in the research program. Thus, he notes that one necessary condition for revolution is “our expectations are disappointed, that the earlier rate of success has diminished, that we have been working fruitlessly on our current projects” (van Fraassen 2002, 93). This is very much in keeping with Kuhn (e.g., Kuhn 2010, 66-91) and Lakatos (e.g., Lakatos 1978, e.g., 34 (but *passim*)). For both, one critical motivation for a revolutionary belief adoption is the realization that the old research program is failing. It is beset by anomalies, unable to cope with the data, its theories and models are more and more baroque, with epicycles on epicalyces within epicycles, and so on. Notice that this degeneration of the research program can be grasped by the pre-revolutionary without too much work. Simply put, the world and her priors are no longer getting along, and her expectations seem not only thwarted but increasingly ridiculous.

However, critically, the emergence of such anomalies and such is, as yet, insufficient to provoke a revolution. As Lakatos aptly said, this is partly because “all programmes grow in a permanent sea of anomalies” (Lakatos 1978, 6. See also, e.g., 53-55). There seem to be at least two additional elements required for revolution. One is a rival research program that, through absurd by pre-revolutionary standards, needs to exist and be gaining converts (cf., Feyerabend 1970 or 2010, *passim*). The other is a subjective factor. Thus, van Fraassen stresses that the failing research program needs to become “a despair about the human condition [that] has to turn into a sense of rebellion against the received view” (van Fraassen 2002, 93). In other words, van Fraassen stresses that scientists need to take the failures of the research program personally and get emotional. Though we return to this in a moment, again, this is in keeping with Kuhn (e.g., Kuhn 2010, 140-150) and especially Feyerabend (e.g., Feyerabend 2010, e.g., 105-121), who each stress that emotions seem to be important and reoccurring features of revolutionary times.

Finally, fourth, van Fraassen notes that any tractable volunteerist epistemology (and any epistemology that takes such epistemic ruptures seriously) needs to provide some story about how we can “exercise the will on options unless we consider them as genuine options. How can we make intelligible to ourselves the process of choice, which takes us into options that we could not see as genuine options beforehand?” (van Fraassen, 2002, 94). In other words, assuming that a proposed revolutionary belief strikes a pre-revolutionary as absurd, how can she so much as entertain it?

It is here that two different answers seem possible. These are: the ‘Prussian’ account; and the ‘English’ account (see van Fraassen 1989, 171-173, for the terms). Let us examine the Prussian account and its perils now. We discuss aspects of the English account in the next section.

The Prussian account begins by insisting that the rational beliefs are beliefs derived from a rationally tractable procedure, i.e., conditionalization a la Bayes. Given this, and given that a revolutionary belief is absurd by pre-revolutionary lights (e.g., van Fraassen 2002, 64-110), it follows that adopting the revolutionary belief is irrational. The Prussian account may well stress the aforementioned subjective factor, the strong emotional reaction, to further support this. Indeed, since, per assumption, an ideal Bayesian agent would not have (or not allow) her emotions to interfere with her belief formation, it seems that such emotional outbursts betoken an irrational reaction. Given this, the Prussian account is likely to explain scientific revolutions with “external factors”. By this, I mean the contention that scientific revolutions are not internally rational. Instead, revolutionary belief formation reflects, e.g., political, economic, psychoanalytic, etc., changes that cause one’s ‘leap’ into revolutionary belief adoption (for example, Shapin & Schaffer 2011, *passim*, discuss how shifts in politics led to a reconceptualization of “knowledge” from demonstration to reliable testimony, thereby carving out room for experimentation and a scientific community). And, concomitant with this, there may be causes for someone to adopt a proposed revolutionary belief, but there are not reasons.

However, van Fraassen insists that such a Prussian account both (a) misunderstands reason and (b) mischaracterizes the role of emotions. Let us take each in turn.

For (a), the conception of reason, van Fraassen contends that “what it is rational to believe includes anything that one is not rationally compelled to disbelieve” (van Fraassen 1989, 171-72). He further adds that “rationality is but bridled irrationality: rational belief is belief within the bounds of reason – that is, permitted (as opposed to compelled) within the dictates or criteria of reason” (van Fraassen 2002, 97).

