Evidence: Knowledge and Understanding

1 Current State of Research in the Field

1.1 Evidence and its Ontology

The notion of evidence is central to epistemology. It is connected to the notion of justification which figures in traditional analyses of knowledge and, more generally, to rational inquiry. Providing a systematic philosophical account of evidence has however proven quite difficult. Several important questions are related to this notion and have generated lively debates among philosophers. One question in particular divides philosophers: what kind of things can constitute a subject's evidence and play the distinctive role played by evidence? This question has important ramifications when it comes to providing an account of epistemic rationality, knowledge and rational inquiry or answering skeptical challenges threatening ordinary knowledge.

According to a view dubbed *the phenomenal view* by Williamson (2000) and Kelly (2008) that can be traced back to Descartes, evidence consists of things which a subject has a special access to. More precisely, the evidence a subject has for holding certain beliefs is ultimately constituted by things accessible to her by reflection or introspection alone such as perceptual experiences and ostensible memories. Facts about the external world or factive mental states are excluded from the kind of things that can constitute the evidence a subject has for holding certain beliefs according to this conception.[1]

A factive turn however recently took place in epistemology and several philosophers have argued for less restrictive conceptions of evidence. In the wake of the attempts to provide a Gettier-proof analysis of knowledge, Williamson (2000, 2011, 2014), building on the skepticism of philosophers such as Craig (1990) and Zagzebski (1994) concerning the prospects of providing such an analysis, initiated the knowledge-first program in epistemology, philosophy of language and philosophy of action.[2] The main tenet of knowledge-first epistemology is that knowledge cannot be analysed in terms of simpler notions but that notions of epistemological importance such as evidence and justification are themselves analysable in terms of knowledge. In Williamson's view, the evidence possessed by a subject consists of the propositions known by her. In that, the notion of evidence itself is analysed in terms of what a subject knows and true propositions about the external world are taken to constitute the evidence possessed by a subject at a given time.[3]

Likewise McDowell's (1982, 1995, 1998) work on perceptual justification led several philosophers to the view that factive mental states which are partly constituted by a subject's

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[1] For proponent of some version of this view see Pollock (1974), Chisholm (1977), Cohen (1984), Davidson (1986), Conee and Feldman (1985, 2001, 2004, 2008, 2011), Brueckner (1994), Huemer (2001), Silins (2005), Turri (2009), Feldman (2014), Madison (2014, 2018) and McCain (2014).

[2] Contributions to this research program have been made by Hyman (1999, 2006), Adler (2002), Bird (2007), Sutton (2005, 2007), Hawthorne and Stanley (2008), Haddock (2010), Millar (2010), Ball (2013), Littlejohn (2011, 2012, 2013a,b, forthcoming b), Logins (2016), Simion (2016, 2019), Kelp (2017a, 2018) and Meylan (2017).

[3] See also Dancy (2000) and Schroeder (2011) for the view that true propositions or facts constitute a subject's evidence.

external environment can be part of a subject's evidence.[4] According to such a view, taking a subject's evidence to consist of non-factive psychological items is overly restrictive in that it fails to correctly account for the particular rational import of factive mental states such as seeings or rememberings.

Thus there is a substantial disagreement among contemporary philosophers concerning the ontology of evidence. This disagreement is rooted in important issues concerning the type of access we have, as rational subjects, to the reasons we possess for holding beliefs about reality and concerning the ability of those reasons to provide us with a cognitive access to reality. The project "Evidence: Knowledge and Understanding" draws on the contemporary debate concerning the ontology of evidence to explore the hypothesis that the understanding we have of what we know contributes to the role played by evidence.

1.2 Varieties of Understanding

Within the philosophy of science, understanding has been almost exclusively associated with the notion of explanation by philosophers such as Hempel (1965), Achinstein (1983), Salmon (1984) or Lipton (2004). Yet, as Zagzebski notes in highlighting the primacy of certainty over understanding in recent epistemology: "people can mean so many different things by the word "understanding" that it is hard to identify the state that has been ignored." (Zagzebski 2009, p. 141). The following sentences can serve to illustrate Zagzebski's remark:

(1) S understands why mammals need oxygen to survive.

(2) S understands what causes lighting.

(3) S understands Newtonian Mechanics.

(4) S understands Athenian victory over the Persians at Marathon.

(5) S understands that the United Kingdom decided to leave the European Union.

(6) S understands that her friend is angry with her.

(7) S and the business owner came to an understanding on the price of a particular product.

