**Understanding without explanation: the case is not closed**

Abstract

This paper takes a stance in the debate on scientific understanding. It claims that the case for a specific type of understanding, understanding without explanation (UWE), is still open, despite some tendencies in the current literature that might suggest otherwise. The paper begins by situating the distinction between explanatory and non-explanatory understanding in the debate on understanding introducing Lipton’s account of UwE. It discusses next the significance of Lipton’s proposals for the debate and argues that Kelp’s interpretation does not exhaust the challenge they pose to any theory of understanding. The paper deals further with the best articulated critique of Lipton’s account provided by Khalifa and reject it as inadequate. It ends by sketching a list of positive reasons that supports a further working agenda on UwE.

Keywords: scientific understanding, understanding without explanation

**INTRODUCTION – A BRIEF RETROSPECTIVE LOOK**

Scientific understanding has not been a mainstream topic in philosophy of science in the analytic tradition. It got a distinct profile recently, in the aftermath of the climax of the great debates on scientific explanation, at the end of the last century.[[1]](#footnote-1) But it also emerged in the frame of these debates. It might be no wonder therefore that it retained a direct reference to the explanation topic. My argument touches on this point and exposes the assumptions that are determining the directions of advance of the inquiry on understanding.

The subject of scientific explanation gained a respectable position in the philosophy of science marking with its working agenda most of the second part of the last century. Since its inception by Hempel (1948, 1965) in the context of neopositivism, it attracted the attention of philosophers of science and triggered heavy debates. After the dismiss of the Hempelian model during the 80s, more varied approaches, such as the influential unificationist approach (Friedman 1974, Kitcher 1981) or the causal one (Salmon 1984), polarized the inquiry. Understanding was initially rejected by Hempel as an unsuitable object of inquiry through logical and philosophical means, due to its pragmatic nature (Hempel 1965). The next generation of philosophers, albeit formed in the spirit of neopositivists, have not ignored the importance of scientific understanding. They acknowledged that understanding is a major goal of scientific inquiry and therefore did not dismissed it but placed it among the topics of philosophical analysis.[[2]](#footnote-2)

The unificationist approach was a mainstream approach to explanation which reevaluated understanding, especially through Friedman’s account. According to his view, any theory of explanation should show also what and how the scientific explanation produces understanding. In order to make understanding respectable, *i.e.* eliminate its subjective and pragmatic dimension, an account has to isolate a propriety that embodies the objective sense of scientific understanding (Friedman 1974). In Friedman’s view, this can be done only by simultaneously offering an explication of explanation and understanding. He qualifies any approach that will define first understanding and proceed afterwards to clarify explanation as unreasonable. This makes any approach on understanding totally dependent on an approach on scientific explanation. Furthermore, this position was taken by the those who worked on explanation topic at that time.

It took some time till radical new views surfaced in the explanation research. Early harbingers are Lambert and Schurz (1994) who advance an account of scientific understanding totally independent of explanation, but not without being tributary to the idea of understanding as unification, central to the unificationist approach. Just after the turn of the century one could see emerging a real debate around the subject. The philosopher Henk de Regt (de Regt, Dieks 2005) can be regarded as a pioneer in this sense, with his contextual theory of scientific understanding and Trout (2002) one of the first fervent opponents to the new research direction by dismissing any value of a philosophical approach to the topic of understanding.

A parallel tendency of reevaluating understanding flourished the last two decades and found its expression in virtue epistemology. Understanding attracted the attention of some epistemologists such as Zagzebski (2001), Riggs (2003), Kvavig (2003) with the promise of reconfiguring the epistemological agenda by rediscovering the value of understanding. As the voices in the two philosophical fields: epistemology and philosophy of science multiplied, the subject gained momentum and cross-fertilizations appeared in this landscape. The recent volume edited by Grimm & collaborators (2017) presents a good sample of these tendencies in both philosophical fields; though not everybody is happy with such intersections as a recent review of the book (Dellsen 2018) suggests. Without entering into details here, I will recall this point later.

**SITUATING THE EXPLANATORY - NON-EXPLANATORY DICHOTOMY**

In this section I track the distinction between explanatory and non-explanatory understanding as it has been suggested, but rarely made explicit, and rather overlooked and suppressed in the mainstream debate. The distinction has a precarious status even today, and therefore might give the impression that we have an almost solved case, or at least not a real issue to be addressed in a proper way. This is mainly due to the dominance of a reductive view, as explained below, in the debate on understanding. On the other side the more applied investigations of scientific practices could not ignore such a distinction but in most cases it did not either reflect it in an explicit way. There is an exception in the proposal advanced by Peter Lipton (2009) that I will discuss at the end of this section and defend it in the next section.

