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Can Testimony Generate Understanding?

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ABSTRACT

Can we gain understanding from testifiers who themselves fail to under-stand? At first glance, this looks counter-intuitive. How could a hearer with a poor understanding of a certain subject matter, or none at all, non–accidentally extract information relevant to understanding from a speaker's testimony if the speaker does not understand what she is talking about? This paper shows that, when there are theories or repre-sentational devices working as mediators, speakers can intentionally generate understanding in their hearers by engaging in relevant speech acts without understanding the topic of these speech acts themselves. More specifically, I argue that testifiers can intentionally elicit under-standing *of empirical phenomena* in their hearers even if they themselves lack such understanding – provided that they properly understand *the epistemic mediators* involved.

1. Introduction

The traditional debate in social epistemology has so far focused on how propositional knowledge can be transmitted from a speaker to a hearer. Suppose that some proposition p is true, that a speaker S tells a hearer H that p and that H forms the testimonial belief that p upon S's telling that p – what does it take for H's belief that p to become testimonial *knowledge* that p? What might be the necessary and sufficient conditions for transmitting knowledge from S to H? As for the latter, consider the following principle: (P$_1$) If S knows that p and tells H that p, H comes to believe that p on the basis of S's telling that p, H has no defeaters for p and has good reasons to trust S (or no reason to distrust S), then H will come to know that p.

This principle tells us that the fact that S knows that p (on the assumption that S sincerely communicates that p to H and that H takes her word for it) is sufficient for H to acquire testimony–based knowledge that p. This principle looks *Prima facie* very plausible and seems to do justice to many everyday cases of testimonial knowledge. Suppose that my history teacher knows that Columbus discovered America in 1492 and tells me. I have good reasons to trust her (or no reason to distrust her) and no defeaters for the corresponding belief. It does seem that, if I come to believe that Columbus discovered America in 1492 on the basis of my teacher's testimony, I will come to know this proposition, too. The prospects for finding a similar principle stating *necessary* conditions for the transmission of knowledge, however, look dim. Consider the following attempt: (P$_2$) In order for H to obtain testimonial knowledge that p from S, S must herself have knowledge that p.

Lackey (2008) and Graham (2006), among others, have challenged (P$_2$) by trying to show that S's knowing that p is actually not necessary for H's acquiring knowledge that p upon S's telling. According to these authors, there are plausible scenarios in which S lacks knowledge that p herself

(either because S is not justified in believing that p or because S does not believe that p, or both), yet S still counts as a reliable source of knowledge that p for H. If correct, Lackey's and Graham's scenarios would support a view according to which there are cases in which testimony is a genuinely generative source of knowledge and does not merely function to transmit or preserve knowledge that is already given (either on the part of the speaker, or somewhere in the chain of communication connected to the hearer).

Recent debates, however, have highlighted that knowledge is not our only epistemic goal. There are other ends and achievements that we seek to attain in our epistemic endeavours. A particularly important one is *understanding*. It is widely acknowledged that knowledge has a social dimension: We are (epistemically) dependent upon one another for most of what we know. But this holds, at least in some measure, for understanding as well. We, too, learn from each other's words and assertions all the time. Sometimes we make sense of things for ourselves; but when for some reason we struggle, we reach out to others who understand better than we do and ask them for (hopefully) understanding–providing explanations. In certain contexts, we even have the rational expectation that other members of our epistemic community – experts, teachers, epistemic authorities and the like – will help us gain or improve understanding, by engaging in a verbal interaction with us (Croce 2019, Jäger 2016 and Wright 2016). Testimony thus plays a very important role in proliferating understanding within an epistemic community. Somewhat surprisingly, however, little attention has been paid so far to the relation between testimony and understanding.[1] Yet the following questions are very important for social epistemology: Can testimony convey understanding, and if so, how? How do we learn? That is, how do we gain and improve understanding on the basis of one another person's words?

Intuitively, there is a striking asymmetry between the testimonial transmission of knowledge and the acquisition of understanding on the basis of testimony. When knowledge is at stake, principle P_1 seems very plausible. If P_1 is satisfied, a hearer will successfully obtain testimonial knowledge from a speaker. However, a corresponding principle for understanding strikes us as intuitively false: To see why, imagine a speaker in possession of deep understanding of a phenomenon or subject matter. Suppose she intends to share her understanding and tries verbally to communicate it in a comprehensible manner to somebody trusting her word. Still, despite all her good will and efforts, her hearer(s) might easily fail to gain understanding on the basis of her testimony. Many authors have taken this asymmetry to support an antireductionist conception of understanding. How, they ask, can an 'understander' pile up explanations for p and convey all the information she has about p, and still fail to make p intelligible for her hearers? Antireductionists have a straightforward explanation for this fact: Understanding p must involve more than having true and justified beliefs about p. Understanding p, these authors suggest, is a matter of having the right set of *abilities* or *know-how* relevant to p (Hills 2009 and 2015). If this is right, while it is certainly true that the way towards understanding can be paved or facilitated, and that understanding can be promoted in the right circumstances, properly speaking there is no understanding that is genuinely testimonial, in the sense of being genuinely based or epistemically dependent upon testimony. Abilities and know–how are not something a speaker can pass on to others in the same way as she would pass on isolated pieces of information or items of knowledge. I can give you some advice on how you need to kick the ball so as to raise the probability of scoring from the penalty spot. I can even demonstrate how it is done. But you won't learn how to do it as long as you sit on the bench. You may even listen carefully to my explanations, understand everything I say and trust me blindly, but you will need to do more than believe me, if you want to get to *know how* to score: You need to use the information I gave you – you need to leave the bench and kick the ball yourself.

