

UNDERSTANDING AND EXPLAINING

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ABSTRACT: The quest to provide a fundamental understanding and explanation of reality is an ambitious one. Perhaps it is too ambitious. The possible restrictions for such an enterprise to be successful must be inquired in order to determine the issue. Section 1 explores one's understanding in reaching (scientific) conclusions: to what extent does a successful account testify to understanding? Section 2 focuses on the other side of such an account: does it provide an explanation in a more fundamental sense than pointing out causes of phenomena, or is it restricted to such a task? A critical attitude vis-à-vis the (scientific) enterprise of unearthing reality's structure remains necessary in order not to confuse a consistent and productive theory with one that demonstrates an understanding and explanation in the sense of this article.

KEYWORDS: understanding, explaining, scientific inquiries

Introduction

In order to provide a solid basis for a (scientific) theory, understanding and explaining seem indispensable. One must understand one's findings, since otherwise the theory is nothing more than a result one has stumbled upon, as if one were to express a correct reasoning in a language one does not master, merely being able to pronounce the phones, following the syllables' sequence without knowing the meaning of the words, not being able to acknowledge the reasoning's correctness. Philosophers and scientists are supposed to have a more extensive grasp on their fields than the straw man just mentioned, not acting as mechanically as he does. Likewise, a result haphazardly reached is not said to attest to an explanation: if a result is presented, it is not sufficient that it be correct; one must also be able to make it clear *why* it is correct.

In this article, the merits of what are considered to be understanding and explaining are critically examined in that the ability to grasp a meaning may be said to constitute a necessary condition for understanding, just as the presence of an account is a necessary condition for an explanation, but that in neither situation a sufficient condition is provided for respectively an understanding and an explanation. In a modest sense, an understanding and an explanation *may* be said to occur, namely if one limits oneself to that which is empirically available. It would, however, testify to a somewhat superficial stance if one might thereby be considered to know how reality is constituted and what the fundamental reason

behind a phenomenon is (unless the possibility for such ‘deeper’ accounts is dismissed, a possibility that is taken seriously in this article).

In order to distinguish between the sorts of understandings and explanations, ‘understanding’ and ‘explanation’ are used in the relatively unproblematic way outlined above and illustrated in sections 1 and 2. By contrast, ‘comprehensive understanding’ and ‘comprehensive explanation’ will refer to a complete account, ‘grasping’ nature or reality, not limiting oneself to pointing out one or more causes of phenomena.

My position will be that comprehensive understanding and comprehensive explaining are not possible. Because I do not actually know what other (human) beings than I know, however, I must counter the objection that this perspective is too simplistic. For that reason, I will adopt a more cautious stance, and limit myself to the actions of factor-determined beings, i.e., beings whose actions are completely determined by factors. Factors are the things that determine (‘make’¹) an action if nothing else is involved. This sounds somewhat abstract, perhaps, but that is in fact unavoidable, since I cannot, being myself factor-determined, indicate which factors are actually decisive. To nonetheless illustrate the matter, presuming that an object such as a stone that is pushed down a hill is fully determined by factors such as the impulse and its shape, the factors determine the stone’s path.²

A stone is a relatively simple object, one may say, compared with animals and human beings. Strictly speaking, I do not know whether human beings, animals or even stones are factor-determined and know only myself to be of that nature (finding no faculty within me to act alternatively from a determined way, be it on the basis of innate or empirical factors or a combination of both). Still, for the sake of convenience, I will presume the agents mentioned in the present article to be factor-determined. Actors (putatively) acting in a non-factor-determined way, on the basis of what is sometimes called ‘free will,’ is, for me at least, unimaginable, ‘free will’ only having a meaning if the freedom of movement of the will is expressed, which is, however, an idiosyncratic interpretation, ‘free will’ usually being used to express the agent’s (as far as I am concerned incomprehensible) freedom in acting. There is (*ex hypothesi*) no way for such a being not to be factor-determined; if it should reach the same outcome as someone who comprehensively understands and/or is able to comprehensively explain, he

¹ ‘Factor’ originally (in Latin) means ‘creator.’

² It is clear that this is a tautological position. That is one of the reasons why I cannot say which beings (if any) besides myself are factor-determined.

has merely stumbled upon that result and does not really find himself in the required state.

A factor-determined being would, in order to comprehensively understand, have to be able to balance the factors themselves, which is of course only possible from a factor-free position, and this is precisely what is lacking. For example, if such a being has adopted some interpretation of quantum mechanics on the basis of an education process and the independent study of authors who promote it (or oppose it, in which case this being in turn opposes *their* interpretation), the education and the result of studying are factors, as is the way the being deals with these sources of information (which may itself be the result of one or more innate or cultivated factors). This being would have to reach a temporary state of suspension of judgment with respect to these factors and then have access to the means to acquire a comprehensive explaining and a comprehensive understanding. It may – in that case, again on the basis of one or more factors – be able to doubt its knowledge and the path that has led to it, but this will be insufficient to reach the desired result; the only result that is reached is this beings' acknowledgement of its own limitations.

