

ARTICLE

Reassessing Lucky Understanding

Miloud Belkoniene 

University of Glasgow, Glasgow, Scotland, UK
Email: miloud.belkoniene@glasgow.ac.uk

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Abstract

Knowledge is widely regarded as being incompatible with epistemic luck, but according to several philosophers, the same does not hold for understanding. This paper examines to what extent understanding is vulnerable to epistemic luck. After discussing the weaknesses of some of the cases that have been offered to support the conclusion that understanding tolerates environmental epistemic luck, I turn to a more recent one offered in favour of the opposite conclusion. I argue that this case does not manage to establish that understanding is vulnerable to environmental luck; this even if the fact that understanding comes in degrees is taken into account. Finally, I examine the vulnerability of understanding to intervening luck – the type of luck present in classical Gettier cases – and conclude that when such luck is present, one’s understanding is necessarily sub-optimal; a conclusion that does not hold, according to what I argue, when it comes to environmental luck.

Keywords: Understanding; knowledge; epistemic luck; grasping; justification

1. Introduction

Knowledge is widely regarded as being incompatible with epistemic luck. One of the lessons one can draw from the post-Gettier literature is indeed that to know that p is the case, one’s belief that p needs to bear a connection to truth that excludes the forms of luck present in standard and non-standard Gettier cases. But does the same holds for understanding?

Although the role idealizations play in understanding raises some challenges for the view that understanding is factive or moderately factive, it is reasonable to think that to understand why p is the case, one normally needs to hold true beliefs about p ’s explanatory story. The question at hand is therefore whether a subject can understand why p even if her beliefs concerning why p are true because of luck. According to philosophers such as Kvanvig (2003), understanding tolerates certain forms of knowledge-undermining luck. This is because “understanding does not advert to the etiological aspects that can be crucial for knowledge” (Kvanvig 2003: 198). Hence, in Kvanvig’s view, despite the similarities that may exist, at first sight, between understanding and knowledge and, in particular, explanatory knowledge, these two cognitive standings have substantially different epistemic profiles.

The importance of the claim that understanding tolerates certain forms of knowledge-undermining luck should not be underestimated when it comes to

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epistemological theorizing as, according to that claim, understanding represents a cognitive standing which is distinct in kind from propositional knowledge and raises its own set of epistemological questions. The importance of this claim explains the lively debate that has emerged from Kvanvig's initial argument. Cases offered by Kvanvig have been carefully examined and philosophers such as Grimm (2006), Khalifa (2013, 2017) and Boyd (2020) have argued that contrary to what these cases were designed to show, "our judgments about the possibility of understanding sway along with our judgments about the possibility of knowledge" (Grimm 2006: 529).

This paper, which focuses on explanatory understanding,¹ offers a critical examination of the arguments that have been offered against the claim that understanding tolerates epistemic luck in order to argue that at least one form of epistemic luck – environmental luck – has no impact on the understanding that can be gained by a subject of a particular phenomenon. Section 2 examines the type of cases that were initially offered to show that understanding tolerates epistemic luck and discusses their weaknesses. In section 3, I then turn to a more recent case offered by Boyd (2020) in favour of the opposite conclusion and argue that this case, despite matching more closely the structure of a genuine Gettier case, does not manage to establish that understanding is vulnerable to environmental luck. Section 4 examines whether epistemic luck and, in particular, environmental epistemic luck negatively impacts the degree of understanding one can gain of a particular phenomenon. After carefully examining cases offered by Khalifa (2013, 2017) in favour of such a claim, I argue that these cases ultimately fail to establish it and that it is possible for a subject to understand why *p* to the highest degree although her beliefs concerning why *p* are true because of environmental luck. Finally, in section 5, I examine how understanding relates to intervening epistemic luck and conclude that when such luck is present, one's understanding is necessarily sub-optimal although outright understanding is, in principle, compatible with such luck.

2. Understanding, knowledge and luck

According to what some philosophers have called the *received view* of understanding,² understanding why *p* is the case is essentially a matter of knowing why it is the case where *S* knows why *p* whenever *S* knows a correct explanation of why *p*. For example, according to Lipton, who endorses a causal conception of explanations, "understanding is not some sort of super-knowledge, but simply more knowledge: knowledge of causes" (Lipton 2004: 30). Thus, for philosophers such as Lipton, understanding does not represent an epistemic standing that is different, in kind, from propositional knowledge.

Part of the appeal of the received view is that, according to this view, understanding does not raise distinctive epistemological problems. The question as to how a subject endowed with abilities such as ours can come to understand an objective reality fundamentally amounts to the question as to how that subject can come to know certain propositions. However, this view has come under attack in recent literature; one important challenge being the apparent compatibility of understanding with certain forms of knowledge-undermining luck.

¹It is now common in the literature concerning the epistemology of understanding to distinguish between explanatory and objectual understanding. While objectual understanding is paradigmatically ascribed by the use of an objectual clause and is not obviously tied to explanations, explanatory understanding is normally ascribed by the use of a why-clause and plausibly depends on the possession of an explanation.

²See notably Khalifa (2017).

