Laval théologique et philosophique

Virtue and Necessity

Steven A. M. Burns

Volume 32, Number 3, 1976

URI: https://id.erudit.org/iderudit/1020544ar
DOI: https://doi.org/10.7202/1020544ar

See table of contents

Publisher(s)

Laval théologique et philosophique, Université Laval

ISSN

0023-9054 (print)
1703-8804 (digital)

Explore this journal

Cite this article

Burns, S. A. M. (1976). Virtue and Necessity. *Laval théologique et philosophique*, *32*(3), 261–275. https://doi.org/10.7202/1020544ar

VIRTUE AND NECESSITY

Steven A. M. Burns

SIMONE WEIL (1909–1943) is known as a brilliant contemporary of Sartre and de Beauvoir during their student days in Paris. Her mature work comprises a remarkable variety of writings, all informed by deep and careful philosophical thinking. This paper is an examination of one of her central themes — her understanding of the rôle of necessity and related notions in both science and ethics — and an attempt to trace her doctrine to its roots in Greek philosophy. She finds these roots in Pythagoreanism, especially as developed by Plato. I discuss her views on Pythagoreanism, on science and on ethics, in that order.[1]

I

Aristotle reports that Plato's *Lecture on the Good*[2] was not well-received by its audience because it had more to do with numbers than with goodness.[3] Plato's modern audience also has difficulty seeing the connection; we prefer to read him in the bright light of current doctrine. For instance, we trace in the passages on *anamnesis*, or on the partial non-being of sensible objects, Plato's incipient recognition of our distinction between empirical and *a priori* knowledge.[4] Whatever the merit of such

1. Among the most valuable essays for my purpose are those translated as *On Science, Necessity and the Love of God*, tr. and ed. by Richard Rees (London: Oxford University Press, 1968). (Hereafter: *On Science*.) I am grateful to Prof. Peter Winch and Mr. Rush Rhees for help in connection with interpreting those essays.
I am also indebted to David Gooding for his help and influence.
2. Unfortunately the Lecture is lost, unless Prof. Ryle's conjecture — that much of it is preserved in the central passages of the *Republic* and in the *Philebus* — is to be believed. See Gilbert Ryle, *Plato's Progress* (Cambridge: Cambridge University Press, 1966), pp. 247 ff.
3. Aristotle, "On the Good", Fragment 2.
4. *Anamnesis* is investigated in this way by Julius Moravcsik, "Learning as Recollection", *Plato: A Collection of Critical Essays*, ed. by Gregory Vlastos (2 vols. New York: Doubleday and Co., 1970), I, pp. 53–69. Non-being is similarly treated by Vlastos, himself, in "Degrees of Reality in Plato", *New Essays on Plato and Aristotle*, ed. by R. Bambrough (London: Routledge and Kegan Paul, 1965), pp. 1–20.

observations, in the *Meno* Plato was exploring the teachability of virtue, and the discussion of *anamnesis* is not so much in the context of geometry as it is in the context of an analogy between moral and geometrical reasoning. It is Plato's interest in this analogy which is the focus of Weil's attention, and she finds the analogy to be much closer than we may be inclined to think it is.

She also finds geometry closer to mathematics than we perhaps do. We acknowledge their proximity, and that both can be given expression in algebraic terms, but the Greeks, claims Weil, discovered that geometry *is* about numbers. "Geometry... [is] the science of what is today called real numbers, of which the square root of two or of any other number not square is an example... Geometry... [is] the science of irrational square roots."[5] I think that one can find this discovery deeply impressive. For instance, one can be familiar with the Pythagorean Theorem ; one can know that the discovery of incommensurables — *irrational* numbers — presented a profound difficulty for Greek rationalism ; and one can be aware that the diagonal of a square is an example in geometry of a length which cannot be expressed as an exact numerical proportion of (*i.e.*, which is incommensurable with) the length of one of the sides of the square. Even in the presence of such knowledge, a question like the following can arise — as this one once did for me: "I wonder if the length of the diagonal is the square root of anything connected with the square?" For a moment this was a real question to which I did not have the answer. Then it dawned: "Of course, the square *of* the diagonal is equal to the sum of the squares *of* two of the sides... just as the square *on* the hypotenuse is equal to the sum of the squares *on* the other two sides... not *just as*, they're the same thing! A square is a square. (The Pythagorean Theorem is not about mapping the area of a farmer's fields, or about diagrams in the sand, it is about measuring an irrational square root in mathematics.) And there, momentarily, I felt the inspiration of seeing that geometry *is* number theory.