This little excursion, which must now, because this is not a topic to be explored here in depth, be terminated, lest the reader should be left confused with respect to the main issues to be expressed here, was merely necessary to gain some clarity on agents' position when they set out to understand and explain matters. Should they not be considered factor-determined, their acts – and therefore judgments – would be completely inexplicable (and not only in the special sense addressed in the second section of this article). That does not mean that non-factor-determined beings do not exist, of course, but only that, besides the fact that I cannot imagine their existence, for present purposes it must be assumed that factor-determined beings are the only ones that exist.

1. Understanding

Scientific theories usually receive their value upon being proved on the basis of experience; mathematical and logical theories are proved deductively. Two aspects with respect to this issue are addressed here. The first is the scientist's perspective when he validates a theory; does he 'grasp' some 'truth,' and what does this mean? This issue will be explored in the present section. The second is the proof's merit, dealt with in section 2. To differentiate, I will use 'comprehensive understanding'³

³ Avoiding the more poetic but perhaps less clear alternative 'comprehensive comprehension.'

to indicate the grasp of reality and ‘understanding’ to indicate the ability to use theories.

What does someone’s understanding something mean? Is this to be taken to reflect a ‘grasp’ of reality in that one knows how part of reality is constituted? I will argue that understanding rather means that one is able to utilize theories for some goal, without thereby penetrating fundamentally into reality, considering it as it is in itself,⁴ whatever that may mean. Even if a theory should in some way reflect reality (in itself), it would still not be clear to the observer why reality is constituted thus and not alternatively.

The best examples to start with are logic and mathematics. What is it that one comprehensively understands (i.e., what occurs apart from being able to use the theory) if one knows that contradictions cannot occur, in line with the principle of contradiction, expressed by the formula “ $\neg (p \wedge \neg p)$ ”?⁵ It is clear⁶ that one needs this information to be able to produce a valuable account at all; if one should, for example, argue that a stone that lies on top of a hill when pushed will both roll down the hill and at the same time remain where it now is, no theory that would be of use would ensue. Quantum mechanics does manifest a number of results that conflict with basic logic (e.g., Schrödinger’s paradox⁷), but whether one should therefore give up some of the laws of logic or part of quantum mechanics (or at least some interpretations) – whether such a choice must be made at all depends again on the question whether one should adhere to the principle of contradiction, so the question may not have been put fairly thus – is something to be decided on the basis of other factors than comprehensive understanding (and rather by, e.g., the desire to have a consistent account).

Does someone who understands the necessary exclusion of mutually contradictory propositions comprehensively understand why this is the case? No. Their simultaneous occurrence simply doesn’t work: it fails to produce viable

⁴ Immanuel Kant, *Kritik der reinen Vernunft* [1781/1787]. *Kant’s Gesammelte Schriften. Erste Abteilung: Werke. Band 3 (Kant’s Collected Writings. First Section: Works. Vol. 3)* (Berlin: Georg Reimer, 1904), A 42/ B 59; B 303.

⁵ This principle is, incidentally, compromised (or at least not evident) on the basis of the existence of alternative views, which acknowledge the existence of contradictions (e.g., Graham Priest, “Classical Logic *aufgehoben*,” in *Paraconsistent Logic. Essays on the Inconsistent*, eds. G. Priest, Richard Routley, and Jean Norman (München, Hamden, Wien: Philosophia Verlag, 1989), 141).

⁶ I do not, of course, myself hereby express the occurrence of a comprehensive understanding.

⁷ Erwin Schrödinger, “Die gegenwärtige Situation in der Quantenmechanik,” in *Die Naturwissenschaften* 23, 48 (1935): 812.

results.⁸ Besides, if one were to comprehensively understand why it is the case, alternative accounts would a priori have been refuted. In mathematics, one cannot penetrate beyond the first definitions and axioms that must be posited, such as those in Euclid's *Elements*. There is no comprehensive understanding here, either: the insights – if one wants to use that term – are not confirmed by a comparison with reality, since no such comparison is available.

This can perhaps best be illustrated on the basis of the (initial) position of Wittgenstein,⁹ sometimes designated 'logical atomism,' a theory whose scope is not limited to that of mathematics, but includes it. Wittgenstein states that one must compare a picture with reality in order to come to know whether the picture is true or false.¹⁰ Reality is the existence and nonexistence of states of affairs,¹¹ while the world is the whole of the *existing* states of affairs¹² (the whole of facts¹³), which entails the (idiosyncratic) position that reality comprises more than the world, a difficulty that is increased by the statement "The complete reality is the world."¹⁴ The difference in scope between 'reality' and 'the world' is apparently not maintained here.

