Erkenntnis
https://doi.org/10.1007/s10670-023-00665-8

ORIGINAL RESEARCH

Understanding in Medicine

Somogy Varga[1,2]

Received: 5 April 2022 / Accepted: 8 February 2023

Abstract

This paper aims to clarify the nature of understanding in medicine. The first part describes in more detail what it means to understand something and links a type of understanding (i.e., objectual understanding) to explanations. The second part proceeds to investigate what objectual understanding of a disease (i.e., biomedical understanding) requires by considering the case of scurvy from the history of medicine. The main hypothesis is that grasping a mechanistic explanation of a condition is necessary for a biomedical understanding of that condition. The third part of the paper argues that biomedical understanding is necessary, but not sufficient for understanding in a clinical context (i.e., clinical understanding). The hypothesis is that clinical understanding combines biomedical understanding of a *disease* or pathological condition with understanding *illness,* which involves some degree of personal understanding of the patient. It is argued that, in many cases, clinical understanding necessitates adopting a particular second-personal stance and using cognitive resources *in addition* to those involved in biomedical understanding.

Reflecting an interest in increasing the transparency of the world, we engage in epistemic endeavors that span from everyday, rudimentary inquiries to structured scientific inquiries. The latter not only aim at furnishing knowledge and rational belief about some target phenomenon, but aspire to *understand it*, which can be seen as a distinct cognitive accomplishment.[1] Due to the significant diversity that characterizes scientific endeavors, what qualifies as constituting proper understanding is to a certain degree context-sensitive and can take on different forms depending on the nature of the scientific field and the features of its subject matter. If so, then we have

[1] For the purposes of this paper, I will accept the view that comprehends scientific progress in terms of increased understanding. One advantage of this view is that it is resistant to difficulties that accounts of scientific progress measured in terms of knowledge accumulation run into (see e.g. De Regt and Dieks, 2005; Elgin, 2007, 2017; Potochnik, 2015).

✉ Somogy Varga
varga@cas.au.dk

[1] Department of Philosophy and Intellectual History, Aarhus University, Aarhus, Denmark

[2] Faculty of Humanities, University of Johannesburg, Johannesburg, South Africa

Published online: 28 February 2023

at least some initial reasons for thinking that understanding within the context of medicine might differ in various ways from understanding in physics or chemistry. A better comprehension of the nature of understanding in medicine merits sustained philosophical attention, and this paper is dedicated to clarifying this matter.

An uncontroversial starting assumption is that the epistemic interest in understanding pathological conditions in medicine is motivated by practical interests, which include being able to intervene on them (i.e., cure, treat, prevent). This starting assumption seems to describe fairly well the context of clinical medicine, but also that of medical research (e.g., clinical trials, acquiring population-level data on health determinants, biological disease mechanisms), which is only properly *medical*—and not biological or something else—if it aims at understanding pathological conditions with respect to at least potential benefits for health. But this initial picture is also incomplete and leaves open major questions about the particular nature of understanding in medicine. The chief task of this paper is to shed light on understanding in medicine and some features that distinguish it from understanding in other fields.

The paper falls into three parts. The first part describes in more detail what it means to understand something, distinguishes types of understanding, and links a type of understanding (i.e., objectual understanding) to central concepts in the philosophy of science, like explanations. The second part proceeds to investigate what objectual understanding of a disease (i.e., biomedical understanding) requires by considering the case of scurvy from the history of medicine. The main hypothesis here is that grasping a mechanistic explanation of a condition is necessary for a biomedical understanding of that condition. The third part of the paper argues that biomedical understanding is necessary, but not sufficient for understanding in a clinical context (i.e., clinical understanding). The hypothesis is that clinical understanding combines biomedical understanding of a *disease* or pathological condition with a personal understanding of the patient with an *illness.* It will be shown that in many cases, clinical understanding necessitates adopting a particular second-personal stance and using cognitive resources *in addition* to those involved in biomedical understanding. The attempt to support this hypothesis will include revisiting the distinction between "understanding" and "explanation" familiar from debates concerning methodological principles in the humanities and social sciences.

1 Knowledge and Types of Understanding

Epistemologists and philosophers of science have rediscovered understanding as a cognitive achievement that merits study on its own and the rehabilitation of the notion of understanding is propelled by several factors (Grimm, 2019, 2021; Baumberger, Beisbart, and Brun, 2017). First, some have argued that knowledge carries no distinct epistemic value above the sum of its proper parts (i.e., truth and justification), which makes it hard to maintain that knowledge merits the attention that it has received in epistemology (Kvanvig, 2003; Pritchard, 2010). Second, the somewhat myopic focus on knowledge tended to ignore what motivates and bestows value on

our inquiries from an epistemic perspective, which is, in general terms, to understand the world we inhabit and to render it more transparent to us.

"Knowing" and "understanding" are closely related cognitive achievements, occur in similar linguistic forms (one can know–how, know–that, and know–who, just as one can understand-how, understand-what, and understand-who), and are often used interchangeably (Brogaard, 2005; Kvanvig, 2009; Hannon, 2019, chap. 9). We operate with different uses of understanding, and we regularly claim to understand computers, languages, other human beings, symbols, why and how certain events occurred, and so on. Disregarding, for instance, linguistic understanding (e.g., "I understand the meaning of 'tool'"), propositional understanding ("S understands that he needs to pass the exam"), and nonexplanatory understanding (e.g., "I understand who my friends are"), the most relevant types of understanding for our context are:

(1) *Explanatory understanding*: "S understands why X is the case"
(2) *Objectual understanding*: "S understands X" (e.g., object, subject matter)[2]
(3) *Practical understanding:* "S understands how to X"

While the first two types of understanding each mirror a type of knowledge, in each case knowledge is not sufficient for understanding. In the case of explanatory understanding, S might know the cause of X, but S can only be said to exhibit understanding if S grasps how the cause brings about X. Call in mind Pritchard's (2010) example in which a young boy comes to know by testimony from a reliable source that the house burned down due to faulty electrical wiring. The boy attains (causal) knowledge, but in lacking some idea of *how* faulty wiring might bring about a fire, he does not attain the relevant piece of explanatory understanding.

In the case of objectual understanding, the situation is similar. This is the sort of understanding that one can acquire of a domain or subject matter (Kvanvig 2003, p. 191; 2009) and it is usually ascribed by means of the verb "understands" followed by a noun ("S understands scurvy"). In such cases, saying that S understands X is attributing to S a more profound penetration of the target, an intimate epistemic acquaintance that outstrips knowledge of individual propositions (Strevens, 2017; Riggs, 2003). S can have acquired knowledge of countless isolated bits of information about X by testimony, but this would not be sufficient to rise to the level of understanding. Objectual understanding displays "multiple gradability" (Bengson, 2017), such that it can always be deeper or richer along various dimensions.

