

Forthcoming in *Grazer Philosophische Studien***(Please cite final draft)****Understanding, knowledge, and scientific antirealism**

Abstract: Epistemologists have recently debated whether understanding is a species of knowledge. However, because they have offered little in the way of a detailed analysis of understanding, they lack the resources to resolve this issue. In this paper, I propose that *S* understands why *p* if and only if *S* has the non-Gettierised true belief that *p*, and for some proposition *q*, *S* has the non-Gettierised true belief that *q* is the best available explanation of *p*, *S* can correctly explain *p* with *q*, and *S* can identify the features that make *q* the best explanation of *p*. On this analysis, understanding is reducible to knowing that *p* and that *q* is the best available explanation of *p*.

Understanding how something works, why someone is in a bad mood, the structure of matter, the causes of a disease, etc. are all things that we immediately recognize as epistemically valuable. However, what is less clear is whether understanding's epistemic footing is exhausted by its being a kind of knowledge. For instance, is understanding why someone is in a bad mood any different than knowing the causes of his mood?

Among epistemologists, there has been a recent upsurge of interest in the concept of understanding, and perhaps the most central of their questions is whether or not understanding is a species of knowledge. On the one hand, this presupposes answers to several other questions in the "epistemology of understanding," e.g. whether or not understanding is propositional and/or factive (Brogaard unpublished; Elgin 2004, 2007; Kvanvig 2003; Riggs 2003; Zagzebski 2001). On the other, understanding's relation to knowledge is presupposed in several other epistemological

issues. In particular, some have urged that understanding should supplant knowledge as the primary aim of inquiry (Kvanvig 2003; Pritchard 2008, 2009; Riggs 2003).

In this paper, I use literature on scientific realism to provide a new argument that understanding is a species of knowledge. Understanding is widely regarded as derivative of explanation, and there has been a longstanding debate between realists and antirealists about the epistemic status of explanation¹. Given the amount of attention that scientific realism has enjoyed in the past three decades, discussions concerning realism provide potential insight into understanding's status as a species of knowledge, and yet they have been largely ignored by epistemologists interested in this discussion.

Specifically, I shall argue that even on an antirealist construal, understanding is a species of knowledge. Such a tactic is dialectically effective, for antirealists are typically seen as hostile to explanation's epistemic standing, which suggests that antirealists should be equally resistant to the idea that understanding is a species of knowledge. So the fact that understanding is a species of knowledge even for antirealists is a compelling reason to think it should be regarded as such by just about anyone. §1 surveys the current epistemological arguments both for and against the claim that understanding is a species of knowledge. §2 then provides an initial motivation for incorporating realism discussions into the epistemology of understanding. §3 presents an antirealist model of understanding. §§4 and 5 then conclude by showing how this model nevertheless reduces to a kind of knowledge.

¹ Here and throughout, all references to realism and antirealism refer only to their use in the philosophy of science.

1. Background

Perhaps nobody has given a more sustained effort to discern whether understanding is a species of knowledge than Grimm (2006) and Pritchard (2008; 2009). While Grimm argues that understanding is a species of knowledge, Pritchard disagrees. Unfortunately, their discussions put the concept of understanding in a black box, and as a result, they are forced to rely on arguments lacking the kind of intuitive force that would compel a disinterested reader.

How do they reach their conclusions? Both agree that understanding why some proposition p is the case, like knowing it, involves a true belief both in p , and in the propositions that constitute the understanding of p . For instance, Grimm writes:

Suppose that you open the refrigerator and notice that the light has gone off, so you put your hand inside and feel around, finding it warm to the touch. While looking around for an explanation eventually you notice something unusual: the cord has been unplugged. [... However, i]t might have broken down as the result of a short circuit, and the cord might have been unplugged for fear of fire. In that case, despite your sense that you understand why the refrigerator stopped working, in fact you don't understand (Grimm 2006, 517-518).

Two points are in order at this point. First, I will follow Grimm and Pritchard in restricting my remarks to cases of understanding *why* something is the case, e.g. she understands why the refrigerator is warm. This is usually contrasted with understanding a topic or field of inquiry (e.g. she understands thermodynamics). While I will not argue

for it here, I believe that this non-propositional or “objectual” form of understanding is reducible to the propositional kind of understanding that will be my focus here².