As these sentences show, we indeed use the term "understanding" to mean very different things. In order to inquire into the epistemology of understanding, it is therefore necessary to identify the meanings of the word "understanding" that are epistemologically relevant. As outlined by Elgin (2007) and Baumberger (2014), the use that is made of the word "understanding" in sentences (6) and (7) is not directly relevant to epistemology. In (6), this word is used in a moderating way. It is used to hedge an assertion or attenuate its force. "Understanding", in that particular sentence, is therefore not used to denote a cognitive state of epistemological interest. Likewise, in (7), the word "understanding" is used to characterize an informal agreement between S and the business owner rather than a state which S is in and which has distinctive epistemic properties.

[4] See Neta (2002, 2008), Neta and Pritchard (2007) and Pritchard (2008b, 2011a,b, 2012, 2015) and Mitova (2015).

On the other hand, the use that is made of the word "understanding" in sentences (1) – (5) is of direct epistemological relevance. Each of these sentences ascribes to S some type of cognitive success. However, distinctions have been drawn between the types of states ascribed by these sentences. A first distinction drawn in Baumberger (2014) and Grimm (2011) among the states ascribed by sentences (1) – (5) concerns the object of the ascribed state. While sentences (1) – (2) and (4) – (5) ascribe an understanding of some worldly item to S – that is, an understanding of some state-of-affairs, event or particular subject matter – (3) ascribes an understanding of some representation that can constitute the vehicle of the understanding of some worldly item.

Orthogonal to the distinction that hinges on the representational nature of the object of the understanding that is ascribed to a subject, philosophers distinguish among the states ascribed in sentences (1) – (5) on the basis of the clauses that follow the word "understanding". Kvanvig (2003) introduces the notion of propositional understanding as the type of understanding that is ascribed by sentences involving a *that*-clause such as (5). He distinguishes this type of understanding from objectual understanding that is ascribed by sentences of the form "S understands x" such as in (3) – (4). Objectual understanding is itself distinguished by Kvanvig (2003), Pritchard (2009), Khalifa (2013a, 2017) and Carter and Gordon (2014) from explanatory understanding which is paradigmatically ascribed by sentences involving wh-clauses such as (1) – (2).

The reason for drawing distinctions between propositional, objectual and explanatory understanding is that each of these kinds of understanding appears to require a separate treatment. Explanatory understanding, for instance, is a type of understanding that is typically promoted by explanations.[5] On the other hand, it is less clear that objectual understanding requires having an explanation and it seems obvious that understanding that the United Kingdom decided to leave the European Union does not require having an explanation of that fact.[6] In addition, certain types of understanding are more easily reducible to knowledge than others. While several philosophers agree that propositional understanding simply amounts to propositional knowledge,[7] there is a substantial disagreement concerning the fact that explanatory or objectual understanding are kinds of knowledge.

1.3 The Epistemology of Understanding

The current debate concerning the epistemology of understanding mainly revolves around arguments provided in favor or against the view that, as Grimm (2006) puts it, understanding is a species of knowledge. As this view involves both a sufficiency claim and a necessity claim, this debate can be broadly divided into challenges raised for each of the two following claims:

(1) Knowledge of some set of propositions is sufficient for understanding.

(2) Knowledge of some set of propositions is necessary for understanding.

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[5] See Lipton (2009) for counter-examples to the claim that having an explanation of p is necessary to understand why p.

[6] See Khalifa (2013a, 2017) for the claim that objectual understanding is reducible to explanatory understanding.

[7] See Elgin (2007), Grimm (2011) and Gordon (2012).

As most philosophers involved in the current debate concerning the epistemology of understanding acknowledge, understanding involves a specific grasping requirement.[8] According to Kvanvig for instance understanding requires "the grasping of explanatory and other coherence-making relationships in a large and comprehensive body of information" (Kvanvig 2003, p. 192). This grasping requirement constitutes, according to some, a challenge for the claim that knowledge of some propositions is sufficient for gaining understanding. For instance Elgin, considering the understanding one can have of the Athenian victory over the Persians at Marathon, states that:

> Understanding the Athenian victory involved more than knowing the various truths that belong to a suitable tethered comprehensive, coherent account of the matter. The understander must also *grasp* how the various truths are related to each other and to other elements of the account. (Elgin 2017, p. 46)

Likewise, Pritchard (2010) and Hills (2016) offer certain cases designed to show that a subject can come to know, through a reliable testimony, why something is the case and still fail to gain an understanding of why it is the case. The reason is that while understanding involves a distinctive grasping component, propositional knowledge and explanatory knowledge do not. This difference, in turn, accounts for the fact that, contrary to propositional knowledge, understanding is not easily transmissible by testimony.[9]

This challenge for claim (1) has however been resisted by philosophers such as Grimm (2006, 2014) and Kelp (2014, 2015, 2017b).[10] A first question raised by this challenge is whether a subject who lacks the grasp that is required to understand in the cases offered by Pritchard (2010) and Hills (2016) can be regarded as genuinely believing what is said to her. Second, the challenge to claim (1) hinges on the way the grasping requirement of understanding is itself to be conceived of. If this requirement can adequately be conceived in terms of knowledge of some set of propositions, cases such as the one put forward by Pritchard and Hills do not constitute a genuine challenge for the sufficiency claim.

