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Fuzzifying the Natural Law—Legal Positivist Debate

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L egal scholars have long advocated and debated various theories of law. One of the most contentious issues legal scholars have addressed is whether natural law theory or legal positivism is the correct, or at least the better, theory of law.[1] *Crudely put, natural law theorists conceive of law and morality as inexorably intertwined. Legal positivists, by contrast, contend that law is not inherently moral—that there is no necessary connection between law and morality. In short, the latter theory denies what the former affirms, and vice versa. The dialogue below details the respective positions of a natural law theorist, Naturalus, a legal positivist, Positivus, and a fuzzy logician, Multivalus, with regard to a case that arose in post-war Germany. As the dialogue highlights, fuzzy logic is a significant new tool which may be used to bridge the gap between the bivalent world views espoused by natural law theorists and legal positivists.*

MULTIVALUS: Explain to me this idea of natural law and natural law theory which creeps ever so often into American jurispru-

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1. Hart and Fuller, along with their many commentators, provide an excellent example of this debate. *See* LON L. FULLER, THE MORALITY OF LAW (1973) [hereinafter FULLER, THE MORALITY OF LAW]; H.L.A. HART, THE CONCEPT OF LAW (1961) [hereinafter HART, THE CONCEPT OF LAW]; MICHAEL MARTIN, THE LEGAL PHILOSOPHY OF H.L.A. HART: A CRITICAL APPRAISAL (1987); N. E. SIMMONDS, CENTRAL ISSUES IN JURISPRUDENCE: JUSTICE, LAW, AND RIGHTS (1986); Ronald A. Duff, *Legal Obligations and the Moral Nature of Law,* 25 JURID. REV. 61 (1980); Ronald M. Dworkin, *Philosophy, Morality, and Law—Observations Prompted by Professor Fuller's Novel Claim,* 113 U. PA. L. REV. 668 (1965); Lon L. Fuller, *Positivism and Fidelity to Law—A Reply to Professor Hart,* 71 HARV. L. REV. 630 (1958) [hereinafter Fuller, *Positivism and Fidelity to Law*]; H.L.A. Hart, *Positivism and the Separation of Law and Morals,* 71 HARV. L. REV. 593 (1958) [hereinafter Hart, *Positivism and the Separation of Law and Morals*]; Peter P. Nicholson, *The Internal Morality of Law: Fuller and his Critics,* 84 ETHICS 307 (1974); Robert S. Summers, *Professor Fuller on Morality and Law,* 18 J. LEG. EDUC. 1 (1965); H.L.A. Hart, *Lon L. Fuller: The Morality of Law,* 78 HARV. L. REV. 1281 (1965) (book review).

dence—from the Supreme Court decision in *Calder v. Bull*[2] to the Clarence Thomas confirmation hearings.[3]

NATURALUS: Certainly. We should distinguish first between (i) natural law as a set of ethical principles and (ii) theories about natural law; and second between (iia) natural law theory as a theory explaining the rational foundations for moral judgment, and (iib) natural law theory as a theory conceiving of law[4] as inherently moral; that is, that there is a necessary connection between law and morality. For our purposes, we need only discuss (iib).

MULTIVALUS: And how does one measure morality? My morality and yours may differ quite markedly.

NATURALUS: When natural law theorists speak of morality they talk about the morality in question being objective; that is, a morality which is independent of people's beliefs and attitudes. Natural law theorists recognize that, on reflection, there are certain moral truths that we simply cannot doubt.

MULTIVALUS: What if a law is immoral? Is it still legally valid?

NATURALUS: No, it follows from the definition of *law* that it meets certain moral requirements, and so a statute, say, that does not meet these requirements is not legally valid—is not a law at all.[5]

POSITIVUS: Naturalus, share with our young friend the history of your movement, the famous names of years gone by that have em-

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2. 3 U.S. 386 (1798).

3. Somewhat lost in the furor over the sexual harassment allegations by Professor Anita Hill was an interesting discussion, both in the media and the Senate confirmation hearings, of then Judge Clarence Thomas' pronounced and rather strident views on natural law. He later recanted; he was criticized for his natural law views by various people as being out of the mainstream. *See* Laurence H. Tribe, *Clarence Thomas and "Natural Law"*, N.Y. TIMES, July 15, 1991, at A15; Clarence Page, *Is Clarence Thomas in Imminent Danger of Getting Borked?*, CHI. TRIB., July 10, 1991, at 21; *Nomination of Judge Clarence Thomas to be Associate Justice of the Supreme Court of the United States: Hearings Before the Committee on the Judiciary of the United States Senate*, 102d Cong., 1st Sess., pt.1 (1991).

4. For a discussion of these distinctions, see JOHN FINNIS, NATURAL LAW AND NATURAL RIGHTS 24-26 (1980).

5. One could argue, however, that this necessary relation between law and morality need not hold at the level of individual legal norms, but only at the level of legal systems. If so, a single, immoral statute would still be legally valid. For a discussion of this issue, see, e.g., Robert Alexy, *On Necessary Relations Between Law and Morality*, 2 RATIO JURIS 167, 173-77 (1989); Hart, *Positivism and the Separation of Law and Morals*, *supra* note 1, at 601, 621-23.

braced your point of view. This will serve to make my wholesale destruction of your view all that more dramatic. Bring him out of the cave in which he dwells[6] and illuminate him with the names of the figures and the history of your movement.

NATURALUS: You know, of course, Positivus, that I am no historian. But, that having been said, you should know, Multivalus, that the view I have espoused is one that has been propounded by such great thinkers as Cicero,[7] St. Augustine,[8] St. Thomas Aquinas,[9] Grotius[10] and, more recently, by Radbruch[11] and Maritain.[12] More-

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6. Positivus's reference here is to Plato's *Republic* and the famous allegory of the cave. Plato posits that human enlightenment is achieved through a process analogous to chained men in a dark cave breaking free and climbing the long staircase to the mouth of the cave where blinding daylight awaits them. PLATO, THE REPUBLIC OF PLATO 193-96 (Allan Bloom trans., 1968).

7. CICERO, DE RE PUBLICA, Book III, § XXII (E.H. Warmington ed. & Clinton Walker Keyes trans., 1928). Cicero contends that

[t]rue law is right reason in agreement with nature . . . . We cannot be freed from its obligations by senate or people . . . [a]nd there will not be different laws at Rome and at Athens, or different laws now and in the future, but one eternal and unchangeable law will be valid for all nations and all times, and there will be one master and ruler, that is, God, over us all, for he is the author of this law, its promulgator, and its enforcing judge.

Id. at 211.

8. ST. AUGUSTINE, THE FREE CHOICE OF THE WILL, Book I, ch. 6, v. 15, 85-86 (Robert P. Russell trans., 1968). St. Augustine speaks of "that law called supreme reason" according to which "it is just that all things exist in perfect order," and "by which, ultimately, that law which we call[ed] 'temporal' [i.e., positive law] can be justly enacted and justly changed"; and he asks if "any thinking person [can] fail to see that this law is changeless and eternal"; and, discussing certain unjust laws, he suggests that an unjust law is not a law at all. *Id.* at ch. 5, v. 11, 80-81.

9. ST. THOMAS AQUINAS, SUMMA THEOLOGIAE, Q 90, Art. 4, at 140 (R.J. Henle, ed., 1993). Aquinas defines a law in general as "nothing other than a certain dictate of reason for the Common Good, made by him who has the care of the community and promulgated." *Id.* at 145. Citing St. Augustine's famous dictum that an unjust law does not seem to be a law at all, ST. AUGUSTINE, *supra* note 8, at ch. 5, v. 11, 80-81, he further maintains that "a law has as much force as it has justice" and that "every human positive law has the nature of law to the extent that it is derived from Natural Law. If, however, in some point it conflicts with the law of nature it will no longer be law but rather a perversion of law." ST. THOMAS AQUI-NAS, *supra*, Q 95, Art. 2, C. Such laws, he suggests, "do not bind in conscience, except perhaps to avoid scandal or disturbances." *Id.* at Q 96, Art. 4, C.

