COMPLEMENTARITY AND THEOLOGICAL PARADOX

by William H. Austin

"The dogmas of religion are the attempts to formulate in precise terms the truths disclosed in the religious experience of mankind. In exactly the same way the dogmas of physical science are the attempts to formulate in precise terms the truths disclosed in the sense-perception of mankind."[1]

This dictum of Whitehead's suggests that theology, like physics, should be regarded as a sort of theoretical interpretation of experience and thus as a sort of science, albeit an odd one. Such a suggestion will at once call forth several objections, of which two of the more immediate are that theological statements are not falsifiable and that "religious experience" is an obscure and dubious concept. The present essay, however, is concerned with a third objection, and touches hardly at all on these two. Religious discourse, it is often remarked, abounds in paradoxes; if we are to grant it any sort of significance at all, therefore, we should regard theology as akin to poetry, rather than to science. Philip Wheelwright, for instance, sees paradox as one of the common characteristics of religious, mythic, and poetic discourse, which he groups together under the heading of "depth language" as opposed to the "steno language" of science and everyday practical literality.[2] Where Wheelwright says "depth language," of course, some will say "nonsense" or "emotive language," etc.

But is science free from paradoxes? We are often told that physicists, in order to give a full account of the experimental evidence pertaining to light and matter at the atomic order of magnitude, are constrained to use apparently incompatible concepts and pictures or models. Of the great historically rival accounts of the nature of light, the wave theory and the particle theory, *both* must be pressed into service to account for the phenomena. If we allow ourselves to be pressured into answering the question "Which is it?" we shall have to say "Both"—even though it

William H. Austin is assistant professor of philosophy at Rice University.

evidently cannot be both. If such is the case in physics, why should it be surprising that theologians sometimes speak in paradoxical ways? Reality is too rich for our concepts. So runs a familiar line of argument.

In this paper, then, I attempt to investigate the validity of the proposed analogy between the wave-particle duality and the paradoxes of religious discourse. The program of the investigation has four stages. First, I will try to clarify the notion of "paradox" by means of a definition and some examples. In the second section, I give a brief indication of the grounds for speaking of a "wave-particle duality" in microphysics and propose an interpretation of the "principle of complementarity," which Niels Bohr developed to account for the necessity of the duality. The heart of the proposal is a suggestion that complementarity be regarded as a particular relation between two *models* used in microphysical inquiry. But most theological traditions hold that the religious ultimate (God or Nirvana or Brahman-Atman) is a mystery beyond the reach of our inquiry, and indeed that it is because the theologian tries to talk about a mystery that he must stammer in paradoxes. If theology is paradoxical because it attempts to deal with *mystery*, then (one is tempted to argue) its paradoxes must not be amenable to a complementarist interpretation. In the third section of the essay, I develop this argument a bit and suggest reasons for regarding it as inconclusive. We are then left with the task of judging whether a complementary use of models lies behind at least some theological paradoxes; the essay concludes with some suggestions as to how that task might be tackled.

Definition of Paradox

Discussions of "paradox" tend to suffer from the fact that the meaning of the term has undergone a major shift in the course of its development. We ordinarily think now of a paradox as a statement which, on the face of it, seems self-contradictory. But there is an older sense, corresponding to the Greek *paradoxos,* in which a "paradox" is a statement which is surprising, contrary to general expectation or belief, but not necessarily having even the appearance of self-contradiction. (Thus Henry More could speak, in his *Antidote to Atheism,* of "that pleasant and true Paradox of the Annual Motion of the Earth.") And not only *statements,* but also events, situations, even people, were characterized as "paradoxes" or "paradoxical" in the older sense. (Liddell and Scott inform us that among the Greeks extraordinary athletes, musicians, etc., were sometimes styled "paradoxes.") To some extent, the older sense survives in our usage. In theological discussions of paradox it is often unclear which sense is meant or whether the same sense is meant throughout. Also, the distinction and relation between paradoxical *statements* and paradoxical *events* or *realities* are often left unclear.

For my purposes, I will confine the term to *statements* and define a paradox as a statement which appears to be *either* self-contradictory *or* incompatible with other statements taken to be true. In part, this definition straddles the two senses just mentioned, but it excludes statements which are merely *surprising*. It seems reasonable to bridge the senses in this way, since if *S* is a statement which is paradoxical in the sense of contradicting some apparently true statement *T*, then the conjunction *S & T* will be paradoxical in the sense of being apparently self-contradictory.

