



## God Does Not Play Dice: Einstein and Religion

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# THE JOURNAL OF BIBLE AND RELIGION

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## God Does Not Play Dice

Einstein and Religion

WALTER E. STUERMANN\*

WRITING about Xenophon's description of Socrates, Bertrand Russell said that "a stupid man's report of what a clever man says is never accurate, because he unconsciously translates what he hears into something that he can understand."<sup>1</sup> There is no occasion for begging excuse from this indictment as we attempt to characterize the Jew of Copernican stature, whose mind was the fulcrum upon which the universe took an unexpected turn and revealed a hidden portion of itself never before seized by the human mind.

In the 1905 *Year Book of Physics*, Albert Einstein, at that time an examiner in the Swiss patent office in Bern, published several articles on different subjects. One had the title, "On the Electrodynamics of Bodies in Movement." It was distinguished by the fact that it quoted no other experts—the writer himself spoke with authority. This was the unpretentious birth of the special theory of relativity. There was no immediate, widespread acclaim, although this small paper spoke of the Archimedean point by which the universe was moved. Later, upon examining the paper, a Polish professor at the University of Cracow exclaimed, "A new Copernicus has been born!"

A second of the *Year Book* essays dealt

with the photoelectric effect, that is, with the quantum law for the emission and absorption of light. Einstein received the 1922 Nobel Prize for this research, and by it he contributed to quantum mechanics, from which interpretation of the universe he later departed and discovered himself opposing the greater number of his scientific contemporaries. A third of his 1905 articles introduced, under the auspices of the formula,  $E = mc^2$ , considerations which were to lead to the release of atomic energy forty years later. Max Born has said that the 1905 *Year Book* is "one of the most remarkable volumes in the whole of scientific literature."<sup>2</sup> Einstein made it so.

The physicist was born in 1879 in Bavaria. His early life was spent in Munich. His father was a free thinker of Jewish ancestry who was a partner in an electrochemical company. No religious ceremonies were observed in the Einstein home. While suffering under what he thought were the coercive procedures of the schools, young Einstein early acquired an interest in mathematics. Not without some difficulties, he entered and graduated from the Swiss Polytechnic School in Zurich, meanwhile having renounced both German citizenship and any official ties with Judaism. After graduation, he finally secured a position as a patent examiner in Bern (1902). While tending to this "shoemaker's job," he pursued his research in theoretical physics on the side. When recognition began to come his way, he moved into the universities in various professorial and lecturing ca-

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pacities. On the application form for the post at Prague, he recorded his religious affiliation as "Mosaic," though this was evidently a concession to the formal application requirements of the state.

In 1914 Einstein accepted a research post with the Royal Prussian Academy of Science in Berlin. The year 1915 saw the publication of a famous paper which set forth the general theory of relativity. After World War I, he travelled and lectured in Europe, America, and Asia, while continuing his work in the Berlin Academy. He did not return to Germany after 1933. In that year, he accepted an appointment to the Institute for Advanced Study in Princeton. There he died in 1955. Fifteen years before, he had written to President Roosevelt on August 2, 1939.

Some recent work by E. Fermi and L. Szilard which has been communicated to me in manuscript leads me to expect that the element Uranium may be turned into a new and important source of energy in the immediate future. . . . A single bomb of this type . . . exploded in a port . . . might very well destroy the whole port, together with the surrounding territory. . . .<sup>3</sup>

Thus, the compact formula,  $E = mc^2$ , of his 1905 paper found terrifying expression in the miracles and disasters of the atomic era. When later questioned about his role, he responded reluctantly, saying each word separately, "Yes, I pressed the button."<sup>4</sup>

On one of his visits to the United States, Einstein saw his features carved in bas-relief at the Riverside Church in New York, the only living man among hundreds of saints, scientists, kings, and philosophers who have most significantly contributed to making the modern world what it is today. On this solemn occasion, his sense of humor proved victor over other sentiments, for he turned to the pastor, saying, "I might have imagined that they could make a Jewish saint out of me, but I never thought I'd become a Protestant one!"

On November 7, 1944, Einstein wrote to Max Born, "In our scientific expectation we

have grown antipodes. You believe in God playing dice and I in perfect laws in the world of things existing as real objects, which I try to grasp in a wildly speculative way."<sup>5</sup> The scientist's proclamation that "God does not play dice with the world" can guide us to an understanding of several important features of his life and thought.