10. HUGO GROTIUS, PROLEGOMENA TO THE LAW ON WAR AND PEACE 6-9 (1957). Grotius is commonly thought of as originator of a new, more secular phase in the history of natural law thinking. Having said that man's impelling desire for society is the source of law properly so called, which comprises, *inter alia*, the obligations to abstain from that which belongs to another, and to keep one's promises, *id.*, he adds that what he has been saying "would have a degree of validity even if we should concede that which cannot be conceded without the utmost wickedness, that there is no God, or that the affairs of men are of no interest to him." *Id.* at 10.

11. GUSTAV RADBRUCH, GESETZLICHES UNRECHT UND UBERGESETZLICHES RECHT 353

over, one could make a case for classifying modern writers such as Lon Fuller,[13] Ronald Dworkin[14] and Robert Alexy[15] as natural law theorists. If we do, however, their theories must be considered somewhat watered down versions of natural law theory, since none of them contend that there are objective moral truths.

POSITIVUS: And what about the English philosopher John Finnis? I thought he too was a leading figure in your movement.

NATURALUS: You are very perceptive, Positivus, and your remark gives me an opportunity to add to my account of natural law theory. No doubt, Finnis is one of the most important natural lawyers of today, though I consider him to be something of a special case. For one thing, he seems to be in total disagreement with many writers including Kelsen, Hart, and Raz, who have discussed natural law theory. You see, he denies what most natural law theorists have commonly asserted—a necessary connection between legal validity and moral content.[16] Nonetheless, I do share his opinion that "a theory of natural law need not have as its principal concern . . . the affirmation that 'unjust laws are not law.' "[17] I accept that, in

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(1950). Once a confirmed positivist, the German lawyer and legal philosopher Gustav Radbruch, having lived through the Nazi era in Germany, came to the conclusion that the notion of morality has to enter into a definition of 'law': "Denn man kann Recht, auch positives Recht, gar nicht anders definieren denn als eine Ordnung und Satzung, die ihrem Sinn nach bestimmt ist, der Gerechtigkeit zu dienen." *Id.* Contemplating the conflict between justice (Gerechtigkeit) and legal certainty (Rechtssicherheit), he suggests that this conflict

> dürfte dahin zu lösen sein, dass das positive, durch Satzung und Macht gesicherte Recht auch dann den Vorrang hat, wenn es inhaltlich ungerecht und unzweckmässig ist, es sei denn, dass der Widerspruch des positiven Gesetzes zur Gerechtigkeit ein so unerträgliches Mass erreicht, dass das Gesetz als 'unrichtiges Recht' der Gerechtigkeit zu weichen hat.

Id.

12. JACQUES MARITAIN, MAN AND THE STATE (1951). Maritain describes natural law as dealing with "the rights and the duties which are connected in a *necessary* manner with the principle: 'Do good and avoid evil.' " *Id.* at 97-98 (emphasis in the original). He claims that it is by virtue of natural law that positive law takes on the force of law and imposes itself upon the conscience. *Id.* at 99.

13. FULLER, THE MORALITY OF LAW, *supra* note 1, at 96. Fuller maintains that his "internal morality of law" represents a procedural version of natural law. *Id.*

14. Ronald M. Dworkin, *"Natural Law" Revisited*, 34 U. FLA. L. REV. 165 (1982). Dworkin admits that if we take natural law theory to mean "any theory which makes the content of law sometimes depend on the correct answer to some moral question," then he is guilty of being a natural law theorist. *Id.*

15. Alexy, *supra* note 5. Alexy contends that there is a "conceptually necessary connection between law and morality" and that consequently positivism fails as a comprehensive theory. *Id.* at 167.

16. FINNIS, *supra* note 4, at 26.

17. *Id.* at 351.

most or perhaps all theories of natural law, such an idea is no more than a subordinate theorem.[18]

POSITIVUS: Very interesting, indeed. I guess I have entertained a rather simplistic view of natural law theory.

MULTIVALUS: And what of positivism, Positivus? How might you explain it?

POSITIVUS: Like natural law theory, legal positivism may take many forms.

NATURALUS: Share with us the most common form, will you?

POSITIVUS: But, of course. Positivism is commonly understood to assert (i) that law is not inherently moral—that there is no necessary connection between law and morality, and (ii) that we can determine legal validity without having to invoke moral considerations.[19]

MULTIVALUS: Do all positivists accept both these elements of positivism?

POSITIVUS: An excellent question. The first element alluded to—the notion that law is not inherently moral—is normally considered to be the backbone of positivism and is asserted by almost everyone who calls himself or herself a legal positivist.[20]

MULTIVALUS: And the second?

NATURALUS: Yes, Positivus. And the second?

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18. *Id.*

19. We should note here that the first tenet of positivism comes in different shapes. For example, when Hart discusses what he calls the doctrine of separation—which he takes to be a, or perhaps the, central tenet of positivism—he interchangeably uses: (a) The existence of law is one thing and its merits and demerits is another; (b) There is no necessary connection between law as it is and law as it ought to be; and (c) There is no necessary connection between law and morality. Hart, *Positivism and the Separation of Law and Morals, supra* note 1, at 596, 601 n.25. The authors doubt, however, whether (a), (b), and (c) above really have the same meaning.

20. *See, e.g.,* JOHN AUSTIN, THE PROVINCE OF JURISPRUDENCE DETERMINED 184 (1965); HART, THE CONCEPT OF LAW, *supra* note 1, at 181; HANS KELSEN, GENERAL THEORY OF LAW AND STATE 4-6 (1945); *see generally* Hart, *Positivism and the Separation of Law and Morals, supra* note 1.

POSITIVUS: As has been pointed out by Simmonds,[21]among others, a theory which asserts only the first tenet of positivism is so lacking in content that it scarcely deserves to be called a theory of law at all. Moreover, most positivists would probably say that this second element is what necessitates the first. After all, according to the second, the task of identifying the law is an empirical one, and since positivists normally believe in a strict separation of Is and Ought, of value and fact, they are likely to contend that no moral implications can follow from this procedure.[22] Thus, most positivists would probably take positivism to endorse the second tenet as well as the first.

MULTIVALUS: I must confess that you are losing me somewhat in this discussion. Do I properly understand positivism to reject the suggestion that morality influences the content of the law?

POSITIVUS: My dear friend, I am afraid I have confused you. Positivism does not deny that morality influences law. Nor does it deny that judges sometimes decide cases by reference to moral values, or that there may be a moral obligation to obey the law. What it does deny is that the notion of morality need enter into the *definition of law*.

MULTIVALUS: Our discussion has been fascinating. But what practical consequences follow from a belief in either of these theories? Suppose I was a judge deciding a case and I wanted to utilize natural law theory, say, in my decision-making process.

NATURALUS: Well, if natural law theory is correct, it follows, as we have said, that an unjust law is not legally valid—is not a law at all.[23] Consequently, you, as the judge, would not consider the law at issue when deciding the case. Moreover—

POSITIVUS: Excuse my interruption. But, if you, as the judge, viewed legal positivism as correct, then it follows that an unjust law is still legally valid, is still a law, although a bad law. You

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21. SIMMONDS, *supra* note 1, at 94.
22. *Cf.* JOSEPH RAZ, THE AUTHORITY OF LAW (1979). Raz asserts something close to the second element without asserting the first. In his opinion,
    [t]he claim that what is law and what is not is purely a matter of social fact still
    leaves it an open question whether or not those social facts by which we identify
    the law or determine its existence do or do not endow it with moral merit. If they
    do, it has of necessity a moral character.
Id. at 38, 39.
23. *But see supra* note 5.

would therefore be under a legal obligation to apply it, if it is applicable.

MULTIVALUS: I understand. Assume, however, that I have a moral obligation not to apply the law in question. What do I do if I confront such a dilemma?

NATURALUS: You raise an interesting point. A case decided by the Oberlandsgericht in Bamberg, West Germany, in 1949 addressed this very situation. In that case, in 1944, a soldier home on leave made some derogatory remarks concerning Hitler and some other leading Nazi party officials, whereupon his wife—who was under no affirmative duty to do so—reported this to the local Nazi party official. As a result of this, the soldier was brought before a military tribunal and was sentenced to death, apparently in accordance with statutes making it illegal to utter statements critical of the Third Reich or to impair the military defense of the German people.

MULTIVALUS: That is simply unbelievable. Was the sentence carried out?

NATURALUS: Actually not. The sentence was never carried out, and instead the soldier was sent back to the front.

MULTIVALUS: And what happened to the soldier's wife?

