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Education and the Advancement of Understanding

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Plato's *Meno* ends on a disheartening note. Virtue cannot be taught, Socrates concludes, because there are no teachers of virtue. And there are no teachers of virtue because no one -- not even those who are virtuous themselves -- knows what virtue is.[1] The background assumption is that you cannot teach what you do not know. Let us call this Plato's Teaching Assumption (PTA for short). At first glance, PTA seems plausible. I cannot hope to teach you the atomic number of gold if I do not know what it is. Even if I happen to guess the correct answer and impart my opinion to you, we would hardly dignify my accomplishment by calling it `teaching'. `Teaching' is a success term, and mere inculcation of opinions does not qualify as the right sort of success. But the implications of accepting Plato's teaching assumption are bleak. For Socrates' conclusion generalizes far beyond the ethical realm. If one cannot teach what one does not know, it is not just virtue that cannot be taught. Neither can (much of) anything else. The requirements on knowing and teaching are too high.

Plato maintains that knowledge differs from (mere) right opinion

1Plato, *Meno*, tr. G. M. A Grube, (Indianapolis: Hackett, 1976), 89d-96d.

through having a tether -- something to secure it or hold it fast.[2] This seems right. Although epistemologists disagree vociferously about the nature and strength of the requisite tether, they generally agree that some sort of tether is needed to confer a right to be sure, and without such a right, one does not know. Although lucky guesses turn out to be correct, we have no right to be sure of them. Hence they do not qualify as knowledge. Epistemologists differ over whether knowledge is contextual or acontextual, whether it rests on justification or reliable mechanisms, whether an internalist or an externalist stance is appropriate. The common denominator is that knowledge requires tethered true belief. So, if you can teach only what you know, you can teach only what you have tethered true beliefs about. And if teaching is conveying knowledge, then when you teach, you convey tethered true beliefs to your students.

Even if we manage to evade global skepticism, we must concede that we don't actually *know* much of what we and our colleagues purport to teach. I won't embarrass you by asking how much philosophy you actually know. (Are your views true? Are they adequately justified or reliably produced? Are they so much as mutually consistent?) Even the `mature sciences' rarely yield knowledge, strictly so-called. Anomalies, discrepancies, and outstanding problems challenge the adequacy of our most strongly supported theories. So long as it lacks the resources to answer such challenges, a scientific theory is insecurely tethered, hence is

2Plato, *Meno,* 98a.

not a repository of knowledge. Nor are the models it generates. Since they involve idealizations, approximations, and simplifying assumptions, they neither are nor purport to be true representations of the phenomena they concern. If PTA is correct, no more than virtue can philosophy or science be taught.

At the cutting edge of inquiry, where cognitive advances take place, matters are controversial, truth is elusive, and any tether is bound to be fairly loose. The latest findings in a field do not immediately merit the status of knowledge. They have to stand the test of time and become enmeshed in accepted, confirmed theories before we consider them adequately grounded. But if the latest findings do not qualify as knowledge, then according to PTA they cannot be taught. This means that in graduate seminars that focus on recent work in a field, teaching does not occur. That may be right. Advanced seminars at their best are collaborative exchanges, not conduits of already established knowledge. As we back away from the cutting edge, we retreat to seemingly more solidly grounded conclusions. So perhaps it is in less advanced courses that knowledge is conveyed. This accords with our words. We lead seminars, we say. But we teach introductory ethics, astronomy, metallurgy or whatever.

There are at least two problems with this proposal. One has to do with systematicity, the other with accessibility. The worry about systematicity is that there is no effective way of isolating antecedently established results from what is going on at the cutting edge. New discoveries can unsettle

findings we consider firmly established and shift the grounds we take to establish them. It's not just the permanent possibility of scientific revolution that causes difficulties. We might feel fairly safe in considering steel a metal and fairly safe in believing that future inquiry is unlikely to lead scientists to conclude otherwise. So we might think the fact that steel is a metal is a bit of knowledge that can be taught in an introductory metallurgy class. But even if we are sanguine about the fact that steel is a metal, we may be (and probably should be) more circumspect in our assessment of our grounds. Further investigation may result in the refinement of the criteria for classifying something as a metal. Even if the newly sanctioned criteria didn't require us to revise our classification of steel, they might constitute a revision in the grounds for classifying it. In that case, our previous claim to knowledge is undercut. If we used to think that something is a metal because it has a particular lattice structure *L* and metallurgists conclude that it is not *L* but related structure *L** that makes something a metal, then our previous reason for counting steel as a metal was incorrect. That being so, our earlier conviction that steel is a metal was not adequately tethered. We believed the right thing for the wrong reason. Current investigations are designed to elaborate, extend, and/or challenge accepted theories. The continued acceptability of those theories and the statements of fact they generate depends on how the investigations turn out.

