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ON THE STRUCTURAL RESEMBLANCES IN ULTIMATE RELIGIOUS,  
PHILOSOPHICAL AND SCIENTIFIC THOUGHT

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Religion, philosophy, and science have complex historical ties. I will ignore these in favor of the ties that depend upon creative imagination. My description of a number of them will be, I am afraid, too rapid. To be genuinely persuasive, my argument would require more and better-analyzed evidence than I can give here. But I hope that even my too-rapid sketch will prove stimulating.

Let me, then, begin abruptly, with the trait of curiosity, in the absence of which neither religion, philosophy, nor science would have developed. As we see most easily in the case of children, curiosity is biologically necessary. Not unlike the thinkers who will be our subject, children prefer, within measure, to expose themselves to the unknown, and to alter and destabilize both themselves and the world, becoming familiar, as they do so, with the world and with their powers in relation to it. Like the thinkers I am referring to, the more children are able to create, understand, and master instability, the deeper the stability they sense within themselves.<sup>1</sup>

Curiosity is both initiatory and creative. On its urging, we explore our surroundings, that is, we give the world shape, content, color, and power. It is out of curiosity that we elicit the reciprocal construction of self and world and become, at once, more richly subjective and more powerfully objective. The world therefore grows in relation to the perceptions and needs of each human being who has elicited it, or, so to speak, completed its creation.

In such stubbornly curious people as those we are considering, curiosity accepts no limits; it penetrates into details radically; or it arouses such

radically general questions as, "How did the world come into being?" or, "Why is there something rather than nothing?" Some of the answers, I suspect, may even precede the explicit asking of the questions. One, anthropomorphic answer, that of the Winnebagos, was that in the beginning the great father, Earthmaker, could not think what to do and so began to cry; but when he looked down he saw that his tears had become the waters of the earth and realized that he could wish whatever he liked into existence. The Indians of ancient India, having a sometimes more abstract cast of mind, imagined the time when there was neither Non-Being nor Being; but, as if by the ardor stimulated by this very absence, the empty principle, the One, was born, so to speak, from itself, and the process that may be called the self-creation of the world had begun. On a less abstract, perhaps proto-scientific level, the ancient Indians learned to describe the world's construction in terms both of the very minute and the enormous. The Buddhists, for example, hypothesized a particle, a paramanu, so small that 1,975,226,743 of them fitted into a measure equivalent to our three-quarters of an inch; while the worlds, infinite in number, were organized, they thought, into walled-off groups of 1,000, 1,000,000, and 1,000,000,000.<sup>2</sup>

Even in the few answers I have repeated, it is possible to discover the potential theologian, potential philosopher, and potential scientist. To judge by the history of religion and philosophy, of all the answers given to the question, "Why is there something rather than nothing?" the most successful philosophical one was that of Plotinus, paralleled in India by that given by the eighth-century philosopher, Shankara. Put without its philosophical justification, the answer was that the infinite plenitude of being, the One, existed necessarily, and was in no way diminished by the ceaseless emanation from it of the world.

Christian thinkers, though they adapted Plotinus's answer to their own

needs, followed the passage in the Second Book of Maccabees (7:28) that represented God as making heaven and earth "not from things existent." They therefore rejected both the eternity of Aristotle's world and the preexistence of matter, which Plato assumed in the Timaeus. Yet the idea of creation ex nihilo was difficult enough to tempt some Christian thinkers to identify it with the Plotinian emanation of reality from, as the Christians put it, the essence of God.<sup>3</sup> Creation ex nihilo naturally raised intellectual problems. Following Aristotle, the medieval philosophers defined time as the measure of motion, so that before creation there could have been no time, and so (they hoped) it made no sense to ask, "Why did God create the world at one rather than at another moment of time?"

The attempt to understand ultimates evidently made some medievals uncomfortable, and they expressed their discomfort in the form of principles that I take to be both expressive and defensive. We find such a principle, I think, in the fifteenth-century churchman, scientist, and mystic, Nicholas of Cusa, who emphasized, in a certain Plotinian vein, that reality could be expressed only in paradoxical terms. Thus the absolute maximum, he said, being infinite, had no degrees of "more" or "less," so that, unable to be smaller than it was, it must be identical with the absolute minimum. This identity of maximum and minimum, he said, "is far and away beyond our understanding, which is fundamentally unable by any rational process to reconcile contradictories."<sup>4</sup>

Now, after mentioning Nicholas, I turn to the twentieth century. I turn, more exactly, to 1927, when the Belgian cosmologist, Georges Lemaitre, proposed the theory that the universe, because it was taken to be expanding, had once been concentrated in a huge, dense "atom," with which space and time themselves originated. The universe, he held, was the sequel of this atom's explosion. The parallel between the moment of explosion and the moment, as the medievals

saw it, of creation, by no means escaped Lemaître, who was, as it happens, a priest. Both, of course, were the moments at which time began.