NATURALUS: I knew you would be curious about her. In 1949, in accordance with the German Criminal Code of 1871, which had been in force continuously since its enactment, the woman was charged with illegally depriving the man of his freedom (rechtswidrige Freiheitsberaubung). She responded to the charge, however, by arguing that in 1944 his act was a crime according to then valid Nazi statutes. Accordingly, she contended that in 1944 she was bringing a criminal to justice, and thus did nothing illegal.

MULTIVALUS: And did she prevail?

NATURALUS: No. Not at all. The post-war court decided that she was guilty of the offense because she had utilized, out of free choice, Nazi laws which were contrary "to the sound conscience and sense of justice of all human beings."[24]

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24. This account is based on a report of the case in the *Harvard Law Review. Recent*

MULTIVALUS: What do you both think of the decision? Was the court right?

POSITIVUS: As you might have guessed, this case is quite significant. Indeed, this particular case was discussed by Hart and Fuller in a famous debate in the *Harvard Law Review*.[25] Hart, who assumed that the post-war court had declared the statute in question legally invalid, quite properly criticized the court's reasoning. He argued, appropriately enough, that an unjust law is still legally valid, and so imposes a legal obligation on the judge to apply it.[26]

MULTIVALUS: But, returning to the question I asked earlier, does positivism suggest that the judge is morally obligated to apply the law?

POSITIVUS: No. Positivism does not mean that a judge is morally obligated to apply the statute. As far as positivism is concerned, a judge may or may not have a moral obligation to apply the law. Indeed, Hart explicitly rejects the idea that legal validity entails moral validity, saying that "[l]aw is not morality; do not let it supplant morality."[27] This means, of course, that a judge may be under conflicting obligations, one legal and the other moral.

NATURALUS: And that, my friend, is the problem with positivism. The dilemma the judge faces highlights the confusion of positivism. What does it mean to say that a person has a legal obligation to apply a certain statute while having a moral obligation not to apply it? As Fuller has noted in this regard: "Surely moral confusion reaches its height when a court refuses to apply something it admits to be law."[28]

MULTIVALUS: I think I have a better understanding of both of your

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Case, 64 HARV. L. REV. 996, 1005-07 (1951). The reader should be warned, however, that the case was not correctly reported in the *Harvard Law Review*. Pappe has pointed out that the post-war court did *not* hold the Nazi statutes in question to be legally invalid. H. O. Pappe, *On the Validity of Judicial Decisions in the Nazi Era*, 23 MOD. L. REV. 260, 263 (1960). On the contrary, the court held that the statutes could not be considered to violate natural law, though adding that it would be theoretically possible to declare a statute violating natural law unlawful. *Id.* at 263. So the case should, strictly speaking, be considered to be at least partly hypothetical.

    25. Fuller, *Positivism and Fidelity to Law*, *supra* note 1; Hart, *Positivism and the Separation of Law and Morals*, *supra* note 1.

    26. Hart, *Positivism and the Separation of Law and Morals*, *supra* note 1, at 618-21.

    27. *Id.* at 618.

    28. Fuller, *Positivism and Fidelity to Law*, *supra* note 1, at 655.

positions now. As defined here, natural law theory and legal positivism are mutually exclusive and jointly exhaustive: one believes that law is inherently moral and one does not. But, is it not possible to reconcile these theories in some fashion?

NATURALUS: I cannot imagine a way to reconcile two mutually exclusive theories such as these.

MULTIVALUS: You see, that is my point. Both of you have defined the debate we have discussed between positivism and natural law theory in bivalent—yes and no, white and black, true and false—terms. But maybe we should take the debate in an entirely different direction.

POSITIVUS: And which direction might that be?

MULTIVALUS: I propose that we reject the very premise of bivalence in this setting in favor of the principle of fuzzy logic.

NATURALUS: The principle of fuzzy logic!? What does it say?

MULTIVALUS: The principle of fuzzy logic posits that everything is a matter of degree.[29] Fuzziness is multivalence. It suggests an infinite number of perspectives to viewing a problem, or debate, instead of only two extremes. The use of the fuzzy principle "means analog instead of binary, infinite shades of gray between black and white."[30]

POSITIVUS: What is all this nonsense you are talking about—fuzziness, multivalence, shades of gray? You are either a positivist or natural law theorist. One cannot be both or some combination of the two.

NATURALUS: For once, I must agree with Positivus. You must embrace his theory or mine, but not both.

MULTIVALUS: You both highlight the problem with your respective

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29. For an excellent, accessible account of fuzzy logic, see BART KOSKO, FUZZY THINKING (1993), which largely informs the fuzzy language discussion of this Article.
    One of the authors has already explored some of these same concepts in a different context. Edward S. Adams et al., *Wedding Carlson and Schwartz: Understanding Secured Credit as a Fuzzy System*, 80 VA. L. REV. 2233 (1994). The discussion here is partly a product of the insights first explored in that piece.
    30. Kosko, *supra* note 29, at 19.

ways of thinking. Maybe you can learn something from a young one such as myself. You have both undoubtedly spent your entire lives speaking, writing, and thinking in binary terms: yes or no, true or false, natural law or positivism.

POSITIVUS: And what is wrong with that? Bivalent logic is used extensively in numerous aspects of everyday life, including mathematics and computer science.[31] It is particularly useful because one can more easily work with strings of 0s and 1s, than with fractions.

MULTIVALUS: It is useful, no doubt. But, in employing this type of logic, one "trades accuracy for simplicity."[32] The statements "My lawn is green" or "My lawn is yellow" are bivalent statements. They describe one's view of the lawn. Yet, they are rarely precisely accurate. Grass is rarely completely green or thoroughly yellow. Green and yellow are two extremes. Bivalence holds only at these extremes. Contemporarily popularized by the work of Lotfi Zadeh,[33] fuzziness or multivalence holds everywhere else—everywhere between these two extremes. A fuzzy interpretation of the statement "My lawn is green" views the statement as a half-truth, as partially true.[34] Fuzziness attempts to capture the true state of the world, not merely a bivalent description of it. While bivalent logic speaks in true or false terms, multivalent logic speaks in terms of true, more or less or false, somewhat. Fuzziness does not completely reject absolutes. Multivalence reduces to bivalence in extreme cases. In rare cases, a lawn is purely green. Yet, fuzziness recognizes that this description is only accurate in very few situations. More often, a lawn is more accurately described as both green and yellow, or, in fuzzy terms, as both green and not green. Multivalent logic trades the "rounded-off simplicity of bivalence" for "the expressive power and accuracy of fuzziness."[35] Fuzzy logic allows an infinite continuum of gray scores between 0 and 1. Fuzziness recognizes that every statement, every word, is a matter of degree.

NATURALUS: Could you please elaborate on that?

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31. For a penetrating analysis of the relation between logic and mathematics, see B. RUSSELL & A. N. WHITEHEAD, PRINCIPIA MATHEMATICA (2d ed. 1927). In this renowned treatise, the authors undertake to reduce mathematics to (bivalent) logic. Whether or not they succeeded depends, *inter alia*, on whether one chooses to count set theory as belonging to logic or mathematics.

32. KOSKO, *supra* note 29, at 21.

33. Lotfi A. Zadeh, *Fuzzy Sets*, 8 INFO. & CONTROL 338 (1965).

34. KOSKO, *supra* note 29, at 26.

35. *Id.* at 29.

MULTIVALUS: Of course. Suppose one imagines being on vacation. The word *vacation* has a different meaning for each of us, because we have all read, taken, or dreamed about different vacations. We may all use the word *vacation*, but it has a meaning peculiar to every individual. The words we use are public, but we think in sets (denoted by these words) that are intensely private and individualistic.[36]

NATURALUS: So the word *vacation* means different things to different people?

MULTIVALUS: Precisely. The word *vacation* stands for a set of vacations, a group of activities that we can each point to and call vacation. But which events are really vacations and which are not? Is a two week stay in Hawaii a vacation? What about a weekend away from your children? How about leaving work early one Friday afternoon? As should be apparent, vacation is a matter of degree. Each of these events is to some degree both a vacation and not a vacation. The boundary between vacation and non-vacation is a blurry one. The word vacation stands for a fuzzy set of events which constitute a vacation.[37] Fuzzy sets such as this constitute the manner in which we think. "We think in fuzzy sets and we each define our fuzzy boundaries in different ways and with different examples."[38] While these boundaries may differ, the very looseness of the fuzzy set enhances its expressiveness.