Knowledge is widely regarded as being incompatible with epistemic luck and a good deal of the post-Gettier literature is premised on the idea that a subject cannot qualify as knowing that p , although she believes the true proposition p with justification, when her belief is true as a matter of luck.³ But according to philosophers such as Kvanvig (2003) and Pritchard (2008, 2009, 2010) the same does not hold for understanding.⁴ Consider this slightly modified version of a case Pritchard takes to support this conclusion:

Nero and the Firefighters: Nero comes home to find his house in flames. When he asks a firefighter what caused the fire, she gives him the correct answer that it was a faulty breaker box. Unbeknownst to Nero, the person he asked is one of the few real firefighters on the scene, as many nearby people are dressed as firefighters en route to a costume party. Nero could have very easily asked these partygoers, and, had he done so, they would have given him a false answer while failing to indicate that they were not real firefighters.

Because Nero could easily have been wrong concerning why his house is burning had he formed his belief in the same way – i.e. by asking what happened to someone dressed as a firefighter – it seems that he is not in a position to know why his house is burning. Yet, in Pritchard's (2010: 78–9) view, it does not follow that he lacks an understanding of why his house is burning.

The reason why Pritchard thinks that Nero does not lack an understanding of why his house is burning is that he takes this case to involve a specific type of knowledge-undermining luck which understanding is compatible with. One can draw a distinction between the kind of luck involved in standard Gettier cases such as Chisholm's (1966) sheep case – labelled intervening luck – and the kind of luck involved in cases such as Goldman's (1976) barn façade case – labelled environmental luck.⁵ In a case such as Chisholm's, where a subject looking at a dog which looks like a sheep and perfectly occludes a real sheep forms the luckily true belief that there is a sheep in the pasture, the luck "intervenes" between the belief and the fact; the subject is not really looking at a sheep. In contrast, in a case such as Goldman's, where a subject forms the luckily true belief that there is a barn in the field she is looking at, the luck is due to the epistemically inhospitable nature of the environment – the fact that the subject is crossing a region filled with fake barns. The subject in this case really is looking at a barn.

While knowledge is vulnerable to both intervening and environmental luck, Pritchard argues that understanding is only vulnerable to intervening luck. In a case such as *Nero and the Firefighters*:

The agent concerned has all the true beliefs required for understanding why his house burned down, and also acquired this understanding in the right fashion. It is thus hard to see why the mere presence of environmental epistemic luck should deprive the agent of understanding. (Pritchard 2010: 79)

If Pritchard's assessment of this case is correct and understanding, contrary to knowledge, is not vulnerable to environmental epistemic luck, then it is difficult to see how

³In what follows I will assume that S's belief that p is true as a matter of luck in the relevant sense whenever S could have easily been wrong about the fact that p , had S formed her belief that p in the same way.

⁴See also Hills (2009, 2016), Morris (2012) and Rohwer (2014).

⁵See Pritchard (2005, 2010).

understanding why p is the case can amount to knowing why it is the case. Understanding why p is the case simply does not entail knowing that such and such is the case.

There are however reasons outlined by Khalifa (2013, 2017) and Kelp (2015, 2017) to consider that this case leads us astray, for it does not really involve the type of luck present in a case such as Goldman's barn façade case. Kelp (2017: 261–2) notes that one important disanalogy between the barn façade case and *Nero and the Firefighter* is that in the latter, Nero would not have formed the same beliefs had he consulted a party-goer. He would have formed another set of beliefs concerning the explanation of why his house is burning that would have turned out to be false. However, in the barn façade case, the subject would have formed the same but false belief had she looked at a fake barn. This difference between the two cases suggests, as Khalifa (2013: 8–10) points out, that the type of luck involved in *Nero and the Firefighter* is in fact quite different from the type of luck involved in cases such as the barn façade case. In *Nero and the Firefighter*, the luck seems to crucially depend on the fact that Nero acquired a particular bit of testimonial evidence as opposed to another one. Nero is lucky to acquire non-misleading testimonial evidence, but this type of luck, as Pritchard (2005) himself remarks, is epistemically benign and does not undermine Nero's claim to know why the house is burning.⁶

3. Environmental luck and understanding

Boyd (2020), who essentially agrees with Khalifa's and Kelp's assessment of *Nero and the Firefighter*, recently offered a variation of that case which he claims involves genuine environmental luck:

Claudius and the Electrician: On his way home, Claudius finds that all the houses in his neighbourhood in Rome are on fire. Wondering what caused the fires, he stops by one of the houses, which happens to be Nero's. When Claudius asks a nearby electrician what caused the fire, she gives him the correct answer that it was a faulty breaker box. The electrician is trustworthy and knowledgeable, and there are no masquerading electricians nearby. On the basis of his true belief that the breaker box was faulty, plus background beliefs regarding electricity, the nature of breaker boxes, heat, and fires, Claudius forms a mental representation of the relationship between Nero's breaker box and the fire: without a functioning breaker box to control the flow of electricity, wires in Nero's house were heated to the point that the surrounding wood combusted. And, in fact, Nero's house did burn down as a result of the faulty breaker box in the way that Claudius represents. Unbeknownst to Claudius, however, due to a recent outbreak of house fires, Roman officials decided that all houses would be retrofitted with lower-voltage breaker boxes. As a result, every house in the city has been retrofitted, except for Nero's, which still uses the old breaker box technology. Despite this change, rampant house fires persist as the result of faulty breaker boxes. When a faulty breaker box causes a fire in a retrofitted house, however, it is not for the same reasons that caused Nero's house fire: instead, the new breaker boxes give off sparks which ignite flammable materials that Romans like to store in their basements. (Boyd 2020: 83)

⁶See also Grimm (2006: 527).