At first sight, the distinction between explanatory and non-explanatory understanding might be a bit confusing. This attitude discloses from the beginning a strong underlying natural trend to consider explanation and understanding together. This is reflected in the debate on explanation besides its historical evolution. As already mentioned in the first section Friedman sees any decoupling or prioritization of the inquiry on understanding and explanation as unreasonable. According to Friedman (1974), we can find out what understanding is just by simultaneously inquiring what explanation is. The close connection might have also a good methodological reason linked to the need to secure the objective dimension of understanding. Explanation approaches already did or tried to secure such an objectivity previously; by coupling understanding to explanation together we might have a stronger warranty for securing objectivity of understanding too. In this circumstance there is no place for a non-explanatory form of understanding which seems to be unconceivable.

The situation changes in recent discussions. The reductive approach to understanding[[3]](#footnote-3) in the recent debates on understanding could be seen following broadly the more general original attitude[[4]](#footnote-4). Khalifa (2017) provides a more elaborated view. His view might be called the ‘redundant view’ since “understanding is redundant given a theory of explanation.” (Khalifa 2012: 17) and is made explicit by the EMU (Explanatory Model of Understanding) thesis stating that: “any philosophically relevant ideas about scientific understanding can be captured by philosophical ideas about the epistemology of scientific explanation without loss” (Khalifa 2012: 17). It echoes the classical attitude but does not simply restate Friedman’s view. Like Friedman and the classics, Khalifa is coupling understanding to explanation, although for him the possibility of non-explanatory forms of understanding is not anymore unconceivable. In fact, Khalifa puts a lot of effort in rejecting it, as I will discuss and reject his critique in a later section. Unlike Friedman, Khalifa is not concerned with recovering understanding in the frame of a theory of explanation, nor is he interested in providing an articulated theory of explanation. Nevertheless, in the book he is offering sometimes a sketchy explication of what he takes to be an explanation. He pushes understanding in the epistemological register and offers a theory of explanatory understanding.

The other term of the distinction, the non-explanatory form of understanding, is harder to be tracked within the debate on understanding. Its plausibility emerges gradually and un-concisely i.e. more by tackling particular cases and specific scientific contexts and less by a general characterization. This emergent approach to understanding took place in the frame of a recent particular approach in philosophy of science: philosophy of science in practice. It aims to reshape the philosophical approach to understanding by overcoming the neopositivist setting that considers mainly the final products of science, i.e. the theories and their relation to the world. It intends to improve the take on science by recuperating the practice of science and the processes though which science unfolds and scientific results are elaborated (Ankeny, Chang, Boumans, Boon 2011). This approach rejects the classical theory-centered approach on science by reevaluating the role and importance of other scientific representations, esp. of scientific models. It is also more pragmatics-friendly oriented by allowing pragmatics to play a major role in scientific practice and explicitly embedding pragmatics in their account.

Usually the philosophers of this approach engage into the investigation of particular scientific domains and contextsand oftentheir intention is exploratory aiming to provide new ways of looking at the scientific inquiry process and knowledge production. It is in such contexts that the distinction between the two kinds of understanding became apparent and therefore one might say that it was rather picked from case studies than theoretized distinctly. The volume edited by de Regt and collaborators (2009) is representative: most contributions do not even mention the distinction between the two forms of understanding, leaving it more implicit. Peter Lipton’s contribution (2009) is nevertheless an exception which aims to provide a more general clarification of the distinction between the explanatory and non-explanatory understanding and advances a bold theory of ‘understanding without explanation’ (UwE). I will take his proposal as a reference for my further discussion and defense of UwE.

