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Jakob Schott, BA BA

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Zusammenfassung

Die vorliegende Arbeit hat das Ziel gute Gründe zu finden, um wissenschaftlichen ExpertInnen zu vertrauen. Die Rechtfertigung der Akzeptanz von Expertenaussagen wird dann gefestigt, wenn Gründe der Rechtfertigung kritisch geprüft werden können. Das erste Kapitel bietet eine kohärente Definition von „Zeugnissen“ (testimony) an und untersucht die Bedingungen für die Möglichkeiten von Wissenstransfer. Im zweiten Kapitel wird die Beziehung von Laien und ExpertInnen erklärt und auf ein epistemisch hierarchisches Verhältnis der beiden Parteien hingewiesen.

Der epistemische Status der ExpertInnen konstituiert einen guten Grund, wissenschaftlichen ExpertInnen zu vertrauen. Da der epistemische Status der Sprecherin oder des Sprechers nur einen Aspekt der Vertrauenswürdigkeit (trustworthiness) ausmacht, muss noch eine zweite Annahme gemacht werden. Die Aufrichtigkeit (veracity) ist der zweite Aspekt der Vertrauenswürdigkeit.

Im dritten Kapitel wird analysiert warum eine genaue Prüfung der Vertrauenswürdigkeit Bedingung für kritische Akzeptanz von Zeugnissen ist. Im vierten Kapitel wird ein Grund für Vertrauenswürdigkeit angeboten, der von einer großen Anzahl von Laien geprüft werden kann und daher eine kritische Bewertung zulässt. Dazu werde ich relevante Texte diskutieren. Im fünften Kapitel widme ich mich den WIKIPEDIA-Einträgen rund um das Thema Klimaerwärmung und gehe der Frage nach, ob sie eine gute Quelle für Argumente für den wissenschaftlichen Konsensus zum Klimawandel sind. In einem „Ausblick“ (Outlook) wird auf die demokratiepolitische Relevanz von Expertenaussagen und der Wissenschaft als Institution hingewiesen.

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Introduction

Assuming trustworthiness critically means being able to access and assess the reasons for one's trust. A reason for trustworthiness of a person serves as a justification for the acceptance of her testimony. Reasons for trustworthiness are the evidence for knowledge in the case of knowledge transmission. This thesis is concerned with knowledge transmission, testimony in particular.

We speak of testimony when someone utters a knowledge-belief and a hearer can accept that belief and come to form a knowledge belief herself. Knowledge is transmitted if the hearer accepts the true testimony and forms a new true belief. The justification of the acceptance transforms the belief into knowledge. The acceptance should ideally be justified in some way since justification of a belief is an essential condition of knowledge (the other ones being the truth of the belief, the justification of the belief, and that you believe that your belief is true and justified). The evaluation of trustworthiness of a person has two aspects: the hearer must believe that the speaker is in the position to know *and* the hearer must believe that the speaker wants to tell me the truth. If I want to assume a person's trustworthiness critically, I need good reasons for both. Trust without reasons can be considered somewhat gullible.

This thesis is an attempt to justify the acceptance of testimony of scientific experts. I will claim that the best way to accept critically and not merely blindly trust the testimony of experts, one must assess the trustworthiness of the speaker. Towards the end of the thesis, I will look at the instance of current climate change and I will try to find the most convincing arguments for those who doubt the scientific consensus about the anthropogenic causes of climate change. Many climate-change skeptics doubt that climate scientists give truthful reports. They sometimes claim that climate scientists are some kind of a cult and thus give unreliable reports.

Scientific testimony plays an important role in democratic policy-making since policy-makers are in most cases not in the epistemic position to produce knowledge themselves and hence rely on all kinds of expertise. It is inherent to the definition of experts that they are in the best position to form a true belief on a matter which they possess expertise of. Therefore, it is epistemically rational to rely on their testimony.

We can easily think of many reasons to put our faith in the expertise of others. Several notable philosophers hinge their arguments on the assumption that it is reasonable to trust experts and accept their testimony. In Chapters 4 and 5, I discuss their claims and conclude that they lack accurate understandings of the epistemic abilities of a layperson.

In the first chapter, I give a coherent theory of testimony, compatible with the focus on expert testimony. We can think of testimony as some sort of reporting about the world. We can define it as *telling that* (propositional telling) in opposition to *telling to* (imperative telling). In testimonial utterances, a proposition is expressed. Ideally, the proposition expressed is identical to what the terms normally refer to. Use of metaphors, for instance, can impede successful knowledge transfer.

I then go on and outline the “problem of justifying belief through testimony”, as Fricker calls it.

The epistemological ‘problem of justifying belief through testimony’ is the problem of showing how it can be the case that a hearer on a particular occasion has the epistemic right to believe what she is told – to believe a particular speaker’s assertion. If an account showing that and how this is possible is given, then the epistemological problem of testimony has been solved (Fricker, “Against Gullibility” 128).

After outlining reductionist and anti-reductionist understandings of testimony, I mediate between them. I argue that the hearer needs to scrutinize reasons for the acceptance of knowledge. However, the scrutiny of the message is likely to fail, especially in the case of expert testimony. The layperson, thus, should look for accessible and available reasons for trustworthiness of the speaker.

In Chapter 2, I offer definitions of both laypersonhood and expertise. My goal is to formulate an accurate theory of the epistemic implications of laypersonhood. I shall discuss the uses of the terms “layperson” and “expert” in philosophical and sociological debates and then give my own applicable definitions which are derived from existing literature on this matter. These definitions should serve as the theoretical foundation for the remainder of the thesis.

In Chapter 3, I discuss two different ways to scrutinize reasons for the acceptance of testimony. I call the first one “Message Scrutiny”. In this case, the hearer tries to find reasons to justify her acceptance of the report based on the message itself. I conclude that this form of scrutiny rarely delivers any useful justification. The much more promising form of scrutiny is “Trustworthiness Scrutiny”. In this case, the hearer looks for reasons to justify the acceptance of testimony based on the assessment of the scrutiny of the speaker. “Trustworthiness Scrutiny” should not be thought of as completely detached from the message, for the message can be an indicator of the trustworthiness of the speaker. Sometimes, we assess the trustworthiness according to how someone says what. Nevertheless, this type of scrutiny does not assess the content of the utterance. I include extensive discussions of Elisabeth Fricker’s and Keith Lehrer’s work that provide necessary background in the epistemology of testimony.

In Chapter 4, I propose an alternative explanation for why trustworthiness of accredited scientific institutions and scientists affiliated with them can be reasonably assumed. This reason is accessible and assessable by laypersons which has the advantage that it does not need to be accepted uncritically. I discuss potential reasons why we should trust the testimony offered by scientists. I draw on influential papers by John Hardwig and Michael Blais and discuss their respective arguments for the trust in scientists. First, there is the reason that scientific knowledge is the best knowledge available. While this argument is objectively true, I argue that ordinary laypersons cannot scrutinize this reason for it violates assessability. Second, we could argue that scientific cultures engage in truth-producing practices such as the peer-review system. Third, we could argue for the trustworthiness of scientists since they are epistemically virtuous agents and it is safe to assume veracity.

Highlighting the respective problems with the presented arguments, I come up with my own argument for the veracity of scientific experts. This argument fulfills the conditions for critical acceptance of testimony: accessibility and assessability. The explanation I want to offer states that accredited scientific institutions and the scientists affiliated with them have an incentive to produce solid research. The severity of consequences of fraudulent behavior is a powerful deterrent. Although many economic aspects interfere with their primary purpose of research production, I argue that the peer community and the consequences of revealed dishonesty create incentives for researchers to produce solid research. Scientific institutions have a strong incentive to uphold their reputation as reliable sources of knowledge production.

In Chapter 5, I examine the example of climate science and the arguments for accepting the trust in scientific experts. My strategy to acquire true beliefs about scientific matters is applicable and could potentially convince skeptics. I will dedicate attention to the claim that climate change is anthropogenic (at least to some extent). I will show that various strategies proposed by Elizabeth Anderson to inform oneself about climate science are not applicable since they consume too much time or demand too much knowledge. I argue that most laypersons will fail to assess these reasons. For instance, basic knowledge about statistical distribution is necessary to understand the anomalies of the global climate we are confronted with today. I will look at the knowledge necessary to understand even Wikipedia entries about climate science.

In the final part of the thesis, I will stress the relevance of expert testimony in a democratic society. Expertise is essential to informed policy-making. Apart from policy-makers, citizens need to have access to factual information in order to make informed decisions.

1. Defining Testimony

A modern understanding of epistemology typically includes the possibility of knowledge transfer. We may call one of the forms of knowledge transfer “testimony”. Since there is speech involved in testimony, it falls in the category of linguistic phenomena. There might be other forms of knowledge transfer that are linguistic phenomena, but they are not of any concern here.¹ Whenever I speak of knowledge transfer, I use it as synonymous with testimony.

To grant testimony a genuine epistemological status means saying that it is possible to learn from words. I can come to know something about the world by hearing testimony about the world. I myself do not make the relevant observation necessary to be in the epistemic position to gain knowledge over a certain matter. In this chapter, I am going to investigate various aspects of testimony, its domain, and necessary conditions for successful knowledge transfer.

But what is the advantage of granting testimony genuine epistemological status? If someone tells me yesterday’s weather in Bangkok, it is not clear why I get to know yesterday’s weather in Bangkok and not only that the person says that she knows yesterday’s weather in Bangkok. However, most of the things we generally assume to know we come to know because someone else told us.

An essential characteristic of knowledge transmission is that knowledge is transferred from one subject to another. The second subject does not stand in a relation to the object of knowledge. This means that she did not herself directly or indirectly make any relevant observation. She only stands in a relation to the speaker who transmits knowledge. The assertion is perceived and not the thing in the world we wish to gain knowledge of. We only know our name because someone else told us. However, we do not want to exclude the possibility of knowledge of the past from our theory of knowledge. Hence, it is essential to a persuasive epistemology to explain cases in which knowledge transfer is possible.

In an initial step, I will mainly focus on the two classic works *Testimony* by C.A.J. Coady and the companion *The Epistemology of Testimony* by Jennifer Lackey and Ernest Sosa. Both books will accompany us throughout the thesis. In further steps, I will include additional sources from other authors in different fields of philosophy.

¹ A good example for non-linguistic testimony can be found in legal context. Ostentative testimony is a perfectly valid means of identifying the culprit. The witness points at the person and identifies her as, for instance, the murderer.

1.1. The Possibility of Knowledge Transfer

Knowledge transfer implies two aspects: firstly, knowledge has to be transformed into a linguistic phenomenon so that it can be transferred from a speaker or a group of speakers to a hearer. Secondly, the knower does not have to stand in direct relation with the object of knowledge. This makes testimony disquotational. This means that the hearer gets to know something, so she can say: “I know p.” If it was not disquotational, she could only say: “I know that Speaker S said that she knows p.”

When I talk about knowledge transfer in my thesis, I only refer to knowledge that is transferred qua words.² The speaker or the group of speakers intentionally tells something about the world. That means that she utters the assertion “P” which expresses the propositional content [P] that corresponds with some actual fact P in the world.

The speaker S knows something about the world that the hearer H does not know. S tells what she knows about the world and H gets to know it as well. Many conditions must be met in order for this knowledge transfer to be successful.

- 1) When S says “P”, she means [P]. The propositional content of “P” is [P].
- 2) S must be in the position to either know P or to at least transmit P.
- 3) S intends to make a testimonial assertion.
- 4) [P] refers to P in the world.
- 5) [P] must be true.
- 6) H hears and understands “P” with the propositional content [P].
- 7) H understands that the assertion is intended to be testimonial.
- 8) H judges S to be trustworthy and [P] to be true.
- 9) H believes that [P].³

Many if not all of these conditions sound trivial. But all of them are essential to the success of the knowledge transfer. That they are necessary conditions is fairly easy to comprehend. Conditions 1-3 are concerned with the speaker and her intentions. 4) and 5) are remarks about the

² This excludes ostentative testimony. I exclude it here not because I wish to deny the epistemological status of ostentation but rather because it is only loosely linked to my original thesis.

Ostentative testimony can occur in legal contexts for instance. The prosecutor might demand the witness to point at the criminal. The witness’ pointing out can be interpreted as one form of knowledge transfer.

³ Conditions 6) to 9) are somewhat similar to Hardwig’s conditions of a hearer’s knowledge in “The Role of Trust in Knowledge” (Hardwig, “The Role of Trust in Knowledge” 699). He focuses on the reasons to trust in his listing. He is interested in the justification of the accepted belief. I intended to show how the propositional content of an utterance can be transferred. In Chapter 4, I include an extensive discussion of Hardwig’s essay. Additionally, I offer an analysis of justificatory reason for the acceptance of testimonial beliefs.

assertions and its propositional sentence. 6) to 9) refer to the hearer and her abilities to properly understand the assertion.

Some remarks are necessary:

Ad 1): The first condition is necessary for the formation of testimony and is tightly linked to condition number 4). With the utterance “P”, S also expresses [P]. That means she is not talking in metaphors. Combined with condition 3), this makes the assertion true iff P and false iff not-P.

Ad 2): This condition refers to the epistemological status of S. S must possess the proper (intellectual) means to know P. If she does not possess these means herself, she must be at least in the position to successfully transmit [P].

Ad 3): S needs to intend to tell us something about the world. That means that she wants to tell us something that she herself believes in. It is not testimony if she does not intend to tell us the truth about the world.

Ad 4): This is a crucial claim about the philosophy of language. Here, language is thought of as a referential system. Since language often does not function this way, many assertions fail to meet the requirements to be considered testimony in this thesis.

Ad 5): Keith Lehrer thinks that successful knowledge transmission requires truth-connection of the assertion (Lehrer, “Testimony and Trustworthiness” 150). This is the truth-condition of knowledge. A falsehood can never be known. I take this condition to be widely accepted in standard epistemology. It should be fairly easy to see that knowledge transfer can only be successful if the propositional content P of the assertion is true.

Ad 6): If S asserts a testimonial utterance, the propositional content must be heard by some hearer H. Furthermore, she has to understand the assertion. That means she is capable of identifying the propositional content and further identifying the terms with the referred objects in the world. The referential system that is used by S has to be understood by H.

Ad 7): This condition is tightly linked to 4). H must also be convinced that S wants to tell her something about the world. H must make an assumption about S’s intention. This is why testimonial knowledge is almost impossible when the speaker’s intentions are doubted.

Ad 8): Furthermore, S should not only intend to tell the truth, but H must judge that S is trustworthy. This means that she is in the position to know [P] or at least in the position to transmit [P].

Ad 9): H must accept [P] and believe it herself. This is the belief-condition of knowledge. This means that the proposition either does not contradict with H's beliefs about the world or that [P] overrides some previous beliefs about the world.

Ever since the famous essay "Is justified true belief knowledge?" (Gettier) presented serious problems to classic epistemology, philosophers are struggling with the Platonic definition of knowledge as justified true belief. However, I offer conditions that are quite similar to the Platonic conception. 4) is the truth-condition and 8) the belief-condition. 7) and 8) can be understood as justification of the testimonial belief.

Condition 2): is sometimes debated in epistemology. Lackey argues that it is not necessary for S to be in the position to know [P] since the chain of knowledge transmission can have multiple links (Lackey, "Testimonial Knowledge and Transmission"). She would go one step further and argue that S does not need to know [P] herself. I tried to offer conditions that avoid these problems. It is not essential to the claims of this thesis where we stand on chains of knowledge transmission.

Both speaker and hearer and the assertion itself must fulfill certain requirements for successful knowledge transmission. I believe that each one of them has to be met. I separate and list them respectively.

On the speaker's side:

Successful knowledge transmission is possible if:

- 1) I intend to make an assertion of the form (or a similar form):
"P" or "I know that P" or "P is true".
- 2) I actually make an assertion of the form (or a similar form):
"P" or "I know that P" or "P is true".
- 3) [P] refers to P in the world. That reference is as clear as possible.
- 4) I believe that [P] is true.
- 5) I intend to make a testimonial utterance.
- 6) I appear to make a testimonial utterance (i.e. I am not joking).
- 7) P is actually true.

On the hearer's side:

I get to know something about the world if:

- 1) I hear S saying "P".

- 2) I understand the propositional content of the assertion.
- 3) I understand the system of reference to the world.
- 4) I believe that S believes that [P].
- 5) I believe that S wants to tell me [P] about the world.
- 6) [P] does not contradict with anything I know about the world or I judge the presented information to be more trustworthy.
- 7) I judge S to be trustworthy.

Requirement of the assertion:

- 1) [P] is actually true. This means that the propositional content of the assertion corresponds with some fact P about the world.

The requirements are fairly straightforward. Both speaker and hearer have to fulfill seven requirements. They concern the intentionality of the speaker and her ability to form an understandable assertion. The requirements of the speaker concern her ability to access the propositional content of the assertion and assess the trustworthiness of the assertion and the speaker. The assertion itself must be corresponding with some facts about the world.

1.2. Testimony and Epistemology

After having established the necessary conditions and requirements of both hearer and speaker for successful knowledge transmission I am now able to identify a clear definition of testimony. As stated before, whenever I say “knowledge transmission” in this thesis I mean testimony.

Testimony is a basic source of knowledge. It can be defined as “learning from words”. A theory of knowledge that excludes the possibility of testimony as a source of knowledge is not feasible since these theories are too demanding since most of what we know we learn from others. Without others, we are not able to know our name, our birthday or scientific discoveries. In all these cases, we are not in direct relation with the object of knowledge. This means that we are not capable of either the observation or a certain thought process that lead to a known fact about the world. We have to rely on others in instances where testimony is necessary.

We may call giving testimony a speech act. We don’t just utter things, we also do things. C.A.J. Coady understands testimony to be a certain kind of speech act that John L. Austin called “illocutionary acts” (Coady 25). Testimony is hence an utterance that expresses meaning. Other examples in that category include promises or commanding.

A testimonial utterance U expresses the proposition P. P refers to something in the world. Testimonial knowledge transmission is possible if the utterance clearly indicates the expressed

utterance and the system of reference to the world is intelligible. This enables the hearer to understand what the speaker says and learn from her words.

It seems uncontroversial to say that I am justified to believe something if I observe it myself, especially if the observation is not problematic and does not require great skill. In other words, if I am in the position to know, my observation might suffice as a form of justification (this is obviously not true for all instances of observation). For example, I see that there is a tree outside, counts as such an observation. My justification is my observation. I form the (true) belief and hence I know that there is a tree outside.

If I rely on testimony, however, I do not make the observation myself. I am told that there is a tree outside. Hence, the justification for testimonial knowledge has to be of kind 7) or 8). I can only observe that I am getting told something and maybe who the speaker is. One can easily see that this is problematic for the justification for the belief fails to be transmitted from speaker to hearer. Ergo, H needs a different set of justificatory reasons.

1.3. The Domain of Testimony

The title of this section is borrowed from Coady's *Testimony: A philosophical study* which I mentioned earlier. When I say that testimony has a domain it becomes clear that there are utterances that are testimony, the ones that look like testimony but aren't and other forms of utterances.

Coady's chapter on the domain of testimony is designed to situate the epistemology of testimony in epistemology in general. He distinguishes between positive and negative epistemology stating that testimony falls in the former category. Negative epistemology deals with questions of philosophical skepticism.

He then goes on to discuss definitions of knowledge. He offers Plato's definition of knowledge as justified true belief and presents the arising problems. Plato famously rejects a genuine epistemological status of testimony. Coady wants to correct that error:

I shall argue that this tradition of neglect is a bad one and that our reliance upon testimony is too important and too fundamental to merit such casual treatment. I shall propose some tentative explanations of the existence of this blind spot in positive epistemology (Coady 6).

Until recent debates, David Hume was "one of the few philosophers who took the topic seriously (Coady 7)." Although Coady acknowledges this accomplishment, he dedicates the chapter "Testimony and Observation" to attack Hume's reductionist approach.

In the next section, I will explore the debate on reductionism in greater detail mediating between the antagonistic positions. Successful knowledge transmission through testimony is possible only if the utterance is recognized as an assertion. Therefore, the assertion will have to follow certain grammatical rules. These rules will obviously differ from language to language. Since the assertion is always embedded in a broader context the grammatical structure alone can never be a sufficient identifying feature for testimony (from the hearer's perspective). I include an example to illustrate this.

In this section, I will focus on the differences between genuine acts of testimony and such speech acts that just look like testimony but are not. The most obvious example of the latter case might be the lie. The characteristic of a lie is its deceitful nature.

A lie is the intentional telling of a falsehood. The speaker makes an assertion which she is convinced is false and attempts to make the hearer accept that falsehood. That happens when there is a successful deceit about the propositional content of the utterance or the system of reference.

Another example might be an utterance in a non-ideal environment. That might occur when we say something that looks like an assertion, but the reference is unclear. This impedes the determination of the truth parameters of the sentence. This typically happens when the hearer is unaware that the speaker uses metaphors. In everyday situations, this can also happen to us. Many of us encounter situations like this:

A friend tells us: I can climb Mount Everest.

This sentence might in an ideal context be true when she can climb the mountain and false if she cannot. This only works in cases where our friend wants to express the proposition that she can climb Mount Everest. However, this is not how conversations are normally conducted. Our friend might want to express her interest in climbing or stress the fact that she is courageous. In this case, the truth parameters are not explicitly obvious. Our reply: no, you can't, might hence not negate the proposition we think.

This points to various problems regarding communication in general and testimony. A sentence has to follow certain grammatical rules in order to be understandable. These rules, however, are not the only decisive element for the recognition of testimony on a formal level for an assertion is always embedded in a broader context. Furthermore, the speaker needs to form the intention to give us a report. In the next two sections, I will deal with some of the problems

1.4. Reductionism and Anti-Reductionism

The debate between reductionists and anti-reductionists concerns the question of the justification of testimony. They ask the question what kind of justification transforms the acceptance of knowledge into testimony.

If the hearer wants to accept the new information and hence acquire new knowledge, she needs to properly justify the acceptance. This thesis will largely focus on the justification of (expert) testimony and it is a good start to look at this vivid debate. Jonathan Adler sums the positions up in a comprehensible way:

The view that our ordinary acceptance of testimony is justified only *a posteriori* has been taken as requiring the *reductionist thesis* that testimony, unlike perception, is not a fundamental source of warrant. The acceptance of testimony resides in other familiar empirical and *a posteriori* sources, notably perception, memory, and induction.