POSITIVUS: If I understand you correctly, you are saying that positivists and natural law theorists alike have inaccurately been assuming what you call a bivalent world view, thus thinking "in terms of yes and no, white and black, true and false," as you put it. But in your opinion, reality is too complex to be adequately described in such crude terms. For example, a statement like "My lawn is green" rarely is adequate, because a lawn rarely is completely green, but rather partially green and partially yellow, say. And, since this is so, we may say that one who utters such a statement is "trading accuracy for simplicity." To capture the true state of the world, you say, we should employ instead a principle of fuzzy logic, according to which everything is a matter of degree. Fuzziness (or multivalence) "speaks in terms of true, more or less or false, somewhat," and suggests an infinite number of perspectives to viewing a problem, not just two. Thus, a fuzzy interpreta-

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36. *Id.* at 122.
37. *Id.*
38. *Id.*

tion of the statement in question views it as a partial truth, as both true and not true. Consequently you reject fundamental laws of logic such as the law of the excluded middle according to which every complete statement is either true or false, and the law of contradiction according to which no complete statement is both true and false. Am I right so far?

MULTIVALUS: Everything is correct so far.

POSITIVUS: So your argument for proposing that we substitute a principle of multivalence for a principle of bivalence is that only the former is capable of capturing the true state of the complex, fuzzy reality.

MULTIVALUS: Correct again.

POSITIVUS: But everybody knows that a lawn may be only partially green, that *vacation* may have a slightly different meaning to different people, that whether a man is tall, say, is to some extent a question of degree, etc. Indeed, many statements are more or less vague and/or ambiguous. But this only means that we have to agree on how to interpret the statement in question before we begin the discussion. That is, we have to ascribe a reasonably definite meaning to the statement for the purposes of our discussion. Furthermore, we may sometimes be totally clear about the meaning of a statement without knowing whether it is true or false. For example, I do not know whether Justice Holmes was born on a Wednesday, but I know that either he was or he was not. What is important here is only that we can in principle give clear criteria for determining the truth-value of the statement in question. So I certainly recognize that language can be vague and/or ambiguous and that we sometimes cannot determine what is true and what is not. I just cannot see why these rather trivial facts should force us to change the logic of our reasoning.

MULTIVALUS: If you agree that the truth of a statement is difficult to determine, you implicitly acknowledge the power of fuzzy reasoning. Fuzzy reasoning recognizes that there are few full-truths and many half-truths. Suppose, for example, that you hold this apple in your hand. At this point, what you hold in your hand is 100 percent an apple. Or, we might say, 100 percent of the apple is there. Now, take a bite out of the apple. Keep biting. That's good. Now what do you have? Keep going. Now, what is left? No apple, right? You have eaten the entire apple. But suppose I asked you what you had when the apple was half eaten. Did you have an ap-

ple, not an apple, or a half apple? Was it clearly more apple than not, or less apple than not? Even if we agree how much of an apple constitutes an apple, we come to agreement merely by fiat. We simply dictate a breakpoint where so many apple-molecules constitute an apple; and so much minus one is not an apple. The paradox of bivalent logic is that it fails to explain midpoints, such as this half-eaten piece of fruit. Although bivalent logic is accurate at the corners or ends of a number line, at 0 or 1, it leaves us with the problem of rounding off everywhere else. We have to round off and say that this half-eaten piece of fruit is either an apple or not an apple.[39]

POSITIVUS: I agree. Language is vague. But, as I just said, we can handle that by agreeing on a particular interpretation for the purpose of the discussion, or, as you put it, by rounding off. That works, does it not?

MULTIVALUS: Not always. As described above, it generates paradoxes. Consider another one. Before you is a heap of sand.[40] Remove a grain of sand, and you still have a heap. Take another grain and still another, and it remains a heap. Eventually, one grain is left. Is it still a heap? If you remove it, you have nothing. Is that a heap? If not, when did it cease to be one?

POSITIVUS: Interesting. Do you know of any more such paradoxes?

MULTIVALUS: Yes. Consider the following paradox, which plagues set theory. Suppose a barber posts a sign that proclaims "I shave all, and only, those men who do not shave themselves."[41] Now, who shaves the barber? If he shaves himself, then by his sign he does not. But if he does not shave himself, then by his sign he does. Here is another. Suppose when I awoke this morning, I uttered a single sentence: "Do not trust a single word I say today."[42] Is the statement true or false? If you trust me, then by my instruction you will not. If you do not trust me, then by instruction you have. Accordingly, you end up both trusting and not trusting me, hardly a state of affairs consistent with your bivalent world view.

POSITIVUS: But can you handle these paradoxes solely by changing

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39. KOSKO, *supra* note 29, at 24-25.

40. This is an ancient paradox known to the Greeks as the paradox of Sorites. *See* DANIEL MCNEILL & PAUL FREIBERGER, FUZZY LOGIC 26-27 (1993).

41. This paradox was posited by the mathematician Bertrand Russell. *Id.* at 62.

42. This paradox was first formalized by Kurt Gödel. *Id.* at 63.

to a multivalent view?

MULTIVALUS: I think so. The strength of fuzzy logic is that it relieves us of the burden of using inaccurate full truth descriptions, when a sliding scale of truth is more appropriate. Fuzzy sets are not wedded to 0 or 1. For example, they "easily resolve the paradox of the heap. With each grain of sand removed, the heap has less membership in the set of heaps. It drops from 1.0 through 0.8 and 0.2 to finally, 0. Fuzzy sets glide smoothly across the truth continuum."[43]

NATURALUS: But what is the practical significance of these paradoxes?

MULTIVALUS: I am not sure about the practical significance, but I do believe that they show that the bivalent world view is fundamentally unsound. Moreover, if we utilize fuzzy logic, thus endorsing a multivalent perspective, we can construct technical devices which are capable of performing extraordinary tasks.

NATURALUS: Can you give us an example?

MULTIVALUS: Certainly. But let me begin by saying a few words about fuzzy sets. "Fuzzy logic," a term used extensively to describe technology utilized in devices from video cameras to washing machines,[44] is nothing more than reasoning with fuzzy sets. In practice, it most often means creating devices that reason with fuzzy rules—"if-then" statements like: If the clothes are *very dirty* (fuzzy set X), then make the wash cycle *longer* (fuzzy set Y). In mathematical terms, fuzzy "if-then" rules express the relation between fuzzy sets. Each rule, in turn, defines a "fuzzy patch," the product of fuzzy sets X and Y.[45] "The wider the fuzzy sets . . . the wider and more uncertain the fuzzy patch."[46] Moreover, the fuzzier

43. *Id.* at 35.
44. *See, e.g.,* Adrian Berry, *Learning Lifts Open Doors to Efficiency,* Sunday Telegraph, Oct. 3, 1993, at 13; Yvonne Chew, *Singapore Team Developing Intelligent Machines,* THE STRAITS TIMES, Dec. 3, 1993, at 25; Mark Dowie, *When Opportunity Tickles,* L.A. TIMES, Oct. 31, 1993, at 13; Margo Hammond, *Fuzzy Logic Sees Shades of Gray,* S. F. EXAM., Oct. 31, 1993, at E16; Roger Highfield, *Guru Heralds The Era of Fuzzy Talk,* DAILY TELEGRAPH, Feb. 16, 1994, at 14; Michael Schrage, *Looking Ahead to the Smart Home,* BOSTON GLOBE, Nov. 28, 1993, at 84; Ven Sreenivasan, *Clear Gains for Fuzzy Logic,* BUS. TIMES, Dec. 16, 1993, at 15; Michael White, *A Woolly Head for Logic,* THE TIMES (London), Jan. 22, 1994, Magazine, at 26.
45. KOSKO, *supra* note 29, at 292.
46. *Id.*

the fuzzy set, the more the set resembles its own opposite—the greater its fuzzy entropy. A set with 0 percent fuzziness is a black and white set, while a set that equals its own opposite is a 100 percent fuzzy set.[47]

NATURALUS: I am not sure I understand exactly what you are talking about. Can you provide us with another example of fuzzy sets?

