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IS UNDERSTANDING FACTIVE?

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In his recent book, *The Value of Knowledge and the Pursuit of Understanding*, Jonathan Kvanvig sets out to do two things. First, he seeks to show that there is no feasible way to account simultaneously for the nature of knowledge and for the value of knowledge. Second, he argues that understanding should be a central epistemological concern. In his book, these two contentions are connected. At least one reason why epistemology should take understanding more seriously, Kvanvig believes, is that it cannot adequately explain what makes knowledge valuable. I do not plan to say anything about the argument concerning knowledge. For I think that the positive reasons for epistemology to treat understanding as central stand on their own. We should treat understanding as epistemologically central because, if we do not, we fail to do justice to important aspects of cognition. The bulk of my paper will be devoted to a disagreement with Kvanvig about what the proper scope of epistemology should be. But before I turn to that, I want to say something about areas in which we agree.

The term ‘understanding’, as Kvanvig rightly points out, is used in a variety of ways. Some are irrelevant to epistemology. I can say ‘I understand’ to moderate the force of an assertion or hedge my claim. ‘I understand that you are angry with me’ may be a mild overture that gives you space to politely demur. This is a moderating use. Or I might say ‘I understand that you are angry with me’ when I am not quite sure that you are angry, but have some reason to think so. In this case, ‘I understand’ seems to be a

backing away from a full-fledged claim to epistemic entitlement. This is hedging. These are not the sorts of usages that Kvanvig and I are interested in. We are interested in cases where understanding is a sort of epistemic success. So for the remainder of this paper, I shall restrict the term ‘understanding’ to the sort of understanding that should be of interest to epistemology – the sort that manifests epistemic success. In such cases the understander has a claim to epistemic entitlement. The questions that concern me here are what is the bearer of the entitlement and what is the claim to it?

There are two obvious candidates for the bearer of epistemic entitlement: individual propositions and more comprehensive bodies of information. I can say, ‘I understand that the Comanches dominated the southern plains of North America in the 18th century’. Or I can say, ‘I understand the power relations among the tribes in the southern plains in the 18th century’. If the primary unit of understanding is the proposition, then the difference between knowledge and understanding seems slight. If the proposition ‘I understand that the Comanches dominated the southern plains’ is supposed to be a stand-alone proposition (and is not supposed to be a hedge), it is hard to see how it differs from ‘I know that the Comanches dominated the southern plains’. But if my understanding that the Comanches dominated the southern plains depends in a suitable way on my overall understanding of the Comanches, or of the political forces and power relationships in the North American plains in the 18th century, or some such thing, then the situation is different. The epistemological standing of ‘The Comanches dominated the southern plains’ then derives from its place in a more comprehensive general understanding of the history of North America (or some part of it). That is, the proposition derives its epistemological status from a unified, integrated, coherent body of

information. This is the conception of understanding that Kvanvig takes to be central. I agree.

The sort of understanding of interest to epistemology then is in the first instance a cognitive relation to comprehensive, coherent sets of cognitive commitments. The understanding encapsulated in individual propositions derives from an understanding of larger bodies of information. I understand that the Comanches dominated the southern plains, because I grasp how that proposition fits into and is justified by reference to a more comprehensive understanding that embeds it.

As Kvanvig rightly insists, to understand the Comanche's dominance of the southern plains involves more than knowing the various truths that belong to a comprehensive, coherent account of the matter. The understander must also grasp how the various truths relate to each other. This is an important point. One might think that the comprehensive body of information is just a large collection of propositions. I suggest that understanding involves more. The understander should be able (and perhaps be aware that she is able) to use that information – to, for example, reason with it, to apply it, to perhaps use it as a source of working hypotheses about other related matters. Someone who knows geometry, for example, knows all the axioms, all the major theorems, and how to derive the major theorems from the axioms. You can do all this by memorizing. But someone who understands geometry can reason geometrically about new problems, apply geometrical insights in different areas, assess the limits of geometrical reasoning for the task at hand and so forth. Understanding something like the Comanche dominance is obviously not exactly like understanding geometry, since the applications and extensions are more tentative, the range to which insights can reasonably

be applied is more restricted, the evidence for a successful application is empirical (and may be hard to come by), and so on. But the main point is that understanding in both cases involves an adeptness in using the information one has, not merely in appreciating that things are so. Kvanvig does not discuss this aspect of understanding. But it is something he could easily assimilate into his account, either by saying that this is part of grasping or by saying that in addition to grasping connections, an understander has to have an ability to use the information at his disposal.

