

UNDERSTANDING KNOWLEDGE TRANSMISSION

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We must allow that knowledge can be transmitted. But to allow this is to allow that an individual can know a proposition despite lacking any evidence for it and reaching belief by an unreliable means. So some explanation is required as to how knowledge rather than belief is transmitted. This paper considers two non-individualistic explanations: one in terms of knowledge existing autonomously, the other in terms of it existing as a property of communities. And it attempts to decide what is at issue between these explanations.

We can communicate what we know to others. By relying on testimony we can acquire knowledge and the simplest explanation of how we can do so is that speakers communicate their knowledge. Testimony functions to transmit knowledge from a speaker to an audience. On this there is much agreement. So, for example Audi claims ‘Testimonially based knowledge is received by transmission and so depends on the attester’s knowing that *p*.’¹ McDowell writes: ‘if a knowledgeable speaker gives intelligible expression to his knowledge, it may become available at second-hand to those who understand what he says.’² And Burge argues that ‘when one depends on an interlocutor for knowledge one’s knowledge depends ... on there being in the chain of sources sufficient justification or entitlement to underwrite knowledge.’³

Testimony transmits knowledge. This could be expressed in a principle such as the following:

(T) If a speaker who knows that p testifies to p , then any audience who appropriately accepts that p can acquire testimonial (or transmitted) knowledge that p .

Of course, such a broad principle allows plenty of scope for disagreement. There is the issue of when acceptance is ‘appropriate’. Most would regard understanding as necessary, but is it epistemically appropriate to accept testimony *without* any reason for acceptance? On this question there is substantial disagreement.⁴ In addition, there is the issue of the scope of (T): is the transmission of knowledge the *sole* epistemic function of testimony? Or is it only the primary function with testimony also generating knowledge?⁵ And there are issues of detail: how should (T) be finessed, for instance, in recognition of the fact that an audience can acquire knowledge that p when the speaker fails to know that p but that p is otherwise known?⁶ However, irrespective of how this substantial disagreement and these further issues are worked out, the large agreement on (T) itself raises the question how to understand the transmission of knowledge.

To see why this is puzzling, suppose that in testifying to p the speaker utters some commonplace that the audience doesn’t fully understand; ‘the cam-belt needs replacing’ or ‘the paint contains a high level of VO₂s’, for instance. In these cases, the audience might have evidence that the speaker is trustworthy and so infer that p . But this evidence is not evidence *for* p . So principle (T) is compatible with the audience acquiring knowledge that p even if they lack evidence for p . Further, principle (T) is compatible with the supposition that the audience’s method of belief formation — say believing this speaker on these kinds of matters — is thoroughly unreliable. It is just that, on this occasion the speaker happens to know that p and the audience’s acceptance is appropriate. So the claim that knowledge is transmitted allows that an audience can acquire knowledge that p even if they reached the

belief that p by an unreliable method and possess no evidence for p . The *puzzle of transmission* is then to flesh out what it means to say that knowledge is transmitted in a way that renders it clear why it is knowledge rather than mere belief that the audience acquires.

One explanation of why (I) describes the acquisition of knowledge rather than mere belief is that the audience appropriately accepted an expression of knowledge. This explanation involves conceiving of knowledge, unlike belief, as being in some sense independent of its expression. The speaker, as it were, puts the knowledge out in the world for the audience to pick up. The audience acquires knowledge because the knowledge expressed by the speaker can exist independently of the speaker. Understanding transmission on this explanation thereby requires some account of knowledge in this objective sense.

That knowledge can be conceived objectively is supported by ordinary ways of talking about knowledge: we happily refer to the current state of scientific or mathematical knowledge. And on this basis Karl Popper hypothesised an independently existing world of knowledge in the objective sense.⁷ The problem is that Popper's hypothesis confronts difficulties which are such that they prompted one author to comment, 'the hypothesis seems scarcely worth preserving'.⁸ However, even if this true of Popper's hypothesis, it need not be true of alternative conceptions of objective knowledge; though the challenge to any alternative would be to show that it is not similarly vulnerable.