Second, since both knowledge and understanding involve true belief, only justification (or some surrogate, e.g. reliability, intellectual virtue, or evidence) and the anti-Gettier conditions remain as possible points of divergence. Both Grimm and Pritchard take the anti-Gettier or “anti-luck” requirement as the crucial dimension of study, but go on to distinguish two kinds of epistemic luck. The first, “Gettier luck,” occurs when one’s cognitive faculties only indirectly cause one to have true beliefs. As its name indicates, this covers the classic Gettier cases. To provide one of Chisholm’s (1966) famous examples of knowledge’s susceptibility to Gettier luck, consider a case in which I look out in a field and see what appears to be a sheep in the distance. While I form a true belief that there is a sheep in the field, unbeknownst to me, what I see is actually a shaggy dog that is perfectly occluding a real sheep from my view. In this case, it is not my seeing the sheep that is the direct cause of my believing that there is a sheep in the field, so I do not know that there is a sheep in the field.

Both Grimm and Pritchard argue that understanding, just like knowledge, is undermined by Gettier luck. Both use an example in which someone reads a book on Comanche history and correctly answers a wide variety of questions about the

² See (Kvanvig 2003) for more on objectual understanding. Roughly, the reduction runs as follows: objectual understanding of some topic is largely exhausted by understanding *why* some significant subset of events, phenomena, etc. concerning that topic occurred, obtained, etc. For instance, understanding Native American history involves understanding why different events in Native American history occurred, why certain Native American rituals are practiced, etc.

Comanche's dominance of the southern plains of North America from the 17th to 19th centuries. All else being equal, we would assume that such a person understands why the Comanche dominated the southern plains. However, let us now assume that this is a Gettier case, such that the person's textbook happened to be based entirely on rumour and shoddy research, but through sheer luck, provided correct information about the Comanche. From this Grimm concludes:

...the author of the theory doesn't genuinely understand why the Comanches [sic] dominated the southern plains. And if the author doesn't understand this, it is very hard to see how the reader of the textbook could in turn (Grimm 2006, 525-526).

Similarly, we are inclined to say that consulting this same book thwarts any claim to *knowing* why the Comanche dominated the plains.

Gettier luck is to be contrasted with "environmental luck," in which one's cognitive faculties directly cause one to have true beliefs, but where a slight difference in one's circumstances (environment) would result in the same exercise of one's faculties yielding false beliefs. Goldman (1976) provides the most famous example involving knowledge-undermining environmental luck, in which a person forms the true belief that there is a barn in front of her on the basis of strong visual evidence, but unbeknownst to her, barn façades constitute a majority of the county's architecture. In this case, she clearly does not know that there is barn in front of her.

Grimm and Pritchard agree that environmental luck does not undermine understanding, but disagree about whether it also undermines the corresponding knowledge. Consider a case similar to the one discussed above, in which, unbeknownst to a subject, most of her library's books on Comanche history are filled with falsehoods. However, if she happens to read one of the few that is both true and well-researched, it would appear that she genuinely understands why e.g. the Comanche dominated the southern plains of North America³. However, Grimm and Pritchard disagree about whether this is also a case of knowledge. Pritchard (2008; 2009) claims that our subject would not know, owing to the example's structural analogy with Goldman's barn façade example. He reasons that because we have strong intuitions that the agent doesn't know that there is a barn in front of her in this case, and because there is a strong analogy to the barns and the books in the two examples, we do not know in the Comanche case of environmental luck either⁴.

In contrast, Grimm (2006) claims that this same Comanche case involving environmental luck does not distinguish understanding from knowledge, for not all cases of environmental luck undermine knowledge, and in this particular case he claims that our subject knows why the Comanche dominated the plains. Curiously, Pritchard (2009, fn.19) claims that Grimm "fails to recognize the mistake here is simply to equate environmental luck with Gettier-style epistemic luck." This seems to get Grimm wrong,

³ Kvanvig (2003), the originator of these "Comanche cases," agrees with Pritchard on this front, though he does not distinguish Gettier from environmental luck.

⁴ Pritchard (2008; 2009) provides another example in which a person comes to understand why her house burned down by asking a fireman who is surrounded by a group of costumed impostors. My treatment of this example would duplicate my treatment of the Comanche case, so I leave it aside for brevity's sake.

for he distinguishes the two, but disagrees with Pritchard that all cases of environmental luck preclude knowledge:

Although believing on the basis of information from a bad source never seems to allow for knowledge, even when by luck the bad source happens to get things right [i.e., Gettier luck], believing on the basis of a good source in a bad information environment *does* seem to allow for knowledge (Grimm 2006, 527)⁵.