The anti-reductionist admits that testimony depends on other sources like perception, unlike its converse. And the dependence, it is claimed, is only psychological or causal. But the epistemic warrant or justification for accepting testimony need not essentially appeal to these other sources. It may refer only to the speaker's knowledge, word-giving (promising), and other principles that are purely testimonial (Adler).

Anti-Reductionists generally think that “testimony is *just as basic* a source of justification as sense perception, memory, inference, and the like” (Lackey and Sosa 4). They believe that no further positive epistemic work needs to be done to justify the acceptance of testimony provided a defeating argument – a so-called defeater – is missing.

Peter Faulkner thinks that anti-reductionist arguments essentially hinge on the assumption that it is not possible for the hearer to give sufficiently good reasons for the acceptance of testimonial beliefs. The hearer thus will always rely on credulity. In his paper “On the Rationality of Our Response to Testimony”, he sums up the anti-reductionist position.

This argument to the conclusion that credulity is justified may be set out somewhat as follows.

- (1) We largely lack reasons – in the sense of propositions believed – for accepting testimony.
- (2) In those cases where we do have reasons, these reasons are usually insufficient to justify our testimonial beliefs.
- (3) Therefore, if our practice of accepting testimony without reason were not justified, few of our testimonial beliefs would be justified.
- (4) Many of our testimonial beliefs are justified.
- (5) Therefore, we must be justified, other things being equal, in accepting

testimony without reason, that is, credulously (Faulkner 354).⁴

Faulkner thinks that anti-reductionist claims are false and that it is possible to provide sufficiently good reasons to justify the acceptance of testimonial belief. He continues to state that we can rationally respond to testimony. In Chapter 4, this will be of significance to this thesis.

The reductionist position states that a person needs to have “sufficiently *good reasons* for accepting a given report” (Lackey and Sosa 5). In their companion, *The Epistemology of Testimony*, Jennifer Lackey and Ernest Sosa dedicate three chapters to the debate about reductionism.

Lackey thinks that philosophers ought to move beyond the debate of reductionism (Lackey, “It Takes Two to Tango”). According to her, reductionists focus entirely on the hearer’s side and non-reductionists entirely on the speaker’s side of justification. Lackey argues against both sides. This seems especially appealing in the case of expert testimony since reductionism clearly fails and non-reductionism focuses on the speaker’s side. This would not be helpful insofar as I want to provide a guideline for laypersons.

In her essay “It takes two to Tango”, Lackey follows the common distinction between *global* and *local* reductionism, arguing that the former is unfeasible for at least three reasons. First, it is “wildly implausible” (Lackey, “It Takes Two to Tango” 161) that before ever accepting any testimony at all, the individual has to make sure that testimony is generally reliable. This means that young children have to check the accuracy of a number of different reports and have reasons to assume that testimony is generally reliable before they can accept anything they hear. Second, the individual has to be exposed to a “non-random, wide-ranging sample of reports, but also to a non-random, wide-ranging sample of corresponding facts” (Lackey, “It Takes Two to Tango” 161). This again does not seem plausible. The third problem Lackey identifies is that the proof of general reliability of testimony might be epistemologically insignificant.

Local reductionism, on the other hand, states that “justification of *each particular report or instance of testimony* reduces to the justification of instances of sense perception, memory, and inductive inference” (Lackey, “It Takes Two to Tango” 162) whereas global reductionists think that justification reduces to the general reliability of testimony.

Lackey ends up rejecting all forms of reductionism since all forms of reductionism ultimately depend on this flawed condition:

⁴ Faulkner sums up the reductionist position in the quote provided. He begins his analysis of these five claims by introducing Thomas Reid and Michael Dummet who are key historical figures in the anti-reductionist tradition.

Appropriate positive reasons are *necessary and sufficient* for testimonial justification (Lackey, “It Takes Two to Tango” 163).

If reductionism was true, according to Lackey, then there would be no difference between “testimony being reduced” and “positive reasons doing reducing” (Lackey, “It Takes Two to Tango” 165). Lackey demonstrates that this is not the case and ends up rejecting reductionism.

Anti-reductionism is an unfeasible position as well. While anti-reductionism states that testimony is independent of the sources that could provide positive epistemic reasons for its acceptance, the view “is often criticized for sanctioning gullibility and intellectual irresponsibility” (Lackey, “It Takes Two to Tango” 179). Lackey thus proposes to move the debate *beyond* reductionist and anti-reductionist positions. Lackey’s objections to both views shall also shape the concept of justification of the acceptance of expert testimony in this thesis.

I will go on and present two further arguments against reductionist interpretations of justification before I will lay out what positive epistemic labor an individual can do to justify the acceptance of the specific case of expert testimony.

1.5. Arguments against Reductionism

As hearers, we might sometimes falsely identify an utterance as testimony. This is due to utterances’ inherent underdetermination for it is not possible to identify an utterance as testimony solely on the basis of what is said. Underdetermination is a serious threat to reductionist arguments for interpretative difficulties can become salient.

Sometimes we ask a question, sometimes our sentences are exclamations, and other times they are assertions. In everyday life, most utterances can be understood by the hearer. Situations like these are unproblematic, even when we use metaphors or ask rhetorical questions. The other party understands our intentions when we utter. Although we might not dwell on these situations, many formal factors have to be in order for simple communication: the frame of reference has to be clear, the intention of the speaker must be understood correctly, and so forth. It is easy to see how communication can sometimes fail. Sometimes we mistake the speaker for being literal when actually she is speaking metaphorically. Sometimes we are uncertain about the speaker’s intentions.

Even when a sentence is grammatically correct, and the hearer is perfectly capable of comprehending the English idiom, there might still be some confusion. That might even occur when the speaker does not intend to cause confusion.

Grammatical underdetermination can be the reason for this uncertainty. The correct identification of a sentence does not allow for the exact identification of the type of utterance. Although

grammatical underdetermination is not problematic in most situations, it will become salient when the frame of reference is not clear. Under these circumstances, the sentence can become ambiguous.

Intentional underdetermination can also cause misinterpretations. Let's look at the example of a promise taken from (Cohen; Green) in order to illustrate the difficulties of identifying types of utterances. Sentences including elements such as "I promise (to do that)" are generally understood as promises. However, sometimes we make promises that are not explicitly marked as such. For instance:

I will read that novel.

Cohen discusses the case of a somniloquist, who utters "I will read that novel" in her sleep. In this example, it would be foolish of us to assume that we are confronted with a promise. In this case, we have no reason to assume that the speaker has the intention of promising.

Interpretation, according to Donald Davidson, depends on the access of mental content (of the speaker) and linguistic meaning (of the utterance) and their connection.⁵ Davidson's hotly debated theory of the *omniscient interpreter* is based on a correspondentalist understanding of language and influenced other epistemologists. For this reason, I shall go into some detail, describing Davidson's argument laid out in "The Very Idea of a Conceptual Scheme".

Davidson thinks that it is indispensable to successful communication to make an assumption about the intention of the speaker. The speaker must *want* to make a comprehensible utterance and have a clear frame of reference. In the case of the somniloquist, her intentionality is clearly in question and hence we must not take her words as an expression of her intentions.

We also need to make an assumption about the intended reference of the speaker. Davidson describes the following example:

The way this problem is solved is best appreciated from undramatic examples. If you see a ketch sailing by and your companion says, "Look at that handsome yawl," you may be faced with a problem of interpretation. One natural possibility is that your friend has mistaken a ketch for a yawl, and has formed a false belief. But if his vision is good and his line of sight favorable it is even more plausible that he does not use the word "yawl" quite as you do, and has made no mistake at all about the position of the jigger on the passing yacht. We do this sort of off the cuff interpretation all the time, deciding in favor of reinterpretation of words in order to preserve a reasonable theory of belief. As philosophers we are peculiarly tolerant of systematic malapropism, and practised at interpreting the result. The process is that of constructing a viable theory of belief and meaning from sentences held true (Davidson, "On the Very Idea of a Conceptual Scheme" 18)

⁵ Davidson lays out his theory in *A coherence theory of truth and knowledge* (Davidson, "A Coherence Theory of Truth and Knowledge").

If the frame of reference is clear, communication can be successful even when the terms are not used correctly. This is due to the fact that a term alone does not determine its reference. Intention is required as well.

It is not possible to infer the intentionality of the speaker from her actions or speech acts. Davidson was not the first philosopher to have discovered this. Elisabeth Anscombe thought that intention is not an observable phenomenon (G. E. M. Anscombe). If I announce that I am going to do it and then I end up not doing it, it is not possible to infer that I never had the intention of doing it in the first place but only that my actions do not align with my words. Internal canceling events (i.e. I reconsider) or external events (altered circumstances) might have occurred.

Davidson wanted to make a claim about communication in general. Since I am concerned with testimony as one kind of communication practice, it seems sensible to look at the specific relation between testimony and intentionality. It will become salient that the testimonial utterance and intentionality are not necessarily linked which can prevent successful knowledge transmission.

C.A.J. Coady uses the theory of Davidson's "omniscient interpreter" to show that interpretation with an alien culture is likely to fail if we do not understand the connection between the mental content and the linguistic meaning.

In his book *Testimony: A Philosophical Study*, Coady famously argues against a reductionist understanding of testimonial justification. He describes the following scenario:

Imagine a community of Martians who are in the mess that RT [Reductivist Thesis] allows as a possibility. Let us suppose for the moment that they have a language which we can translate ... with names for distinguishable things in their environment and suitable predicative equipment. We find however to our astonishment, that whenever they construct sentences addressed to each other in the absence (from their vicinity) of the things designated by the names, but when they are, as we should think, in a position to *report*, then they seem to say what we (more synoptically placed) can observe to be false. But in such a situation what reason would there be for believing that they even had the practice of reporting (Coady 85).

Coady suggests that we have no reason to assume that the Martians constantly misinform each other or lie to each other. This is backed up by the fact that the hearing Martians do not react to the alleged assertions and hence are not misinformed. Coady concludes that the Martians might not engage in knowledge transmission.

Coady's argument is directed against reductionist understandings. However, it makes the importance of intentionality when thinking about testimony apparent. If the intent of making a testimonial utterance is not linked to the utterance itself, successful knowledge transmission is

not possible. In other words: the speaker must *want* to tell us something about the world. If she doesn't, we are not dealing with testimony.⁶

This section was concerned with problems for reductionism arising from formal aspects of utterances. However, these problems present no knockdown argument against reductionism. In the case of expert testimony, I will show that the specific content of this type of testimonial utterance makes it impossible for the layperson to find positive epistemic reasons to justify the acceptance of expert reports based on the utterance itself. Still, the layperson can perform epistemic labor to find positive epistemic reasons to justify the acceptance of expert testimony. These reasons, however, are detached from the utterance or the expertise of the speaker.

1.6. Transition to the Origin of Trustworthiness: Anti-Reductionism Is not the Answer

In a reductionist understanding of testimonial justification, the hearer has to do positive epistemic labor to find reasons for the reliability of either testimony in general or individual statements. The arguments presented against reductionism seem to make it implausible that individuals can perform such a task when confronted. Reductionism seems even less feasible when we consider that the assessment of the utterance or the epistemic status of the speaker in the case of expert testimony is likely to fail.

The essay “Against Gullibility” by Elizabeth Fricker (Fricker, “Against Gullibility”) is primarily concerned with the dangers of non-reductionist thinking. If we do not demand any positive labor of individuals, then we might give rise to gullibility

⁶ A famous counterexample are the Lackey cases. For I think that they do not object my main thesis concerning expert testimony, I will not analyze in detail here. Her essay *Testimonial Knowledge and Transmission* explicitly questions the necessity of intentionality in transmission chains. She does not think that knowledge transmission requires the veracity of the speaker. She considers the following case:

“Jane is currently in the grips of sceptical worries which are so strong that she can scarcely be said to know anything at all. (I here emphasize 'currently' to capture the idea in contextualist views of knowledge that sceptical doubts may undermine knowledge while those doubts are being entertained, even if they need not undermine knowledge in ordinary or everyday contexts. That is, her belief that she could now be the victim of an evil demon is strong enough to defeat the justification she has for many of her ordinary beliefs and, moreover, it is currently an undefeated defeater. Jim, a passer-by, approaches her, asks her where the cafe is, and she reports that it is around the corner, but does not report her sceptical worries to Jim. Now Jim has never considered any sceptical possibilities at all, and hence he does not have any doxastic defeaters for his ordinary beliefs. Furthermore, he does have positive reasons for accepting Jane's report, e.g., he has perceived a general conformity between facts and the reports of many speakers in these types of contexts, and he has inductively inferred that speakers are generally reliable when they are giving directions, and Jane does not exhibit any behaviour which indicates a lack of sincerity or competence with respect to her report. So Jim forms the true belief that there is a cafe around the corner on the basis of Jane's testimony (Lackey, “Testimonial Knowledge and Transmission”).

In this case, we might think that Jim's acceptance of the report is justified, and his new belief justified. Ergo, we also think that that this is an instance of successful knowledge transmission even though Jane is not convinced that she gives an accurate report about the world and hence, does not possess the knowledge that Jim has. Since neither transmission chains nor the skeptical scientists are of any concern in the next chapter, I do not see a reason to engage in these examples in greater detail.

Fricker has been criticized for being “too demanding” (Tollefsen 307) in her views. Since this thesis largely focuses on the relation between a layperson and experts, we might ask the following question that will guide through my essay: how can the layperson accept the testimony of experts without being gullible at the same time?

The issue of gullibility should be taken seriously. Many concrete problems arise by wrongful identifying experts. Later in this thesis, I will expand on the dangers of pseudo-science when I focus on the work of Heather Douglas and Philip Kitcher. Climate-science deniers or proclaimers of alternative medicine often appear to be experts on some domain, when their claims are actually not backed up by much evidence. Charlatans threaten the overall trustworthiness of the scientific community and hence democratic societies.

Note that Fricker does not have expert testimony in mind when she demands epistemic labor of the hearer. In the next chapters, I will show why all attempts of the layperson to assess the credibility of the expert’s utterance will fail. Furthermore, the layperson will most likely lack meta-expertise that grants her the right to find sufficient justificatory reasons to accept the expert’s testimony. However, her criticism of anti-reductionism aligns with Lackey’s remarks on this topic. The individual must perform epistemic labor to justify the acceptance of experts’ reports.

Keith Lehrer suggests that the justification of a report needs to include reasons for the trustworthiness of the speaker (Lehrer, “Testimony and Trustworthiness”). Trustworthiness bridges that gap between the report and the observation. Looking for salient reasons to trust or distrust experts is an epistemic task that laypersons can partially perform. Lehrer states that if trustworthiness is truth-connected, it is possible to transform the acceptance of a report into discursive knowledge.

In the case of expert testimony, I argue that truth-connection is not transparent. The layperson cannot recognize the truth-connex of the utterance to facts. For this reason, I focus on trustworthiness as the only hope to make laypersons less gullible when confronted with expert reports.

In this thesis, I explore reasons for the trustworthiness of experts that laypersons have access to. I propose that experts’ trustworthiness can originate in their expertise and the fact that they might be right. Elizabeth Anderson and Alvin Goldman think that these are the reasons to trust experts (Anderson; Goldman). However, I will conclude that these reasons are generally not accessible by the layperson.

The origin of the trustworthiness of expert testimony should not be explained epistemologically but sociologically. This shift makes reasons for trustworthiness accessible to the layperson. Accredited scientific institutions such as universities have an incentive to produce solid science and have an incentive to get rid of dishonest researchers. Even though exceptions to this are easy to find, I believe that this claim is overall true. Moreover, the opposite claim, that accredited scientific institutions do not have an incentive to produce solid research is not supported by evidence.

2. Defining Expertise, Laypersonhood, and the Relation between Layperson and Expert

In this chapter, I intend to provide the conceptual foundation for my social epistemological argument. I rephrase some existing definitions or introduce new ones in order to have a framework suitable for the chapters afterward.

Expert testimony is a specific kind of testimony which differs from other kinds of testimony because expert knowledge differs from other kinds of knowledge. I illustrate this claim with Helen Longino's quote about scientific knowledge. It sums up nicely what I think about expert knowledge. I will spend much of this chapter explaining why I think it is true.

It is tempting to think that scientific knowledge is like ordinary knowledge except better. But scientists are not (or not just) better observers, and more careful reasoners than the rest of us, they also observe and reason differently and to different ends (Longino 124).

I will defend two claims in the next sections: First, I will argue that the relation between expert and layperson has a specific nature. In the case of expert testimony, the layperson could not have been in the epistemic position to know.⁷ This characteristic intensifies the epistemic dependence on the expert. The hearer's successful identification of herself as a layperson and the speaker as an expert creates an epistemic hierarchy. Second, the layperson has a specific relation to the utterance, for she is likely to fail to assess the utterance or even properly understand it. I will provide examples for this claim. In other instances of knowledge transmission, it is possible that the hearer *could have made* the observation herself. This means that the hearer might understand what motivated the speaker to form a certain belief. But in cases I am interested in, the expert's reasons are opaque for the hearer.

The defense of these claims makes it necessary to have a clear definition of expertise. I will briefly discuss definitions of experthood that can be found in the main sources of this thesis and highlight those that I find particularly useful for understanding for the proper understanding of the layperson-expert relation. Furthermore, some remarks about the epistemic status of laypeople are indispensable. Laypeople are no homogenous group. Laypersons may have

⁷ We can imagine a number of reasons that could be responsible for this counterfactual formulation. The layperson simply does not have the necessary extent of knowledge in a domain to make the observation. Sometimes the observation requires cognitive operations which the layperson cannot perform. In other instances, time or talent is scarce with the layperson and she could not have made the observation due to practical reasons.

My point here is not so much an essential condition for laypersonhood in the sense that laypersons will never be able to get to know certain things but to point out that there are many situations in everyday-life where the layperson is highly dependent on the expert.

extensive knowledge over a certain domain (but still remain laypeople in other domains). Hence, some laypeople can be able to understand and assess some expert assertions. Others might have to rely on experts completely.

The degree of reliance also depends on the domain. We as laypeople may find it easier to access some domains of expertise while completely fail to assess expert utterances in others. Expertise in sports, for instance, might produce understandable utterances. Quantum physics on the contrary needs very extensive knowledge on physics and mathematics rendering laypersons unable to comprehend the utterances. Furthermore, expert utterances *within* a certain domain may vary by complexity. For instance, a doctor clearly is an expert on medical issues and can still be able to make assertions about medicine that the layperson can understand. The layperson, as I will show in this chapter, is not defined by the failure to understand expert utterances. However, her epistemic status does not enable her to access the epistemic reasons that have motivated the expert to the assertion. The next chapters will be dedicated to the question which motivating reasons the layperson can access.

2.1. Defining Expertise

Elizabeth Fricker identifies an ideal of an “autonomous knower” (Fricker, “Testimony and Epistemic Autonomy” 225). According to this concept of an epistemic agent, an individual comes to know something by making an observation. The knowledge-belief she then forms does not rely on any other epistemic agents. Recent developments in epistemology reject this ideal, leading philosophers to ascribe social components to knowledge. Knowledge is often created by collaborative processes.

When we come to know something, very often we depend on others. Someone might tell us where the train will leave or the results of yesterday’s soccer game. Many philosophers think that we have the right to claim knowledge of facts even when that knowledge is transmitted. As we have seen in the last chapter, the requirements for successful knowledge transmission might vary across different theories.

Most people probably agree that our epistemic dependence is particularly high in the case of expert testimony. When matters get complicated and we as laypeople might have no relevant experience, we have to rely on experts to tell us facts.

In the existing literature, the term “expert” is used widely. While most philosophers might have a similar notion of what it is to be an expert, however, the definitions vary. Some think that expertise has something to do with intellectual authority (Hardwig, “Epistemic Dependence”) while others say that they “possess an extensive body of knowledge” (Goldman 92) on some

matter. Elizabeth Anderson lists an 8-staged hierarchy of expertise (Anderson 146) and sociologist Harry Collins identifies different models of expertise (H. M. Collins).

Each of these definitions has their own merits and might refer to a similar notion of expertise. Nonetheless, I find it useful here to point out what I take to be the demarcation criterion of expertise: It is not only the case that the expert knows *more* in some domain but that she is able to gain knowledge differently over different matters in at least one specific domain. The difference between a layperson and an expert are her improved skills to make observations in some domain and her tendency to form accurate beliefs. The existing scientific literature on expert knowledge supports this idea.

The chemist and philosopher Michael Polanyi was one of the first people to acknowledge that ways in which a layperson and an expert observe things are fundamentally different. This difference is founded in the two dimensions of knowledge. Explicit knowledge can be written down, understood, and transmitted. An expert, however, has more than explicit knowledge in a certain domain. Given the expert's extensive body of knowledge, she develops what Polanyi calls the tacit dimension of knowledge.

Tacit knowledge can be acquired through experience. In his book *Personal Knowledge*, Polanyi objects the tendency to understand knowledge as impersonal. Knowledge always has an inef-fable part. This is why knowledge is personal to some extent. What does this mean for our reflection on scientific processes?

Polanyi briefly describes the intuition that a mathematician has in *Personal Knowledge* (Polanyi, 1958, pp. 130–131) . After some time and through the process of learning, the scientist develops some sort of expertise. The solution will seem right to the mathematician although she might not be fully aware of the reason why it is right. This is the very part of inarticulate intelligence that makes up the tacit dimension of knowledge. We can apply this intuition to other scientists in other areas. Scientific processes always involve some tacit knowledge that a scientist cannot make transparent.

The aforementioned sociologist Harry Collins seems to have a similar notion of expertise. In his essay “The Core of Expertise” (2013), he sought to find a common denominator for expertise in different disciplines. The following quote should illustrate his close vicinity to Polanyi's remarks:

There are two notions that seem central to the interdisciplinary core of expertise studies whatever our lobe discipline. The first is that tacit knowledge is often central to expertise. The second is that expertises are

defined by groups, that expert performance is judged by the standards of groups, and it is from groups that tacit knowledge is acquired (H. Collins 400).

Expertise appears to be a concept which undermines many claims of philosophers that scientists need to work as transparent as possible.⁸ Polanyi's remarks should give rise to the idea that experts observe *differently* than laypeople. This aligns well with the quote by Longino that I used at the beginning of the chapter.

The different types of observation have certain implications. For it means that the expert's belief might be based on reasons that are at least partially opaque to the layperson. An individual who makes an assertion should, ideally, base the propositional content of that assertion on reasons which determine the truth-value of the assertion. The essential feature of expertise is the unique account to a certain domain.