According to Boyd, *Claudius and the Electrician*, contrary to Pritchard's original case, truly allows addressing the question as to whether understanding tolerates environmental luck because the luck does not depend on the fact that Claudius obtained a particular bit of testimonial evidence as opposed to another one. The electrician's testimony provides Claudius with evidence for believing that without a functioning breaker box to control the flow of electricity, wires in Nero's house were heated to the point that the surrounding wood combusted – call that explanation H. In other words, as Claudius ignores that all the houses have been retrofitted except for Nero's house, he can rationally expect H to be the right way to account for Nero's house fire given the electrician's testimony, and as there are no masquerading electricians nearby, there is no question of evidential luck in this case. What makes Claudius's beliefs concerning why Nero's house burned down lucky is that, *given the nature of the environment*, it would have been easy for him to be wrong concerning these reasons had he formed his beliefs in the same way. Had Claudius stopped in front of another house in his neighbourhood, he would have falsely believed, of that house, that the fire was due to the fact that wires were heated to the point that the surrounding wood combusted.⁷ In that, it is reasonable to think that Claudius's true beliefs concerning why Nero's house burned down fall short of constituting knowledge.

In addition, as Boyd rightly outlines, it is quite clear that Claudius has a sufficient grasp of the explanation of the fire he comes to endorse. In his (2020: 77) view, Claudius' grasp is what enables him to represent the relationship between Nero's breaker box and the fire on the basis of the evidence he obtains. That is, he is able to form a mental representation of the way in which the fire relates to Nero's breaker box. In what follows, I will endorse a slightly different yet not incompatible conception of what it takes for someone to grasp an explanation such as the one endorsed by Claudius. I submit that Claudius grasps the explanation by means of which he comes to account for why Nero's house is burning in that his beliefs concerning why Nero's house is burning manifest a knowledge of how the fire depends on the elements cited in that explanation.⁸ Claudius, by virtue of knowing how the fire depends on the elements cited in the explanation – the faulty breaker box – is able, as Elgin (2017: 33) puts it, “to wield [that explanation] to further one's epistemic ends”. He is able to account for why Nero's house is burning by means of that explanation in such a way as to understand this state of affairs.⁹

With this in mind, the question raised by *Claudius and the Electrician* is whether the environmental luck that is present in that case is sufficient to prevent Claudius from understanding why Nero's house is burning in spite of the fact that he has a sufficient grasp of the explanation by means of which he accounts for the fire, that he can rationally expect that explanation to be the right way to account for the fire and that that

⁷As the electrician simply states that the fire is due to a faulty breaker box, there is a nearby world in which Claudius stops in front of another house on fire in his neighbourhood, asks a nearby electrician what caused the fire and forms the same yet false belief that the fire is due to the fact that wires were heated to the point that the surrounding wood combusted.

⁸See Belkoniene (Forthcoming) for a detailed discussion of the grasping component of understanding and for a presentation of the relation between knowing how the elements of some account of why p depend on each other and knowing how to account for why p by means of that account.

⁹Note that to account for why p by means of an explanation H should not be understood here in an overly restrictive way. To account for why p by means of H in the relevant sense does not simply amount to explaining why p by means of H. It also amounts to applying H to situations which are taken to be relevantly similar and to use H in counterfactual reasoning pertaining to p .

explanation turns out to be correct. According to Boyd, Claudius falls short of understanding why Nero's house is burning; the main reason being that Claudius fails to recognise that the fire in Nero's house constitutes an exception and is therefore unable to explain relevantly similar phenomena such as the fire in neighbouring houses. To quote Boyd directly: "if a hallmark of understanding is that it requires that one be able to not only provide a correct explanation in the relevant case, but in all cases that one takes to be relevantly similar, then Claudius does not possess the relevant understanding in the individual case" (2020: 85).

I see, however, reasons to resist Boyd's assessment of *Claudius and the Electrician*. While he is right in claiming that Claudius is not able to correctly explain why the other houses are on fire, one should pay close attention to the reason why he is unable to do so. It is because the cases Claudius takes to be relevantly similar to Nero's house are not, as a matter of fact, relevantly similar to this case. Unbeknown to Claudius, all the other houses in the city were retrofitted and, as a result, he mistakenly takes other fires in the city to be relevantly similar to Nero's house. However, Claudius is perfectly able to offer a correct explanation in cases that are actually relevantly similar to Nero's house. This suggests that Claudius's inability to offer the right explanation of why the other houses are burning is not due to a deficiency in his understanding of the individual case, as Boyd claims; instead, it is due to a lack of information regarding what is relevantly similar to the individual case he comes to understand.