While Grimm provides a rather byzantine example, I think we can construct an equally compelling case of environmental luck in which we would be inclined to attribute knowledge to the agent. For instance, suppose that I am a student in a school district in which a majority of American history teachers have false beliefs about Comanche history, but I happen to take a course with the one teacher who is an expert. The probable but counterfactual scenario of my having had a teacher who would have filled me with falsehoods does not seem to preclude knowledge of why the Comanche dominated the southern plains. This would be just as “barn façadeesque” as the case of the books, but denying knowledge in this case seems to yield odd (and socially pernicious) results. For instance, should we assume that, even when students receive the same quality of teaching, have the same true beliefs, can provide the same explanations and justifications, etc., those in good school districts know things that those in bad school districts don’t?

⁵ To add to the mystery, immediately before this quote, Grimm cites Pritchard (2005) as supporting this claim!

If the debate continues in its current direction, there is little room for headway. Both Grimm and Pritchard largely rest on taking an intuitive thought experiment, drawing an analogy to the Comanche case, and then claiming that the Comanche case is just as intuitive. It appears we are at an impasse. Indeed, one might say that precisely because analogies with different cases can be drawn, intuitions about knowledge in the Comanche case must be weak⁶. Since intuitions alone simply aren't strong enough to build a compelling case for either side of issue, let's call it a tie between Pritchard and Grimm, and look for arguments in different corners of the philosophical landscape.

2. Explanation and the epistemology of understanding

One possible diagnosis for this deadlock is that, to date, understanding is still only vaguely understood. Perhaps a more precise formulation of it could provide us with principled theoretical reasons, as opposed to seemingly contentious intuitions, when determining whether or not understanding is a species of knowledge. Indeed, it would appear that the seeds for a more developed account of understanding are not too far to find. Insofar as there is consensus among epistemologists about the nature of understanding, it is well encapsulated by Kvanvig's remark that understanding entails "the grasping of explanatory and other coherence-making relationships in a large and comprehensive body of information" (Kvanvig 2003: 192). While this is not the most informative construal, it at least suggests a way of developing a fairly illuminating

⁶ Pritchard (2009) concedes as much, calling the Comanche example "crucially ambiguous."

account of understanding, for there is no shortage of philosophical literature on explanation⁷.

Within the explanation literature, the debates about scientific realism provide an especially suggestive avenue for addressing the issues at hand. Scientific realists generally take explanatory considerations to be truth-conducive, and thus seem disposed to take understanding as a species of knowledge. For instance, Lipton (2004: 40), a realist who has devoted considerable attention to the epistemology of explanation, writes that “Understanding is not some sort of super-knowledge, but simply more knowledge: knowledge of causes.” Antirealists, by contrast, are suspicious of explanation’s veridicality, and would thereby seem disinclined to treat understanding as knowledge. Thus, it would be a significant advance in the discussion if we could show that *even* realists need not take understanding to be a species of knowledge, or, alternatively, that *even* antirealists need not deny that understanding is knowledge. Furthermore, given that the realism debates have been going full steam for several decades, if one of these claims could be established, a significant number of new arguments could enter the epistemology of understanding, which by comparison to the realism debate, is a young discussion.

On this front, it is interesting to note that Grimm and Pritchard both cite the “general consensus” in the philosophy of science that understanding is a species of knowledge, identifying leading theorists in the explanation literature, such as Achinstein

⁷ See (Cartwright 2004a; Lycan 2002; Salmon 1989; Woodward 2002) for fairly broad surveys of the philosophical literature on explanation.

(1983), Kitcher (2002), Lipton (2004), Salmon (1989), and Woodward (2003), as representatives of this consensus. However, both Grimm and Pritchard largely proceed without engaging this consensus, and furthermore, fail to recognize the bias in this sample, for these philosophers are all scientific realists⁸. Since understanding is derivative of explanation, and realists take explanation to be a guide to truth, it is unsurprising that these philosophers of science take understanding to be a species of knowledge.

However, closer scrutiny of the philosophy of science indicates that this so-called consensus is an imagined community, for an equally impressive group of philosophers opposes the idea that explanation is a guide to truth, and *a fortiori*, knowledge. Instead, they take explanatory considerations as merely pragmatic or aesthetic criteria to help us “organize, briefly and efficiently, the unwieldy, and perhaps unlearnable, mass of highly detailed knowledge that we have of the phenomena” (Cartwright 1983, 87); to “make our minds feel good” (Hacking 1982); to concern primarily “the use and usefulness of a theory” (van Fraassen 1980, 88); and to be merely “a function of our interests and pleasures” (van Fraassen 1980, 87).