The rival of Lemaître's and then Gamow's equivalent theory, the steady-state theory of Bondi and Gold, was also significantly analogous to an old view of creation, that of Plotinus. Bondi and Gold's assumption that the universe must be basically uniform over space and time, but sustained eternally by the creation of new matter, is surely like the Plotinian universe, which emanates uniformly and eternally from the infinite plenitude of being. Bondi and Gold's notion that the energy of the universe did not run down because extracted from a negative energy reservoir, which became more negative, that is, denser, as it was used, would have pleased the paradox-oriented Nicholas of Cusa. How, too, Nicholas would have been pleased by contemporary talk of "black holes" containing "singularities" at which matter is concentrated to a mathematical point of infinite density. And how particularly pleased he would have been by the speculation, exemplifying the coincidence of maximum and minimum, that the whole universe might be warped and concentrated to such a singularity. Nicholas believed in only a single, though unlimited universe, but Bruno, who was permeated by Nicholas's thought, would have been endlessly exhilarated by John Wheeler's timeless superspace embedding an infinite number of universes, which enter and leave space-time by way of singularities. On second thought, however, Bruno might have felt that Wheeler's <sup>(scheme)</sup>violated the perfect cosmological principle in which he, Bruno, implicitly believed.

We have heard the answers of the Winnebagos, the ancient Indians, Plotinus, the medieval Christians, and some modern cosmologists. But there is a point at which they all fail, and, I take it, must fail. Philosophers have now and then explained why reason cannot grasp the question at issue, let alone answer it. When we attempt to understand anything, they have pointed out, we

consider its origin, development, and use, we observe how and to what it reacts, we analyze it into its constituents, and we compare and contrast it with something else of its own or a different kind. To understand it is to set it within a variable web of relationships. But what of existence or being as such? Where and how does it begin, what does it react to, and with what can it be compared and contrasted? What is its place in any variable web of relationships? Of course there are answers. Theology and philosophy are filled with them, and contemporary cosmology makes and remakes its conjectures every day. But it is a question whether the absence of being or existence as a whole can even be conceived and whether or not there is anything to compare it with as a whole. It is even a question whether such general questions about existence make any abstract sense.

Although I do not want to engage directly in the classical debate on existence as such, I find that it begins to make clear sense only when transposed into a problem that I have so far not mentioned, the problem of life and death. For very nearly all of us, living or living well is all our hope and dying or dying badly all our fear, and the vocabulary of "existence" and "non-existence" is the abstract counterpart of our hope and fear and the thoughts and imaginings that cluster around them. When we transpose the problem, being or existence is, of course, equated with life, and non-being or non-existence with death. "True" existence then becomes equivalent to that in life which demands the most attention or gives the greatest rewards, while "illusory" being or existence to that which, in fact or feeling, does not or ought not to demand attention or give any reward we value. To say that existence as a whole is "illusory" is thus to express disappointment in life, to find it not to have fulfilled its promise and therefore to be painful, repulsive, insipid, or thin.

Such questions as, "Why is there anything?" are therefore not susceptible

of simply rational or objective responses. If the response is not dogmatic or conventional, it must be subjective. The response of creative men, I believe, expresses either the fantasy of perfect intimacy, or the related, equally powerful fantasy of destruction and creation, that is, of death followed by rebirth or renewal.

Let me begin to explore my contention, that fantasies and subjective needs underlie religious, philosophical, and scientific thinking by comparing the thought mechanisms of two types of apparently antithetical persons, the philosophical mystic, who is a possible amalgam of the religious man and philosopher, and the physicist.

Like other mystics, the philosophical mystic makes a sharp distinction between inauthentic and authentic experience. The inauthentic is this varied world we sense and live or appear to live in. The authentic, which is indescribably simple and satisfactory, lies behind it. We are really, that is, in the authentic world, but to realize its satisfactions we must learn to see through the illusion to the truth.