So does the interpretation of those statements. What we understand when we understand the statement `Steel is a metal' depends on and

derives from an understanding of the theory or system of thought that generates it. For it is that theory that spells out the implications and implicatures of the statement. As the theory is extended, revised, and/or deepened, the interpretation of the statement evolves as well.

Holism pulls against knowledge. If, as Quine says, statements face the tribunal of experience as a corporate body,[3] we can't know individual facts. To know the fact that steel is a metal, we need to know a good deal of metallurgy. For we need to know what it means to claim that steel is a metal, what such a claim commits us to, what sort of evidence supports that claim, and what makes that evidence adequate. To the extent that the theory is vulnerable, so is our claim to know the fact. If PTA is correct, then if the theory is vulnerable, so is our competence to teach that fact.

The other worry concerns accessibility. If we are to convey knowledge to our students, we need to impart both content and grounds. But the more basic the course, the less prepared students are to understand the complexities of the subject. Perhaps there are adequately tethered truths about, say, magnetism. Perhaps the instructor knows those truths. Still, according to PTA, to teach them, to impart knowledge of them, requires conveying both the truths and the tether. And to impart the tether is to convey to the students in a way that they can grasp both the grounds for believing them and the reasons for considering those grounds adequate.

3W. V. Quine, `Two Dogmas of Empiricism,' *From a Logical Point of View*, (New York: Harper Torchbooks, 1961), p. 41.

This may seem unproblematic. We're not, after all, trying to teach the complexities of electromagnetism in a fourth grade science class. The truths imparted in elementary courses tend to be more general and less nuanced than the ones more advanced students and professionals grapple with. Hence, one might think, they and their grounds are more easily taught. But the complexities that emerge at higher levels are integral to the content and grounds for the generalizations we seek to impart. If a particular alignment of atoms is what makes something magnetic, then to know what is being claimed in saying that a material is magnetic requires appreciating the significance of that alignment. If teaching is imparting knowledge, we cannot teach magnetism to students who lack the resources to understand what that alignment is and why it matters.

Maybe the worry about accessibility is misguided. Granted, the instructor can't convey to novices the full content and grounds for the facts she imparts. But, one might argue, if those facts are secured by an adequate theory, and the instructor knows as much, then in imparting the facts to her students, she teaches them. This is not wholly implausible. We purport to know a variety of more or less free floating facts -- the atomic number of gold, the main product of Bolivia, the causes of the Franco-Prussian War, and so on. Often these bits of information are products of educational encounters. Why shouldn't we say that we were taught such facts, we learned them, so now we know them? But if a parrot were trained to recite on demand the causes of the Franco-Prussian War or the atomic

numbers of the elements, we wouldn't say that it knew them, for it wouldn't understand its own words. Even if *we* can provide its utterances with content and grounds, it cannot. So it does not know. No more should we claim that a student who memorizes such matters by rote knows them. For he, like the parrot, knows not whereof it speaks. To understand an assertion requires an appreciation of what its acceptance would commit one to, and what would count as reason to accept it. Neither the parrot nor the rote memorizer has such an appreciation.

Teaching looks to be well nigh impossible. PTA insists that we can teach only what we know. Given the stringent demands on knowledge and the systematic interdependence of seemingly established and tentative findings, we know very little. Moreover, since `teaching' is a success term, and attempts to teach are successful only if students learn, we can teach only what our students are capable of learning. If teaching is a matter of conveying knowledge, then unless the students can grasp the entire theory, or a suitably extended, isolable fragment of it that provides a statement of fact with its content and its grounds, they cannot learn, so we cannot teach them, that fact.

Rather than abandoning hope of teaching, I suggest that we reject PTA. Even if we concede (as we should) that imparting one's lucky guesses is not the same as teaching, and that competence with the subject matter is a requirement on teaching, it does not follow that teaching consists in imparting knowledge, or that you can teach only what you know. Rather, I

suggest, teaching consists in advancing understanding. How does this help?

First, understanding, unlike knowledge, does not require truth. An approximation, idealization or sketch, although not true, reveals some understanding of a subject. If I have a rough understanding of the workings of the spleen, I may be able to convey it to my students, thus advancing their even more rudimentary understanding of physiology. And if my mechanic has a deep understanding of the workings of the carburetor, he may be able to convey to me at least a superficial understanding of it. Even if I acquire no truths about how the carburetor works (the details required for truth in this area being beyond my ken), I may now have at least some idea what is going on under the hood. And investigators who recognize that their current best theories are not precisely true may nevertheless have something to teach. Despite the anomalies, tensions, and outstanding problems at the forefront of physics, if we concede that physics provides an understanding of its subject matter, physics can be taught. Indeed, to understand physics requires recognizing the existence and appreciating the significance of the anomalies, tensions, and problems that remain. Teaching a subject involves conveying the limits as well as the established findings of the field. If I'm right, philosophy can be taught too. Granted, we don't have anything like the progress of the physical sciences to brag about. Still, we can reasonably claim to have achieved some understanding of the problems we study. We can, in principle, convey that understanding to our students.