Practical understanding ("understanding-how") has been less prominent in the debates in epistemology. It is sometimes contrasted with "theoretical understanding" (Lipton, 2009) although some argue that they possess a common underlying nature (Bengson, 2017). The paradigm case of practical understanding is a skillful activity that differs from reflexive behaviors and underscores that practical understanding is not about explanations but about certain bodily or mental abilities. Practical

[2] Objectual understanding can also have as its object a theory, but this might be a special case, as it is often a means to achieve objectual understanding of subject matters, processes, etc.

understanding is in this sense not explanatory (Khalifa, 2013) and builds on non-propositional knowledge that is not vulnerable to Gettier-style defeaters.

1.1 Grasping Explanations

According to a widely accepted view, explanatory understanding and objectual understanding involve an additional cognitive achievement that distinguishes understanding from knowledge, and many conceive of this as a kind of "grasping" (see e.g., de Regt and Dieks, 2005; de Regt, 2009; Grimm, 2006, 2014, 2016; Newman 2012; Khalifa, 2013; Hills, 2016; Strevens, 2017; Elgin, 2007, 2017). As Jonathan Kvanvig (2003, p. 192) puts it, "understanding requires the grasping of explanatory and other coherence-making relationships in a large and comprehensive body of information." There is no consensus on what "grasping" precisely consists in, and there is an unfortunate tendency to use the term in a largely metaphorical way (Hannon, 2019), even though many agree with Michael Strevens (2017, p. 41) that "to grasp a fact is like knowing a fact, but it involves a more intimate epistemic acquaintance with the state of affairs in question." To clarify these matters, we may make two points about (a) what grasping is and (b) what is grasped in understanding.

As to (a), we may comprehend grasping as some kind of *cognitive command* or cognitive control (Hills, 2016) that we acquire upon the exercise of our epistemic agency in assembling information, making transparent and representing conceptual and explanatory connections between parts and processes. When one possesses cognitive command, one is able to mentally map a relational assembly that allows one to exploit the information in some way. Consider again the boy who has attained causal knowledge. When we say that he lacks understanding, what best describes the most relevant difference is that he lacks cognitive command of explanatory dependency relations with respect to the event. This renders him unable to reach correct conclusions about similar cases in slightly different circumstances by engaging in counterfactual reasoning.

When speaking of grasping as some kind of ability of cognitive command, it is important to avoid reducing the *subjective aspect* of understanding to a *phenomenological aspect* (i.e., a so-called "aha"-feeling, some sort of mental "click"). Good explanations may fail to yield a sense of understanding, while poor explanations might produce a bias in scientists for thinking that the correct explanation has been found (Trout, 2002). While there are obvious problems with assessing the quality of explanations with recourse to the sense of understanding, it is not clear whether this can be avoided entirely (Wilkenfeld, 2013), and the sense of understanding may be mediated simultaneously by subjective experience and still function as a reliable source of knowledge (Lipton, 2009).

As to (b), at least in most cases, in the context of the sciences, what are grasped are *explanations*. While it is intuitive to think that anything deserving the label "explanation" ought to be capable of clarifying something previously unclear, some of these debates have comprehended understanding as something that is produced by having an explanation. Carl G. Hempel and Paul Oppenheim (1948, p. 145) argued that understanding is produced by deductive-nomological explanations while

causal-mechanistic accounts connect explanation to identifying causal mechanisms responsible for the target phenomenon (Salmon, 1984, p. 132; Machamer, Darden, and Craver, 2000). Taking this further, others have supposed that understanding is *the point* of explanation: science wants to explain some target phenomena X *because* we want to understand X (Lipton, 2001). Whether or not this stronger point is correct, it is worth noting that the discussions sometimes suggest that understanding lies in the objective relation of subsumption under laws or the identification of causal mechanisms itself. For our purposes, it is important to keep in mind that understanding requires some additional subjective aspect linked to representing those relations.

1.2 Objectual Understanding

Much of the literature distinguishes between objectual and explanatory understanding and highlights differences between their objects, the cognitive efforts they involve, and what is distinctively valuable about them (Kvanvig, 2003, 2009; Carter and Gordon, 2014; Baumberger, 2019; Hannon, 2019). However, some think that, ultimately, objectual understanding is reducible to having some sufficiently large amount of relevant explanatory understanding (see e.g., Khalifa, 2017, ch. 4). The idea is, roughly, that explanatory understanding takes as its object a state of affairs (e.g., that the occurrence of scurvy has rapidly increased), while objectual understanding takes as its object a subject matter (e.g., scurvy), which itself is nothing more than a composite of states of affairs (Grimm, 2011). This is a thorny matter, and I cannot do justice to the details of this debate in this paper. However, I list four reasons to keep objectual and explanatory understanding apart, while leaving open whether there might be other and better ways of distinguishing forms of understanding.

First, some have argued for the general view that attaining objectual understanding is the goal of inquiry (Kvanvig, 2013; Carter and Gordon, 2014). Objectual understanding is what satisfies the desire to comprehend a subject matter, and attaining it legitimately closes the investigation into the subject. At least in the context of medicine, objectual understanding appears to more adequately describe the ultimate goal of inquiry. Of course, we want to understand why a condition like scurvy arises, but we also want to understand why scurvy takes on the form it does, how it is correlated with other conditions, what effects it has on the mind, how its impact varies across individuals, how we can systematically describe and classify its signs and symptoms, etc. (see e.g., Varga, 2021, on the drive toward systematicity in medicine). In short, medicine does not merely aim to obtain explanatory understanding of the features of scurvy (e.g., why various biochemical reactions occur, why the ingestion of citrus fruits mitigates the symptoms). Instead, the goal is to systematically *understand scurvy*, to attain some coherent completeness with respect to knowledge, classifications, and taxonomies, even if single inquiries cannot take on such a large task. Such systematic understanding of a subject matter also indicates that the focus of objectual understanding is broader than that of explanatory understanding (Hannon, 2021).