This contradiction is difficult to account for, but, more importantly, it is propagated that a fact and a picture must have something in common for a fact to be a picture.¹⁵ That means that reality is approached in a somewhat procrustean manner – if something does not fit the model, it cannot be accounted for –, which is, however, not problematical as long as this model is acknowledged to be what it is: an a priori exclusion of that which cannot be expressed in language and logic.¹⁶

⁸ Cf., in a different context, Richard Rorty, *Philosophy and the Mirror of Nature* (Princeton: Princeton University Press, 1979), Ch. 3, § 4, 157, 158: "The idea of 'necessary truth' is just the idea of a proposition which is believed because the 'grip' of the object upon us is ineluctable. [...] The objects of mathematical truths will not *let* themselves be misjudged or misrepresented."

⁹ Wittgenstein subjects his own theory to severe criticism, of course (e.g., *Philosophische Untersuchungen* [1953] Working edition, vol. 1 (Frankfurt am Main: Suhrkamp, 1997), part 1, § 114, where the contention in *Tractatus Logico-Philosophicus* that through language nature is ascertained is criticized).

¹⁰ Ludwig Wittgenstein, *Tractatus Logico-Philosophicus* [1921], Working edition, vol. 1 (Frankfurt am Main: Suhrkamp, 1997), 2.223.

¹¹ Wittgenstein, *Tractatus*, 2.06.

¹² Wittgenstein, *Tractatus*, 2.04.

¹³ Wittgenstein, *Tractatus*, 1.01, 2, 2.04.

¹⁴ "Die gesamte Wirklichkeit ist die Welt." (Wittgenstein, *Tractatus*, 2.063.)

¹⁵ Wittgenstein, *Tractatus*, 2.16; cf. 2.12: "The picture is a model of reality." ("Das Bild ist ein Modell der Wirklichkeit.")

¹⁶ Wittgenstein, *Tractatus*, 5.4711, 5.6, 5.61.

In order to ascertain whether Wittgenstein attests to this limitation, the following is illuminating: “The state of affairs is a union of objects (things).”¹⁷ A proposition of the form “aRb” is perceived as a picture¹⁸ (e.g., “Colorado Springs lies to the south of Denver”, if ‘a’ is ‘Colorado Springs’, ‘b’ is ‘Denver’ and ‘R’ is ‘lying to the south of’).

The problem here is that “we make pictures of facts for ourselves”¹⁹ (the picture itself, incidentally, being a fact²⁰), and in order to come to know whether the picture is true or false it must be compared with reality (cf. note 10, *supra*). So the pictures that are made of the facts are compared with reality, the positive part of which is the world (the whole of facts): the pictures made of the facts are compared with the facts. In the most antagonistic interpretation, this amounts to a circle, in which the outcome is a result of one’s own contribution. In the most forthcoming interpretation, Wittgenstein’s insistence that everything is experienced within the boundaries of logic and language results in a conceptual prison from which one is unable to escape. This does mean that speaking of ‘the world’ and ‘reality’ as unreservedly as Wittgenstein does is not justified (unless this is itself said to follow from one’s limitations – being able to use another expression would counter these limitations); it leaves room for remarks on the ‘mystical’²¹ and propositions as “how the world is, is completely indifferent for what is higher. God does not manifest himself in the world.”²² The meaning of such sentences depends on how far Wittgenstein’s observation is taken that the answer to the problems of life lies in their absence once the possible scientific questions have been answered.²³

The first interpretation leads to an untenable result, ‘the world,’ whatever it may be in this case, remaining undisclosed. The same outcome applies in the second interpretation, but it is not equally untenable. In the latter case, the limits of knowledge are rather acknowledged, ‘the world’ meaning the world insofar as it can be grasped (through logic and language). In any event, logical atomism (in this guise) can merely point to one’s limitations in comprehensive understanding.

¹⁷ “Der Sachverhalt ist eine Verbindung von Gegenständen (Sachen, Dingen).” (Wittgenstein, *Tractatus*, 2.01.)

¹⁸ Wittgenstein, *Tractatus*, 4.012.

¹⁹ “Wir machen uns Bilder der Tatsachen.” (Wittgenstein, *Tractatus*, 2.1.)

²⁰ Wittgenstein, *Tractatus*, 2.141.

²¹ Wittgenstein, *Tractatus*, 6.44, 6.45, 6.522.

²² “Wie die Welt ist, ist für das Höhere vollkommen gleichgültig. Gott offenbart sich nicht in der Welt.” (Wittgenstein, *Tractatus*, 6.432.)

²³ Wittgenstein, *Tractatus*, 6.52.