For a starter, I present briefly the main lines of Lipton’s proposal in order to discuss later its importance for the issue under scrutiny. In his paper *Understanding without explanation*, Peter Lipton argues for the possibility of non-explanatory understanding by suggesting a decoupling of understanding from explanation in two steps: first, by identifying the cognitive benefits of an explanation (and not the explanation *per se*) with understanding and second by suggesting that such benefits could be gained also through other means than explanation. The benefits are identified in terms of knowledge such as: causality, necessity, possibility or unity, through diverse non-explanatory means such as: models, visualizations, manipulations, thought experiments, or possible explanations. In Lipton’s view, visual models and manipulations of physical systems provide tacit knowledge of causes, hence causal information without explanation, as in the case of experiment manipulation (for example, through visualizing the retrograde motion of a planet by looking at a planetarium). Optimization and symmetry arguments or thought experiments constitute examples of non-explanatory deductive inferences that usually provide knowledge of necessity, as is the case of Galileo’s argument for independence of acceleration and mass. Tacit knowledge of unification could be provided through non-explanatory analogies as illustrated by the exemplars mechanisms that Kuhn emphasized, through the scientists’ abilities to select problems and generate solutions. The last case that I will discuss in more detail in this paper is related to false explanations, *i.e.* merely potential explanations which would provide modal information and knowledge of possibilities.

**WHAT DO LIPTON’S PROPOSALS REVEAL?**

In this section I will address the question of what is in fact the importance of Lipton’s proposals to approach understanding. If one looks at the reception and proliferation of Lipton’s ideas, one might see that they became challenging for some mainstream approaches. I will focus next on what this challenge might be and how Kelp’s construal of this challenge does not settle the issue.

Lipton’s examples seem uncomfortable for the reductivist approaches, but not to all the parties involved. Some of the adherents of this view as Strevens (2012) or Khalifa (2012, 2013, 2017) admit that these examples threaten their approaches and engage them directly. Khalifa takes great pains in offering a general argument against Lipton’s proposals and rejects them as not providing a genuine form of understanding.[[5]](#footnote-5) But no author, apart from Kelp, advances a construal of the challenge that Lipton’s proposals might rise. I discuss Kelp’s approach and partially agree with his interpretation. Nevertheless, I will argue that his theory of understanding, which was intended to meet the challenge, is not satisfactory from the perspective of the inquiry into understanding in scientific contexts.

Kelp (2015) tries to make explicit the threat that Lipton’s proposal constitutes for the other accounts. He claims that it exposes the overintellectualisation of the approaches which he divides in two major groups: the explanationist and the manipulationist. The two groups refer to accounts that invoke explanation as the key to understanding, in the first case, or ability to manipulate certain representations, in the second case, as central to characterizing understanding.[[6]](#footnote-6) The overintellectualisation refers to the fact that these approaches theorize understanding at an inadequate level asking for more demanding intellectual capabilities than are involved in the act of understanding. In Kelp’s words: “The intellectual demands they place on understanding - knowledge of an explanation - are unrealistically high. Less sophisticated cognitive achievements can qualify as understanding” (Kelp 2015: 3801). In case of the explanationist accounts this might be clear since the grasping of a full-blown explanation is needed to gain understanding. In case of de Regt’s manipulationist account, the invocation of a scientific theory and the related skills needed to apply it supports Kelp’s criticism. It is less clear in Wilkenfeld’s case whose theory construes understanding as manipulation of a representation in a quite broad and unspecified way.[[7]](#footnote-7)

Kelp’s theory of understanding is intended to overcome the limitations of the other approaches including the one of overintellectualisation. His account is articulated in three main steps defining maximal understanding (MAX-U), degrees of understanding (DEG-U) and outright understanding (OUT-U). Maximal understanding of a phenomenon P is attributed to someone who has “fully comprehensive and maximally well-connected knowledge of a phenomenon P” (Kelp 2015: 3811).In the next step, different degrees of understanding of P are modeled as a function of distance from this maximal state of knowledge. The last step introduces a contextually variable threshold of distance from maximal understanding and characterizes outright understanding of P in a context c of a subject S if “*S* approximates fully comprehensive and maximally well-connected knowledge of *P* closely enough to be such that *S* would (be sufficiently likely to) successfully perform any task concerning *P* determined by *c*, if, in addition, *S* were to have the skills needed to do so and to exercise them in suitably favorable conditions” (Kelp 2015: 3813).

I argue that Kelp’s account is reaching its intended goal only to a certain degree and fails to provide a final answer to Lipton’s challenges. His theory escapes the shortcoming he identifies in the other approaches: the overintellectualisation, the reference to an ‘all inclusive’ notion of representation as in Winkelfeld’s theory or Khalifa’s wrong choice for the ideal standard for understanding. Therefore, one might see his account as providing a viable epistemological solution where all the other failed. Nevertheless, regarding the challenges that Lipton’s example rise it fails short to meet them as my argument goes.