Consider the example of the diffraction patterns produced by crystals. Crystals are materials which, when exposed to electromagnetic waves, produce sharp or discrete diffraction patterns. Scientists understand this phenomenon based on the fact that the materials producing these diffraction patterns are three-dimensional arrangements of atoms with translational periodicity – i.e. they can be extended indefinitely in the three directions of space by repeating their unit cells. Yet Shechtman *et al.* (1984) observed such diffraction patterns produced by three-dimensional arrangements of atoms (quasicrystals) that lack translational periodicity. This discovery showed that the explanation by which the sharp diffraction patterns produced by certain materials was understood could not be applied to the materials observed by Shechtman *et al.* It did not show, however, that our understanding of the diffraction patterns produced by what are now called classical crystals as opposed to quasicrystals was defective. The translational periodicity of classical crystals is the reason why such material arrangements produce sharp diffraction patterns. What this discovery showed is that the scope of the explanation by which we understood the sharp diffraction patterns produced by certain materials was more restricted than initially thought. Likewise, in *Claudius and the Electrician*, the scope of the explanation that Claudius comes to endorse is more limited than he takes it to be. But this does not entail that Claudius lacks an understanding of the individual case. What Claudius lacks is a specific piece of knowledge concerning the scope of the explanation by which he understands the individual case – i.e. that the fire in Nero's house is exceptional when it comes to its explanation.

These considerations show, I believe, that one should distinguish between a subject's ability to provide a correct explanation in the cases that are actually relevantly similar to the one she understands and a subject's ability to discriminate between the cases that are relevantly similar to the one she understands and the cases that aren't. What Claudius lacks, because he ignores that every house in the city has been retrofitted except for Nero's house, is the ability to properly discriminate between cases that are relevantly similar to Nero's house and cases that are not. Yet this inability is not due

to a deficiency in his understanding of why Nero's house is burning. Because he grasps how the fire in Nero's house depends on the elements cited in the correct explanation that he comes to endorse, Claudius is perfectly able to provide a correct explanation in cases which he knows to be relevantly similar to the case of Nero's house. There is simply no reason to regard his ability to discriminate between cases that are relevantly similar to the case he understands and cases that are not as being central to his understanding of the individual case.

The same holds for the case put forward by Grimm (2006) in favour of the conclusion that understanding does not tolerate environmental luck. Grimm's case, contrary to Boyd's, does not involve the formation of certain beliefs on the basis of someone else's testimony. He considers the following situation:

Becky and the Blacksmith: While wandering through a blacksmith's shop Becky notices a chestnut lying on top of an anvil, and she pauses to watch as the blacksmith moves to strike the chestnut with his hammer. At the very instant that the hammer touches the chestnut, the chestnut explodes into fragments. Becky then concludes, naturally enough, that the chestnut shattered because of the blow from the hammer. (Grimm 2006: 521)

Grimm then adds the following twist: the blacksmith, as a rule, heats the anvil to an extremely high temperature and after being placed on the anvil for a certain amount of time, the chestnuts simply explode due to the heat. In addition, the blacksmith enjoys testing his timing so that his hammer touches the top of the chestnut at the precise moment that the chestnut explodes as a result of the heat. Yet, at the time Becky is watching the blacksmith, he actually forgot to heat the anvil and the chestnut explodes due to the force of the hammer blow. As Becky does not know anything about the blacksmith routine, her true belief that the chestnut shattered because of the blow from the hammer falls short of constituting knowledge. The environmental luck present in this case does not, however, prevent her from understanding why the particular chestnut she is observing shattered. In this case too Becky is unable to discriminate between the cases that are relevantly similar to the one she understands and the cases that aren't. Because she does not know anything about the blacksmith's routine, she is disposed to treat cases in which the blacksmith's hammer touches the top of a chestnut at the precise moment that the chestnut explodes as being relevantly similar to the situation that prompted her to draw the conclusion that the chestnut shattered because of the blow from the hammer. Yet, that inability is not due to a deficiency in her understanding of the particular situation that prompted her to draw that conclusion. She understands why that particular chestnut shattered and she is in a position to provide a correct explanation in cases that are actually relevantly similar to the situation she is observing.

If I am correct, then contrary to what Grimm (2006: 529) claims, judgements concerning the possibility of understanding do not always sway along with judgements concerning the possibility of knowledge. For *Claudius and the Electrician* and *Becky and the Blacksmith* actually support the conclusion that understanding tolerates environmental luck in the following sense: S can understand why *p* by means of H even if, due to the epistemically inhospitable environment, S could easily have been wrong concerning why *p* had she formed her beliefs in the same way. What matters, it seems, when it comes to S's understanding of why *p* is not so much the strength of the connection between S's beliefs concerning why *p* and the fact that H is the right way to account

for why p . Whenever H is the right way to account for why p and S , given her evidence, can expect H to be correct, what matters is that S 's beliefs concerning why p manifest a sufficient grasp of how p actually depends on the elements cited in H . This is true even when the connection between S 's beliefs and the fact that H is the right way to account for why p is merely accidental.