Another explanation of why (I) describes the acquisition of knowledge rather than mere belief invokes knowing communities, rather than independently existing knowledge. Roughly, the suggestion here is that the audience acquires knowledge rather than mere belief because their appropriate acceptance makes them part of a community of knowledge which knows that p . This explanation is proposed in Welbourne's account of knowledge

transmission.⁹ And it is suggested, but not developed, by Hardwig in his presentation of a parallel puzzle of transmission.¹⁰

Of these two possible ways of understanding transmission, this paper aims to argue for the first. Testimony functions to transmit warrants that can be conceived of as existing independently of the speaker and audience. That these warrants cannot be conceived of as existing independently of some community of knowledge does not suggest that an explanation of any individual's acquisition of knowledge should proceed in terms of the individual becoming a member of that community. To reach these conclusions, this paper will proceed as follows. The first section will outline Popper's hypothesis of an independently existing world of objective knowledge and criticisms of this hypothesis. The second section will attempt to develop a non-Popperian account of objective knowledge, which can answer these criticisms. The third section will consider Hardwig's presentation of the puzzle of transmission and the alternative community solution he proposed. What is at issue between these two solutions, I shall argue, is epistemological realism, or the question of whether there can be facts about warrant and knowledge that transcend our community's best judgements of them.

1.1

Popper distinguishes objective and subjective senses of knowledge. To identify knowledge as some kind of mental state, ordinarily as justified true belief, is to conceive of knowledge in the subjective sense. Popper is disparaging of this epistemological approach — it 'is irrelevant, in a pretty strict sense of the word' — and argues that epistemology should

consider the knowledge product, man's intellectual creation.¹¹ This product, our theories, can both transcend our subjective awareness and be false as well as true. For instance, we created the natural numbers but no one will entertain them all, and our best theories have been and will continue to be falsified. To consider knowledge, not as a species of belief, but as a product is to conceive of it in the objective sense. It is, Popper argues, to conceive of a *third world*, independent of the physical and mental worlds, a 'world of intelligibles or *ideas in the objective sense*; it is the world of possible objects of thought: the world of theories in themselves, and their logical relations; of arguments in themselves; and of problem situations in themselves.'¹² And Popper has three main theses concerning this third world of knowledge in the objective sense.

First, *the third world is a human creation*; 'the third world is a natural product of the human animal, comparable to a spider's web.'¹³ It is a consequence of our using language to describe and argue. The descriptions and arguments we produce are third world objects because they possess the objective properties of truth or falsity, and validity or invalidity. Of course, the 'human animal' has not always possessed language and just as mankind has a history so too, therefore, does the third world. Second, and following on the first thesis, *the third world is autonomous in its existence*; 'it is autonomous in spite of the fact that it is our product and that it has a strong feedback effect upon us.'¹⁴ Popper's main reason for claiming this autonomy for the third world is that from the moment we have produced some description or argument, some theory in short, this theory will have unforeseen consequences and generate further problems. Popper gives the example of the natural numbers. 'Although we create this sequence, it creates its own autonomous problems in turn. The distinction between odd and even numbers is not created by us: it is an unintended and unavoidable consequence of our

creation.¹⁵ Similarly Goldbach's conjecture — that every even number is the sum of two primes — is a problem that we *discover* rather than make. Third, and following on the second thesis, *the growth of objective knowledge results from a feedback process that can be understood in evolutionary terms*. There is a constant feedback between our work and us. Our tentatively proposed theories suggest different responses to the problem situations created by our third world environment. Testing of these theories eliminates their errors and none but the fittest survive. So 'there is a close analogy between the growth of knowledge and biological growth'.¹⁶ As the third world changes, it creates new problem situations that lead to further new theories. 'All work in science', Popper grandly claims, 'is work directed towards the growth of objective knowledge. We are workers who are adding to the growth of objective knowledge as masons work on a cathedral.'¹⁷ The job of epistemology, meanwhile, is to study the growth of objective knowledge, and its starting point is always a reconstruction of the third world problem situation.

This hypothesis of a third world of objective knowledge 'seems scarcely worth preserving'. Cohen claimed this because of the inability of these three main theses to withstand even the following superficial scrutiny.¹⁸ The first thesis is that the third world is our creation, *but whose creation exactly is that?* Groups of scientists working on the same project do not always communicate: witness the recent rush to decode the human genome.¹⁹ And, whilst there is presently a good degree of global communication, one need only go back forty years to the cold war to find two scientific cultures that failed to communicate. When this is the case, each scientist will be able to judge the problem situation *as he perceives it*. But no scientist will be able to judge whether he has correctly conjectured the objective problem situation since it is possible that knowledge has objectively progressed further than he

judges. So it seems that epistemology must start from second world judgements of the third world problem situation, rather than the third world problem situation itself.