Challenges for the claim that knowledge of some set of propositions is necessary for understanding are related, for their parts, to notions that are traditionally tied to the analysis of propositional knowledge such as belief, truth, justification and luck. While most philosophers agree that understanding is somehow answerable to facts, some argue that it is in a way that is importantly different from the way knowledge is. In Elgin's (2004, 2007, 2017) view the role of idealized models in science and, more generally, the contribution of falsehoods to the understanding we gain of phenomena supports the conclusion that understanding's answerability to facts is not to be conceived in terms of a set of true beliefs or approximately true beliefs held by a subject about reality.[11] Instead, understanding crucially depends on the

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[8] See Kvanvig (2003), Riggs (2003), De Regt and Dieks (2005), Greco (2014), Kelp (2015, 2017b), Grimm (2006, 2014, 2016), De Regt (2009), Khalifa (2013c, 2017), Hills (2009, 2016), Elgin (2007, 2017), Baumberger and Brun (2017), Strevens (2013, 2017), Dellsen (2018) and Janvid (2018).

[9] See Zagzebski (2009) and Hills (2009, 2016) for the claim that contrary to propositional knowledge, understanding does not transmit or does not transmit easily through testimony. See Gordon (2017), Boyd (2017), Malfatti (2019, 2020, forthcoming) and Grimm (2020) for a critical discussion of this claim.

[10] See also Sliwa (2015) and Khalifa (2013c, 2017).

[11] See also Zagzebski (2001), Janvid (2014) and Riggs (2009) for weak factivity constraints on understanding. See Dellsen (2017) for the claim that understanding, contrary to knowledge, does not require belief.

contextual acceptance of useful fictions that can promote, in particular contexts of inquiry, some understanding of phenomena. However philosophers such as Kvanvig (2003, 2009a,b) and Mizrahi (2012) resist this conclusion by providing alternative accounts of the role falsehoods play in the understanding delivered by idealizations. In addition, they offer moderate factivity constraints on understanding to account for the fact that understanding often is compatible with holding certain false beliefs concerning a target phenomenon.[12]

Another challenge raised against the necessity claim (2) concerns understanding's connection to justification and luck. Cases offered by Hills (2009, 2016) and Dellsen (2017) purport to show that, contrary to propositional knowledge, understanding can be based on defeated evidence. Additionally, cases offered by Kvanvig (2003) and Pritchard (2008a, 2010) purport to show that contrary to propositional knowledge, understanding is not vulnerable to certain forms of epistemic luck.[13] Proponents of knowledge-based accounts of understanding such as Grimm (2006), Khalifa (2013c, 2017) and Kelp (2014, 2017b) resist these conclusions by carefully examining the connection between cases offered as challenges to claim (2) and Gettier-style cases that are taken to involve genuine knowledge-undermining luck.[14] The debate concerning understanding's compatibility with luck has thereby led to an insightful re-examination of the kind of luck which knowledge is taken to be vulnerable to.

2 Detailed Research Plan

The "Evidence: Knowledge and Understanding" project is structured around two subprojects: subproject A and B. Each of these subprojects is itself subdivided into three distinct parts. The main hypothesis that Subproject A will investigate is that the understanding we gain of what we know contributes to the role played by the evidence we possess. Subproject B, for its part, will investigate three aspects of the current debate concerning the epistemology of understanding with the aim of making explicit the reasons for thinking that understanding is best conceived of as a body of comprehensive and well-connected knowledge. We take both of these subprojects to be complementary as we believe that a knowledge-based account of understanding is best suited to account for the contribution understanding makes to the role played by the evidence we possess. Because of their complementarity, pursuing both of these subprojects simultaneously has the potential of articulating a novel and unified view of the relation between evidence, knowledge and understanding. However, while complementary, each of these subprojects can be pursued separately. For instance, even if we do not obtain the results we intend to achieve in subproject A, it would be perfectly possible to pursue subproject B and show that a knowledge-based account of understanding can be motivated independently of its ability to shed light on understanding's contribution to the role played by evidence.

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[12] See Carter and Gordon (2014), Greco (2014), Rice (2016), Khalifa (2017) and Lawler (forthcoming) for moderate factivity constraints on understanding.

[13] See also Zagzebski (2001), Morris (2012), Rohwer (2014) and Hills (2016) for the view that understanding is compatible with certain forms of knowledge-undermining luck.