The necessity involved here is not just that of *a priori* observation: that this is how it *must* be. Nor is it, as we are often told, just important as an *illustration* of the problem of incommensurables. The importance of the Pythagorean Theorem for the Greeks, Weil tells us, was that it *solved* the problem of incommensurables; it permitted rational expression in terms of geometry (the diagonal of a square with sides of one unit in length) of a magnitude which is irrational in terms of numbers (the square root of two). In its proper context, this assumes religious significance. It was a confirmation of the faith: that the elements of numbers are the elements of all things, and that the universe is intelligible. As evidence that Plato also thought this way, Weil cites the *Epinomis*, where he speaks of:

> what is ridiculously called land-measuring and is really the assimilation to one another of numbers not naturally similar, an assimilation made manifest by the

---

5. WEIL, *Intimations of Christianity among the Ancient Greeks*, tr. and ed. by Elisabeth Chase Geissbuhler (London: Routledge and Kegan Paul, 1957), p. 161. (Hereafter: *Intimations of Christianity*.) The essay, "The Pythagorean Doctrine", pp. 151–201, is of the first importance.

destiny of plane figures. It is clear to anyone who is able to understand it that this marvel is not of human but of divine origin.[6]

It is not surprising, then, that numbers and divine things go together in this way. Aristotle tells us that the Pythagoreans were devoted to mathematics, and thought that its principles were the principles of all things — and even that "the whole heaven is numbers."[7] There is also a remark by Proclus to the effect that "Pythagoras turned geometrical philosophy into a form of liberal education by seeking its first principles in a higher realm of reality."[8] It would have been surprising if the *Lecture on the Good* had not had a good deal to do with numbers. The connections with goodness and with divinity are quite real. Perhaps it is in recognition of the marvel that this is so, and that we can see it (that it is revealed to us), that Weil says: "Simple intellectual curiosity cannot give one contact with the thought of Pythagoras and Plato, because in regard to thought of that kind knowledge and adhesion are one single act of the mind."[9] Religious language comes naturally here. By "adhesion" Weil clearly intends something like "faith". Commitment is a part of the idea. But this "belief" must not be confused with what we ordinarily distinguish by that name from knowledge. Faith is not a matter of imperfect knowledge, or of commitment in the absence of adequate evidence. It is the certainty which comes with the clear vision of what is absolutely and eternally necessary.

Another point of importance is that many concepts besides number and necessity cross here. In her notes on Philolaus, Weil has a remarkable passage in which the notions of *logos*, number, necessity, geometry, harmony and equilibrium are all connected. Indeed, she traces the presence of all of them in the "mediation" of Christian theology. She concludes:

> These comparisons may appear arbitrary, but they confer perfect coherence and intelligibility upon texts which, if I mistake not, can acquire it only in this way. There is no other criterion for piecing together a fragmented mosaic. The sole alternative to this interpretation is to concede that the Greeks wrote incoherent and unintelligible things. That is what people have done up to now, but they were wrong. The mistake was to judge the Greeks as if they were like ourselves.[10]

Later, on her death bed, she was to write more abruptly of the integration of these notions:

> There are idiots who speak of syncretism in connection with Plato. But there is no need to syncretize what is all one thing. In Thales, Anaximander, Heraclitus,

6. PLATO, *Epinomis*, 990d. (Weil acknowledges this work as "apocrypha". The translation is hers; see *On Science*, p. 16, *Intimations of Christianity*, p. 161, and *Seventy Letters*, p. 121.)

7. ARISTOTLE, *Metaphysics*, A5, 985-6.

8. G.S. KIRK and J. E. RAVEN, *The Presocratic Philosophers* (Cambridge: Cambridge University Press, 1964), (hereafter: KIRK and RAVEN), fragment 277.

9. From a letter written to Déodat Roché in 1941. WEIL, *Seventy Letters*, tr. and ed. by R. Rees (London: Oxford University Press, 1965), p. 131. See, also, the letters to her brother, the mathematician, André WEIL, (pp. 112–127), which are especially illuminating about her view of Pythagoreanism and Greek science.

10. *On Science*, p. 144.

> Socrates, Pythagoras, there is the same doctrine, the single Greek doctrine, expressed through different temperaments.[11]

How can she imagine that so many different concepts come together here? Greek rationalism held that the universe is intelligible. Whether or not something is intelligible depends indirectly upon what is acknowledged to be an explanation, but you cannot set about explaining if you do not know what there is to be explained. Accordingly, a pre-requisite for intelligibility is mensurability — being able to say what the limits of a thing are. Measuring is only possible against a standard. A primitive model is the balance — equal weights placed at the ends of a balanced beam will not disturb the equilibrium (assuming that the beam is uniform, and balanced at its mid-point). The notions of balance, equilibrium, equality, measure, intelligibility and rationality are all thus connected. How this is mediated in Christian theology, especially through the symbol of the cross, is a question which I shall leave aside, but there are further points which I shall pursue. Consider the Pythagoreans.

What has been discussed so far is not inconsistent with the received opinion about the Pythagorean religious community, about the secrecy surrounding the mysteries revealed in their study/worship, and about their achievements in number theory. Some of it is illustrated by the familiar assimilation of the number series to points geometrically arranged in triangles, squares, rectangles and solid forms.[12] The expression of the series of odd and even numbers is especially germane. The odd numbers are arranged, beginning with the point:

. (1), :: (1 + 3), ⁝⁝⁝ (1+3+5), etc.

Each successive odd number is arranged around the previous figure, and makes a square of greater magnitude; the first square is one unit per side, the next is two units by two units, and so on. Similarly, the even numbers make a series of figures, beginning with the line:

.. (2), ::: (2+4), ⁝⁝⁝⁝ (2+4+6), etc.