It will be my aim in the balance of this paper to show that, despite these quotations, antirealists can treat understanding as a species of knowledge. To reiterate, understanding’s reducibility to knowledge in an antirealist framework, where such an idea would seem inhospitable, coincides with Grimm’s position on this issue. However, I

⁸ For their most explicit realist avowals, see (Achinstein 2002; Kitcher 2001; Lipton 2004: 184-206; Salmon 1984: 213-227; Woodward 1992).

shall depart from Grimm both in my characterization of understanding, and in the justification I provide for our shared position. For in addition to using the epistemologist's stock set of intuitive thought experiments, my position provides an actual account of why understanding tracks with knowledge.

Before proceeding, however, three caveats are in order. First, I will construe understanding in a fairly demanding sense. While understanding certainly admits of degrees, I am mostly concerned with something approaching "full" or "complete" understanding. I assume that the tolerance we have for less than full understanding is mostly a pragmatic issue to be settled by the interests and background beliefs of the relevant parties, and while there will be obvious places where these contextual factors could potentially enter our model, this is not my primary concern.

Second, I will use the term "antirealist" somewhat idiosyncratically, referring to anyone who denies that the truth of our theories can be supported via explanatory considerations, paradigmatically via Inference to the Best Explanation (IBE). Thus, while Hacking and Cartwright are "entity realists," their critiques of more conventional brands of scientific realism based on IBE make them antirealists for the purposes of this paper.

Third, it is not my intention to defend antirealism in this paper, only to show that *if* it provides the correct view of understanding, then the latter concept is still a species of knowledge. Obviously, at various times I will have to *motivate* the specific aspects of the antirealist account of understanding I present below, but I urge the reader not to mistake these for attempted *justifications* of that position. Given the volume of ink

spilled on the viability of scientific antirealism, I think it safe to defer those discussions for another occasion, and to focus instead on how such a view bears on the epistemology of understanding.

3. An antirealist theory of understanding

So what will such an antirealist conception of understanding look like? I suggest the following:

S understands *why p* if and only if

- 1) *S* has the true, non-Gettierised belief that *p*, and
- 2) For some proposition *q*,
 - a) *S* has the true, non-Gettierised belief that *q is the best available explanation of p*,
 - b) *S* is able to correctly explain *p* with *q*, and
 - c) *S* is able to identify the marks that make *q* a better explanation of *p* than any available rival explanations.

Let me now discuss my rationale for such an account.

First, because of cases such as the Grimm's refrigerator example above, I take understanding as precluding Gettier luck. Concerning the truth and content of such beliefs, my formulation draws on the idea that antirealists deny the realist's requirement that *q* can be a correct or successful explanation of *p* only if *q* is true. Antirealists support this relaxed attitude towards explanatory propositions using, among other arguments, the *Pessimistic Induction*, in which they argue that because the history of science features many explanatorily successful theories that subsequent scientific developments later proved to be false (primarily about unobservable entities), we

should harbour no greater confidence in our current theories (Laudan 1981; Stanford 2006). Of course, realists offer some replies to this and other antirealist arguments, e.g. (Kitcher 2001; Psillos 1999), but as stated above, it is not my aim to settle the scientific realism debate here, only to motivate why antirealists would adopt certain stances towards concepts germane to understanding.

While this would suggest that antirealists deny that explanantia must be true in order to provide understanding, we might wonder if inquirers still must *believe* these explanantia. Antirealists deny this too, claiming that such a belief is superogatory but not obligatory, i.e. believing that q is a correct explanation of p does not entail believing that q . For example, van Fraassen (1980) claims that a theory's explanatory credentials make it rational to undertake a pragmatic *commitment* to pursue it without believing such a theory. Once again, the history of science provides examples in support of this idea. For example, several scientists appear to fully understand their theories but do not believe core assumptions of those theories. To choose but one example, Murray Gell-Mann, who won a Nobel Prize in 1969 for developing the quark model, denies that quarks even exist! For instance, he wrote the following in one of his groundbreaking articles in this area:

A search for stable quarks ... at the highest energy accelerators would help to reassure us of the *non-existence* of real quarks. (Gell-Mann 1964, 214 emphasis added)

So the antirealist holds that true beliefs in explanantia are not mandatory for understanding their corresponding explananda⁹.