[14] See also Brogaard (2005), DePaul and Grimm (2007), Khalifa and Gadomski (2013), Greco (2014), Riaz (2015), Sliwa (2015) and Boyd (2020) for the claim that knowledge and understanding do not differ when it comes to their connection to epistemic luck.

2.1 Subproject A: Evidence and Understanding

2.1.1 Evidence and Knowledge

According to the main hypothesis that Subproject A will investigate, there is an important connection between what a subject knows and the evidence she possesses. More precisely, the evidence possessed by a subject depends, in some important sense, on what a subject knows to be the case. While it seems intuitively correct that when a subject learns a particular truth, she thereby acquires this truth as evidence for further claims, how precisely does a subject's overall evidence depend on what she knows? This part of subproject A aims at exploring the hypothesis that the evidence possessed by a subject consists of the true propositions known by that subject; a hypothesis formulated, in its most influential form, by Williamson (2000).

An important reason for the view that the evidence possessed by a subject consists of the propositions known by her is that a subject's evidence must consist of true propositions. Williamson (2000, p. 193-194) notes that only propositions can bear the kind of logical, explanatory and probabilistic relation to the content of a subject's beliefs that the evidence possessed by that subject bears to those contents. Only propositions can be used in inferences to support further beliefs because only propositions bear the right kind of relations to the propositions inferred by a subject.[15] In addition, only true propositions can guide a subject to the truth in the way a subject's evidence is supposed to guide her. Williamson points out that: "if one's evidence included falsehoods, it would rule out some truths, by being inconsistent with them. One's evidence may make some truths improbable, but it should not exclude any outright." (Williamson 2000, p. 200) and that "Once it is granted that all propositional evidence is true [. . .] adjusting our beliefs to the evidence has an obvious point. It is a way of adjusting them to the truth. Although true evidence can still support false conclusions, it will tend to support truths." (Williamson 2000, p. 201).

If one accepts these considerations for the claim that evidence must consist of true propositions, there are reasons to think that what it takes to possess some true proposition as evidence is to know it. One important reason is that, as pointed out by Hyman (1999) and Littlejohn (forthcoming c), if evidence is constituted of true propositions or facts, a true proposition or a fact cannot guide one's thought or behaviour if one's connection to it is accidental.[16] This is corroborated by the oddness of statements such as 'S believes q for the reason that p but S does not know whether p' outlined by Unger (1975). This part of subproject A will carefully examine this line of argument for the view that the evidence possessed by a given subject consists of the propositions she knows. In particular, it will examine the hypothesis that knowledge is the kind of relation that a subject must bear to some true content in order for her to be guided by that content in the way evidence can guide rational subjects. This will require considering alternative kinds of relations that a subject can bear to some true proposition such as gettierized justified true belief and veridical perception. A particular attention will be paid to the ongoing debate concerning the question as to whether knowledge is the most general factive mental state and whether states of

[15] See also Unger (1975) and Davidson (1986).

[16] Williamson (2000) provides additional reasons for the claim that nothing that falls short of being knowledge can provide a subject with evidence for acting or believing a particular claim.

veridical perceptions for instance are more adequately conceived of as ways of knowing.[17]

Another aim of this part of subproject A is to explore the externalist consequences of the view that the evidence a subject possesses consists of the propositions she knows. Indeed, this view conflicts with the internalist intuition that a subject's evidential and epistemic situation is importantly independent from factors that are external to her perspective such as the reliability of the process through which her beliefs are formed.[18] A case often used to illustrate that intuition is the New Evil Demon thought experiment introduced by Cohen (1984). In this scenario, a subject who inhabits our world has a counterpart in a world run by a deceitful demon. Her counterpart undergoes exactly the same experiences as she undergoes – that is, her counterpart's experiences are introspectively indistinguishable from hers. Her counterpart also holds exactly the same beliefs as she does but, contrary to the subject who inhabits our world, she is systematically deceived. This thought experiment is designed to elicit the intuition that both subjects are alike when it comes to the evidence they have for the propositions they believe. An intuition that is in direct tension with the view that a subject's evidence consists of the propositions she knows as, given this view, the counterpart's evidential situation is far worse than the evidential situation of the subject who inhabits our world.