The second thesis is that the third world is autonomous, *but if it is truly autonomous, how can it be our creation?* The third world contains not only our theories but also their logical consequences. The problem situation formed by Goldbach's conjecture is not of our making; we discover it as consequence of the postulates of number theory. However, if Goldbach's conjecture is provably true, then this proof will equally be derivable from the postulates of number theory and likewise if it is provably false. So if we manage to prove Goldbach's conjecture to be true or false, this achievement should also be represented as a discovery. The growth of *human knowledge*, therefore, is not a third world affair. Rather, it is a second world process: we gradually become aware of what is already objectively knowledge. And the situation is worse than this. Since the third world can contain falsehoods as well as truths, it is probable that it contains a contradiction. For example, the third world surely contains Frege's *Grundgeset ζ* since this theory is intelligibly expressed by many books.²⁰ And if it contains this theory, it contains a contradiction since Russell's paradox can be derived from its basic laws.²¹ The problem is that according to classical logic a contradiction entails anything. So if the third world contains all the consequences of our theories, it contains every proposition.

The third thesis is that the growth of the third world is by means of natural selection: only the fittest theories survive. *But what happens to falsified theories?* It is true that falsified theories gradually cease to be believed and in this sense fail to survive. But this is failure to survive in the second world. Now one of Popper's arguments for 'the independent existence of the third world' consists of a thought experiment which asks us to imagine two apocalyptic

situations. In both our civilisation is destroyed but in the first case the libraries are preserved. The intuition is that ‘in the second case there will be no re-emergence of our civilisation for many millennia.’²² This thought experiment suggests that if all first world expressions of a proposition are destroyed (and given materialism this includes an absence of belief), then the proposition will no longer be part of the third world. However, a falsified theory is not expunged from the library stacks. And that it might no longer be read is immaterial. A book contains objective knowledge simply because of ‘its possibility or potentiality of being understood’, ‘whether anybody ever reads it and really grasps its contents is almost accidental’.²³

On this basis, Cohen concludes that Popper’s hypothesis of an independently existing third world of objective knowledge is ‘scarcely worth preserving’.

1.2

Popper’s conception of knowledge in the objective sense is very different to the mainstream epistemological conception of knowledge, which Popper rightly terms the subjective view. Principle (I) is formulated within this subjective view: it concerns the individual subject’s acquisition of knowledge, where this implies the acquisition of an appropriately warranted true belief. However, (I) generates a puzzle for this subjective conception and one solution to this puzzle, I suggested, is to recognise that knowledge can be conceived objectively. The relevance of Popper’s conception of objective knowledge is that his three theses provide an abstract characterisation of objective knowledge; to conceive of knowledge objectively is to conceive something that is our creation but which exists independently of us and has a

certain governing logic of its own. So the challenge for this resolution of the puzzle of transmission is to give an account of objective knowledge that captures these three properties in terms that are consistent with the subjective conception governing (I). In doing so, any such account must address the problems outlined in the previous section.

‘There is a destructive tension’, O’Hear suggests, ‘in the combined view that world 3 is partially constructed by us and partially autonomous.’²⁴ This tension can be seen as a source of difficulty in the following way. Popper’s third world is not eternal like Plato’s forms; it has a history and this history is partially a history of its invention by man. However, the third world is autonomous because our theoretical inventions have unexpected consequences and these can be discovered in much the same way that things about the physical world are discovered. The problem is that since we are fallible, our theories inevitably contain falsehoods but if these falsehoods are part of the third world then the unexpected consequences of our theories become legion. However, suppose contrary to Popper that falsehoods do not make it into world three. This supposition is required by any factive conception of knowledge, and it should resolve the problem of the third world’s over-extension. On this supposition, the third world would still be our creation but it should be more autonomous than Popper credited, and this implies that our fallibility in formulating descriptions of the physical first world is precisely mirrored by our fallibility in formulating (the third world of) theory. So it would be correct to characterise the problem situation in terms of our conception of it; non-communication between scientists would then be simply a further source of fallibility. And the first two problems of the previous section could thereby be resolved.

However, this supposition does not resolve the tension between construing the third world as both autonomous and our creation. Rather this tension re-emerges as that between the conception of knowledge as a collection of true propositions and as what develops in the growth of science. What we have taken ourselves to know in the development and growth of science has changed remarkably through history. However, for some enduring state of affairs, the factive conception implies that it is contradictory to suppose that we knew that p at time t_0 and knew that not- p at time t_1 . Consequently, where present science implies the falsity of past science, past scientific theory cannot have been known or, therefore, part of the third world of objective knowledge. However, an induction from past scientific failings then provides a reason for thinking the same of present theory and for each case where this induction proves retrospectively true, there will have been a change in our theory without any implied change in the third world. Consequently, the third problem above remains: the growth of knowledge is best represented as a second world affair wherein we discover our previous beliefs about the third world to have been false. But then it becomes hard to see how the third world remains our creation. Our theories might be our creation but their truth is not similarly so.