What about P_2? A corresponding principle for the acquisition of understanding on the basis of testimony sounds very plausible to us. After all, how could a speaker intentionally convey insights to her hearers that she herself is lacking? How could her hearers non–accidentally extract

information relevant to understanding from a speaker's testimony if the speaker does not herself understand what she is talking about?[2] Suppose you are struggling to make sense of a phenomenon P belonging to a domain of reality D. Who would you reach out to? Probably, to someone you take to have a better understanding of D than you. Of course, not every understander will be equally good at providing explanations, and thus in producing explanations in her hearers. Still, the intuition is strong that one needs to understand a phenomenon or a domain of reality oneself in order to be a reliable source of understanding for others.

In what follows, I argue that this intuition is mistaken, or at least not valid across the board. When what we are trying to understand are empirical phenomena, there are often theories or representational devices working as 'epistemic mediators'. When this is the case, there are different types of cognitive achievement that one might attain (De Regt and Dieks 2005; De Regt and Gijsbers 2017; De Regt 2017): On the one hand, one needs to understand the theories involved; on the other, one needs to understand the phenomena *via* the theories. By spelling out this distinction, I show that there is a sense in which testimony can work as a generative source of understanding, i.e., that we can gain understanding from testifiers who themselves fail to understand. More specifically, I argue that testifiers can intentionally elicit understanding *of empirical phenomena* in their hearers even if they themselves lack such understanding – provided that they properly understand *the epistemic mediators* involved.

2. Dimensions of Understanding

Before we start, it is useful to distinguish various between dimensions of understanding, to make clear which kind of understanding will concern us in what follows. I'll start by noting some common ways of talking about 'understanding':

  (i) in relation to single propositional contents ("S understands that the Sun King's power was absolute");
 (ii) in relation to single events, phenomena or states of affair ("S understands the historic event of the beheading of King Louis XVI of France");
(iii) in relation to a certain domain or subject matter ("S understands the French Revolution");
 (iv) in relation to the reason *why* something – an event, phenomenon or state of affair – occurred or is the case ("S understands why King Louis XVI of France was beheaded");
  (v) in relation to representational devices or representational systems ("S understands phlogiston theory" or "S understands the historical reconstruction of the French Revolution");
 (vi) ...

This list is clearly not exhaustive, and it is not intended to be. It seems plausible, however, that these uses correspond to the most common types of understanding, respectively: (i) *propositional*; (ii) *factual*; (iii) *objectual*; (iv) *explanatory* and (v) *symbolic*. Many authors take propositional understanding to be reducible to knowledge of the corresponding fact (Elgin 2007; Baumberger, Beisbart, and Brun 2017); hence, I will set it aside for the sake of this paper. Understanding–types (ii)–(v) for their part seem to be closely related. Factual understanding seems to imply explanatory understanding, at least in a very broad variety of cases. If we understand a certain event or phenomenon, this usually implies, among other things, that we have an explanation for the phenomenon. We would not say that a person understands the historic event of the beheading of King of France if she had no clue whatsoever of its causal history. Factual understanding, however, seems to involve more than explanatory understanding. Suppose a subject is aware of the reasons why the King of France was beheaded, but cannot see how the event led, say, to Robespierre's takeover. Probably, we would not say that she understands everything there is to understand about the beheading of the King. Understanding the beheading of the King of France seems to be a matter of being able to embed the event in the overall framework of the French

Revolution. If this is right, factual and objectual understanding go hand in hand (see Elgin 2007, 35).

What about symbolic understanding? I said in the introduction that if what we are trying to understand are empirical phenomena, or domains thereof, we usually need theories or representational devices working as mediators. The idea, more specifically, is that in order to understand empirical phenomena, we formulate and deploy theories accounting for them and providing explanatory frameworks into which these phenomena can be embedded. But, as I said, if our theories and representational devices are to work effectively as sources of understanding of reality, they need to be intelligible to us. We cannot gain understanding of reality by means of a theory or representational device that we do not understand. So, at least when it comes to understanding empirical phenomena, both factual and objectual understanding seem to require symbolic understanding. (However, symbolic understanding by itself is, *ceteris paribus,* insufficient for factual or objectual understanding. More on this in section 4).

In what follows, I will focus on a case in which understanding is directed at certain empirical phenomena and in which there is a scientific theory that works as an epistemic mediator and provides the subject with certain explanatory frameworks within which these phenomena can be embedded.

3. Understanding the Theory of Anthropogenic Climate Change

Consider the following case.