Some examples, chosen with a view to later exposition, follow. The first three are from the Upanishads, the rest from the Christian tradition. The first and last are chosen as examples of statements, not prima facie self-contradictory, which fall under our definition by virtue of their apparent incompatibility with other statements which we have good grounds for considering to be true.

1. "That [Brahman] art thou" (Chandogya, VI.8.7).
2. "That One, the Self, though never stirring, is swifter than Thought . . . though standing still, it overtakes those who are running. . . . It stirs and it stirs not" (Isa 4–5).
3. "[Brahman] is both far and near; It is within all this and It is outside all this" (Isa 5).
4. "Whoever would save his life will lose it; and whoever loses his life for my sake and the gospel's will save it" (Mark 8:35).
5. Jesus Christ is Very God and Very Man.
6. God is a merciful Father and a severe Judge.
7. God sends the rain.

Complementarity in Microphysics

In the 1920's, Niels Bohr, reflecting on the paradoxes (his word) which had arisen in investigations of atomic spectra, X-rays, and the like, developed a "principle of complementarity" as the guiding principle of a "new mode of description" physicists had been forced to adopt. Its sense, according to one of the most characteristic of Bohr's formulations, was "that any given application of classical concepts precludes the simultaneous use of other classical concepts which in a different connection are equally necessary for the elucidation of the phenomena."[3] Two "classical concepts" which exclude each other in this way are said to be complementary. By "classical concepts" Bohr means the concepts employed in classical physics. What "classical physics" comprises is neatly summed up by von Weizsäcker,[4] whose viewpoint is not far from Bohr's:

> Newtonian mechanics, Maxwell's electrodynamics, and all the disciplines which by any interpretation of their basic phenomena through the use of models can be reduced to mechanics and electrodynamics: such as acoustics (on the basis of the interpretation of sound as wave motion), the theory of heat (on the basis of the kinetic theory of heat), optics (on the basis of the electromagnetic theory of light).

Classical physics thus rested on two bases, Newtonian mechanics and Maxwellian electrodynamics; each of these had its own range of application, the ranges did not overlap, and within each there was one characteristic dominant model. Every physical phenomenon was interpreted with the aid either of the model of particles moving and colliding in space, or else with the aid of the model of wave motion through a medium. I do not mean to suggest that no more specialized models were ever used, nor that there was extensive explicit reference to these basic models in every investigation. But the great mathematical tools of classical physics were developed in attempts to represent the behavior of these models, and it was to them that one turned when he wanted a "physical interpretation" of a new-formed mathematical artifact.

Whatever dissatisfaction one might have felt about the lack of a *single* fundamental model was mitigated by the great simplicity and power of each of the two basic models and by the comforting fact that one always knew when to think of particles and in what sorts of investigation to think of waves. It was in large part the breakdown of this situation which led Bohr to speak of paradoxes. Electromagnetic radiation phenomena began to appear which could be explained only with the help of particle models, and wave models came to be needed in areas where particle models had always sufficed before. Or, as it was often put, things we had always thought were particles turned out to have wavelike properties, and vice versa.

Well-known instances of the puzzling new situation are the photoelectric effect, the Compton effect, and the discovery of "wave properties" for electrons. Let us consider them briefly, in turn.

When light falls on a metal surface, electrons are given off by the metal: energy is transferred from the absorbed light to the electrons, and they "tear themselves loose from their metallic confinement."[5] Now according to the wave theory, the energy of the emitted electrons should depend on the *intensity* of the incoming light. And since the electrons could be expected to build up energy gradually and continuously until the escape threshold is reached,[6] we should expect to be able to calculate a time (a fairly considerable time, in fact) that should elapse before the first electron is emitted, and swarms should follow quickly after that. But in fact the electrons start to come out almost immediately and in an irregular pattern which cannot be reconciled with the wave picture: and their energy depends not on the intensity of the light but on its frequency, in accordance with the relation $E=h\nu$, where h is Planck's constant. These puzzling phenomena can be explained quite well—almost—if we regard light as a shower of corpuscles ("photons"), each carrying a quantum of energy. The explanation is that an electron gets the energy to break loose by *absorbing* an individual photon. Since the electron gets its escape energy all at once instead of building it up gradually, there is no reason why electrons should not begin to emerge as soon as the light strikes the surface. But photons are strange particles: they have no mass, they must travel at the speed of light, and they have a *frequency*—but only waves have frequency.