Each successive even number, arranged around the previous figure, makes a rectangle of greater magnitude; but in this case the shape of the figure is constantly changing. The first is one unit by two units, the second is two by three, and so on. The ratio does not remain the same. Because of this difference the odd numbers, and especially the unit (1), were taken to embody the principle of Limit and Unity; the even numbers, and especially the dyad (2), embodied Diversity and the Unlimited. The Limited is the first principle, and the unchanging. The Unlimited is responsible for division and for change. This is the clearest and simplest of the aspects of Pythagoreanism which show the confluence of number, geometrical form and higher principles.

11. Weil, *First and Last Notebooks*, tr. and ed. by R. Rees (London: Oxford University Press, 1970), p. 351.

12. For some further details, see Kirk and Raven, Chapters VII, VIII and IX. Concerning the geometrical arrangement of numbers, see especially pp. 230 and 243–245.

What we have discussed so far is also compatible with the famous Pythagorean discovery of the relation between mathematical proportions and musical intervals. For a musician, the discovery that mediaeval plainsong is not only historically and musically, but also mathematically the foundation of harmony, is a discovery which can be revelatory. The first four integers contain the whole secret of the musical scale, and since the most obvious connection between the proportions in numbers and the harmonies in music is found in the geometrical proportions of a divided line (a string), it is revealing that these subjects are associated as they are, for instance by Plato in the *Republic*. There, as Weil points out, the geometrical terms are explicitly extended to morality. The preliminary attempts to teach a soul virtue (to make it harmonious and balanced) consist in making the child familiar with music and dancing.

At two important points, however, Simone Weil stands in defiance of modern scholarly opinion. She does not agree with those who think that Aristotle should be taken literally when he says that: "All suppose numbers to consist of abstract units, except the Pythagoreans; but *they* suppose the numbers to have magnitude." [13] Raven takes this to mean that the Pythagoreans were unable to think of number abstractly, separately from space. He observes that such an incapacity would prevent the discovery of things mathematical which have no geometrical analogues or which imply new geometries. If he is correct, Raven is also able to take Zeno to be attacking with some of his paradoxes the specifically Pythagorean doctrine that units and atoms of space coincide.[14] Neither consideration is conclusive, although Aristotle, himself, is confident. Weil, however, would have Pythagoreans acknowledge that numbers need not be material. Even if Raven is correct about the pre-Parmenidean Pythagoreans, Weil is safe with the later tradition, and with Plato (who could certainly tell numbers from spaces, and who found the way their proportions were manifest in each other "a marvel of divine origin"). In the end, even if they did think that *numbers* are spatially extended (confusing number with magnitude), Pythagorean appreciation of non-physical principles is as old as the tradition itself:

> Harmony in the Pythagorean sense, is always mysterious. It represents the simultaneous conception of what is conceived separately. For example, the sequence of odd numbers and the sequence of the squares. The demonstration of this is perfectly clear, and yet it remains a mystery. The odd number partakes of the nature of unity in that it is indivisible and at the same time in that it generates the squares.
>
> In the eyes of the Pythagoreans, the element in mathematics which eludes demonstration, that is to say the coincidences, is made up of symbols for truths concerning God.[15]

The second point of contention is Weil's inclusion of the Philolaus fragments among her primary Pythagorean texts. The score of fragments attributed to Philolaus, who was roughly contemporary with Socrates, are, if they are genuine, our best

13. ARISTOTLE, *Metaphysics*, M6, 1080. See Raven's discussion in KIRK and RAVEN, pp. 246 ff.

14. This is a central thesis of F.M. Cornford's, also. *Plato and Parmenides* (London: Routledge and Kegan Paul, 1939), Chapter I.

15. *The Notebooks of Simone Weil*, tr. by Arthur Wills (2 vols. London: Routledge and Kegan Paul, 1956), II, p. 512.

information about fifth century Pythagoreanism. They would also represent a part of the Pythagorean influence on Plato.[16] Unfortunately their authenticity has been under attack for more than a century, and as Raven puts it: "On the whole the argument must be pronounced so far to have gone in favour of the prosecution."[17] Weil is particularly interested in two of the fragments. One is cryptic: "And all things that can be known contain number; without this nothing could be thought or known."[18] The second helps to elucidate the first:

> As regards nature and harmony, it is as follows. That which constitutes the eternal essence of things, and nature itself, is the object of divine and not of human knowledge, except for this: It would be impossible for us to know anything of what exists if there were not, to begin with, the essence of the things which constitute the order of the world, both the reality which determines and the reality which is indeterminate. But since at the beginning there are found dissimilar principles, of different kinds, it would be impossible for an order of the world to arise out of them unless harmony were added to them, in whatever manner produced. Similar things, of the same kind, have no need of harmony. But things which are neither similar nor of the same kind or rank need to be locked in by a harmony appropriate for enclosing them within a world order.[19]

This has the appearance of audacious epistemological theory. Are we reading this into an innocent text? Or is it an anachronism? Some have found it unbelievable that it might have been propounded at a time when the critical enquiry, "How is knowledge possible?" was scarcely started (and it was started, anyhow, by Socrates, Plato says), much less settled. Aristotle's failure to attribute any such sophisticated epistemological insight either to Philolaus or to other Pythagoreans is further evidence that these fragments must be regarded as post-Aristotelian forgeries. Weil evidently considers Philolaus genuine. I do not think that much depends on this. If it took Plato to add this important development to the Pythagorean tradition, that would not disrupt the coherence of that tradition. Nor, indeed, would it vitiate the adumbration of this doctrine in the general view that all things are made of numbers.