4. Understanding comes in degrees

One could accept the considerations put forward regarding *Claudius and the Electrician* and nonetheless maintain that understanding is vulnerable to environmental luck. Indeed, according to Khalifa (2017: 185), one ought to distinguish two possible claims concerning the compatibility of understanding with environmental luck. First, that S can understand why p by means of H even if S 's beliefs concerning why p are true as a matter of environmental luck. Second, that two subjects S_i and S_j can understand why p to the *same degree* by means of H even if S_i 's beliefs – but not S_j 's – concerning why p are true as a matter of environmental luck.

As outlined by Khalifa, one can concede that the first claim is correct while rejecting the second one. For once one acknowledges the fact that understanding comes in degrees, it is possible that, depending on the context of epistemic appraisal, a subject qualifies as genuinely understanding (understanding outright) why p without understanding why p to the highest degree. In Khalifa's (2013, 2017) view the highest degree of understanding a subject can have of why p amounts to explanatory knowledge. But even if the subject's beliefs concerning why p is the case are true as a matter of environmental luck and thereby fall short of constituting explanatory knowledge, she can qualify as outright understanding why p ; her understanding of why p consisting, in such a situation, of "a second-rate surrogate of explanatory knowledge" (Khalifa 2013: 15).

Thus the considerations put forward in the previous section do not really vindicate the claim that understanding and knowledge have different epistemic profiles for if Khalifa (2013, 2017) is right, cases in which S luckily understands why p are cases of sub-optimal understanding which ought, in final analysis, to be conceived of in relation to explanatory knowledge – that is, as that which approximates sufficiently explanatory knowledge in a given context of epistemic appraisal.¹⁰ What must be done, therefore, is to assess the claim that two subjects S_i and S_j can understand why p to the same degree by means of H even if S_i 's beliefs – but not S_j 's – concerning why p are true as a matter of environmental luck. Consider the following case from Khalifa:

Fiona the Firefighter: Fiona is a firefighter who does an exemplary job in collecting all of the evidence that could be extracted from the embers of Nero's house. On the basis of this evidence, she comes to believe that a faulty breaker box is the root cause of the fire, and this is in fact true. However, at the moment of the fire, the breaker box malfunctioned at the same time that the grounding wire shorted. The two events were causally independent, and the shorted grounding wire did not actually cause the fire. But, had the shorted grounding wire (rather than the faulty breaker box) caused the fire, Fiona would have discovered exactly the same evidence and still believed that the breaker box's malfunctioning explains why

¹⁰Note that, as it will become clear, what Khalifa (2017) refers to as "explanatory knowledge" does not merely amount to a knowledge of a correct explanation of p .

Nero's house caught fire. By contrast, one of Fiona's colleagues, Carmen, considers both the breaker box and the grounding wire explanation. Moreover, she has all of Fiona's evidence, plus she takes some additional voltmeter readings at different points in the house, and these readings allow her to eliminate the grounding wire explanation. (Khalifa 2017: 196)

Given the evidence collected from the embers of Nero's house, it seems that Fiona can expect the faulty breaker box explanation to be the right way to account for the fire and as she is an experienced firefighter, it can be assumed that she knows how the fire depends on the elements cited in the explanation. Yet, as the breaker box malfunctioned at the same time as the grounding wire shorted and the shorted wire could easily have caused the fire, Fiona's beliefs regarding the reasons why Nero's house burned down are true as a matter of luck. Due to the epistemically inhospitable nature of the environment, it would have been easy for her to be wrong concerning why Nero's house burned down had she formed her beliefs in the same way. Granted that this does not disqualify her from counting as understanding outright why Nero's house burned down, the question is: does she understand this event to the same degree as Carmen does?

Carmen, contrary to Fiona, considers the possibility that the fire was caused by the shorted grounding wire and, as a result, performs a test which allows her to rule out this possible explanation. Given her use of additional voltmeter readings, Carmen is not lucky to be correct concerning why Nero's house burned down. As Khalifa (2017: 198) notes, her beliefs are safer than Fiona's as in nearby possible worlds in which Carmen forms the false belief that the fire is due to a faulty breaker box, Carmen does not form that belief in the same way as in the actual world. In particular, Khalifa argues that what matters is that Carmen's beliefs are safer than Fiona's as a result of a better scientific explanatory evaluation: Carmen considers a plausible alternative explanation of why Nero's house burned down and collects decisive evidence in favour of one of the possible explanations for the fire.

Scientific explanatory evaluation is taken, by Khalifa, as a belief formation process which is reliable in that it allows one to identify and rule out alternative explanations that could easily have been true – plausible alternative explanations. Now, according to him, Carmen, in *Fiona the Firefighter*, understands why Nero's house burned down better than Fiona because her beliefs concerning why Nero's house burned down are safer than Fiona's as a result of a scientific explanatory evaluation. In that they better approximate scientific explanatory knowledge than Fiona's beliefs.