Still more perplexing is the Compton effect, which has to do with the scattering of X-rays. Early investigations after their discovery in 1895 seemed definitely to indicate that X-rays are electromagnetic waves, like light waves but with shorter wavelength. The full panoply of properties—interference, refraction, polarization, diffraction (by means of which wavelengths can be calculated)—which had required adoption of a wave theory of light, were found to hold for X-rays too.

Scattering is the phenomenon that enables us to see light beams when dust particles are suspended in the air—the particles reflect the light in all directions and make it visible. Something similar happens when X-rays pass through substances, but with a puzzling difference. The scattered X-rays are of two frequencies—some of the original frequency, but some of a different frequency which depends on the angle at which the odd wave is deflected, but not on the scattering substance. This was unheard-of behavior for waves; their frequencies had never been known to change in any process. But the observed results could be derived quite accurately if the X-rays were regarded as photons, colliding with electrons and bounding off in good billiard-ball fashion, in accordance with the classical conservation laws for collisions.

But again these X-ray photons are odd particles, in that their energy and momentum (which figure prominently in the above-mentioned calculations) are functions of their *frequency*, a variable which has its natural habitat in wave theories and has no place in classical particle theories. Thus if we set out to explain what we know about X-rays, we find ourselves both mixing and juggling wave and particle models. We juggle them in that we use now one, now the other, as it suits our purpose. A wave model (perhaps not then thought of explicitly as a model) was employed to set up experimental procedures to look for reflection, interference, etc.; and they were found. A particle model was used to explain X-rays scattering. But in the latter case we mix features of the models as well as juggling them. Thus it is misleading to say simply that some phenomena are accounted for by means of a wave model, and some by means of a particle model.

The photoelectric and Compton effects required employment of particle models where only wave models had been in place before. From the relation $E=h\nu$, de Broglie was able to derive the surprising conclusion that an electron (or any mass particle, for that matter) has a wavelength $\lambda=h/mv$, where h is Planck's constant, and m and v are the electron's mass and velocity, respectively. De Broglie had no physical interpretation to offer for the "wavelength of an electron," and it was largely ignored as a sort of mathematical curiosity until Davisson and Germer discovered that an electron beam reflected from a nickel crystal showed a diffraction pattern. From diffraction patterns wavelengths can be calculated, and the wavelengths turn out to agree with de Broglie's formula.

So the segregation of wave phenomena from particle phenomena seems to have broken down. Wherever we turn, we must use both models, in strange and perplexing combinations. Now it is possible to derive Heisenberg's notorious "uncertainty relation" $(\Delta x) \cdot \Delta p \geq h$, where Δx is the range within which the position of an elementary particle is known, and Δp the range within which its momentum is known) from the necessity to combine wave and particle models. (The *propriety* of the derivation would not be universally granted; see below, p. 373.)

The derivation is as follows: if we are going to mix the two models, we need some entity which will function as a sort of compromise, combining approximations to the features of both. Such entities exist; they are called "wave packets." Two wave motions, added together, can reinforce each other or cancel each other out, according to the way the peaks of one coincide with the peaks or the troughs of the other. Now it is always possible, by adding together waves of a suitable combination of frequencies, to obtain a resultant wave in which reinforcement (or "constructive interference") is confined to a small interval, outside which destructive interference prevails. This resultant wave will have a projecting peak which is our wave packet. The packet can move along for some period of time without dissipating itself and in many ways behaves like a reasonable facsimile of a particle. But wave packets have an important mathematical property; the narrower the packet, the greater the range of the frequencies of the waves which make it up. In mathematical language, $\Delta x \cdot \Delta \nu \geq 1$, where Δx is the width of the packet, and $\Delta \nu$ is the range of the frequencies that make it up. Here we have the mathematical *form* of Heisenberg's relation; we get the relation itself when we recall that the momentum of the packet-particle is a function of the frequency.[7]

In a way, then, the uncertainty relations can be regarded as a sort of quantitative measure of the vagueness with which the wave and the particle models must be taken if they are to be mixed and juggled successfully, and of the restrictions which are imposed on each in the process.