By itself, this suggests that antirealists are committed to understanding entailing a belief that *q potentially explains p*, i.e. *q would explain p if q were true*, though they are not committed to understanding entailing the belief that *q actually explains p*, in which case *q* is true. Of course, antirealists aren't silly enough to claim that this alone will provide a compelling account of understanding. For instance, many of us know that the intelligent machinations of little invisible creatures potentially explains the workings of a computer, but even antirealists would regard people touting such hypotheses as misunderstanding why the computer works. Rather, antirealists assume that understanding entails believing that *q is the best available explanation of p*.

For this position to be plausible, it must be the case that the best available of explanation is understood in a relatively demanding sense. For example, "available" should be construed as an explanation considered by at least one member of the relevant epistemic community (paradigmatically the scientific community) at a given time, and the "best" explanation should be understood as optimizing theoretical virtues such as simplicity, consilience, mechanism, fruitfulness, conservatism, etc. as well as satisfying antirealist epistemic requirements, which for the purposes of this paper, I will take to be empirical adequacy, i.e. everything thing that a theory says about the observable world (past, present, and future) is true (van Fraassen 1980).

⁹ See (van Fraassen 1980) for arguments to this effect.

Importantly, requiring q to be the best available explanation of p still does not require that q is an actual explanation of p . For instance, an actual explanation of p may never be considered by anyone in the scientific community, but among the explanations that have been considered, there is at least one empirically adequate hypothesis that optimizes the theoretical virtues. Furthermore, this position would be consistent with the lessons of the Pessimistic Induction. While it may seem odd that the claim that q is *the best available explanation of p* is true when q is neither an actual explanation of p nor believed by the agent, there are certainly analogous kinds of true beliefs. For instance, someone may have a true belief that *the Bible is the best-selling book of all time*, though it may be the case that she does not believe the Bible to be true and that the Bible is in fact not true.

This suggests that for antirealists, S understands *why p* only if S has the true, non-Gettierised beliefs that p and that q is *the best available explanation of p* . As mentioned above, two additional “explanatory abilities” are required if this analysis is to prove sufficient. First, understanding involves being able to correctly explain the phenomenon in question. Suppose that I believe, on the basis of an astronomer’s testimony, that the curvature of spacetime best explains the precession of Mercury’s perihelion, but that when pressed on the details of my belief, I invoke a highly implausible mechanism (e.g. invoking supernatural entities) for how curved spacetime influences the peculiarities in Mercury’s orbit. In this case, I seem to have the true beliefs required by antirealist understanding, but I do not appear to understand why Mercury’s perihelion precesses. Thus, understanding *why p* not only requires having the

true belief that *q* is the best available explanation of *p*, but also being able to correctly explain *p* with *q*. What this precisely entails will depend on the appropriate form of explanation, ranging from something as abstract as a theoretical derivation to something as concrete as intervening on a device¹⁰.

In addition to being able to correctly explain *p* with *q*, antirealist understanding requires a second explanatory ability: to identify what makes a particular hypothesis the best explanation of the phenomenon at hand. Imagine that I read a reputable science textbook which tells me that the heliocentric theory is the best explanation of various observations in the night sky, and, unlike the relativity example, I can correctly explain these observations. However, I am stumped when a curious neighbour asks why these same observations could not be explained just as well by the geocentric theory and its Ptolemaic repertoire of equants, epicycles, and deferents. Thus, we have true beliefs about the best available explanation and about the explanandum, as well as having the ability to explain the latter using the former, but we also have serious gaps in our *understanding* of why the night sky appears as it does.

So our second explanatory ability, to discriminate the best available explanation from competing hypotheses, is also essential to understanding. As with our first explanatory ability, many of the details involving this ability will be depend on the particular explanations at hand, but some general remarks are worth highlighting. For

¹⁰ See note 7 for surveys of different models of explanation. Crucially, antirealists will not define “correct” explanation as actual explanation, but might instead define it in terms of interests or fit with background beliefs.

instance, this ability clearly involves discriminating between explanations on the basis of the aforementioned theoretical virtues, e.g. simplicity, consilience, conservatism, etc. Closely related, this ability also involves being able to rule out viable rival explanations and confounds that might sully an otherwise plausible explanation. Additionally, there are non-comparative criteria of explanatory evaluation, e.g. if one is either unaware of or unable to explain away some potentially damning evidence against the best explanation, then one has a serious gap in one's understanding. Similarly, understanding is compromised if one is unable to explain why a hypothesis has false empirical consequences, which would suggest that the theory is empirically inadequate. Thus, the ability to give "principled rankings" to competing explanations, as well as the ability to account for recalcitrant evidence—all of which I have placed under the umbrella of being able to identify what makes something the best available explanation of a given phenomenon—seem necessary for understanding a phenomenon. Finally, both this ability and the ability to correctly explain a phenomenon with a hypothesis involve systematizing a fair number of claims, and it is this systematization that captures the "grasp" that characterizes Kvanvig's suggestive remark about the nature of understanding.