His theory is intended to accommodate Lipton’s examples, but this is done in a too general and unfruitful way. Through DEG-U he avoids the overintellectualisation making room for lower non- demanding forms of understanding as instantiated in Lipton’s examples and through the OUT-U step it should capture the variety of these UwE, seen as instances of ‘outright understanding’. But applying the OUT-U to Lipton’s examples does not clarify further UwE. For example, the UwE gained through implicit causal knowledge might identify the successful performance with the successful manipulation of the system; but the other cases of UwE as the one through visual means or the one through the possible explanations are opaque through OUT-U[[8]](#footnote-8). It does not give us a clue of what could be the tasks successful performed in the different contexts. It fails therefore to discriminate and characterize these forms in a way that should provide insights in their particularity. Therefore, from the perspective of an inquirer in philosophy of science it fails to provide a satisfactory tool for inquiry on understanding in scientific contexts.

On the one hand, Kelp’s overintellectualisation interpretation and his request for allowing “less sophisticated cognitive achievements’ to provide understanding widely opens the possibility of distancing ourselves from an explanation-centered approach on understanding. In fact, the threat to explanationism relies exactly in this move that undercuts the inquiry from the ‘safety’ way of unfolding in the shadow of the explanation.On the other hand, Kelp’s account does not give us either any clue on how to approach Lipton’s examples and does not provide the necessary power and resolution of getting useful insights in concrete scientific knowledge building contexts. This inability to provide proper resources to deal with concrete cases in scientific activity might be due to a wrong methodological take, as suggested further.

In order to substantiate the last suspicion and support my early claim, I will recall some recent remarks provided by Dellsen (2018) in a review-analysis of the recent volume *Explaining Understanding: New Perspectives from Epistemology and Philosophy of Science* edited by Grimm, Baumberger and Ammon (2017). Dellsen exposes the failure of the volume to fulfill its main intention: bringing together the two main approaches: epistemology and philosophy of science. The gap is identified in the difference between the two methodologies. While philosophers of science develop ideas by appealing to specific aspects of scientific practice, epistemologists proceed by analyzing pre-theoretical epistemological concepts, as the one of understanding. The first will try to capture a concept suited for scientific practice meanwhile the last are targeting the ordinary concept of understanding. So, the danger raises by applying results to fit our pre-theoretical intuitions to explaining scientific practice. In fact, Dellsen suspects that Kelp’s contribution in the volume does exactly this: he appeals to a number of intuitive results about people showing a better understanding of a subject than others.

I concur with Dellsen that Kelp’s solution is not relevant to an investigation of understanding in scientific contexts. I think it fails to provide the necessary resolution to dissociate the diverse aspects of understanding in a scientific context and to be a starting point for characterizing different species of understanding at work in scientific practice. On the contrary, Lipton’s examples instantiate or are similar enough to such type of understanding. The challenge posed by Lipton’s examples are only partially rendered through the ‘overintellectualisation’ avoidance request that Kelp claims to have met by his theory. The more demanding part and hard core of the challenge is to account for the species of understanding that the examples instantiate. The ‘high-level’ approaches to understanding proffered in philosophy of science are explanation-centered and fail to do justice to the full-range of types of understanding. Therefore, the hard core of Lipton’s challenge remains open.

The above view will not be complete without a close encounter with the fully-articulated explanation-centered account of understanding, the one which rebuts the non-explanatory type of understanding and subsumes any understanding to explanation-centered approach, and this is the plan of the following section.

**REJECTING AN EXPLICIT CRITIQUE**

I will now turn to an explicit bold critique of Lipton’s position advanced by Khalifa. It is probably the most extensive articulated critique of Lipton’s proposal. I will sketch a rejection of this critique, showing that Khalifa’s argument misses the point and is not fulfilling its promise.