To return to mathematics: it can be applied, e.g. in construction engineering. Still, that only proves the *application* and not an insight into reality: one knows what to do in order to produce a desired result, but that is all. The stability that is ever observed (the process works in this situation as it has worked in the past, because of the conformity in nature which has hitherto been present, as far as one can tell) is not itself comprehensively understood and may come to an end without the observer being able to account for such an event, something that will be dealt with in section 2. The regularity is, in other words, observed and then posited to be present in the future. This is of course no critique of the procedure that scientists follow; no engineer or doctor would be able to perform any action without resorting to such a regular pattern. I merely want to indicate that scientists do not comprehensively understand the regularity's presence and cannot therefore be assured that it will last;²⁴ that doesn't detract from the need to act.

In physics, the problems are even greater than in mathematics and logic. A vague notion, or rather – since not only comprehensive understanding but even understanding is absent here – word such as 'force' is used.²⁵ This does not invalidate the results that have been produced any more than in the cases above, but invoking notions or words that cannot be understood means that its practical outcomes constitute its sole merit. If something's cause is provided, the question 'why' it occurs or exists is not answered,²⁶ but merely the question 'because of what.' Indeed, Hume rightly points to a priori reasonings' insufficiency to lay bare the reason why things are as they are in matters of fact, 'cause' itself being a problematical notion,²⁷ a view that needs to be complemented with the position that on the basis of experience such an account cannot be produced either (which Hume, incidentally, seems to acknowledge²⁸).

Physics' *applications* are not in the least struck by the present observations and these are not their focus. A lack of comprehensive understanding with its practitioners follows, however, from the mere given that they have to resort to words that only describe a process, such as 'force,' 'gravity' and 'attraction,' the

²⁴ Cf. David Hume, *An Enquiry concerning Human Understanding* [1748], ed. Tom Beauchamp (Oxford: Clarendon Press, 2000), 32, 33: "Let the course of things be allowed hitherto ever so regular; that alone, without some new argument or inference, proves not, that, for the future, it will continue so."

²⁵ This point will receive additional attention in section 2.

²⁶ Which is not to imply that it necessarily *can* be answered; perhaps the idea that such an answer is possible is merely a human imagination.

²⁷ E.g., Hume, *An Enquiry*, 60.

²⁸ Hume, *An Enquiry*, 26-28, 29, 30, 36.

introduction of which does not testify to a comprehensive understanding but to the fact that the limits of the ability to understand have been reached.

An even more radical account may be rendered, according to which the perspective that a theory can be said to reflect an insight (even if one grants that a comprehensive understanding is lacking) is forsaken and man's entire enterprise to make sense of the world he encounters is a mere consequence of his need to survive. In that case, he may also be said to delude himself in supposing that the problems that are solved point to a comprehensive understanding, when they are rather to be considered outcomes of an attempt to control his surroundings (an attempt that is doomed to fail, as long as there is no comprehensive understanding; any unexpected event may, after all, thwart one's plans, however carefully they may have been outlined and implemented); one may at most achieve a provisional theory, whose sole merit lies in its applicability.

2. Explaining

In a similar fashion as in section 1 with respect to 'comprehensive understanding' and 'understanding,' I will discern between 'comprehensive explaining' and 'explaining,' 'explaining' meaning that an account is provided in which one or more causes (keeping in mind the problems associated with this mentioned in section 1) for a phenomenon are discerned, and 'comprehensive explaining' meaning that the question 'why' something occurs or exists is answered. The link between the present section and the previous one is easily established. If there is no comprehensive understanding, scientific theories do not comprehensively explain anything, although they may be said to explain some phenomena, if they are successful, which is the criterion for their continuity and development.

Scientists do not proceed from a comprehensive understanding, but rather collect data on the basis of which a theory is constructed, ever in the context of the relevant background knowledge. A scientific explanation is, accordingly, fundamentally contingent, which means that it does not necessarily reflect reality; the fact that one thinks in some way does not entail that one *has* to think thus. (The word 'necessarily' is used here; of course, I cannot say that the explanation does not reflect reality *sec*, since this would imply a point of view on my part that is not the case, viz., that I would myself comprehensively understand and from that perspective be able to notice such a discrepancy.) For example, nature could have been constituted in such a way that objects randomly appear and disappear. It (presumably) does not behave thus,²⁹ at least not at the macroscopic level, but

²⁹ I say 'presumably' since I can only say something about nature as it appears to me.

science cannot comprehensively explain why this is the case. It can merely discern regular patterns in nature as it actually presents itself. Logic and mathematics are no less contingent in this sense, by the way, despite their claim to necessity and universality. They may apply necessarily and universally, but even if that is the case, it does not derogate from their being contingent in the present sense.