Of course, one might agree that objectual understanding better captures the aims of inquiry, and that attaining it requires having some sufficient degree of explanatory understanding, but still insist that objectual understanding is reducible to explanatory understanding. Against such a view, Kvanvig (2009) argues that objectual understanding cannot be reduced to the latter because it is possible (e.g., in indeterministic systems) to attain some degree of objectual understanding where explanatory relations do not exist. In such cases, while explanatory understanding lacks, one can still attain objectual understanding by grasping other structural relationships such as probabilistic relationships. While some of the relevant examples and the claim of irreducibility might be disputed (see Khalifa, 2013), for the purposes of this paper, we may note that the type of inquiry associated with medicine described above involves aspects that are not straightforwardly explanatory. For example, the classificatory efforts with respect to various diseases like scurvy and the taxonomy of different forms of scurvy *enhance* our objectual understanding of scurvy even if classifications in themselves do not enable us to explain facts about scurvy.[3]

There is perhaps also a relevant difference in the state of understanding. When we say that S understands scurvy, we attribute to S some significant level of cognitive command of scurvy, reflecting that she understands *how* and *why* various elements and aspects of what is explanatory with respect to scurvy hang together. S's epistemic commitments relevant to scurvy are interrelated in a coherent network, and she has a firm grasp of dependency relationships between a large number of items of information. Moreover, objectual understanding says something about *how* S holds an understanding of the relevant explanatory and other structural relationships, namely in a *systematic* fashion, offering her cognitive command over a body of interlinked information that enables further cognition and action with respect to the phenomenon. For example, given her objectual understanding, we might expect S to have a good idea of what explanatory understanding would be worth seeking in order to ameliorate her understanding of scurvy. Such expectations would be unjustified if S's objectual understanding of scurvy was nothing more than having a fragmented collection of explanatory understandings.

Another reason to maintain this distinction is that it conserves the intuition that the factivity condition of objectual understanding is less demanding than that of explanatory understanding, such that the former is less vulnerable to peripheral falsehoods (see e.g., Elgin, 2017; Baumberger, Beisbart, and Brun 2017; Kvanvig, 2009). Moreover, as Baumberger and Brun (2016) point out, the two forms of understanding can also be distinguished in terms of the means by which they are achieved.

That said, perhaps we may remain agnostic about the question whether objectual understanding is reducible to explanatory understanding, but preserve the difference due to pragmatic reasons. As Michael Stuart (2017, p. 529) points out, even if different forms of understanding were mutually reducible, "we would still want to keep them apart since there are different ways of obtaining each type of understanding

[3] For a general discussion of taxonomies and objectual understanding that makes a similar point, see Gijsbers (2013).

and different ways of determining when each has been achieved. This is particularly clear in the scientific context."

2 Understanding Disease

The account of understanding offered here allows us to acknowledge that what constitutes suitable understanding in the different scientific fields might be different, in part, because what qualifies as a suitable explanation depends on the disciplinary context and the relevant research questions (for a discussion, see Strevens, 2010). For example, understanding phenomena can involve using simulations based on mathematical models, finding robust patterns in large databases, direct intervention (e.g., manipulation of components in the case of biological entities), and so on. But even within the same branch of science, what constitutes understanding can be subject to change. For example, while Lord Kelvin maintained that scientific understanding in physics is achieved by developing mechanical models of physical phenomena, developments in physics such as the emergence of quantum theory undermined this idea (De Regt, Leonelli, and Eigner, 2009).

Nonetheless, the account offered here provides the basis for exploring what objectual understanding of a disease (i.e., biomedical understanding) requires in the context of medicine. For this, we will now consider an example from the history of medicine.

2.1 Understanding Scurvy

Scurvy, a disease of malnutrition that we now know is caused by a vitamin C deficiency, killed millions of sailors between the sixteenth and nineteenth centuries, and the default assumption of shipowners was that half the sailors on any major voyage would die from it. Although the effectiveness of a certain diet involving fresh fruits, especially lemons, as a prophylactic was known to sailors already in the early seventeenth century, physicians stuck to the diagnosis of "humoral imbalance" and recommended bloodletting, salt-water-induced vomiting, and the consumption of "fizzy drinks" to stimulate digestion.

In 1747, the naval surgeon James Lind conducted a landmark clinical trial involving 12 participants suffering from advanced scurvy. Persuaded that in order to understand disease and develop a cure treatments had to be assessed (a) in similar patients and (b) simultaneously (Lind, 1772, pp. 149–152), Lind divided the patients into six groups. One group was given cider, one received elixir of vitriol, one vinegar, one salt water, one a laxative, and one oranges and lemons. In current terms, Lind's undertaking was a six-armed, non-controlled comparative trial that concurrently studied commonly used scurvy treatments. Holding all other circumstances constant, Lind supplied groups of randomly chosen individuals with different alleged remedies and observed whether or not a significant difference was produced

in the course of the scurvy. The result of Lind's study was relatively unambiguous: the sailors receiving oranges and lemons were cured, but not the others.

Lind's experimental intervention advanced the explanatory understanding of scurvy by distinguishing variables that make a difference for the occurrence of scurvy from those that are simply correlated with it (e.g., sea travel, crowded living spaces, hard work). To shed light on how Lind proceeded and how causal relationships are comprehended in the sciences, we may return to accounts of causation that subscribe to the view that a cause must make a difference to its effects (see Woodward 2003, 2010, 2015). A causal relationship holding between variables X and Y is a matter of counterfactual dependence between X and Y. Claiming that X causes Y (represented as X → Y) means that there is a possible manipulation of some value of X, which, under the appropriate conditions, will change the value of Y or its probability distribution (Woodward 2003, p.40; 2010, p. 290). What it is for a causal connection to hold between X and Y can be explicated in terms of the results of an ideal experimental intervention I on X with respect to Y. I is an intervention variable for X with respect to Y if and only if I meets four conditions:

(1) I causes X.
(2) I acts as a switch for all the other variables that cause X. That is, certain values of I are such that when I attains those values, X ceases to depend on the values of other variables that cause X and instead depends only on the value taken by I.
(3) Any directed path from I to Y goes through X. (…)
(4) I is (statistically) independent of any variable Z that causes Y and that is on a directed path that does not go through X. (Woodward, 2003, p. 98)

This account offers a way to probe an alleged causal relation by experimental manipulation, consisting of an intervention that manipulates the putative cause and observes whether an effect results. It does not merely offer a tool to distinguish correlation and causation, but it also fits a fundamental pragmatic objective, which is to causally intervene to treat or prevent diseases (Kendler and Campbell, 2009).

Returning to Lind's experimental intervention, we see that it meets condition (1), because the intervention determined the level of lemon and orange consumption. Condition (2) is met because only Lind's choice to assign a particular diet to a group determined whether the group has a high consumption of lemon and orange. Condition (3) is met because if assigning people in various groups influenced their scurvy, then it did so only by way of the elevated consumption of the relevant substance. Finally, condition (4) is met so long as the intervention was a randomized experiment in which fixing the value of the consumption of lemons and oranges was independent of other variables that might have influenced the course of scurvy.

2.2 Some Limitations: the Lack of A (Correct) Mechanism

Lind's contribution to understanding scurvy was of course enormously important: unlike the causal relationship between the ingestion of oranges and lemons and

scurvy, the correlational relationship between the ingestion of nutmeg, vinegar, or salt water and scurvy is not exploitable for manipulation and control. Even so, his comprehension of the causal relation of oranges and lemons on scurvy was relatively rudimentary, as he had no knowledge of two important dimensions of the causal relationship, namely *stability* and *specificity* (for a general discussion, see Woodward, 2010).