MULTIVALUS: Sure. The operation of fuzzy sets is nicely illustrated in the context of America's favorite pastime.[48] Suppose, for example, we are attempting to determine the batting average possessed by a good hitter according to baseball pundits. On the x continuum (below in Illustration 1), we might sketch various batting averages, beginning with .050 and continuing through .450. On the y axis, we might measure whether or not a particular player is a *good* hitter. Illustration 1 details the traditional, bivalent view of a *good* hitter, as measured solely by a player's batting average.
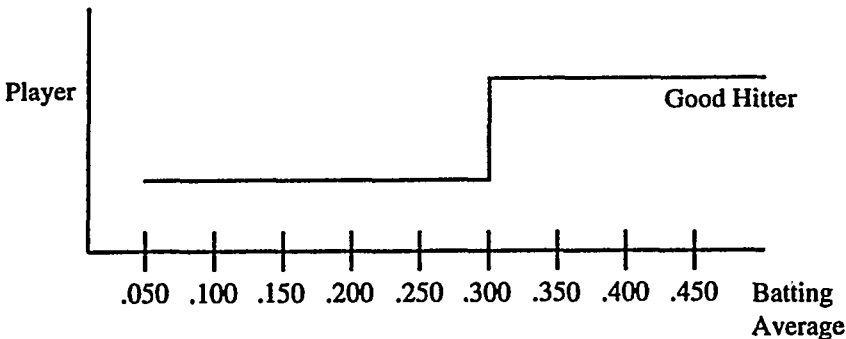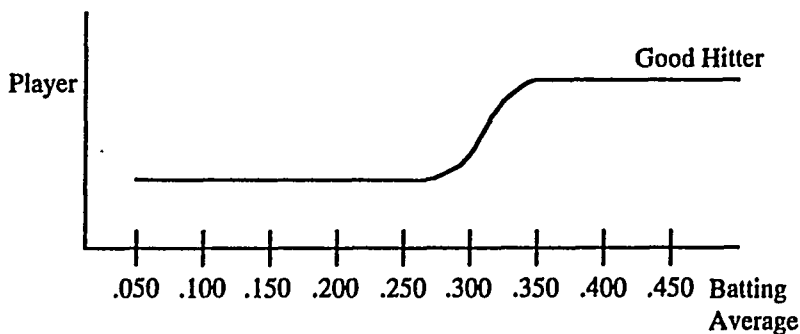
ILLUSTRATION 1

Illustration 2 below illustrates the fuzzy view of this same question.

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47. *Id.* at 291.

48. Dottie Enrico, *How Baseball's Faithful Beckon the Joys of Spring*, NEWSDAY, Feb. 11, 1994, at 77.

ILLUSTRATION 2

In Illustration 2, the concept *good* is denoted by a curve of fit values—a fit value is a number or degree between 0 and 1; a bit value is a 0 or 1—which for each average provides the degree or membership in the set of good hitters. Good hitting is a smooth function of average. Every hitter is a good or not good hitter to some degree. As such, *not good* looks like the inverse of the *good* curve (Illustration 3 below). If Illustrations 2 and 3 are placed on top of each other, they intersect at a point where *good* equals *not good*, where fuzziness reigns.[49]

ILLUSTRATION 3

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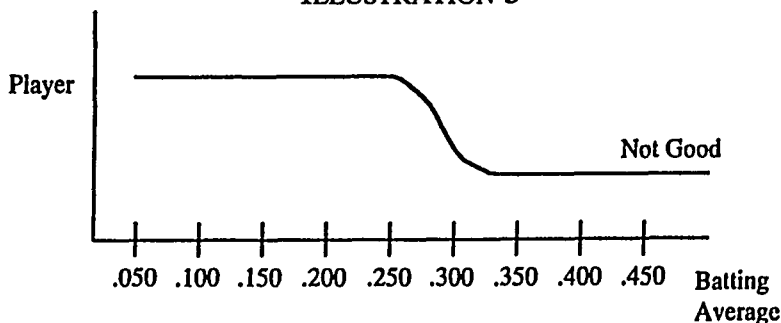
49. A similar model is developed in KOSKO, *supra* note 29, at 146-54; *see also* Leif M. Clark, *Fuzzy Thinking and Legislating Logically*, 12 AM. BANKR. INST. J. 14 (1994) (proposing a fuzzy logic model for analyzing the effectiveness of Chapter 11 Bankruptcy Law); Harold A. McDougal, *Lawyering and the Public Interest in the 1990s*, 60 FORDHAM L. REV. 1, 38 (1991); Jack F. Williams, *The Fallacies of Contemporary Fraudulent Transfer Models as Applied to Intercorporate Guaranties: Fraudulent Transfer Law as a Fuzzy System*, 15 CARDOZO L. REV. 1403, 1406 (1994).

POSITIVUS: And how are fuzzy sets supposedly superior to traditional bivalent sets?

MULTIVALUS: The power of fuzzy sets is readily evident if we compare them to traditional bivalent sets. Bivalent sets are drawn in hard, sharp lines between being a good and not good hitter. In bivalent terms, there are hitters that are good and not good, and no one hitter is both. We denote a hitter as good or not good at one point; here, a hitter with an average of .300 or higher is considered good, and one with an average below that mark is viewed as not good. But, as should be clear by now, such a view does not comport with reality. Whether or not a hitter is good, like most properties of the world, is "a matter of degree."[50] Whereas curves and fuzzy sets show this smooth change, from good to not good, straight lines do not show it, nor can they. Fuzzy sets tie words to curves, recognizing that all hitters are good or not good to some degree. The hitter who has a batting average of .280 is good and not good, maybe more good than not.

NATURALUS: Please go on and explain how fuzzy rules relate to fuzzy sets?

MULTIVALUS: By combining fuzzy rules we can create a fuzzy system, one that automatically converts inputs into outputs. Building such a fuzzy system requires three steps: (1) selecting the inputs and outputs of the system; (2) picking the fuzzy sets; and (3) choosing the fuzzy rules. Assume, for example, that we want to build a washing machine that "knows" to wash dirtier clothes for a longer duration than clothes which are relatively clean. Suppose that our input is the degree of dirtiness and our output is the duration of the wash. We want the washing machine to wash longer when the clothes are dirtier and to wash less when the clothes are cleaner.

NATURALUS: I could certainly use a washing machine such as that.

MULTIVALUS: We all could, I am certain. Now we select the fuzzy subsets of the inputs and outputs. For the fuzzy input sets we might pick *very dirty, dirty, slightly dirty, relatively clean,* and *almost completely clean.* We might draw these as triangles, as il-

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50. KOSKO, *supra* note 29, at 147; *see also* David A. Schum, *Diverse Models of Evidence and Inference: Probability and the Process of Discovery, Proof and Choice,* 66 B.U. L. REV. 825, 867 (1986); Peter Tillers, *Diverse Models of Evidence and Inference: Mapping Inferential Domains,* 66 B.U. L. REV. 883, 929 (1986).
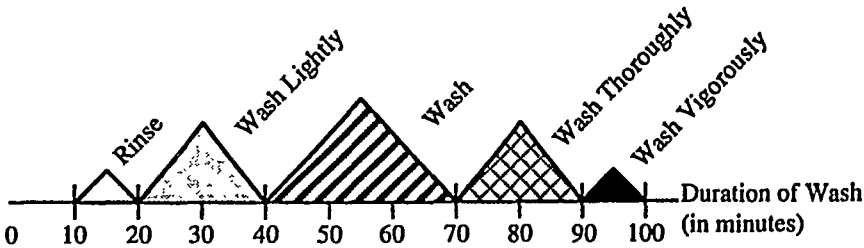
lustrated in Illustration 4 below.

ILLUSTRATION 4
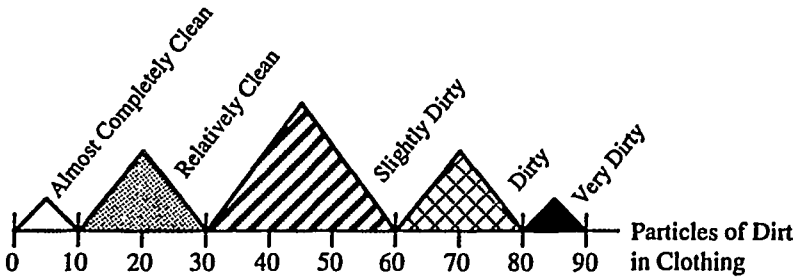
Next draw the five fuzzy output sets *wash vigorously, wash thoroughly, wash, slight wash* and *rinse.* These are denoted by the triangles below in Illustration 5.