The tension between the properties of being created and being autonomous is not removed by characterising the third world as a collection of true propositions. Given a fallibilist epistemology, the tension simply re-emerges between this characterisation and the conception of the third world as what develops in the growth of science. However, this tension is roughly that between conceiving of science as a collection of truths and conceiving of science as a body of belief, and there is a concept intended precisely to bridge belief and truth, *viz.* the concept of warrant. Whilst, for an enduring state of affairs, it is contradictory

to suppose that we knew that p at time t_0 *and* knew that not- p at time t_1 , there is no contradiction in supposing that we were warranted in believing that p at time t_0 *and* were warranted in believing that not- p at time t_1 . Consequently, I suggest, that the third world be interpreted as a body of warranted propositions.

There are different grades of warrant. Two grades that are commonly distinguished are personal or subjective warrant, and undefeated or objective warrant.²⁵ The distinction between these two grades of warrant can be defined in terms of the absence of certain defeaters, where a defeater is a proposition that implies either that the warranted belief is false or that it is unreliably acquired or sustained.²⁶ A defeating proposition might be something else believed by the subject, or it might simply be a true proposition. Call the former defeaters *doxastic* and the latter *factual*. Given this distinction, subjective and objective warrant could be identified as follows. The belief that p is *subjectively warranted* for subject S if and only if S is warranted in believing that p and there are no doxastic defeaters. Whilst, the belief that p is *objectively warranted* for subject S if and only if S is warranted in believing that p and there are no factual defeaters. Further, an intermediary grade of warrant should be identified. Suppose that at t_0 , S appropriately accepts testimony to p where this proposition is some scientific theorem. Given (I), S will be warranted in believing that p .²⁷ Given that S 's acceptance has been appropriate S will have not ignored any belief that defeats this warrant, so S 's warrant will be at least subjective. Now suppose that science progresses, that p is believed to be false by the scientific community and this belief is well communicated to the wider populace. For example, several popular magazines and television shows publicised the recent scientific developments. If S remains ignorant of the news, he acquires no doxastic defeater for his belief that p . And if recent science takes that p to be false for good reason,

then S acquires no factual defeater for his belief that p because there has always been such a true proposition. Thus, the distinction between subjective and objective warrant is not sufficient to account for the intuition that the recent scientific development causes a *change* in S 's warrant for p .²⁸ There is such a change because S *should not* continue to believe that p when there is evidence available which defeats S 's warrant for belief. Thus, a proposition can be a defeater through being socially recognised as a defeater. Call this *normative* defeat. Normative defeat identifies a third grade of warrant: the belief that p is *socially warranted* for subject S if and only if S is warranted in believing that p and there are no normative defeaters.

Distinguishing these grades of warrant presupposes no particular positive account of how beliefs are warranted. What it takes for S to be warranted in believing that p is left open. This is correct since there are different ways in which belief in a given proposition may be warranted; (I) for instance states one way, but a belief warranted for one subject through being acquired by appropriate acceptance of testimony could be warranted in a different way for another subject. And propositions may differ in what it takes to be warranted in believing them; for instance, many ordinary empirical propositions we can simply see to be true but this is not the case for propositions stating scientific theorems. So without wanting to say what makes a belief warranted, I suggest that the third world of objective knowledge can be identified as a body of socially warranted propositions.

If the third world is a body of socially warranted propositions, Popper's three theses can then be accounted for in the following way. The third world is our creation in at least two senses. First, whether a proposition is socially warranted will depend on whether there exist any socially recognised defeaters. Second, whether a proposition is warranted at all can

depend on our justifying activity. As noted, the conditions under which a proposition is warranted are various, and belief in some propositions will be warranted merely because appropriately formed. But scientific theories will not be warranted in this way; scientific theories are warranted by our justifying activity. Justifying arguments are something that we produce and so too, therefore, is the third world of warranted theory.²⁹ With respect to the first criticism, which queries exactly whose creation is the third world, the broad response is that warrant is the creation of that community of individuals which determines whether there exists any normative defeaters. So the third world of warranted propositions is relative to a given community. Communities may be characterised in social, historical, political and economic terms. The characterisation offered here is epistemic. Unlike truth or validity, justification has an intrinsically indexical element: a proposition, or set of propositions, is justified for a person, or set of persons, at a particular time. Of course, this implies there can be different third worlds just as there can be different communities (understood in this epistemic sense). And it implies that third worlds can be as fluid in their history as communicating groups are fluid in their identity. But this seems to me to be the right conclusion to draw. Fortunately, this relativization tends to go unnoticed in the sciences since the scientific community tends not to be plural. And when it does so and there are non-communicating groups, it is equally right that there should be damaging epistemic consequences.³⁰