A clear sign that scientific theories do not provide comprehensive explanations is the fact that they resort to words that are merely used because the analysis cannot proceed any further. As Berkeley poignantly observes:

That a stone falls to the earth, or the sea swells towards the moon, may to some appear sufficiently explained [by gravity]. But how are we enlightened by being told this is done by attraction? [...] [N]othing is determined of the manner or action, and it may as truly (for aught we know) be termed *impulse* or *protrusion* as *attraction*.³⁰

It is also important to realize that attraction is adhered to by Newton as a mathematical hypothesis rather than a “true and physical quality” (“*qualitatem veram et physicam*”).³¹

Indeed, Newton himself insists that he does not seek to penetrate into the nature of things:

Up to now I have exhibited the phenomena of the heavens and our sea by the force of gravity, but I have not yet pointed out the cause of gravity [...] I do not contrive hypotheses. For whatever is not inferred from phenomena must be called a *hypothesis*; and hypotheses, whether they be metaphysical, physical, of occult qualities or mechanical, have no place in *experimental philosophy*. In this philosophy theorems are inferred from phenomena and rendered general through induction. [...] And it is satisfactory that gravity in fact exists and acts according to the laws that have been demonstrated by us, and suffices for all motions of the celestial bodies and our sea.³²

³⁰ George Berkeley, *A Treatise concerning the Principles of Human Knowledge* [1710] – *The Works of George Berkeley*, Vol. 2, eds. A. A. Luce and T. E. Jessop (London: Thomas Nelson and Sons, 1949), 86; cf. Hume, *An Enquiry*, 50: “There are no ideas, which occur in metaphysics, more obscure and uncertain, than those of *power*, *force*, *energy*, or *necessary connexion*, of which it is every moment necessary for us to treat in all our disquisitions.”

³¹ George Berkeley, *De Motu* [1721] – *The Works of George Berkeley*, Vol. 4, eds. A. A. Luce and T. E. Jessop (London: Thomas Nelson and Sons, 1951), 15; cf. Isaac Newton, *Philosophiæ Naturalis Principia Mathematica* (London: Apud Guil. & Joh. Innys, 1726), Def. VIII, 5.

³² Hactenus phaenomena caelorum et maris nostri per vim gravitatis exposui, sed causam gravitatis nondum assignavi. [...] [H]ypotheses non fingo. Quicquid enim ex phaenomenis non deducitur, *hypothesis* vocanda est; et hypotheses seu metaphysicae, seu physicae, seu qualitatum occultarum, seu mechanicae, in *philosophia experimentalis* locum non habent. In

'Force' ('vis') is a vague word³³ and gravity itself is not observed,³⁴ the cause of a body's being brought downwards not being grasped.³⁵ One may, then, say that explanations are given, but no comprehensive explanations. Berkeley does not himself draw this conclusion, by the way, stating that metaphysics can provide "truly active causes" ("causae vere activae").³⁶

The Newtonian theory of gravity³⁷ may be considered superior to that of Aristotle,³⁸ but only because it can account for phenomena more precisely and provide a better (in the sense of encompassing) description (or explanation) than the former. As for a comprehensive explanation, neither theory provides one, 'gravity' ('heaviness') remaining an opaque word. A comprehensively explanatory distance between one's theory and one's object may also be said to follow from the inclusion of thinking aids in one's theory that make reality a priori inaccessible, however useful such aids may be.

This can be argued for the branch of physics that deals with subatomic particles. 'Subatomic' supervenes on 'atomic,' of course ('indivisible' or, literally, 'uncuttable'). The atom is not observed but rather postulated as – in the pre-subatomic theories – the smallest possible unit. The atom is indeed postulated: "The atom is no *discovery* of natural science, but an *invention*."³⁹ The notion of the atom entails a contradiction, being without extension.⁴⁰ In spite of that, it is an unavoidable means.⁴¹ The atom has fared well, for want of a better model of explanation.⁴² Such models have been proposed, in the wake of the exploration of the subatomic realm. However, this development alleviates none of the potency of

hac philosophia propositiones deducuntur ex phaenomenis, et redduntur generales per inductionem. [...] Et satis est quod gravitas revera existat, et agat secundum leges a nobis expositas, et ad corporum caelestium et maris nostri motus omnes sufficiat." (Newton, *Philosophiæ Naturalis*, Book 3, Scolium Generale, 530.)

³³ Berkeley, *De Motu*, 12.

³⁴ Berkeley, *De Motu*, 12.

³⁵ Berkeley, *De Motu*, 16.

³⁶ Berkeley, *De Motu*, 52; cf. 19.

³⁷ Newton, *Philosophiæ Naturalis*, Def. V, 3, 4; Book 3, Regula 3, 388, 389.

³⁸ Aristotle, *Physica* [± 350 BCE] – *Aristotelis Opera, Vol. 1*, ed. I. Bekker (Darmstadt: Wissenschaftliche Buchgesellschaft, 1960), Book 8, 255b.