It is here that three bridges to Wittgenstein 1969 become extremely helpful. First, if van Fraassen maintains this for all types of beliefs, he seems stuck with demons that trick us and the logically possible radical skepticism therein (cf. van Fraassen 1988, 146-155; 1989, 176-182). To this possibility, van Fraassen notes that “we can and do see the truth about many things: ourselves, others, trees and animals, clouds and rivers – in the immediacy of experience” (van Fraassen 1989, 178). Indeed, commenting on Moore’s refutation of skepticism, van Fraassen further contends that “I can see my hand, but I can only *believe* in it as the means for lifting the cup, breaking the bread, touching a hand” (van Fraassen 1988, 153). Plausibly, one way to make sense of these claims is precisely in terms of unmediated beliefs. We believe that there is one hand not as an inference per se. Instead, we believe this because our epistemic lives would fall into disarray without it. Thus, as Wittgenstein stresses, “[Moore’s use of ‘know’ in his refutation] is the truth only inasmuch as it is an unmoving foundation of his language-games” (Wittgenstein 1969 § 403). If this is so, then radical skepticism can be ruled out not because it falls on the wrong side of reason but because we *cannot* seriously entertain it and continue to be epistemic subjects at all. Thus, radical skepticism may be a permissible belief insofar as it does not violate rationality. However, it is pragmatically unworkable precisely because it is self-stultifying if one wants to continue being an epistemic subject.⁴

Second, against the idea that we always need a rule like conditionalization for belief updating, van Fraassen claims that especially if one begins from a broadly Bayesian point of view,

⁴ Notice that this is a conditional claim, and the antecedent is optional. Indeed, we can easily imagine people who have little interest in being epistemic subjects and find real peace in, e.g., Pyrrhonist skepticism. We return to this in a moment.

any such rule [in addition to conditionalization like abduction, inference to the best explanation, etc.] which goes beyond the mere logical accommodation of evidence... makes its adherents incoherent in the following precise sense: by their own lights, they sabotage themselves through the commitment to follow that [non-Bayesian] rule (van Fraassen 1989, 173).

So far, this seems entirely in keeping with the Prussian account. The only beliefs we can form that avoid Dutch book arguments are ones formed via conditionalization. However, van Fraassen notes that this “conclusion is only that *if and when we commit ourselves to a rule for the revision of opinion, it must be non-ampliative... But who says that we must commit ourselves to such a rule beforehand*” (van Fraassen 1989, 174)? Van Fraassen adds that “[i]t will be no use [to claim] ... that if he expected to proceed rationally, then he would not expect to proceed by rules” (van Fraassen 1989, 174). These somewhat jarring claims are underwritten by van Fraassen’s conception of what our epistemic situation really is. For van Fraassen, our epistemic situation is marked by frailty, partial information, finitude, the constant possibility of utterly bizarre priors, and a felt sense of how lucky we are to manage to obtain anything like true beliefs (e.g., van Fraassen 1994, 118-124; van Fraassen 2000, 272-279). Given this, for van Fraassen, a prelapsarian epistemology that, e.g., stipulates logically omniscient agents with reasonable priors and full knowledge of all their well-ordered credence assignments, is not so much a useful idealization as a product of ideology, an attempt to cover over the bleakness (and related excitement and wonder) of our real predicament (e.g., van Fraassen 2002, 60-63). Again, Wittgenstein emphasizes just such points. Thus, Wittgenstein stresses that “[t]he difficulty is to realize the groundlessness of our believing (Wittgenstein 1969 § 166). Further, he notes that “[a]t the foundation of well-founded belief lies belief that is not founded” (Wittgenstein 1969 § 253). However, Wittgenstein’s presentation of our real epistemic situation seems to open the door to radical epistemic relativism. It is here that van Fraassen can assist Wittgenstein, as we discuss in section III.