Epistemology, as William James said, should be concerned with what is good in the way of belief. Kvanvig takes it that the sort of understanding that epistemology is concerned with consists of coherent bodies of (mostly) true beliefs. Coherence alone is not enough. A coherent body of beliefs that are largely false, such as astrology, does not constitute an understanding. Understanding is good in the way of belief on Kvanvig's view, because (a) true beliefs are good and (b) a grasp of coherence among true beliefs affords subjective justification, which is also good.

Knowledge is factive in that it is impossible to know that p unless ' p ' is true. Kvanvig maintains that understanding is factive as well. But understanding concerns subject matters rather than individual propositions. So what it means to claim that understanding is factive is a bit harder to make out. Perhaps understanding is factive if it is impossible to understand a subject – say, the history of the American Plains Indians – unless some identifiable, suitably comprehensive proposition is true. That proposition might be the long conjunction of all the shorter propositions that belong to the coherent body of information. (This parallels the interpretation of coherence theories of knowledge as requiring the truth of the conjunction of the propositions in the coherent

system.)

On such an account, understanding would be a sort of knowledge, namely the knowledge of long, subject-matter-connected, conjunctive propositions. There are several problems with this proposal. The first is that it does not accommodate the requirement that the understander grasp the relations among the propositions – that the understander appreciate how they bear on one another. Although the body of information understood must be coherent, if the understander need only know the conjunction, there is no requirement that she grasp the coherence. Second, it does not accommodate the insight that the student who understands geometry can do more with it than the student who just knows all the axioms, the main theorems and their derivations. Third, it does not accommodate the fact that not all of the propositions that comprise a genuine understanding of a subject need to be true. We would be inclined to say that an historian understood the Comanche dominance even if he harbored a few relatively minor false beliefs about the matter.

Kvanvig agrees. He does not believe that understanding a subject consists in believing a long conjunction. He does not insist that every proposition in the comprehensive body of information be true. Rather, he maintains, we cannot understand a subject matter unless most of the propositions and all of the central propositions that constitute our coherent take on that subject matter are true. He allows that a few peripheral falsehoods might degrade one's understanding of a subject matter, but not destroy it. That the understanding of interest to epistemology is factive in this sense is the thesis I want to dispute.

Unlike knowledge, understanding admits of degrees. A freshman has some

understanding of the Comanche dominance, while her teaching fellow has a greater understanding and her professor has an even greater understanding. So epistemology should explain what such differences in degree consist in. Kvanvig recognizes two dimensions along which understanding can vary: breadth and depth. The professor might have a broader understanding of the Comanche, being able to embed his coherent body of true beliefs into a more comprehensive understanding of American history. He might also have a deeper understanding. In that case, his web of belief is more tightly woven. It contains more facts. But both the student and the professor understand the Comanche dominance because they grasp coherent bodies of predominantly true propositions, and believe the propositions that belong to those bodies. There is another dimension along which the student and the professor might differ. The professor and the students might weight the facts differently. That is, even if each believes a given fact, and each incorporates it into a coherent body of beliefs about the matter, the professor might consider it highly significant, while the student considers it just another fact about the Comanches. If the fact really is significant – if, e.g., it is central to explaining why the Comanches allied with one tribe but were antagonistic to another – then the professor’s better understanding would consist in his appreciating the significance of the fact, not merely in his recognizing that it was a fact. Again, this is something that Kvanvig could easily concede.

However, there is another dimension along which we can measure greater and lesser understanding that Kvanvig cannot take on board. For it involves conceding that some bodies of information, even though they are not true, nonetheless display a measure of understanding. The growth of understanding often involves a trajectory from beliefs

that, although strictly false, are in the right general neighborhood to beliefs that are closer to the truth. The sequence may terminate in true beliefs. But I would contend that the earlier steps in the sequence should fall within the ambit of epistemology. For they are, to an extent – often to a considerable extent – good in the way of belief. A second grader’s understanding of human evolution might include as a central strand the proposition that human beings descended from apes. A more sophisticated understanding has it that human beings and the other great apes descended from a common hominid ancestor. The child’s opinion displays some understanding of evolution. It is clearly cognitively better than the belief that humans did not evolve. But it is not strictly true. And since it is central to her take on human evolution, it follows from Kvanvig’s theory that her take on human evolution is not the sort of understanding of interest to epistemology. Epistemology need give no account of what makes the child’s understanding of evolution good in the way of belief, or better in the way of belief than a view that takes humans to have evolved from butterflies. But the pattern exhibited in this case is endemic to scientific education. We typically begin with rough characterizations that properly orient us toward the phenomena, and then refine the characterizations as our understanding of the science advances. Think of the trajectory from naïve folk physics through Newtonian mechanics to relativity and quantum mechanics.