It is, however, crucial that the observation be made — that without numbers nothing could be thought or known. Weil begins here to trace the foundation of a philosophy of science; the principles of number and harmony are the necessary prerequisite for any knowledge, including knowledge of nature. It is not just that we must have a cosmos rather than a chaos before anything can be intelligible, although this is one way in which she expresses the requirement that truth be the guiding concept in any attempt at understanding or explaining anything. Weil makes the further claim that the dominance of order over chaos takes the form of mediation

16. E.g., *Phaedo*, 61d-e: Cebes — "What do you mean, Socrates, by saying... that the philosopher would be willing to follow the dying?"
"Why, Cebes," he said, "have not you and Simmias heard all about such things from Philolaus, when you were his pupils?"

17. KIRK and RAVEN, p. 309. See Ch. XIII for an assessment of the most important evidence.

18. KIRK and RAVEN, fragment 400.

19. *On Science*, p. 146, (Weil's translation). Cf., "Were it not for number and its nature, nothing that exists would be clear to anybody either in itself or in its relation to other things," attributed to Philolaus without further references by M. Klein, *Mathematical Thought from Ancient to Modern Times* (Oxford: Oxford University Press, 1972), p. 147.

between things not obviously connected: between odd numbers and squares, between square roots and diagonals, between flotation and displacement (*cf.*, Archimedes), for instance. The perfect, and necessary, relations which constitute these mediations bring to our discussion the concepts of equilibrium, proportion, balance, equivalence and harmony. Thus:

> Equilibrium, in so far as equilibrium defines limits, is the essential idea of science; by means of this idea every change, and therefore every phenomenon, is considered as a rupture of equilibrium...; and this... makes all disequilibria an image of equilibrium, all changes an image of the motionless, and time an image of eternity.[20]

In order to appreciate properly the connection which Weil sees between numbers and nature, and between necessity and physics, we need not only to understand the passage just cited, but also to consider the essays on quantum physics. Although the latter are sufficiently technical to defy adequate summary, I shall try to deal with both in the following section.

II

The principles of number and harmony are the precondition of any intelligibility, and Weil would add that they are religious principles. "This is the discovery that intoxicated the Greeks: that the reality of the sensible universe is constituted by a necessity whose laws are the symbolic expression of the mysteries of faith."[21] She claims, further, that to read numbers in the universe and to love the universe go together. "Ancient science was more suitable for such reading than is modern science."[22] Now, very roughly, Weil argues that classical modern physics has been Greek science *minus* something, and that contemporary physics is the classical theory with something further omitted. Science since Galileo has left out the love of the evident divinity of the requisite necessity. In the early twentieth century, physics, especially in quantum theory, has left out the necessity itself, and hence intelligibility. What content can these claims be given?

That classical modern science is an incomplete version of ancient science, Weil argues in great detail on many different occasions. For instance:

> The whole of classical science is already contained in the works of Eudoxus and Archimedes. To Eudoxus, the friend of Plato and pupil of one of the last authentic Pythagoreans, are attributed the theory of generalized number and the invention of the integral calculus; he invented the combination of circular and uniform movements carried out on the same sphere but around different axes and at different velocities, so as to furnish a mechanical model which accounted perfectly for all the astronomical facts known in his day. The idea of the same moving body carrying out at the same time several different motions whose resultant is a particular trajectory is the very basis of kinetics and is necessary for the conception of a combination of forces; all we have done since is to substitute

20. *On Science*, p. 79.
21. *On Science*, p. 144.
22. *The Notebooks of Simone Weil*, I, p. 191.

> linear for circular motion and to introduce acceleration. That is the sole difference between our conception of stellar motion and that of Eudoxus, because, although Newton said a great deal about force of attraction, gravity is no more than uniformly accelerated motion in the direction of the sun. Archimedes was the founder not only of statics but of the whole of mechanics by his purely mathematical theory of the balance, the lever, and the centre of gravity; and the whole of physics is contained in germ in his theory of the equilibrium of floating bodies, which is also purely mathematical and which amounts to considering a fluid as an ensemble of levers superimposed on one another with an axis of symmetry playing the part of the fulcrum. Teachers today very mistakenly reduce these marvellous conceptions to the rank of totally uninteresting empirical observations.[23]