Finally, third, pursuant to the second point, one aspect of the Prussian account that van Fraassen attacks is the normative contention that a belief revision *should* count as rational *only if* it follows some pre-set rule or algorithm. Indeed, for him, this contention removes our responsibility, displaces our need to make decisions, and discounts the sheer complexity of our epistemic situation. Indeed, the contention inexorably levels down this complexity, reducing it to some prefabricated standard that always already determines what ‘being rational’ or ‘being reasonable’ means. Pace this contention, van Fraassen insists that

neither the logic of belief and knowledge nor the theory of subjective probability can address more than a severely abstract aspect of our epistemic life... Neither logic nor empirical study will take away this element of choice or the value judgment involved in that choice. (van Fraassen 2002, 88)

Elaborating on this, van Fraassen notes that

[William] James points out [James 1956, 63-110] that the belief that one can jump [over a chasm and avoid freezing to death on a mountain] is almost a necessary condition of jumping successfully... [Bracketing the issue of how the will might engender this belief, t]he contrast between the mountaineer who jumps, perhaps to survive... and the one who hunkers down till dawn, perhaps to survive... is a contrast between forms of life. The question is: which life does he find worth living. Once we see that there is no *method, no rule* which will produce a rationally compelling conclusion... Virtues other than the ability to calculate profit and risks come to light. (van Fraassen 2000, 274)

This thought is further spelled out by van Fraassen's reading of Pascal's wager not as some way to trick ourselves into belief in God (as if God would accept that we bet on Her, casino style, to save us!), but as a device to both frame and, by framing, show the limits to decision-theoretic procedures (van Fraassen 2002, 94-100).

Van Fraassen's primary point, I take it, is that our complicated epistemic lives cannot be reduced to such algorithms. And one reason for this is that there are irresolvable tensions that can only be coped with by value judgments concerning who one is and what one hopes for (cf. Kuhn 1977, 320-339). To take a well-known example, either I can maximize true beliefs or minimize false ones, but I cannot simultaneously do both (Runder 1953). And the selection criteria I have that determines which I pick interdepends with my stance (cf. van Fraassen 2002, 46-63) or attitude (Wittgenstein 1969, § 404). In other words, it turns on who I take myself to be (am I so risk-averse that believing anything other than tautologies with probability one seems like a leap of faith?) and what I want (do I want to be a revolutionary beyond the 'bounds of sense?'). The point is that this tension, and others like them,⁵ are simply a feature of our epistemic situation, and attempts to idealize them away are tantamount to avoiding our responsibility for becoming and being the sort of epistemic agents we are or want to be.

To this, Wittgenstein adds that

I would like to regard this certainty [e.g., the belief the mountaineer has that she can make the jump], not as something akin to hastiness or superficiality [as if the critical issue is that she did not carefully conditionalize and calculate her chances, given her priors] but as a form of life (Wittgenstein 1969, § 358)

Dissatisfied with this, Wittgenstein adds, "I want to conceive of something that lies beyond being justified or unjustified" (Wittgenstein 1969, § 359). It seems as though Wittgenstein also is trying to argue that there is no epistemic view-from-nowhere rule, no way to remove the critically important role that form(s) of life play in informing us about where, how, and with what we should begin. Values are inexorably interwoven into our epistemic lives, and values reflect path-dependent histories, choices, ideals, and so on. Indeed,

[w]hat we consider reasonable or unreasonable alters... Very intelligent and well-educated people believe in the story of creation in the Bible, while others hold it as proven false, and the grounds of the latter are well known to the former (Wittgenstein 1969, § 336)

In other words, what a 'reasonable' prior is taken to be, turns partly on the entire way one has gone about engaging with the world epistemically up until this point.

In sum, the Prussian account's conception of reason, for both Wittgenstein and van Fraassen, is an attempt to avoid taking responsibility for what we believe and where we stand. For both, there are logically possible beliefs that are both true and that we, give our priors, may well assign extremely low credence to. For both, our epistemic situation is shot through with tensions, conflicts, discordant values, etc., such that attempts to idealize these away is to distort what's afoot, almost beyond recognition. And, for both, the role that risk aversion, courage, one's goal of achieving the ataraxia that Pyrrhonist skepticism promises or of boldly venturing forth to speculate about whatever, one's history of trust paying off or trust leading to horrors, etc., (cf. van Fraassen 2000; Wittgenstein 1969 § 288-299), should be emphasized as a critical feature of how we actually get by, epistemically.

⁵ Van Fraassen 2002, 86-90, notes at least four different tensions in our epistemic situation.

For (b), the role of emotions, van Fraassen notes that the Prussian account's dismissal of emotions as 'merely' irrational reactions that cannot be part of rational belief formation turns partly on the Prussian conception of rationality attached above. Given this, there are at least two related points van Fraassen makes about emotion and/in epistemology.