### I. *His Simplicity and Humility*

The simplicity and brevity of the remark about God is a sign of the general lack of affectation and the deep humility in his speech, conduct, and thought.

In this simple, lucid phrase he is able to sum up his difference in perspective from his colleagues in a complex field of scientific interpretations. On another occasion, when asked how it was that he did not immediately perceive that his early formula,  $E = mc^2$ , meant that every ounce of matter contained such vast energy, he responded with characteristic clarity, "If a fabulously rich man never spends any money, no one can estimate the size of his fortune."<sup>6</sup> Although Einstein's name has commonly been a symbol of the extremely intricate and the incomprehensible, his writings generally are easily read and his thoughts are quickly distilled from them. One of his biographers, Antonina Vallentin, rightly said that he had a "horror of unnecessary words." This infrequently noted trait of the scientist may be confirmed by observing, through the veil of translation, the lucidity and directness of his style and thought in both *The World As I See It* and *Out of My Later Years*, collections of his essays in science, religion, and public affairs. Einstein is readable in ways in which Spinoza, Kant, Hegel, and Wittgenstein are not. He displayed a remarkable facility to express in commonly understood words and analogies even the most complex topics of theoretical physics. Although his style does not have the thunder and lightning of a poetic Nietzsche, it possesses its brevity and lucidity, marks not generally found among German philoso-

phers and scientists, who frequently write in ponderous, complex sentences.

The simple and clear words with which Einstein spoke and wrote are symptomatic of the simplicity and commonness of his personality. He had a delightful sense of humor, loved to converse with children, was devoted to his family, and was moved by a deep concern for the welfare of others. His generosity and self-effacing temperament were such as often to be costly to his own welfare. To human liberty and enlightenment he was religiously dedicated. The ordinary strivings of men for fame, pleasure, and wealth were alien to his Spinozistic personality. "Even when I was a fairly precocious young man," he said, "the nothingness of the hopes and strivings which chases most men restlessly through life came to my consciousness with considerable vitality."<sup>7</sup> He seemed always to be embarrassed by the tide of attention and honor which swept over him. On occasions he left the impression that to him it was a hilarious joke, just as if the adulation was really intended for someone else. With unkempt hair, shrouded in a rumpled sweater and unpressed trousers, and with sockless feet reluctantly encased in shoes, he spurned the bourgeois formalities and ceremonies with which "civilized" life surrounded him and sometimes attempted to smother him. "I believe that a simple and unassuming manner of life is best for everyone," he affirmed, "best both for the body and the mind."<sup>8</sup> "Attending funerals is something one does to please the people around us. In itself it is meaningless. It seems to me not unlike the zeal we polish our shoes with every day just so that no one will say we are wearing dirty shoes."<sup>9</sup> With Spinoza he was inclined to respond to a world which, in missionary spirit, wanted to make him assume the veneer of sophistication, "A man is never better for having a fine gown. It is unreasonable to wrap up things of little or no value in a precious cover."

One of the reasons for Einstein's aliena-

tion from this world's modes of aspiration, dress, and behavior was the passion and depth of thought hidden within him. In many ways he was a stranger among us, free from the customs and obligations under which we toil. There was also an asceticism about him which has characterized many men of genius and saintliness. His colleague and friend, Philipp Frank, says that "he always managed to maintain a certain 'free space' around himself which protected him from all disturbances, a space large enough to contain a world erected by an artistic and scientific imagination."<sup>10</sup> Authentic and distinguished existence for man is found in the intellect's contemplation of the rational structure of the universe. What counts among men is how they think and what they think, not how they dress, whether they receive applause, or how materially prosperous they are. This perspective was clearly revealed in his "Autobiographical Notes" in P. A. Schilpp's volume, *Albert Einstein: Philosopher-Scientist*. The forty-seven pages in which the scientist discloses himself contain only several short paragraphs of personal references and reminiscences. The remainder is a presentation of his reflections on and contributions to scientific thought: an autobiography in mathematical equations! "The essential in the being of a man of my type," he said, "lies precisely in *what* he thinks and *how* he thinks, not in what he does or suffers."<sup>11</sup> As he once observed, he was not cut out for "tandem or teamwork."