Second, understanding admits of degrees. A rough approximation

exhibits some understanding of it subject matter, a close approximation, greater understanding. PTA needs to assume that education is a matter of moving from easily learned truths to more difficult truths. For knowledge requires truth. But much education proceeds by a series of approximations. We begin with a crude outline, and elaborate, extend, and emend it as we go. Although Newtonian theory isn't strictly true, it is an excellent first approximation. Hence, teaching about physical interactions as though they conformed to Newtonian laws is a good way to begin to teach physics.

Third, understanding is not restricted to facts. We understand rules and reasons, objectives and obstacles, actions and passions, techniques and tools, forms, functions, and feelings, as well as facts. If the objective of teaching is the advancement of understanding, then the scope of teaching is wider than PTA assumes. Understanding need not be couched in literally true sentences. It may be located in apt terminology, insightful metaphors, useful fictions, penetrating questions, effective non-verbal symbols, intelligent behavior. We've got to grasp a lot more than the established facts to understand a subject. And we've got to convey a lot more than established facts to teach a subject. To teach science, for example, requires conveying an understanding of the scientific method. It also requires conveying an appreciation of the role of anomalies and outstanding problems, the significance of evidence, the power of the idealizations, and the importance of the requirement that results be replicable. Merely to impart a list of facts that scientists have discovered (that $e=mc^2$, that

vitamin C prevents scurvy, that hydrogen is lighter than oxygen, etc.,) would not be to teach science. To teach philosophy requires enabling students to understand and assess the significance of the arguments that constitute a philosophical position and to contrive arguments of their own. Merely to impart a list of positions philosophers have held (Thales believed that everything is water, Descartes believed that mind and body are distinct, Quine believes that whatever is is physical, etc.) or a list of the philosophical propositions the professor believes to be true (whatever is actual, there is no necessary connection between matters of fact, etc.) would not be to teach philosophy. To teach a subject -- philosophy or physics or auto mechanics -- is to teach how it various commitments interweave to provide an understanding of the items in the domain.

The question is: what constitutes understanding? Truth, I said, is not required. Nevertheless, there must be some standard that distinguishes understanding from mere opinion. If we say (as we should) that there are no absolutely secure propositions on which to build our theories, and no failsafe rules of reasoning, how do we decide what belongs in a good theory or system of thought? In *Considered Judgment* I argue that we understand a subject when our relevant commitments constitute a system of thought in reflective equilibrium.[4] Understanding advances when a system in reflective equilibrium is extended, elaborated, or supplanted by a better system.

4Catherine Z. Elgin, *Considered Judgment,* Princeton: Princeton University Press, 1997.

Whether or not we are justified, we accept some sentences, stances, and methods without reservation. Being our current best guesses about the matter at hand and the appropriate ways of dealing with it, these function as our working hypotheses. We do not contend that they are surely right or to be held true come what may. But because they are our best guesses, they have some claim on our epistemic allegiance. We need a reason to give the to give them up.

To be sure, reasons are often all too readily available. Our working hypotheses may be mutually incompatible, jointly untenable, or otherwise at odds with each other. Our methods may yield inconsistent answers or provide no answers to questions we consider both relevant and significant for the subject at hand. Our standards of acceptability may endorse too many, or two few, or intuitively wrong answers. And so on. For any number of reasons, available resources may be inadequate to achieve our cognitive and practical objectives. To arrive at an acceptable theory or system of thought, we typically need to revise, extend, and correct the judgments, methods, and approaches we started with. A process of delicate adjustments occurs, its goal being a system of mutually supportive, independently supported commitments. Such a system, I maintain, is in reflective equilibrium. To achieve reflective equilibrium may require drawing new evaluative and descriptive distinctions or erasing previously drawn lines, reordering priorities or imposing new ones, reconceiving the relevant facts and values or recognizing new ones as relevant. To test the system for accuracy, we see

whether it reflects (closely enough) the commitments we began with; to test it for adequacy, we see whether it realizes our cognitive and practical ends. Reflecting closely enough does not require and is not insured by exact replication of the commitments we began with. We realize that those commitments are incomplete and suspect that they are flawed; we recognize that our initial conception of our objectives is vague and perhaps inconsistent. We do not expect our working hypotheses to be precisely right. Nonetheless, being our current best guesses, they function as guides to research.