One way of showing what is lacking of ancient science in the classical, consists in pointing out the flatness of concepts which once had significance on many levels, a "haunting resonance" which was not left out when the concepts were employed scientifically. The idea of equilibrium is one of Weil's examples. Not just important in physics, it was at the centre of Greek thought; and the balance was a symbol of equity, one of the primary virtues.[24] The lever, which in Archimedes' thought pits displacement against flotation, is also the set of scales, symbol of balanced and impartial judgment, held by the blindfolded figure of Justice. The notion of balance has primacy over other related concepts (for instance, "heavier than"). This conceptual priority can be seen if we think of a situation in which equal weights placed at the ends of a balanced beam would result in an *im*balance. Perhaps one of the weights is affected by a magnet. Perhaps the beam itself is not true, but is shorter and heavier on one side than on the other. These and other possible explanations are *derivative* cases, understood only as modifications of the primary case of perfect balance. The latter, we might say, is part of the system of measurement. It makes the drawing of the other distinctions *possible*.[25] This primacy is part of the concept in all of its main uses, in physics, geometry, law and theology, and is the mediator of the various uses, preserving the unity of the concept. Difficult though it is for us to preserve the moral and religious senses of a term when doing science — for ordinary language is ill-adapted for displaying differences of level — these are part of the original significance of the terms, and are crucial to the intelligibility of Greek thought. Classical science deliberately leaves out differences of level. "If the algebra of physicists gives the impression of profundity it is because it is entirely flat; the third dimension of thought is missing."[26] There is profundity. The writing is esoteric, intelligible only to the very learned — and it may be of far-reaching significance within the notation in question. But so far as the other dimensions of human understanding are concerned the algebra is mute. There is only the illusion of metaphysical profundity.

---

23. *On Science*, pp. 13-14. See also pp. 45, 64 and 73, *Seventy Letters*, p. 1, and *Intimations of Christianity*, pp. 202 ff.
24. Cf. *On Science*, p. 14.
25. Weil claims that Euclidean geometry has the same conceptual priority over derivatively conceivable systems in which, say, two straight lines may have more than one common point.
26. *On Science*, pp. 54-55.

We believe, of course, that modern science has deliberately left out this profundity, and the religious resonances, in the interest of probity and greater intelligibility. Weil analyzes our delusion in this way: The continuous and the discontinuous are both given to us. (Weil's illustrations here are, of the former, that we cannot pass from one side of a river to the other without crossing it, and of the latter, that we can find no intermediary between iron and gold.) A perfect balance between these two givens is the necessity which is presupposed by any intelligibility in a field where these principles operate. Because of its deference to uniform linear motion,[27] because of its ambition to be able to explain everything without exception, and because of the presuppositions of its main mathematical tool (the calculus), among other causes, classical science mistakenly identified necessity with the continuous. As a result:

> Classical science wanted to suppress the discontinuous, so inevitably it stumbled over it and the shock was felt at the very centre of physics, in its main department, in the study of energy itself, which was to have been the means of suppressing the discontinuous; in other words, it was felt in the study of thermodynamics... The scientists forged ahead without revising anything, because any revision would have seemed a retrogression; they merely made an addition. When they ran into the discontinuous they still went on reducing everything to variations of energy; they simply put the discontinuous into energy itself, which deprived the latter of all meaning... They were unembarrassed by the difficulty of using the idea of probability as a bridge between the world as it is given to us and the hypothetical and purely mechanical world of atoms; the consequences of the quantum theory, which derived from the study of probability, led them to introduce probability among the atoms themselves. Thus the trajectories of atomic particles are no longer called necessary but probable, and there is no necessity anywhere. And yet, probability can only be defined as a rigorous necessity, of whose conditions some are known and others unknown; the conception of probability, divorced from that of necessity, is meaningless.[28]

By thus abandoning necessity, we succumb to unintelligibility. This claim can be most easily examined by considering the way in which probability can only have meaning if it can be measured against necessity. It would be a mistake, for instance, to think that Weil's requirement is met by one familiar contemporary position. When a philosopher of science assimilates scientists' reasoning to a "nomological-deductive" model, he defers to a necessity of a sort. Any model lacking the invariability of the law, or lacking the certainty of the deduction of its consequences, fails, he claims, to be an adequate model of *explanation.* So, when exceptional results accrue, they must be accounted for either by the scientist's error, or by a law-like statement of the exception — as a modification of the original law. (Thus stated, this is a traditional rationalist position, held in opposition to empiricism and other irrationalisms. It is a superficial curiosity that its contemporary defenders often count themselves empiricists. An excellent defense of the traditional opposition to this position is Professor Anscombe's Inaugural Lecture,[29] in which she argues that necessity is not any part of

27. Discussions of this and other basic concepts in classical physics are found in *On Science*, "Reflections on Quantum Theory", "The Paradox of Inertia", *et passim*.

28. *On Science*, pp. 59–61.

29. G.E.M. Anscombe, "Causality and Determinism" (Cambridge: Cambridge University Press, 1971).

the notion of causal explanation. It is Weil's intention to account for both of these temptations.)

She begins with two related theses.[30] First, a philosopher learns no more from the sciences than from the arts, from religion or from politics. Of course this is not to say that he cannot learn a great deal from physics, and from poetry, and other human endeavour. But, second, in the end physics cannot *change* philosophy. Philosophy is, among other things, about what makes physics *possible*. Physicists are naive, and philosophers who agree even moreso, when they claim to have made philosophical discoveries about determinism, probability, and so on. Weil acknowledges that they do work much as described above.