Not only were his personal bearing and his style simple, but in a real sense his thought was also, even his distinctly scientific reflections. Perhaps it was profound precisely because of its simplicity. His mind penetrated to the heart of an issue and, shrugging off the confusing maze of superficial and confusing details, laid bare the essence of the matter. This may be said even of his most notable achievement, the theory of relativity. Defining precisely the few postulates necessary for interpreting motion, in an elegant and short

series of deductions he reconstructed, in the special theory of 1905, our scientific understanding of the universe, shattering the Newtonian world view with its doctrines of the absoluteness and independence of space and time. Mathematics, the tool of scientific inquiry, is *par excellence* the language of precision, simplicity, and elegance. In brief and lucid form, through Einstein's idiom it tells us of the simplicity of nature. How much more simply can the deep mysteries of mass-energy relations be expressed than in the phrase,  $E = mc^2$ ? Even when we are pressed into domains of Einstein's science where our mastery of the mathematical language fails us, the impression of the simplicity of both the scientific descriptions and of the reality described nevertheless pours in upon us, as when in the general theory of relativity deductions commence with the compact little formula,  $ds^2 = g_{ik}dx_i dx_k$ . In Einstein as in Spinoza, the complexities of the vast and majestic universe about us are reducible to very simple categories, when one looks to the heart of nature and possesses the proper language for describing what he sees. "The most incomprehensible thing about the world," he observed, "is that it is comprehensible."<sup>12</sup>

While the vigorous and creative energies of his mind frequently carried him to the point of divorce from the common walks of life, he exhibited a compassion for the sufferings of his fellow men, an interest in children and students, a sense of humor, a love of music, and a humility such as has marked those we have judged as the most saintly among men. Shortly after 1905 the world recognized that a new Copernicus had been born. At his death in 1955, it honored, not only a man around whose mind the universe had turned, but also one of great integrity, compassion, and humility.

## II. *His Views of God and Religion*

The word "God" will be found in Einstein's vocabulary, as the subject of "God

does not play dice" indicates. Its sense is not, however, obvious.

Physical reality in its mathematical simplicity was for Einstein an object, not merely of the understanding, but also of the affections. He says,

Out yonder there was this huge world, which exists independently of us human beings and which stands before us like a great, eternal riddle, at least partially accessible to our inspection and thinking. The contemplation of this world beckoned like a liberation, and I soon noticed that many a man whom I had learned to esteem and to admire had found inner freedom and security in devoted occupation with it. The mental grasp of this extra-personal world within the frame of the given possibilities swam as highest aim half consciously and half unconsciously before my mind's eye. Similarly motivated men of the present and of the past, as well as the insights which they had achieved, were the friends which could not be lost. The road to this paradise was not as comfortable and alluring as the road to religious paradise; but it has proved itself as trustworthy, and I have never regretted having chosen it.<sup>13</sup>

The search for a meaningful life is a religious response, according to the scientist.<sup>14</sup> He conceived religion as basically a practical activity. Its function is "to make clear . . . fundamental ends and valuations and to set them fast in the emotional life of the individual. . . ."<sup>15</sup> Moreover, the goal of religion is service of others: "Man is here for the sake of other men—above all for those upon whose smile and well-being our own happiness depends, and also for the countless unknown souls with whose fate we are connected by a bond of sympathy."<sup>16</sup> Einstein's judgment on the function of religion was very similar to Spinoza's (cf. *Theologico-Political Treatise*). For both of them, the end of religion was the inculcation of obedience.<sup>17</sup>

A distinctly humane type of life among men is the object sought by religion, when it is authentic.

If one purges the Judaism of the Prophets and Christianity as Jesus Christ taught it, of all subsequent additions, especially those of the priests,

one is left with a teaching which is capable of curing all the social ills of humanity. It is the duty of every man of good will to strive steadfastly in his own little world to make this teaching of pure humanity a living force, so far as he can.<sup>18</sup>

Einstein therefore counted Buddha and Spinoza as well as Jesus among the select group of creative and authentic religious personalities. It is the moral example of such persons which constitutes one of the most vigorous and elevating impulses to selfless religious living.