On the basis of these considerations, I suggest that "complementarity" be defined as a relation between two models used in the investigation of a given domain—a relation in which the need to alternate, and combine features of, two models imposes restrictions on the freedom and precision with which we can deploy each. An example of such a restriction is that the need to allow for the application of the one model prevents us from drawing otherwise natural inferences from the other.

For the purpose of investigating whether the idea of complementarity is applicable in the interpretation of theological paradoxes, this definition seems the most promising I have been able to formulate. But its appropriateness to the situation in microphysics may be challenged on two counts: (1) that Bohr means something different by "complementarity"; and (2) that, in any case, a non-complementarist quantum theory can be developed.

There is justice in the first challenge. Bohr says nothing of models. He does include the wave and particle "pictures" or "theories" among his examples of "classical concepts" which stand in a complementary relation as defined in the quotation given above (p. 367). But the complementary relations he treats most extensively are the relation between the concepts of position and momentum and that between causal and kinematic accounts of the same atomic process.[8] Moreover, his statement that two concepts are complementary if, while both are necessary in their separate connections, the employment of one *precludes* the simultaneous employment of the other, sounds quite different from our talk about "mixing and juggling" models. The discrepancy seems to become still greater when we observe that Bohr often says that the use of one concept of a complementary pair precludes use of the other because they depend respectively on *mutually exclusive experimental conditions.* However, a good many mistaken interpretations of Bohr have resulted from the interpreters' failure to take "mutually exclusive" and "experimental conditions" with enough grains of salt. Where examples of the "experimental conditions" are given, they turn out to be *Gedanken-experimenten* of the sort that are set up to test out the conceptual consequences of different models. And Bohr's statements about the mutual exclusiveness of applications of complementarity need to be taken in connection with the following important qualifying statement:

> Of course, there can be no question of a quite independent application of the ideas of space and time and of causality. The two views of the nature of light are rather to be considered as different attempts at an interpretation of experimental evidence in which the limitation of the classical concepts is expressed in complementary ways.[9]

That is, both concepts are used, but the Heisenberg piper must be paid: we can choose how much accuracy in the one we will sacrifice to obtain accuracy in the other, but sacrifice we must, somewhere.

The above quotation may perhaps also serve as an illustration of the rather obscure and oracular character of Bohr's writing. The obscurity results in part from Bohr's attempts to show how complementarity is a quite general epistemological principle which is not confined to, but merely illustrated by, atomic physics. Moreover, the principle is one which he had conceived long before the quantum-physical crises arose and had attempted to illustrate by means of some rather abstruse mathematical examples before the more satisfactory physical examples came along. The gist of it is that in describing any situation of knowing we must distinguish between subject and object, but where we draw the line is arbitrary.[10] In particular, in considering the relation of subject, object, and experimental apparatus, we are free to divide the last between the "subject" and "object" sides of the line in various ways; we thereby get correspondingly various accounts of the object, accounts which stand in a complementary relation of mutual limitation.

All of this suggests a line of approach to our fundamental problem different from the one I am taking. If there is a general epistemological principle of complementarity, one might be able to apply it in theology without having to hunt for theological models. Moreover, there is an immense theological literature on the connection between the problem of religious knowledge and the subject-object relation. But a perusal of this literature leads to the suspicion that to approach the interpretation of religious paradoxes via analyses of the subject-object relation is to take the beaten path to a swamp. I prefer to take the chance of finding new swamps, rather than wallowing in the old familiar ones.

I have reinterpreted Bohr's principle of complementarity, assigning a more central place to *models* than he does, and I think the reinterpretation can be defended. But there remains to be considered the objection that both the wave-particle duality and the principle of complementarity (in any recognizable form) are simply out of date: progress in the understanding of atomic physics has left them behind, or soon will. This objection is presented from several standpoints. Schrödinger never relinquished his view that a unified wave theory could be achieved; others espouse a unified particle theory. David Bohm and others are working toward a theory in which different, non-complementary models will be used. Margenau and others maintain that the lesson to be drawn from quantum physics is that we can and should get along without visualizable models altogether: we have a clear mathematical formalism and correspondence rules for linking it to observations, and that is all we need. Plausible arguments can be advanced against the last doctrine,[11] but I am not rash enough to try to predict the future role of waves and particles in physics. Bohr may be wrong in thinking that complementarity is here to stay. But, in any case, a "wave-particle duality" exists in the sense that wave and particle models, peculiarly related, have guided the thought of physicists in a crucial stage in the development of their craft. Whether that stage is merely transitional does not materially affect the possibility that analysis of it will prove helpful in the understanding of theological paradoxes, and thereby of the general logic of theological discourse.