ILLUSTRATION 5

Finally, we choose the fuzzy rules. This step associates the inputs and outputs, the degree of dirtiness with the duration of the wash, *slightly dirty* with *wash.* Because we want the duration and degree of the wash to correspond with the level of dirtiness of the clothing, we might posit the following rules:

Rule 1: If the clothes are almost completely clean, then they are only rinsed.

Rule 2: If the clothes are relatively clean, then they are rinsed and slightly washed.

Rule 3: If the clothes are slightly dirty, then they are washed.

Rule 4: If the clothes are dirty, then they are washed thoroughly.

Rule 5: If the clothes are very dirty, then they are washed vigorously.

NATURALUS: And what does all this do?

MULTIVALUS: By tying these fuzzy sets together into fuzzy rules we create fuzzy patches. These patches are derived from the intersection of the triangles of our fuzzy sets, as shown below in Illustration 6. If the sets are *dirty* and *wash thoroughly*, we get rule 4 which provides that when the clothes are *dirty*, then they should be *washed thoroughly*. The rule is a patch.[51]

ILLUSTRATION 6
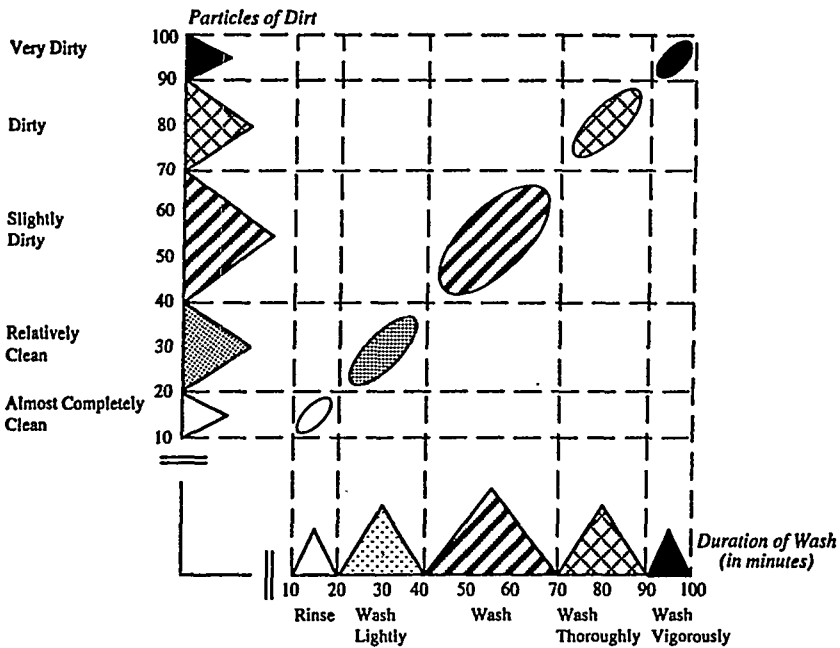
NATURALUS: And the patch?

MULTIVALUS: The type of rule we develop determines the size of the patch. Sloppy rules create large patches. Fine rules produce smaller patches. As the widths of our triangles decrease, the fuzzy sets decrease in their fuzziness. The finer the rule, the greater its precision. Importantly, regardless of the precision of the rule, each input to a fuzzy system activates all the rules to some degree as in a massive associative memory. The more the input resembles the

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51. A similar model is developed in KOSKO, *supra* note 29, at 161-67.

"if" segment of a fuzzy rule, the more the "then" part is activated. The fuzzy system then calculates all these "then" part fuzzy sets and takes their average or centroid value. This value is the output of the fuzzy system.[52] "Fuzzy chips perform this associative mapping from input to output thousands or millions of times per second. Each map from input to output defines one FLIPS—or fuzzy logical inferences per second."[53] This mapping, in turn, produces products which literally think for themselves; they can infer the manner in which to respond in certain situations. For example, Panasonic utilizes fuzzy rules in some of its video cameras to stop the image jigger that develops when a user's hand begins to shake. The rules guess where the image will shift and then compensate.[54]

NATURALUS: And exactly how much has fuzzy logic been used in products?

MULTIVALUS: Quite a bit. Interestingly, most of the devices that employ fuzzy logic have been developed in the Far East. "Japan [in particular] has led the fuzzy revolution at the level of high-tech consumer products. Japanese engineers have used fuzzy logic to raise the machine IQ of camcorders and transmissions and vacuum sweepers and hundreds of other devices and systems."[55] In 1991, some $2 billion in fuzzy consumer products were sold by Japanese companies alone.[56]

POSITIVUS: How is fuzzy logic different from artificial intelligence that I have heard so much about?

MULTIVALUS: An excellent question. How do you make a decision? Suppose you want to plan a golfing vacation in January. Suppose you have a choice between traveling to Minnesota or Florida. Now, you reason that Florida is the better choice. But how do you reach this answer? Of course, you reach your decision with rules. "Rules associate ideas. They relate one thing or event or process to another thing or event or process."[57] Rules, as we have suggested, are

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52. *Id.* at 293.
53. *Id.*
54. *See, e.g., Electronic Firms Get a Clear Picture with Fuzzy Logic,* ST. LOUIS POST-DISPATCH, May 23, 1990, at C9; *The Future of Electronics Looks Fuzzy,* WASH. POST, Dec. 23, 1990, at H1; T.R. Reid, *Tokyo's Tech for Teeth and Toilets,* WASH. POST, June 15, 1992, at A12; Rich Warren, *Manufacturers Are Thinking Small This Year,* CHI. TRIB., June 1, 1990, at C2.
55. KOSKO, *supra* note 29, at 71.
56. *Id.*
57. *Id.* at 158-59.

"if-then" statements. If it snows, then you can cannot play golf. If it is January in Minnesota, then snow is likely. If it is January in Florida, then the weather is likely to be quite nice. So, you go on vacation to Florida.

POSITIVUS: I understand so far.

MULTIVALUS: Excellent. Artificial intelligence is premised on two notions: (1) knowledge flows from rules, and (2) you can reduce these rules to the black-and-white language of computers.[58] As proponents of artificial intelligence contend, you can design a computer, a machine, that does anything if you can program enough rules into the system.[59] But, artificial intelligence, unlike fuzzy logic, has failed "[a]fter over 30 years of research and billions of dollars in funding . . . [t]o produc[e] smart machines or smart products."[60]

POSITIVUS: And, why has it failed?

MULTIVALUS: Proponents of artificial intelligence claim they have so far been unsuccessful because they cannot program enough bivalent rules into computers. You see, to create a washing machine employing artificial intelligence would require one to program thousands of rules for every likely sequence of events and factors related to the machine's operation. For example, in order to devise a program that washed very dirty clothes perfectly with bivalent rules, one would have to write a program that took account of such factors as the precise degree of dirt in the clothes, the composition of dirt, the duration that the dirt has remained on the clothes, the type of detergent used, the type of water used, etc. By contrast, fuzzy devices do not use many rules, but rather they employ fuzzy rules: If the clothes are very dirty, then wash vigorously. One rule covers a myriad of cases. Granted it is a vague, fuzzy, inexact rule, but it works now, today, to produce products that work today. "The AI crowd missed [all of this]. They went for rules but scrubbed all the gray out of them."[61]

NATURALUS: Can you give us another example of the practical strength of fuzzy logic?

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58. *Id.* at 159.
59. *Id.*
60. *Id.*
61. *Id.* at 160.

MULTIVALUS: Sure. Fuzzy cameras are a case in point. "The Canon hand-held H800 cameras use only 13 rules to tune the autofocus on the lens."[62] In the camera, "[s]mall electrical sensors measure the image clarity and the change in image clarity in six parts of the image. That gives 12 types of sensor data. The 13 rules turn these 12 data into new lens settings."[63] Cannon claims the fuzzy system focuses twice as well as did the other controllers they tested and used to use.[64] What is perhaps most amazing is that this fuzzy system takes up only a tiny bit of chip memory, only 1.1 kilobytes—a small part of even an old big floppy disk.[65]

POSITIVUS: But can you not accomplish the same things by using probability theory? I mean Bayesian probability, as we know it.

MULTIVALUS: Refresh my memory, will you, about Bayesian probability?