To reiterate, an antirealist account of understanding requires not only the true, non-Gettierised beliefs that p and that q is *the best available explanation of p* , but also that the agent is able to correctly explain p with q , as we saw in our relativity example, and is also able to identify the features that make q the best available explanation of p , as the heliocentric example suggested.

3. Understanding and knowledge of the best available explanation

With our antirealist analysis of understanding ready to hand, we can now return to the larger question: is understanding a species of knowledge? As mentioned earlier, I believe the answer is affirmative *even* for antirealists, who, in light of the earlier quotations, would seem *prima facie* uncongenial to such an idea. Furthermore, I have tried my best in the preceding section not to beg any questions about what must be known in my formulation, e.g. by stipulating that understanding why *p* entails *knowing* that *p* or *knowing* that *q* is the best available explanation of *p*. In short, I've given my best effort to provide a plausible antirealist account of understanding that would not obviously reduce to a species of knowledge, and despite this effort, I will now argue that this analysis of understanding converts to knowledge without remainder.

Recall that knowledge is true belief plus a set of epistemic conditions that rule out Gettier and environmental luck. Since we have stipulated that antirealist understanding entails two non-Gettierised true beliefs—in an explanandum *p* and that *q* is the best available explanation of *p*—it follows that antirealist understanding is a species of knowledge only if our two explanatory abilities rule out environmental luck with respect to these two beliefs. In this section, I focus on the belief that *q* is the best available explanation of *p*; in the next, on the belief that *p*.

Thus, a central point in determining whether or not antirealist understanding is a species of knowledge turns on whether one can have a non-Gettierised true belief that *q* is the best available explanation of *p* while possessing our two explanatory abilities

and still be susceptible to environmental luck. I think such a scenario is impossible, for our ability to identify the best available explanation is designed to rule out exactly this sort of luck, but to argue for this, one important feature of environmental luck must be highlighted.

In general, if one is environmentally lucky, then one correctly exercises one's abilities, forms a true belief, but such a belief would have been false in nearby possible worlds where one exercises the same cognitive abilities. The barn façade example nicely illustrates this point: had I looked at a nearby façade, I would have falsely judged it to be barn. Importantly, cases where one easily could *have lacked the relevant cognitive abilities* are *not* cases of environmental luck. Consider a case in which 100 people are standing in a line, 99 of whom will be blindfolded at random. Does the one person who is not blindfolded fail to have perceptual knowledge, e.g. that there is a gunman in front of him, due to environmental luck? No, and environmental luck respects this verdict, for it holds that knowledge-attributions only concern worlds in which the relevant cognitive abilities are functioning as they are in the actual world, so the person's very easily lacking the appropriate cognitive ability is beside the point. Rather, what matters is that were he to have the cognitive ability (vision), his belief would not easily have been false.

Returning to the Comanche case, we can now diagnose the impasse between Pritchard and Grimm. Because neither provides a clear account of understanding, they consider possible worlds that are irrelevant to assessing the safety of the belief about the best available explanation. Suppose that the Comanche's efficient social

organization is the best available explanation of their dominance of the southern plains.

Possible worlds in which I could have easily read a book that incorrectly explained Comanche dominance, e.g. in terms of their military technology, would not be ones in which I would have *the ability* to identify the marks that makes this the best available explanation of Comanche dominance, for in these cases, the military hypothesis would *not* be the best available explanation—the social organization hypothesis trumps it.

Since it is no more possible to identify what makes a suboptimal explanation the best than it is to identify what makes a fly the heaviest animal on Earth, it is clear that such worlds do not bear on whether or not understanding is a species of knowledge, any more than worlds in which a person is blindfolded bear on whether perception provides knowledge.

So, the paradigm counterexamples to the claim that understanding is a species of knowledge would be cases in which a person is vigilant about ruling out rival hypotheses and recalcitrant evidence, attentive to the various theoretical virtues, mindful of empirical adequacy, etc. and yet easily would have had a false belief that some hypothesis is the best available explanation of a given phenomenon. I think this kind of case is impossible, and so understanding always entails knowledge of the best available explanation. For in such a case, we would surely say that our agent is unable to identify the features of q that make it better than other available explanations of p . But this is just to say that she lacks one of the explanatory abilities required for understanding. Since this clearly contradicts our initial assumptions, understanding cannot be divorced from knowledge of the best available explanation.