A causal relationship being more or less stable depends on the amount of background circumstances in which it occurs. The causal relationship between oranges and lemons (OL) and scurvy (S) is relatively stable if the counterfactual dependence holds under a wide variety of background circumstances. Moreover, OL → S can be more or less specific, referring to the grain level of counterfactual dependencies between OL and S. OL → S is specific if the counterfactual dependencies holding between OL and S are fine-grained, in which case the manipulation of OL enables more precise control over the value of S. X → Y has a high specificity when intervening on X enables modulating the state of Y in a fine-grained manner. Conversely, switch-like causation has a low grade of causal specificity. Clearly, Lind's understanding of scurvy would have been more profound had he attained some grasp of the stability and causal specificity of the relationship between OL and S.

While Lind's rudimentary comprehension of some causal dependencies allowed him to manipulate the condition, it would be odd to claim that he understood scurvy in the sense of objectual understanding. One could say that he made important steps toward achieving objectual understanding, or perhaps even that he attained some degree of objectual understanding, but it would be excessive to claim that Lind has obtained objectual understanding of scurvy in any significant sense. Importantly, Lind did not know whether scurvy was somehow caused by a diet lacking lemons and oranges, which also meant that he could not refute other explanations of why scurvy occurs (e.g., bad air or crowding that somehow disturbs humoral balance, which can be relieved by ingesting lemons and oranges). Of course, he could have used the same procedure to determine whether the lack of lemons and oranges causes or increases the risk for scurvy. He could have designed an experiment in which he randomly intervened on individuals in a given population exposing them to the lack of citrus fruits and observe if they subsequently suffered from an increased incidence of scurvy. Still, objectual understanding of scurvy requires something else that allows one to "trace" the causal process (Steel, 2008) and that helps piece causal information together and grasp coherence-making relationships. It requires some degree of explanatory understanding, which could be attained by *identifying the mechanism* responsible for the causal connection between the two variables.

Roughly, a mechanism M for a phenomenon P consists of parts the activities of which are organized in a way that they are responsible for P (Glennan, Illari, and Weber, 2021). Outlining the spatio-temporal and hierarchical organisation of mechanisms (e.g., biochemical pathways) plays a key explanatory role in the biomedical sciences by shedding light on the proper function of features of the body and the emergence and progress of diseases (Williamson, 2019). Placing additional emphasis on mechanisms, some hold that establishing the claim that X → Y not only requires difference-making evidence (e.g., the kind of evidence that Lind had gained), but also evidence of a satisfactorily delineated mechanism constituted by

entities (e.g., proteins) and activities (e.g., protein expression) linking X and Y (Russo and Williamson, 2007). While many have argued that this thesis is too strong and that causal claims can be accepted on the basis of clinical studies alone (e.g., Howick 2011; Broadbent, 2011), a weaker thesis is acceptable. According to the weaker thesis, evidence of a mechanism in conjunction with evidence of difference-making helps increase confidence that the observed correlation between X and Y is not spurious and that changes in Y can be attributed to the experimental intervention on X and not to confounding (Illari, 2011; Williamson, 2019).[4]

While evidence of mechanisms may not be necessary for establishing causal claims, attaining understanding seems to require both difference-making evidence and some evidence of mechanism. Lind's study helps establish a difference-making relationship, but it because it does not identify a correct mechanism linking cause and effect such that citrus fruits act to prevent scurvy, it fails to offer the kind of explanatory understanding that—together with bits of knowledge—could amount to biomedical understanding.

Lind made attempts to reach this stage of understanding. He tried to offer an account of the relevant mechanism in virtue of which scurvy is produced and why lemons and oranges had a positive effect on it. However, his account relied on the humoral theory of disease. Roughly, he claimed that (a) perspiration through the skin is vital for the balance of the humors, (b) scurvy involved a blockage of the pores caused by damp air, and (c) lemons and oranges had the capacity to dissolve it. As Leen De Vreese (2008, p. 22) puts it, "the conceptual framework which could have provided him understanding of the real mechanisms leading from such a nutritional deficiency to the development of the disease was entirely lacking."[5] In this manner, De Vreese (2008, p. 15) notes that the wrong account of the mechanisms has led to *mis*understanding, only seemingly enhancing explanatory coherence. This flawed account of the mechanisms prevented answering a variety of what-if-things-had-been-different questions, and to anticipate the effects of certain conceivable interventions. As understanding is a success term that involves some degree of factivity, one might claim that Lind's inquiry counts as increasing or making steps toward understanding by way of uncovering a causal relationship, but not that he attained explanatory or objectual understanding.

The failure to identify the mechanism responsible for the causal connection is also the reason why Lind encountered a major setback later in his career. He began treating patients with concentrated lemon juice that had been heated, which destroyed much of the vitamin C. Unwavering in his commitment to humoral theory, Lind conducted no tests to compare his boiled concentrates with fresh fruits and ultimately returned to bloodletting (Wootton, 2006).

[4] Similarly, evidence of the absence of a possible mechanism linking X and Y decreases confidence that there is a causal relationship. For example, evaluating whether mobile phone usage can cause cancer, a significant correlation was found between certain forms of cancers and high levels of call time. However, because it was found unlikely that there is a mechanism connecting the purported cause and effect, the conclusion was that the result is best explained as due to error or chance (Williamson, 2019).

[5] I am indebted to an anonymous referee for suggesting De Vreese's work.

2.3 Biomedical Understanding and Mechanistic Explanation

Before exploring additional gains in understanding scurvy, it is helpful to add some clarifications about mechanistic explanations that are prevalent in the biological and behavioral sciences. An etiological mechanistic explanation typically comprehends phenomena in terms of their being caused by a mechanism, defined as "a structure performing a function in virtue of its component parts, component operations, and their organization" (Bechtel and Abrahamsen, 2005, p. 423).[6] In contrast, a constitutive mechanistic explanation advances understanding by recourse to the behaviors and organization of component entities of the underlying mechanism, which stand in a constitutive relationship to the phenomenon.