> When a physicist studies a problem he conceives a perfectly definite, perfectly closed system and allows nothing to enter it except what he has put there, and which can be expressed in a few phrases. Often, he represents his system in the manner of a mathematician, by figures and formulae; but he sometimes represents it by objects, and that is what is called making an experiment... Naturally, the experiment sometimes succeeds and sometimes not.[31]

Weil also points to the importance of the negligible in physics. It is that which has to be overlooked when accomodating particular cases to general rules, as a scientist would overlook minute amounts of friction when testing acceleration equations by rolling balls down inclined planes. The surfaces could not be perfectly smooth except in the theory. Weil complains: « Not only do physicists neglect the negligible, as they ought to do by definition, but they are also inclined to neglect, even when they are making use of it, the very notion of the negligible." [32] It is this neglect which allows them the illusion of discovery when they run into the discontinuous. When a physicist whom she admires very much writes of the discovery of discontinuity by modern physics, she says, not without sarcasm:

> It was suspected before the appearance of quanta that there is not only continuity in the universe but also discontinuity... It is only a physicist who can speak of "the apparent determinism of the macroscopic scale". ... Look at the sea, and say if the shapes of the waves appear to reveal a very rigorous necessity! The truth is that nineteenth-century physicists believed there were no more things in heaven and earth than in their laboratory — and indeed in their laboratory only at the moment when an experiment succeeded. Their excuse was their professional obsession but those who shared their belief without that excuse were fools. Physicists today have lost that illusion; so much the better, but they are wrong to think that this means they are contributing something new. Determinism, says M. de Broglie, can no longer be maintained except as a "metaphysical postulate". But it was never anything else for a man of any intelligence. It was nothing else for Lucretius.[33]

30. See, e.g., *On Science*, p. 70.
31. *On Science*, p. 33.
32. *On Science*, p. 31.
33. From a review of *L'Avenir de la Science*, by Louis de Broglie *et al.*, 1941. *On Science*, p. 68.

And she adds, with reference to the "fools" without excuse, "when we find that the ideas of Louis de Broglie about the contributions of science to philosophy are not worth of a mind like his, it is not him that we should blame but the philosophers whom he has happened to meet."[34]

The necessity which Weil insists is the prerequisite for intelligibility is not, then, the determinist or deductive-explanation thesis any more than it is the indeterminist or contingent thesis. These concepts are both required for an understanding of the world, and their significance is itself dependent upon their being held in equilibrium. What does Weil mean by claiming that probability can only make sense as a reflection of necessity? It is not just that a probability statement is itself a determinate numerical ratio; nor just that a probability "p" that an A will be attended by a B is a disguised claim that what is not (has not been, cannot be) determined is in fact the real explanation of p, namely that an A *is* determinately connected to a B except when a C interferes; nor that the estimate of a probability will grow more accurate with additional data, approximating perfect accuracy as it approaches an infinity of data. Each of these is a way in which probability is only intelligible as an image of necessity, but I think that Weil's fundamental thought is yet another.

What often accompagnies the view of contemporary physics in question is the empiricist idea that the reasoning involved, the algebra, for instance, is axiomatic and contentless, and derives its value only from its happening to permit prediction of empirical phenomena. In a Lecture before the Prussian Academy of Science in 1921, Einstein said: "As far as the propositions of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality."[35] In its purest form this is the view that necessity is manmade, that it is a relation among propositions, and is derived from the axioms of the system in which the propositions have their place. Objects and events in the world are only contingently related. Thus it is also accidental when the theoretical necessities appear closely to resemble regularities in the world. In the view that *a priori* truths are only abstract, Weil sees an error; it is one which has led empiricists to attribute to rationalists the *bêtise* of thinking the world is nothing but embodied *a priori* truths (and known without recourse to the senses, indeed). (Of course this is a straw man; not even Plato was under the illusion that the empirical world was perfect, or that experience was dispensable.) What really distinguishes this view of reason from the correct one, Weil suggests, is that the former speaks as though reason itself were a "metaphysical postulate", hypothetically adopted in hopes that it would happen to be useful, and to

34. *On Science*, p. 70. For further examples of this sort, see Werner Heisenberg's *Physics and Philosophy* (New York: Harper and Row, 1958) and the introduction to it by F.S.C. Northrop, pp. 19, 28, *et passim*, and Weil's review of Planck's writings, *On Science*, pp. 55 ff.

35. Albert EINSTEIN, "Geometry and Experience", *Ideas and Opinions* (New York: Crown Publishers, 1954), p. 233. But cf. Heisenberg (*Physics and Philosophy*, p. 71), who claims that modern physics is not a materialist atomism like that of Democritus, but is Platonic and Pythagorean in holding that the elementary particles *are* mathematical forms.

be abandoned should it prove inefficient in the pursuit of practical ends. This Weil considers not only a morally reprehensible view, but an incoherent one.[36]

The proper view is rather that reason involves the apprehension of the necessity of equilibrium as a condition of scientific thought, as of all else human. It is the prior and the ultimate reality, that without which the question of the relation of geometry to physics could not even arise. The rôle of necessity and equilibrium in every area in which thought is possible is an indispensable one; to the extent that they are absent, thought is not possible. Since it is this which connects Weil's understanding of physics and Pythagoreanism with her understanding of the human sciences and morality, I shall say more about the rôle of necessity and equilibrium while discussing the last topic of this paper.