So much is common to philosophical and other mystics. But the philosophical mystic, depending on his intellectual and cultural circumstances, supports his mysticism by making use of one of at least four different intellectual mechanisms. These I shall call, "the singularizing mechanism," "the dissociating mechanism," "the relativizing mechanism," and "the ranking mechanism."

Let me explain each of these briefly. The singularizing mechanism is meant to reduce the plural world to a single, essentially unvarying spiritual substance. In the West, Plotinus makes free use of this mechanism, and his disciple, Proclus, singularizes the world with great intensity and pseudo-Euclidean exactness.<sup>5</sup> In India, Shankara is prominent among those who argue that everything is constituted by consciousness, the creative ability of which

we experience in dreams. At its greatest intensity and purity, he argues, consciousness is the steady unvarying reality that is common to all the manifestations of consciousness. Sadly, although consciousness is reality and bliss, in us it tends to misapprehend itself.<sup>6</sup>

The dissociating mechanism is especially popular among Buddhists. They deny that anything, whether soul, body, or object has any genuine coherence of its own, any genuine existence apart from that of its most elementary constituents. From a technical standpoint, their method of dissociating resembles that of the (unmystical) Moslem theologians, the Mutakallimun, who use it against the causal determinism of the Aristotelians.<sup>7</sup> This is also, of course, the method used by Hume against speculative metaphysics in general, and is therefore the most obvious link between mystical and Positivistic philosophers.

Another, somewhat analogous dissociating mechanism is what I shall call, for obvious reasons, "quantization." It is exploited in particular by certain Buddhists, the seventh-century philosopher, Dharmakirti, for example, who argues that nothing, not even time and space, are continuous, but that the continuous appearance of the spatial and temporal world is constructed of point-instants, briefer, perhaps, even than our physicists' "resonances," for the real, "momentary thing represents its own annihilation."<sup>8</sup>

The relativizing mechanism is used in one version by Nagarjuna, a second or third-century South Indian, who begins with the assumption that really to exist is to be independent, to have "own-being." He then tries to demonstrate that all human perceptions and ideas are relative and therefore, in themselves, empty. Furthermore, they all involve contradictions or, in the Kantian sense, antinomies, so that they cannot be said to exist, not to exist, to both exist and not exist, or not to both exist and not exist. The world we appear to live in is, to put it briefly, incoherent and therefore impossible.<sup>9</sup>



The ranking mechanism is common to all Neoplatonic philosophies and to many Oriental ones. It is exemplified by Plotinus and, more systematically, by Proclus, who say that all that exists proceeds from a single first cause, The One, which is identical with the Good. They add that every order begins in a monad, from which emanate subsidiary beings, which remain linked to one another and to the monad by the desire or tension to return to the primal unity.<sup>10</sup>

In spite of their differences, all the mechanisms I have described share a quite general aim. That is, they all transform the world of space, time, matter, and plurality (as ordinarily understood) into an epiphenomenon or illusion. The metaphysical, or, I should say, psychological results are impressive, for when everything has been either singularized, dissociated, relativized, or referred for its existence to a monad, past and future are abolished, and, with them, past and anticipated evil. Furthermore, because selfhood has either been abolished or made absolute, the difficulties in associating with something or someone else must vanish.

Now let me turn to the comparison of the thought mechanisms<sup>a</sup> of the philosophical mystics with those of the physicists, by whom I mean the great theoretical physicists of the twentieth century. Singularizing seems to me quite characteristic of these physicists. Certainly Einstein wanted to penetrate to a deeper constancy and simplicity, a universe without either quanta or accidents, a universe as geometrical, symmetrical, invariant, unified, and fieldlike as possible, in consonance with what he himself called his "cosmic religion" and "mystical emotion." Pauli, generalizing, claimed that the desire for a greater unification of the world was universal among scientists. He explained the happiness men feel in understanding nature as the discovery that inner images correspond with outer reality, the difference between inner and outer therefore being revealed as superficial.<sup>11</sup>

The dissociating, like the singularizing mechanism is a legacy to Western thought from Greece, where it was most radically developed by the skeptics, who used it to deprive substances of their substantiality and causes of their causal force. No doubt as a result of its own internal development, but also, perhaps, as the result of the philosophical arguments of Hume, Mach, Russell, and the Positivists, this dissociative emphasis on correlations rather than causes became usual in modern physics. It may be speculated that the breaking of causal continuity into separate occurrences made it easier to arrive at the idea of the quantum. Interestingly, the modern union of the idea of quanta with that of causal uncertainty recalls the dissociative tactics of the Moslem theologians I have mentioned. Buddhist philosophers, though no less dissociative, usually retained their belief in uniform laws of causality.