To make this argument more concrete, suppose that our agent could state the explanatory shortcomings of every rival hypothesis about the Comanche's dominance, could provide compelling empirical support for the claim that it was their social organization that explains their dominance, appreciates the simplicity, fruitfulness, etc. of the social organization hypothesis, etc. Now, suppose that she is the victim of environmental luck, such that there is some explanation of Comanche dominance that she has failed to consider¹¹. There are three scenarios we have to evaluate, and none of them falsify the claim that understanding is a species of knowledge.

In the first case, our agent fails to consider an available explanation, say a hypothesis advanced by an American historian who considers whether the Comanche's superior hunting skills explain their dominance. Furthermore, let us suppose that had the agent known of the hunting hypothesis, she would have exercised her explanatory abilities and falsely believed that it better explains the Comanche's dominance than the social organization hypothesis. Surely we would say that she lacks the ability to identify the features that make the social organization hypothesis the best available explanation. Since that ability is necessary for understanding, this kind of case cannot show that understanding is not a species of knowledge.

¹¹ I note in passing that these thought experiments have strong affinities with the "bad lot" or "underconsideration" argument raised against realists. Such arguments have been raised by (Khalifa 2010; Stanford 2006; van Fraassen 1989; Wray 2008). This suggests that, contrary to our initial assumptions, realists have a harder go than antirealists in defending the idea that understanding is a species of knowledge.

In the second case, the agent is once again unaware of an available explanation, but the counterfactual is different: had she considered this explanation, say the hunting hypothesis again, she would have still correctly judged the social organization hypothesis to be better. Unlike the last case, it seems that we would say that there is no fault in her abilities, but equally importantly, we would say that she wasn't environmentally lucky, so this is consistent with her *knowing* that the social organization hypothesis is the best available explanation of the Comanche's dominance.

In the final scenario, the explanation our agent has failed to consider is something that nobody has considered. In this case, it is not an *available* explanation, which thus ruins neither her understanding nor her knowledge of the best available explanation. In other words, this last scenario seems sufficiently remote from our own that we would not say that our agent *easily* could have had a false belief about the best available explanation. For instance, there may be a hypothesis that nobody has yet considered, but whose explanatory credentials eclipse any currently available theory. This possibility does not paralyze us from attributing understanding to people in the present, even though their understanding may appear fundamentally flawed if we later discover this super-theory. Now I fully grant that realists might be unhappy with this verdict, denying that correct understanding is historically relative, e.g. by insisting that understanding entails knowledge of an actual explanation rather than of merely the best available one. But to repeat, this would simply rehearse the realism debates, and the goal here is only to show that *if* antirealism is true, then understanding is a species of knowledge, and on this score, these worries are misplaced.

4. Understanding and knowledge of explananda

Thus, we have seen that understanding and knowledge of the best available explanation cannot be divorced. But what of knowledge of the explanandum, i.e. p in our formulation? Since antirealists' primary point of contention with realists is not about explananda, but about explanantia, I think they can agree with realists that understanding why p entails knowing that p without making a giant concession. However, I think antirealists can supplement this with a more principled argument, namely that in cases of epistemic luck (Gettier or environmental) involving beliefs about explananda, subjects typically lack the kind of explanatory information that would enable them to satisfy the other conditions of antirealist understanding.

For example, consider a case where a person has a true belief about an explanandum p without knowing that p , e.g. suppose that she is in Barn Façade County and gets environmentally lucky exactly as Goldman intended, but furthermore, she provides an actual explanation of why there is a barn in front of her, namely that somebody built it to store farm equipment. In particular, while this is a correct explanation, it is a suboptimal explanation in that an explanation of why there is a barn *rather than a barn façade* in front of her would surely be superior, and embody fuller understanding¹². More generally, one might argue that when an agent forms an epistemically lucky true belief about an explanandum p , it is often the case that she either lacks a true belief about the best available explanation of that phenomenon or

¹² Both realists (Lipton 2004) and antirealists (van Fraassen 1980) acknowledge the importance of contrastive claims, such as these, in explanation.

cannot identify the marks that make that explanation better than its competition. Since these are both necessary for understanding, it follows that epistemic luck about explananda—even of the environmental kind—is often incompatible with understanding.