Another externalist consequence of the view of evidence that this part of subproject A will investigate is that a subject is not always in a position to know what her evidence includes. This is because she is not always in a position to know what she knows to be the case. This consequence conflicts with the intuition that we have a special kind of access to our evidence. More precisely, it conflicts with the idea that our evidence consists of the kind of things which we have reflexive access to; of things that we can know by reflection alone.[19] One important motivation for accepting this constraint on what constitutes a subject's evidence is the claim that we should be able, by virtue of the exercise of our rational capacities, to do what rationality requires from us and this entails being able, by virtue of the exercise of these capacities, to know what evidence we possess.[20]

Exploring the externalist consequences of the view that the evidence possessed by a subject consists of the proposition that subject knows will require providing a critical assessment of cases such as the New Evil Demon and of the intuitions these cases are designed to elicit. A particular attention will be devoted to the ongoing debate concerning the distinction that can be drawn between justification and epistemic excuses with the aim of offering a convincing way to account for those intuitions through this distinction.[21] Attention will also be paid to the insightful anti-luminosity arguments offered by Williamson (2000) to the effect that the assumption concerning the type of privileged access we enjoy to ordinary facts, including facts about our mental life, should be reconsidered. The investigation that will be carried

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[17] See Williamson (2000) and Millar (2010) for this view and Kelp and Ghijsen (2016) for a critical discussion of the justifying role of success states such as seeings and rememberings.

[18] The line between internal and external factors is sometimes drawn in terms of factors (internal) supervening on the subject's non-factive mental states.

[19] The notion of reflexive access should be understood as including the introspective access we have to our mental states.

[20] It should be noted that this constraint on what constitutes evidence is accepted by certain externalists as well; see for instance Pritchard (2008b, 2011a,b, 2012, 2015).

[21] See Meylan (2017), Williamson (forthcoming) and Littlejohn (forthcoming a).

out in this part of subproject A will thereby directly contribute to the debate that opposes externalist and internalist views of evidence and epistemic justification.

2.1.2 The Role of Evidence

According to the received view, understanding some target phenomenon requires having evidence for believing an account of that phenomenon. As understanding plausibly involves committing to the truth of some account, this requirement is intuitively correct and cases discussed by Khalifa (2017) strongly suggest that acquiring better evidence for the account one accepts as the explanation of some phenomenon increases the degree of understanding one has of the phenomenon.

The hypothesis that will be explored in this part of subproject A however focuses on a connection between evidence and understanding that, to our knowledge, has not been addressed as such in the literature. Thus, this part of subproject A will contribute to fill a scientific gap. According to this hypothesis the understanding a subject has of whatever constitutes her evidence contributes to the role played by that evidence. Kelly (2008, 2016) identifies several of these roles. As noted in section 2.1.1, evidence is what makes some belief reasonable or justified and guides a subject to the truth. By believing in accordance to the evidence they have, rational subjects adjust their beliefs to the truth. But evidence also plays an important social role. It constitutes a neutral and intersubjective arbiter of dispute that can settle disagreements among rational thinkers. This role explains, in Kelly's view, the value that is placed on the publicity of evidence:

> A large value is placed on the *publicity* of evidence, *i.e.*, on the fact that paradigmatic evidence is something that can be shared by multiple individuals. Indeed, it is this public character of evidence which is often taken to underwrite the possibility of an inquiry that is genuinely objective. (Kelly 2008, p. 949)

It is common in science to talk of evidence as something that is public in nature and that can make the beliefs of different inquirers converge. As Railton (1984, p. 764) remarks, objective inquiry typically proceeds by relying on intersubjectively available evidence when assessing theories; such publicly available evidence being what can play a role of neutral arbiter essential to the process of inquiry.[22]

To use an example borrowed from Kelly, consider the presence of Koplik spots on the skin of some individual which is regarded by medical specialists as evidence for the proposition that the individual at issue has measles. The presence of Koplik spots on the skin of an individual is a publicly available fact that can constitute a neutral arbiter of dispute in case two specialists disagree on a diagnosis. One could base a certain diagnosis on the presence of a certain class of symptoms while the other could argue for an alternative diagnosis based on another class of symptoms. The discovery of Koplik spots on the skin of the individual about whom these two alternative diagnoses are made could arbiter the dispute between the two specialists in that it could make their respective diagnoses converge.

[22] See also Hempel (1952) and Popper (1959).

The mere discovery of Koplik spots on the skin of the individual however does not appear sufficient for the two specialists to converge in their diagnoses. If they have radically different accounts of the presence of Kolplik spots on someone's skin, the discovery of such spots on the skin of a particular individual will not suffice for them to reach an agreement concerning the fact that that individual has measles. In order for them to agree, what is needed is a shared understanding of what they discover. Unless they possess this common understanding, the evidence they acquire cannot make them converge in their diagnoses.

These considerations suggest that the understanding subjects have of whatever constitutes their evidence makes a crucial contribution to the role that is played by that evidence. Investigating this hypothesis will require carefully examining the roles that are played by the evidence we come to acquire. In particular, we will examine precisely in what way evidence can constitute a neutral arbiter of dispute and how this role can underwrite, as Kelly puts it, the possibility of a genuinely objective inquiry. In addition, we will explore the influence of background theories and of the understanding they provide of whatever constitutes the evidence possessed by a subject on the roles played by that evidence. Another aim of this part of subproject A will thus be to examine more precisely disagreements that are based on conflicting accounts or background theories. Are such disagreements, for instance, due to a lack of rationality on the part of the disagreeing subjects or can two perfectly rational subjects fail to reach an agreement because of a lack of shared understanding of what constitutes their evidence?