³⁹ "Das Atom ist keine naturwissenschaftliche *Entdeckung*, sondern eine *Erfindung*." (Hans Vaihinger, *Die Philosophie des Als Ob* (Leipzig: Felix Meiner, 1922), 150.)

⁴⁰ Vaihinger, *Die Philosophie*, 102, 605.

⁴¹ Vaihinger, *Die Philosophie*, 104, 105.

⁴² Vaihinger, *Die Philosophie*, 450.

Vaihinger's remark that "*without* the atom, science collapses, but, to be sure, true knowing and understanding is impossible *with* it."⁴³

The value of the carefully constructed atomic and subatomic models must be acknowledged, but also the corollary of their introduction, namely an absence of comprehensive explanation.⁴⁴ This entails that a 'theory of everything' in the sense of a theory that aims at unlocking "[...] the cardinal secrets of nature so as to render physical reality comprehensively intelligible,"⁴⁵ may consist in an account that explains all phenomena (or at least all physical phenomena), but not in a definitive theory in the sense that it would offer a comprehensive explanation for all aspects of reality.⁴⁶ After all, physics is characterized by an empirical approach no less than the other sciences, collecting data and constructing a theory by integrating them into a meaningful synthesis.⁴⁷ For a comprehensive explanation,

⁴³ "Ohne das Atom fällt die Wissenschaft; aber allerdings – wahres Wissen und Erkennen ist *mit* demselben nicht möglich." (Vaihinger, *Die Philosophie*, 102.)

⁴⁴ Fine's conclusion is more radical than mine: "If pressed to answer the question of what, then, does it *mean* to say that something is true (or to what does the truth of so-and-so commit one), NOA [the natural ontological attitude] will reply by pointing out the logical relations engendered by the specific claim and by focusing, then, on the concrete historical circumstances that ground that particular judgment of truth. For, after all, there *is* nothing more to say." (Arthur Fine, *The Shaky Game. Einstein, Realism and the Quantum Theory* (Chicago, London: University of Chicago Press, 1986), 134.)

⁴⁵ Nicholas Rescher, *Nature and Understanding. The Metaphysics and Method of Science* (Oxford: Clarendon Press, 2000), 74.

⁴⁶ As Duhem observes, "Explaining, *explicare*, is to reveal the *reality* of *appearances* that cover it like veils, in order to see this reality stripped and face to face. The observation of physical phenomena does not put us in touch with reality hidden behind the sensible appearances, but with these sensible appearances themselves, taken in a particular and concrete form. The experiential laws no more have material reality for their object; they deal with these same sensible appearances, albeit taken in an abstract and general form." ("Expliquer, *explicare*, c'est dépouiller la *réalité* des *apparences* qui l'enveloppent comme des voiles, afin de voir cette réalité nue et face à face. L'observation des phénomènes physiques ne nous met pas en rapport avec la réalité qui se cache sous les apparences sensibles, mais avec ces apparences sensibles elles-mêmes, prises sous forme particulière et concrète. Les lois expérimentales n'ont pas davantage pour objet la réalité matérielle; elles traitent de ces mêmes apparences sensibles, prises, il est vrai, sous forme abstraite et générale.") (Pierre Duhem, *La Théorie Physique. Son Objet et sa Structure* (Paris: Chevalier & Rivière, 1906), 6.) Physical theories do not provide a comprehensive explanation (Duhem speaks of 'explanation' (so without 'comprehensive'), of course) (Duhem, *La Théorie Physique*, 26, 38; cf. 171, 361, 362).

⁴⁷ One may even be more critical and say that such a methodology cannot even lead to an explanatory account, a holistic theory being necessary for such a result (Rescher, *Nature and Understanding*, 78-80).

another model would be needed as a necessary condition; whether it would also be a *sufficient* condition would depend on the sort of model.

Those who aspire to establish a ‘theory of everything’ as an alleged reflection of the structure of reality seem, then, to be confined to the metaphysical stage as Comte describes it:

In the metaphysical state [...], the supernatural agents are replaced by abstract forces, veritable entities (personified abstractions) inherent in various beings of the world, and conceived as capable to engender by themselves all observed phenomena, the explanation of which consists, then, in assigning to each the corresponding entity.⁴⁸

Indeed,

the final term of the metaphysical system consists in conceiving, instead of multiple particular entities, a single great entity, *nature*, considered as the unique source of all phenomena.⁴⁹

Once the level of application is considered, the same analysis pertains. From the fact that one knows how to reach a desired result, no comprehensive explanation follows.⁵⁰ If a doctor manages to treat a patient successfully, or even cures a disease, all he does (which is not to imply that this is a slight task) is to combine several data to find one or more causes of a disease that can subsequently be abated or removed. An appeal to notions that cannot be further elucidated, such as ‘cell’ or ‘gene,’⁵¹ remains necessary. Moreover, from the observation that certain behavior is prone to lead to a disease, or, conversely, its absence, no

⁴⁸ “Dans l’état métaphysique [...], les agents surnaturels sont remplacées par des forces abstraites, véritables entités (abstractions personnifiées) inhérentes aux divers êtres du monde, et conçues comme capables d’engendrer par elles-mêmes tous les phénomènes observés, dont l’explication consiste alors à assigner pour chacun l’entité correspondante.” (Auguste Comte, *Cours de Philosophie Positive, part 1* [1830] – *Œuvres d’Auguste Comte, Vol. 1* (Paris: Éditions Anthropos, 1968), 3, 4.