One aspect of the case discussed by Khalifa however deserves greater scrutiny. While it is true that Carmen's beliefs are safer than Fiona's, part of the problem appears to be that both Fiona and Carmen have reasons to regard the grounding wire explanation as a plausible explanation of the fire and therefore both of them should try to rule out that alternative prior to accounting for the fire by means of the faulty breaker box explanation. To be sure, Carmen is not supposed to have any particular insight regarding the possible cause of the fire. Both are experienced firefighters with the same information concerning their environment. Accordingly, both have reasons to suspect that the fire is due to a shorted grounding wire. It follows that, in *Fiona the Firefighter*, it is not clear, irrespective of the luck present in the case, whether Fiona is even justified in endorsing the faulty breaker box explanation. It is not clear whether she can rationally expect that explanation to be the right way to account for the fire as the grounding wire explanation, which she has reasons to regard as plausible, is compatible with all the evidence she collected from the embers of Nero's house. As a result, all that *Fiona the Firefighter*

might show is that full understanding requires justification and such a requirement, as shown by Gettier cases, is much weaker than requiring explanatory knowledge for full understanding. To address the question as to whether the luck that is present in that case negatively impacts the understanding Fiona has, one therefore ought to modify the case in such a way as to make it clear that both Fiona and Carmen are justified in endorsing the faulty breaker box explanation:

Fiona the lucky Firefighter: Everything is exactly the same apart from the fact that Roman officials recently decided that all houses would be equipped with brand new grounding wires that cannot, due to the way they are designed, cause a short circuit. Fiona is aware of that as she personally helped equip certain houses with the new type of grounding wires. Yet unbeknownst to her, Nero's house is the only house in the city that was not equipped with new grounding wires and due to the damage caused by the fire, she cannot tell, by inspection alone, that the house was still equipped with old grounding wires. By contrast, Carmen, who arrives later at Nero's house, is aware that this house was not equipped with new grounding wires and therefore takes additional voltmeter readings to determine if the fire was due to a shorted grounding wire.

Here, Fiona has no reason to regard the grounding wire explanation as a plausible alternative to the faulty breaker box explanation. Given her epistemic situation and the evidence she collected from the embers of Nero's house, she can rationally expect the faulty breaker box explanation to be the right way to account for the fire. Her beliefs concerning why Nero's house burned down nevertheless remain unsafe as, due to the nature of the environment, she could easily have been wrong concerning these reasons had she formed her beliefs in the same way. As a result, in this case too, Fiona lacks explanatory knowledge of why Nero's house burned down. However, it is no longer clear that Carmen understands why Nero's house burned down better than Fiona in that particular situation. In what sense is Fiona's understanding of what happened deficient compared with Carmen's understanding?

Regarding his original case, Khalifa (2017: 200) claims that Carmen's understanding is superior to Fiona's in at least four respects. First, Carmen grasps more coherence-making relations than Fiona in that she grasps how the faulty breaker box and the grounding wire explanation relate to each other and to the voltmeter readings. Second, Carmen can answer more what-if-things-had-been-different questions than Fiona as she can predict how the voltmeter readings would have been different had the grounding wire caused the fire. Third, Carmen has more true beliefs than Fiona about the fire as, for instance, she correctly believes that even if the breaker box had not malfunctioned, the house would not have caught fire because of the grounding wire. Fourth, Carmen's beliefs represent a greater cognitive achievement than Fiona's for Carmen has ruled out a particularly thorny alternative explanation of the fire.

Let me start with the first two reasons to regard Carmen as understanding why Nero's house burned down better than Fiona. As outlined in the previous section, understanding is typically associated with a grasp of coherence-making relations as well as an ability to engage in counterfactual reasoning. If Khalifa is correct that Carmen grasps more coherence-making relations and is able to answer more what-if-things-had-been-different questions than Fiona, then there is ground to regard Carmen as understanding why Nero's house burned down better than Fiona. Yet, I am doubtful that such ground actually exists. That Fiona has no reason to regard the

grounding wire explanation as a plausible alternative to the faulty breaker box explanation does not entail that she lacks a grasp of how the two explanations relate to each other and to the voltmeter readings. As an experienced firefighter, Fiona can know that if Nero's house was equipped with old grounding wires, the fire could have been due to a shorted grounding wire. She can also know that voltmeter readings would have allowed determining whether the fire was due to a shorted grounding wire. The knowledge Fiona lacks about her environment does not prevent her from having a good grasp of how the two explanations relate to each other and to voltmeter readings. Having such a grasp is simply not dependent on having an accurate representation of her environment. Similarly, the knowledge she lacks about her environment does not prevent her from being able to correctly answer counterfactual questions about the fire. Nothing prevents Fiona from reaching the conclusion that she would have had certain voltmeter readings if a grounding wire had caused the fire. That she ignores that Nero's house was not equipped with new grounding wires and that a grounding wire shorted does not prevent her either from reaching the conclusion that the fire could have been caused by an old grounding wire.