2.1.3 Objects of Understanding

The main hypothesis of subproject A – namely that the understanding a subject has of what she knows contributes to the role played by her evidence – raises an interesting question that has received little attention on its own that this part of subproject A aims at examining: what kind of things are understood by a subject? There is little doubt that the primary objects of propositional knowledge are true propositions or facts but the varieties of understanding outlined by philosophers involved in the current debate concerning the nature of understanding suggests that almost anything can be the object of someone's understanding. This, we believe, however deserves further attention.

As outlined in section 1.2, philosophers tend to distinguish at least three varieties of understanding: propositional understanding, explanatory understanding and objectual understanding. It is highly plausible that both propositional understanding and explanatory understanding are similar to propositional knowledge when it comes to their object. Both kinds of states appear to be understanding of true propositions or facts. As a matter of fact their object has a propositional structure. Someone understands that something is the case or understands why something is the case. In addition, both kinds of states appear to be factive in the sense that one cannot understand that p unless p is the case and that one cannot understand why p unless p is the case. One cannot, for instance, understand that the United Kingdom decided to leave the European Union or why the United Kingdom decided to leave the European Union unless it is true that the United Kingdom decided to leave the European Union.

However, it is less clear that objectual understanding is similar to propositional knowledge in that respect. This is true, in particular, when one considers the distinction that can be drawn between the understanding one can have of some worldly item and the understanding one can have of a representation of some worldly item (cf. section 1.2). Objectual understanding is often described as the understanding a subject can have of a particular *subject matter* and, this seems obvious, subject matters go beyond individual propositions. The understanding one has of the Athenian victory over the Persians at Marathon does not consist of an understanding of some individual proposition or fact. It seems, instead, to consist, as Elgin puts it, of "a cognitive relation to a fairly comprehensive, coherent body of information." (Elgin 2007, p. 35). This coherent body of information can concern a particular event, a particular object or a structured representation of the world such as a particular scientific theory.

The holistic dimension of objectual understanding suggests that this kind of understanding is not primarily an understanding of true propositions or facts. Anything can be understood as a subject matter by a given subject. Yet such a conclusion concerning the primary object of objectual understanding requires a more careful examination and our hypothesis is that in the case of objectual understanding too, what is understood by a subject consists of whatever can be known by a subject. To examine this hypothesis, we will draw on Khalifa's (2013a, 2017) argument to the effect that objectual understanding does not constitute a genuine variety of understanding and that whenever a fair comparison can be made between a state of objectual understanding and a state of explanatory understanding, objectual understanding amounts to explanatory understanding. We will also explore the possibility of accounting for the holistic dimension of objectual understanding in terms of the degree of connectedness and comprehensiveness of a body of factual knowledge that concerns a particular subject matter.[23]

Our investigation of the question of understanding's object will directly contribute to the current debate concerning the varieties of understanding and, if we are correct concerning the fact that the type of things that can be understood by a subject are the type of things that can be known by a subject, this would nicely fit with the results we intend to achieve in the other parts of subproject A.

2.2 Subproject B: Knowledge and Understanding

2.2.1 Central Truths

It should be obvious that one cannot understand why something is the case or a particular phenomenon by means of a deeply inaccurate representation of the world. If one believes that thunder results from Hephaistos using a hammer, one cannot qualify as understanding the phenomenon of thunder. Yet, understanding admits of certain falsehoods. One can understand a phenomenon by means of a representation that is only approximately correct. If one believes that the Athenians deployed 9000 troops at the battle of Marathon while, in fact, they deployed 10'000, this false belief, on its own, does not prevent one from understanding the Athenian victory over the Persians at Marathon. If, when questioned about this historical

[23] See Greco (2014) and Kelp (2015, 2017b) for theories of objectual understanding that account for its holistic nature in terms of the internal properties of a body of factual knowledge.

event, one manifests a good grasp of what happened and can answer correctly many questions concerning that event, finding out that one holds that false belief would not provide a good ground to deny that one lacks understanding of that event. But what if one believes that the Athenians used gunpowder during the battle of Marathon? This false belief surely prevents one from understanding Athenian victory over the Persians at Marathon. One cannot, it seems, genuinely understand what happened during the battle of Marathon if one believes that the Athenians used gunpowder during the battle.