Khalifa articulated his critique on non-explanatory understanding in his paper *The Role of Explanation in Understanding* (Khalifa 2013) and reiterated it with some modifications in his 2017 book *Understanding, Explanation, and Scientific Knowledge* (Khalifa 2017). His position is clearly a reductionist one, denying any philosophical value to an approach to understanding decoupled from explanation. This is boldly formulated in his EMU thesis which states that “Any philosophically relevant ideas about scientific understanding can be captured by philosophical ideas about the epistemology of scientific explanation without loss” (Khalifa 2012, 17). In his paper *The Role of Explanation in Understanding* (Khalifa 2013) he scrutinizes Lipton’s proposal by grounding his critique in what the calls ‘explanatory idealism’ which claims that “other modes of understanding ought to be assessed by how well they replicate the understanding provided by knowledge of a good and correct explanation” (Khalifa 2013, 2). In the synthetic view articulated later in his book (Khalifa 2017), he re-centers the critique in the frame of his more complete account of scientific understanding, called the EKS-model (Explanation-Knowledge-Science model). This approach is based on two major principles: the Nexus Principle and the Scientific Knowledge Principle. His view takes a similar starting point as Kelp’s account (Kelp 2015) by emphasizing a comparative perspective on understanding and purporting that degrees of understanding are the central aspect of the approach. In this sense, the Nexus Principle states that a subject has better understanding than another subject by grasping more of the complete explanatory nexus. According to the second principle a better understanding involves a greater resemblance of this nexus to scientific knowledge.

In both, the paper and the book version, his critique of non-explanatory understanding might be seen as unfolding in two major steps. The first one is a reconstruction of Lipton’s framework exposing its main assumptions with a focus on the one called Lipton’s Assumption (LA). The second step seeks to show that the explanatory sort of understanding is greater[[9]](#footnote-9) than the non-explanatory one as instantiated in Lipton’s examples. In the paper version this step gets implemented through a General Argumentative Strategy that measures the degrees of understanding while in the book version the critique is articulated through the formulation of three major objections. I will concentrate on the most sensible points of his critique.

Lipton’s Assumption or LA refers to Lipton’s claim that “it is more natural to identify understanding with the cognitive benefits that an explanation provides rather than with the explanation itself” (Lipton 2009, 43). In his attempt to clarify the assumption, Khalifa’s ‘friendly’ (as he puts it) reconstruction of LA states that: “If knowing that b constitutes understanding of p, then ***there exists[[10]](#footnote-10)*** a correct explanation e of p such that knowing that e explains p entails knowing that b” (Khalifa 2013: 2). The emphasize on ‘there exist’ is meant to mark the particularity of the reading Khalifa is proposing, i.e. a strong ontological sort of reading. We could therefore claim that there is always a correct explanation behind any non-explanatory form of understanding provided through a specific benefit. Khalifa’s reading pushes this ontological claim as the unique one, ignoring other variants. From the fact that a benefit could be provided through an explanation it does not necessary follow that such an explanation always exists, less a correct one. Moreover, it contradicts Lipton’s main intention to open a gap between explanation and understanding reorienting the entire inquiry exactly in the opposite direction as initial intended. In fact, it could be said that once one buys this interpretation, the entire subsequent critique is just an easy ride. But Khalifa might have realized this weak point since in the book version of the critique, the strong ontological reading is dropped for the following more neutral interpretation: “If an explanation of p provides a kind of knowledge about p, then that kind of knowledge amounts to understanding why p” (Khalifa 2017: 127). Moreover, LA also becomes just a premise in a larger reconstruction of Lipton’s entire argument for the existence of UWE.

In the chapter dedicated to UwE from his book, Khalifa formulates three main objections which he calls: the Right Track Objection (RTO), the Wrong Benefit Objection (WBO) and the Explanatory Objection (EO) (Khalifa 2017, 127-130). The RTO objection claims that the sort of understanding gained through Lipton’s examples might be a just a provisional sort of understanding - “merely a way station for understanding with explanation” (Khalifa 2017: 129). The second objection WBO cashes on the issue of the possible different natures of the benefits provided via an explanation versus a non-explanatory way. The EO objection claims that in fact the agents in Lipton’s’ examples might “actually grasp a correct explanation’ (Khalifa 2017: 130). From these three just the last one reiterates openly the previous ontological claim. Nevertheless, the RTO objection, which could be claimed to be the most complete one under which all of Lipton’s examples might succumb, does also include this assumption, even if less explicit. RTO in fact reiterates in a more condensed way the entire paper version of the critique without stating the ontological claim explicit but comprising the second major move of the critique. This second move is concerned with unfolding the General Argumentative Strategy in supporting the claim that any non-explanatory form of understanding is a diminished one in comparison to the explanatory form - or in Khalifa’s word the last one is always ‘greater’ than the non-explanatory form. I’m calling this the ‘bigger than” strategy and I discuss it in more detail below.