With respect to the second thesis, the third world is autonomous in two senses. First, the third world is strongly autonomous with respect to *any particular* individual. It is strongly autonomous in that the individual does not determine the absence of normative defeat. This is socially determined. And in that no individual can fully determine the presence of the

warrant needed for scientific knowledge. This latter claim follows from science being *essentially* collaborative, not just in that collaborative endeavour is common in science. But collaborative in the sense that all scientific work uses established theories and addresses problems largely defined by these theories. No one scientist could recapitulate scientific history therefore no individual can fully determine the presence of the warrant needed for scientific knowledge. Second, the third world is weakly autonomous with respect to *all* individuals because being socially warranted does not entail being objectively warranted. Consequently, for any socially warranted theorem it is possible for a true proposition to become known which is socially recognised to defeat the warrant for theorem. This makes the third world autonomous of all individuals because at any given time it is possible to induce that the third world is not as presently conceived. However, this is not the strong sense of autonomy employed by Popper: a proposition does not enter the third world simply by being the logical consequence of presently existing world three. So, with respect to the second criticism, the third world does not over-extend itself: the logical consequences of a theory enter the third world only when these consequences are discerned and socially warranted.

Finally, Popper's third thesis is that the third world results from a feedback process that can be understood in evolutionary terms. Less contestably, this could be expressed as the thesis that there is a certain logic governing change in the third world, (where for Popper this logic is just falsificationism). This is true on the present understanding of the third world insofar as there are norms of rationality governing when a proposition is warranted. That there are such norms is implied by the fact that social warrant does not entail objective warrant. Moreover, the relativization of the third world to epistemic communities allows the

possible extension of the Popper's evolutionary analogy. In the evolution of species, minor genetic variations exist side by side and this may prove essential to survive new problem situations. So too differing scientific departments may persist in pursuing differently warranted tentative solutions thereby forming slightly different communities, and this too may prove essential to the objective growth of knowledge.³¹ Finally, the problem of the status of falsified theories may be simple resolved. Of course books that propose falsified theories are not removed from the library. But insofar as their contents are not presently warranted for the community, their contents are not part of the third world. Falsification has killed them off.

The suggestion, then, is that principle (I) describes a process of knowledge acquisition because in appropriately accepting a speaker's testimony to p , the audience accepts a true proposition that is supported by a third world body of warrant sufficient for knowledge. Knowledge gets transmitted in that this body of warrant supporting the speaker's belief that p now — subsequent to the speaker's testimony to p and the audience's appropriate acceptance — also supports the audience's belief that p . An individual's possession of knowledge is thereby to be explained, as always, in terms of the relation that their belief has to the warrant supporting it; that is to the warrant supporting the proposition believed. It is just that testimonial knowledge introduces the possibility that the believer might not be the source of this warrant.

Communities enter the epistemological picture in three ways. First, testimony generates communities of knowledge: a chain of testifiers being an epistemic community with respect to the proposition told. Second, it is the community that determines the absence of normative defeaters and so, for a warranted proposition, the presence of social warrant.

Given our fallibility, social warrant is not truth guaranteeing and so is not always sufficient for knowledge. In this way, the growth of the third world could be expressed as a progress from thinking that we know a theory to realising that we do not. Third, certain propositions — and specifically those expressing scientific theories — are supported by a body of warrant that requires the knowledge of more than one individual for its articulation; that is, requires a community for its articulation. These last two points imply that the propositions composing the third world thereby do so only relative to an epistemic community at a particular time. That is, only relative to that group which through communication and agreement contains members who possess the needed warrants — where this can involve having access to, or awareness of, the appropriate justifying arguments — and which do not recognise any defeaters for these warrants.

In the next section I would like to consider an alternative solution to the puzzle of transmission, which starts from the observation of the collaborative nature of science. It differs from the solution just canvassed in that warrant is made *essentially* social.

1.3

John Hardwig formulates a version of the puzzle of transmission based on the observation that knowledge can be a collaborative product. He cites an extreme case: an experiment to record charm events and measure the life-span of charm particles which took ninety-nine physicists for its conduct.³² Such an immense collaboration was required for this experiment because making the needed equipment, modifying Stanford's Linear Accelerator and then analysing the vast quantities of data produced took two hundred and eighty man years and

needed a range of expertise that no one individual could possess. Moreover, collaborative endeavour is common in science because experiments are often of such complexity that they need a division of expert knowledge and skills to execute. And since all scientific work depends upon the epistemic achievements of previous theories, all science is collaborative in the broad sense of the word. So if collaboration generates a problem, the problem generated is not marginal.