Philosophical relativizing certainly has some parallel with the theory of relativity, which not only translated matter and energy into one another, but which tended to attenuate matter into geometry. Relativity even inspired such a thinker as Hermann Weyl to claim that we are now aware that becoming is no more than a subjective, psychological phenomenon, for the presentness of time has lost its objectivity. But the parallel is not only with the theory of relativity. The antinomical relativizing of Nagarjuna, like Chuang Tzu's, and like Nicholas of Cusa's, recalls the complementarity principle of modern physics. Reasoning in the vein of these philosophers, and, in fact, influenced by their likes, Bohr maintained that language was inherently ambiguous and dialectical, as was, from the human standpoint, reality itself.<sup>12</sup> I am sure that Nagarjuna, Chuang Tzu, and Nicholas would all have been gratified by the demonstration of the complementarity of waves and particles and would have found it to confirm the paradoxical philosophy they shared with Bohr.

The ranking mechanism, too, has its analogies in physics. It is involved, of course, in the idea that the universe is constituted of minimal unities

arranged in an order of increasing complexity and held together by a network of reciprocal tensions. Just as the Neo-Platonists assumed that the minimum in rank resembled the maximum, or, in other words, that the microcosm resembled the macrocosm, so modern physicists have attempted to understand the universe by analogy with the atom. In saying this, I am referring to the attempts of Jordan, Eddington, and Dirac to discover universal dimensionless constants. There is something, too, in the exclusion principle that reminds me of the Neo-Platonic hierarchy. In both, that is, there is a principle of levels that allows differentiation and energy transfer without collapse. I find it therefore interesting that Pauli, the formulator of the exclusion principle, was philosophically, at least in later life, an adherent of a kind of Neo-Platonism, who found that the archetypical images in our psyche were essential to relate sense perceptions with ideas, that is to say, outer with inner reality.<sup>13</sup>

I am not sure how far the analogies I have been suggesting can be reasonably pursued. Of all the analogous mechanisms, the most fundamental, to my mind, is that which depends on the desire to penetrate, simplify, and singularize the world. But however far the analogies can be pursued, I am convinced that they are not superficial, for they rest, as I have said, on analogous needs, fantasies, and creative impulses. No doubt faulty but suggestive empirical studies have convinced me that the creative impulses of scientists have been stimulated by the attempt to transcend the sense of isolation. Isolated, that is, by anything from heart trouble, difficulties in seeing and hearing, physical clumsiness, or neurotic disturbances, they withdraw into a world of investigation and speculation, which creates a compensatory intimacy with themselves, the world, and, in time, others like themselves, and which endows them with a sense of creative power.<sup>14</sup> The theoretical physicist, Yukawa, for example, may have become one in part because so physically clumsy and so poor at dealing with other

people.<sup>15</sup> The child who is to become a physicist is likely to find unusual satisfaction in reacting to objects as such, spaces as such, and motions as such.<sup>16</sup> The deprivations of the size he happens to be are perhaps relieved by his excursions into atomic and galactic sizes; and he may escape his painful closeness to or distance from other persons by withdrawing into atomic and galactic spaces.<sup>17</sup> In paying tribute to Max Planck, Einstein said that he himself had been led to art and science largely in order to escape the painful crudity, hopeless dreariness, and shifting desires of life. In compensation, he said, "man tries to make for himself in the fashion that suits him best a simplified and intelligible picture of the world; he then tries to some extent to substitute this cosmos of his for the world of experience, and thus to overcome it... The state of mind which enables a man to do work of this kind is akin to that of the religious worshipper or the lover."<sup>18</sup> Yukawa, with a different emphasis, confessed that he had searched in science for a ray of light in order to dispel the darkness within himself.<sup>19</sup>