III

Notoriously, the Pythagoreans thought justice was a number, but Simone Weil takes a remark attributed to Anaximander (by Simplicius) as the most profound text on the subject: "It is from this that things arise and to it their destruction returns them, according to necessity; for thing undergo from one another a punishment and an expiation because of their injustices according to the order of time."[37] As Simplicius adds, these are "rather poetical terms", but we have already considered the notion of number as the mediator between the limited and the unlimited. In the *Politicus* (or *Statesman*), Plato speaks of number as the just mean or measure in every act and activity.[38] Weil takes this prospect with complete seriousness. When discussing the physicists' geometrical models, which she admits are abstractions rather than existing things, she adds that they are:

> ... yet more real than the phenomena present to our senses. The simplest of them, and symbol of all the others, is *the balance, which can therefore symbolize both knowledge of the world and justice.*
>
> Whatever department or aspect of nature or of human life we may study, we have understood something when we have defined an equilibrium, and limits in relation to this equilibrium, and relations of compensation linking successive ruptures of equilibrium. This is also true for studies of social life and of the human soul, and only in this way can they be sciences.[39]

Weil intends this to be a fundamental methodological remark about the social sciences, and many times in her writing on history, politics, economics, literature and

36. Cf. *First and Last Notebooks*, p. 135, and *On Science*, pp. 71–74.
A physicist will sometimes claim that nothing is necessary. "There is evidence that the speed of light may not be constant; even the fundamental laws of physics may vary."
But of course. The speed of clouds and motorcycles varies, why not that of light? However, if there is evidence — if we are to tell — then something must be constant so that the inconstancy of the speed of light may be noticed. There *is* necessity, but this is a philosophical claim, not an empirical one. (Consider, perhaps, what Wittgenstein says about the unalterable, at *Tractatus Logico-Philosophicus* 2.022 and 2.0231.)

37. Kirk and Raven, fragment 103a. I have preserved Weil's translation (*On Science*, p. 80).

38. Plato, *The Statesman*, 285a. The digression on measurement (283c-285b), and its sequel on "suitability" as a standard (-287b), are closely related to the general position which Weil defends.

39. *On Science*, p. 81, (emphasis added).

religion she gives it concrete applications. I do not propose to discuss any examples of this aspect of her work, although it may be illustrated, in passing, by my quoting from an essay on bankruptcy:

> In every domain accessible to human thought and activity the key is provided by a certain conception of equilibrium, and without it we only fumble in the dark... Economic life has not yet been touched by the Greek miracle. We possess no conception of the equilibrium proper to an economy... (We've substituted the notion of a balanced budget.).[40]

I propose instead to consider the way Weil uses "necessity" in her treatment of ethics. She makes a graceful transition from using it as the basis of intelligibility in the sciences, to using it in showing the relation between harmony and virtue. This transition is one which has become much more widely understood in recent years due to the growth of interest in ecology. The biological study of the internal relations of relatively closed life systems (once called the balance of nature) is now popularly extended to include human productivity, natural resources, and the equilibrium of the entire planet (the relatively closed system dramatically called "spaceship earth"). This makes up a study in which nearly all sciences have a part, from town planning to organic chemistry. When individuals conscientiously try to recycle their refuse, try to restrict themselves to a natural diet, take to bicycles instead of motor cars, and so on, they do so on grounds of expediency and for scientific motives, as well as for moral and aesthetic reasons. They may also be said to be expressing a view of the nature of human life and man's place in creation. If Weil is right, this is not a curious mixture of motives, but a unified and many-levelled response to a particular vision of the demands of the principle of harmony. Interestingly, when ill-health, ill-humour and fore-shortened prospects for individuals and species alike are seen to be the results of man's swift exploitation of technique and resources in the pursuit of progress, many are moved to see this as a sort of revenge on the part of nature for man's short-sightedness and arrogance. What springs to mind is the line just cited from Anaximander, "things undergo from one another a punishment... because of their injustices according to the order of time." But even without representing Nature as a moral agent, we have here a clear example of the notion of equilibrium playing a combined rôle as a standard in scientific thought and a guiding principle in moral life.

One of Weil's favourites among the speeches of Socrates is this one to Callicles:

> The wise tell us, Callicles, that heaven and earth, and gods and men, are kept together by communion and friendship and order (*kosmiotēta*) and temperance and justice; and that, my friend, is why they call this totality an "order" (*kosmos*) and not a dis-order or an intemperance. But it seems to me that you have not paid attention to all this, clever though you are. You do not see that

40. Weil, *Selected Essays, 1934–43*, tr. and ed. by R. Rees (London: Oxford University Press, 1962), p. 146. For further examples of the notion of balance put to use on specific subjects, see "The Romanesque Renaissance" (*Selected Essays*, pp. 44–54), discussions of socialism and sport (*First and Last Notebooks*, pp. 8 and 50, respectively), and of justice (*The Notebooks of Simone Weil*, II, pp. 456 and 508).