⁴⁹ “[...] le dernier terme du système métaphysique consiste à concevoir, au lieu des différentes entités particulières, une seule entité générale, la *nature*, envisagée comme la source unique de tous les phénomènes.” (Comte, *Cours*, 4.)

⁵⁰ Cf. Richard Rorty, *Objectivity, Relativism, and Truth. Philosophical Papers Vol. 1* (Cambridge: Cambridge University Press, 1991), 5: “On an antirepresentationalist view, it is one thing to say that a prehensile thumb, or an ability to use the word ‘atom’ as physicists do, is useful for coping with the environment. It is another thing to attempt to *explain* this utility by reference to representationalist notions, such as the notion that the reality referred to by ‘quarks’ was ‘determinate’ before the word ‘quark’ came along [...].”

⁵¹ Cells’ and genes’ internal structures can of course be uncovered, but that does not lead to a comprehensive explanation.

answer to the question ‘why’ that is the case ensues, and one remains in the realm of explanations in the sense of ‘because of what’ as mentioned in section 1. All that is provided in medicine is a generalized observation. Even if some cure exhibits universal results (the cure being effective in each instance encountered hitherto), one still has not comprehensively explained why. A comprehensive explanation would bring with it that doctors could not be surprised by a new case in which the cure would prove not to be effective (in which case a lack of universality would in hindsight be established), but that cannot be guaranteed in medicine,⁵² some new situation that had not been considered being ever possible.

Doctors only discern a regular pattern, oblivious why certain diseases occur in certain cases, only able to observe causes. Apparently, some behavior leads to a disease; somewhere, the explanation ends (so that no comprehensive explanation is given), the difference with previous theories being that one is now able to give a better explanation in the sense that the deepest cause one can find is further removed from the surface than the deepest ones that appeared before, evidenced in doctors being better equipped to combat illnesses than their precursors were. For medicine’s purposes, a comprehensively explicative account may not be required (although its presence would probably be welcomed), but it does question the justification of placing this discipline on a pedestal.⁵³ Of course, Molière’s discrediting of doctors, *inter alia* on account of their (obviously circular) appeal to a ‘dormitive virtue’ (‘virtus dormitiva’) to explain why opium makes someone sleep,⁵⁴ is not fully pertinent, at least not anymore, especially since they do know how to cure some patients, as opposed to those derided by him for not being able to do so.⁵⁵

Presuming that animals (all varieties, from ants to chimpanzees) are factor-determined beings and can be said to use their abilities for survival purposes only,

⁵² Or other fields of research, for that matter.

⁵³ Cf. Richard Rorty, *Contingency, Irony, and Solidarity* (Cambridge: Cambridge University Press, 1989), 8: “From our point of view, explaining the success of science, or the desirability of political liberalism, by talk of ‘fitting the world’ or ‘expressing human nature’ is like explaining why opium makes you sleepy by talking about its dormitive power. To say that Freud’s vocabulary gets at the truth about human nature, or Newton’s at the truth about the heavens, is not an explanation of anything. It is just an empty compliment – one traditionally paid to writers whose novel jargon we have found useful.”

⁵⁴ Molière, *Le Malade Imaginaire* [1673] – *Œuvres de Molière, Vol. 9*, eds. E. Despois and P. Mesnard (Paris: Librairie Hachette, 1886), 443.

⁵⁵ Molière, *Le Malade*, 397.

acquiring no comprehensive explanations (and not even explanations, perhaps⁵⁶), this consideration may be extended to human beings (if they are factor-determined beings), so that any theory they constitute does not represent reality, but only serves to (very modestly) control nature.⁵⁷ This approach may, in the light of what has been said hitherto, be more convincing than one which does adhere to such a representation.⁵⁸ The theories that are proposed and corroborated may be ever so intricate and impressive, that takes away nothing of the divide that separates them from a comprehensive explanation, which would only be possible if another approach than the prevailing one were available. The difference between a description and an explanation may, accordingly, be said to be gradual, if such a difference can be upheld at all.