The enhanced cognitive skillset is an essential feature of expertise. This helps the expert to form more true than false beliefs. Many of the cognitive skills might stay opaque for the expert but help them in the belief-forming processes. The unawareness of a person towards her cognitive processes while reasoning is not special. But what is extraordinary is the higher reliability of these cognitive operations which allows for a special insight into a certain insight in the domain which they are experts in. The implicit component of expert knowledge can create opaqueness of the reasoning process. Expert knowledge cannot be fully transparent. I formulate this as follows:

I call an essential feature of expertise Special Cognitive Capabilities (SCC).

It is important to note that not every knowledge-belief of an expert is based on opaque reasons. The expert may very well make assertions and be able to fully explain how she acquired the

⁸ There are many adherents of the idea that science and scientific processes need to be made as transparent as possible. Two recent contributions with significant academic impact are for instance: (Douglas; Kitcher). Not only is the scientist not excluded from society anymore, according to Douglas, she should be included in the political process. Scientists, for instance, should have the task of both risk assessment and risk management. But risk assessment is a value-laden process (Douglas 67). For example: When do I assess an interference in the eco system as a risk or a threat? Due to the fact that it is value-laden, Douglas wants to make the process of risk assessment transparent. The scientist can only be held responsible for a sloppy, wrong or for some reasons morally questionable risk assessment, if it is accountable, how these results came about, in other words made transparent (Douglas, 2009, p. 137).

Similarly, but differently accentuated, Kitcher claims transparency for scientific processes (Kitcher). He dedicates far more room to the problem of the relation between science and society than Douglas does in her book. This seems understandable if we consider the key significance of transparency in Kitcher's writings.

In the Outlook, I will come back to Douglas and Kitcher and briefly discuss implications of the acceptance of expert testimony for democratic societies. For now, it is important to understand that the claim for transparency of scientific processes is prevailing in philosophy of science. The claim that scientists play an important role in policy making should be endorsed and I will argue for it in the Outlook. My understanding of scientific testimony, however, requires no such transparency claim since I am aware of the difficulties. Throughout this thesis, it should become clear why I do not think (full) transparency of scientific processes is attainable.

belief. However, two aspects are crucial here: first, experts possess these SCC even if they are not salient in every assertion. Second, many more reasons seem to be very opaque to the hearer, especially if we only consider laypersons. In Footnote 5, I pointed out that the expert assessment of the assertion is likely to fail because the reasons that motivated the expert to acquire certain beliefs are opaque *for the layperson*.

While it is true that experts usually have extensive knowledge in a certain domain and an impressive track record, when it comes to making accurate predictions about the world, laypersons may fail to assess this evidence for expertise. For it would require some sort of meta-expertise to assess the expert's knowledge in some domain and special insight into this domain. I find it very conceivable that the layperson does not have this kind of expertise and, for practical reasons, might even struggle to inform herself about the expert's epistemic status.⁹ Many testimonial expert utterances are not easy to verify or falsify which makes it difficult to assess the expert's track record. Many predictions may still be unclarified or the determination of the truth-values of expert utterances would require meta-expertise.

Hence, in some cases, an expert should not be defined by her extensive knowledge in a certain domain or her impressive track record to make accurate predictions but rather by her unique access to the world.

In his entry in the *Stanford Encyclopedia of Philosophy*, Alvin Goldman and Thomas Blanchard define the term "expert" as follows:

An expert in any domain will know more truths and have more evidence than an average layperson, and these things can be used to form true beliefs about new questions concerning the domain (Goldman and Blanchard).

While my definition of expertise hinges on the special insight of the expert, Goldman and Blanchard emphasize another crucial point about expertise: the expert typically holds more true beliefs in a certain domain than the average layperson. I take from this definition that expertise usually goes hand in hand with high empirical accuracy.

Why is this so crucial? From a defintory standpoint, it seems obvious that the expert knows more about a certain subject than the layperson. But these unequal epistemic statuses provide a good reason to the layperson to accept the expert's testimony and acquire a new belief. If the layperson identifies herself as a layperson and the expert as the expert, she *ought* to accept the expert's report, all things considered. In Chapter 4, I will explain why this is not a complete argument. Even if the layperson acknowledges the privileged epistemic status of the expert,

⁹ For instance, she might not have time to do research on the Internet.

the testimony should only be accepted if the hearer can safely assume the veracity of the speaker. For our purposes here in this chapter, the reason that arises from the epistemic hierarchy should suffice. I provide an argument for the veracity of scientific experts later in Chapter 4.

I try to sum up what I have said about expertise and formulate a definition that should guide through the rest of the thesis. The definition should encompass many different aspects of expertise and apply to many different cases. Like Collins, I try to find the “core of expertise”.

DEFINITION: Expertise essentially features SCC which offers a unique account to a certain domain. This implies a specific opaqueness of expert knowledge making it hard to access and consequently to assess the content. Usually, expertise comes with a high predictive power and empirical accuracy. An expert, hence, forms many true beliefs about or within the domain she is an expert about.

2.1.1. Quick Detour: Bayesian Networks as real-life examples for scientific discourses

The importance of Michael Polanyi in epistemological debates is undeniable. Recent scientific discourse about expert knowledge also supports his idea that expertise has a tacit dimension and further that expert knowledge is not equal to extensive knowledge about a domain. This seems to be an extremely bold claim. In this short section, however, I will provide some examples from recent scientific literature that suggest that experts have special insight into a domain that cannot be reduced to their extensive knowledge in that domain.

Many scientific explanations can be understood as Bayesian Networks. Bayesian Networks, also known as causal probabilistic models (Constantinou et al.), are statistical models.¹⁰ Learning from existing data is not sufficient for developing such Bayesian Networks for it requires a combination of data learning and expert knowledge (Fenton et al.). The paper by (Constantinou et al.) suggests that expert knowledge (alongside data learning) is needed to determine the structure of the network as well as the conditional probabilities.

Bayesian Networks become increasingly important in debates on artificial intelligence with many applications in medicine. (Flores et al.) think that developing Bayesian Networks in medicine requires an interplay of domain knowledge and (implicit) expert knowledge. The combination of these two kinds of knowledge proves to be more successful than the automated

¹⁰ The Wikipedia entry on Bayesian Networks provides a helpful explanation for initial contact with the subject matter (“Bayesian network,” 2018).

learning processes of Bayesian Networks.¹¹ I think this a further indication for the opaqueness of (scientific) expert knowledge.

The relevance of Bayesian Networks for this thesis derives from the fact that the scientific literature takes expert knowledge to be a serious epistemic factor. This means that probabilities assigned by experts can have epistemic power *even if* the formation of the expert's belief is based on opaque reasons. Especially in the field of medicine, the (accurate) probabilistic assessment of the doctor plays a crucial role in the patient's chances of recovery.

This quick detour allowed me to illustrate the importance of opaque expertise. However, this does not mean that every assertion of an expert is, at least in part, based on opaque reasoning. But the cases where it does show to be epistemically valuable.

2.2. Defining Laypersonhood

Laypeople are far from being a homogenous group. Introducing recent studies in sociology gives an accurate picture of the range of different epistemic statuses of laypersons. Nonetheless, I believe that the different groups have something in common and this laypersonhood will serve as the demarcation criterion.

Originally, "layperson" is derived from the Greek word *λαϊκος* and means "of the people". For a long time, the term referred to people who are not members of the clergy. Later, "layperson" was extended to non-professionals.

In the 20th century, the concept of laypersonhood seemed fairly unproblematic for many decades. But ever since epistemologists added a social component to the concept of knowledge, the relationship between experts and laypersons becomes a relevant topic. This relationship, however, cannot be understood properly if the expert and the layperson are not identified. Expertise arises qua extensive knowledge in a certain domain but also qua implicit expert knowledge which can be thought of as some kind of special insight into the subject matter. In the previous section, I called that Special Cognitive Capabilities, or SCC.

Initial remarks about the relationship between experts and laypersons must be made. British sociologists Harry Collins and Robert Evans identify three stages of science studies. Collins and Evans claim that the relationship was not thought of as problematic in the first stage. In the 50s and 60s, the expert-layperson relation was not seen as problematic in the positivistic

¹¹ I will not discuss the various implications of the different kinds of knowledge discussed in the paper. However, I include a quote from the paper which sums up the findings relevant to my purposes:

Both approaches to building BNs [Bayesian Networks] have limitations: expert elicitation is expensive, time-consuming and relies on experts having full domain knowledge, while automated learning is often ineffective given small or noisy datasets. This has led to hybrid approaches which incorporate prior expert information into the causal discovery process (Flores et al. 182).

stage of science studies. The era of positivistic thinking began to crumble with Kuhn's *The Structure of Scientific Revolutions* (Collins and Evans 239). The second stage is often referred to 'social constructivism' with the "Sociology of Scientific Knowledge" (SSK) as its key variant. The interpretation that scientific knowledge is just one amongst other kinds of knowledge was and still is hotly debated within science studies. Collins and Evans propose to overcome this second stage of science studies and propose the alternate "Studies of Expertise and Experience" (SEE). In doing so, they are able to secure the epistemic authority of experts while promoting participation of laypeople in decision-making processes.

Regardless of the various interpretations of the relation between layperson and expert, we can see that the concept of expertise depends on some sort of epistemic hierarchy between the two. Social Constructivism, the second stage of science studies, questioned this hierarchy, although it can be debated whether they believed in the existence of it. This, however, is not the topic here.¹² I claim that the higher epistemic status of the expert provides a good epistemic reason to accept the expert's testimony.

Sociologists have provided us with examples and studies about the relation between laypersons and experts. These studies show that laypersons can very well have some competences in certain domains. In rare examples, laypersons made predictions that turned out to be scientifically valid or even successfully corrected scientific experts.¹³ This, however, should not undermine the basic validity of the claim that the relation between laypersons and experts should be understood hierarchical. Rather, these cases should teach us that the hierarchical relation is much more complicated since laypersons have such different epistemic statuses. The term describes people who are utter novices in one field as well as quite competent knowers within a certain domain.

Since this is a philosophical essay, I will not provide a sociological analysis of the different classes of laypersons. In this thesis, I attempt to find a useful definition of laypersonhood that covers the different epistemic authorities of laypersons. I will, therefore, return to a more philosophical discussion to laypersonhood.

While these unexpected instances prove the heterogeneity of laypersons, I think it would be unwise not to insist on some kind of epistemic hierarchy of laypersons and experts. Better educated laypersons in a certain domain will be able to make a more sophisticated judgment about the trustworthiness of the expert and her report. This layperson might find different

¹² For further criticism of the social constructivist view, see for instance: Boghossian (2013, 2011)

¹³ For further information on Sociological studies about the epistemic status of laypeople, see for instance: (Wynne).

motivating reasons that will lead her to accept or reject the expert's judgment. This does not make her any less of a layperson, however, she is less likely to trust blindly. But this does not mean that she developed what I called the SCC which I defined as an essential condition of expertise.

In the previous section "Defining Expertise", I included a concise definition of experts by Goldman and Blanchard. I will cite from the same encyclopedia entry and look at their definition of laypersons as well.

[L]aypersons will commonly recognize that they know less than experts. Indeed, they may start out having no opinion about the correct answer to many important questions; and feel hesitant in trying to form such opinions. They are therefore motivated to consult with a suitable expert to whom they can pose the relevant question and thereby learn the correct answer. In all such cases, one seeks an expert whose statements or opinions are likely to be true (Goldman and Blanchard).

This definition gives us a concrete image of the epistemic status of the layperson. The layperson will struggle to form true beliefs and make accurate predictions in a certain domain. Note that a layperson is always a layperson in a certain domain for she can (and sometimes is) an expert in others. A chemist can be an expert in chemistry but still struggle to understand the content at a physics conference. The chemist, in this example, lacks SCC in physics. Furthermore, even if she understands the content, she will most likely fail to critically assess it since she lacks the knowledge and skills required to do so.

The second reason for laypersons to grant high credibility to experts is their special insight into the domain. Experts can know what laypersons cannot know *qua their expertise*. The SCC of an expert provide for the insight. The layperson is essentially someone who is not capable of making a particular observation, at least partially.

The definition also shows that laypersons have motivating epistemic reasons to consult experts. By acknowledging your layperson status, you automatically have a reason to accept the testimony of an expert, if you lack defeating reasons. If you do not characterize your own layperson status, you are either not a layperson or guilty of intellectual arrogance.¹⁴

I am ready to give my own definition of a layperson. It is important to emphasize certain aspects of laypersonhood in this thesis. I claimed that a layperson may or may not understand the expert's testimony, but she will ultimately fail to see on what reasons the expert bases her convictions. This failure is due to the layperson's lack of SCC on the one hand but also to the

¹⁴ I adopted this concept from Tanesini's useful paper *Calm Down, Dear* (Tanesini). Intellectual arrogance can be defined as wrongful overestimation of your own epistemic status. Hence, intellectual arrogance always involves harmful behavior towards the epistemic agent.

opaqueness of the expert's SCC on the other. While another expert can critically assess the assertion and its propositional content, the layperson cannot. However, the layperson can and should assess the trustworthiness of the expert.¹⁵ The layperson should ask the question: does the expert have a reason to give false testimony? And furthermore: does the expert have an incentive to attempt to tell the truth? The layperson hence only has a motivating reason to accept the expert's testimony if she considers the trustworthiness of the expert. The trustworthiness of a scientific expert originates in the scientific affiliation.

DEFINITION: A layperson is someone who has a motivating reason to accept the expert's testimony in a domain D *because* of the expert's expertise in said domain D and if she has a reason to believe in the trustworthiness of the expert, all things considered. Furthermore, the layperson typically lacks the special insight into a certain domain which I called SCC. The concept of laypersonhood implies the hierarchical relation between the layperson with the expert in a certain domain. If the layperson cares about a doxastic attitude, she will be epistemically dependent on the expert.

I realize that I have not spent much time explaining how general reasons for the trustworthiness of an expert could look like. This will prove to be a complicated matter and I dedicate the whole Chapter 4 to this question.

Goldman and Blanchard's definition is useful and intuitive. Their definition does not explicitly disagree with mine; however, I emphasized the hierarchical relation between expert and layperson and the motivated reasoning that creates normativity for the layperson. Also, I introduced SCC as an essential condition of expertise. I insisted that there is an epistemically hierarchical relation between experts and layperson. This hierarchy creates normativity. The expert's testimony combined with a good reason to accept the trustworthiness of the expert provide the layperson with good reasons to accept the expert's report if the layperson does not have strong reasons to doubt the expert's trustworthiness.

2.2.1. Limitations

In my thesis, I will not talk about all of the variations of expertise. Although the following will have a wider application, I will focus on scientific experts. By that, I mean scientists who are affiliated with accredited scientific institutions.

The University of Harvard would be such an example amongst countless others. As I will show later on, these institutions have an incentive to produce solid research and employ scientists

¹⁵ When I speak of trustworthiness of an expert now or in other parts of this thesis, I only mean the trustworthiness *in a certain domain*. I can still consider the expert unreliable in other situations.

who also have an incentive to produce solid research. Institutions that conduct research but are not primarily research institutions like pharmaceutical institutions do not primarily have such an incentive. I will show later why this is the case.

The scientific expert I have in mind works in an accredited scientific institution and has gained expertise in some domain. Furthermore, her report is on a topic in said domain.

Expertise is, of course, not necessarily restricted to scientists with proper degrees. Expertise can be found in many ways although it may perhaps be strongly correlated with institutionalized education. Nonetheless, when I talk about experts, I mean scientific experts affiliated with accredited scientific institutions since large parts of this thesis are concerned with the scientific consensus and the implications for laypersons.

2.3. Claim 1: The Specific Relation Between the Expert and the Layperson

The presented two claims are mostly a summary of what has been established before. Epistemic hierarchy arises from the different epistemic statuses of both expert and layperson. The expert possesses intellectual authority in some domain that the layperson lacks.

John Hardwig seems to think similarly. He writes in his paper “Epistemic Dependence”:

The list of things I believe, though I have no evidence for the truth of them, is, if not infinite, virtually endless. And I am finite. Though I can readily imagine what I would have to do to obtain the evidence that would support any one of my beliefs, I cannot imagine being able to do this for *all* of my beliefs. I believe too much; there is too much relevant evidence (much of it available after extensive, specialized training); intellect is too small and life too short (Hardwig, “Epistemic Dependence” 335).

Hardwig thinks that appeals to epistemic or intellectual authority are an “essential ingredient in much of our knowledge (Hardwig, “Epistemic Dependence” 336).” The fact that we might not possess that authority ourselves is not relevant for knowledge transmission. However, if we fail to form an accurate belief about something or do not possess the epistemic authority to justify our beliefs, we are dependent on others who do possess it. As laypersons, we believe many things for which we lack evidence and justification. Expert testimony can provide justification for our beliefs and transform them into knowledge. Furthermore, they can provide us a doxastic attitude which we can adopt. For personal and democratic reasons, it is indispensable to inform oneself about certain matters that would require expertise.¹⁶ Epistemic dependence is hence an essential feature of the expert-layperson relation.

¹⁶ In order to perform epistemic task competently in a democratic society, citizens must rely on experts. Climate change is an example for a complicated matter that requires expertise to critically assess scientists’ reports.

The concept of epistemic dependence is often thought of as the countermodel to epistemic autonomy. This is the idea that we as individuals can know things on our own based on our own observation. While we are definitely autonomous knowers in some instances in our everyday life, we cannot get to know everything we know by ourselves. If autonomous knowledge were the only kind of knowledge, we could for instance not know historical facts. In other cases, multiple observations and various kinds of expertise are necessary to acquire knowledge-beliefs. Many scientific articles, for instance, are nowadays written by more than one author. These scientists, although experts themselves, are often epistemically dependent on one another. This is true even more so for laypersons. Their dependence is intensified due to their insufficient knowledge in a domain. They are not in the epistemic position to sufficiently justify what they believe to know.

For a better understanding of epistemic dependence, it will be sensible to distinguish its different kinds. Benjamin McMyler identifies three types of epistemic dependence in the third chapter of his book *Testimony, Trust, and Authority* (McMyler). He distinguishes between the *Evidential Model*, the *Inheritance Model*, and the *Second-Personal Model*.

Evidential Model: The hearer is epistemically dependent since the speaker provides the necessary evidence.

Inheritance Model: The hearer inherits justification for the belief.

Second-Personal Model: The hearer accepts the speaker's report and acquires a new belief. McMyler uses Anscombe's definition of testimonial knowledge as "trusting a speaker for the truth" (Gertrude Elizabeth Margaret Anscombe 151).

This differentiation will be the underlying concept for the next section. For many instances, it will be sensible to think of the expert-layperson relation in terms of the *Second-Personal Model* where the layperson accepts the experts report and comes to a new belief. McMyler himself dedicates much space in his book to defending the *Second-Personal Model* against the *Inheritance Model*. He thinks that the justification for a testimonial belief originates in the justification (the "ultimate justification") of the transmitted belief.

I now turn to the analysis of the formal aspects of the acceptance of testimony. This will provide a theoretical setting for the following chapters. In Chapter 1, I claimed that a hearer has to perform epistemic labor that justifies her acceptance of a report. An individual has to justify

In our personal lives, it is also indispensable to rely on expert testimony or on technology produced relying on expert testimony. Scientific discoveries pervade almost every aspect of our modern-day lives. Later in the thesis, I will dedicate more time to the necessity of expert testimony and democratic tasks of citizens.

why she can learn something about the world from the words of someone else. I argue that there are at least three different kinds of categories of justification of the acceptance: indirect internal, direct external, and indirect external. I called the search for internal or direct external reasons “message scrutiny” in 3.3.. The search for indirect external reasons justifies the acceptance or rejection of testimony and can, for instance, entail the scrutiny of trustworthiness of the speaker. I will favor the latter in this thesis.

2.3.1. Internal Reasons of Justification

Internal reasons have something to do with the utterance itself. Statements have to be grammatically and logically correct. Internal reasons do not provide strong grounds of justification for they do not tell us anything about the world. The statement may be internally very consistent making it very appealing to accept but does not comply with other facts about the world we believe to know. Nonetheless, it is crucial to include the internal dimension of testimonial utterances here since inconsistency provide a strong reason to reject statements. These reasons are called defeaters and I will deal with them in greater detail later.

There is disagreement whether there can be testimony of mathematical truths since they do not tell us anything about the world. I do not want to enter this debate. I merely want to point out here that if there is testimony about mathematics then internal reasons like logical consistency, of course, play a big part.

2.3.2. Direct External Reasons of Justification

This kind of justifications has something to do with the context of the utterance *in connection with* the utterance. The statement seems right to the hearer because it complies with what she justifiably believes to know. A person tells me that she is from Vienna and I accept that because I myself live there and distinctly recognize her accent. This can serve as a perfect justification.

The more complex the utterances are the more intricate it will be for the hearer to handle direct reasons appropriately. This becomes salient in scientific contexts. A scientific statement might be non-compliant with our previous knowledge about the world for it might be revolutionary. Thus, direct reasons rather serve as a defeater than justification. Nonetheless, the utterance can be correct.

Revolutionary knowledge (at least revolutionary to the hearer) is even more difficult in a context of a layperson/expert relation. Scientific knowledge often falsifies our everyday assumptions about the world. The epistemic peer is wise not to reject revolutionary knowledge right

away. The layperson might be left with confusion. She cannot assess which statement is correct based on direct external reasons.

The utterance can never give a direct external reason for justification alone for there is always some background knowledge required. As we will see, the difference to the indirect external reasons consists in the fact that the reasons are directly linked to the propositional content of the utterance. Therefore, I call them content-related.

2.3.3. Indirect External Reasons of Justification

The last kind of justification differs from direct reasons in the detachment from the propositional content of the utterance itself. We are looking for reasons to accept testimony which do not stand in relation to the statement. Arguably, the “presumptive right” is such an indirect justification.¹⁷

The “presumptive right” is the right to accept someone’s testimony *prima facie*. The circumstances are limited: the speaker must not benefit from a lie, there is also no reason to lie, and there is not much at stake. Politics are excluded from the “presumptive right” for obvious reasons. Politicians can benefit greatly from dishonesty as countless examples show. Furthermore, much is at stake when politicians make a statement. I would like to cite this useful quote by Tyler Burge who writes on that matter:

In areas like politics, where cooperation is not the rule and truth is of little consequence, or philosophy, where questioning is as much at issue as belief, we engage in complex reasoning about whether to accept what we hear or read. Reasonable doubt becomes a norm (Burge 484).