Climate change denier teacher: Lilith teaches science in a high school. The principal wants the students to learn about the causes and implications of climate change and asks Lilith to offer a seminar on the topic. Lilith consults the right sources (e.g., she reads the reports of the Intergovernmental Panel on Climate Change), understands the content, and gets ready for the seminar. On the basis of her readings, she asserts to her students that human activity and pollution are causally responsible for the rise in temperature on our planet, and she explains the details of the causal nexus between greenhouse gas emissions and global warming. The students judge Lilith to be an authority as far as science is concerned and do not hesitate to form corresponding beliefs on the basis of her testimony. Outside the classroom, Lilith is a climate change denier. She believes that there is no causal nexus between human activity and global warming, that global warming is a natural, and unavoidable process, and that it will be naturally followed by a phase of temperature reduction. Despite her strong convictions, due mostly to her overall fatalism, she regards it as her duty as a teacher to share with her students the viewpoint of the majority of the members of the scientific community.

Lackey (2008) famously argues that a very similar thought experiment proves that we can gain knowledge from speakers who fail themselves to know. Granted that it does so (more on this in section 5), does the similar case depicted here prove that we can gain understanding from speakers who fail themselves to understand? The answer depends upon whether Lilith understands the phenomenon of climate change, and upon whether she succeeds or fails in providing her students with understanding of this particular phenomenon.

Let us start with the first question. Does Lilith understand the phenomenon of climate change? Does she understand why temperatures are currently rising on our planet at this particular speed? There are actually two independent questions to address here: whether Lilith understands the so–called cursive of anthropogenic climate change, and whether she understands the cursive of climate change itself (Greco 2014). These two questions are certainly related, but they are different and need to be addressed separately. Intuitively, understanding a theory, or an explanatory hypothesis, is not the same as understanding the phenomena pertaining to its intended domain. As I mentioned in the previous paragraph, the following principle seems to hold: *Given a certain*

theory T about a phenomenon P and given a certain subject S, S needs to understand T in order to be able to understand P via T.

In order to provide us with understanding of reality, a theory ought to be *intelligible* to us. However, what does it take it for a theory to be intelligible? Note that it is possible for us:

(i) to understand a theory that we have reason to believe or know to be false (e.g., it makes perfect sense to say that we understand the dynamics of epicycles and deferents as described in the theory of Ptolemy);

(ii) to understand a theory, the truth–value of which (true, partially true, mostly true, mostly false, … ?) we judge as not yet settled;

(iii) to understand a theory without taking a stance whatsoever concerning its truth or falsity or concerning the amount of truth it contains.

What (i)–(iii) tell us, it seems, is that understanding *a theory*, whatever this amounts to, is not a matter of believing it, or of holding any of its claims to be true. Whether one believes a theory's claims or not is completely irrelevant to whether one understands the theory.[3] However, if understanding a theory is not about believing it, then what is it about?

Simplifying a bit, let us take a theory T to be made of a set of propositions depending upon one another, interconnected with one another in some way. Understanding T, it seems, requires:

(a) being aware of which *propositions* belong to the set in question;

(b) being aware of how the propositions of the set in question are *related* to one another and depend upon one another (i.e., being aware of which relation-types hold among propositions – logical, e.g., explanatory, and so on);

(c) being able to reason within T, that is, to make appropriate *inferences* on the basis of T;

(d) being able to *use* T, e.g., to apply T to the phenomena in order to make predictions;

(e) being aware of what the world *according to theory* the looks like;

(f) being aware of which what mechanisms, according to the theory, would *bring about* the observable phenomena we are confronted with.[4]

A complete theory of intelligibility should probably tell us much more about each of these conditions and also tell us how exactly these conditions depend upon one another. As a general remark, it seems that (b) implies (a), but not the other way around: One might be aware of which propositions belong to a theory and still fail to appreciate exactly how they are interrelated. Condition (c) seems to be closely dependent upon conditions (a) and (b): Given that one is aware of which propositions belong to the theory and of how they are related to one another, one will be able to tell what, according to the theory, follows from what and is dependent upon what. Conditions (d) and (e) seem to be at least partially independent: Condition (d) pulls towards pragmatics, telling us that understanding a theory has to do with certain skills in applying the theory to observable reality.[5] Condition (e) for its part might be spelled out in terms of *awareness of truth conditions*. The rough idea is that, if a subject understands a theory, she has an adequate representation of what *would* be the case or of how the world would look, *if* the theory turned out to be true. Intuitively, one might be aware of a theory's truth conditions, without being able to use the theory in question to predict observable phenomena (because, e.g., one is missing the appropriate auxiliary theories or hypotheses). On the other hand, one might be able to apply the theory to the phenomena (because, e.g., one can perfectly handle the math) without being aware of what the world according to the theory looks like at an unobservable level. Condition (f), finally, seems to closely depend on condition (e), and we might take it to imply the ability to provide *explanations* of phenomena on the basis of the theory (at least, under a causal-mechanical model of explanation à-la-Salmon 1984).

These very general remarks make it possible for us to say what might have gone wrong, in the event that somebody S fails to understand a theory T. At least one of the following scenarios might be the case:

(a*)   S is not aware of which propositions belong to T;
(b*)   S is not aware of how the propositions belonging to T are related to each other;
(c*)   S is unable to make the appropriate inferences on the basis of T;
(d*)   S is unable to apply T to the phenomena in order to make predictions;
(e*)   S cannot say what the world according to T looks like;
(f*)   S is unable to provide explanations of the phenomena by means of T.