The Paradox of the Religious Ultimate

We are asking, then, whether a complementarist interpretation of theological paradoxes is possible, that is, whether we can trace them to the complementary use of distinct models which cannot be interpreted as partial manifestations of a single self-consistent model (by which they could then, in principle at least, be replaced). To my knowledge, no such interpretation of any theological paradox has ever been carried out, though the possibility of such an interpretation has been suggested in at least two particular cases, the fifth and sixth in our list (see above). Bohr himself, at the conclusion of his Gifford lectures, admonished the theologians present that they ought to make more use of the principle of complementarity and, in various writings, has raised (but not elaborated) the suggestion that the love and justice of God be regarded as complementary attributes.[12] We shall return to this suggestion below.

But there is one important theological paradox for which a complementarist interpretation seems impossible. It can be illustrated from the following two quotations from a fifth-century neo-Platonist Christian *writer whose ideas greatly influenced the classical theological tradition:*[13]

1. Surely it is truer to affirm that God is life and goodness than that he is air or stone.
2. The Universal Cause transcending all things is neither impersonal nor lifeless nor without understanding . . . nor is it darkness, nor is it light, or error or truth; nor can any affirmation or negation apply to it.

We can formulate the paradox more generally thus:

1. On the one hand, some properties can be attributed to the religious ultimate (while others cannot) ; yet,
2. On the other hand, no properties can be attributed to the religious ultimate: it (or he) is beyond them all.

This paradox seems to be characteristic wherever a religious ultimate is recognized, whether it is Nirvana or Brahman-Atman or the God of Christian belief. Let us call it the "paradox of the religious ultimate," or (for short) the PRU, or (for variety) the "affirmation-negation paradox."

Thus in classical Christian theology it is true, and yet again it is not true, to say that God is good. Here is an important type of paradox which does not seem to be susceptible of a complementarist interpretation.

"Quite the contrary," runs an obvious reply. "This paradox is no contradiction, and in fact there is a remarkable parallel with the way concepts are used in contemporary physics. Rather than indulge in riddling talk about its being true, and yet not true, to say that God is good, we must recognize that when we make any statements about God we are talking *analogically*. When Bohr says that in talking about electrons we must use classical models and concepts but must use them in restricted and symbolic senses, he is saying that physicists must talk analogically too."

These last words which I have put into the mouth of my hypothetical objector may seem a bit bold, but otherwise his little speech sounds not unreasonable. But it could be misleading. The ideas of analogical and symbolic propositions present us with thickets which we shall have to bypass here. But it seems fair to say that the paradox of the simultaneous applicability and non-applicability of predicates, mitigated as it may be by a doctrine of analogy, is more *important* in theology than in physics.

To say that God is beyond all our concepts is to make an important point about God, a point which should qualify in an intimate (and unspecifiable)[14] manner all the assertions which theologians do nevertheless undertake to make about him. The theological point being made in that statement is that God is marked off from all other things as quite transcending them in value, importance, and ontological status. It is for this reason that he is a mystery beyond the reach of human concepts, which are after all fashioned to deal with things on our side of the great ontological divide. Theologians often say that we cannot say of God what he is, but can say what he is not. They claim also that this ability constitutes a real sort of knowledge of God on our part. For saying of God what he is not does not mean listing all known predicates $P_1, P_2, \ldots$ and systematically denying that God is P_1, that he is P_2, etc. It is significant to say "God is not just," and our ability to do so constitutes a sort of knowledge; there is no such significance in the statement "God is not red." The predicates which it is significant to deny of God are just those which we can, in an unspecifiable analogical sense, affirm of him. God is really just, according to classical Christian theology; the significance of the denial that he is just is that the sense in which he is just cannot be obtained by the finite modification of any sense of the term "just" which we can formulate.