Hence, understanding is not compatible with believing any falsehood. But why does believing certain falsehoods prevent one from understanding a given phenomenon while believing other falsehoods remains compatible with having an understanding of that phenomenon? According to Kvanvig (2003, p. 201) "when the falsehoods are peripheral, we can ascribe understanding based on the rest of the information grasped that is true and contains no falsehoods". Kvanvig's thought is thus that certain propositions are central to the understanding of a phenomenon while others are only peripheral to its understanding. Insofar as the false propositions that are believed by a subject are peripheral to the understanding of a given phenomenon, a subject can understand the phenomenon by virtue of her being correct concerning propositions that are central to its understanding.

We believe that the distinction between propositions that are central to the understanding of a phenomenon and propositions that are only peripheral to its understanding constitutes a promising way of accounting for understanding's connection to truth and this part of subproject B aims at exploring the hypothesis that understanding requires believing truths that are *central* to the understanding of a target phenomenon.

Exploring this hypothesis will require examining the role played by idealized assumptions and models in the understanding delivered by science. The ideal gas law, for instance, involves the assumption that no intermolecular attraction takes place within a gas and can, under certain conditions, provide an understanding of the behaviour of real gases. Is, as Elgin (2004, 2007, 2017) thinks, the false assumption involved in this law central to the understanding it delivers of the behaviour of real gases? Do the idealized models used in science involve falsehoods that are central to and possibility ineliminable from the understanding they deliver?[24]

Providing an answer to these questions requires first clarifying what it takes precisely for some proposition to be central to the understanding of a given phenomenon. According to a recent proposal made by Gordon (forthcoming), central propositions are propositions that are highly practically relevant to the understanding of a phenomenon. That is, central propositions are propositions such that if a subject believed falsely whether they are true, it would undermine significantly her ability to make reliable predictions and to manipulate information pertaining to a target phenomenon. The link between the centrality of certain propositions to the understanding of a phenomenon and their practical relevance is certainly one dimension of the notion of centrality invoked by Kvanvig that will be investigated in this part of subproject B. However, we believe that the notion of centrality should also be examined in relation to the fact that understanding typically comes in degrees and

[24] See Wayne (2011), Bokulich (2011) and De Regt and Dieks (2015) and De Regt and Gijsbers (2017) for the claim that idealizations relied upon in science involve central falsehoods.

that attributions of outright understanding exhibit a sensitivity to the overall context of attribution.[25] Another aim of this part of subproject B is therefore to examine if and how the hypothesis that understanding requires believing truths that are *central* to the understanding of a target phenomenon can shed light on these two features of understanding.

Providing an elucidation of the distinction between propositions that are central to the understanding of a phenomenon and propositions that are peripheral to its understanding will directly contribute to the ongoing debate concerning the type of factivity constraint that applies to understanding. In addition, it will contribute, if we are correct concerning the hypothesis that lies at the centre of this part of subproject B, to the debate concerning the relationship between understanding an knowledge. For our hypothesis, if correct, lays ground for an analysis of understanding in terms of knowledge a subject has of propositions that are central to the understanding of a target phenomenon.

2.2.2 Grasping

The grasping component of understanding is taken by several philosophers to represent a challenge to knowledge-based accounts of understanding (cf. section 1.3). Yet, the hypothesis that this part of subproject B aims at exploring is that this component is itself best conceived in terms of propositional knowledge.

To understand why something is the case or to understand a particular phenomenon, a subject plausibly needs to possess a comprehensive account of that phenomenon. But she also needs to grasp the connections between the elements of that account. The question is: what does it take precisely to grasp these connections? According to Strevens (2013) who focuses on explanations as vehicles of understanding, what is needed is a grasp of the structure instantiated by the explanation that one possesses. That is, to understand why something is the case by means of an explanation, a subject needs a grasp that the propositions that constitute that explanation "instantiate the prescribed structure—for example, that they form a deductive argument for the explanandum (for Hempel) or that they stand in the right kinds of statistical relationship to the explanandum and to each other (for Salmon)." (Strevens 2013, p. 511). By grasping this structure, a subject can come to understand why something is the case by means of an explanation.

If Strevens is right concerning the kind of feature that needs to be grasped by a subject for her to understand why something is the case by means of an explanation, there is no *prima facie* reason for thinking that the grasping component of understanding could not be analysed in terms of propositional knowledge. But what exactly would such knowledge consist in? Is it sufficient for the subject to know that the account she possesses constitutes a causal explanation as opposed to a deductive argument? This does not appear to be enough, for to understand why p by means of an explanation that states that p because of c, a subject plausibly needs, as Pritchard claims "some sort of grip on how this cause generated this effect" (Pritchard 2014, p. 331). Knowing that the explanation works by citing the cause of

[25] See Khalifa (2013b, 2017) and Kelp (2015, 2017b) for the claim that understanding comes in degrees and Wilkenfeld (2013, 2017), Kelp (2015, 2017b) and Bachmann (2020) for the claim that outright understanding is context-sensitive.

the effect rather than by citing a law under which the explained phenomenon falls is simply not enough.