Note that case (e*) might occur because T itself has an unclear or still undefined metaphysical picture. If that is the case, the truth conditions of the theory are not fixed; that is, there are many different ways in which the world (at an unobservable level) might look like, according to the theory. This holds, for example, for the case of quantum mechanics – at least at the actual state of scientific knowledge (see Bell 1987).

Let us return to Lilith. Can we say that she understands the theory of anthropogenic climate change, provided we assume these conditions of theory intelligibility? Note that Lilith is a competent teacher. She picks the right sources to prepare for her seminar. Surely, she is aware of which propositions belong to the theory of anthropogenic climate change, as she memorized them and is able to repeat them to her students. Condition (a), therefore, seems to be satisfied. Lilith is probably also aware of how the propositions of the theory of anthropogenic climate change hang together. We can take it, then, that condition (b) is also fulfilled. Granting (a) and (b), we might take it that condition (c) is also satisfied: Lilith will probably be able to reason properly within the theory and on the basis of the theory. For example, she will be aware that, according to the theory, if there were no humans on earth, there would probably be no rise in temperature at this particular speed. Moreover, we have reason to think that Lilith is – or would be – competent in applying the theory to the phenomena to make correct predictions. During a school trip to the Alps, she would probably point to a glacier on the horizon and tell her students something like: 'Look, the glacier is retreating. If we don't stop or decrease the emission of greenhouse gases significantly, in approximately 100 years there will be no ice left there'. We might take condition (d), therefore, to be satisfied, too. What about conditions (e) and (f)? These two conditions seem also to be satisfied, for Lilith is aware of the theory's truth conditions and can provide adequate answers to why–questions. If a student were to ask her why sea levels are rising, she would tell him that this is probably because sea ice is melting as a result of global warming.

We can conclude that Lilith, no matter which doxastic attitude she entertains towards the propositions belonging to it, does understand the theory of anthropogenic climate change.

4. Understanding Climate Change

Does Lilith understand the phenomenon of climate change as well? Does she understand, e.g., why temperatures are currently rising on our planet at this particular speed?

It might be argued that, all things considered, Lilith is able to do everything we reasonably expect an 'understander' to do. She is aware of what the theory of anthropogenic climate change says. She is aware of how the propositions of the theory hang together. She can reason within the theory. She can make the right inferences. She can answer why–questions (and, probably, even what–if–things–had–been–different questions). She is perfectly aware of the theory's truth conditions, that is, of what would be the case, if the theory turned out to be true, and so on. What she is missing is just belief, but she seems to be doing fine entertaining just about any doxastic or noetic attitude towards the propositions comprising the theory of anthropogenic climate change. How can we demand more from her?

However, it seems simply undeniable that Lilith is not in a good position, epistemically speaking. It would be a highly discomforting result if it turned out from any theory of understanding that a climate change denier, who believes the best available theory on the matter to be false, genuinely understands the phenomenon of climate change. After all, philosophers all agree that understanding must be *grounded on facts* – the important question to be answered is how (Elgin 2007).

We noted before that the following general principle seems to hold: We cannot gain understanding of reality by means of theories that we fail to understand. Understanding a theory T about a phenomenon P, in other words, counts as a *necessary* condition for a subject S to attain understanding of P via T. Of course, this condition is not sufficient. This is because we can understand theories we know or have reason to believe to be false, and because we might be wrong in what we believe to be true (or false). Understanding astrology, say, is not enough to understand the dependence relations allegedly holding between our personality traits and the position of the planets at our birth. Understanding phlogiston theory is not enough to understand the way substances burn. The crucial question to deal with at this point is – what is missing?

Some authors believe that the best way to go here is to embrace a certain measure of factivism (Carter and Gordon 2016; Greco 2014; Grimm 2014; Kelp 2016; Khalifa 2012; Strevens 2013). Factivism about understanding tells us, roughly, that we cannot gain genuine understanding by committing ourselves to false theories, because understanding is incompatible with false beliefs about the relevant subject matter. We won't understand our personality traits any better by committing ourselves to astrology, because the theory depicts dependence relations that, to the best of our knowledge, have no counterpart in reality. We won't gain any understanding of combustion by committing ourselves to phlogiston theory, because the term 'phlogiston' has turned out to be non–referring, and, to the best of our current scientific knowledge, there is no such thing as phlogiston leaving substances when they are burning. To enable understanding of the relevant subject matter, factivists claim, a theory must provide us with (approximately or probably) true explanatory frameworks. From within a factivist perspective, the reason why Lilith fails to understand the phenomenon of climate change is very simple: She is holding (probably) false beliefs about the reason(s) why the temperatures on our planet are rising, and she does not commit herself to a theory that is (probably) true.