Some authors would deny that the “presumptive right” is given at any time. A good alternative indirect external reason to rely on testimony seems to be the intellectual authority of a speaker. Expertise is a good ground to justify the acceptance of testimonial utterances. I believe that indirect external reasons are the *only* way of assessing expert testimony from the perspective of the layperson. We will see that expert disagreement is perhaps the biggest threat to expert testimony.

I mentioned above that I will offer a justification for the assumption of the veracity of scientific experts under specific circumstances. This explanation is a good example of the indirect internal form of justification. This is necessary since the other forms of assessing an utterance are likely to fail in the case of expert testimony from the perspective of a layperson.

¹⁷ The “presumptive right” implies that a hearer is justified to assume the veracity of the speaker.

Wrapping up this section, I argued that the specific relation between expert testimony is characterized by the epistemic hierarchy. The hierarchical relation originates in the SCC of the expert that the layperson lacks. I find it useful to understand the relation in terms of the three models proposed by McMyler. The *Second-Personal Model* will accurately describe many instances of scientific expert testimony. However, there are some exceptions. I will dedicate time to these cases in the next section. Confronted with scientific expert testimony, laypersons fail to assess the utterance directly. However, I believe it is possible to find good indirect external reasons to rationally justify the acceptance of scientific expert testimony. Moreover, I intend to show that the rejection of scientific testimony is *prima facie* not rational.

2.4. Claim 2: Specific Relation between the Layperson and the Utterance

If a layperson is confronted with an expert's report which she cares about, she has three possibilities to act:

1. The layperson should adopt a new belief about a certain matter about which she has held no previous belief, all things considered.
2. The expert's report agrees with the layperson's doxastic attitude. In this case, she is entitled to uphold her belief but should adopt the justification, all things considered.
3. The expert's report contradicts the layperson's doxastic attitude. The layperson is now confronted with a defeater and should give up her belief and adopt the expert's belief, all things considered.¹⁸

Obviously, there is also a fourth option in which the expert's testimonial assertion is not relevant to the hearer and she chooses to ignore the testimony. These cases are of no importance in this thesis. Thus, whenever I speak of testimony confronting a layperson, I only mean such utterances which are relevant to the hearer.

When confronted with expert testimony, and if the propositional content of the utterance is relevant to the layperson, the layperson has a reason to (re-)assess her own previous belief (if she held one before). If the testimony contradicts her belief, she will be required to give up her belief for she is confronted with a defeater. In most cases, the layperson should adopt the belief of the expert. The reason for the required changing or acquiring of the belief comes from the normativity that originates in the epistemic hierarchy of the relation between layperson and expert. Accurate assessment of her own epistemic status and the expert's status will be crucial

¹⁸ To simplify the cases, I only have cases in mind where there is no expert disagreement. In these cases, the layperson can rely on the expert testimony.

for the successful identification of expert-layperson relation from the perspective of the layperson.

In conjunction with the previous section, I will now explain why I believe that most ways of assessing the general trustworthiness of the speaker and the reliability of utterances likely fail in the case of expert testimony. Since I also consider which epistemic tasks a layperson can actually perform, the assumption of trustworthiness creates a problem for the rational acceptance of expert testimony.

In the remainder of this section, I will show the possible kind of epistemic labor that the layperson can perform. Performing epistemic labor means that the layperson accesses reasons to justify the acceptance or the rejection of testimony. An applicable theory of expert testimony should consider the accessibility of the reasons to the layperson.

I believe that internal and direct external reasons to trust someone are most likely to be inaccessible in the case of expert testimony. Since the hearer is a layperson, direct internal reasons fail. A layperson might likely fail to embed the utterance in a broader context. We do not know whether the propositional content of the utterance corresponds with the facts. There is another obvious argument against the accessibility of direct external reasons to the layperson: expert testimony, especially in the scientific context, might be revolutionary. Revolutionary testimony has the unpleasant side-effect that it sometimes calls for rejection although it should be accepted.

One further remark has to be made about what I understand by accessibility before I can identify the kinds of reasons accessible to laypeople. A person should accept or reject testimony based on reasons. This means that she must in one way or another assess these reasons. A proper theory of testimony should, therefore, include careful consideration what kinds of reasons the hearer actually *can* assess. Accessibility is a necessary condition for assessability. Only if a person can access a reason, she will be able to assess that reason. My goal in this thesis is to show for which kind of reasons the layperson will be able to find good reasons to justify the acceptance of expert testimony.

2.4.1. Why Internal Reasons Are Not Motivating

I believe that the acceptance of expert testimony will likely not be motivated by structural grounds. This has practical reasons. First, the complexity of the structure might be so high that novices face great troubles understanding it, let alone detect its fallacies. This does not mean that there is no internally fallacious expert testimony at all. Second, expert testimony is mostly uttered after some deliberation. This gives the speaker time to correct possible fallacies before uttering them. Both these reasons make it intuitively implausible to hope for the aid of internal reasons when we assess expert testimony.

There are instances of rejecting expert testimony on internal grounds. The best example I could find was the Einstein–Cartan–Evans theory, which was ultimately rejected due to mathematical problems. The rejection came from within the scientific community and not from novices. Therefore, I do not think that laypeople could access the (mathematical) reason to reject this theory. In the case of scientific expert testimony, internal reasons are normally not motivating for the layperson.

2.4.2. Why Direct External Reasons Are no Help

I believe that direct external reasons are not more helpful motivating a layperson to the acceptance of expert testimony. A layperson will ultimately fail to put expert testimony into context. As a layperson, I will fail to reject the utterance due to previously known facts about the world. This is because scientific knowledge can trump our everyday experience but not the other way around.¹⁹ Additionally, I already mention the possibly revolutionary character of expert testimony that cannot be embedded in a broader context.

A plethora of scientific assertions can be found easily that will be difficult to assess for the layperson. In this section, I include relatively comprehensible assertions by climate scientists. The terms and syntax used are simple enough for many laypersons to understand the claims made. Nonetheless, I argue that the assessment of these claims by laypersons will most likely fail.

Average global sea levels are currently higher than at any point within the past ~115,000 years, since the termination of the last interglacial of the Pleistocene epoch. The physical expression of sea-level change in the geological record is the displacement of sedimentary facies, for which the rate of change of sea level relative to rates of sediment accumulation and subsidence due to compaction is crucial. For example, rapid sea-level rise can cause delta tops to flood, producing sharp transitions into overlying relatively deep marine

¹⁹ Scientific knowledge is more robust than our everyday experiences. We perceive the sun to go up every morning. Science can falsify this experience. This does not work the other way.

and anoxic muds, marking a flooding surface. By the time of peak sea level, the rate of rise is slower, and fluvial systems can resupply sediment to re-establish deltas as progradational successions building up and out from the coast (Waters et al.).

What would be needed to assess claims like these? Certainly, observational data of the average global sea level from the past 115 000 years will be necessary. Furthermore, knowledge of sediment examination is needed to understand why the rates of sediment accumulation is an indicator for sea levels. Average laypersons, meaning people without higher education and many people with higher education, will not possess the knowledge necessary to embed the claims in a broader context. The acceptance or rejections of assertions as such cannot be based on the assertion and its truth-relation to the world.

2.4.3. The Upshot of the Section

It seems to me like we are left with indirect external reasons. The layperson lacks the necessary abilities to assess the content of expert testimony or its context. That leaves us with the reliance on intellectual authorities. I believe that the most fruitful way of assessment of justification (although deeply unsatisfactory) is scrutinizing the speaker's general trustworthiness on a certain matter.²⁰ That means to check her epistemic authority on a subject matter.

Relying on expert testimony is not a matter of choice. In our everyday life, we simply depend on experts. I believe that indirect external reasons which we can actually access as laypersons are often sociologically motivated. It should be possible to argue that, despite all criticism, it is not a bad idea to trust the accredited scientific institutions. Examples of scientific misconduct even in the most established institutions can be found easily. But still, these institutions and the scientists affiliated with them have strong incentives to produce truthful research.

2.5. Getting Motivated: Three Scenarios

The special relation between the expert, the expert's assertion, and the layperson create normative motivating reasons for the layperson. The propositional content of the expert assertion provides a strong reason for the layperson to change or acquire a belief. If the expert's report supports the initial belief, then the layperson should adopt the expert's justification of the belief. The special insight, which I called the SCC, puts the expert in an epistemically advantageous situation to know and to justify her belief. I will briefly describe three scenarios. Each scenario exemplifies one possibility to act as a layperson when presented with expert testimony.

²⁰ I shall not discuss the necessity of expert testimony for I believe it is self-evident.

Scenario 1

Andrew from Iowa learned in high school that climate change has no anthropogenic causes. He is very convinced that climate scientists are wrong. Since he is interested in the matter and watches many debates on FOX NEWS, he can back up his belief with evidence. He is able to give reasons for his beliefs and furthermore even to provide an explanation of why climate scientists might misunderstand developments in worldwide climate. Although Andrew has accumulated quite some knowledge about climate-science and holds strong beliefs, he knows that he is no expert on that matter.

After watching an interview by Naomi Oreskes, he learns that there is a wide consensus on the anthropogenic causes of climate change. Given that she is a professor at Harvard University, he starts to doubt what he had learned in school and on TV. This comes from his conviction that Harvard University is an excellent research facility which, in general, produces reliable science. He bases this conviction on the fact that they have a certain reputation and are reliable in other scientific fields as well. At the end of the interview, Oreskes had even convinced him to reject his old belief and accept the new belief that climate change has man-made causes.

In this case, we can easily see that Andrew changed his belief. He had a good reason to do so. In order to access these reasons, he had to get clarity over several aspects of the decision to alter his belief. First Andrew understands himself as a layperson (even though he actually has some knowledge of climate change). Second, he understands that Oreskes is an expert. Third, he understands that she utters a belief in a domain in which she is an expert that contradicts Andrew's belief. Fourth, he understands that this scientist is affiliated with a scientific institution which he judges to be generally reliable.

Since Andrew cannot find a reason to doubt the trustworthiness of the scientists and acknowledges their expertise and his own laypersonhood (and with that acknowledges the epistemic hierarchy), he is presented with a defeater. The defeater's normative gravity presents a motivating reason to give up his own belief and accept the belief presented by the expert. The importance of the scientific affiliation will be explained in Chapter 4 later. For now, let us assume that the affiliation provides a reason to assume the trustworthiness of the scientists.

Scenario 2:

In Jane's country, important political elections are upcoming. Since climate change is one of the most debated topics in the election campaigns, Jane decides to inform herself on this issue. She had assumed that the causes of contemporary climate change are not clearly identified. Hence, she always suspended judgment on whether the causes of climate change are anthropogenic. Upon research, she stumbles upon an interview by Naomi Oreskes, a professor at Harvard University. She claims that there are actually far fewer controversies about the causes of climate change than normally conveyed in the media. After some thought, Jane gives up her belief that the causes of climate change are not clear. Furthermore, she acquires a new belief that there is a broad scientific consensus that climate change is man-made.

In this scenario, Jane did not have a belief about the causes of climate change, but she acquired one through testimony. I will claim that she acted rational to do so. Many authors claim that the reason that should motivate her is the fact that climate change *has* anthropogenic causes. This would be a reason directly linked to the proposition expressed in the expert's assertion. I claim that Jane, a layperson, will fail to assess this reason. I will also show which skills would be required to do so.

In contrary, I argued that indirect external reasons are the only ones accessible to the layperson. Since Jane cannot access the direct external reason, she cannot assess the fact that climate change has anthropogenic causes. She, hence, will not be motivated to acquire the attitude that climate change is anthropogenic. What motivated her to acquire a new belief is the identification of Oreskes as an expert correlated with the assessment of the trustworthiness due to the accredited scientific affiliation of Oreskes.

Scenario 3:

Susan has strong faith in climate researchers. She believes that there is a widespread consensus amongst accredited climate scientists that current climate change has anthropogenic causes. She also knows about forcing mechanisms which have a positive or negative impact on the climate. She believes that the poles are an especially important region for the climate on Earth since they cool the planet. She acquires this new information since she learns about the albedo mechanism from an interview with Oreskes, a distinguished Harvard professor. Snow and ice have the highest albedo. Consequently, she believes that the albedo mechanism is responsible for cooling the planet which just happens to be strongest on the poles. Susann, hence, maintains her belief that the poles are an important region for the climate on Earth.

In this scenario, Susann does not change her belief. Her belief, however, was not based on any justificatory reasons. By adopting the scientific justification (explaining the albedo mechanism) her belief was arguably strengthened. I believe that Susann acted right to adopt the justification. She was provided a motivating reason to do so since she identified an authority in a certain domain and acknowledging her own layperson status. The reader might think that this scenario is an exemplification of McMyler's *Inheritance Model*. But I digress from his remarks of this model in a crucial point: he thinks that the justification for a testimonial belief originates in the justification (the "ultimate justification") of the transmitted belief and not the justification of the acceptance of the testimony for he writes:

According to the inheritance model, what is really going on when I cite a speaker's testimony is that I am deferring to, pointing to, or attempting to access the speaker's own reasons for belief on the matter. I am not citing the speaker's testimony as what justifies my belief, but rather pointing to where the ultimate justification of my belief can be located, a justification that the speaker's testimony simply makes available or accessible to me (McMyler 91)

The scenarios attempted to show the relations of laypersons, experts, utterance, and motivating reasons. The layperson has a specific relation with the expert characterized by the epistemic hierarchy arising due to the unequal distribution of SCC. Furthermore, the layperson's relation with the utterance is characterized by the failure of accessibility and assessability. Still, the layperson has a good reason to accept the belief expressed by the expert. The layperson, however, does not have the same motivating reasons to adopt the belief as the expert does. The expert should be epistemically motivated to adopt a belief.²¹ If the layperson wants to adopt the same belief, her motivation will likely not be purely epistemic since she will struggle to find good epistemic reasons. Hence, I argue for a social reason to rationally adopt a new belief.

This chapter identified the core of expertise and laypersonhood and their relation. The definitions provided should be a guideline for the rest of the thesis. Some claims are not sufficiently backed up yet. It is, for example, not clear how the motivating reason for the layperson looks like exactly and what it motivates to. Furthermore, I did not explain why I believe that there are incentives for scientists to give truthful reports which can create the reason that motivate to justifiably accept expert testimony. I will provide such an explanation in Chapter 4.

²¹ The expert does not have to be exclusively epistemically motivated. The expert can still have political or ideological tendencies to interpret her observations.

3. What to Scrutinize?

In the first two chapters, I tried to outline my own perspective on testimony in general and then expert testimony in particular and the relation between the relevant parties. I described the respective weaknesses of the reductionist and the anti-reductionist approach. Mediating between these antagonistic positions I claimed that epistemic labor of the individual is necessary to justify one's acceptance of a given report. Here, I relied on Fricker's criticism of anti-reductionism claiming that trust should not be blind. In the case of expert testimony, the layperson will likely struggle to find good reasons to justify the acceptance which are related to the utterance itself since justification will be detached from the utterance.

This leaves me with a specific program for the rest of this thesis. I want to provide good reasons to accept the testimony of scientific experts that can motivate laypersons to accept this testimony. Although there are many good reasons one can think of that are provided by science's impressive track record, the history of science, and the philosophy of science, I believe my theory will be strengthened if I consider only the reasons that most laypersons actually can access. My theory will be too demanding if it demands epistemic tasks from people which they cannot perform.

Theories of rationality can come in handy to fulfill the tasks of both providing an accurate understanding of the epistemic status of laypersons on the one hand and the normative strength of a philosophical theory on the other. In this chapter, I will focus on philosophers I deem to think in a similar fashion. The next section will include a discussion of Elisabeth Fricker's aim to provide a theory of knowledge transmission that excludes blind trust in the speaker's words. This performance of epistemic tasks on the hearer's side can make her acceptance of testimony less gullible and more critical. Fricker wants the hearer to look actively for reasons to accept the justification of the acceptance of testimony. She thinks that the hearer has to justify the assumption of the trustworthiness of the speaker. In conclusion, I understand my take on testimonial justification to be somewhat similar to Fricker's "Against Gullibility". Since Fricker's account can be considered radical and has thus provoked some criticism, I shall point out weaknesses of her understanding of testimonial knowledge. I believe that Fricker's paper raises the important question for the epistemic labor on the hearer's side but should not be fully embraced without considering the criticism.

In a further step, I am going to discuss the work of Keith Lehrer and the role of trustworthiness in testimony. In the case of expert testimony, I showed that only indirect external reasons, reasons concerning the trustworthiness of the speaker are accessible and assessable by laypersons. Lehrer's role in my line of argumentation is key. He shows that the focus on trustworthiness can rationalize the acceptance of testimony since it allows the hearer to find good reasons for it. Although he thinks of his position as neither reductionist nor anti-reductionist, I understand his work to be close to reductionist stance. For Lehrer demands the hearer to look actively for reasons for trustworthiness that can justify the acceptance of the belief.

An epistemic agent should strive to live up to epistemic ideals. For instance, she should aim to have true beliefs. Further, she should try to adopt only true beliefs and get rid of false beliefs. I call this an epistemic ideal. Rational behavior will help her achieve epistemic goals. If the account of rationality she has is intuitive and aims at epistemic ideals she will end up with a practical and epistemically valuable strategy of belief-acquisition. This does not mean that the agent will never acquire any false beliefs but much rather that her strategy cannot be faulted if she does. I argue that the hearer might conceivably have acted rationally even if she adopts a false belief. I come to this conclusion because I believe that in most cases the hearer has to scrutinize the trustworthiness of the speaker and not the propositional content of the message itself. If the speaker is trustworthy, meaning that the hearer judges the speaker to be in the epistemic position to know a proposition *and* tries to tell the truth, then the hearer is entitled to accept testimony. The hearer is blameworthy if the trustworthiness of the speaker should be doubted.²²

The kind of epistemic labor hearers of testimony should perform is called "scrutiny". I use this term since it is used in many other discussions transcending the borders of philosophy. This chapter aims at providing a useful strategy for laypersons to acquire right beliefs and rid themselves of false beliefs in the domain of expert testimony. The strategy will prove valuable even in the case of occasional error. I will show what kind of facts a layperson can scrutinize, and which ones are not accessible or assessable to her.

I distinguish two forms of scrutiny. I call the first one *Message Scrutiny* since the hearer tries to justify her acceptance of the testimony from the utterance itself. These reasons are either internal to the utterance or directly external. In the Sections 2.3.1. and 2.3.2., I explained how

²² This does not mean that the hearer can *never* scrutinize the message. However, I claim that only messages that contradict my most corroborated knowledge of the world or lack internal consistency to an exceedingly high degree can be defeated. I believe that defeaters cannot be found that easily in most cases and are especially hard to detect in the case of scientific expert testimony. As we will see in the discussion of John Hardwig's contribution, the hearer is reliant on trust in the process of the acquisition of a knowledge-belief through knowledge transmission.

these reasons can be related to the utterance. The other kind of scrutiny shall be named *Trustworthiness Scrutiny*. Reasons for justification frequently do not originate in the utterance itself but in the speaker's trustworthiness. These reasons are indirectly linked to the utterance (see 2.3.3.). In the second Chapter, I argued that in the case of expert testimony, the layperson will likely have to look for indirect reasons. For an utterance-related assessment of the testimony will likely exceed the epistemic capabilities of the layperson.

Theories of rationalities are normally thought of to possess normative power. Many of these theories express their normative content through rational requirements. I argue that these requirements are only intuitive if they consider the specific epistemic position the agent is in. Ignoring the agent's position might make the requirements too demanding. A good theory of rationality takes into account what the agent *can* do. For this reason, Chapter 2 dedicated great attention to the epistemic capabilities of laypersons.

After drawing on Fricker's and Lehrer's work, I will dedicate attention to a third debate revolving around to key papers by John Hardwig. The discussion of Hardwig's debate with Michael Blais will turn out to be a useful source in the coming chapters. For Hardwig focuses on scientific expert testimony and considers the hierarchical relation between layperson and expert when he thinks about testimonial knowledge. He emphasizes the role of trust in knowledge. Trust, to his mind, will be at least partially blind because the knowledge gained from transmission cannot rest on evidence (Hardwig, "The Role of Trust in Knowledge" 693). Michael Blais replies to Hardwig's *Epistemic Dependence* and argues that hearers might very well have a good reason to accept testimony provided by scientific experts.

In this chapter, I will describe which attitudes best help us in acquiring new true beliefs in the case of expert testimony. My account can be characterized as a higher-order account of rationality. This means that it is not enough to have the right attitude, you have to have at least one attitude about your attitudes (hence higher-order). I will call this requirement the *Trustworthiness Scrutiny Requirement*. I believe that it is necessary to include this higher-order reasoning to acquire rational beliefs and remain critical.

3.1. The Rational Thing to Believe

From an epistemological point of view, it is relatively obvious why we should accept the testimony from experts transmitted to us. We can find many reasons of epistemological or other kinds why it would be a good idea to grant high credibility to scientists.²³

The rough understandings of rationality of most people will also overlap to a great extent. For instance, most people might think that it is important to attempt to acquire true beliefs and throw out false ones from our belief-system. Many people think that it would be beneficial to have a belief-system that fulfills epistemic desiderata, such as consistency, aptness, adroitness, or accuracy (Sosa) amongst many others.

Testimonial beliefs are a matter of rationality. The main reason for this is the essential inferential character of knowledge transfer. In the Section “Reductionism vs. Anti-Reductionism”, I examined arguments against anti-reductionist arguments. I concluded that it is possible to provide sufficient arguments for the acceptance of testimony. Hence, we can rationally respond to testimony. At this point, let us turn back to the Peter Faulkner paper “On the Rationality of Our Response to Testimony”. He made a reductionist claim, arguing that it is possible to rationally respond to testimony and find sufficiently good reasons for the acceptance of testimonial belief.

Our response to testimony is rationally sophisticated: when we accept testimony, we usually have reasons for doing so. The claim that we usually have reasons for accepting testimony ... embodies little more than recognition of this rational sophistication (Faulkner 363).