When we construe such a take on a subject as understanding, Kvanvig believes, we use the term ‘understanding’ in an honorific sense, just as we use the term ‘knowledge’ in an honorific sense when we speak of ‘the current state of scientific knowledge’, while conceding that some of what belongs to the current state of scientific knowledge is false. Such honorific usages of epistemic terms are, he believes, extended

usages that fall outside the scope of epistemology.

Perhaps it would be feasible to accept Kvanvig's dismissal of such uses of 'understanding' as merely honorific if they applied only to young children or novice students of the subject. I tend to think otherwise, however, for I think epistemology should have something to say about what makes the views of the second grader who thinks humans evolved from apes better than the views of the second grader who thinks humans did not evolve or evolved from butterflies. But the main problem with Kvanvig's contention that understanding is factive is that the pattern displayed by the student as he moves from the naïve view of human evolution up to the view held by the professor of evolutionary biology is the same pattern as science displays in the sequence of theories it develops.

Copernicus's theory has as a central claim the contention that the Earth travels in a circular orbit around the sun. Kepler improved on Copernicus by contending that the Earth's orbit is not circular, but elliptical. With the abandonment of a commitment to absolute space, current astronomers can no longer say that the Earth travels around the sun simpliciter, but must talk about how the Earth and the sun move relative to each other. Despite the fact that Copernicus's central claim was strictly false, the theory it belongs to constitutes a major advance in understanding over the Ptolemaic theory it replaced. Kepler's theory is a further advance in understanding, and the current theory is yet a further advance. The advances are clearly cognitive advances. With each step in the sequence, we understand the motion of the planets better than we did before. But no one claims that science has as yet arrived at the truth about the motion of the planets. Should we say that the use of the term 'understanding' that applies to science should be

of no interest to epistemology?

Again Kvanvig might contend that the use of ‘understanding’ here is honorific. We only apply the term in these cases because we think that the advances that the scientists have made are on the way to the truth – the comprehensive, general account of celestial motion that gets it right. In effect, current science borrows its epistemic status from its descendants. Sellars argued that in a mature science, later theories should show why their predecessors were right to the extent that they were. So the later theories are supposed to at least partially vindicate their predecessors. Where this does not happen, we are apt to conclude that the earlier scientists didn’t understand the phenomena that their theory purported to explain. We do not, for example, consider phlogiston theorists to have had any understanding of combustion. Suppose we concede this point. Let us admit that in saying that the various astronomical theories embody an understanding, we are taking out a lien on the future of science. Still, I would urge, the cognitive achievements embodied in such theories should be a central concern for epistemology. Even if we do not yet have (and may never get to) the truth, we have made real cognitive progress. We understand the motions of celestial bodies better than our predecessors did. Epistemology should explain what makes current understanding better. If we say that the uses in question are honorific, epistemology should explain why certain attitudes toward certain subject matters are worthy of honor.

But there is another aspect of science that is even more troublesome for Kvanvig’s view. That is science’s penchant for idealization. Science streamlines and simplifies. It devises and deploys simplified models that diverge from the phenomena it seeks to explain. The ideal gas law, for example, accounts for the behavior of gases by

characterizing the behavior of a gas composed of dimensionless, spherical molecules that are not subject to friction and exhibit no intermolecular attraction. There is no such gas. Indeed, there could be no such gas. Nonetheless, scientists purport to understand the behavior of actual gases by reference to the ideal gas law.

Idealization is taken by scientists not to be an unfortunate expedient, but rather a powerful tool. There is no expectation that in the fullness of time idealizations will be eliminated from scientific theories. So the ‘promissory note-ishness’ that we saw in talking about the progress in our understanding of celestial motion seems not to be in place here. Elimination of idealizations is not a desideratum. Nor is consigning them to the periphery of a theory. It is simply not the case that the bodies of information that constitute scientific understanding are, or that their ultimate successors can be expected to be, composed of truths, with any residual falsehoods only occurring at the periphery. The ideal gas law lies at the core of statistical mechanics, and some such law is likely to lie at the core of any successor to current theories.