Many prominent authors, however, have pointed out that spelling out the link between understanding and the facts in terms of truth might turn out to be more problematic than it seems at first sight. De Regt (2017) and De Regt and Gijsbers (2017) highlight the contextual nature of understanding and claim that a factive conception of understanding has a hard time accommodating it. Le Bihan (2017, 111) depicts the scientific activity as consisting mainly in 'constructing, comparing and testing theories and associated models that are known to misrepresent the way the world actually is', and points out that it is uncontroversial that such representational devices have epistemic value. Elgin (2007, 2017) claims that a factive conception of understanding does not do justice to our practices of ascription of understanding, and that it forces us to deny that contemporary science affords or embodies an understanding of the phenomena it seeks to explain. Our best contemporary science, e.g., depicts gases as comprised of dimensionless, spherical molecules that exhibit no mutual attraction. As Elgin puts it: 'There is no such gas; indeed, if our fundamental theories are even nearly right, there could be no such gas' (Elgin 2017, 15). Now, the fact that the ideal gas model departs from reality in certain respects does not seem to obstruct its epistemic functioning. On the contrary, it seems to foster it: The idealized model makes us appreciate how pressure, volume and temperature are related *in real gases*. By picturing gases as the model suggests we think of them, we genuinely understand something about gas–phenomena. Now, if we demand from an 'understander' (only or mostly) true beliefs about a subject matter, we are forced to deny that somebody who masters the ideal gas model genuinely understands gas–phenomena. But this, according to Elgin, is highly counter-intuitive.

Elgin's arguments haven't convinced everyone. They probably do not prove factivism to be false, or to be a completely untenable position. For the aims of this paper, however, it is enough to acknowledge that the issue of the relation between understanding and the facts is far from settled in the literature, and that factivism might be problematic. This, I believe, is enough to justify the attempt to explain why Lilith's position is untenable, without appealing to the notion of truth. So, what is Lilith doing wrong, from a nonfactivist perspective?

First, it should be noted that understanding is not 'local' in the same way that knowledge is (or at least can be). Understanding has a strong *holistic* component (Elgin 2007, 2017; Baumberger and Brun 2017). Many authors convincingly claim that understanding is a matter of balancing one's noetic system, in the sense of bringing to equilibrium relevant subsets of it that bear on a certain topic or subject matter. What the process of balancing or bringing to equilibrium involves is still a matter of dispute; what is clear, however, is that one's noetic system is not – indeed cannot – be in a state of equilibrium if it contains inconsistencies, cognitive dissonances or conflicts. Now, Lilith certainly has the right conceptual and pragmatic tools that would suffice for understanding the phenomenon of climate change. But is her noetic system also in equilibrium?

It might be argued that, all things considered, it is not. First, there are two conflicting theories or explanatory hypotheses that have been incorporated into her system, and if Lilith were to believe the theory that is – objectively speaking – best grounded, this would result in a radical inconsistency in her system. Moreover, there certainly is a *conflict* within her noetic system – in the sense of Lehrer (1990), Bartelborth (1999) and Elgin (2017). As described by these authors, a conflict is a situation in which for a certain claim that p (or account A) belonging to a noetic system, there is a competitor p* (or A*) belonging to the very same system, and the system does not have the epistemic resources necessary and sufficient to neutralize it, i.e., to show why p (or A) is preferable over p* (or A*). The idea here is that in order for a noetic system to be in equilibrium, what one chooses to endorse at a given time should prove itself to be stronger than (or at least as strong as) every available alternative. If one endorses, for example, an account A and is aware of the fact that there is an alternative account A* that is more reasonable or better defensible than A – given the epistemic circumstances and relative to the epistemic resources of one's overall system of thought – it would be epistemically irresponsible for one to prefer A over A*. If one chooses to endorse A, either one is not aware of the available alternatives, or one's noetic system contains the epistemic resources to show why A is worthy of endorsement, despite there being such alternatives.

Now, if we consider Lilith's noetic system, we realize that the theory of anthropogenic climate change is working as a competitor that she is not in a position to neutralize. This makes it tempting to say that she is being epistemically irresponsible: Of the two theories she incorporated into her system, she is endorsing the one that is less reasonable and less defensible, given not only objective features of her social–epistemic environment, but also given the resources of her very own system of thought. Her system, thus, is not in balance – and this seems to be incompatible with genuine understanding. In order to achieve equilibrium, and hence understanding, conflicts need to be mitigated, or amended.

Moreover, there seems to be a further reason why Lilith is not in a good place, epistemically speaking. If we consider what she is committed to and what she believes, she seems to be extremely badly located within her social–epistemic environment. She is in a state of radical disagreement with most experts on climate change belonging to her epistemic community. But, as Elgin nicely puts it, understanding (reality) is not just a matter of being 'in suitable relation … to the phenomena we seek to understand … but also to other members of the epistemic community' (Elgin 2017, 121). As epistemically responsible subjects, we have a rational obligation to test what we believe or endorse by comparing it to what other members of our epistemic community think. More specifically: We must take disagreements with our peers as an indication that we *could* be wrong, and disagreements with epistemically superior subjects (such as experts and epistemic authorities) to be an indication that we are *very probably* wrong – as far as their domain of

expertise is concerned. Lilith is not being epistemically responsible in this way – and this, it seems, might be detrimental to her understanding.