Now the claim that knowledge can be transmitted, a claim articulated by principle (I), can seem puzzling because it implies that an individual can get to know that p without reaching this state by a reliable means and without any evidence for p . The observation that knowledge can be a collaborative product, when combined with the claim that knowledge can be transmitted, simply deepens this puzzle. According to principle (I), if an audience is to acquire testimonial knowledge that p , then the speaker — and one might suppose a liberalised version of (I) allowing the speaker or someone in the chain of sources — must know that p in a non-testimonial way. However, where knowledge that p is a collaborative achievement, then neither the speaker (nor anyone in the chain of sources) will possess the complete non-testimonial grounds for p . So the claims that knowledge can result from collaboration and be transmitted seem inconsistent: where that p is originally known through collaboration and then transmitted by testimony it seems that there can be no one person who possesses wholly non-testimonial knowledge that p but someone person must do so for p to be known. In Hardwig's terms the observation that knowledge can be collaborative generates a dilemma: either we must say 'that someone can know 'vicariously' — i.e. without possessing the evidence for the truth of what he knows'; or we must allow that the experimental result 'is known, not by any one person, but by the *community*'.³³

It is worth setting up Hardwig's dilemma carefully. Knowledge in general does not require support by argument because many of the things we know are knowledge because they were acquired as belief in the appropriate kind of way. However, a defining criterion of scientific knowledge is its support by a significant body of empirical and theoretical evidence. This is not to make any substantial claims about the nature of scientific knowledge. Rather, the claim is the trivial one that scientific theories are not self-evidently true but require evidential support, where this support comes in the form of both other scientific theories and observations. As such, the problem posed by collaboration may be presented as follows.

1. We possess scientific knowledge.
2. All scientific knowledge is the result of collaboration in a broad sense.
3. We acquire scientific knowledge on either testimonial or non-testimonial grounds.
4. If we acquire scientific knowledge on testimonial grounds, then someone must possess this knowledge on non-testimonial grounds.
5. To be scientific knowledge a proposition must be supported by a significant body of evidence.
6. When knowledge results from collaboration in science, no one person can articulate the supporting body of evidence.
7. Premises 1 to 6 are inconsistent.

The inconsistency of premises 1 to 6 should be clear. If we possess scientific knowledge (premise 1), then someone must possess this knowledge in a non-testimonial way (premises 3 and 4). To possess scientific knowledge in a non-testimonial way is to be able to articulate a body of supporting evidence in its favour (premise 5). But since all science is collaborative

(premise 2) and when science is collaborative no one is in a position to fully articulate this evidence (premise 6), it cannot be the case that we possess scientific knowledge (contrary to premise 1). Hardwig's dilemma follows from this problem by considering which premises can be rejected. Clearly we take ourselves to possess scientific knowledge, we take this knowledge to be broadly collaborative (or at least that scientific knowledge can result from collaboration) and we take it that scientific knowledge must be well-supported: premises one, two and five cannot be rejected. Premise three is a tautology. So either premise four is false — scientific knowledge can be *purely vicarious* — or premise six is false — 'someone' can articulate the supporting body of evidence, *viz. the community*. Faced with this dilemma, Hardwig suggests that the latter course is 'more epistemologically palatable; for it enables us to save the old and important idea that *knowing* a proposition requires understanding the proposition and possessing the relevant evidence for its truth.'³⁴

Knowledge can result from collaboration. This can seem problematic when starting from the ordinary understanding of knowledge as an epistemically privileged state of an individual. It can seem problematic because it is then natural to assume that knowledge must be *individually grounded*, (whether by reasons accessible to the individual, or by individual processes of beliefs formation). Hardwig's suggestion involves the rejection of this natural assumption — it is the community, not the individual, that must possess the knowledge determining grounds — and in this way it resolves the problem of collaboration. It does so, effectively, through providing a re-interpretation of the principle (T), namely: we can acquire testimonial knowledge that *p* only if the community possesses this knowledge. This interpretation explains why scientific knowledge is not 'purely vicarious' — it is grounded in community knowledge.