The only advantage Carmen has over Fiona is that, contrary to Fiona, she knows that Nero's house is still equipped with old grounding wires and that a grounding wire shorted prior to the fire. As such, it is true that she has more true beliefs pertaining to the fire than Fiona. However, it is not clear that these additional true beliefs allow her to understand what actually happened better than Fiona does. In *Fiona the lucky Firefighter*, Fiona identified in a perfectly reasonable way the reasons why Nero's house burned down. While she ignores that the fire could have been caused by a shorted grounding wire, this does not prevent her from understanding to the fullest extent what happened in that particular case. After all, she has no reason to suspect that the fire is due to a shorted grounding wire and presumably she has a very good grasp of what actually led to the fire. Simply acquiring the true belief that Nero's house is in fact equipped with old grounding wires and that a grounding wire shorted at the same time as the breaker box faulted would not add anything to Fiona's understanding of what actually led to the fire.

As to the last reason provided by Khalifa in favour of the conclusion that Carmen's understanding is superior to Fiona's, it is a direct consequence of the claim he wants to defend based on the case under discussion. It is true that Carmen's beliefs represent a greater cognitive achievement than Fiona's in the sense that Carmen ruled out a plausible alternative to the explanation she came to endorse. Yet this is a reason to believe that Carmen's understanding is better than Fiona's only under the assumption that understanding improves as it better approximates what Khalifa regards as scientific explanatory knowledge; an assumption that I think should be rejected in light of the above considerations.

Once properly examined, the considerations put forward by Khalifa in favour of the conclusion that Carmen's understanding is superior to Fiona's are thus unconvincing. In *Fiona the lucky Firefighter*, there is no reason to regard Fiona's understanding of what happened as being deficient compared with Carmen's understanding. Both Fiona and Carmen seem to have an equally good understanding of why Nero's house burned down although Fiona lacks explanatory knowledge. More generally, two subjects S_i and S_j can understand why p to the same degree by means of H even if S_i 's beliefs – but not S_j 's – concerning why p are true as a matter of environmental luck. That S_j 's beliefs are safer as the result of a scientific explanatory evaluation does not necessarily increase S_j 's understanding of why p . If both S_i and S_j can rationally

expect H to be the right way to account for why p and H actually is then both S_1 's and S_2 's beliefs concerning why p can manifest, to the same extent, their grasp of how p depends on the elements cited in H.

5. Intervening luck and understanding

My discussion of understanding's compatibility with epistemic luck focused so far on environmental luck. But what of the type of luck present in classic Gettier-style cases such as Chisholm's (1966) sheep case? Before drawing more general conclusions from the considerations put forward in the previous sections regarding understanding's connection to epistemic luck, let me examine if and how intervening luck negatively impacts a subject's understanding of why p .

According to Pritchard (2009, 2010), understanding is only compatible with environmental luck; intervening luck undermining both knowledge and understanding.¹¹ To support this claim, he (2010: 78) considers a modified version of *Nero and the Firefighters* in which the person who is asked by Nero why his house is burning is actually a partygoer dressed as a firefighter but, by sheer luck, provides Nero with a correct explanation of why his house is in flames. In Pritchard's view, Nero cannot, in this version of the case, gain an understanding of why his house is burning by means of the explanation that is made available to him, for "one cannot gain an understanding of why one's house burnt down by consulting someone who, unbeknownst to you, is not a real fire officer but instead merely someone in fancy dress" (Pritchard 2010: 78). As noted by Morris (2012: 9), Pritchard's point here seems to be that one cannot come to understand why one's house is burning on the basis of the testimony of person who does not, herself, understand why it is the case.

Morris (2012), in an attempt to resist Pritchard's conclusion, offers several reasons for thinking that one can gain an understanding of why p on the basis of what a person who has no understanding of why p asserts. Yet, setting aside this specific question, one can note with Khalifa (2017) that the version of *Nero and the Firefighters* considered by Pritchard suffers from the same weaknesses as the version of the case discussed in the first section of the paper. In both versions, the luck present seems to be due to the fact that Nero acquired a particular bit of testimonial evidence as opposed to another one. In Khalifa's (2017: 211) view, a case involving genuine intervening luck with respect to understanding should have the following structure:

An agent is Gettier-lucky with respect to the belief that q explains why p if:

1. In the actual world,
 - a. the agent's belief that q explains why p is true, and
 - b. the agent's belief that q explains why p is produced by the fact that r explains why p (rather than the fact that q explains why p).
2. In a nearby possible world, everything is the same as the actual world except:
 - a. the agent's belief that q explains why p is false.

In a case structured according to this model, the luck is not due to the fact that the subject happens to acquire a particular bit of evidence as opposed to another one. It is due, instead, to the fact that some explanation is true in the actual world and that the subject

¹¹See also Grimm (2006) for the claim that intervening luck undermines both knowledge and understanding.

endorses another explanation which also happens to be correct because of the former explanation. In the modified version of *Nero and the Firefighters* considered by Pritchard (2010), Nero's belief that the fire is due to a faulty breaker box is not produced by the fact that another explanation of the fire happens to be correct but by the fact that a partygoer dressed as a firefighter happens, by sheer luck, to provide Nero with a correct explanation of why his house is in flames.