I do not contend that great physicists must be philosophical or other mystics. On the other hand, it should not be surprising to find mystics or quasi-mystics among them. Some of them, Einstein, Pauli, and Weyl, for example, passed through a Positivistic stage. Others no doubt remained Positivists, though I do not think Positivism as distant from mysticism as may first appear. At any rate, Einstein and Pauli can be situated on the border of mysticism, Pauli in the end supposing that human beings must remain in tension between the Positivistic and mystical poles.<sup>20</sup> Schrödinger, at the very time he made his greatest contributions as a physicist, was an avowed Vedantist, that is, a follower of Shankara; and it is fitting that, as a Vedantist, he disliked the idea of quanta and hypothesized a kind of continuous vibrating "cloud" not quite unlike Shankara's reality.<sup>21</sup> Weyl was at times an explicit mystic.<sup>22</sup>

Weizsäcker went so far as to say, "Physics is possible only on the background of negative theology."<sup>23</sup>

I have been emphasizing scientists because, on a first view, their lives might be supposed to have been, so to speak, direct and positive, not compensatory and isolated. Religious thinkers are too many in type to be characterized briefly, but if I confine them, as I have in fact done, to those with philosophical and mystical tendencies, I find that I cannot understand their development in the absence of a crucially difficult personal isolation.<sup>24</sup> As for philosophers, my own relatively intensive examination of the lives of some twenty of the greatest has convinced me that their need to create philosophy has been a response to anxiety and isolation, perhaps the result of the early death of a parent.<sup>25</sup>

I have been able to say only part of what I wanted. I have certainly not wanted to conceal the often fundamental differences between religious, philosophical, and scientific thought; but I have been trying to point out some deep, perhaps unobvious similarities. Religious, philosophical, and scientific thinkers have often had similar implicit aims, or, as I should like to call them, psychic rules. Although I cannot now elaborate on the theme, I feel I will be understood when I say that the psychic rules of fundamental, that is, deeply theoretical science, are roughly these: Things cannot be just as they appear. As they appear, they are not sufficiently intelligible. In the end, they must be intelligible. In the end, they will be grasped in somehow simple, intelligible formulas.

Like philosophy, science is meant to be a process of both simplification and penetration, which are meant, as in most classical philosophy, to be or to give access to the truth and the healing, stabilizing pleasure with which it is experienced. Of course, the philosophical mystics I have mentioned would not agree (any more than Plato) that the healing truth can be reached by sheerly,

that is, narrowly intellectual means; and some of them would deny that the intellect can reach truth in their sense at all; but they, like the scientists and philosophers agree that things cannot be just as they appear, and that one must penetrate beneath or beyond them.

If the psychic rules I have stated are approximately right, and if my remarks on the effect of personal isolation have been well taken, then the religious thinker, the philosopher, and the scientist have been impelled to follow the rules by their struggle against clumsiness and for precision and power; against depression and for stimulation; against ambivalence and for a whole self; against loneliness and for closeness at least to oneself; and against death and for permanence. Their struggle takes what is, for the usual adult, the unusual form of serious, even obsessive play with ideas and things, in order to bridge the distance between personal and impersonal reality. If, as I assume, they are genuinely creative, they invest their ideas with narcissistic intensity, because their love and hope for them are their love and hope for themselves, and they dream of the discovery or experience that will grant them rebirth and reunion. The very intensity of their creative effort is a form of isolation, which may both exhilarate and frighten them because it may reawaken early experiences of loneliness, abandonment, and weakness.

In all seriousness, I suggest that it is such a desire to invent by and for oneself, but within and for the sake of a deep human mutuality, that underlies the creation of religion, philosophy, and science, not to speak of art in all its forms. It underlies the professional activities of thinkers of all kinds, the papers and books they write and the reactions and counter-reactions these solicit, the lectures, seminars, and congresses they hold, and the pleasure that many of them take in teaching and in preaching. We invent in solitude in order to people and escape it, in order to renew ourselves, in order--of course--

to understand better, but also--of course--to feel better.

I find it interesting to make out to what a degree our needy, primitive, fundamental selves are inextricably bound up in our complex, sophisticated, professional selves, and to see how professional differences that have evolved by what appears to be an irreversible process leave such different professions and structures of ideas, not merely different, but, as Hindu philosophers say, identical in their difference, which is to say, different in their identity.