I concede that many of the propositions that fall within the scope of ‘the current state of scientific knowledge’ are not strictly *knowledge* because they are not true. In ordinary usage we withdraw a claim to know a proposition if we discover that the proposition is false. So it is reasonable to construe ‘knowledge’ as a factive. If we are being scrupulous, we should probably not speak of the current state of scientific *knowledge* unless we are convinced that the propositions we are speaking of are true. But the contention that ‘understanding’ is a factive does not have the same sort of support from ordinary language. Since ‘understanding’ applies to large, often somewhat inchoate bodies of information, it takes a direct object that is not a proposition. *S* understands the

Comanche dominance of the plains, Q understands the motions of the planets, R understands the Federal Reserve System. And we typically acknowledge that people can have some measure of understanding even if the contentions making up the bodies of information they endorse diverge somewhat from the truth. So there is not a strong argument from our ordinary use of ‘understanding’ as applied to bodies of information to pull in the direction of favoring a factive analysis. There is, however, a recognition that ‘understanding’ is some sort of a cognitive success term. If I am going to reject the factive analysis, I need some way to identify or characterize the cognitive success.

As a very crude first approximation, I suggest that understanding is a grasp of a comprehensive general body of information that is grounded in fact, is duly responsive to evidence, and enables non-trivial inference, argument, and perhaps action regarding that subject the information pertains to. Obviously this is hideously rough. Some of the roughness is inevitable, if understanding must comprehend everything from the second grader’s very shallow take on evolution to the mature scientist’s broad, deep, textured grasp of the subject. But some of the roughness can be smoothed out with a bit more work.

Let us start by looking at scientific idealizations. These are both central and ineliminable. We understand the behavior of actual gases by reference to the alleged behavior of a so-called ideal gas. There is no such gas. So how can it figure in our understanding of the world? I suggest that effective idealizations are felicitous falsehoods. That they are false is evident. They are felicitous in that they afford epistemic access to matters of fact that are otherwise difficult or impossible to discern. Idealizations are fictions expressly designed to highlight subtle matters of fact. They do

so by exemplifying features they share with the facts.

To make this out requires saying a bit about exemplification. Let us look at a pedestrian example. Commercial paint companies supply sample cards that exemplify the colors of paints they sell. The cards contain instances of those colors, and refer to the colors they instantiate. Such cards have a large variety of other properties as well. They consist of sequences of rectangles of color, usually with a name or number associated with each color. They are a few inches long, and perhaps an inch and a half wide. They make good bookmarks. They were manufactured somewhere, on some particular date, were shipped via some means. They are a certain distance from the Eiffel Tower. Most of the properties of the cards are utterly irrelevant to their function. Some nonfunctional elements facilitate but do not figure in the card's function. None of these properties is exemplified. To exemplify a property, an exemplar must both instantiate and refer to it. The function of the cards, in their standard use, is to display and hence afford epistemic access to the paint colors. By at once instantiating and making reference to the colors then, the cards perform their function.

Other samples and examples function in the same way. A water sample exemplifies its impurities. A sample problem worked out in a textbook exemplifies a reasoning strategy that the students are supposed to learn. Each sample highlights some of its own properties, makes them manifest, draws attention to them.

Exemplification is selective. An exemplar exemplifies only some of its properties. It brings those properties to the fore by marginalizing, downplaying, or overshadowing others. What a given exemplar exemplifies is depends on how it functions. The paint sample cards could be used to teach children what a rectangle is. In

that case, they would exemplify the shape rather than the colors of the patches.

In principle an item can exemplify any property it literally or metaphorically instantiates. But doing so is not always easy. The tail feathers of a falcon are a particular shade of brownish gray. But a paint company would be ill advised to recommend that potential customers look at a falcon's tail in order to see that color. Falcons are so rare and fly so fast, and display so many more interesting properties than the color of their tail feathers, that any glimpse we get of the tail is unlikely to make the color manifest. We could not see it long enough or well enough, and would be unlikely to attend to it carefully enough to decide whether it was the color we wanted to paint the porch. It is far better to create a lasting, readily available, easily interpretable sample of the color – one whose function is precisely to manifest the color. Such a sample should be stable, accessible, and have no properties that distract from attention to the color. Effective samples and examples are carefully contrived to exemplify particular features. Factors that might otherwise predominate are omitted, bracketed or muted. If the property is at all subtle or difficult to discern, a good deal of stage setting may be required to bring it to the fore. Similarly in scientific cases. The conductivity of water is hard to determine in nature, because the liquid in lakes, puddles, rivers and streams contains impurities. By eliminating the impurities in the lab, the scientist can contrive a sample of pure water, thus gaining epistemic access to the property she is interested in studying.