Explanations in medicine are often modelled on biological explanations, which are most frequently defined as mechanistic explanations involving biochemical mechanisms (Thagard, 2003 2005; Darrason, 2018; Kaplan and Craver, 2011). For example, Paul Thagard defines medical explanations as identifying the "mechanisms whose proper and improper functioning generate the states and symptoms of a disease" (Thagard, 2005, p. 59). Disease is thus the product of altered biological mechanisms, or in some cases perhaps the product of autonomous pathological mechanisms (Nervi, 2010), but explanations in medicine are typically mechanistic such that they explain a disease by localizing and disclosing the spatiotemporal organization of a mechanism that produces its symptoms. As Marie Darrason (2018) puts it, "most medical explanations are considered mechanistic explanations: in order to explain a disease, you need to localize and decompose the mechanism that produces the disease symptoms" (Darrason, 2018). Mechanistic explanations of diseases have certain advantages: identifying the mechanisms responsible for the disease permits going beyond pure phenotypic characterization of disease and helps illuminate what restoring the dysfunctional mechanism would require.

To further support the idea that biomedical understanding requires grasping mechanistic explanation, we may now continue our exploration of the history of scurvy. A decisive step toward understanding occurred in the beginning of the twentieth century, when Norwegian researchers Axel Holst and Theodor Frølich were developing an animal model for "ship beriberi," which resembled scurvy in a number of ways. They suspected a nutritional deficiency and tested the idea on guinea pigs, which, incidentally, are among the few mammals unable to endogenously synthesize ascorbic acid. Holst and Frølich found that guinea pigs on a diet of grains developed scurvy-like symptoms, and their autopsies showed signs of scurvy but not beriberi. Subsequently, their studies indicated that symptoms could be neutralized by putting the animals on a diet of fresh foods (apples, cabbage, potatoes, and lemon juice), and they proposed that these contained a special substance that mediates the causal relationship between nutrition and scurvy (Combs and McClung, 2016, p. 18).

Holst and Frølich's findings supported the idea of a nutritional deficiency causing scurvy, but the crucial factor was only discovered two decades later when Albert Szent-Györgyi isolated a molecule that he termed "hexuronic acid." Together with

[6] See Illari and Williamson (2012) for different characterizations.

Joseph L. Svirbely, Szent-Györgyi conducted further experiments using guinea pigs. One group received boiled food, which destroyed the vitamin C, while the other received food supplemented with hexuronic acid. The animals in the first group developed scurvy while those in the second group did not. Svirbely and Szent-Györgyi argued that hexuronic acid was responsible for protection from scurvy in the second group and renamed it "ascorbic acid" to highlight its anti-scurvy effects. Ascorbic acid eventually became known as vitamin C (Carpenter, 2012).

Having found the causal agent, there was still no comprehension of how the elements of scurvy are configured: What is it that binds together putrid gums, spots, fatigue, and joint pain? Are these symptoms parts of scurvy or are they caused by scurvy? A final breakthrough in this regard was the discovery of the *metabolic mechanism* that is responsible for the synthesis of collagen, which requires vitamin C for its functioning. More precisely, vitamin C is a cofactor for two enzymes (prolylhydroxylase and lysylhydroxylase) that are responsible for the hydroxylation of collagen. These enzymes require vitamin C to be present as a cofactor, and deficiencies of vitamin C, such as in scurvy, can cause defects in collagen. This explanation identifies the mechanisms responsible for the normal functioning of collagen hydroxylation *and* a way in which vitamin C deficiency is a factor that can interfere with it.

With a mechanistic explanation of normal and altered collagen synthesis as constituted by the configuration and activities of component entities—entities in the mechanism relevant to its operation—researchers took a leap toward objectual understanding, toward being able to construct a web of relational networks that include correlations, causes, and mechanisms. The identification of a fine-grained mechanism increased explanatory power, allowing for more what-if-things-were-different questions to be answered and doing so in a more precise manner. The mechanism explains not just what causes scurvy, but also why some tissues such as skin, gums, and bones with higher concentration of collagen are more disposed to be affected. The seemingly disparate symptoms now stand out as a coherent whole that do not stand in a causal relationship to each other, but are connected by a common cause.

2.4 Mechanisms and Two Types of Dependence

One might agree that grasping a mechanistic explanation is required for objectual understanding in biomedicine, but insist that the information about mechanisms can be reduced to information about fine-grained causal relations (see Woodward, 2004, 2010).[7] While some stress that information about mechanisms involves more than that, as mechanisms are truth-makers for causal claims (Waskan, 2011), for our purposes, we need not take sides on the details (for a recent

[7] As Woodward (2004, p. 60) puts it, "I certainly don't dispute the importance of information about intervening mechanisms, but see this as more information about additional, fine-grained patterns of counterfactual dependence, rather than as information that dispenses with counterfactuals in favour of something else."

discussion, see Craver, Glennan, and Povich, 2021). Instead, we merely point out that while both causal and mechanistic explanations map networks of counterfactual dependence, it is often helpful to keep separate two difference-making relationships. In a mechanism, there is a horizontal (causal) dimension and a vertical (part-whole) dimension, such that the relations among the components are *causal*, while the relationship between individual components and the phenomenon is *constitutive* (Craver, 2007; Craver and Bechtel, 2007; Craver and Tabery, 2019; Glennan, 2017).

The difference is that in a causal relationship between X and Y dependence is *asymmetrical* (If X causes Y, then Y depends on X but not vice versa), and X and Y are mereologically independent entities such that X temporally precedes Y. However, if X constitutes Y, then their relationship of dependence is *symmetrical* (Y depends on X and vice versa), and X and Y are spatiotemporally overlapping entities. Due to such differences, many maintain that the relations of dependence supporting constitutive mechanistic explanations of activities of wholes using activities of components are not causal (Gillett, 2020), but they can make sense of how wholes have the causal capacities they have by appealing to their components and their organization (Ylikovski, 2013).

These distinctions in terms of difference-making matter for biomedical understanding, and scientists have established experimental methods to distinguish genuine components from causal factors. To discover causal relationships, scientists unidirectionally intervene to manipulate X and thereby change Y, but given the symmetrical nature of constitutive relations, this is clearly not sufficient. On the basis of an examination of explanations in the biological sciences, Carl Craver (2007) has put forward what he refers to as the *mutual manipulability* approach to constitutive relevance. The main idea is that the parts and their activities are constituents of a phenomenon if the relevant interventions uncover mutual difference-making. So X is constitutively relevant to Y if the relata stand in a part-whole relationship and if they are mutually manipulable, such that there is a possible ideal intervention on Y under which X is altered and vice versa (Craver 2007, pp. 152–153; for recent clarifications, see Craver, Glennan, and Povich, 2021).

Constitutive relations are established by executing interventions on a phenomenon in a top-down manner and on the parts in a bottom-up manner. Bottom-up experiments intervene on putative lower-level components (often by boosting or reducing its activity) while tracking changes in the phenomenon at a higher-level. In contrast, top-down experiments intervene on the level of the overall phenomenon while tracking changes on the lower-level of putative components. Although determining the adequate combination of bottom-up and top-down interventions will vary from case to case, demonstrating constitutive relevance necessitates performing both top-down and bottom-up experiments (Craver and Darden, 2013).