An anonymous referee pointed out to me that the social constraint I suggest here might turn out to be highly problematic. Think of Galileo, s/he suggests: He came up with superior arguments and evidence for heliocentrism in a social–epistemic environment in which all (or at least most of) the experts in his epistemic community were firmly committed to geocentrism. Hence, he certainly was very badly located within his social–epistemic environment, as Lilith is. If we embrace the social constraint sketched above, we are apparently forced to conclude that Galileo did not understand astronomical phenomena. This, however, would be a very odd result.

Here is how I would deal with this case. It seems as if Galileo and Lilith are in a completely different situation, epistemically speaking. The evidence Lilith has considered for and against the theory of anthropogenic climate change probably constitutes, at best, a subset of the evidence considered by the experts of her epistemic community. I think we would not be surprised if there was significant evidence speaking for the theory in question that Lilith is not able to appreciate fully. The 'epistemic gap' between Lilith and the experts on climate change belonging to her epistemic community, thus, is very big. This is the reason why the opinion of experts should have considerable weight for her. I am not claiming that Lilith should completely *defer* to the experts' opinion – maybe even dropping or disregarding her previously held reasons on the matter. However, she definitely should take the fact that all (or at least most) experts in her epistemic community are committed to the theory of anthropogenic climate change as *very strong evidence* for the theory's truth. Galileo's situation is radically different. I think it is fair to say that he actually *was* among the experts of his epistemic community. Being an expert, at the end of the day, is not a matter of being recognized as such by someone (or by some institution). Lone geniuses can be experts. If Darwin had never returned from the Galapagos Islands, and his notebooks had never been found, he could still be considered an expert on, say, the Galapagos turtle. Expertise is an objective feature. Being an expert is a matter of being objectively more knowledgeable than the average layperson, relative to a certain subject matter or domain of reality; of having better, deeper, more sophisticated understanding; of having considered more evidence, and of being capable of evaluating new, incoming evidence in light of one's background knowledge, and so on. Now, if an expert disagrees with other experts – i.e., with subjects who are as knowledgeable as s/he is – what we have is a form of *peer disagreement*. But in the case of a peer disagreement, who is right and who is wrong is an open question. The chances are even. Assuming that he took his fellow scientists to be epistemically as good as he was, Galileo had good reason to stick to his guns – as he actually did. What is relevant for us here is that, contrary to what it might seem at first sight, Galileo was *not* badly located within his social–epistemic environment, while Lilith certainly is.

I am aware of the fact that things are not so simple. Experts disagree, and this raises the question of whom we, as laypersons, should trust.[6] And even if experts agree, they are humans, and fallible. Even the most brilliant, trustworthy, and knowledgeable members of our epistemic community might be wrong. What they hold true today might turn out to be untenable, or false, in the near future. This possibility, however, does not seem to undermine the principle grounding the social constraint: We, as laypersons, are much more likely to get things right and to find ourselves on the right track under the experts' guidance than we would be alone.

5. Teaching the Theory of Anthropogenic Climate Change

Here is where we stand. Lilith, our high school teacher, succeeds in understanding *the theory* of anthropogenic climate change, but she fails to understand *the phenomenon* of climate change. Factivists about understanding would say that Lilith's epistemic situation is deficient, because she is holding false beliefs about the reason(s) why the temperatures on our planet are rising and because she does not commit herself to a theory that is (probably) true. Nonfactivists about

understanding would say that Lilith fails to understand the phenomenon of climate change (i) because her noetic system is not in equilibrium and (ii) because she is badly located within her social–epistemic environment. I believe that factivists and nonfactivists would agree on the following: Given her social–epistemic environment and given the resources of her noetic system, Lilith should commit herself to the theory of anthropogenic climate change, and hence believe the theory's claims.

The question I would like to address in this section is whether Lilith is doing a good job as a teacher. More specifically, does Lilith succeed in bringing her students to understand not just the theory of anthropogenic climate change, but also the phenomenon of climate change? Note that if it turns out that she does, this would support the claim that testimony can work as a generative source of understanding and that we can acquire understanding of phenomena from testifiers who fail to understand them.

Let us assume that the students trust Lilith. They have no reason to think that she is insincere, that she is deceiving them, or that she would tell them something she does not actually believe, pretending that she does. Additionally, they recognize Lilith's authority. Usually, when Lilith claims that p – if they do not already have a clear position about whether p, if p fits with what they already believe, and in the absence of defeaters – they usually come to believe that p without reflecting further on what speaks for and against p. Yet the students are reflective and do not trust her blindly. If Lilith claims that p, and they firmly hold that not–p (or when Lilith claims that p, and p sounds very puzzling to them), they do not just switch their doxastic attitude from disbelief to belief. Rather, they ask her questions. Once Lilith convincingly shows them the path that leads to p or provides them with a plausible explanatory framework in which p can be embedded, they come to believe p.

Note that Lilith for her part will probably do the best she can in order to bring her students to understand. She will promote the acquisition of true beliefs and the abandoning of false ones. She will do her best to bring the students to appreciate how the propositions belonging to the theory of anthropogenic climate change hang together, to appreciate what depends upon what. She will make inferences about what false belief(s) or what assumption her students probably must drop or revise in order to grasp certain dependence relations (Gordon 2017).