But if the cognitive contribution of an exemplar consists in the exemplification of select features, then anything that exemplifies exactly those features can, in a suitable context, make the same contribution. Return to the sample cards mentioned above. Like just about everyone else, I spoke of the cards as though they were comprised of paint

samples, telling instances of the stuff you might use to paint the porch. This is not true. The sample on the card does not consist of paint, but of an ink or dye of the same color as the paint whose color it exemplifies. If the sample were supposed to exemplify other properties of the paint, this divergence would be objectionable. But since it purports only to exemplify the paint's color, and is in fact the same color as the paint, the divergence is unproblematic. The card affords epistemic access to the property we want epistemic access to.

I suggest that idealizations in science function similarly. The ideal gas is a fiction that exemplifies features that exist, but are hard to discern in actual gases. The idealization affords epistemic access to those features, and enables us to explore them and their consequences by prescind from complications that overshadow the features in real cases. The reason why it is valuable is that it equips us to recognize these features, appreciate their significance, and tease out subtle consequences that might be obscured in the welter of complicating factors that obtain in fact. It serves as a focus that facilitates indirect comparisons, where direct comparisons are unilluminating or intractable. We understand the phenomena in terms of their deviations from the ideal. Such idealizations are not, do not purport to be, and do not aspire to be replaced by, truths. But it is hard to deny that they are cognitively valuable, and hard to deny that epistemology should attempt to explain what makes the theories they figure in cognitively valuable.

What should we say about the false factual propositions that occur in the scientific understanding of both scientists and novices? I said that we might concede with Kvanvig that there is something honorific about calling these cases of understanding. At least their claim to be genuine understanding depends on their relation to some (real or

anticipated) future account that is cognitively better. I suggest that they too are felicitous falsehoods. The child who thinks that humans descended from apes embeds that contention in a general account that reflects both a commitment to evolution and an idea that humans and other apes are closely related. So although there is a falsehood involved, it is a falsehood that enables her to connect, synthesize, and grasp a body of information that is grounded in the biological facts, and is supported (to an extent) by her available evidence. It may not be a lot, but it is something. Similarly in the case of Copernicus. The Earth's orbit is not circular. But the Earth can be accurately represented as going around the sun in an orbit that is not all that far from circular. So the falsehood is felicitous in that it figures in and enables Copernicus to unify a body of information in a way that answers to the evidence better than his predecessors could.

These felicitous falsehoods are not fictions. Fictive sentences neither are nor purport to be true. They function in other ways. So it is no defect in ideal gas descriptions that there are no gases that instantiate them. But it is a defect in Copernicus's view that the Earth's orbit is not circular, and it is a defect in the child's view that humans did not descend from apes. So understandings that embed propositions like these are in need of improvement. They are just way stations toward a better understanding of the subjects they concern.

The epistemic status of idealizations is parasitic. The only reason to accept them is that they figure in theories that make sense of the facts. If those theories are overthrown, we lose our reason to accept the idealizations they contain. The theories in question are answerable to evidence. So there is no danger that by acknowledging that genuine understanding may involve felicitous falsehoods, epistemology loses touch with

the facts or abandons hope of discovering what is good in the way of belief. For duly accommodating the evidence is answering to the facts and is good in the way of belief. But answering to the evidence is a requirement on the entire theory or comprehensive body of information, not on each individual element of it.

I have argued that the sort of understanding displayed in science falls within epistemology's purview, and that that sort of understanding cannot plausibly be construed as factive. Kvanvig does not discuss scientific understanding. His example is drawn from history. It seems far more plausible that historical understanding is factive than that scientific understanding is. History, for example, does not resort to idealizations or simplifying assumptions. It does not go in for thought experiments. If this is right, then one question that arises for an epistemology that comprehends understanding is how do the understandings afforded by different disciplines differ? By insisting that epistemology should concern itself with understanding, Kvanvig makes such questions salient.