It sems odd to say that the electron is "beyond our [classical] concepts" or that "we can say of it only what it is not" because these statements make no point about electrons that cannot be made in other, less mystifying, ways. When physicists acknowledge that an electron is not a wave or particle or "wavicle," and does not have a position or momentum in the classical manner, they acknowledge it and carry on—wary of the pitfalls of an unduly literal use of their models and, at the same time, free to handle them in a more uninhibited and adventurous way. ("Since the particles aren't 'really' particles anyway, we can endow them with all sorts of remarkable properties that the paradigm cases of 'particles' do not possess.") There is no reason to say that an electron is "really" (in some analogical sense) a particle; rather, particles provide models which can, subject to specifiable restrictions, profitably be used to talk about electrons. On the other hand, between the subatomic realm and the realm of objects dealt with by classical physics, there is no such infinite ontological gulf as there is between God and creatures. As we have seen, one of the functions of the denial of all attributes to God is to indicate this gulf, and, since there is no such gulf in physics, the denial that electrons are particles cannot have a like function.

At this point there is, of course, a significant difference between Bohr's account of the microphysical situation and the accounts of his critics. Some of his critics say that we *have* perfectly good (mathematical) concepts to apply to electrons and thus have no need of analogies. Others say that we need models, but these models are unlike theological analogies in that any model might conceivably serve, and we are free to use any that prove helpful. According to Bohr, the quantum of action does impose a gap between the realms of classical and atomic physics, and we are restricted to those models which occur in classical physics. But the gap is not infinite, we need no *via negativa* to indicate it, and the qualifications which it imposes on our use of classical concepts can be specified in the Heisenberg indeterminacy relations. Thus, even in Bohr's version of quantum physics, the affirmation-negation paradox is weaker than in theology, and "analogy" is used in a more general, non-technical sense.

I have suggested that the affirmation-negation paradox in theology is more drastic and more important than its counterpart in Bohr's quantum physics and has different functions. The suggestion can be extended in a way which seems plausible but is not (I shall try to show) sound. The extension consists in the second and third steps of the following progression: (1) The affirmation-negation paradox is of fundamental importance in theology, giving expression to the principle that the religious ultimate is beyond all human concepts, so that what is affirmed of it must also be denied. (2) It is because the religious ultimate is beyond our concepts that theology has its familiar paradoxes (besides the PRU itself); otherwise, it might well be free of them. (3) Each of the paradoxes of theology is a consequence, a special case, or a particular spelling out of the affirmation-negation paradox. That is, the PRU provides a ground pattern to which each of the particular paradoxes of theology can be "reduced."

One can accept the first step without being thereby committed to accept the second, and can accept the second without commitment to the third. There is no evident inconsistency in accepting the PRU while maintaining that the whole system of theological *affirmations* is (or could in principle be brought to be) internally consistent. Similarly, there is no evident inconsistency in holding that the PRU requires that there *be* other paradoxes within the system of theological affirmations, while denying that these other paradoxes are individually deducible from, or in some other fashion "reducible to," the PRU. There may be a certain intuitive plausibility in the moves from (1) to (2) and from (2) to (3), but they are not necessary. It is step (3) that I shall attack here.

The argument against (3) can be conveniently presented with the aid of a simple schematism. A paradox might be of any of the forms

$$(M \text{ is } A) \& \sim (M \text{ is } A) \tag{i}$$

$$(M \text{ is } A) \& (M \text{ is} \sim A) \tag{ii}$$

$$(M \text{ is } A) \& (M \text{ is } B); \tag{iii}$$

where M is a logical subject, and A and B are two apparently incompatible predicates (e.g., "wave" and "particle" or "just" and "merciful"). To illustrate the schemata and their differences, let us substitute for M "an electron," for A "green," and B "red." Now clearly (M is B) is more informative than (M is $\sim A$); and, if a reasonable convention is adopted, it will be clear that (M is $\sim A$) is more informative than $\sim$(M is A). The proposed convention is that (M is $\sim A$) be restricted to cases where A is a predicate that logically *could* apply to M, but does not, and that $\sim$(M is A) be allowed to cover also the cases where A is inapplicable to M. In our example, $\sim$(M is A) is the correct formula, since electrons have diameters less than the smallest wavelength in the visible spectrum, and thus cannot have color.

We can expect, then, that there will be at least some paradoxes of form (iii) which cannot be reduced to paradoxes of form (ii) without loss of specificity and informativeness, and, similarly, some of form (ii) which cannot be reduced to paradoxes of form (i) without such loss. In particular, there are theological paradoxes of form (iii) which cannot be reduced to form (ii), etc.

Form (i) is clearly the appropriate schema for the affirmation-negation paradox. Form (ii) is exemplified by the last sentence ("It stirs and it stirs not") of the Upanishadic passage quoted as number (2) in our list of paradoxes above. "Brahman is both far and near," the christological paradox, and the paradox of the justice and mercy of God are all of form (iii). Let us look a little more closely at the last of these form (iii) paradoxes.