5. Conclusion

Thus, as we've argued, if *S* understands *why p*, then *S* has the non-Gettierised true beliefs that *p* and that *q is the best available explanation of p*, *S* can correctly explain *p* with *q*, and *S* can identify the marks that make *q* the best available explanation of *p*. As we saw, the two explanatory abilities suffice to give *S* knowledge that *q best explains p* whenever *S* understands *why p*. So it is impossible for *S* to understand *why p* without knowing that *q is the best available explanation of p*. Furthermore, antirealists can either make a modest concession that *S's* understanding *why p* entails that *S* knows that *p*, or they can argue that lacking such knowledge undermines the aforementioned explanatory knowledge required for understanding *why p*. Thus, even for the antirealist, understanding is a species of knowledge.

The nascent concern with understanding is part of a larger renaissance in recent epistemology, and should be welcomed. As with other new research programmes, it is often wise to look at adjacent fields for inspiration and instruction. In this case, I hope to have provided a compelling case for the fruitfulness of using the scientific realism debates to more clearly analyze understanding, and to ultimately judge whether or not understanding is a species of knowledge. As mentioned at the outset of this paper, this

particular question is central in the epistemology of understanding, presupposing answers to some questions and being presupposed by others, and I will conclude by suggesting three areas where further crosstalk would be beneficial.

First, the aforementioned debates about the factive character of understanding can now be seen as much older than they first appear, recapitulating much of the exchange between realists and their opponents. Nevertheless, the account offered here has pinpointed the contentious issues in the more recent epistemological debates. For instance, those sympathetic to factive accounts of understanding will presumably want to include some reference to true explanantia and actual explanations in their accounts. It is worth examining if factive understanding amounts to having our two explanatory abilities plus the true beliefs that p , q , and that q is the best actual explanation of p ; whether S must know that p , q , and that q is the best actual explanation of p ; etc. Furthermore, despite the initial plausibility that understanding could only be knowledge if understanding is factive, this paper's conclusions suggest that understanding's status as knowledge may be *easier* to prove if we assume it is *not* factive, since it appears likely that any realist/factive account of understanding will entail the antirealist account of understanding plus some further requirements about actual explanations.

Second, if the preceding is correct, understanding's role in discussions about epistemic value will have to be re-examined. Pritchard is one of several prominent epistemologists to argue that knowledge is not distinctively valuable, but that

understanding is¹³. From this, he concludes that “the product of successful inquiry is not knowledge at all, but rather understanding” (Pritchard 2008). For these epistemologists, the preceding suggests that more work will need to be done. However, one possibility largely consistent with their views is that knowledge *as such* isn’t distinctively valuable, but certain *kinds* of knowledge, namely understanding, *are* distinctively valuable, and thus should serve as the proper goal of inquiry. In other words, not all forms of knowledge are of equal value, but perhaps understanding is plausibly seen as an exemplary form of knowledge.

Third, the lessons of this paper also suggest ways of reinvigorating the debates about scientific realism. While that debate is more often regarded as a concern about the metaphysics, semantics, or justificatory strictures of science¹⁴, it has sometimes been cast as an axiological debate about the aims of science (Ellis 1985; Lee 2007; Lyons 2005; Popper 1983; Rescher 1987). Indeed, van Fraassen, the arch antirealist, frames his position as claiming that “Science *aims* to give us theories which are empirically adequate” (van Fraassen 1980: 12) articulating an aim as that which “determines what counts as a success” (van Fraassen 1980: 8). The overlap between these axiological debates about scientific realism and the epistemological discussions about epistemic value are obvious. Furthermore, since axiological forms of realism and antirealism are significantly less developed than their metaphysical, semantic, and justificatory siblings,

¹³ Others include (Kvanvig 2003; Pritchard 2008, 2009; Riggs 2009; Zagzebski 2001)

¹⁴ I owe this carving up of the realism debate to (Psillos 2000).

this promises to breathe new life into a debate that some consider to be exhausted¹⁵.

For example, despite the hostility that we saw antirealists harbouring towards explanatory concepts, if this paper's central ideas are correct, understanding can be a primary aim of science even if one is an antirealist.

Of course, these are just suggestions. For now, I think it enough that we've shown understanding to be a species of knowledge even in the unlikeliest of intellectual corners—from a broadly antirealist worldview. In the process, I hope we've come to understand just a little bit more than when we started. And I suppose this means that we've come to know something, too.

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¹⁵ See (Fine 1986; Wylie 1986).

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