In all, mechanisms matter for achieving some acceptable level of systematic, biomedical understanding of a condition. Mechanistic explanation helps map a rich network of counterfactual dependence that enable increasing opportunities for intervention.

2.5 Summing Up

Thus far, the paper has offered support for the view that in the medical context, grasping a mechanistic explanation of a disease is a necessary condition for attaining an objectual understanding of it. The approach chosen here has some rather serious limitations. The paper has only considered a single case, so without further arguments, the conclusion is not very well supported. However, scurvy is commonly discussed as a prototypical disease, so there are at least some reasons for thinking that our findings will also apply to a wide range of other diseases. Moreover, it appears that the idea that objectual understanding in the context of medicine requires grasping a mechanistic explanation also applies in standard clinical settings. In regular clinical medicine it seems difficult to think of cases in which physicians display objectual understanding of a condition while having no grasp of a mechanistic explanation with some reasonable level of detail. Being aware of a causal connection between headaches and paracetamol enables one to intervene on headaches, but understanding the difference-making relationship does not suffice for objectual understanding of headaches unless one has a grasp of the specific mechanism connecting them, clarifying why intervening on one variable makes a difference to the value of the other. Of course, our understanding of a number of conditions is still very fragmentary, and in those cases, it might not be unwarranted to attribute objectual understanding. Moreover, what a reasonable level of detail is will depend on its relevance for diagnosis, treatment, and prognosis.

Of course, this is far from sufficient to adequately describe what constitutes understanding in a clinical context. It merely indicates that biomedical understanding as developed in this paper is a necessary condition for clinical understanding. In the following sections, we turn our attention to the question of what understanding is in a clinical context.

3 Clinical Understanding

While grasping a mechanistic explanation is a necessary condition for biomedical understanding, in standard clinical situations, biomedical understanding has to be adequately contextualized and supplemented. In order to make an accurate diagnosis, the medical professional initiates a systematic inquiry to gather an interconnected body of information. To achieve this in an optimal fashion, biomedical understanding will, in many cases, need to be complemented by a participatory, subjectively involved form of *personal understanding,* which necessitates adopting a particular second-personal stance and using cognitive resources *in addition* to those involved in biomedical understanding. This requires going beyond understanding *disease* (i.e., how prototypes of diseases manifest themselves in unique individuals) to understanding *illness* in its specificity that reflects the individual's distinctive predicament. In turn, at least in some cases, biomedical understanding will be required to assist personal understanding, indicating that biomedical and personal understanding can be entangled.

The attempt to clarify these aspects and identify unique features of clinical understanding takes us back to the juxtaposition of explanation and understanding, which has played a key role in attempts to locate medicine in relation to the biological sciences, on the one hand, and the distinctively human sciences, on the other (see e.g., Wartofsky and Zaner, 1980). Contrasting explanation (*erklären*) with understanding (*verstehen*), influential figures in the nineteenth century, like Johann G. B. Droysen and Wilhelm Dilthey, have argued that this distinction marks a methodological division between the human/social sciences essentially aimed at understanding and the natural sciences essentially aimed at explanation. On this view, explaining (*erklären*) designates primarily causal explanations in the natural sciences (primarily physics) dealing with phenomena that are amenable to explanation in terms of laws (or law-like regularities).

In contrast, inquiries in the social sciences and humanities aim at understanding (*verstehen*) and follow a different path, because comprehending human behavior requires capturing the *meaning* the events have for the subjects (Taylor, 1971). Thus, understanding often involves making sense of other people's mental processes, and it refers to a form of comprehension that we can acquire of human cognition, psychological states, action, artifacts, and institutions, but not of the kinds of entities and processes that the natural sciences typically deal with.

This brief sketch cannot do justice to the depth of the different positions, but it is sufficient to comprehend why many have thought that medicine stands at the center of this methodological distinction, integrating both *erklären* and *verstehen*. While there are reasons to attempt to identify the specific scientific character of medicine by recourse to this juxtaposition, there are also several reasons why approaches choosing this path have not been very productive.

First, the juxtaposition builds on faulty assumptions about explanation in the sciences. For example, it is often based on the assumption that explanation in the natural sciences is aptly characterized by the D-N model, on which explanations involve at least one law plus the initial conditions, from which explanations emerge much like logical proofs. This, however, does not sit well with the fact that explanations in a range of scientific domains like biology do not necessarily invoke laws (Bechtel and Abrahamsen, 2005). If one abandons the idea that causation requires laws and accepts that it only requires counterfactual dependencies, then the strict juxtaposition becomes untenable.

Second, any account that imposes such a strict juxtaposition between explanation and understanding is forced to accept the view that inquiries in the natural sciences never achieve understanding of the subject they study, while the humanities and social sciences never explain anything (Stueber, 2012). This not only sounds intuitively implausible for contemporary ears, it is also inconsistent with the account of science as systematic inquiry.

Consequently, present work in epistemology and the philosophy of science challenges this juxtaposition (see e.g., Khalifa, 2019), and recent accounts of understanding encompass the human and natural sciences. However, with respect to medicine specifically, rejecting such juxtaposition should not lead us to lose sight of important aspects that can be illuminated along the understanding vs. explanation distinction. Even though the juxtaposition of explanation and understanding

is misguided, keeping it in mind might help us remain sensitive to the intuitively plausible idea that when the subjects of inquiry are human beings instead of organs, tissues, or proteins, understanding and explanation may take on different forms and require different methods and cognitive efforts. Operating with a context-sensitive notion of understanding, we are able to acknowledge that there is something distinct about understanding human beings, without having to impose a stark methodological division between the human/social sciences and the natural sciences.

Applying these reflections to medicine, the next sections will seek support for the thesis that clinical medicine involves understanding in the sense of *verstehen*, because comprehending the condition that a patient seeks help with often requires capturing the *meaning* that health-related events have for them. Put differently, when seeking to make an accurate diagnosis and devise a treatment plan, the successful application of the biomedical understanding of the disease often requires understanding the *illness*. Roughly speaking, illness includes the patient's perspective on their ill health, its perceived origin and significance, and the meaning the patient gives to that experience, all of which are profoundly influenced by socio-cultural backgrounds and personality traits. Understanding illness is comprehending subjective aspects of how the disease is experienced, including patterns of emotions, reasoning, and actions that it is associated with (for a discussion, see Hoffmann, 2016). Such understanding is essential especially in cases in which the therapeutic encounter not only aims to classify and treat disease, but also to offer comfort and care. However, understanding illness necessitates some form of *personal understanding* that deploys cognitive resources in addition to those involved in understanding required for explaining and predicting the behavior of purely biological processes. Such personal understanding can be vital to the development of a therapeutic relationship and to practicing medicine effectively. To see how, we start by considering some characteristics of the medical interview.