However, couldn't this assumption be rejected simply by claiming that what privileges the individual knower's epistemic state is a body of independently existing warrant? If it is allowed that the community can articulate the non-testimonial grounds of our scientific knowledge, then that no individual can do so does not imply that these grounds do not exist. Consequently, it is open to resolve the problem of collaboration by offering the alternative interpretation of principle (T) suggested in the previous section, namely: if we acquire scientific knowledge on testimonial grounds, then there exist non-testimonial grounds for this knowledge. This interpretation is sufficient to resolve the problem of collaboration because the generation of knowledge through collaboration can then be accounted for in terms of individuals modifying and supplementing independently existing transmitted warrants. On such an account, epistemic collaboration should be no different to any other form of collaboration.

'If a speaker who knows that p testifies to p , then any audience who appropriately accepts that p can acquire knowledge that p .' Given an individualist interpretation, this principle, and how it could license collaborative knowledge, can seem puzzling. However, the transmission of knowledge, and its generation through collaboration, can be easily understood once individualism is forgone. The position developed in the previous section explains an audience's possession of testimonial knowledge that p in terms of the audience being appropriately related to the ('third world' independently existing) body of warrant for p . In contrast, to this account of transmission, Hardwig suggests a *communitarian* account: an audience's testimonial knowledge that p is to be explained in terms of the audience being a member of an epistemic community that knows that p .³⁵ However, insofar as independent

warrant is relativised to an epistemic community, the question is raised as to the nature of the contrast between these two views of transmission.

There need be no disagreement: we acquire knowledge through becoming members of epistemic communities. However, on the view developed here this offers no epistemic explanation of our acquiring knowledge. The epistemic explanation of our acquisition of knowledge is that our appropriate acceptance of testimony relates us to a ('third world') body of warrant. It is this body of warrant which explains why the proposition we believe is knowledge, it is not the community's agreement that does so. This is so because it must be allowed that it is possible for a community to agree that a proposition is warranted when it is not so; it must be allowed that objectively a community can be in error in its judgement of warrant. The difference between communitarianism and the position outlined in previous section thereby turns on the issue of epistemological realism.

The communitarian, as an epistemological anti-realist, contends that claims about warrant are fundamentally no more than claims about our (communal) beliefs about warrant. However, there is a fundamental distinction between social and objective warrant. It is an open question whether or not a community belief is objectively warranted; this is shown by the possibility that the third world body of warrant will collapse under future criticism.³⁶ Just as one can envisage cases where an individual's reasons are deemed inadequate because of community judgement, so one can envisage cases where reasons which are deemed adequate by community judgement nonetheless prove not to be. The best explanation of these failures is that the communitarian distinction between subjective and community warrant needs to be replaced by a tripartite schema of subjective, community and objective warrant.³⁷ A distinction such as this is presupposed by any realism about warrant and is needed to give

some account of theory change. The shift from a phlogiston to an oxygen theory of combustion, for instance, could be schematically represented in terms of a disagreement between subjects, or communities, over what was a reason for what. Theory change shows that our address of this issue is fallible and our going wrong can sometimes be explained in terms of our getting facts about warrant wrong.³⁸

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¹ Audi, 'The Place of Testimony in the Fabric of Knowledge and Justification' *American Philosophical Quarterly* 34 (1997), p.410.

² McDowell 'Knowledge by Hearsay', in McDowell Ed. *Meaning, Knowledge and Reality* (Cambridge MA: Harvard University Press, 1994), p.417.

³ Burge, 'Computer Proof, A Priori Knowledge, and Other Minds' *Philosophical Perspectives* 12 (1998), p.5.

⁴ This is one question that divides reductionist and anti-reductionist theories of testimony. For an account of these positions see Fricker, 'Telling and Trusting: Reductionism and Anti-Reductionism in the Epistemology of Testimony' *MIND* 104 (1995), and for two different answers as to this question of appropriateness see Burge, 'Content Preservation' *Philosophical Review* 102 (1993) and Adler, 'Transmitting Knowledge' *Nous* 30 (1996).

⁵ For different answers to this question consider Dummett 'Testimony and Memory', in Dummett Ed. *The Seas of Language* (Oxford: Clarendon Press, 1993) and Kusch, *Knowledge by Agreement* (Oxford: Clarendon Press, 2002).

⁶ For instance a student seems to be able to acquire knowledge about evolution from a teacher who is a creationist and so lacks this knowledge through disbelief. For this and other refinements see Lackey, 'Testimonial Knowledge and Transmission' *Philosophical Quarterly* 49

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⁷ Popper 'Epistemology Without a Knowing Subject', and 'On the Theory of the Objective Mind' both in Popper Ed. *Objective Knowledge: An Evolutionary Approach* (Oxford: Clarendon Press, 1972).