In general, Einstein was an opponent of institutionalized religion with its creeds and ceremonies—in short, with its stifling atmosphere of conformity and coercion, which he hated so intensely. While holding to a religious position which may be termed ethical idealism, he nevertheless recognized that the high moral values which enrich our lives are communicated to us in the Judeo-Christian tradition. Consequently, he frequently assumed a favorable attitude toward the historical religious heritage of the West, as when he invested his prestige and energies in Zionist activities. The substance of our traditional religious values is, according to him,

free and self-responsible development of the individual so that he will freely and joyfully put his energies at the service of the community of man. If attention is paid to the content and not to the form, the same words may be considered as the expression of the fundamental democratic principle.<sup>19</sup>

How did Einstein think of God? On one occasion, Rabbi Herbert S. Goldstein cabled him, "Do you believe in God?" With characteristic brevity and frankness, Einstein responded, "I believe in Spinoza's God, who reveals himself in a harmony among all people, not in a God who worries about the destiny and actions of men."<sup>20</sup> It is not unfair, then, to say that the term "God" designated, for the physicist, the mathematical-like, impersonal structure of physical reality. Perhaps one modification is

needed, although we cannot be absolutely certain. The mathematical structure of physical reality may not itself be Einstein's God—God is the spirit or mind which conceives or thinks that structure. For, on occasions he expressed himself thus: "My religion consists of a humble admiration of the illimitable superior spirit who reveals himself in the slightest details we are able to perceive with our frail and feeble minds. That deeply emotional conviction of the presence of a superior reasoning power, which is revealed in the incomprehensible universe forms my idea of God."<sup>21</sup> The personal pronouns "who" and "himself" were evidently inadvertent inexactitudes, for the evidences overwhelmingly testify that his God was as impersonal as Spinoza's. In other passages, he unequivocally rejected the ideas that God can assume attitudes, will reward or punish the objects of creation, and that the individual survives the death of his body.<sup>22</sup> Intelligence is manifest in the universe, but not providential care. We may add a phrase, then, to the incisive Einsteinian aphorism inscribed in Fine Hall, Princeton, and say, "God is subtle, but it is *neither benevolent nor malicious.*" A short paragraph, "On Scientific Truth," from Einstein's *World As I See It* will further illumine his convictions about God and truth. Notice again the mention of Spinoza in the passage.

(1) It is difficult even to attach a precise meaning to the term "scientific truth." So different is the meaning of the word "truth" according to whether we are dealing with a fact of experience, a mathematical proposition, or a scientific theory. "Religious truth" conveys nothing clear to me at all.

(2) Scientific research can reduce superstition by encouraging people to think and survey things in terms of cause and effect. Certain it is that a conviction, akin to religious feeling, of the rationality or intelligibility of the world lies behind all scientific work of a higher order.

(3) This firm belief, a belief bound up with deep feeling, in a superior mind that reveals itself in the world of experience, represents my conception of God. In common parlance this may be described as "pantheistic." (Spinoza)

(4) Denominational traditions I can only consider historically and psychologically; they have no other significance for me.<sup>23</sup>

There are a number of references in Einstein's writings to a "cosmic religious experience." In *The World As I See It*, he described rather inadequately three stages in the genealogy of religion. First, among primitive men, fear evoked religious ideas and practices. Second, we discover in history the emergence of a social and moral conception of God, who exercises providential care over his creatures. This God is conceived anthropomorphically. Third, in the case of the cosmic religious experience, there is no anthropomorphically conceived God who is the object of the feeling.

The individual feels the nothingness of human desires and aims and the sublimity and marvellous order which reveal themselves both in Nature and in the world of thought. He looks upon individual existence as a sort of prison and wants to experience the universe as a single significant whole.

The religious geniuses of all ages have been distinguished by this kind of religious feeling, which knows no dogma and no God conceived in man's image; so that there can be no church whose central teachings are based on it. Hence it is precisely among the heretics of every age that we find men who were filled with the highest kind of religious feeling and were in many cases regarded by their contemporaries as atheists, sometimes also as saints.<sup>24</sup>

Einstein called this experience mystical. In his judgment, it is the source of true art and science as well as the fountain of authentic religious living. It is Spinoza's intellectual love of God. But, for both Einstein and Spinoza, the affections as well as the intellect are wrapped up in it. The cosmic religious feeling is truly a state of awe, and in it man finds true humanity. Not to experience it is to be as good as dead. And "in this sense, and in this sense only," says Einstein, "I belong to the ranks of devoutly religious men."<sup>25</sup>

Einstein's cosmic religious feeling is not only the *via mystica*; it is also the *via sci-*

*entiae*. "Science, at its greatest, is identical with religion, at its most sublime,"<sup>26</sup> he asserted. The most important function of art and science is to awaken this feeling in men and to nourish it.<sup>27</sup> Moreover, by the energies of this feeling, men are moved to creative scientific thought.