The paradox of the righteous justice and loving mercy of God is seriously distorted if one tries to interpret it as a special expression or instance of the PRU. A dialectically inclined theologian might attempt to do so in something like the following way. "We affirm God's loving mercy toward men. But because of the infinite qualitative difference between God and the world, every affirmation about God requires its balancing negation. Better expressed (since the initiative is always with God), every divine 'Yes' to men must carry with it a 'No.' His word of mercy must carry with it, since he is God, a word of righteous judgment." Now there may well be good theological reasons for saying that every divine act (or word) of justice is also an act of mercy, and vice versa. But if so, these are two distinct characterizations of the same act, and the relation between them is a substantial and significant problem. The statement that God is just is surely meant to convey more information than merely that there is a sense in which "mercy" (like other human concepts) is inapplicable to God. The latter point is most naturally expressed by a paradox of form (i): "God is merciful, and yet there is a sense in which 'merciful' is inapplicable to him." Even the form (ii) paradox, "God is merciful yet not merciful," if it is an acceptable theological statement at all, is not merely an instance of the affirmation-negation paradox. For it says that in the same sort of sense in which God can be said to be merciful he can be said to be unmerciful, where "unmerciful" could mean "rigorously just," "capricious," "vindictive," etc. The paradox of mercy and justice differs from this at least in being more specific.

The reduction of all paradoxes to form (i) leaves them with but one function: to point to a mystery into which we cannot inquire. An alternative route to the same conclusion is provided by the doctrine that, since the object of theological discourse is mystery, said discourse is a species of that use of language which serves to evoke awareness of realities not accessible to prosaic inquiry, that is, poetry. We cannot here consider all the difficulties in this doctrine. The essential point to be made is this: classical theology has insisted that there is a sense in which *no* human language is appropriate to the religious ultimate. Poetry, being as human a product as prose, is no more appropriate in *that* sense. On the other hand, there is a sense in which human language can nevertheless be used to talk about the mystery, and here it is not self-evident that only poetry qualifies.

Complementary Models in Theology?

Let us suppose, then, for the sake of discussion, that the religious mystery is somehow such that it can be explored and inquired into.

Men have made this supposition whenever they have attempted to order their behavior, or interpret events and aspects of the world, by reference to the mystery. Are models used in a complementary way in the explorations?

I know of no theologian who has explicitly and self-consciously applied a principle of complementarity. Balancing affirmations off against contrasting affirmations is not uncommon, but there has seldom been systematic attention to the question of how the one affirmation limits the sense in which its contrasting partner can be taken (e.g., by precluding certain natural inferences from it). We shall have to look, then, for implicit complementary relations in the de facto use of models by theologians (not only professionals, but also religious men generally, who can be thought of as theologians insofar as they attempt to interpret their experience by means of the models their traditions provide).

Perhaps the most direct and straightforward way to conduct such a search would be to take a paradox like (6) and reflect on it in some such fashion as the following: "Loving father" and "rigorously just judge" are two models which Jewish and Christian theologians have used in thinking about God and about their experience in the world as understood in relation to God. In some situations it seems appropriate to stick fairly close to one model, while the other recedes far into the background (though never out of the picture altogether—that would be unsound theology). Amos understood the woes of Israel by means of the model of God as a just judge; if someone had asked him if God were not also he whose property it is to have mercy, Amos would presumably have had to agree that this was true but that this model seemed hard to apply in the situation at hand. The meaning to be attached to "merciful" in this situation is quite unclear, but that God is being merciful is not to be denied. Consider a case on the other side. A man is saved from a disaster in which many perish. His devout friends, interpreting the event by means of the model of a loving heavenly Father, see it as an instance of divine deliverance. But someone asks, Where is the justice in this? Why was he saved while the others perished? The devout reply that, since we know that God is just, we must suppose that there were good reasons, though we cannot say what they are.