Granted all this, we might conclude that, *ceteris paribus*, Lilith's students will probably come to understand at least the theory of anthropogenic climate change on the basis of Lilith's testimony. And this level of understanding is something that Lilith is *transmitting* to them. Now, would they come to understand the phenomenon of climate change as well? Would their understanding of the theory of anthropogenic climate change bring them to understand real phenomena? Note that what Lilith is missing, in order to genuinely understand – not just the theory of anthropogenic climate change, but also climate change itself – is *a commitment* to the theory in question, and hence *belief* in the theory's claims. Now, can Lilith bring her students to believe the theory, even though she does not believe it herself? The answer intuitively seems to be *yes*. Lilith, during her science seminar, will not use an operator of the form:

According to T, p.
According to the theory of anthropogenic climate change, human behaviour is responsible for global warming.

She will probably just state 'p'. Although she is applying the operator 'according to the theory' *in her mind* (or in her language of thought, if there is such a thing), she does not articulate it. She decides never to share it with her audience. The students have nothing to go by beyond Lilith's utterances, that is, her speech acts. They do not (cannot) have access to Lilith's mind. As they have no reason to suspect that Grice's maxim of quality is violated (Grice 1989, 27), they will interpret Lilith's stating 'p' as meaning 'I believe that p', and they will adjust their doxastic attitudes accordingly.

We may conclude that, since Lilith's students rely on Grice's maxim of quality and since she is aware of the fact that they do, she succeeds in her intention of bringing them to believe even though she does not believe herself. However, this means that, when it comes to the cognitive aim of understanding, *the pupil can become the master*: Lilith indirectly (i.e., by means of her speech acts, and thanks to her role as an authority) provides her students with the element that she herself was missing, in order to genuinely understand – in this specific case, belief. Lilith, thus, is able to give something to her students that she does not possess herself. She can provide her students with understanding of phenomena, without having it.[7]

6. Worries and Possible Replies

As it stands, the case I propose in this paper is structurally very similar to Lackey's creationist teacher case, by means of which Lackey (1999, 2007, 2008) famously argues that we can gain knowledge from testifiers who themselves fail to know. Stella, Lackey's creationist teacher, conveys true, justified information about evolutionary theory to her students, without believing any of the theory's claims. As standardly conceived, knowledge implies belief, so Stella does not know, e.g., that our planet is approximately six billion years old, or that human beings and apes have evolved from a common ancestor. However, it seems that she is successful in bringing her students to believe, and therefore to know, the corresponding propositions. Hence, Lackey concludes, testimony does not just perform the function of transmitting knowledge that is already given; in certain conditions, it might work as a generative source of knowledge.

Lackey's case has received extensive attention in the recent literature and reconstructing the details of the current debate would exceed the limits of this paper. However, there is an objection that has been raised against Stella's case that might apply also to the case of Lilith and that is therefore worth considering.

Lackey's creationist teacher case is meant to falsify the principle according to which a speaker needs to have knowledge herself in order to be a reliable source of knowledge for others. Many authors concede that the creationist teacher case actually succeeds at this aim. But they also claim that this does not prove much, since the principle is very poorly formulated and does not do justice to what most authors mean when they say that testimony merely transmits knowledge that is already given. Roughly stated, the actual intuition is that knowledge must be given *somewhere* in the chain of communication connected to the hearer, if the hearer is to acquire it on the basis of testimony. But this is perfectly compatible with the fact that not every member of the chain knows the propositions that are passed along. In Lackey's case, then, Stella might be simply passing along items of information known by somebody else – by the authors of the books she deployed to prepare for her lessons, by the experts of her epistemic community, or by Darwin himself.[8]

What about Lilith, our climate change denying teacher? Is Lilith simply passing along an epistemic achievement already attained by someone else? Do her students acquire understanding merely because someone else in the chain of communication connected to them understood the phenomenon of climate change? If so, my case would probably fail to show that testimony can work as a generative source of understanding.

Let us concede that, in the case, as I describe it, Lilith is merely passing along an understanding already present somewhere in the chain of communication connected to her students. Still, there are ways in which one could immunize Lilith's case against this objection. Here is one (inspired mainly by Graham 2006). Lilith's sister, Yael, is an ethologist working in India. Yael tells Lilith about a phenomenon that she has been observing and studying: that the population of rats in southern India is growing massively and causing serious damage to the local agriculture. No one in the scientific community has so far considered the phenomenon particularly worthy of attention. Lilith is the first one to realize that one could make sense of this phenomenon by deploying the theory of anthropogenic climate change. Southern India is extremely polluted. Hence – on the assumption that the theory of anthropogenic climate change is right – it is to be expected that temperatures will be rising especially quickly in that region of the planet.