In the paper version of his critique, Khalifa appeals to a quantitative measuring of understanding as presented in the Superior Explanation Thesis (SET). SET states that: “For any non-explanatory way, w, to understand p, there exists a correct and reasonably good explanation, e, such that the understanding of p provided by w is a proper subset of the understanding of p provided by knowing that e” (Khalifa 2013: 9). He implements SET through the General Argumentative Strategy intended to ‘measure’ the degrees of understanding and applying it to each of Lipton’s examples. I focus just on the example of the benefit that provides modal knowledge through possible explanations. Rejecting this specific critique will be enough to show that Khalifa’s strategy does not work, failing this way to rebut Lipton’s challenge.

For Lipton possible explanations, even false ones, could provide understanding through the modal information of the actual mechanism; they tell us something either about the contingency, or the necessity of the mechanism. In this sense they would offer understanding not only of possible worlds, but understanding of the actual world, too. Such a scientific example mentioned by Lipton is Darwin’s explanation of natural selection through artificial selection which illuminates the mechanism of natural selection. Other more fictional examples are discussed in more detail. One of this involves a rigged boxing match between two boxers A & B, the second far more experienced as the first, who agrees to take a dive in the 10th round and let A win. By chance A knock-outs B in the 5th round through a lucky upper-cut. The explanation invoking the rigging fact becomes this way a possible explanation, which is in fact false, but provides us understanding, pace Lipton, through the modal knowledge on the actual mechanism.[[11]](#footnote-11) For Khalifa, this could not offer any genuine understanding. This has to be gained just if the explainer knows the actual cause - the existence of the lucky uppercut.

In the above case of modal understanding, Khalifa specifies further the ‘subset’ relation mentioned in SET as involving the sets of w-answers that an explanation should always provide. According to Woodward’s account (2003) widely accepted nowadays, an explanation should provide w-answers, i.e. answers to counterfactual questions of the form ‘what-if-things-would-have-been-different’. The explainer would answer such questions by varying the conditions in the *explanans* and see the corresponding variation in the *explanandum*. The explanatory relation would define the set of w-questions and w-answers, such that the set will be relative to the specific explanans. The inclusion relation between the sets of answers to w-questions could therefore not be defined in a proper way; the sets would intersect but not include each-other. In fact, to obtain such a strict inclusion relation one needs to make an assumption that is totally implausible. This would claim that knowledge of the actual explanation implies knowledge of all possible explanations. There were also other voices to expose this tacit assumption in Khalifa’s argument since he feels the need to mention it. Nevertheless, his answer remains unconvicting since it relies on the same initial strong ontological reading - the existence of a correct explanation which he invokes.

In case of the above-mentioned exemplification, we could see how the inclusion relations between these sets fail. By asking a subject who knows the actual explanation what would have happened if A would have missed the lucky uppercut, the normal answer would be that he would not have won. So, we could not get the right answer provided by the one who would know the possible explanation that the match was rigged and A would have won anyway. Unless one assumes that the subject knows also the answers to the possible explanation and by extension to all possible explanations justifying this way the inclusion relation between w-answers. This assumption vitiates the argumentation.

Moreover we might further claim that the subject who believes just the possible explanation - that the match was rigged - engages on a further investigation track which proves to be much fruitful for expanding our knowledge Under a special construal as the one proposed by de Regt and Gijsbers (de Regt, Gijsbers 2016) who argued for considering an effectiveness requirement for understanding i.e. taking into account the effectiveness in further expanding our knowledge, in acquiring new results, better methodologies etc., one could rightly claim a greater understanding from the possible explanation than from the actual one in our case. The understanding gained from the possible explanation would further direct our investigation towards the rigging practices and expand our knowledge more than by simply accepting that the match was won by simple chance.

In the book version of the critique, Khalifa takes another path invoking the Right Track Objection. He characterizes Lipton’s cases as a sort of preliminary and incomplete forms of understanding, or proto-understanding as he calls them. Such forms are ‘merely a way station for understanding with explanation’ (Khalifa 2017: 129) i.e. they are on the right track. Being on the right track means according to Khalifa that one does not know the proper answer to a relevant explanation-seeking question but has information that would be useful in acquiring such knowledge*.* This characterization is on the one hand too inclusive, since in an inquiry context there are plenty pieces of information of this kind; and on the other hand it ignores the fact that possible explanations are also involved in changing tracks and reorienting inquiry towards a better track. As in case of our example, the track of the correct explanation might be meager and irrelevant for the knowledge-expansion in comparison to the one of the possible explanation.