We believe that the grasp required to understand a phenomenon by means of a comprehensive account of it crucially requires that a subject makes the appropriate connections between the elements of that account and we will examine a proposal made by Newman (2012, 2013, 2017) according to whom these connections are made by inferring certain pieces of knowledge from the account one possesses. One important aim of this part of subproject B is thus to examine precisely how the inferences pertaining to some account that are made by a subject can allow her to connect the elements of the account in a way required to understand a phenomenon by means of that account. This will require elucidating the link between such inferences and the cognitive abilities that are taken to be distinctive of understanding. [26] Indeed, if performing certain inferences that pertain to some account is sufficient to make the appropriate connections between the elements of that account, the inferential knowledge acquired by the subject who performs those inferences should endow her with cognitive abilities that are distinctive of understanding.

2.2.3 Epistemic Luck

Epistemic luck is regarded by most philosophers as being incompatible with knowledge. If one knows that p, then one could not easily have been wrong, had one formed one's belief that p in the same way. Now if understanding is a species of knowledge, then the same should be true of understanding. Yet, several cases have been offered as arguments to the effects that understanding, contrary to knowledge, is compatible with epistemic luck – at least with certain forms of it. Kvanvig, for instance, offers the following case:

> Consider, say, someone's historical understanding of the Comanche dominance of the southern plains of North America from the late seventeenth until the late nineteenth centuries. Suppose that if you asked this person any question about this matter, she would answer correctly. Assume further that the person is answering from stored information; she is not guessing or making up answers, but is honestly averring what she confidently believes the truth to be. Such an ability is surely constitutive of understanding, and the experience of query and answer, if sustained for a long enough period of time, would generate convincing evidence that the person in question understood the phenomenon of Comanche dominance of the southern plains. (Kvanvig 2003, pp. 197-198)

In Kvanvig's view, while the person's beliefs concerning the Comanche dominance will normally count as knowledge, it is not necessary that they do for her to understand the Comanche dominance of the southern plains of North America. For if, for instance, most of the history books that she could have consulted were mistaken with the only one correct being the one she actually consulted, she would understand the Comanche dominance of the southern plains of North America while lacking the relevant knowledge pertaining to that event.

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[26] See Grimm (2014), Hills (2016) and Wilkenfeld (2013, 2017) for ability-oriented accounts of grasping and understanding.

The case offered by Kvanvig is presented as a typical Gettier case such as the notorious fake barns case discussed by Goldman (1976) in which the luck involved prevents the subject from acquiring knowledge. We believe however, along with Khalifa (2013c, 2017) and Boyd (2020), that such cases do not constitute genuine Gettier cases; our hypothesis being that knowledge and understanding are equally vulnerable to epistemic luck. The aim of this part of subproject B is to examine thoroughly the cases that have been offered to elicit the intuition that contrary to propositional knowledge, understanding is not vulnerable to certain forms of epistemic luck. One can note, for instance, that in the fake barn case, the subject forms the true belief that she is looking at a barn but she could have easily believed the same (but false) proposition had she been looking at a fake barn. In the case offered by Kvanvig however, the subject forms a body of interconnected beliefs concerning the Comanche dominance of the southern plains of North America and had she consulted one of the mistaken books that were around her, she would have come to form a *different* set of interconnected beliefs concerning that phenomenon.

Such considerations suggest that the type of cases offered by Kvanvig are not relevantly similar to genuine Gettier cases and this, in turn, suggests that the type of luck involved in these cases is importantly different from the one involved in genuine Gettier cases. According to Khalifa (2013c, 2017) and Boyd (2020), for instance, the luck involved in Kvanvig's Comanche case is more akin to a type of epistemically benign luck identified by Pritchard (2005) as evidential luck.

A critical examination of the kind of cases offered by Kvanvig will involve examining different types of luck and their relation to knowledge and understanding. Accordingly, one of the aims of this part of subproject B is to investigate the varieties of epistemic luck and to provide a typology that could be used to assess the intuitions that cases offered in the ongoing debate concerning the epistemology of understanding are designed to elicit.

If we are correct concerning the fact that knowledge and understanding are equally vulnerable to epistemic luck and the hypotheses that will be explored in the two previous parts of subproject B, then there are very good reasons to conceive of understanding as a type of knowledge, more precisely, as a body of comprehensive and well-connected knowledge. Such a conception of understanding would nicely fit with the results we intend to achieve in subproject A. For the contribution of understanding to the role our evidence plays would be naturally conceived in terms of how individually known propositions that are part of a subject's evidence stock fit into a larger body of comprehensive and well-connected knowledge.

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