Ordinary people, as well as professional philosophers, often argue that rationality possesses a normative quality. Theories of rationality are often thought of in terms of rational requirements that one *ought to* fulfill. What these requirements entail differs from theory to theory. If a person fails to do so, then she is not rational. In other words, rationality obtrudes a certain behavior. We might think that you ought to base your beliefs about the world on good reasons. These reasons can be manifold: you can rely on your observation, you can make inferences, or you can learn from the words of others. Each of these usually uncontroversial possibilities to get to know something seems rationally permissible to most of us.

From an epistemic standpoint, trusting experts arguably is fairly intuitive. Although the unmitigated pursuit for truth of citizens in our democratic societies would surely be desirable, we can frequently observe that citizens do not base their belief on truth-conducive reasons. The

²³ I will discuss various kinds of explanations in Chapter 4. What I call the “Best Knowledge Explanation” will not convince many climate-science deniers. Another kind of explanation argues from “Epistemic Cultures”. I believe that both lines of argument might objectively be valid and convince those who know about the history and the practices of science anyways but surely not be subjectively convincing. Especially those who doubt the integrity of scientists and need the most convincing.

beliefs of many citizens are shaped by emotions and often based on power-relations. Therefore, in order to convince climate-science deniers, we first must ask the question: why should I be rational and why should I have to accept a true belief? Then we have to offer accessible and assessable truth-conductive reasons laypersons should base their beliefs on.

When thinking about expert testimony, I believe that it is important not to argue from the point of view of the epistemologists or persons within the scientific community but rather from the point of view of the layperson. This entails considering her epistemic status and her knowledge about scientific practices such as peer-reviewing. I will discuss this in greater detail in Chapter 4.

Several aspects have to be considered when analyzing the connection between rationality and epistemology: first, the layperson might not be in the epistemic position to know the truth-conducting function of the scientific method and the scientific community. While it is true that scientific knowledge is the best knowledge available and we have a reason to trust scientific experts, it might not be a reason *for us*. This means that we as laypersons can conceivably be unaware of the difference between the methodized observation of scientists and the everyday observations of us as laypersons. The many cognitive difficulties (for instance cognitive dissonance reduction) that shape our empirical account to the world are often unknown to ordinary citizens. Furthermore, practices such as peer-reviewing are a helpful tool to ensure and raise the quality of scientific research. This epistemic culture (Knorr-Cetina) of the scientific community is arguably beneficial for the production of true beliefs and the sorting-out of false beliefs. But it is a sociological given that it is difficult to understand cultural codes and practices as an outsider.²⁴ Even objectively good reasons to trust scientific experts might fail to be accessible to and assessable by laypersons. By “objectively good”, I do not understand that they are absolutely good reasons but that they are objective in the sense that they do not relate to any specific person.

When talking about testimony, there are many things most of us agree on. We rely on testimony in our everyday life. We are – at least to some degree – epistemically dependent on others. That means that there are certain things we cannot gain knowledge of by ourselves. The reasons for this might be manifold. Sometimes, we do not have the time to find out the truth. Sometimes we lack cognitive capabilities that would be necessary to form a certain belief. Most of us also agree that expert testimony should be granted high credibility. We could also say that the word

²⁴ A climate-science denier might very well deny that peer-reviewing ensures quality of scientific output but rather the supremacy of some ideology. Conspiracy theories like these can be found everywhere on the internet.

of experts can sometimes outweigh our own. I believe that assertions like these seem relatively uncontroversial.

Nevertheless, epistemologists of testimony are far from a homogeneous mass. For instance, philosophers disagree on whether it is possible for the hearer to determine that the speaker gives us genuine testimony. This is a debate on whether or not to be reductionist about testimony. I described the debate earlier in 1.4.. There is also little agreement about what justifies the hearer to accept testimony. I cannot attempt to answer all the unsettled questions. Rather I will try to assert many uncontroversial statements and focus on specific aspects that I believe need clarification.

We often need to rely on experts in our everyday life. We are highly dependent on engineers, medical professionals, or teachers. It seems right to assert that there are many circumstances where it is rational to favor expert testimony over layperson testimony or even our own beliefs about the world. But it might be clear why we should trust experts. The easy answer is that we should accept what experts say simply because they are experts. But this answer is unsatisfying. For sometimes it seems, we do not possess the ability to distinguish genuine expertise from charlatanerie. It certainly is not favorable to accept testimony from a fake expert. Then how are we to decide whom to trust?

Elisabeth Fricker (1994) contemplates the right attitude of a hearer towards speakers' testimony. Fricker believes that the hearer must check the sources in some way. She thinks that epistemic labor should be divided into tasks for both hearer and speaker (Fricker, "Testimony and Epistemic Autonomy"). The hearer of testimony cannot simply presume that the speaker is truthful and reliable but has to look actively for reasons to trust. The epistemic tasks a hearer will be able to perform will obviously vary to a great extent. However, this does not change the fact that the hearer is responsible for finding some kind of reasons. Fricker argues against what she calls "simple trust" (Fricker, "Against Gullibility" 140) which leads to gullible behavior.

My account requires a speaker always to take a critical stance to the speaker, to assess for her trustworthiness (Fricker, "Against Gullibility" 154).

I believe that my own proposal of justification for the acceptance of testimony sounds similar. As hearers and epistemic agents, we have to look actively for reasons that should assess the trustworthiness of the speaker. In "Claim 2" in Chapter 2, I showed that message scrutiny (that is the assessment of internal and direct external reasons) is likely to fail in the case of expert testimony from the perspective of the layperson. Thus, the assessability of indirect external

reasons, that is the assessment of the trustworthiness of the speaker, should be the focus. I call the action of this assessment “trustworthiness scrutiny”.

Criticism of her approach is that the hearer might not be able to check the relevant sources and hence her approach might be too demanding (Tollefsen 307). Jennifer Lackey analyzes the possibility of local reductionism and ends up rejecting reductionism altogether. She thinks that reductionism is only plausible as a philosophical position if the “appropriate positive reasons are *necessary and sufficient* for testimonial justification” (Lackey, “It Takes Two to Tango” 163). This, however, is implausible since the hearer will fail to fulfill the sufficiency requirement. The possession of good reasons “does not put one in contact with testimony that is reliable” (Lackey, “It Takes Two to Tango” 164). Reductionism, thus, has to fail in Lackey’s view.

I will take the criticism seriously but also Fricker’s attempt to demand scrutinizing, critical behavior from the epistemic agents. Fricker’s “Against Gullibility” does not talk about the specific intricacies originating in the complexity of the utterances in the case of expert testimony. She might agree that message scrutiny will be almost impossible for the layperson. However, taking her attempt seriously, I provide a different set of reasons that should motivate laypersons to accept the testimony of scientists affiliated with accredited scientific institutions who engage in scientific discussions.

Lackey’s criticism of Fricker’s local reductionism and reductionism, in general, is convincing. The transmission of the knowledge necessarily prevents the sufficiency clause necessary for successful reductionism. The aim of the position, however, is to give as much epistemic weight as possible to the adopted belief of the hearer. Anti-reductionism fails to do so because the hearer does not have to look for any kind of justification of her belief.

Many of us uphold the epistemic ideal to form true beliefs and lose false beliefs in our belief-system. Apart from ameliorating our perceptual skillset²⁵, rational behavior can help us achieve the goal of forming true beliefs rather than false beliefs. A good theory of rationality can explain which reasons should motivate us to acquire which beliefs. In this thesis, I only focus on beliefs based on knowledge transmitted to us by experts. Scrutinizing the trustworthiness of the speaker is understood here as the rational thing to do. Gullibility, trust without a reason, on the contrary, is often irrational. Rationality is to be understood in this thesis as a strategic guideline, a manual if you will, to form true beliefs based on rational consideration.

If rationality is normative, then you ought to be rational. If you reason rationally, then your reasons “ought you to do something or to have the right attitude towards it.” In this chapter, I

²⁵ I borrowed the term “perceptual skills” from Fricker’s “Against Gullibility”.

want to show that there is a right attitude towards scientific expert testimony if the scientific experts are affiliated with accredited scientific institutions and speak about the domain which they are an expert in.

3.1.1. Why Be Rational? Do We Need Epistemic Ideals?

The title of this section poses difficult questions. Again, from an epistemological standpoint, it is conceivably rational to accept reports of climate scientists who assert that the current climate change has mainly anthropogenic causes. The acceptance of the scientific consensus as a layperson can be considered rational since we might fail to come up with a reason for rejecting the reports. Without a defeater and granting the veracity of the expert, we should accept scientific reports.

The source of our normative beliefs is determined by the various goals that we have. Considering our goals in life, we could easily end up with contradictory rational requirements. When I am talking about rational requirements in this thesis, I understand them to be epistemically normative. I want to describe the epistemically rational thing to do for the layperson.

People's lives are complicated. It is normally not the case that our beliefs about the world are exclusively epistemically motivated. Certain beliefs might cause societal alienation. If someone believes in anthropogenic causes of current climate change, she can get into conflicts in certain groups. *Prima facie*, it is far from obvious why this kind of opportunistic thinking is less rational than living up to epistemic ideals. Societal sanctions can be quite severe and the gain from expressing deviant opinions relatively small.

Our ideological convictions can also interfere with our desire to form true beliefs. Sometimes, we simply do not accept truths because we actively *choose* not to. We can have good moral reasons not to accept certain epistemic truths. If scientists found a new way of mass destruction, we have a reason not to fund this research even though it might be epistemically valuable.

Rational behavior can be understood as essentially goal-dependent. If our goal is to fit in with our community and we adopt a controversial belief that alienates us from our social group, our actions and attitudes might not be considered rational. If, on the contrary, our goal is to form true beliefs, we have to consider different kinds of reasons. I want to argue here that there are reasons that should motivate us as laypersons to accept the testimony of accredited scientists affiliated with accredited scientific institutions who engage in scientific contexts.

Why someone should want to form true beliefs rather than false beliefs is also not clear. The traveler who sees the footprint of a lion has an interest in forming a true belief about it and

subsequently acting in a goal-oriented fashion (i.e. to escape a life-threatening situation). However, it is not intuitively obvious why a citizen should want to form a true belief about climate change rather than siding with her community. For it is hard for ordinary citizens to assess the consequences of climate changes for her life but far easier to predict responses from peers when holding deviant beliefs.

I will discuss one possible answer to this problem in the “Outlook” at the end of my thesis. I will claim that it is essential to deliberative democracy that the citizens within this democratic society hold true beliefs and aim at adopting true beliefs and sorting-out false beliefs. Successful deliberation essentially depends on the citizen’s willingness to form true beliefs. For, only the awareness of the facts is necessary to make an informed decision. Also, the willingness to live up to epistemic ideals can be understood as the willingness to create common ground between different parties. This is vital for a well-functioning democracy. For, we can only deliberate intersubjectively when our beliefs have a factual basis. I cannot discuss all the arguments for and against this conception of deliberative democracy, but I will rely on the notion that the normativity of the epistemic ideals can be (and often is) politically motivated. This becomes specifically salient in the case of climate-science that I am mostly concerned with.

It is not the purpose of this thesis to determine the source of normativity in epistemology. The point of this short digression was to emphasize the relation between normativity and epistemology of testimony. Without being able to give a convincing argument here, I believe that the inferential character of testimonial knowledge makes the epistemology of testimony a matter of rationality. And rationality has normative power.

3.2. Trustworthiness: Bridging the Gap

Drawing on Fricker’s position that accepting testimony without good reasons is gullible and my conclusion that expert testimony does not allow for message scrutiny (from the perspective of the layperson, obviously), we have to rely on other reasons to justify the acceptance of scientific expert testimony. Fricker hints at trustworthiness of the speaker as a source of justification. However, I concluded that it is too demanding to think that the hearer is always blameworthy in the case of the adoption of a false testimonial belief. My own analysis that justification has to come from indirect external reasons points in a similar direction. Trustworthiness provides us with a reason to accept the testimony and helps us bridge the gap that the inaccessibility of the propositional content of the expert assertions creates. In this section, I want to rely on Lehrer’s account of trustworthiness and rational reasoning when confronted with testimony.

Taking Lackey's criticism of reductionist positions seriously, I want to draw on a position that is not considered reductionist but can be thought of as quite close to it. I hence turn to Lehrer. His writings can give us a theoretical foundation of how our reasoning process can realistically work when we adopt a new belief. Lehrer thinks that neither the reductionist nor the non-reductionist approach can explain the problems that arise from this gap. Reductionists say we need "inductive reasons for supposing that what a person says is true" (Lehrer, "Testimony and Trustworthiness" 149). The non-reductionist understanding of testimonial knowledge, on the other hand, has the problem that we do not have any justification for the acceptance of our beliefs. It is not clear how we could speak of knowledge in these cases.

Although Lehrer refrains from identifying as neither a reductionist nor an anti-reductionist, I believe that his position is in the vicinity of reductionist thinking. I come to this conclusion because Lehrer wants the hearer to find reasons to justify the acceptance of testimony. The interesting aspect of his work regarding this thesis is his emphasis on the hearer's ability to check the trustworthiness of the speaker.

I shall start reflecting on Lehrer's position by quoting him directly:

I shall argue that when the knowledge acquired is discursive knowledge [that is knowledge through testimony], which is knowledge that involves justification and defensibility, the trustworthiness of self and other is a condition of knowledge (Lehrer, "Testimony and Trustworthiness" 145).

This sentence involves some key aspects of Lehrer's thinking and hence needs further explanation. Lehrer thinks that knowledge through testimony is an inferential kind of knowledge. This makes it distinct from other ways of acquiring knowledge-beliefs such as knowledge through perception. In the case of testimony, we cannot acquire knowledge solely based on perception, for what we perceive is the assertion. We have to infer the propositional content and the trustworthiness of the speaker and the assertion itself. The reasons for the adoption of the belief transmitted through testimony will thus not be based on what causes the belief.²⁶

The justification of the acceptance of the testimony cannot be reduced to the assertion. The hearer must rely on other assumptions, according to Lehrer. For instance, we have to assess the trustworthiness of ourselves and others. That means not only do we have to assess whether we

²⁶ For instance, I say: "I know that this is an apple tree." You can say that the apple tree causes your perception of it and then causes your belief. A belief acquired through knowledge transmission has a different basing relation. Since you have not perceived the apple tree you only have a direct relation to the words of the speaker. This means that the apple tree did not (at least directly) cause your belief. More specifically, the causal reason for the belief is not evidence. The distal reason should still be the evidence. The belief of the speaker should be evidence-based (or of the first speaker in a transmission chain). Evidence should obviously be somewhere in the causal chain. This is problematic for conceptions of epistemology that do not include the possibility of knowledge transmission because your beliefs about the world should be caused by your empirical data about the world.

believe that a speaker tells us the truth and is actually in a position to know a certain proposition, we first have to evaluate our own capabilities to assess the speaker's intentions and epistemic position. Successful knowledge transmission requires the accurate assessment of the epistemic position of both hearer and speaker.

Trustworthiness is the second essential aspect of the success of knowledge transmission. The speaker *must want* to tell me the truth. Furthermore, she also has to be in the position to form an accurate belief in general (about a certain domain) and in the specific instance. Lehrer calls this condition the "truth-connection" of the speaker's belief. The hearer must make assumptions of each of these conditions: the speaker's epistemic position, her and the testimony's trustworthiness, and the truth-connection of her assertion. Lehrer understands the relation between truth-connection and trustworthiness as follows:

We must accept not only that her trustworthiness is in general reliably truth-connected but, also, that in her current situation the trustworthiness of her testimony is successfully truth-connected (Lehrer, "Testimony and Trustworthiness" 150).

Lehrer's epistemology focuses on the question about the appropriate relation between a reason and a belief. Furthermore, he is concerned with the question what kind of reasons the basis of the justification of our knowledge can be. In the existing literature, this is known as the "basing-problem".

For something to be knowledge, it must be defensible and justified; if not, it is a mere belief. In his unique account, Lehrer tells us that the justification of the knowledge-belief does not need to be based on the evidence. He argues that, much rather, the justification needs to be based on evidence.

To satisfy Lehrer's justification-giving relation, the agent must count the evidence that justifies his or her holding the belief in question as actually justifying his or her holding that belief (which is why the agent would appeal to that evidence when called upon to justify his or her belief) (Tierney and Smith 33).

Lehrer wants to make a broader point in the epistemology of testimony and shift the "basing-relation" of knowledge to a "justification-giving relation". Furthermore, he wants to stress the fact that the reason someone has to believe something is not the same as the cause of that belief. This certainly does not mean that the causal explanation of knowledge is never successful in explaining how beliefs are formed, but in the case of testimony, the hearer comes to knowledge in a different manner. She has to justify her acceptance rather than make an observation herself. Lehrer explains his justification-giving account of knowledge:

[J]ustification of a belief that is known to be true is based on certain evidence if and only if [the knower's] having that evidence explains how he knows that the belief is true (Lehrer, *Theory of Knowledge* 171)

This is a fruitful approach when considering expert testimony, for we have established before that the propositional content of the expert utterance or the expert utterance itself are neither accessible nor assessable for laypersons. The typical layperson can hence not be in the position to know. From the perspective of the layperson, the cause of the belief does not come from the evidence. Lehrer thinks that it is much more the justification that is based on evidence and not the belief (Tierney and Smith).

If the hearer who accepts the testimony wants to call her belief “knowledge”, she must provide a justification. I take this to be essentially Lehrer’s “justification-giving” account. I have already hinted at what Lehrer thinks to be a sufficient justification of testimonial belief. The hearer’s assessment of the trustworthiness of the testimony and the speaker provides such a justification.

Sometimes one's knowledge is based on reasons. The reasons give us knowledge. But what it means to say that our knowledge is based on reasons is problematic. I once contended that what it means is that one would appeal to those reasons to justify his knowledge (Lehrer, “How Reasons Give Us Knowledge, or the Case of the Gypsy Lawyer” 311)

How should we understand the role of trustworthiness in the acceptance of testimonial belief? Here is how knowledge transmission should ideally function: a speaker comes to a belief based on some evidence. She then utters this belief about the world to some hearer. The hearer hears and understands that testimony and accepts the belief about the world. This belief if true, however, transforms into knowledge. This is because the hearer is able to successfully justify her belief in the trustworthiness of the speaker, the general truth-connection of the speaker’s beliefs and the specific truth-connection of the specific testimony. That means that the reasons the hearer gives to justify her belief are different from the cause of the belief (which might for instance be the observation of the scientist).

Trustworthiness is the key element in successful knowledge transmission. Without it, there would be a gap between the evidence causing a belief and the hearer accepting a belief. For the hearer would not be able to give sufficient reasons to justify the acceptance of testimonial belief. The gap would arise since the evidence for a certain belief would not stand in any relation to the hearer. This cannot be: knowledge must inherently be person-related. There is no

knowledge if there is no knower. Knowledge describes the doxastic attitude of a subject to an object.²⁷

A reason for trustworthiness can justify a knowledge claim. The hearer has to evaluate the trustworthiness of the speaker before the testimony can count as testimony for a belief. Reasons for trustworthiness can be epistemic, for instance, the track record of the speaker, or non-epistemic. In Chapter 2, I showed that purely epistemic reasons cannot justify the acceptance of expert testimony since laypersons fail to access and assess it. I believe that we as laypersons have to actively look for reasons to justify our acceptance of the trustworthiness of the speaker and the assumption of the truth-connection of the expert's statements. I argue that these reasons for the trustworthiness and the general truth-connection of scientific expert's assertions provide a normative motivating reason for us to accept their testimony.

3.3. Message Scrutiny

Rationality can be understood as the source of requirements (Broome 116). I believe this understanding will prove sensible in this context. I begin this section by stipulating two rational requirements that seem quite intuitive to me. A rational requirement is a condition you have to fulfill in order to be considered rational. If you fail to fulfill it, you will likely be considered irrational. The scope of the requirements is the epistemology of testimony. Their applicability beyond epistemology is not subject to debate here. There are perhaps more rational requirements and even concerning epistemology more can be found but I take these two as fairly uncontroversial and intuitive.

The first rational requirement is uncontroversial:

Rationality requires of you that you ought to want to form true beliefs and reject false beliefs.

I am under the impression that most people will agree that this is a sensible requirement considering the rationality of epistemology. Epistemology is the study of knowledge and many philosophers hold the view that it is not possible to know false propositions.²⁸ Thus, it will be rational to attempt to form only such beliefs which are true. If you do not fulfill this requirement, you do not wish to know things. Note here that the requirement only commits you to want to form true beliefs. You do not necessarily fail to fulfill this requirement if you hold a false belief.

²⁷ Consider a knowledge-claim of this sort: I know Mr. Smith.

²⁸ This is also known as the principle of factivity.

I formulate what could count as a rational requirement about your attitudes towards what you hear. It is a so-called higher-order requirement. Higher-order means that you not only have an attitude towards facts in this case but also an attitude about your attitudes. I call this the *Message Scrutiny Requirement*:

Rationality requires of you that you ought to scrutinize the messages whose propositions you accept.

Message scrutiny means looking for two possible kinds of reasons to justify either the acceptance or the rejection of testimony. I called them internal and direct external reasons before. It should be obvious that a requirement like this one is far too demanding, especially in the case of expert testimony. While it would certainly be desirable if hearers can make full use of their critical faculties, ordinary laypersons can never fulfill the requirement of what they hear from experts. So why bother thinking that message scrutiny has something to do with rationality?

Scrutiny is arguably the most important attitude if we wish to form beliefs in a critical manner and want to avoid gullible behavior. This leads many commentators to the assumption that scrutiny is of major epistemological significance. Beyond the borders of epistemology and philosophy in general, scientists examine our critical faculties by looking at our capabilities to scrutinize the messages we are confronted with. Since the concept of scrutiny seems to be of interest in other debates, I included it here in this thesis.

We normally think that a rational person is also someone who holds a critical attitude towards what she hears. A gullible person is normally not considered to be rational. We believe that a person is more rational the more and the better reasons she can give for her attitudes and her actions. If what she does and believes is based on good reasons, we will call her rational.

In other philosophical fields, such as epistemology of testimony, or even in psychology the attitudes towards facts and beliefs are matters of interest. I try to explain my own interest in scrutiny using an example from the epistemology of testimony. It should show that a belief has to be embedded in a context and I have to scrutinize that belief and put it in perspective:

In everyday occurrences like asking a stranger when the train leaves, we are entitled to believe that she tries to tell us the truth. This is called the “presumptive right”. In these cases, sincerity might not be in doubt but some sort of scrutiny in the assessment process of testimonial belief. The hearer cannot be granted some sort of “presumptive right” even in these cases. When I ask: ‘Where does the train leave?’ your testimony might be more credible when you answer ‘platform nine’ than if you answer ‘platform nine and three quarters’. I might know that there is no such platform, or I know that it

is highly unusual to name platforms in that way. I will be even more justified to believe the statement if I ask at the information desk at the train station than if I ask a random stranger.