Another characterization of non-explanatory understanding in Khalifa’s reconstruction is the one of proto-understanding referring to a sort of understanding provided by grasping just the explanatory roles of some propositions and not the full-explanation (Khalifa 2017: 129). Grasping direct explanatory roles involve grasping the explanans or explanandum while indirect roles is attributed to other background information. Proto-understanding refers to this later case and we could quite well accuse in this case an underdetermination since many different explanations might appeal to the same pieces of information in the background involving indirect explanatory roles. So, grasping them does not warrant the uniqueness of the explanatory track i.e. the right track.

To conclude the discussion on Khalifa’s criticism, we could say that in order to bolster his argument, he overlooks and ignores important aspects of non-explanatory understanding. These forms are presented in the first criticism as diminished forms that can be retrieved from the full explanatory one. As we saw in case of possible explanation the argument fails to establish the inclusion relation. In the other attempt, they are presented just as stations, i.e. provisory stages on the track towards the full explanation. This view proves to be a narrow one raising a series of unsolved questions.

**SOME POSITIVE REASONS AND PERSPECTIVES**

I’ve showed that there are no good reasons to reject the non-explanatory understanding and that the criticism raised by Khalifa - at least one of them, i.e. the most complete one – fails to achieve its aim. But there are also positive reasons why we should keep investigating these non-explanatory forms of understanding. In this section I briefly point to some of the main reasons that support the fact that in the case of non-explanatory understanding the jury is still out.

A first reason which supports my claim points to the initial driving force of the research on understanding and the motivation of the pro-understanding camp. As already mentioned at the beginning the initial main intention was to liberate it from the subordinated position relative to explanation. The non-explanatory forms of scientific understanding fulfill this desideratum in the most direct way and brings it to its ultimate consequences. It has good chances to make the investigation totally independent from any inquiry on scientific explanation since it needs to focus on the other sort of means than explanation. Lipton’s suggestions discussed in the previous sections are a good starting point in this sense. Nevertheless, focusing on such non-explanatory means should not imply dropping any reference to explanation. On the contrary, investigations as Lipton’s, have to be completed by a reference to explanatory understanding, by an explication of the relations and role such non-explanatory means have to explanation and the process of building them and providing the explanatory form of understanding.

Another important reason invokes the philosophical research on scientific practice,[[12]](#footnote-12) rather than its end-products as the main focus of investigation in philosophy of science. The main assumptions under which this orientation unfolds consider that scientific practice would unveil more interesting philosophical insights into scientific knowledge than just by focusing on the finished products presented usually in textbook format. The philosophical investigation will avoid this way the artificial reconstructions that characterized the classical approaches. It enhances the contact between the scientific and the philosophical communities, making the work of philosophers more relevant to the scientists.

Under this perspective,the non-explanatory forms of understanding might hardly be ignored since they are so pervasive. One might mention here esp. the exploratory aspects of scientific practice which were situated by the neopositivists in the realm of context of discovery and considered therefore unsuited for a philosophical analysis. The non-explanatory forms of understanding might be driving such episodes in which achieving a sort of understanding on the inquired situation is the main goal of the investigative process. Nevertheless, this might not be the only episode that involves these forms of understanding. As already widely accepted the distinction of the two contexts is unattainable. One might see an intermingled set of distinctions as Hoyningen-Huene (1987) or might propose other more situated ones as Echeverria (Echeverria 1995) does. If we are to take such a specific analysis as the last one, in which four such more particular contexts are identified the contexts of education, of innovation, of evaluation and of application (Echeverria 1995) we can find in each of them the presence of non-explanatory forms of understanding as indispensable ingredients of these scientific episodes an artificial move.

One might invoke also an optimism regarding the newly opened areas of research. Letting aside the *Angst* of stepping outside the known routes, the novelty of the items of research should be an incentive to advance in the exploration of such forms of understanding. Lipton’s examples are not to be seen just as challenges to the classical position but also as starting options for an agenda of further research. This will require the more investigation of each non-explanatory form *per se.* One important direction of the investigation needs to target their conditions of validation in order to distinguish them from ungenuine forms of understanding or to put it in Khalifa’s words “misunderstandings without explanation” (Khalifa 2013: 167). The positive contributions to the inquiry and the productive dimension of the acquired understanding has to be closely considered as a central criterion of validation. Furthermore, the investigation will not be limited to such inquiry but will have to look at the relation between these forms and the explanatory one as already mentioned previously. Moreover, we have to take into account the possible relations among these different sorts of non-explanatory understanding in the more comprising dynamic frame of scientific inquiry. I cannot see a better strategy for the mentioned goals as one unfolding in a particular scientific context considering the particularity of a scientific domain and a specific methodology.