3.1 Personal Understanding: Clinical Empathy

Usually prompted by patients requesting help with specific health problems, medical interviews assess current risk factors in part by collecting relevant information about the patient's family history, past medical history, and social history (e.g., occupation, marital status). When gathering evidence, the interviewer solicits information that permits more fitting hypotheses and often prompts further questions. The information received is evaluated for reliability, comprehensiveness, and significance to the patient's problem, and it is examined for symptom complexes and clues about possible underlying conditions that might explain the patient's complaints. In spite of the advances of laboratory testing, the medical interview continues to retain an important role: an accurate history alone is often sufficient for a diagnosis, and it is essential for focusing the scope of further diagnostic examination.

What needs to be understood in the clinical interview is not just how prototypes of diseases described in medical textbooks manifest themselves in particular individuals. In other words, what needs to be understood is *illness*, not disease. As Peter Lichstein (1990) puts it, "patients rarely report their symptoms in an organized and

logical fashion comparable to the descriptions of disease in medical texts. In fact, patients complain of illness or sickness rather than stating their problems in terms of the pathophysiologic categories of disease." Accordingly, one task in the medical interview is to complement biomedical understanding of disease with understanding the illness in its specificity, which, in turn, requires minimal personal understanding. To illustrate how this transpires, it is helpful to turn our attention to how interviewing strikes a balance between leading the interaction and assisting the patient's spontaneous report.

Patients do not present symptom complexes in an organized fashion, and no matter how experienced and skilled clinicians are, they cannot simply "extract" a history from a patient (Reiser and Schroder, 1980). To acquire comprehensive information that cannot be obtained from other sources (i.e., *what* the patient says and *how* the patient says it), attention has to be paid to verbal and nonverbal aspects of the patient's behavior during the interview, especially given that patients typically meet the clinician in a situation of heightened anxiety and vulnerability. Facial expressions, posture, gestures, along with abrupt changes in topic and evasion of certain issues may constitute reactions to illness or indicate concerns that are not directly expressed. For example, a patient might state that she is feeling excellent, but the physician might detect distress prompting further questioning or examination. In such cases, information that physicians need to register and pursue is often only nonverbally hinted at (Halpern, 2014; Suchman et al., 1997).

What emerges is that in the context of clinical medicine, efficiently deploying biomedical understanding of pathological conditions often requires some degree of *personal understanding*. To see what this amounts to, we may start by drawing attention to certain aspects of clinical communication that are often described under the heading "clinical empathy." According to a common definition, clinical empathy is "the ability to understand the patient's situation, perspective and feelings, and to communicate that understanding to the patient" (Coulehan et al., 2001). Such ability to understand, which we describe here as a minimal personal understanding, is expressed in "active listening" techniques that show involvement, reflect the patient's message (e.g., by using verbal paraphrasing), and encourage patients to elaborate on key symptoms or experiences.

This is obviously a complex topic and definitions of what clinical empathy amounts to have definitive weaknesses, but in this context, we may suffice with highlighting that personal understanding can be important for obtaining comprehensive histories and for making the correct assessment of the patient's condition. One reason is that the quality of the information collected during the clinical interview depends on quality of the connection that develops between physician and patient. A good rapport is best achieved by interacting with the patient in an attuned manner, which requires the kind of ability to understand characterized by "clinical empathy." For further support, it is helpful to consider studies reporting that patient-perceived empathy is associated with reduction in severity and duration of symptoms and with positive clinical outcomes in the common cold and diabetes (Rakel et al., 2011; Hojat et al., 2011). This effect can in part be explained by patients' being more open about their intimidating symptoms and psychosocial concerns to a physician displaying clinical empathy, which leads to a more accurate diagnosis and better

compliance with proposed therapies (Neumann et al., 2009). Observational studies of patient–physician interactions show that patients' decisions to either omit or disclose fuller histories and anxiety-provoking symptoms depends on whether they sense that the physicians are emotionally attuned to them (Halpern, 2014). Based on patient interviews with primary care physicians, other studies report that physicians who acknowledge emotive cues and probe for further information based on them obtain more comprehensive histories from patients (Suchman et al., 1997).

On the basis of this brief sketch, we may suspect that while clinical empathy entails a minimal form of personal understanding, it is best described as a *practical understanding*, as a skillful performance that unfolds based on embodied interaction with the patient.[8] Many of the features described under the banner "clinical empathy" are executed smoothly, without explicit awareness, knowledge-driven processes, or online performance-monitoring. Such practical understanding is not about grasping explanations, but about certain abilities for embodied, engaged social interaction that require a second-personal, embodied stance and encompass the coordination of, for example, expressions, intonations, and gestures. In other words, it involves emotional and sensory-motor processes often described as "primary intersubjectivity" (Trevarthen, 1979; Gallagher, 2005).

Of course, this is not all there is to personal understanding in clinical encounters. In many cases, understanding illness will require understanding *reasons*. Those who favor the Davidsonian view that reasons are causes (Davidson, 1963; for a discussion, see Risjord, 2014, pp. 88–91) could perhaps argue that personal understanding in such cases simply reduces to a sort of explanatory understanding, acquired, just like in scientific inquiry, by uncovering causal relationships of dependence. The only difference is that here understanding involves identifying relations of dependence between psychological elements that are causally involved in acting, thinking, or feeling. While this is not the right place to offer a thorough discussion of this complicated matter, in the ensuing examination of a particular type of situation involving *extended* forms of personal understanding, explanation and understanding appear to come apart. It is shown that extended personal understanding can be described as practical and may require adopting a particular second-personal stance and personal engagement.[9]

3.2 Extended Personal Understanding

Consider an interaction between a medical practitioner (MP) and a patient (P), a 74-year-old woman who complains of hoarseness, altered voice, and shortness

[8] Thanks to an *anonymous referee* for pointing out the importance of this aspect.

[9] Of course, this distinction does not exhaust personal understanding. Some literature on social cognition highlights embodied ways to understand others that are constituted by skillful interaction (Gallagher, 2005; Johnson, 2015). Others distinguish between "understanding-about persons" and the more holistic "understanding persons" (Debes, 2018). It should be pointed out that both minimal and extended personal understanding require more than "understanding-about persons" (which essentially boils down to knowing things about persons), but less than "understanding persons" (which is too demanding in a clinical situation).

of breath, loosely based on a published case study (see Snow and Fleming, 2014). After an initial medical interview, MP feels that she has obtained a clear enough picture. Based on her own observations and a battery of lab tests, MP has achieved some degree of biomedical understanding when MP has identified the variables upon which P's pathological condition depends: she has an upper respiratory tract infection and the stridor and dysphonia caused by a large multinodular goiter, which compresses her trachea. MP grasps what produces the condition and its symptoms, allowing MP to make appropriate counterfactual inferences and accurate predictions about the course of disease and treatment. On such basis, MP leans toward recommending surgery (thyroidectomy).