POSITIVUS: Three premises underlie Bayesian probability. First, it reasons backward from evidence to hypothesis. Second, it accepts subjective evaluations. Finally, it builds a complete model of the situation, creating an edifice in which all probabilities add up to 100 percent, rather than assessing individual frequencies in isolation.[66]

MULTIVALUS: You forget one critical element that runs throughout all probability analysis. From my perspective, the most noteworthy element regarding probability is that it is inherently bivalent. According to probability theory, a flipped coin is either heads or tails. A flipped coin cannot be heads and tails, and must be either heads or tails. This differs decidedly, however, from fuzziness. Allow me to explain.

NATURALUS: Please do.

MULTIVALUS: If we ask, "Is there a loaf of bread in the freezer?," we are dealing with probability. The answer might be 0.5, as in a coin toss. But, suppose there is three-quarters of a loaf of bread in

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62. *Id.* at 182.
63. *Id.*
64. *Id.*
65. *Id.*
66. Judea Pearl, *Bayesian and Belief—Function Formalisms by Evidential Reasoning: A Conceptual Analysis, in* READINGS IN UNCERTAIN REASONING 540, 541 (Glenn Shafer & Judea Pearl eds., 1990).

the freezer or one-half of a loaf of bread. Now, we are required to ask the question, "To what degree is there a loaf of bread in the freezer?" This is a profoundly different question. It is a fuzzy question, though the answer might still be the same 0.5. You see, fuzziness is inherently different from Bayesian probability in that probability dissipates with increasing information. As you noted, Bayesian probability reasons backward from evidence to hypothesis. Fuzziness, by contrast, "can coexist with total information."[67] We may know there is a one-half of a loaf of bread in the freezer, and yet the fuzziness remains. Is that still a loaf? I acknowledge that fuzziness resembles probability, in that both deal with degrees, "one of truth, the other of likelihood or expectation."[68] But the fact that they both deal with different degrees is critical. That is the difference, my friends.

POSITIVUS: Let us, for the sake of argument, suppose that fuzzy logic is theoretically sound and also a workable technology. What, exactly, is the significance of fuzzy logic for the natural law-legal positivist debate?

MULTIVALUS: I will explain. Let me begin by pointing out that the legal system is commonly thought of as a system of norms, some of which are rules and some of which are principles.[69] Rules are usually said to be exact and precise. They are black and white and, hence, bivalent. To use the example we discussed earlier, a rule might provide: "It is unlawful to speak against the leadership of the Third Reich." Principles, by contrast, are thought to be abstract and fuzzy: "Freedom of speech is a human right." Unlike principles, rules change rapidly. Whereas principles evolve and metamorphosize gradually over time, rules die relatively young. Each decision or debate regarding the legal system might involve a particular rule or two, but *several* legal principles can be involved to some lesser or greater degree.[70]

NATURALUS: So the legal system is fuzzy?

MULTIVALUS: Yes. In many ways, law is a paradigmatic example of fuzziness. Everything is a matter of degree in law. Legal terms and

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67. *Id.*

68. *Id.*

69. RONALD M. DWORKIN, TAKING RIGHTS SERIOUSLY ch. 2 (1977) (exploring extensively the distinction between rules and principles); *see also* KOSKO, *supra* note 29, at 178-80; Roscoe Pound, *Why Law Day?*, 10 HARV. L. SCH. BULL. no. 3 (1958).

70. KOSKO, *supra* note 29, at 179.

borders are inherently fuzzy. Every rule or principle has excep-
tions, and you can never be certain that a court will not add an-
other exception to the already existing ones. For example, Article 9
of the *Uniform Commercial Code* provides a seemingly straight-
line rule that the first secured creditor to file or perfect prevails
between two competing creditors with an interest in the same col-
lateral, but numerous judicial decisions ignore this rule in the
name of equity.[71] These decisions fuzzify law. Try to imagine a line
between a secured party having priority and not having priority.
The line will be a curve, subject to being redrawn with each new
case.[72] So we can see that not only principles, but rules, too, are
fuzzy.

NATURALUS: What you say seems reasonable. What follows?

POSITIVUS: Does this mean, for example, that judges are using or
creating fuzzy rules in rendering decisions?

MULTIVALUS: Sort of. How does a judge decide a case? Does a judge
look to the appropriate code section or case and match the facts of
the instant case to the "if" part of the rule and then render a deci-
sion? Or does the judge match "fuzzy facts to fuzzy loose prece-
dents"[73] and end up using something that looks very akin to fuzzy
logic?

POSITIVUS: If what you have in mind is the way a judge actually
reaches a decision, that is, the process of discovery, as opposed to
the process of justification, then you are probably right in sug-
gesting that she moves back and forth between the rule and the
facts, thus perhaps letting her reading of the rule influence the
fact-finding process and vice versa. But I cannot see how this sup-
ports your conclusion that the judge uses something akin to fuzzy
logic.

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71. *See, e.g., In re* Howard's Appliance Corp., 874 F.2d 88 (2d Cir. 1989) (re-ordering
normal priority scheme pursuant to constructive trust theory); General Ins. Co. v. Lowry,
412 F. Supp. 12 (S.D. Ohio 1976), *aff'd*, 570 F.2d 120 (6th Cir. 1978) (re-ordering normal
priority scheme pursuant to equitable lien theory); Producers Cotton Oil Co. v. Amstar
Corp., 242 Cal. Rptr. 914 (Cal. Ct. App. 1988) (re-ordering normal priority scheme pursuant
to unjust enrichment theory); Affiliated Foods, Inc. v. McGinley, 426 N.W.2d 646 (Iowa Ct.
App. 1988) (re-ordering normal priority scheme pursuant to estoppel principles); First Wyo-
ming Bank v. Mudge, 748 P.2d 713 (Wyo. 1988) (re-ordering normal priority scheme pursu-
ant to tortious interference with contractual relations theory); *see generally* ROBERT A.
HILLMAN ET AL., COMMON LAW AND EQUITY (1985 & Supp. 1991).

72. KOSKO, *supra* note 29, at 263.

73. *Id.* at 178.

MULTIVALUS: What I mean is that no case before a judge is identical to a case that has preceded it. Accordingly, a judge must apply the instant facts to the fuzzy law that came before to render a decision.

NATURALUS: But, am I not correct, Positivus, in assuming that under your formulation of decision-making, a judge could easily be reproduced by a computer? For you, law is a rule tree. "A judge just checks the rules and matches the facts to the rule."[74]

POSITIVUS: Wait a minute, Naturalus. What you are saying may be an accurate description of an attitude toward law and judicial decision-making, which Pound[75] has called mechanical jurisprudence, and which holds that the judge is working within a closed system of norms capable of deciding every conceivable issue, leaving no room for any creative activity on the part of the judge.[76] But, if it is intended as a description of a modern positivist's view of judicial decision-making, it is totally inaccurate. As Hart[77] has pointed out, natural languages (English, German, etc.) are open-textured or, if you will, indeterminate, thus leaving us a certain amount of discretion to choose between equally reasonable interpretations. More specifically, when interpreting a statute, say, the judge will normally be able to distinguish some cases clearly covered by the rule, some cases which are clearly not covered by the rule, and some cases which seem to be on the borderline. For example, if a statute speaks of "vehicles," we can be reasonably certain that it covers cars, but what about street cars, mopeds, bicycles or roller skates? Not surprisingly, we cannot decide this question on linguistic grounds alone, but have to make use of principles of interpretation and other tools of legal reasoning. Consequently, Hart's and other positivists' insistence on the separation of law and morality in no way necessitates a view according to which law is "a closed system" in the way just indicated.

NATURALUS: I doubt whether Hart's view regarding discretion is consistent with positivism's other key tenets? Like Dworkin, I view Hart's version of positivism as "a model of and a system for rules,"[78] which fails to take into account the important role that

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74. *Id.* at 179.
75. Roscoe Pound, *Mechanical Jurisprudence*, 8 COLUM. L. REV. 604, 605-09 (1908).
76. This approach is said to have dominated the law in the middle and later part of the nineteenth century. *See, e.g.,* NEIL MACCORMICK, H.L.A. HART 121 (1981).
77. HART, THE CONCEPT OF LAW, *supra* note 1, at 121-32.
78. DWORKIN, *supra* note 69, at 22.

principles play in legal reasoning.