The cosmic religious experience is the strongest and the noblest, deriving from behind scientific research. No one who does not appreciate the terrific exertions, the devotion, without which pioneer creation in scientific thought cannot come into being can judge the strength of the feeling out of which alone such work, turned away as it is from immediate practical life, can grow.

What deep faith in the rationality of the structure of the world, what a longing to understand even a small glimpse of the reason revealed in the world, there must have been in Kepler and Newton!<sup>28</sup>

Science, religion, and art are three expressions of the love of God. That love of divinity consists in an understanding of and affection for the elegant simplicity of thought deposited in physical reality. In an address in Berlin on the occasion of Max Planck's 60th birthday, Einstein asserted that "the state of mind which enables a man to do work of this kind [involving extraordinary will power and discipline directed to the most general scientific problems] is akin to that of the religious worshipper or the lover; the daily effort comes from no deliberate intention or programme, but straight from the heart."<sup>29</sup> The roots of science are found in this feeling. Science, in turn, purifies the religious impulse of primitive and outrageous anthropomorphisms. In addition to this negative function, science positively contributes to "a religious spiritualization of our understanding of life."<sup>30</sup> "Science without religion is lame, religion without science is blind,"<sup>31</sup> he said, perhaps dredging up from memory at this point the Kantian dictum, "Concepts without percepts are empty, percepts without concepts are blind." Both science and religion will perish in the absence of the cosmic religious feeling.

Einstein's pacifism, with its testimonies to

his fellow feeling and his social concern, must be left aside. A few observations should be made, however, about his connections with the Zionist movement. Although he loosed himself from institutionalized religion and maintained a critical attitude toward the traditional conception of God, he found himself moved by the conspiracy of circumstances, especially in Germany, to identify himself with the Jewish community. In the 1930's he said, "It was when I came to Germany, fifteen years ago, that I discovered that I was a Jew and I owe this discovery more to non-Jews than to Jews."<sup>32</sup> The everlasting longing for independence, the cultivation of creative intellectual enterprises, and the love of justice among the Jews "prove to me that it is my destiny to belong to them."<sup>33</sup> Einstein became friends with Chaim Weizmann after World War I. He then helped those supporting the Zionist movement, though he never officially joined the movement itself and was never a political Zionist. His motives were chiefly of a humanitarian nature. Above all, the Hebrew University in Jerusalem interested him. Consequently, his first trip to the United States in 1921 was for the purpose of raising funds for the University and the Zionist movement.

The nature of Einstein's religious orientation dictated that his Zionist sympathies would be of a general cultural and humanitarian character. To him Judaism was not a creed. It was a way of serving men and sanctifying life. Nor was Judaism a political entity, in his opinion. He would only go so far as to concede that a Palestinian center for Judaism would give unity and direction to the ongoing cultural life of Jews everywhere. In Zionism, we discover a technique for creating a feeling of self-respect among Jews and also for providing a refuge, though an inadequate one, for homeless peoples. He recognized that, while his position occasionally gave strength and prestige to Jewish nationalism and religious orthodoxy,

the humanitarian and cultural benefits outweighed these unsatisfactory results.<sup>34</sup> "I believe," he said, "that the existence of a Jewish cultural center will strengthen the moral and political position of the Jews all over the world, by virtue of the very fact that there will be in existence a kind of embodiment of the interests of the whole Jewish people."<sup>35</sup> Einstein felt deeply the obligation of the Jews to place at the disposal of mankind their intellectual and moral heritage in order that the struggle for peace and humane behavior might prove victorious.

Those who are raging today against the ideals of reason and individual liberty and are trying to establish a spiritless state-slavery by brute force rightly see in us their irreconcilable foes. History has given us a difficult row to hoe; but so long as we remain devoted servants of truth, justice, and liberty, we shall continue not merely to survive as the oldest of living peoples, but by creative work to bring forth fruits which contribute to the ennoblement of the human race, as heretofore.<sup>36</sup>

### III. Conclusion

Philipp Frank observes that one of Einstein's most characteristic traits was

his intractable hatred of any form of coercion arbitrarily imposed by one group of people on another. He detested the idea of the oppressor preventing the oppressed from following their inclinations and developing their natural talents, and turning them into automatons. On the other hand Albert was also conscious of the natural laws of the universe; he felt that there are great eternal laws of nature. . . . This dual attitude—hatred for the arbitrary laws of man and devotion to the laws of nature— . . . accompanied Einstein throughout his life and explains many of his actions that have been considered peculiar and inconsistent.<sup>37</sup>

The laws, customs, and expectations of men are part of the face of nature. Reality or God lies hidden beneath. In this Spinozistic deity, we find the natural habitation of creative reason and the object of the cosmic religious feeling. Nothing in this world—the principalities and powers of politics, economics, race, or organized religion—can coerce men whose spirits, liberated from the



bonds of this world, are caught up in the intellectual love of God.