A quite novel perspective of research opens up another issue discussed in philosophy of science: the methodological differences between different major scientific outlooks: that of natural science and the one of social & human science. Notwithstanding the classical separation of explanation and understanding casted as explanation belonging just to natural sciences and understanding assigned to the other, the distinction between the two registers might reveal the existence of different sorts of such non-explanatory understanding. The methodological specificity of the human and social realm invoked by some authors was linked to such forms of understanding as the one of intentions or the presence of empathy or the more theoretized methodology of ‘participant observation’ as in anthropological research. These could be recast in the form of species of non-explanatory understanding which could either per se or as a provisional format contribute to the furthering of the explanatory inquiry. A working agenda opens up this way.

**CONCLUSIONS**

The present contribution calls for a reconsideration of a neglected form of scientific understanding. My argument shows that there are no good reasons to ignore this form of understanding: the understanding without explanation, either by dismissing it as an unimportant issue or by rejecting it through an articulated critique from the perspective of a reductivist account on understanding

I began by a brief introduction to the subject of scientific understanding after it reached a more independent status in philosophy of science than being strongly linked to explanation. The second section tracks the dichotomy between explanatory and non-explanatory understanding which is an implicit sort during the development of the subject of understanding. I wrapped up the second section by presenting Lipton’s analysis who is the first and the only author offering an explicit account of non-explanatory forms of understanding. I looked to the possible challenges that his proposal raises for other theories of understanding and discussed Kelp’s interpretation. I argued that Kelp’s construal does not exhaust the core of the challenge, neither does his theory offer a satisfactory answer to it. The core challenge is to account for these forms of understanding that are so pervasive in the scientific practice doing justice to their particularities. The explanation-centered approach on understanding fails in this sense and I offer a rejection of Khalifa’s reductive critique of Lipton’s examples. My argument intends to prove that the jury on UwE is still out. In the last section I suggest that one can find some positive reasons that open a rich working agenda centered on this subject.

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1. A good review of the debate with presentations of the major moments and directions till the end of the 80s can be found in Wesley Salmon’s book *Four Decades of Scientific Explanation (*Salmon 2006). [↑](#footnote-ref-1)
2. As does Friedman (1974) in his seminal paper. [↑](#footnote-ref-2)
3. I call it reductive in trying to capture the intention of the authors to closely connect and reduce its inquiry to the one of explanation and its associated epistemology. [↑](#footnote-ref-3)
4. Friedman’s view could be called the ‘original’ or ‘classical’ attitude to understanding. [↑](#footnote-ref-4)
5. I will discuss in more detail his argumentation in the next section*.*  [↑](#footnote-ref-5)
6. For the explanationists ‘understanding in essence involves knowledge of correct explanations” meanwhile for manipulationists “understanding involves a specific kind of ability on the part of the cognitive agent, roughly, an ability to perform manipulations of representations of the phenomena understood.”(Kelp 2015: 3800) [↑](#footnote-ref-6)
7. Kelp identifies the main drawback of Wilkenfeld’s theory in the use of a too ‘inclusive’ notion of representation. [↑](#footnote-ref-7)
8. One might suspect that the ‘successful performance’ is related to the manipulation of representations of P, but Kelp does not endorse this interpretation. [↑](#footnote-ref-8)
9. Where greater is rendered in a general form in the SET thesis as “the understanding of p provided by w being a proper subset of the understanding of p provided by knowing that e” and in the particular case of the possible explanations is quantified through the number of answers to the w-questions i.e. what-if- things-would-have-been-different’ questions that an explanation is supposed to provide. [↑](#footnote-ref-9)
10. my emphasis. [↑](#footnote-ref-10)
11. In this case we get knowledge of necessity “by revealing fail-safe overdetermination”. In Lipton’s wording: “if the merely possible mechanism is such that it would have been actual, had the actual mechanism not been in operation, then showing how the phenomenon would have been produced by the alternative mechanism may help to show that the phenomenon had to occur, one way or another. Even though we already know how the phenomenon actually came about, the merely possible explanation thus improves our understanding.” (Lipton 2009: 51) [↑](#footnote-ref-11)
12. the philosophy of science in practice approach which became bolder in the last 20 year as best exemplified by the increasing influence of the SPSP (Society of Philosophy of Science in Practice). [↑](#footnote-ref-12)