Without any defeater, I might have a reason to believe what I have been told. ‘Platform nine and three quarters’ might be true, but it would seem highly inconsistent with other beliefs we have. For instance, we have the belief that platforms normally have integers as names.²⁹

Many philosophers would probably agree that scrutiny is an important feature of our rational behavior. Part of it has to do with the fact that many people think that rational behavior is responding correctly to reasons, at least to some extent. Rationality is a sensible interaction with our environment. This entails that our beliefs also have to be somewhat apt. These reasons can be external facts. Knowing these facts can mean to scrutinize the information delivered to us or critically assessing an observation we made. Philosophers who hold such a view on rationality are externalists. Note that this is just one understanding of rationality. Internalists will reject the notion of aptness of our beliefs. In this thesis, I shall propose a mediation between externalism and internalism of rationality: The goal should be to form apt beliefs but a failure to form an apt belief – which arguably implies a failure of the correct response to reasons – does not necessarily imply a failure of rational reasoning.³⁰ What counts as a failure of rational behavior is the neglect of message scrutiny.

Scrutiny is a useful concept mediating between externalists and internalists.³¹ This means that we do not have to give up either the notion of responding correctly to reasons nor will we run into difficulties explaining the rationality of a false belief. A person who correctly scrutinized the facts and then formed a false belief did so rationally. This includes, for instance, many scientific theories that later turned out to be false. These beliefs might have still been formed rationally (at the time of the creation of the theories). Holding a true belief without scrutiny might rob us of the possibility of the justification of that belief and might consequently not count as knowledge.

²⁹ The last paragraphs were inspired by the recent discussion in the epistemology of testimony. The notion of scrutiny is used by (Fricker, “Against Gullibility”).

³⁰ The term “apt belief” was introduced into epistemology by Ernest Sosa in his book *A virtue epistemology* (Sosa). Belief-forming processes should be apt performances. Sosa names three epistemic desiderata: accuracy, adroitness, and aptness. He uses the metaphor of an archer aiming at the target. The epistemic agent should follow the same desiderata as the archer.

³¹ The discussion of internalist and externalist arguments in theories of rationality are somewhat similar to the discussion of internalism and externalism in the epistemology of testimony. Theories of rationality often struggle with the question how rational behavior or a rational attitude is determined by external facts. Further, they sometimes find it difficult to explain the rationality of false beliefs.

Scrutiny as the missing link between externalism and internalism could potentially solve a big dilemma of theories of rationality and certain problems in the philosophy of science: it could explain the rationality of false beliefs without giving up externalism.

3.4. The (Very) Limited Scope of Message Scrutiny and a Possible Solution

The careful reader will have already noticed the problem with message scrutiny in the case under consideration. The layperson is not able to scrutinize the message delivered by experts. She will fail either to assess the assertion because she struggles to understand it, or she will fail to assess the cognitive processes that led the expert to form a certain belief. I showed this in Chapter 2. The layperson cannot access or assess internal or direct external reasons for justification of the acceptance of expert testimony.

Since I showed that the requirement of message scrutiny is too demanding and hence not helpful, one obvious way of responding to this problem is to give up the requirement of scrutiny altogether. But this does not seem feasible. Epistemic agents who scrutinize the available facts before they form their beliefs can surely offer a better justification for their doxastic attitudes than the ones who do not perform such epistemic labor.

I am convinced that rationality requires epistemic agents to maintain a critical attitude towards our own beliefs. One option to remain critical during the belief-forming process is scrutinizing the available facts. Now we can turn to the crucial question of this thesis: which facts are available for scrutiny to the layperson?

I believe that the best candidate for scrutiny is the concept of trustworthiness introduced by Lehrer. He writes:

It is [the speaker's] trustworthiness, not her testimony, that is the evidence for the truth of what she says (Lehrer, "Testimony and Trustworthiness" 148).

Since the hearer is always reliant on trust to some extent, she will do well to at least scrutinize the reasons for trustworthiness. Note that I slightly diverge from Lehrer's notion of trustworthiness since I focus on a narrower notion of trustworthiness. In the case of expert testimony, the layperson must only check reasons for the trustworthiness of the speaker and not of the message.

I now formulate a new rational requirement for epistemic agents in the case of the justification of testimonial belief. One that is more applicable in the case of expert testimony and considers the epistemic position of the layperson. I call this the *Trustworthiness Scrutiny Requirement*:

Rationality requires of you that you ought to scrutinize reasons for trustworthiness.

This chapter provided the background in the philosophy of rationality necessary to understand the normative force of the requirement to scrutinize reasons for the trustworthiness of the speaker. The discussion of Fricker and Lehrer made the need for proper justification for trust clear. I believe that it is now sufficiently clear why the *Trustworthiness Scrutiny Requirement* should be preferred over the *Message Scrutiny Requirement*. In the remainder of the thesis, I will describe the kind of reason for trustworthiness laypersons should examine.

In conclusion, rationality requires a person to form true beliefs and throw-out false beliefs from her belief-system. In the case of testimony, I argue that there are reasons that motivate a person to accept the testimony if the person wishes to fulfill epistemic ideals (which she should). Even after accepting this requirement, a layperson might not be certain who's testimony to accept. This is a matter of trust. I will show that a layperson can successfully find good reasons for the trustworthiness of scientific experts.

4. Incentives Instead of Game-Theory

The previous chapter showed that laypersons should scrutinize reasons to accept (or reject) the testimony which are likely to lead them to the adoption of a new true belief or to reject a previously held false belief. This is so since a person is an epistemic agent and an epistemic agent ought to attempt to live up to epistemic ideals. Furthermore, a person ought to scrutinize the reasons for trustworthiness of the speaker in opposition to message scrutiny where the hearer tries to find reasons to justify the acceptance of the utterance based on the content of the utterance. I showed that reasons for trustworthiness are the only kind of reasons available to scrutiny.

In the present case of scientific experts, it is not trivial to find good reasons for trustworthiness that can also motivate common laypersons. Many good reasons will fail to motivate laypersons to accept scientific expert testimony since they are either not accessible, not assessable, or plainly not convincing. I will browse through arguments that could be presented to show trustworthiness of scientific experts and point out their respective problems. I want to lay out arguments that can potentially convince classic science skeptics like climate-science deniers to accept the testimony of scientists. Then, I will present my own argument.

I want to stress the fact that I am only looking at one specific kind of reasons, namely the one that is rationally required by epistemic ideals. In everyday-life, we frequently get motivated to accept testimony without scrutinizing the reasons for it. For many epistemologists, this is perfectly permissible in countless cases. However, in the case of expert testimony, no such right should be granted to the hearers.

I believe that the most powerful strategy to argue for the trustworthiness of scientific expert testimony is to approach the subject matter from the perspective of the science skeptic and try to imagine an argument that might convince her. I present three arguments in this chapter in greater detail. They can all motivate you, but I argue that a layperson has to accept at least two of them without further scrutiny. The first argument hinges on the intuitive assumption that scientific knowledge is the best knowledge available. Thus, we have a reason to trust the producers of scientific knowledge and the motivation to accept the testimony of scientists. The second argument for the trustworthiness of scientists argues that scientists have developed a specific culture that fosters the production of true statements. Someone who is part of that culture is likely to produce a true statement and from an epistemic perspective, it would sure be desirable to accept the testimony of scientists. The third argument can only be convincing

if you accept the trustworthiness of the speaker. This is preaching to the choir. The skeptic who doubts the integrity of scientists will hardly find such a line of arguments persuasive.

I go on to present an alternative argument which focuses on the incentives of scientists. It does therefore not require special insight into the history of successful scientific endeavors nor into the scientific practices and their purposes nor does it require you to assume that scientists hold a certain attitude. It might not objectively be the best argument for the trust in scientific experts but nonetheless, I argue that it can potentially convince the skeptics.

What I call the “Sociological Argument” provides a reason which is objective and subjective simultaneously. The epistemic ideal is to form true beliefs and throw-out false beliefs of our belief-system. Accepting epistemic ideals is epistemically rational. Further, we also have a motivating reason to accept the testimony of scientists affiliated with accredited scientific institutions if they speak of a domain that they possess expertise of.

One final remark about the nature of trustworthiness is necessary before I can proceed to the analysis of the arguments. There are two aspects that make a speaker worthy of my trust. One is that I judge the speaker to be in the epistemic position to tell me the truth. I must believe that the speaker can know the truth. The other is that I must assume that the speaker’s testimony moreover is truthful. Veracity is an essential condition for most knowledge transmission.³² The sole belief that the speaker is an expert in a certain field does not motivate me to accept her testimony.

4.1. Best Knowledge Explanation Does Not Motivate

I shall start this chapter by discussing the most obvious argument why it is rational to accept the testimony from scientific experts: scientists produce the best knowledge available. And because of this reason, it is epistemically desirable to obtain scientific knowledge. I begin this section by quoting some influential philosophers from various philosophical stances. Despite their different positions, they agree in their conviction that science has and should have a privileged epistemic status.

Many philosophers sought to distinguish ordinary ways of belief-acquisition from the scientific method. Science produces knowledge, not mere beliefs. The reason for this conviction is that scientists who rely on methods do not merely “get the facts right” but also succeed at delivering sufficient justifications for their beliefs. One of the die-hard believers in the scientific method

³² I will not discuss various exceptions brought forth by Jennifer Lackey.

was the Karl Popper. He insisted on a differentiation of science and non-science defining his famous *Demarcations Criterion*. Popper describes his aims:

... I wished to distinguish, between science and pseudo-science; knowing very well that science often errs, and that pseudo-science may happen to stumble on the truth (Popper 33).

Popper was not the only philosopher who sought such a demarcation criterion. His approach was not in any way unproblematic, it is sensible to quote the strongest proclaimer of the scientific method. Using scientific methods falsifies or corroborates our hypotheses and makes them more robust.

Apart from Popper, many more philosophers are convinced of the epistemic superiority of the sciences; precisely because of their rigor and success in the production of knowledge. In his recent 2006 book *Fear of Knowledge*, Paul Boghossian argued adamantly for the privileged epistemic position of science.

For if science wasn't privileged, we might well have to accord as much credibility to archeology as to Zuni creationism, as much credibility to evolution as to Christian creationism—precisely the view advocated by an increasing number of scholars in the academy, and increasingly echoed by people outside it (Boghossian, *Fear of Knowledge* 5).

His remark is included here because it highlights the privileged epistemic status of modern scientific practices over other forms of belief acquiring. That is because the knowledge produced by scientists is better justified and hence more robust and more accurate.

One further aspect of the epistemic status of science should be included before I turn back to the discussion of Hardwig and point out weaknesses in his position. Helen Longino describes her view on epistemology and emphasizes the fundamental difference between laypersons and scientists in the belief-acquiring process.

It is tempting to think that scientific knowledge is like ordinary knowledge except better. But scientists are not (or not just) better observers, and more careful reasoners than the rest of us, they also observe and reason differently and to different ends (Longino 124).

This quote fits well in the context of my own conception of expertise. Remember that I insisted on granting experts some special cognitive capabilities, called SCC. They are special since they are based on implicit knowledge. Longino seems to think in a similar fashion characterizes the process in which scientists acquire new beliefs so fundamentally different than ordinary knowledge.

John Hardwig does not focus on the nature of reasoning processes. However, his remarks on the epistemology of testimony share certain similarities with both Boghossian's privileging of

science and Longino's insisting on different observational and perceptual skills of scientists. He writes:

I find myself believing all sorts of things for which I do not possess evidence: that smoking causes lung cancer, that my car keeps stalling because the carburetor needs to be rebuilt, that mass media threaten democracy, that slums cause emotional disorders, that my irregular heart beat is premature ventricular contraction, that students' grades are not correlated with success in the nonacademic world, that nuclear power plants are not safe (enough) ... The list of things I believe, though I have no evidence for the truth of them, is, if not infinite, virtually endless. And I am finite. Though I can readily imagine what I would have to do to obtain the evidence that would support any one of my beliefs, I cannot imagine being able to do this for *all* my beliefs. I believe too much; there is too much relevant evidence (much of it available only after extensive, specialized training); intellect is too small and life too short (Hardwig, "Epistemic Dependence" 335).

This quote contains the essential features of the conceptions of science that I mentioned and were also pointed out by Boghossian and Longino. Hardwig stresses the importance of scientific expertise. He also states that the belief-acquiring processes might not be accessible to or assessable by the hearers. The reasons for this are contingent. The hearer either does not have the time or the knowledge to gather all the relevant evidence or lacks the required expertise to make the relevant observations or execute the correct reasoning process.

Hardwig continues:

In this paper, I want to consider the idea of intellectual authority, particularly that of experts. I want to explore the "logic" or epistemic structure of an appeal to intellectual authority and the way in which such an appeal to intellectual authority constitutes justification for believing and knowing (Hardwig, "Epistemic Dependence" 335).

Hardwig's famous answer is that laypersons have to trust intellectual authorities if they wish to form certain beliefs. Trust is blind to some extent since we form a belief for which we do not have evidence. In a nutshell, the papers "Epistemic Dependence" and "The Role of Trust in Knowledge" argue against the claim that trust undermines our traditional conception of rationality. Rationality requires us to form a belief if we find evidence for it. Knowledge through knowledge transmission does not allow for this process. Instead, we have to rely on trust. Hardwig argues that it can be rational to trust experts and consequently accept their testimony. The intellectual authority is evidence for the epistemic position of the speaker.

I turn to my critical remarks on Hardwig's description of the correct rational behavior of the layperson. While it is true that it is epistemically sensible to assign a higher epistemic status to an expert than to oneself as a layperson, that alone should not motivate a layperson to accept the expert's testimony. This is because the epistemic status is only one of two aspects of

trustworthiness. The other is the veracity of the speaker. But we cannot assume the veracity of the speaker without any basis and still be rational.

Let us consider following quote by Tyler Burge:

“In areas like politics, where cooperation is not the rule and truth is of little consequence, or philosophy, where questioning is as much at issue as belief, we engage in complex reasoning about whether to accept what we hear or read. Reasonable doubt becomes a norm (Burge 484).”

Burge’s quote shows that the assumption of trustworthiness depends on the context of the utterance. The right to grant veracity is highly circumstantial. Hardwig is aware of this fact. Discussing Michael Blais in “The Role of Trust in Knowledge”, he concludes that scientists, in fact, do not have a reason to tell the truth. It is ironic that Hardwig privileges scientific knowledge production and at the same time acknowledges that a “presumptive right” cannot be granted for scientists. For, this seems to epistemically weaken the acceptance of expert testimony.

If veracity cannot be assumed, then it is not clear how we can assume trustworthiness of experts. Hardwig focuses on only one of two aspects of trustworthiness, namely, that the expert is in the epistemic position to know (better than the layperson). But only because the expert can know does not mean that she is willing to transmit the knowledge. She can lie and we should not assume that she is truthful. Hardwig even goes one step further and argues that a scientist might benefit greatly from dishonesty. It is not intuitive why we should accept this testimony. We might have a reason to be doubtful of her testimony.

I believe that I showed successfully that the argument from expertise is not sufficient to justify someone’s acceptance of expert testimony. We must have a reason to assume the veracity of the speaker in order to strengthen the epistemic status of our own belief. There are many examples of scientists who abuse their intellectual authority to support the spreading of untruths.³³

Most of philosophy of science can provide a convincing explanation of why scientific knowledge should be granted higher credibility than ordinary ways of knowledge production. However, to critically assess these reasons extensive knowledge about why the scientific knowledge produces justificatory reasons and hence robust knowledge. I have serious doubts that what I call the “Best Knowledge Explanation” will fail to make trust more rational in the sense that the hearer is unable to give reasons for her trust.

³³ Instances of the abuse of intellectual authority can easily be found. One of the most impressive collections of fraud was published by the aforementioned Naomi Oreskes and Erik Conway. *Merchants of Doubt* shows how some experts use their authority to push hidden agendas and purposefully omit facts (Oreskes and Conway).

Furthermore, I believe that in cases like climate-science denial this kind of explanation does not make a convincing case. This is because there is no argument for the truthfulness of scientists. Even if they are capable to produce the best knowledge available, the climate-science denier may conceivably say that this does not mean that the report given about the world by a scientist is truthful.

4.2. More Arguments for Trustworthiness

I will briefly introduce two possible arguments for the trustworthiness of experts, especially scientific experts. I claim that both arguments are in fact true and provide a reason for the trustworthiness of scientific experts. However, I shall argue that laypersons cannot access or assess these reasons and hence fail to scrutinize them. It will thus not make them more critical to rely on them for laypersons have to accept the reports blindly. Many people will not get motivated to accept scientist's testimony based on these reasons. The second problem with the two arguments is that they might not be convincing for those who already doubt the veracity of scientists. Climate-science skeptics often do not deny the expertise of the scientists but rather the truthfulness of their testimony.

4.2.1. Epistemic Culture Explanation Violates Accessibility

One powerful argument that frequently gets mentioned to assure the high quality of scientific research is that science has developed its own culture with its own practices. This epistemic culture is beneficial to the production of true reports about the world and the falsification of false statements. When I talk about truth-conducive scientific practices, I mean for instance the peer-reviewing processes that scientific papers must undergo in order to be published.

The scientific community consists of enough members so that most statements can be scrutinized, and many studies can be replicated. Although scientific fraud and the publication of studies with a low quality cannot be eliminated completely, the overall success of these practices is generally not denied. Peer-review processes make it significantly harder for scientists to give fake reports and to get away with it. The global scientific community has grown enormously in the past few decades and modern technology has enabled a global scientific network. It is now easier for scientists to replicate studies and detect mistakes. This raises the quality of scientific research published in peer-review journals. There is evidence that could support the claim that the overall quality of scientific research has improved over the past decades.

Scientific practices, however, are hard to understand, especially for an outsider. The logic of publication is a powerful argument for trust in the truth-producing scientific community. I argue that as nice as this argument sounds. Laypersons typically lack the skills to access these

reasons. Accessibility would be given if the hearer understands the culture-specific behavior within the scientific community. But these reasons are only accessible to people *within* the scientific community. The climate-science denier whom I have in mind will not be persuaded by the logic of publication.

Arguing from the success of a particular epistemic culture has weaknesses. Practices within a culture are very hard to understand as an outsider. Often the purpose of the specific practice is only accessible by those within the community. The same counts for the publication processes of scientific studies. Peer-reviewing is a complicated business and many aspects have to be considered. Even trained scientists often need some experience to place successfully their papers in the right journals. It is hard to see how a layperson can access the reasons why peer-reviewing processes should ensure the trustworthiness of scientific reports.

If accessibility is not given, then the hearer cannot (critically) assess the reason. In other words, an argument from epistemic cultures forces the (not-scientifically-trained) layperson to accept or reject the reason based on either no grounds at all or again on indirect grounds. The latter can occur if I accept the argument based on a report of a trustworthy person. But then again, I am not less gullible if I accept the trustworthiness of scientific experts based on indirect reasons or no reasons.

The explanation from epistemic culture can provide a powerful argument for the trustworthiness of the reports of scientists within a certain epistemic culture. I believe that it can convincingly be demonstrated that scientists often produce truthful reports. The argument, however, is not accessible by most laypersons and fails to strengthen the epistemic status of the acceptance of scientific expert testimony.

4.2.2. Epistemic Virtues Are Not Convincing

For the sake of completeness, I will briefly mention another possible argument. I do not believe that many people will find it very convincing. Hardwig stated that we have no alternative but to blindly trust experts even when we are experts ourselves and are scientifically trained.

Often, then, a scientific community has no alternative to trust, including trust in the characters of its members. ... Scientific propositions must often be accepted on the basis of evidence that only others have. Consequently, much of scientific knowledge rests on the moral and epistemic character of scientists. Unavoidably so. Not because “hard data” and logical arguments are not necessary, but the relevant data and arguments are too extensive and too difficult to be had by any means other than testimony (Hardwig, “The Role of Trust in Knowledge” 706).

Obviously, Hardwig does not claim that the reliance on the moral and epistemic integrity of scientists is epistemically desirable. He claims that no (sufficient) evidence can be found to know whether a speaker tells us the truth. We simply have no choice but to rely on their testimony. The question is: can we think of an argument for the integrity of scientists?

I can think of one possible argument. People who decide to pursue a career in one of the sciences will most likely do so because of their interest in the field. Naturally, the scientist will be eager to find the truth about the matter of her studies. A person who goes into sciences is honest about her research because of her thirst for knowledge.

This strange argument might even be true in some cases. But it neglects the two crucial problems: even if it is true that scientists tend to be virtuous people who generally give truthful and reliable reports about their research, it does not mean that scientists are never pressured to fake the results of their studies. A scientist might risk running out of funding for her research and feel pressured into faking data. Another scientist might work on a research team and is the only member who fails to deliver data. In a moment of despair, she fakes the results.

Even virtuous people might be tempted or pressured in certain situations. It is much to ask of a researcher to act honorable in extreme situations. I myself cannot find it plausible that this argument from the virtuous character of scientists applies to the vast majority of members of the scientific community.

But there is also a further problem that arises from this argument. I call this “preaching to the choir”. Only those people will find this argument convincing who are already convinced that scientists generally give truthful reports. I have the impression that many climate-science deniers question the very integrity of scientists claiming that they are ideologues who only publish research that supports their views. I do not see how a climate-science denier will be persuaded by the argument from epistemic virtues.

I do not want to dismiss the argument completely, but it will not play any further role in my thesis. Since the intrinsic motivation to give truthful reports plays an important role in Hardwig’s argumentation, I wanted to explain why I believe that it is not a good strategy to argue for trust in scientific experts.

4.3. Sociological Explanation Instead of Game Theory

The arguments from epistemic cultures and epistemic virtues are not fruitful. They fail in making laypersons more critical and skeptics might not be persuaded. In this section, I will provide the argument that I believe to be the most persuading. It will also provide the most accessible and assessable justificatory reason for the acceptance of expert testimony from the perspective of the layperson.