> geometrical equality has great power with gods and men. According to you one ought to cultivate acquisitiveness; for you overlook geometry.[41]

Number as the mediation between the one and the indefinite is discussed as a principle of morals in the *Philebus*, also. It is connected with temperance, of course, with balance in the face of temptation, and with the avoidance of false pleasures.[42] The final essential is to see the harmony or equilibrium as such, to recognize the necessity — which comes neither from ourselves nor from the world — for the divine principle it is. In connection with the natural part of man, for instance, with his physical needs, she writes of the forces which govern the world and which make men obey. But she distinguishes a higher from a lower way of seeing this aspect of the world. The lower is to see it as force — brute, contendable with, either to be conquered or to be succumbed to with indulgence; the higher is to see it as necessity — to be met with equanimity if possible, and not to be exceeded. Especially is necessity not to be exceeded.[43] To see necessity instead of force, she continues, is to release the spiritual in us.

This is not confined to physical needs and desires, for as Weil writes in the essay on the Pythagorean doctrine:

> Necessity constitutes an order whereby each thing, being in its place, permits all other things to exist. The maintenance of boundaries constitutes for material things the equivalent of what the consent to the existence of others is for the human spirit, that is to say charity toward one's neighbour. Moreover, for man, in so far as he is a natural being, keeping within limits is justice.
>
> ... The supreme justice for us is acceptance of the coexistence with ourselves of all creatures... It is permissible to have enemies, but not to desire that they should not exist... All crimes, all grave sins are particular forms of the refusal of this coexistence.[44]

The harmony which is fundamental to the structure of understanding, and that which is the principle of friendship and justice, and that which is the measure of sin and the object of the recognition of necessity, are all one and the same.

We are not normally inclined to agree with persons who speak in such a way. For contrast, here is an illustration of a more ordinary way of thinking of necessity. In a

---

41. PLATO, *Gorgias*, 508a. Again, this is Weil's translation (*On Science*, p. 115).

42. Readers familiar with the essays of Albert Camus will be able to expand on these implications. What he called "*la pensée de midi*" (analyzed at length in his last philosophical work, *L'Homme révolté*) concerns the importance for European man of recapturing the Ancients' respect for limits and harmony. Camus was deeply impressed by Weil; he was the editor responsible for Gallimard's publishing *La Source grecque* (translated as *Intimations of Christianity among the Ancient Greeks*). Students of Camus would do well to read Weil for a much more acutely argued presentation of what he found philosophically important.

43. Cf. *Intimations of Christianity*, p. 182.

    In a letter to her brother, Weil claims that there is sadness but no anguish in the Greeks. "In struggling against anguish one never produces serenity; the struggle against anguish only produces new forms of anguish. But the Greeks possessed grace from the beginning." (*Seventy Letters*, pp. 122-123.)

44. *Intimations of Christianity*, pp. 185 and 189. See also *First and Last Notebooks*, pp. 85–89, on the relation of necessity to science and charity.

paper entitled, "Let Needs Diminish That Preferences May Prosper",[45] David Braybrooke has given an excellent portrayal of the view that necessities are our common needs, and should be contrasted with the objects and products of our freedom, our creativity and our preferences. He argues sensitively against the danger of multiplying necessities beyond necessity — for instance, that tendency to find, amid growing affluence, more and more commodities which one "simply cannot do without", until one is completely dominated by "essentials". And where there is no discretionary (income) there can be no (economic) freedom. This is a libertarian view, which takes freedom and the escape from the domination of necessity to be of the highest moral importance. Of two persons with equal resources, he will be the better, and happier, person who has minimized his subservience to necessities and has maximized his freedom to choose. This is also to some extent a view from the political right, for it is the well-to-do who often treat luxuries as necessities as a rationalization of self-indulgence. When there is an escalation of "necessities" from the political left, on the other hand, this is part of a campaign to increase the minimum living conditions of the most poorly-off. These cases belong together, however, and Braybrooke's use of "necessity" and "preference" is a familiar and widely-accepted one.

Weil would turn this picture of ours upside down. It is not that she would countenance the multiplication of needs just described. "Social goods", she says, "are no more than reinforcements to the power of saying 'I'," [46] and this she contrasts with the acceptance of poverty. Necessity is the enemy for the man who says "I". The virtue she would have us see is that of self-abnegation, that of the man who truly prays, "Thy will, not mine, be done." [47] Weil would also argue that our preference for the indulgence of preferences should not be taken to be a good thing. "Seek first the kingdom and the justice of the heavenly Father, and then receive whatever is given." [48]

To pursue this, however, would exceed the limits of our paper by requiring an examination of Weil's philosophical theology. The necessity which we must apprehend in the equilibrium which underlies any intelligibility is also the foundation of all virtue, and as she puts it in these rather poetical terms, "God has inscribed his signature in necessity." [49]

45. David BRAYBROOKE, "Let Needs Diminish that Preferences May Prosper", *Studies in Moral Philosophy* (American Philosophical Quarterly Monograph No. 1), ed. by N. Rescher (Oxford: Basil Blackwell, 1968), pp. 86–107.

46. *First and Last Notebooks*, pp. 87–88. Cf. *Gravity and Grace*, tr. by E. Craufurd (London: Routledge and Kegan Paul, 1952), pp. 23–27 ff., and *On Science*, pp. 183 ff.

47. *St. Luke xxii*, 42. And cf. Weil's remarkable prayer, *First and Last Notebooks*, pp. 243–244.

48. *First and Last Notebooks*, p. 308.

49. *First and Last Notebooks*, p. 337.