First, one aspect of an emotional reaction is that it precisely reflects a commitment. Someone becomes emotional because "all outcomes of envisaged actions [possible beliefs, etc.] are just different forms of misery" (van Fraassen 1988, 143). And these dead ends seem so stark and demand some sort of revolution, precisely because they call into question the decision to make sense of nature in terms of, e.g., classical physics. To see this more clearly, consider that it is easy to imagine someone accepting that Newtonian physics is sufficient for building bridges around here and not caring that, when stuff gets really small or goes really fast, Newton starts having problems. Such a 'utilitarian' attitude concerning science would obviate the need for revolution because the subjective factor would be missing. Thus, what strong emotional reactions, and taking crises at the outer edges of research so personally, reflect is one's deep commitment to a research program, over and above its merely pragmatic payoff (cf. van Fraassen 1980, 10). Suffice it to say, this is simply not reflected in the Prussian account.

Second, relatedly, van Fraassen contends that emotions, properly understood, have "a definite cognitive and volitional function" (van Fraassen 2002, 104). Specifically, and drawing from Sartre, van Fraassen claims that we can see this function clearly

in terms of the decision paradigm whose anomalies they are. The values of possible outcomes of various actions are changed [the credence assigned to beliefs are changed, etc.] in a way that changes the action [situation] into something different. (van Fraassen 2002, 106)

This is accomplished partly because emotions enable "a new sort of alternative (or a new cross-classification of the same outcomes as envisaged before)" (van Fraassen 1988, 143). Thus, what strong emotional reactions change are "imagined sets of possibilities, or the opinions concerning them, or values and desires that define their significance" (van Fraassen 1988, 132).

Notice that, phenomenologically speaking, this understanding of emotion seems to far more accurate and compelling than a pushmi-pullyu mechanistic model, at least in extreme cases (van Fraassen 2002, 103). For example, a person may have a prior belief that they are worthless. And they may find themselves in an emotionally and physically abusive relationship. However, as the relationship persists and the abuse worsens, they might be pushed to a point where they simply cannot tolerate it any longer, where they no longer know how to go on. And, suddenly, they might come to believe that they do not deserve such treatment, that they are worth more than this. And this belief may well lead them to leave the abuser, against their 'better judgment'. A logical possibility (the belief that one is worth something) that had a low credence is suddenly transmogrified into a live-option. Moreover, many tales of conversion stress exactly this radical "transvaluation of all values" (van Fraassen 1989, 143, see also 135-141). If this is compelling, then it seems like emotions can play precisely the role we need. They are what can enable us to reject our priors and consider seriously (supposedly) absurd possibilities.

However, van Fraassen asks, "how could any emotion make meaningful to us what was patently absurd by our lights previously?" (van Fraassen 2002, 109). And, indeed, his comparisons of such emotions to "magic" (van Fraassen 2002, 109) or "voodoo" (van Fraassen 2002, 104) attest to a critical lacuna in this account. To wit, emotions in themselves seem insufficient for such a transmutation of the plausibility set and credence re-assignment

to possible beliefs.⁶ And it is here that Wittgenstein can begin to supplement van Fraassen, as we see in the next section.

Relativism vs. Responsibility; Idle Emotions vs. Epiphanies

In the last section, I adumbrated van Fraassen's radical conception of revolutionary change. I also discussed why, for him, a Prussian account of reason is not viable. Finally, I proffered a brief discussion of how and why emotions seem to be a promising avenue to internally account for revolutionary belief adoption, both because they help account for the need to revolt and because they enable a radical reassessment and re-assignment of one's credence viz. logically possible revolutionary beliefs.

In this section, I read Wittgenstein and van Fraassen together so that two critical issues facing this radical account of revolutionary belief adoption (and conversion) are mitigated. Specifically, I use van Fraassen to help Wittgenstein avoid extreme epistemic relativism. And I use Wittgenstein to begin to help address van Fraassen's question about what factors enable emotion to transvalue our credence assignments of various beliefs. Together, this helps further the point that conversion, though resting on a decision, need not be construed as a 'mad leap.'

To begin, both van Fraassen and Wittgenstein, it seems to me, adopt an English account of reason. On this view, whatever belief is not forbidden by rationality is rationally permissible. However, this raises the specter of radical epistemic relativism.