Lilith hypothesizes that the rise in temperature and the resulting water shortage have been causing sudden extinctions of certain animal species that are unable to adapt – e.g., of cats, which are the rats' natural predators. She realizes that this would explain the massive increase in the rats' population extremely well. Suppose that Lilith is right. She shares her reasoning with her students, and they come to understand why the rats' population in southern India is undergoing such fast growth. This phenomenon has been completely neglected by the scientific community thus far, and Lilith, despite her admirable reasoning skills, is in a deficient epistemic situation which, we saw, both from a factivist and a nonfactivist perspective, is incompatible with genuine understanding. Granting this, her students seem to be the first to grasp this particular explanatory relation and the first to genuinely understand. We may thus conclude that Lilith is not only able to give something she does not possess herself; she is also able to give something that no one else in the epistemic community has yet attained.

7. Conclusion

In this paper, I argued that the case of Lilith, a climate change denying teacher, shows that we can gain understanding from testifiers who themselves fail to understand. More specifically, the case of Lilith shows that, on the basis of their understanding of the theories involved, testifiers can generate understanding of the phenomena explained by these theories even if they do not understand these phenomena themselves.

In the first part of the paper, I spell out six conditions for a theory's intelligibility, and argue that Lilith, relative to the theory of anthropogenic climate change, fulfills them all. I then argue that, although Lilith understands the *theory* of anthropogenic climate change, she does not understand the *phenomenon* of climate change on the basis of the theory. I show that this is a conclusion that both factivists and nonfactivists about understanding would embrace – although for different reasons. I then argue that, despite her undeniably deficient epistemic situation, Lilith is successful in bringing her students to understand – not just the theory of anthropogenic climate change, but the phenomenon of climate change as well. More specifically, Lilith *passes along* to her students her own understanding of the theory of anthropogenic climate change, and she *generates* understanding of the phenomenon of climate change. Understanding of the phenomenon is generated in that Lilith, by means of her speech acts of assertion, provides her students with the element she was herself missing, in order to genuinely understand – namely, belief.

Is understanding, however, properly generated in the interaction between Lilith and her students? It might be argued that Lilith, at the end of the day, is merely passing along an epistemic achievement already attained by someone else – e.g., by the experts on climate change belonging to her epistemic community. In the last part of the paper I tackle this objection and show that Lilith would have the skills to apply the theory of anthropogenic climate change to phenomena still disregarded by the epistemic community, and hence would be able to provide her interlocutors with an understanding that no one else had yet achieved.

This suggests that, contrary to our intuitions, testimony can work, in some sense and to some extent, as a generative source of understanding. One may fail to understand a phenomenon or a domain of reality, yet still be a fruitful source of understanding for others.

Notes

1. For a few insightful exceptions, see Boyd (2017) and Gordon (2017).
2. There is actually a very straightforward scenario in which this seems to be possible, namely the case in which the hearer already understands the domain in question, at least to some extent. On the basis of her partial understanding, it is plausible that the hearer can use the information provided by a speaker to make advancements in understanding, even if the speaker does not understand what she is talking about. It might be sufficient that the speaker knows, or even just truly believes, the information that she is communicating. In what follows, however, I rule out this possibility by focusing only on cases in which the hearer has either poor understanding, or none at all.

3. If this position does not sound convincing enough, we can try to reason a little bit more on point (iii). Bas van Fraassen (1980, 2008) endorses a form of instrumentalism called 'empiricist structuralism' which demands, among other things, an agnosticism about whether the theoretical terms occurring in our best scientific theories succeed in referring to existing objects and a pessimistic stance concerning the possibility of ever determining whether these theories are true. Would someone really want to defend the claim that Bas van Fraassen does not understand, e.g., quantum theory, as he does not believe – and probably will never believe – any of the theory's claims? This would be just absurd and probably hubristic, for anybody who had skimmed through his *Quantum Mechanics. An Empiricist View* (1991).

4. My suggestion is that conditions (a)–(f) must be all fulfilled for a theory to be intelligible. It seems, however, as if one could satisfy some of these conditions – certainly condition (c) and condition (d) – to a greater or lesser degree. One can be more or less skilful in seeing consequences of a theory, or in applying a theory to the phenomena. This makes it tempting to say that intelligibility comes in degrees.

5. This use condition is particularly important for De Regt's conception of intelligibility. He writes: 'I have interpreted scientists' understanding of theories in terms of abilities: scientists understand a theory if they have the skills to use the theory in a fruitful way.' (De Regt 2017, 44). Kelp (2015) also points out that an important aspect of understanding concerns the ability to make correct predictions and to use the information at one's disposal.

6. Goldman 2001.

7. This possibility yields an interesting conclusion. Grice's maxims are construed as principles that connect conditions for successful communication with certain epistemic goals that speaker and hearer share in the conversational context. The maxim of quality, for instance, tells us (i) not to say what we believe to be false and (ii) not to state that for which we lack adequate evidence. Lilith clearly violates (i). Hence, if the maxim of quality is correct, Lilith *is not* performing the right conversational behaviour. However, what if we include (advances in) understanding among the typical conversational goals? If my analysis of Lilith's case is correct, Grice's maxim of quality is not, in fact, a maxim we should *always* obey or employ. If speakers were to tell their interlocutors only what they believe, the number of conversations that spread, for example, understanding, would be reduced significantly.

8. Faulkner (2006), Graham (2000, 2006). For a strategy as to make Lackey's case immune to this objection, see Carter and Nickel (2014).

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Disclosure statement

Notes on contributor

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