⁸ Cohen, 'Some Comments on Third World Epistemology' *British Journal for the Philosophy of Science* 31 (1980), p.180.

⁹ Welbourne, *The Community of Knowledge* (Aberdeen: Aberdeen University Press, 1986).

¹⁰ Hardwig, 'Epistemic Dependence' *The Journal of Philosophy* 82 (1985).

¹¹ This epistemological approach is irrelevant, the quote continues, 'if we assume that it aims at a theory of *scientific knowledge*.' Popper 'Epistemology Without a Knowing Subject', p.108.

¹² Popper 'On the Theory of the Objective Mind', p.154.

¹³ Popper 'On the Theory of the Objective Mind', p.112.

¹⁴ Popper 'On the Theory of the Objective Mind', p.112.

¹⁵ Popper 'On the Theory of the Objective Mind', p.118.

¹⁶ Popper 'On the Theory of the Objective Mind', p.112. This 'evolutionary process' is just Popper's methodology of falsification, (hence he describes his epistemology as evolutionary).

¹⁷ Popper 'On the Theory of the Objective Mind', p.121.

¹⁸ See Cohen, 'Some Comments on Third World Epistemology'. Further criticism is supplied by Currie, 'Popper's Evolutionary Epistemology: A Critique' *Synthese* 37 (1978).

¹⁹ See '<http://www.cnn.com/2000/HEALTH/06/26/human.genome/index.html>'.

²⁰ 'I should say that almost every book is like this: it contains objective knowledge, true or false, useful or useless.' Popper 'Epistemology Without a Knowing Subject', p.135. Given that the third world contains 'poetic thoughts' and 'works of art', Popper 'Epistemology Without a Knowing Subject', p.106. I suspect that the qualification 'almost' rules out only nonsense.

²¹ See Russell, *The Principles of Mathematics* (Cambridge: CUP, 1905).

²² Popper 'Epistemology Without a Knowing Subject', pp.107-8. Whilst this intuition may be accepted, it is not obvious that this intuition supports Popper's conclusion since it could equally be accommodated by 'belief philosophers', (i.e. by those who only recognise knowledge in the subjective sense). See Currie, 'Popper's Evolutionary Epistemology: A Critique', pp.417-420.

²³ Popper 'On the Theory of the Objective Mind', p.116 and p.115 respectively.

²⁴ O'Hear, *Karl Popper* (London: Routledge & Kegan Paul, 1980), p.187.

²⁵ See Lehrer, *Theory of Knowledge* (Boulder, CO: Westview Press, 1990).

²⁶ For an account of defeaters see Pollock, *Contemporary Theories of Knowledge* (Totowa N.J.: Rowman & Littlefield, 1986).

²⁷ Or at least will be so on the assumption that warrant is necessary for knowledge.

²⁸ The intuition that S loses warrant is just the intuition that evidence we don't possess can cause us to fail to be warranted in the first place. See, in particular, Harman's newspaper case in *Thought* (Princeton: Princeton University Press, 1973), pp.143-4.

²⁹ This leaves the nature of the justifying argument open. Historically, the two broad positions on the nature of this argument are inductivism and falsificationism.

³⁰ Popper would not endorse relativism, but that his position is equally pluralistic is argued by Currie, 'Popper's Evolutionary Epistemology: A Critique', pp.425-8.

³¹ This point is made, though not in evolutionary language, by Solomon, 'Social Empiricism' *Nous* 28 (1994).

³² Hardwig, 'Epistemic Dependence'. The article Hardwig cites is 'Charm Photoproduction Cross Section at 20 GeV', *Physical Review Letters*, 51, no.5, (1983): 156-9.

³³ Hardwig, 'Epistemic Dependence', pp. 348-9.

³⁴ Hardwig, 'Epistemic Dependence', p.349.

³⁵ The term 'communitarian' comes from Kusch, *Knowledge by Agreement* which develops a communitarian epistemology.

³⁶ However, in itself this is not conclusive: a communitarian could argue that the putative distinction amounts to no more than this. See Rorty 'Solidarity or Objectivity?' in Rorty Ed. *Objectivity, Relativism and Truth* (Cambridge: Cambridge University Press, 1985).

³⁷ In this way, the communitarianism can be seen as reworking traditional individualism, with objectivity replaced by communal judgement. This is explicit in Bloor 'A Sociological Theory of Objectivity', in Brown Ed. *Objectivity and Cultural Divergence* (Cambridge: CUP, 1984).

³⁸ My thanks to an anonymous referee.