Once more, I turn to John Hardwig and his discussion of Michael Blais' suggestion for a reason for the trustworthiness of scientists. Again, Hardwig argued that we are epistemically dependent on expert testimony. He concluded that trust is, at least to some extent, blind. The layperson cannot gather evidence for what she believes and has to blindly trust. Blais responded in his "Epistemic Tit for Tat" to Hardwig's "Epistemic Dependence". In "The Role of Trust in Knowledge", Hardwig replied to Blais' suggestions.

Blais begins his paper by summing up Hardwig's criticism of cognitive individualism:

Thus, rational inquiry must include at least some cases of deferring to authority. But this is tantamount to admitting that, under the traditional individualistic analysis of knowledge, it is sometimes rational to be irrational; for, if I believe something without proper grounds, I believe irrationally. Although this conclusion may be found minimally acceptable in the case of the layperson who perhaps cannot be expected to have all the relevant information that the expert is supposed to have, this form of cognitive elitism cannot avoid the fact that *no* expert has verified each and every piece of data upon which he bases his or her own expert opinion. So, suggests Hardwig, either no one knows much of anything (certainly not any scientific thing), or there is genuine knowledge reposing not within the individual but within the collective body of the community (Hardwig, "The Role of Trust in Knowledge" 364).

Blais praises Hardwig's criticism of cognitive individualism and his critique of traditional conceptions of knowing. But Blais asks one important question Hardwig has no answer for: why should the expert tell the truth? The answer to this question is essential since veracity is one of the two key aspects of trustworthiness.

Blais has a surprising answer. He understands the situation of the scientist within the scientific community from a game-theoretical perspective. He considers the "Prisoner's Dilemma". Blais sees parallels to the situation of scientists who have to work together. The scientific community as a whole does not benefit from, he believes, from dishonesty and individual scientists should produce truthful reports as they face dangers of exclusion from the scientific community. In science, there are two "games" being played: Individual scientists have a game-theoretic reason to produce truthful reports and science as a whole has a strong interest to produce generally reliable research.

What could traditionally be called trustworthiness or honesty is thus reinforced by the very real danger of exclusion. During apprenticeship, one soon learns that short-term gains of defection are far outweighed by the long-term rewards of cooperation, whether one is morally trustworthy or not. To be allowed to stay in the game requires cooperation, but the punishment is permanent exclusion (Blais, 1987, p. 372).

We can see that Blais considers the problem with the argument from epistemic virtues presented in 4.2.2.. It is not obvious why it should be permissible to us to assume that scientists *intrinsically* are particularly cooperative and morally upright. Blais presents an argument for the assumption of the veracity of the scientific experts without further relying on implicitly assuming the moral integrity of members of the scientific community.

He continues to describe the benefits for the scientific community which are generated by the veracity of the members:

The scientific community does not stand to gain at all from long-term defection with the public, for loss of credibility means loss of funding. Science cannot afford to permit wholesale defection within its ranks: so effective policing is necessary (Blais 373).

So far, Blais' game-theoretic understanding seems convincing. Hardwig, however, finds the argumentation flawed. The individual does not have a reason to be honest. In "The Role of Trust in Knowledge", he provides examples from the history of science showing that some scientists could benefit from dishonesty. Furthermore, dishonest research is often hard to detect. Many studies are expensive and thus hard to reproduce. The individual scientist can benefit greatly from faking results. The history of biomedical studies shows that the epistemic culture does not produce such a truth-conducive environment.

At least one scientific community, however, the biomedical community, has had its faith in replication and peer-review shattered by a number of spectacular and highly publicized examples of research fraud. Within biomedical science, the names of the fraudulent researchers have become well-known – Although there are other sloppy, careless, or deceptive research practices that may even be more damaging to the reliability of scientific testimony, "scientific misconduct" – commonly defined as plagiarism or the fabrication, falsification, or deliberate misrepresentation of data – is the most blatant example of defection in the knowledge game (Hardwig, "The Role of Trust in Knowledge" 703).

Hardwig continues to claim that the peer-review processes are often ineffective since the reviewers are often not as specialized as the researchers and cannot verify all the relevant evidence. This means that peer-reviewers again rely on the data gathered by the scientists they review. Hardwig, thus, ends up with a devastating conclusion:

Often then, a scientific community has no alternative to [blindly] trust, including trust in the character of its members. The modern pursuit of scientific knowledge is increasingly and unavoidably a very cooperative enterprise. Cooperation, not self-reliance, is the key virtue in any scientific community. But epistemic

cooperation is possible only on the basis of reliance on the testimony of others (Hardwig, "The Role of Trust in Knowledge" 706).

This statement is devastating because it makes our trust in sciences uncritical and sometimes unrewarded. Given Hardwig's portrayal of trust, we would have no rational way of deciding who to trust. Our sole ground for decision-making would be whether we judge the testifier to be in a better epistemic position than we are.

This is an unsatisfying answer. If we do not have a chance to assess the message presented, or the trustworthiness of the speaker, we are still left gullible. I claim that there is a way for laypersons to determine whether or not it is plausible to assume the expert's trustworthiness. Remember that I stated earlier that trustworthiness is highly circumstantial. In everyday situations, a "presumptive right" can sometimes be granted. In other situations, when the speaker would benefit from dishonesty and deception, in politics, for instance, the hearer should always be cautious before accepting a report. Science is a field where individuals could benefit from lying. Thus, the "presumptive right" cannot be granted.

Scientists, however, give reports in various circumstances. In some, veracity can safely be assumed. Since the Hardwig-Blais debate, a lot has changed in the scientific community. Initial research has been done on scientific misconduct (for instance: Fanelli, 2013a, 2013b, 2012). There is more knowledge available about how and why scientists commit fraud. Furthermore, I want to introduce one additional aspect to the discussion of scientific misconduct.

I claim that trustworthiness can be assumed because scientists and the institutions they are affiliated with have an incentive to produce true reports. Under specific circumstances, an incentive to be truthful can safely be assumed. Only after assessing these circumstances, the trust of the layperson is not gullible. The advantage of approaching the problem of trustworthiness as context-dependent, the list of conditions does not require that the layperson knows much about the scientific community or its practices.

- a) The scientist speaks of something within or about the domain she is an expert in.
- b) The scientist is affiliated with an accredited scientific institution.
- c) The scientist testifies as a representative of this institution.
- d) The scientist gives the report engaging in a scientific discourse.

Circumstances a) to c) are of utmost importance. Condition d) does not always have to be fulfilled but surely it will help the credibility of the scientist. I believe that everyone can understand these conditions and understand why they are so crucial. Condition a) is straightforward: the scientists must not leave the area of her expertise. This is the problem with many so-

called pop-scientists who enter public discourses on topics that exceed their primary area of expertise. If circumstance a) is in doubt, we also have a reason to doubt the first aspect of trustworthiness; the epistemic position of the speaker. It does not mean that we automatically have to reject the testimony but that we have to be cautious and should gather more information.

Circumstances b) and c) require further explanation, for it is not intuitively clear why the affiliation should matter. Here my argument runs somewhat similar to Blais' but hinges on different assumptions. I already described the problems with his account and Hardwig's objections. I too believe that a scientist might have to engage in this game-theoretical reasoning and weigh the possibility of getting caught against the chance of undetected fraud. Furthermore, it is not clear to me why the long-term damages that science could suffer from fraudulent behavior should affect the intentions of individual scientists. My argument makes simpler assumptions.

After the analysis of Hardwig's and Blais' contributions, I remain that it is crucial to find an argument for the veracity of the speakers in the case of expert testimony. Note that the argument from epistemic cultures and epistemic virtues should not be undermined. My criticism was not that they were wrong but rather that they were not convincing or required too much knowledge of the scientific community. However, I still believe that they are true.

Scientists within the scientific community have various incentives to give true reports. They *want* to be known for their high-quality research. Sometimes, their motivation to do honest research is extrinsic: scientists are afraid of the consequences. Peer-reviewing systems, for instance, effectively prevent fraudulent behavior. I offer a different extrinsic incentive for scientists to engage in honest research.

4.3.1. Consequences of Scientific Fraud in Recent History

Although scientific fraud is the rare exception, instances for misconduct can be found easily. Part of it has to do with the fact that these cases had a severe impact on society and the fraudulent researchers themselves. Extensive media coverage followed the cases I mention in this thesis. I will look at two famous examples in recent history and show what consequences scientists face. Both instances occurred after the debate Hardwig and Blais had in the early 1990s. As mentioned before, Hardwig came to the conclusion that game-theoretical reasoning will not necessarily bring scientists to produce honest research since scientific misconduct is often not easy to detect. However, Hardwig does not focus on the severe consequences fraudulent scientists were facing after they were confronted with their deeds.

The MMR controversy is perhaps the most infamous case of scientific fraud in history. The claim that vaccinations could cause autism led to a worldwide outbreak of mistrust against

conventional medicine and a rapid decline of vaccinations. Andrew Wakefield, a British doctor and author of the fraudulent research, was publicly held accountable for faking data and omitting a conflict of interest. As a result of the ongoing controversy, Wakefield resigned at Royal Free Hospital School of Medicine where he had previously held teaching position (Fraser). Subsequently, he moved to the United States and established the “Thoughtful House Center for Children” and served as executive director. After being accused of fraud in 2010 by the British “General Medical Council”, he also resigned from this position. Additionally, Wakefield cannot practice medicine in the United Kingdom anymore (Meikle and Boseley).

The second instance of scientific fraud is even more recent. German anesthesiologist Joachim Boldt published a great number of scientific papers that had since been retracted. Journalist Jacqui Wise summed up the case for the BMJ, the British Medical Journal.

The withdrawal of almost 90 fraudulent studies by a German anaesthetist is one of the biggest medical research scandals of recent time (Wise, 2013, p. 16).

After describing the details of the fraudulent studies, Wise also mentions the consequences for Boldt. His fraud affected him outside the academic environment. Not only did he lose his position as a professor at the Klinikum Ludwigshafen, Boldt also faced criminal investigation.

The investigative report has now been handed to the criminal prosecutor and a criminal investigation is ongoing. Boldt, however, has left Germany and is rumoured to be working as an anaesthetist, possibly in the Czech Republic (Wise 17).

Accredited scientific institutions have a certain reputation to uphold. Thus, they have an incentive to employ truthful and competent researchers. Individual scientists, in return, have an incentive to match the expectations these institutions have. The Klinikum Ludwigshafen, for instance, reacted in the aftermath of the fraudulent studies of Joachim Boldt by assuring the quality of the studies conducted.

The affair has prompted research institutions and journals to examine research oversight. Klinikum Ludwigshafen has tightened procedural requirements relating to how it conducts clinical studies. It has also set up a scientific steering committee within the hospital to monitor all clinical studies conducted and to ensure that quality standards are maintained and researchers have access to detailed guidance and support (Wise 18).

Scientific institutions can be thought of as employing similar logics as companies, at least in this respect. Companies greatly care about their branding. “Facebook” was involved in scandals in 2018 and has since suffered enormous damage to its image. As a result, the value of a “Facebook”-stock declined. Accredited research institutions have to uphold their image for similar economic reasons.

There is little data available about the real deterring effects of the consequences of detected fraudulent behavior. Much more research needs to be done in this area. But in recent years, scientists like the aforementioned Fanelli have started to investigate reasons and motivations for fraudulent behavior. The more data will be available, the easier it will be to instantiate effective means against fraud-culture amongst scientists. As for now, empirical material included in this thesis unavoidably remains anecdotal (as did empirical claims in Hardwig's paper). Nonetheless, I believe that the two cases used in this chapter highlighted the seriousness of fraudulent behavior and the severity of the consequences.

Note that the incentives for scientific institutions and the scientists affiliated with them are created by the economic reasoning, that is the branding. But different research institutions have different incentives. That is why I insist on the word "accredited". These institutions must have an image as high-quality science-producers and their branding must be an integral part of their business-model. Many other research facilities have different goals or push hidden agendas. To put it in simpler terms: we should grant higher trustworthiness to an environmental study from a researcher or a research team from, let's say, the University of Harvard than Shell. For the success of their business is not directly affected by the truthfulness of their reports but by the revenues they generate. The image of accredited scientific institutions is largely built on their abilities to produce reliable research. As a consequence, truthfulness of the scientists plays a key role in maintaining their image. Thus, the universities have an incentive to cleanse themselves from fraudulent researchers. Researchers, on the other hand, have an incentive to abide by their employers' rules.

The advantage of my incentive-based reason for the trustworthiness of scientists compared to Blais' game-theoretical considerations is convincing. The Hardwig-style blind reliance on the moral and epistemic integrity of the scientists is not necessary anymore. Further, I believe that my account successfully avoids the problems that arise from the game-theoretical account. Hence Hardwig's objections to Blais do not affect the incentive-based reason. My own strategy of looking for reasons for trustworthiness does not rely on the long-term success of science. Individual scientists might not have an incentive to behave in a way that is beneficial to the survival of science in the long-run. The severity of the consequences of scientific misconduct, however, is a powerful deterrent that keeps the overwhelming majority of scientists from committing fraud. The game-theoretical argument also relies on the expectation of a certain behavior of scientists. The risks outweigh the benefits from fraudulent research and scientists thus have a reason not to engage in fraudulent behavior. Individual scientists, however, might be willing to take this risk, as Hardwig points out. My incentive-based argument, on the contrary,

relies on the incentives scientists *have* and not what they actually *do*. This difference is crucial, for it is far easier for laypersons to assess. I argued in a previous section that the scientific practices are difficult to assess as an outsider of the epistemic culture. Incentive-based explanations transcend the specific culture and can be understood by laypersons.

Incentive-based reasons cannot avoid the risk of the acceptance of false reports. However, my goal in this section was not to show the most successful strategy of acceptance of expert testimony but the most rational one. Above, I argued against Fricker that the hearer cannot always be blamed for accepting false propositions. The epistemic labor a layperson can perform is to check the incentives for the veracity of the speaker and not the evidence for the accepted proposition. These reasons will be the most accessible and assessable by the layperson. And the better the layperson can assess a reason, the more critically she can treat the reason. Other reasons, like the “Epistemic Culture-Argument”, have to be accepted without further assessment.

The incentive for scientists is only given if circumstance b) and c) are also real. A scientist who is affiliated with an oil company or a pharmaceutical company might have different incentives than producing truthful testimony. Furthermore, the scientist must testify as a representative of her scientific institution in order for the institution to have incentives to produce reliable, truthful testimony.

My argument looks somewhat similar to the argument from epistemic culture. However, there is one essential difference: The latter argument can only be critically accepted by someone who understands the culture of the scientific community. A person who has no knowledge about the scientific practices has to uncritically accept the argument. My incentive-based argument hinges only on the consequences which dishonest scientists face. It means that people have to understand what it means to lose the license to practice your profession or to face criminal investigations.

5. Anderson's and Goldman's Referral to the Scientific Consensus

In this penultimate chapter, I will discuss two further philosophers. Elisabeth Anderson explains her position in “Democracy, Public Policy, and Lay Assessments of Scientific Testimony”. She argues that laypersons should accept the testimony of scientists if their reports represent a wider consensus in the scientific community. Scientific consensus should be understood as a reason for the trustworthiness of the reports. Many weaknesses of this account should be fairly obvious at this point. In the next section, I will discuss each of my objections.

Despite ultimately rejecting Anderson's claims, I find her approach to be particularly interesting since she made her claims with regard to a hotly debated, current topic: climate change. Although the scientific community reaches an ever-wider consensus that the recent changes in global climate are at least in part man-made, so-called climate skeptics make themselves heard with loud voices. It seems paradoxical that scientific hypotheses that are corroborated with much data and are believed by the overwhelming majority of climate researchers are doubted by laypersons without any evidence.

Anderson wants to offer a strategy for laypeople to assess the trustworthiness of testimony of scientists that represent the scientific consensus and weigh them against climate skeptical assertions. Ultimately, the laypersons should accept the testimony which corresponds with views held by the majority of scientists in the field.

From a certain perspective, this seems very intuitive: if science produces the best knowledge available, we should accept the testimony provided by scientists. If many scientists hold the same or similar views, we have all the more reason to accept the testimony. But if everyone accepted this predicament, then there would not be a debate about whether or not climate change is real (and has anthropogenic causes).

After analyzing the steps of Anderson's argument, I will point out the weaknesses of her position. The weaknesses can be subsumed into two categories: first, they rely on utterance-related assessment of the testimony of scientists. In Chapter 3, I showed the problems with message-scrutiny in the case of expert testimony. I therefore think that Anderson's account is not convincing. Second, Anderson mischaracterizes the epistemic abilities of laypersons. I believe that she overestimates the capabilities of laypersons to sufficiently comprehend the WIKIPEDIA entries about climate change and related topics. These are not easy to understand, certainly not for the majority of the laypeople.

After discussing “Democracy, Public Policy, and Lay Assessments of Scientific Testimony”, it should become obvious why many aspects of the proposed strategy are not particularly useful. Since Anderson suggested that laypersons should look at WIKIPEDIA entries to inform themselves about the scientific consensus about climate-science, I will analyze the same articles and assess whether laypersons are generally able to understand many of the claims made. I will conclude that they are not able to understand them. Many laypersons are not in the epistemic position to inform themselves on climate-science via WIKIPEDIA entries. One reason for this one is that many laypersons lack a proper high-school education and have hence no means to understand statistical or meteorological claims. The other is that they are in fact hard to understand even for highly educated laypersons (who lack special training in meteorology). I will describe the conditions for the understanding of the entry about “Climate Change” to highlight Anderson’s inaccurate picture of the epistemic position of the layperson.

Alvin Goldman offers five “sources of evidence” that the layperson can scrutinize to determine which expert to trust. In a separate section, I will discuss each one respectively and conclude that I do not think that they are particularly useful to the average layperson. Furthermore, Goldman does not offer any source for scrutinizing the veracity of the scientific experts. In the previous chapter, I argued that an argument for the general reliability is incomplete without an argument for the veracity of the speaker. In science, the veracity of the speaker cannot be assumed without further ado since the benefits for the speaker in case of a lie would be too great.

5.1. Anderson’s Strategy for Assessment

In 2011, Elizabeth Anderson published “Democracy, Public Policy, and Lay Assessments of Scientific Testimony”. In this paper, she offers a set of criteria to assess the trustworthiness of scientific experts and to justifiably accept expert testimony. The merits of her paper are obvious. She considers the epistemic position of the hearer. That means that she wants to offer reasons that laypersons can access. I do not explicitly disagree with her set of criteria that she offers to the layperson, but I do think that the reasons she offers do not have the intended strength to convince potential climate-science deniers.

Such reliance does not compromise the democratic credentials of public policy, or challenge the capacity of citizens to perform the epistemic tasks democracy demands of them, so long as citizens are able to judge who can be trusted. The solution to our problem is therefore to show that laypersons have the second-order capacity to judge trustworthiness and consensus, and access to the information needed to make such judgments (Anderson, 2011, pp. 144–145).

The quote illustrates why Anderson’s approach to expert testimony is of interest here. On first sight, her and my accounts seem very similar. Citizens (laypersons) should perform epistemic

tasks. Anderson's goal is to look for such tasks ordinary citizens actually can perform. In other words, she takes the conditions for reasons "accessibility" and "assessability" into account.

Anderson goes on to offer a manual on how to judge the trustworthiness of the testifier. It depends on three assessments of expertise (Anderson, 2011, pp. 145–149): the assessment of expertise, the assessment of honesty, and the assessment of epistemic expertise, and the assessment whether there is a consensus of trustworthy experts. This means that the hearer has to judge the testifier to be in the position to know, that the testifier tries to say the truth and that the testifier formed the belief in a responsible way. Anderson goes on to apply these criteria to the theory of anthropogenic climate change.

The assessment of the expertise of the speaker seems to be very straightforward. Expertise in a certain domain appears to have a hierarchical structure. This aligns well with my own diagnosis in Chapter 2 that laypersons and experts are in an epistemically hierarchical relationship.

There nevertheless remain many technical scientific questions that require specialized expertise. We may construct a hierarchy of expertise, from lowest to highest, as follows:

- (a) Laypersons.
- (b) People with a B.S. degree, a B.A. science major, or a professional degree in an applied science specialty far removed from the field of inquiry in question.
- (c) Ph.D. scientists outside the field of inquiry.
- (d) Ph.D.scientists outside the field, but with collateral expertise (for example, a statistician who is judging the use of statistics in the field).
- (e) Ph.D.scientists trained in the field.
- (f) Scientists who are research-active in the field (regularly publish in peer-reviewed scientific journals in the field).
- (g) Scientists whose current research is widely recognized by other experts in the field, and whose findings they use as the basis for their own research. This can be determined by considering such factors as citation counts, the impact factors of the journals in which they publish, and record in winning major grants.
- (h) Scientists who are leaders in the field—who have taken leading roles in advancing theories that have won scientific consensus or opened up major new lines of research, or in developing instruments and methods that have become standard practice. In addition to the factors cited in (g), leadership is indicated by election to leadership positions in the professional societies of the field, election to honorary scientific societies, such as the

National Academy of Science, and receipt of major prizes in the field, such as the Nobel Prize (Anderson 147).

So far, so good. Anderson offers an applicable understanding of the layperson-expert relationship. However, I argued before that the identification of expertise in a speaker is only one aspect of trustworthiness. The other aspect is the assumption of the veracity of the speaker. She also offers an argument for the assumption for the honesty of the speaker.

Criteria for Judging Honesty. The following factors tend to discredit a person's testimony by casting doubt on their honesty:

- (a) Conflicts of interest, such as receiving funds from agents who have stake in getting people to believe a particular claim.
- (b) Evidence of previous scientific dishonesty, such as plagiarism, faking experiments or data, and repeatedly citing research that does not support one's claims.
- (c) Evidence of misleading statements, such as cherry picking data or other misleading use of statistics, or taking quotations out of context.
- (d) Persistently misrepresenting the arguments and claims of scientific opponents, or making false accusations of dishonesty against them (Anderson 147).

This list is problematic. First of all, these criteria do not judge the honesty of scientists but rather dishonesty. While they do offer a comprehensive list of compelling reasons to be skeptic about the claims of scientists who meet the criteria, she fails to offer any reason to assume the scientist's veracity. Each of these criteria tells you what to do in case you encounter a scientist who previously was charged with dishonesty. People who accept homeopathy, climate-science denial, or creationism do so precisely because they do not think that there is consensus amongst scientist or because the consensus is somewhat tainted. Furthermore, they also question the very integrity of the scientists. If the incentive of scientists to produce solid research is questioned, then there is also no use of looking at the scientific consensus.