This danger seems to become particularly acute in Wittgenstein. For example, he gnominically remarks that he would

'combat' the other man [who consulted an oracle instead of a physicist] – but wouldn't I give him *reasons*? Certainly; but how far do they go? At the end of reason comes *persuasion* (Think of what happens when missionaries convert natives). (Wittgenstein 1969, § 612)

This quote seems to invite a radical relativism such that the people who consult the oracle are doing something perfectly licit, epistemically speaking. Indeed, we might further contend that they are playing a different 'orthogonal language-game' from physics (cf. Winch 1964).

And it is precisely here that van Fraassen can help mitigate this worry. First, van Fraassen notes that

[a] judgment of opinion... is not *itself* an autobiographical [or auto-ethnographical] statement of fact. It does not state or describe [one's psychology, one's culture] but avow: it expresses a proposition attitude. To make it is to take a stance. To adopt an attitude or stance is akin to a commitment, intention. (Van Fraassen 1988, 179-emphasis mine)

In turn, this begins to alter how to construe the situation. For example, consider the Azande hardened belief that "some people are witches and can injure them in virtue of an inherent quality... Against [witches], they employ diviners, oracles, and medicines" (Evans-Pritchard 1976, 1). As Evans-Pritchard's justifiably famous ethnography goes on to show, this hardened belief may well be a precondition for an entire cultural ensemble of practices (Evans-Pritchard 1976, *passim*). However, critically, this belief among the Azande is not an auto-

⁶ Indeed, phenomenologically speaking, it seems equally clear that there are occasions where nothing like this transpires. One gets pissed off by a rude remark, takes a long walk, and wakes up the next day feeling silly that such a slight had such an outsized effect.

ethnographic reflection on their cultural ensemble. Instead, they take this belief to be about the world– i.e., there *are* witches, and these *are* found and fought with oracles.

Second, following from this, the Azande have taken a stand concerning what the world is like. And respect for them as epistemic agents dictate that we take this stand seriously. To do so, we must not

deny the element of free choice involved in our own [and Azande] decisions. However comforting that might be– *how nice to think that we could not rationally have concluded differently*– it would still be intellectual bad faith. (van Fraassen 1989, 179-180)

However, equally clearly, this respect for the Azande and their epistemic agency also requires that we are willing to “accuse this [witchcraft-oracle belief complex] of being mistaken or wrong but *not of being irrational*” (van Fraassen 1989, 179). This is simply entailed by taking the Azande seriously as having avowed their belief and made a commitment. Notice that this is *not* the “reasoning that so often supports relativism” (Van Fraassen 1989, 179). As it were, *‘anything goes!’* to begin with, but taking belief avows seriously means actively assessing, criticizing, etc., them (cf. van Fraassen 2002, 31-63, for why this is a hallmark of the empirical stance). Crucially, where the conversation goes from there, if and how an Azande can be converted or convert us, is unsurprisingly unpredictable. However, and this is the point, such dialogical exchanges concerning hardened beliefs are certainly rational in the English sense.⁷ Moreover, relativism miscasts this precisely because it misreads the Azande belief as an odd ‘expression of culture’ that refuses to take it seriously.

Hence, under this reading, Wittgenstein’s turn to persuasion is not an admission that, e.g., physics is in no better (or worse) shape than oracles. Rather it stems from both his refusal to rely on a Prussian account of reason *and* his insistence on holding the Azande (and ourselves) accountable for our commitments as epistemic subjects. Moreover, Wittgenstein’s use of emotionally charged words like “combat”, “persuade”, and the allusion to missionaries reflect a realization that, during such exchanges, attempts to bracket out emotions is both not to take this situation seriously enough (a lot rides, for the Azande, or us, on their or our (dis)belief in witchcraft oracles) and deprives all parties involved in a critically important feature of our actual ways with beliefs.

Turning to how Wittgenstein can help van Fraassen, recall that one key lacuna in van Fraassen’s account of emotions and their epistemic role is how, precisely, they can trigger a transformation of the credence we assign to revolutionary beliefs. Though this is a complex problem, I believe that Wittgenstein provides one factor that helps begin to solve it.