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1. D.E. Berlyne, "Laughter, Humor, and Play," in G. Lindzey & E. Aronson, eds., The Handbook of Social Psychology, 2nd. ed., vol. 3 (Reading, Mass.: Addison-Wesley, 1969). J.S. Bruner, A. Jolly & K. Sylva, eds., Play (Harmondsworth: Penguin Books, 1976).
2. W.M. McGovern, A Manual of Buddhist Philosophy, vol. 1, Cosmology (London: Kegan Taul Trench & Trubner, 1923, pp. 4iff. R.F. Gombrich, "Ancient Indian Cosmology," in C. Blacker & M. Loewe, eds., Ancient Cosmologies (London: Allen & Unwin, 1975).
3. "The Identification of Ex Nihilo with Emanation in Gregory of Nyassa," and "The Meaning of Ex Nihilo in the Church Fathers, Arabid and Hebrew Philosophy and St. Thomas," In H.A. Wolfson, Studies in the History of Philosophy and Religion, vol. 1 (Cambridge, Mass.: Harvard University Press, 1973).
4. Nicholas Cusanus, Of Learned Ignorance, trans. G. Heron (New Haven: Yale University Press, 1954), chap. 4, pp. 12. 13.
5. Proclus, The Elements of Theology, trans. E.R. Dodds, 2nd ed. (London: Oxford University Press, 1963).
6. The Vedanta Sutras of Badarayana, with the Commentary by Sankara, trans. G. Thibault, 2 vols. (reprint New York: Dover, 1962). E. Deutsch, Advaita Vedanta: A Philosophical Reconstruction (Honolulu, University of Hawaii Press, 1969).
7. H.A. Wolfson, The Philosophy of the Kalam (Cambridge, Mass.: Harvard University Press, 1976).
8. Th. Stcherbatsky, Buddhist Logic, vol. 1 (reprint The Hague: Mouton, 1958), pp. 79-118.
9. F.J. Streng, Emptiness (Nashville: Abingdon Press, 1967).
10. Proclus, *ibid.*
11. W. Pauli, "The Influence of Archetypal Ideas on the Scientific Theories of Kepler," in C.G. Jung & W. Pauli, The Interpretation of Nature and the Psyche (New York: Pantheon, 1955), p. 152.

12. L. Rosenfeld, "Niels Bohr in the Thirties," in S. Rozental, ed., Niels Bohr (Amsterdam, 1967), p. 121.
13. Pauli, op. cit. "Wolfgang Pauli's philosophische Auffassungen," in W. Heisenberg, Schritte über Grenzen (Munich: Piper, 1971), pp. 48-51.
14. A. Roe, The Making of a Scientist (New York: Dodd, Mead & Co., 1953), summarizing earlier, more technical studies. B.T. Eiduson, Scientists: Their Psychological World (New York: Basic Books, 1953). F. Bello & A. Roe, in P.C. Obler & H.A. Estrin, ed., The New Scientist (New York: Anchor Books, 1962). L.S. Kubie, "Some Unsolved Problems of the Scientific Career," in M.R. Stein, A.J. Vidich & D.M. White, eds., Identity and Anxiety (Glencoe, Ill.: Free Press, 1960). P. Greenacre, Emotional Growth, vol. 2 (New York: International Universities Press, 1971).
15. H. Yukawa, Creativity and Intuition (Tokyo: Kodansha, 1973), pp. 24, 26.
16. A.E. Michotte, "The Emotional Significance of Movement," in M.B. Arnold, ed., The Nature of Emotion (Harmondsworth: Penguin Books, 1968), pp. 263-68.
17. A. Roe, The Making of a Scientist, p. 88. R. Eckstein, Children of Time and Space (New York: Appleton-Century-Crofts, 1966), p. 340.
18. A. Einstein, Ideas and Opinions (New York: Crown Publishers, 1954), p. 225.
19. Yukawa, op. cit., pp. 131-32.
20. W. Heisenberg, op. cit., p. 48.
21. E. Schrödinger, What Is Life? and Other Scientific Essays (New York: Anchor Books, 1956); My View of the World (Cambridge: Cambridge University Press, 1964).
22. H. Weyl, "Insight and Reflection," in T.L. Saaty & F.J. Weyl, ed., The Spirit and Use of the Mathematical Sciences (New York: McGraw-Hill, 1969).
23. C.F. von Weizsäcker, Die Einheit der Natur (Munich: Hanser, 1971), pp. 319-19.
24. B.-A. Scharfstein, Mystical Experience (Baltimore: Penguin Books, 1974).
25. This examination is contained in a book, Philosophers as Humans, that I am now completing.