Anderson is sensitive to this problem. Considering climate change, she suggests that the layperson searches the Web for evidence of scientific consensus. A Web search for "climate change" will refer us to the Wikipedia entry. There we can read about the broad consensus amongst climate scientists that climate change is anthropogenic. However, it seems to me that climate change deniers often do not disagree with the fact that there is a consensus. They question the very integrity of mainstream scientists to produce honest research.

The second aspect of trustworthiness, veracity, seems to be of little interest to Anderson. Instead, she focuses on the truth-connection of the testimony. One powerful argument for the

assumption of truth-connection of the testimony is the scientific consensus. Anderson seems to think that we have all the more reason to accept the testimony of scientific experts if their report is backed-up by a wider consensus within the scientific community. This seems very intuitive. I believe most people would agree that it is more rational to accept a report if many epistemic agents hold the same proposition true.

The acknowledgment of scientific consensus, however, has very limited effects on the general acceptance of testimony by citizens (Kerr and Wilson). Psychological research suggests that science communication runs into at least three problems. Anderson is aware of these issues:

Thus, there is evidence for at least three obstacles to accurate lay assessment of scientific claims: cultural cognition, segregation, and misleading media reports. These three factors influence the public reception of science by influencing relations of trust and distrust. People trust sources that reinforce their values and distrust sources that threaten their values. They trust sources from their parochial ingroup and distrust sources distant from them in space, cyberspace, and social identity. They even trust claims debunked by the media, if the media has broadcasted these claims often enough (Anderson 157).

The media is the connection between science and the public. Anderson thinks that a stronger message control, where the media cannot broadcast fake news, can support the attempt to get rid of pseudo-scientific claims that persist in society. This is not only Anderson's suggestion to the crisis of faith in climate-science. Dan Kahan came to similar conclusions. His research shows that people have biased perceptions of expertise (Kahan et al.). This makes science communications even harder. It is not that people mistrust all experts, but rather that it is selective which ones they trust. This trust is rarely based on epistemic reasons.

5.2. WIKIPEDIA: A Source of Reliable Evidence?

The search for scientific consensus does not appear to be promising when tackling views of climate-science deniers. Yet, Anderson thinks that WIKIPEDIA can communicate scientific research in a correct way to us. According to her, it should be easy for us to access the reference to the scientific consensus even as laypersons.

I start this section by including a longer quote from Anderson.

The first permanent entry in a Google search of the term “global warming” is the Wikipedia article on this subject. This is a reasonable place for the public to start an investigation, given that Wikipedia incorporates extensive self-correcting measures, strives to enforce the political neutrality of entries, and prohibits original research—which means that claims must cite research published, and usually vetted, elsewhere. For our purposes, the most relevant section of the article is the one on “Debate and Skepticism.” While this is too brief to allow application of our criteria, it leads with links to articles on “Scientific Opinion on Climate Change,” “Climate Change Denial,” and “Global Warming Controversy.” These articles do allow application of our

criteria. They indicate that all three types of ground for asserting a consensus support the claim that there is a consensus of the experts in favor of the theory of global warming.

Surveys of the Peer-Reviewed Literature. “Scientific Opinion on Climate Change” leads with an account of the Intergovernmental Panel on Climate Change Fourth Assessment Report 2007 – the most important and authoritative consensus report of leading climate scientists worldwide on the findings of the peer-reviewed climate change literature. It concludes that the earth has been warming and that the chance that most of this warming is caused by human activity is at least 90%. The Wikipedia entry also discusses and links to a survey of the peer-reviewed literature on climate-science, which found that 75% of the papers either endorsed or took for granted the truth of anthropogenic climate change, 25% of the papers dealt with methodology or paleoclimate, and hence took no position on recent climate change, and none rejected the theory (Anderson, 2011, pp. 150–151) .

Anderson refers to the WIKIPEDIA entry on global warming, more specifically to the Section “Scientific discussion” which is quoted below. Converted to a pdf-file, the entry consists of 38 pages. More than 15 pages are text, the rest are footnotes and references. The reader either has to read almost the entire entry or directly scroll down to the section “Scientific discussion” to find the relevant information on the scientific consensus. I point this out since it poses an important threshold for two reasons: the reader is confronted with difficult terminology and syntax throughout the document. It is very unlikely that many laypersons understand every claim made in it and might feel discouraged. The reader’s other option is to scroll down and only read the section “Scientific discussion”. But again, we run into a problem. A person needs to know why this particular section should matter. That means that she must know enough about the scientific culture to be aware why consensus should strengthen the justification of the testimonial belief.

In the scientific literature, there is a strong consensus that global surface temperatures have increased in recent decades and that the trend is caused mainly by human-induced emissions of greenhouse gases. No scientific body of national or international standing disagrees with this view. In November 2017, a second warning to humanity signed by 15,364 scientists from 184 countries stated that "the current trajectory of potentially catastrophic climate change due to rising greenhouse gases from burning fossil fuels, deforestation, and agricultural production – particularly from farming ruminants for meat consumption" is "especially troubling". A July 2017 study published in *Environmental Research Letters* asserts that the most significant action individuals could make to mitigate their own carbon footprint is to have fewer children, followed by living vehicle free, forgoing air travel and adopting a plant-based diet (“Global Warming”).

Anderson thinks that a reason for the acceptance of the reports of anthropogenic causes of current climate change emerges from the fact that there is a widespread consensus. Considering the scientific evidence that this reason does not prove to be convincing, she suggests stronger message control. But does this really solve the problem?

The section of the WIKIPEDIA entry quoted above can be either accepted or rejected, but based on the average layperson's epistemic position, she will have to do so based on blind trust (or mistrust). I am left with no strategy how I can critically assess this claim. I have to trust the person(s) who wrote the entry and I have to trust the person(s) who authored the study mentioned.

From an epistemic perspective, this strategy is very dubious. WIKIPEDIA entries can be edited by anyone and it is not clear who the author(s) were. Given that the authors are often unknown to us, we have to trust WIKIPEDIA itself for the reliability of its entries. However, this is not possible for at least four reasons:

1. The number of entries exceeds the capacities of any realistic number of fact-checkers one could employ
2. WIKIPEDIA is not liable in case of any inaccuracies
3. Any person can edit entries on, for instance, global warming
4. Even the WIKIPEDIA entry on WIKIPEDIA mentions the inaccuracies in many entries³⁴

We can see that apart from contradicting empirical evidence, Anderson's strategy has weaknesses. The general reliability of WIKIPEDIA can reasonably be doubted and the fact that this particular information is correct does not prevent faking information by malicious editors in the future.

Laypersons often have no epistemic means to determine the truth of the claims in these WIKIPEDIA entries. Given that message-scrutiny is likely to fail here, trustworthiness-scrutiny does not appear to be more promising. It is unlikely that individuals can successfully find reasons for the trustworthiness of the authors and editors of the specific WIKIPEDIA entries. That leaves us checking the sources of the entries. This means to click on the links and analyze the trustworthiness of the author(s) of the studies, newspaper articles, blog entries, or the likes. Checking of sources seems to be an extraordinary task. As of late October 2018, the WIKIPEDIA entry on global warming cites 277 sources. I think it is intuitively too demanding to require people to scrutinize many or all of the sources.

³⁴ The section "Accuracy of content" points out the many inaccuracies of the entries. Although, there are thoroughly researched entries, it is not advisable to take them for granted.

Articles for traditional encyclopedias such as *Encyclopædia Britannica* are carefully and deliberately written by experts, lending such encyclopedias a reputation for accuracy. However, a peer-review in 2005 of forty-two scientific entries on both Wikipedia and *Encyclopædia Britannica* by the science journal *Nature* found few differences in accuracy, and concluded that "the average science entry in Wikipedia contained around four inaccuracies; *Britannica*, about three ("Wikipedia")."

A layperson who wants to inform herself on WIKIPEDIA about global warming thus needs to believe that she is justified to accept the information she reads and further to accept that the scientific consensus is a valid reason to accept claims that correspond with it.

5.3. Goldman's Strategies to Assess Trustworthiness

I will briefly mention one other alternative strategy to test trustworthiness proposed by Alvin Goldman. I include him here at this point since he contemplates another crucial question that complicates matters immensely: what should laypersons do in case of expert dissent? If two or more experts disagree on some matter, the simplest solution for the layperson would be to suspend judgment. Goldman, however, is not satisfied with this answer. He tries to find ways in which laypersons can assess the "which ones to trust".

Goldman analyzes five possible sources of trustworthiness which can be assessed by the layperson.

- (A) Arguments presented by the contending experts to support their own views and critique their rivals' views.
- (B) Agreement from additional putative experts on one side or other of the subject in question.
- (C) Appraisals by "meta-experts" of the experts' expertise (including appraisals reflected in formal credentials earned by the experts).
- (D) Evidence of the experts' interests and biases vis-a-vis the question at issue.
- (E) Evidence of the experts' past "track-records" (Goldman 93).

I argue that his five sources lack an accurate understanding of some fundamental problems regarding the layperson's outlook of science. I shall demonstrate using some examples that these sources might not be available at all times and to everyone. None one of these sources is a strategy for how the layperson should analyze testimony by scientists. Furthermore, laypersons will fail to decide which expert to trust in cases of scientific disagreement.

I believe that the current debates on climate change clearly show that laypersons frequently struggle to access each of these sources. I will address my issues with each of the sources respectively.

Ad (A): It is not clear to me how one should assess the arguments presented by the putative experts, especially in the case of climate-science. First, this would require a rough understanding of statistical distribution, meteorology, and a working knowledge of physical and chemical laws. For, the argument laid out by climate scientists hinges on statistical correlations. Second,

a layperson will find it hard to assess the effect of, for instance, CO₂ concentrations in the air on the weather. This again would require knowledge of meteorological phenomena.

Ad (B): The theory of “Cultural Cognition” by Dan Kahan, psychologist at Yale Law School, provides insight into the flaws of Goldman’s second “source”. Often, we do not ascribe expertise on epistemic grounds. Kahan thinks that our cultural background often shapes the way we ascribe expertise to peers. We are often powerless against these biases. An increase of scientific information about climate change, for instance, does not raise the awareness of the problems within all groups of society. Often, we as laypersons look for experts who share views that correspond with our worldview.

A process that does account for this distinctive form of polarization is ‘cultural cognition’. Cultural cognition refers to the influence of group values — ones relating to equality and authority, individualism and community — on risk perceptions and related beliefs. ... For example, people find it disconcerting to believe that behaviour that they find noble is nevertheless detrimental to society, and behaviour that they find base is beneficial to it. Because accepting such a claim could drive a wedge between them and their peers, they have a strong emotional predisposition to reject it (Dan Kahan).

It is easy to identify the problems of this source. Consulting more putative experts might not result in a belief that corresponds with the scientific consensus but rather corresponds with the person’s previously-held worldview.

Scientific consensus is a powerful justification for the acceptance of a belief. It seems rational if a multitude of experts holds the same beliefs. Matters are not settled in many scientific discussions. Furthermore, people think that there is more dissent than there actually is. People often do not trust the right experts.

In current debates on climate change laypersons struggle to distinguish between experts and non-experts. Many debates on TV are conducted by either laypersons or scientists who are trained in fields that do not make you a climate-science expert.

Ad (C): It is hard to see who the meta-experts on this matter are. Sometimes, we think of philosophers as meta-experts. However, I fail to see how philosophical training helps us understanding statistical data. Furthermore, what counts for (B) also counts for (C). If it is problematic to identify experts, I fail to see why identifying meta-experts should be any different.

Ad (D): Hidden agendas jeopardize the trustworthiness of any researcher. Goldman is right to point this out. Biased views of scientists can influence the outcome of research.

In the climate debate, each side wants to discredit the other by saying that their finding serves a hidden agenda. What is problematic here is that deniers of some scientific knowledge

sometimes insinuate hidden agendas of the scientific community to discredit their scientific findings. For instance, famous scientist and climate change skeptic William Happer was interviewed on FOX BUSINESS in which he states that there is a cult building around climate scientists (*Princeton Physicist: There's a 'Cult' Building around Climate Scientists - YouTube*).

Ad (E): I fail to see how the track record of a scientist should look like. For, most scientific hypothesis, including those about climate change, are not subject to simple verification. It is hence not possible to say how many times a scientist got it right and then assess her success rate.

Consider once again the interview with William Happer. He was introduced as a scientific expert. His track record and his professorship at Princeton University (from which he retired before the interview was conducted) also make him seem like a reliable pundit. FOX, however, fails to mention that he worked on adaptive optics and specialized in “atomic physics, optics, and spectroscopy” (“William Happer”). Climate-science is not his area of research or expertise. A layperson assessing the track record also needs to assess the eligibility of this track record for expertise. This is not always an easy task.

The argument from track record has one additional conceptual flaw. Track record is an argument (if at all) for general reliability but not for special reliability. A person who doubts the claims made might not be convinced by general reliability.

I find it conceivable that a layperson fails to access even one of the five sources in the example of climate change. Consequently, the layperson cannot assess the evidence these sources provide. Goldman takes the epistemic subject into account but lacks an accurate understanding of its epistemic abilities. Moreover, Goldman did not pay much attention to the actual application of his sources to the real world. Many arguments for climate-science that originate in these five sources are not convincing. Following his instructions could also complicate matters even more.

Ultimately, Goldman's approach does not prove to be particularly useful in the case of climate-science. The five sources often fail to identify distinguished scientists and dismissing charlatans. Furthermore, even if his sources can be safely applied, none of them would provide a convincing argument for trustworthiness without an argument for the veracity of the speaker. He fails to provide the latter.

5.4. “Climate-Science Is a Hoax”

The analysis of Anderson’s strategy should highlight the importance of my own incentive-based argument in the public discussion about climate change. The argument can be combined with other strategies to claim trustworthiness of scientific expert testimony and strengthens its persuasive power. Anderson demands that the citizen performs a number of epistemic tasks to determine what belief to accept. My own position is that it is crucial that every epistemic agent performs epistemic tasks when she adopts new beliefs. The ordinary citizen should scrutinize reasons for the justification of the acceptance. Sometimes the message itself is under scrutiny and sometimes it is the trustworthiness of the speaker.

Checking for a scientific consensus can be characterized as scrutinizing the message. It is a typical example of what I earlier called “direct external reasons”. The justifying reason that should arise from scientific consensus is not accessible and assessable by everyone. Consequently, it will not convince everyone.

Those people who do not find it a convincing reason often do so because they do not believe in the veracity of the experts. These people are often under the impression that climate scientists follow some sort of political agenda.³⁵ Even though these counterarguments are often ill-spirited and not supported by any factual evidence whatsoever, these concerns are prominent in the public debate. People who believe that some political agenda governs climate research will likely not be persuaded by the referral to the scientific consensus. The argument from incentives tackles precisely this worry.

Anderson is right in pointing at the scientific consensus but her goal to convince climate-science deniers might not be achieved. Her strategy does, however, target the group of people that are not skeptic about the scientific claims but are merely misinformed and think that the matter is not settled. A person who holds these beliefs can be skeptic about the truth of the WIKIPEDIA entries. Anderson’s strategy hence lacks persuasive power.

Likewise, Goldman wants laypersons to perform epistemic tasks before they accept reports from experts. He offers sources of evidence that should determine which expert to trust in the case of an expert dissent. These sources aim at improving the critical attitudes of the laypersons towards expert reports. Goldman’s approach is in part motivated by the rejection of Hardwig’s claim that we are left with blind trust when confronted with expert testimony.

³⁵ For instance, US-President Donald Trump insinuates on numerous occasions that the industry and liberal economy could have shaped the perception of climate scientists. A recent example can be found in an article published in the “New York Times” (The Associated Press).

In the recent literature the novice/expert problem is formulated in stark terms by John Hardwig (1985, 1991). When a layperson relies on an expert, that reliance, says Hardwig, is necessarily blind. Hardwig is intent on denying full-fledged skepticism; he holds that the receiver of testimony can acquire "knowledge" from a source. But by characterizing the receiver's knowledge as "blind", Hardwig seems to give us a skepticism of sorts. The term "blind" seems to imply that a layperson (or a scientist in a different field) cannot be rationally justified in trusting an expert. So his approach would leave us with testimonial skepticism concerning rational justification, if not knowledge (Goldman 86).

The sources Goldman offers, however, may not be accessible to laypersons. Moreover, laypersons might not be able to correctly identify experts. Cultural cognition threatens an epistemic evaluation of the expertise of the speaker. The evaluation of the track record of the experts is more complex than Goldman assumes. I conclude that the sources are not particularly useful in our case of climate change. Persons who believe that climate-science is a hoax will not change their minds scrutinizing any of the sources Goldman suggests. Anderson's hierarchical list of expertise might not be accepted because there she provides no argument for the veracity of the experts. Discussing Anderson and Goldman, I maintain that my incentive-based argument is essential because it is accessible and convincing.

Outlook: Science and Democracy

I now turn to an aspect briefly mentioned in the Introduction: the relevance of this thesis for society. Some of the arguments are not yet worked out in detail because they were not central enough to this thesis. However, I believe that some final remarks are interesting enough to be mentioned here at the end. Like many philosophers, I argued that it is rational to trust reports from which reflect the scientific consensus. I included an accessible argument for the veracity of scientists which makes the assumption of trustworthiness critical and thus strengthens the justification of the belief of the hearer. In the concluding part of the thesis, I want to hint at an answer of a (provocative) question, that has not been attempted to be answered yet: why is it so important for a democratic society that we put our trust in the scientific consensus?

In Chapter 4, I described what I called the “Best Knowledge Explanation”. It is fairly obvious why a society would want to have access to the best knowledge available. Scientific progresses in various fields like medicine entail apparent advantages for society and individual citizens. Science can provide “adequate solutions” to “significant problems” (Kitcher 105–06). It can be argued that the advantages of scientific progress for a society are intuitive. They are not my concern here. The “Best Knowledge Explanation” seems to be a good reason to justify trust in science from an epistemic standpoint.

Here in this Outlook, I briefly want to discuss another key aspect of why science is essential to the concept of democracy itself. Science has a *democratizing function* in society. In a democratic society, the element of deliberation is crucial. It is necessary to make informed decisions by policy-makers possible. But science as an institution can also create common ground for deliberation. The agreement on a common factual basis makes deliberative processes intersubjectively accessible. Although scientific processes are not value-free themselves, the scientific methods can provide such factual basis. For they are our best shot at objectifying experiences and critically assessing hypotheses.

Diverging beliefs with common ground can be called commensurable. This means that there are sets of standards of discourse which are accepted by all parties. Disagreement can still occur but not about the standards of discourse or the factual basis. Disputes about our policies should be commensurable to some extent. Different policy-makers may very well have incommensurable values. The factual basis should, however, be the common ground. The instantiation of

science as a source of facts and standards should create this common ground that enables democratic deliberation.

By “commensurable” I mean able to be brought under a set of rules which will tell us how rational agreement can be reached on what would settle the issue on every point where statements seem to conflict (Rorty 316).

Societies which do not possess a functioning scientific community or lack trust in science as a producer of true statements face serious democratic issues. Science, although not the sole creator of common ground in a society, is an important contributor to the deliberation processes.

Discrediting the scientific consensus (without providing good reasons) is a very serious threat to democratic deliberation. We should be cautious to spread such beliefs, for this would mean that we cast doubt on the truth-conducting practices of the scientific culture. Questioning the integrity of science can have severe consequences for societies.

Disagreements of policy-makers become incommensurable if “natural instinct” (Watson) becomes the reason they base their acceptance or rejection of expert testimony on.³⁶ Incommensurability of justification gives rise to a damaging form of relativism in democratic societies.

One can argue that plurality (Rawls 217) or even relativism is an essential feature to democracy itself. The election of parties or individual people is largely based on diverging understandings of ethical concepts like justice amongst many others. But a democratic society needs common ground for deliberation. An institution is needed to ensure a common factual basis. There are good reasons, like the “Best Knowledge Explanation” or my “incentive-based argument” which argue that science should be this institution. However, some propositions are harmful to democratic societies when relativized.

The acceptance of the scientific consensus cannot be treated as optional and relative to a belief system. The claims that correspond with it must therefore be understood as true in an unrelativized way. Philosophy of science showed that scientific hypotheses should not be treated as ultimately true. Karl Popper famously thought that hypotheses cannot be confirmed but only be corroborated. While a relativization of the truth of scientific propositions is crucial to maintaining the critical attitude of members of the scientific community, the situation for laypersons and policy-makers differs fundamentally. While scientists have the training to formulate good reasons for doubt, laypersons will often not be able to do so. For instance, in the case of climate science, most laypersons will simply have to accept the scientific consensus that current climate

³⁶ US-President Donald Trump defended his skeptic view on claims of climate scientists arguing that he possesses “natural instinct” for science.

change has mainly anthropogenic causes. For they cannot make relevant observations and formulate reasonable doubt.

The tacit dimension of knowledge threatens deliberative models of democracy since they cannot be linguistically communicated. Tacit knowledge, a term introduced by Michael Polanyi, is the concept of the inarticulate part of knowledge (Polanyi). Although Jonathan Benson understands that trust in epistemic authorities can help overcome a shorting of reason-giving for citizens, he thinks that it is possible to deliberate over reasons to trust someone (Benson). Deliberation ends at trust. In this thesis, however, I provided a reason that makes deliberation possible.

Benson calls the reasons to trust someone “personal”. Deliberative democracy should not focus exclusively on impersonal reasoning but should also incorporate personal reasons for trust. I agree with him. Nonetheless, I believe that strong impersonal reasons for trust in our best epistemic institutions and the people affiliated with them can be found. Reasons do not need to remain solely personal if they are objective reasons for trustworthiness. Incentive-based reasoning is not purely subjective for others can observe the incentives a person has. I believe that I provided such an argument. For ordinary citizens, to rely on these reasons they must fulfill two conditions: accessibility and assessability. The incentive-based argument which does not merely require people to have faith in scientific institutions or believe in their integrity but merely access to their incentives created by the scientific culture.

More research can be done on the function of science as a creator of common ground in a democratic society. The aspects mentioned in this section are worth exploring. The claim that science is a creator of common ground is tempting but far from compelling. Analysis of the epistemic status of the truth-claims of scientific hypotheses within a democratic society is needed to understand the role of relativistic thinking in a democracy. The output of certain central institutions of science must be treated by laypersons and policy-makers as an absolute foundation for deliberation.

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