It should be clear from the model proposed by Khalifa that if S_i 's beliefs concerning why p are lucky in that sense, then S_i cannot understand why p to the same degree as S_j whose beliefs are not true as a matter of luck. The reason why is that if S_i fits the model offered by Khalifa, then the explanation by means of which S_i accounts of why p is necessarily incomplete. Indeed, in Khalifa's model, the two explanations involved are not, strictly speaking, alternative explanations, for both are correct explanations of why p . It is assumed that both ' q explains why p ' and ' r explains why p ' are true and, consequently, S_i , who only believes that q explains p , only gets half of the story so to speak. It is therefore not surprising that, in the case of standard Gettier luck, the degree of understanding one has of why p increases once the luck is removed. But let me stress that contrary to what Khalifa suggests the strength of the epistemic access S has to the reasons why p is not the crucial factor here. While cases in which S_i 's beliefs concerning why p are true as a matter of intervening luck are cases in which S_i 's understanding is sub-optimal, such understanding should not be conceived of in relation to explanatory knowledge where explanatory knowledge would constitute the standard in relation to which lesser degrees of understanding are to be defined. For, as argued in the previous section, a subject can possess a full and complete understanding of why p although her beliefs concerning why p fall short of constituting explanatory knowledge. The reason why intervening luck negatively impacts one's understanding of why p is thus not that, as argued by philosophers such as Khalifa (2013, 2017) and Grimm (2006), understanding involves an anti-luck component but that situations in which intervening luck is present, when it comes to understanding, are situations in which the explanation one possesses for p is incomplete.

Once the fact that understanding typically comes in degrees is taken into consideration, the question of its connection to epistemic luck thus requires a more subtle treatment. While outright understanding tolerates both intervening and environmental luck, intervening luck prevents one from having a maximal understanding of why something is the case. The reason for this is that, as I just outlined, cases structured on Khalifa's model are cases where the account of why p possessed by S is incomplete. In contrast, environmental luck does not prevent one from having a maximal understanding of why p and construing ideal understanding in terms of explanatory knowledge would therefore be a mistake. The strength of the connection between S 's beliefs concerning why p and the truth is, in the case of understanding, incidental. The fact that, due to environmental luck, S could easily have been wrong concerning why p had she formed her beliefs in the same way does not impinge on the understanding she has of why p . This is because, when it comes to understanding, what matters is that S manifesting a grasp of how p depends on the elements cited in the account she has justification to endorse. But as shown in the previous section, S can manifest such a grasp even if the connection between her beliefs concerning why p and the correctness of the explanation she endorses is merely accidental.¹² This raises, of course, the question as to why

¹²Hills (2016) makes a similar observation although she has a slightly different conception of what understanding why p ultimately amounts to. In her view, understanding why p by means of H essentially

one seeks explanatory knowledge and engages in scientific explanatory evaluations, for according to what I have just claimed, such knowledge is not essential to gaining an understanding of reality.

It is almost a platitude that scientific inquiry aims, at least in part, to acquire knowledge about reality. Scientists are engaged in the pursuit of knowledge and, through reliable means, attempt to settle the question of the truth of various propositions; explanations being a subset of the propositions whose truth scientific inquiry aims at settling. But another aim of scientific inquiry is to foster an understanding of phenomena and if scientific explanatory knowledge is not essential to secure this understanding, then this aim cannot simply be identified with the aim of determining whether certain explanations constitute the right way to account for phenomena. What the considerations put forward in this paper suggest is that scientific inquiry is guided by two fundamental values identified by Zagzebski (2009) as the value of understanding and the value of certainty. Scientists aim at gaining an understanding of phenomena accompanied with the knowledge that the explanations they rely upon constitute the right way to account for these phenomena. While that knowledge is not essential to secure such an understanding, it completes it in that it makes the understanding provided by correct explanations more transparent for the subjects who possess it. A subject does not need to know that H is the right way to account for why p to understand why p to the fullest extent by means of H. But knowing, in addition, that H is correct provides that subject with an insight into what makes that understanding possible in the first place.

6. Conclusion

Understanding tolerates certain forms of epistemic luck and as a result differs with respect to its epistemic profile from propositional knowledge. More precisely, in the present paper, I examined the compatibility of understanding and, in particular, explanatory understanding with both environmental luck and intervening luck which are regarded by most philosophers as being incompatible with knowledge. Although a subject cannot understand why p to the fullest extent when her beliefs concerning why p are true as a matter of intervening luck, contrary to what recent arguments purport to show, environmental luck does not necessarily impinge on the degree of understanding a subject has of why p . Two subjects can in principle understand why p is the case to the same degree even if the beliefs of one of them concerning why p are true because of environmental luck. What matters when it comes to a subject's understanding of why p , according to what I have argued, is not the strength of the connection between her beliefs concerning why p and the fact that the explanation she relies upon is the right way to account for why p . What matters instead, is that that subject manifesting a sufficient grasp of how p actually depends on the elements cited in the explanation she has justification to endorse.¹³

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involves having cognitive control over the connection between H and p and this condition can be satisfied even if S's beliefs concerning why p are true because of luck.

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Miloud Belkoniene is a Research Associate at the University of Glasgow, with research interests in epistemology, philosophy of science and philosophy of mind. His work on justification and understanding has appeared in journals such as *Synthese*, *Erkenntnis* and the *British Journal for the Philosophy of Science*.