At the same time, conforming to prevailing standards, MP also thinks that the right treatment must respect P's autonomy and reflect her values and goals in shaping her own future, particularly because the treatment might involve risks and affect the kind of life she will be able to lead. In this regard, current bioethics often emphasizes the importance of *respecting autonomy*, which is comprehended as the "acknowledgment of a person's right to hold views, make choices, and take action based on personal values and beliefs" (Beauchamp and Childress, 2001, p. 61). To be able to suggest the optimal treatment, biomedical understanding of the pathological condition is not sufficient. Because MP strives to involve P as an active agent in her own care, she must present options in ways that are intelligible for P, and she must communicate medical knowledge in a way that enables P to consider the different options. Effective communication in such situations displays difficulties similar to those found in intercultural communication. As Laurence Kirmayer (2011, pp. 413–414) puts it, due to the character of present-day medicine, there is a "cultural divide" between clinician and patient: "medicine constitutes a subculture with its own taken-for-granted background knowledge and, therefore, every clinical encounter is intercultural."

Bridging such a divide requires that MP is aware of broader aspects of P's history, background knowledge, and social environment, and a lack of personal understanding hinders identifying a mutually acceptable treatment plan and MP's ability to care for P. To see why, consider how the interaction continued. MP recommends surgery to P and explains the risks, maintaining that the surgery is relatively safe, and adds that one of the downsides is that it would leave a scar. Although P knows that she would almost certainly die from tracheal obstruction without surgery, to MP's surprise, she refuses treatment. P explains her decision by recourse to her desire not to live with a scar on her neck. In an important sense, MP has now gained knowledge of why P decided against the treatment option and is able to offer an explanation by citing the relevant belief-desire pair causally involved in P's decision. Nonetheless, while this offers MP knowledge that renders her able to offer an explanation of P's decision, it does not suffice for personal understanding in a richer, extended sense. Explanation and understanding come apart, and MP will likely report not being able to care for this patient because she is unable to understand her.

Given the tight link between explanation and understanding in theoretical understanding, the fact that they come apart speaks in favor of interpreting personal understanding more in terms of practical understanding. MP's knowledge of the relevant belief-desire pair causally involved in P's decision is not enough for personal understanding. What is missing? The lack of understanding here boils down to MP's failing to comprehend the relevant belief and desire as constituting *a normative reason* for the decision.[10] MP is unable to understand, because she assumes something about P's personal history, background knowledge, and larger network of defining values, including that the desire to prevent worsening the conditions or death constitutes a much stronger reason than the aversion to a scar.

MP engages in further dialogue and realizes that she does not have any reason to doubt that the rational capacities of the patient have been affected. The dialogue also reveals a crucial bit of information about P: in her native Sicily, bearing a scar on one's neck ("the Sicilian bowtie") references a violent Mafia practice and depicts the carrier as dishonorable. This information helps MP transition from being able to *explain* the patient's decision by comprehending the relevant explanatory or motivational reason, to being able to *understand* it as reflecting a basic value (being able to participate in social life) that MP can comprehend as being worth deeply caring about. Because this now resonates with values that MP cares about or at least comprehends as potentially worth caring about, MP is able to take up P's perspective and to immerse herself in it, for instance, by using her own mind to reenact P's deliberative thought processes.[11] This allows her to grasp how the illness is woven into the fabric of P's life: what it means to P and how it affects the overall scheme of values, desires, and beliefs that are constitutive of who P is. MP is now able to comprehend how the illness experience and the envisioned therapeutic outcomes fit within a coherent narrative. Her decision is rendered intelligible for MP, and perhaps not entirely inappropriate from P's point of view.

In a sense, the extended personal understanding MP has achieved represents an epistemic gain that will allow her to optimally care for P. But perhaps this is nothing else than MP attaining personal understanding by grasping more explanations of P's motives, which could make us doubt that the relevant understanding here is practical. However, it is worth stressing that the epistemic gain occurs because MP is able to adopt a particular second-personal stance, an attitude characterized by *recognition*, that (counterfactually) understands the patient as a rational agent governed by normative reasons, with the decisions and actions of the person oriented toward ends

[10] It is customary to distinguish normative reasons (that justify an action as judged by an impartial observer), motivating reasons (that justify an action as judged by the agent), and explanatory reasons (see Alvarez, 2016; Stueber, 2017).

[11] Distinguishing basic and advanced forms of empathy, Stueber (2017) argues that a cognitively advanced form of *reenactive empathy* plays a key epistemic role in understanding reasons. On this view, I understand a person's reason if I am able to comprehend it as one that I could potentially entertain in the other person's situation. For our purposes, we may leave aside the question whether such reenaction involves simulation as described in some of the literature on social cognition (see e.g., Heal, 2003; Goldman, 2006).

that are worth pursuing.[12] In other words, understanding only becomes available to MP insofar as she adopts a particular stance toward the patient, as a being—just like her—whose life is centered on values that can be comprehend as being *worth* caring about.[13]

4 Concluding Remarks

This paper set out to clarify the specific nature of understanding in medicine. After distinguishing types of understanding and connecting objectual understanding to grasping explanations, the paper considered the history of scurvy to explore what obtaining understanding of a disease in the context of medicine involves. The main conclusion was that biomedical understanding of a disease requires grasping a mechanistic explanation of that disease. However, alluding to the distinction between understanding and explanation in debates on the methodological principles of the humanities and social sciences, it was argued that biomedical understanding is not sufficient for clinical understanding. Rather, clinical understanding combines biomedical understanding of a pathological condition with a personal understanding of an illness. In some cases, personal understanding is extended, necessitating the adoption of a particular second-personal stance and using cognitive resources in addition to those involved in biomedical understanding.

Acknowledgments I would like to thank Stephen Grimm, Remy Debes, Jens Christian Bjerring, Klemens Kappel, and two anonymous referees for helpful comments on earlier drafts. This work was supported by the Carlsberg Foundation.

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[12] Drawing on Cavell's (1969) idea that our primary relation to others is not epistemic, Axel Honneth (2008) has argued that such attitude of recognition is a basic empathetic engagement that precedes cognitive access to other minds.

[13] Some hold that such personal understanding is neither theoretical nor practical. For example, Bengson (2017, p. 24) maintains that "a psychoanalyst's empathic understanding of a patient, or a lover's understanding of a beloved, is (perhaps) neither theoretical nor practical." The view proposed here describes personal understanding as practical, even if it acknowledges that it is not paradigmatically practical.

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