A system of thought is in reflective equilibrium just in case its components are reasonable in light of one another, and the system as a whole is as reasonable as any available alternative in light of our relevant antecedent commitments. Such a system is one that on reflection we can endorse. It is tethered, not to epistemological absolutes, but to our prior understanding of the matter at hand. It does not purport to yield irrevocable truths or permanently tenable epistemic commitments. New evidence and further refinements can upset the balance. But the commitments that constitute such a system are reasonable in the epistemic circumstances. Because they hang together to constitute a creditable system, they provide an understanding of the subject at hand. They admit of elaboration and refinement, as well as revision or rejection in light of further investigation. So the understanding the system yields can be broadened, deepened, and corrected. But being our new constellation of working hypotheses, the

system provides a springboard for further inquiry. The commitments that comprise it become our current best guesses about the matter at hand.

Understanding, as I construe it, is holistic. It is a matter of how commitments mesh to form a mutually supportive, independently supported system of thought. It is advanced by bootstrapping. We start with what we think we know and build from there. This makes education continuous with what goes on at the cutting edge of inquiry. Physicists take the scientific community's consensus about electromagnetism as their working hypotheses. Fourth graders start with what they take themselves to know about magnets, or metals, or whatever else seems relevant. Both groups build from what they already accept, extending, revising, reconceiving as necessary to advance their understanding of the phenomena. Methods, standards, categories and stances are as important as facts. The understanding that a scientist or a fourth grader obtains from her inquiries is inseparably linked to the methods she uses, the standards she takes her investigations to be subject to, the assumptions she takes to be the uncontroversial background to her work, and the conceptual resources she has to work with. So something like E. D. Hirsch's list of facts every fourth grader should know is slightly silly. At least, knowledge of those facts would not make a child an educated fourth grader. What makes for a good fourth grade education is not the set of facts the fourth grader knows, but the level of understanding she has achieved and the resources she can deploy to advance that understanding. Facts are part of the story, but so are fictions,

methods, standards, and categories. A major part of understanding is recognizing what problems remain to be solved.

Literal truth is not privileged. Non-verbal symbols, non-factual symbols, non-true symbols may belong to systems in reflective equilibrium. So may methods, perspectives, values and standards. To evaluate them requires asking what we can do with them. In studying literature, for example, the question arises how the insights gleaned from a work export to other areas. How can we make sense of other things in light of the insights a fiction affords? This is a question that arises whether the work in question is *Ulysses* or *Horton Hatches the Egg.* The same question arises for factual treatises. We need to ask how our findings export from the lab as well. If we can't answer that adequately, we don't know what to make of them. They are cognitively inert.

Holism undermines PTA because the content of a claim derives from and depends on the system of thought it belongs to. What it means to say that iron is magnetic turns on what such a claim commits us to. Since, according to PTA, the children who haven't mastered electromagnetic theory don't know what their words commit them to, they don't know what they are saying. My account is not vulnerable to this difficulty because it contends that understanding a claim, like understanding the facts it pertains to, is a matter of degree. Since the children's system of thought is sparser and cruder than the physicist's, it is reasonable to think that the physicist has a deeper, more sophisticated, more accurate conception of a magnet than the

children have. She consequently draws on a richer network of presuppositions and background assumptions and her use of the term commits her to a more complex constellation of implications and implicatures. But it does not follow that the children's words are vacuous. They too draw on a network of commitments in reflective equilibrium. That network supplies them with an understanding of their words and their objects. Their network is sparser than the scientist's. So the children's conception of a magnet is comparatively impoverished. This is as it should be. But there is enough agreement between the two conceptions that we can (sometimes with a dollop of the principle of charity) recognize them as conceptions of the same thing. This agreement affords a basis for communication and a platform for teaching. Scientists and science teachers, having a greater understanding of the subject, can raise questions and introduce considerations that push the children to broaden and deepen their understanding.

If we look back at *The Meno*, we see an example of this. Socrates insists (what no one has ever believed) that he is not teaching the slave geometry.[5] True, he is not imparting geometric truths to the boy. But he is asking leading questions that guide the slave toward a better understanding of the relation between the length and area of a square. Socrates began the exercise with a better understanding of geometry than the slave had. But there is no reason to think that he either understood or needed to

5Plato, *Meno*, 82e.

understand the truth, the whole truth, and nothing but the truth to teach effectively.

Should we say than that you can teach only what you understand? Maybe. But if we do, we should recognize that the principle is more a terminological stipulation than an insight about education. If I understand enough about a matter to successfully direct your efforts to advance your understanding, as Socrates directed Meno's slave, we call what I do teaching and what you do learning. If we're pretty much on a par, grappling with the material, puzzling it out together, we call what we do collaborative investigation. It is a difference in degree, not in kind. And often it may be unclear which description is appropriate.

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