3. Consequences

It appears that no attempt to gain a comprehensive understanding or a comprehensive explanation has been successful. The two appear to be interrelated in that the acquisition of one entails the other. Whether this is indeed the case remains, strictly speaking, a matter of speculation until the stage of comprehensive understanding or comprehensive explanation is reached. One may, however, doubt the possibility of such a result, not only whether this is feasible for factor-determined beings but whether it is possible at all. Are endeavors to gain a comprehensive understanding as a more fundamental understanding and a comprehensive explanation as a more fundamental explanation than those provided by the sciences not a priori doomed to fail, since they are directed at something that is not available, from any perspective whatsoever?

Perhaps that is the most viable way to approach these issues. Perhaps, then, it must be said, with James: “Purely objective truth, truth in whose establishment the function of giving human satisfaction in marrying previous parts of experience with newer parts played no role whatever, is nowhere to be found. The reasons why we call things true is the reason why they *are* true, for ‘to be true’ *means* only

⁵⁶ I say ‘perhaps,’ since this depends on the scope of the notion ‘explanation’; it may be man’s prerogative to explain matters, animals being unable to do so, but only if reason is supposed to be a special faculty vis-à-vis the other faculties inherent in man and the animals rather than the apex (as far as I can tell) of a hierarchy of skills to (modestly) control nature.

⁵⁷ Cf. Rescher, *Nature and Understanding*, 134-140.

⁵⁸ In addition, the idea that phenomena can be described and explained in a single, correct way, one creature having the privilege of being capable to do so, may be deemed “merely mythology” (Rescher, *Nature and Understanding*, 131).

to perform this marriage-function.”⁵⁹ Whether this is correct cannot be said by a factor-determined being, since it would otherwise already have transgressed its conceptual limits and have entered the realm that is, *ex hypothesi*, undisclosed to it, and whether other beings than factor-determined ones (can) exist is just as speculative, at least for a factor-determined being, let alone the answer to the question whether those beings would be able to reach such a state if they did in fact exist.

For the practical sciences, this result has but few consequences, as was remarked specifically with regard to comprehensive explaining in section 2. For those sciences that aim to unravel nature’s secrets, however, a need to reflect on the validity and possibility of their pursuit arises. Unless a means to construct an alternative method to the one prevalent in the scientific method, viz., a construction of a theory on the basis of empirical input, a model that works quite well in practice but provides neither a comprehensive understanding nor a comprehensive explanation (the contents of which model I am of course unable to provide, not even being able to indicate whether such a model is possible at all), is found, the realm of comprehensive understanding and comprehensive explaining is unattainable. Such a result is obviously unsatisfactory, but the only one that can warrantably be said to follow from the foregoing analysis.

It is tempting to say that a domain of comprehensive understanding and a domain of comprehensive explaining are unreachable a priori since they are illusions, fantasies created to have something to aspire to, and that the regular patterns scientists discern are all there is. First of all, this means the acknowledgement of science’s limitations. Second, as I mentioned, this is, from the viewpoint of a factor-determined being at least, just as speculative as positing such a realm. One is unable to determine whether nature holds great secrets (whether they be ultimately inaccessible or not) or rather merely presents the material to fabricate the illusion that such secrets would exist, just as it is impossible (for now at least) for a factor-determined being to grasp such secrets if they do in fact exist. In any event, it is unwarranted to identify discovering a regular pattern in data with comprehensive understanding and comprehensive explaining; all this points to is a regularity, the basis of which remains elusive if all one is able to do is observe it. As long as scientists’ activities are limited to induction (or, in mathematics in logic, deduction), however intricate their pursuits may be, no comprehensive understanding or comprehensive explaining is realized.

⁵⁹ William James, *Pragmatism. A New Name for Some Old Ways of Thinking* [1907] (Cambridge, London: Harvard University Press, 1975), 37.

Conclusion

The foregoing easily leads to the conclusion that one is delivered to a forlorn skepticism. No fundamental, comprehensive understanding or comprehensive explanation of that which is encountered is provided. Since this situation is inescapable for a factor-determined being, won't an unbridgeable chasm to reality (or nature) remain forever? That depends on one's position. The very notion of a realm of reality existing independently of reasonable inquirers, waiting to be discovered, understood, explained or – according to others than myself – comprehensively understood and comprehensively explained, may have to be relinquished.

I cannot myself draw this conclusion, nor aver the opposite, as I am, after all, a factor-determined being. Strictly speaking, then, some degree of skepticism remains. This is not problematical in practice for most sciences, whose practitioners will unencumbered continue their pursuits, and whose successes are undisputed, as long as they provide actual results. Those sciences that aim at comprehensively explaining reality, however, will need to reflect the very possibility of such a goal. It cannot a priori be said to be fruitless – also because I am factor-determined –, but considering the (necessarily empirically uncorroborated) notions they have smuggled in (or, less unfavorably, posited), the need to temper their ambitions appears to be a given.