In other situations, the models may be mixed, or an attempt made to merge them. The good parent, religious writers often point out, is generally fair and firm, but still will sometimes be lenient and make special allowances; we will not generally go far wrong if we think of God as being like that. It is not easy to think of a simple particular situation to which this model would be especially likely to be applied, but it may not be too far removed from the general working picture which religious people carry around in their heads and push in one direction or the other as occasions suggest. It is related to the other models, we might say, somewhat as the wave packet is related to waves and particles. As with the wave packet, it tends to break down in extreme situations, in which one or the other of the more strictly plausible models comes to the fore.[15]

This interpretation of the justice-mercy paradox, as just stated, is not very satisfactory. It may suffice to yield a rather weak sense in which the paradox could be said to reflect the use of complementary models, but perhaps not a very interesting sense. What it lacks is any sort of specification of *how* the need to use both models restricts the freedom and precision with which each is employed. We can hardly ask for equations in theology, or even mathematical uncertainty relations. But we want some qualitative indication of how the rigorous judge model restricts application of the merciful father model, and vice versa, beyond the observation that, if one is affirmed strictly, the other will have to be affirmed in a quite vague and uncertain sense. The compromise model of the "generally fair but kindly lenient parent" is too indefinite to help much here.

In both the Jewish and the Christian tradition, however, there is another factor which we have left out of account. In each case there is an interpreted historical event which occupies a central place in the whole theological system and serves as a touchstone for the use of all models—Yahweh's covenant with Israel and the deliverance from Egypt, in the one case; the death and resurrection of Christ, in the other. The requirement that all models be used conformably to these key "events" (e.g., for Christian theology the death and resurrection of Christ must be the definitive manifestation both of the justice and of the mercy of God) means that any adequate general formulation of a complementarity relation between two models would have to take account of the role of the key "event" in limiting the ways that the models can be applied to the interpretation of particular situations. And before we could venture any such general formulation we would need to study a number of specimens of theological argument to determine the relation within them of the models in question and the "event."

Thus the outcome of this essay appears to be a program of research in the history of theological doctrine.[16]

NOTES

1. A. N. Whitehead, *Religion in the Making* (New York: Macmillan Co., 1926), p. 58.

2. Philip Wheelwright, *The Burning Fountain* (Bloomington: Indiana University Press, 1954), *passim*.

3. Niels Bohr, *Atomic Theory and the Description of Nature* (Cambridge: Cambridge University Press, 1961), p. 10.

4. C. F. von Weizsäcker, *The World View of Physics* (Chicago: University of Chicago Press, 1952), p. 93.

5. Henry Margenau, *The Nature of Physical Reality* (New York: McGraw-Hill Book Co., 1950), p. 315.

6. Because in classical electrodynamics the energy of the light waves is considered to be distributed equally over the wave front. Therefore, only a very small proportion of it, and about the same proportion, would be absorbed by each electron.

7. The function is (with the mathematics simplified) $p = h\nu$, so that $\Delta p = h\Delta\nu$. It follows from the above relation that $\Delta x \cdot \Delta p \geq h$.

8. Because of the uncertainty relations, a causal account (one which follows out precisely the energy and momentum transfers from one state of the system to the next) will have to be vague about the spatio-temporal locations involved, and an account which accurately specifies the locations cannot give energy and momentum values accurate enough for the conservation laws to be applied.

9. Bohr, *op. cit.*, p. 56.

10. Aage Petersen, "The Philosophy of Niels Bohr," *Bulletin of the Atomic Scientists,* XIX (September, 1963), 8–14.

11. See, e.g., Mary Hesse, *Models and Analogies in Science* (New York: Sheed & Ward, 1963).

12. See John Baillie, *The Sense of the Presence of God* (New York: Charles Scribner's Sons, 1962), p. 217; and Niels Bohr, *Atomic Physics and Human Knowledge* (New York: Science Editions, 1961), pp. 80 ff.

13. Pseudo-Dionysius, *De mystica theologia,* chaps. iii and v.

14. "Unspecifiable" in the sense that the qualification cannot be "written into" the assertions; we cannot reformulate them so as to take it into account. See the last sentence of this paragraph.

15. The other two models are more strictly plausible in relation to God because they are both capable of being qualified by "infinitely" or "perfectly." A perfectly just judge we can (in a way) imagine and an infinitely forgiving lord and master (cf. Hosea). But an infinite case of a "generally fair but kindly lenient" parent?

16. Some lines along which such research might be conducted are suggested in the last two chapters of my *Waves, Particles, and Paradoxes* (Rice University Studies, Vol. LIII, No. 2). The justice-mercy paradox and the christological paradox are there treated in more detail, along with some more general suggestions based on the work of Ninian Smart.