Some of the symbols of liberation and union with the divine in Einstein were non-conformist dress, world-shattering thoughts, compassion for his fellow men, a sense of the ridiculousness of conventional behavior, and a deep humility. The signs that he could not completely escape flesh and blood, and indeed felt obliged to participate in the contests of this world, were his support of pacifism, his dedication to Zionist ideals, his participation in the League of Nations, his contest against those "cool blond people [who] . . . have no psychological comprehension of others," and his courage and realism in deciding, contrary to his personal feelings, to press the button which signaled the opening of the atomic era.

In his use of mathematics as the key to an understanding of nature, his view of physical reality, his faith in the competence of reason, his interpretation of the divine, his attitude toward organized religion and its function, and his personality and conduct, Einstein was a twentieth-century Spinoza. Just as in Spinoza's case, subsequent generations will turn in the verdict that he was, despite his failure to live up to orthodox expectations, a genuinely religious person. Observe how well Friedrich Schleiermacher's tribute to Spinoza applies to him.

The high World-Spirit pervaded him; the Infinite was his beginning and his end; the Universe was his only and his everlasting love. In holy innocence and in deep humility he beheld himself mirrored in the eternal world, and perceived how he also was its most worthy mirror. He was full of religion, full of the Holy Spirit. Wherefore, he stands there alone and unequalled; master in his art, yet without disciples and without citizenship, sublime above the profane tribe.<sup>38</sup>

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<sup>7</sup> Einstein, "Autobiographical Notes," in P. A. Schilpp, *op. cit.*, p. 3.

<sup>8</sup> Albert Einstein, *et al.*, *Living Philosophies* (New York: Simon and Schuster, 1931), p. 4.

<sup>9</sup> Frank, *op. cit.*, p. 80.

<sup>10</sup> *Ibid.*, p. 113.

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<sup>12</sup> Vallentin, *op. cit.*, p. 39.

<sup>13</sup> Einstein, "Autobiographical Notes," in P. A. Schilpp, *op. cit.*, p. 5.

<sup>14</sup> Einstein, *The World As I See It* (New York: Covici, Friede Publ., 1934), p. 237.

<sup>15</sup> Einstein, *Out of My Later Years* (New York: Philosophical Library, 1950), p. 22.

<sup>16</sup> *Living Philosophies*, p. 3.

<sup>17</sup> e.g., Frank, *op. cit.*, p. 287.

<sup>18</sup> *The World As I See It*, p. 170.

<sup>19</sup> Frank, *op. cit.*, p. 288.

<sup>20</sup> Vallentin, *op. cit.*, p. 102.

<sup>21</sup> Lincoln Barnett, *The Universe and Dr. Einstein* (New York: Mentor Books, 1955), p. 118; cf. also Frank, *op. cit.*, pp. 283-284.

<sup>22</sup> e.g., *Living Philosophies*, pp. 6-7.

<sup>23</sup> *The World As I See It*, pp. 29-30.

<sup>24</sup> *The World As I See It*, pp. 264-265.

<sup>25</sup> Frank, *op. cit.*, p. 284.

<sup>26</sup> Kristol, "Einstein: The Passion of Pure Reason," *Commentary*, 10, 3, p. 221.

<sup>27</sup> *The World As I See It*, p. 265.

<sup>28</sup> Frank, *op. cit.*, p. 284.

<sup>29</sup> *The World As I See It*, p. 23.

<sup>30</sup> *Out of My Later Years*, p. 29.

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<sup>32</sup> Vallentin, *op. cit.*, p. 93.

<sup>33</sup> *Ibid.*, p. 95.

<sup>34</sup> Frank, *op. cit.*, p. 149.

<sup>35</sup> C. O. Peare, *Albert Einstein: A Biography for Young People* (New York: Henry Holt, 1949), p. 70.

<sup>36</sup> *The World As I See It*, p. 143.

<sup>37</sup> Frank, *op. cit.*, pp. 8-9.

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