To begin, the aspect of the problem I focus on is what differentiates idle emotions, from an epistemic perspective, from ones that can trigger a reassessment and a re-assignment of credence. And one insight that can be drawn from Wittgenstein is that triggering emotions interdepend not only with absurd revolutionary beliefs but also new or different practices. For example, returning to the above quote, Wittgenstein asks us to “think of what happens when missionaries convert natives” (Wittgenstein 1969, 612). Taking up this invitation, it is telling that St. Francis famously remarked that missionaries should “preach the gospel [be it of a new religion or new research program] when necessary use

⁷ Two further points should be made. First, “respect” and “taking seriously” seem to me to inexorably depend on the epistemic context in such a way that we, the people with the guns, must always keep in mind certain asymmetries vis-à-vis the Azande that may engender epistemic (and worse) injustices (cf. Fricker 2007, *passim*). Second, perhaps a careful and critical dialogue will show that Azande oracles and physics are orthogonal in the same sort of way that first-order predicate calculus and poetry are. This would be a wonderful conclusion. But it must be the result of a discussion, not an a priori stipulation.

words”. In other words, one critical feature of conversion is that a different set of practices enter the scene.

In turn, this insistence on practice brings into view three critically important factors that partly account for how emotions can trigger revolutionary belief adoption. First, a focus on practice helps account for why there is an emotional reaction in the first place. In effect, it is likely that astronomers do not fall into despair when a new theory of astrology is proposed. And this is partly because such a new theory does not affect their practices in the slightest. In contrast, revolutionary beliefs and theories interdepend with practices so that one ramifies into the other and vice versa. Given this, part of why the emotional reaction occurs is that the pre-revolutionary has an internal tension. She notes that the revolutionaries claim to believe absurd things. However, she also notes that they are using equipment, running experiments, building models etc., in new or different ways (cf. Kuhn 2010, 111-134). And this intersection between belief and practice does, in fact, begin to put pressure on her own commitments. Perhaps there is more to heaven and earth than in her current research program?

Second, following from this, it accounts for why emotions can only act as triggers against the backdrop of a new research program. In effect, the emotional reaction can only do epistemic work when a new set of practices underwrite and are being underwritten by the revolutionary belief. Though cognitively speaking from a pre-revolutionary viewpoint, these beliefs are absurd, they are related to novel practices, from a pre-revolutionary perspective. And, again, it is this strange conjunction of ‘mad’ beliefs and new practices that begins to enable emotions to play an epistemic role.

Finally, and most critically, third, emotions that can trigger reassessment and re-allocation of credence precisely by provoking the pre-revolutionary to “look at the practice of language, then you will see it” (Wittgenstein 1969, § 500). In other words, van Fraassen’s account of revolutionary belief adoption tends to focus exclusively on the theoretical/semantical level (e.g., van Fraassen 2002, 64-152).⁸ However, Wittgenstein reminds us that “[n]ot only rules [theories, beliefs, etc.] but also examples are needed for establishing a practice” (Wittgenstein 1969, § 139). If this is so, then a pre-revolutionary’s emotional trigger might cause her to begin practicing differently, even if this does not yet make total sense to her. For, “in the beginning was the deed” (Wittgenstein 1969, § 402). Or, as Pascal would remind epistemic volunteerists, sometimes one must “[f]ollow the way by which they [converts] began; by acting as if they believed... Even this will naturally make you believe” (Pascal 1958, 233).

In sum, part of what enables emotions to trigger in the epistemically relevant way is that practices are changing and being changed by revolutionary beliefs. And, since it seems likely that science is more than theories (cf. Galison 1997, 781-803), an emotion might lead a pre-revolutionary scientist to change her practice, even without fully endorsing the beliefs involved therein (cf. van Fraassen 1980, 56-59). By doing so, she would begin to change the credence assigned to the proposed revolutionary belief, as she comes to see how the proposed revolutionary belief practically works. In sum, emotions might lead one to do so as to believe.

Conclusion

This paper has attempted to demonstrate the fecundity of reading certain parts of *On Certainty* together with van Fraassen’s “new epistemology”. Specifically, it has explored how each enriches the other’s account of revolutionary change and conversion, as (permissively)

⁸ Given his semantic understanding of theories, laid out very early and very clearly in van Fraassen 1980, 6-69, this focus is unsurprising.

rational. In this view, the certainty of beliefs depends on decisions, and changing these decisions requires emotions.

In closing, if nothing else, I hope that this paper's argument has helped address and redress one myth. To wit, that later Wittgenstein was a thinker so concerned with the 'ordinary' that he has little to say to philosophy and history of (especially, the natural) sciences. If nothing else, I hope I have helped confute this myth.

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