POSITIVUS: Would you care to elaborate on your train of thought?

NATURALUS: Sure. Let me reproduce the essence of Dworkin's inge-
nious argument. Dworkin begins by ascribing to Hart what he calls
the doctrine of discretion, according to which a judge cannot de-
cide a case that is not clearly covered by a legal rule simply by
applying the rule, but has to exercise discretion, thus creating
law.[79] He then goes on to distinguish between legal rules and legal
principles,[80] claiming that the former, if applicable, conclusively
determine the case at hand, whereas the latter only state reasons
that argue in one direction.[81] Having done that, he points out that
since principles play an important role in legal reasoning, including
judicial decision-making, we have to account for them in an analy-
sis of legal rights and obligations.[82] And in doing this we have to
choose between two fundamentally different ways of treating prin-
ciples: either (i) as part of the law, as legally binding norms, or (ii)
as extra-legal norms, which may be morally but not legally bind-
ing.[83] Positivists, however, are not free to choose as they please be-
tween these two different ways of treating principles, but have to
choose (ii), because it follows from the doctrine of discretion that
principles are extra-legal norms.[84] Indeed, judicial discretion, in a
strong sense, consists of not being bound by principles:

> It is the same thing to say that when a judge runs out of rules he has discre-
> tion, in the sense that he is not bound by any standards from the authority
> of law, as to say that the legal standards judges cite other than rules are not
> binding on them.[85]

Now if this is true, it means that very few legal rules can be bind-
ing, and this, in turn, means that positivism collapses into some
sort of realism or rule-skepticism. This is so because courts some-
times reject established rules, and if they have discretion to do
that, these rules cannot be binding; and this, of course, contradicts
the positivist conception of the law as a set or a system of binding
norms.

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79. *Id.* at 33.
80. *Id.* at 22-27.
81. *Id.*
82. *Id.* at 26.
83. *Id.* at 29.
84. *Id.* at 30-31.
85. *Id.* at 34.

POSITIVUS: Could you please go over the last part of the argument one more time?

NATURALUS: Of course, Positivus. If the courts, as a matter of fact, change established legal rules, then an adequate theory of law must be able to explain this fact. Now if, contrary to what has been assumed, the law includes principles that are legally binding, we can say that these principles guide the courts in their activity of changing established legal rules. If, on the other hand, the law does not include such principles, the courts seem to change established legal rules without the guidance of binding legal norms. This means that the courts have discretion to change the rules in question, in which case the rules cannot be legally binding.

POSITIVUS: This is an ingenious argument, indeed. Yet, I am not completely convinced by it. For one thing, positivists can reject the doctrine of discretion and treat the principles as part of the law, as legally binding norms, which guide the behavior of judges. This means, to be sure, that they have to come up with a 'rule of recognition', that is, a criterion of pedigree, that captures them. But I believe that this is possible. Moreover, I believe that many, though not all, of Dworkin's principles should properly be conceived of as summaries of a set of pre-existing rules and, consequently, lack independent standing. However, let us assume that you are right. What follows?

MULTIVALUS: If we accept that law is inherently fuzzy, then we should also recognize that creating a fuzzy system from these rules and principles is useful because it forces us to think through and seek intersections of agreement. This search for intersection helps us to refine the debate and allows us to screen out needless noise. In short, the very process of devising and thinking through a fuzzy system requires the lion and lamb to lay down together,[86] in a quest for areas of mutual agreement. This type of group therapy between natural law theorist and positivist will give birth to mutual recognition that both sides are not as divided in their views as it might otherwise seem. It defines areas of mutual agreement, thus identifying the parameters and degree of disagreement. In an important way, building this fuzzy system simply confirms what we may already expect: your two views are not without significant common ground.

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86. *Isaiah* 11:6. The authors invite the reader to assign what they view as the appropriate label to each of the respective parties in the debate.

NATURALUS: But all this is pretty general, Multivalus. I would like to find areas of mutual agreement as well as identify the parameters and degree of disagreement. I just want to know how, exactly, we are going to do that?

MULTIVALUS: Let me explain what I mean. We need, I think, to take a closer look at the premises underlying the respective theories. One reason for being a legal positivist is that one embraces some sort of value relativism and thus rejects the existence of objective moral values. Such a person is likely to argue that important moral and political decisions ought to be decided by a democratically elected body and, that once a law is enacted, it should be applied by the judiciary in accordance with the principle of formal justice, thus treating like cases alike and different cases differently. Clearly, this line of argument emphasizes legal certainty or predictability, which happens to be a major concern of positivists.

POSITIVUS: What you have said seems plausible.

NATURALUS: And what about natural law theory?

MULTIVALUS: Not surprisingly, natural law theorists tend to believe in an objective morality. They believe that one party in a moral dispute can be right and the other wrong. So, it seems reasonable to claim that natural law theorists tend to give priority to substantial over formal justice, if by "substantial justice" we understand that a rule, say, is moral, fair and just as regards its content.

NATURALUS: But this is far too crude a description of the aims of natural law theorists. For example, Fuller, a self-proclaimed natural law theorist, devotes a whole chapter in *The Morality of Law*[87] to a discussion of The Rule of Law, stressing that laws ought to be general, public and prospective, and that there ought to be congruence between the law and official action.[88] He considers these requirements to be moral requirements, calling them "the inner morality of law"[89] and "the morality that makes law possible."[90] Wouldn't you say that Fuller constitutes a counter-example to your hypothesis, Multivalus?

MULTIVALUS: No, I would not. Fuller fails to substantiate his claim

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87. FULLER, THE MORALITY OF LAW, *supra* note 1.
88. *Id.* at 46-91.
89. *Id.* at 42.
90. *Id.* at 33.

that his requirements are *moral* requirements in any reasonable sense of the word, and consequently, one may question whether his theory of law should properly be called a theory of natural law. Like Hart,[91] I believe that Fuller confuses purposive activity and morality. For example, poisoning can surely be conceived of as a purposive activity, which means that to be successful in poisoning, one ought to conform to certain principles. But, needless to say, it would be absurd to speak of the inner morality of poisoning.

NATURALUS: Suppose you are right. What follows?

MULTIVALUS: I suggest that we construct a fuzzy system, utilizing the notions of formal and substantial justice in the following way. We might posit that the system has as its inputs the degree of legal certainty conceived of as predictability combined with the degree to which the system adopted coincides with the demands of substantial justice, and has as its outputs the degree of legal validity; that is, the extent or degree to which the statute or system is law. We can, I think, assume that everyone, positivist and natural law theorist alike, can tolerate a lesser degree of predictability the more the demands of substantial justice are satisfied and, conversely, desires a greater degree of predictability the lesser the demands of substantial justice are satisfied. We might assert that this is so because both natural law theorists and positivists would give priority to predictability in cases where it is difficult to determine what justice requires, but would value morality above predictability in cases where the demands of justice are clear. In short, we might assert that if we know what is just and if the legal system coincides with morality, we need not require predictability as much as we do when we know this. So, the degree of formal and substantial justice, when taken together, determines the degree of legal validity of the system. Do you both follow me so far?

NATURALUS: Please continue. I shall hold my tongue until you are finished.

MULTIVALUS: Very well. If you accept what I have suggested, we might now posit the following fuzzy subsets of inputs and outputs. As our fuzzy inputs, we might utilize a combination of the following sets: *perfectly predictable, highly predictable, somewhat predictable, perfectly moral, highly moral* and *somewhat moral.* As our fuzzy outputs, we might posit the following: *perfectly valid,*

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91. *See generally* H.L.A. HART, THE MORALITY OF THE CRIMINAL LAW (1965).

nearly perfectly valid, highly valid, significantly valid, moderately valid and *somewhat valid.*

POSITIVUS: And, now what?

MULTIVALUS: Having developed these sets, we then create our fuzzy rules. Because we want a higher degree of predictability and morality to correspond with a higher degree of legal validity, we might posit the following rules:
  Rule 1: If the system is *somewhat predictable* and *somewhat moral*, then it is *somewhat valid.*
  Rule 2: If the system is *somewhat predictable* and *highly moral* or *highly predictable* and *somewhat moral*, then it is *moderately valid.*
  Rule 3: If the system is *somewhat predictable* and *perfectly moral* or *perfectly predictable* and *somewhat moral*, then it is *significantly valid.*
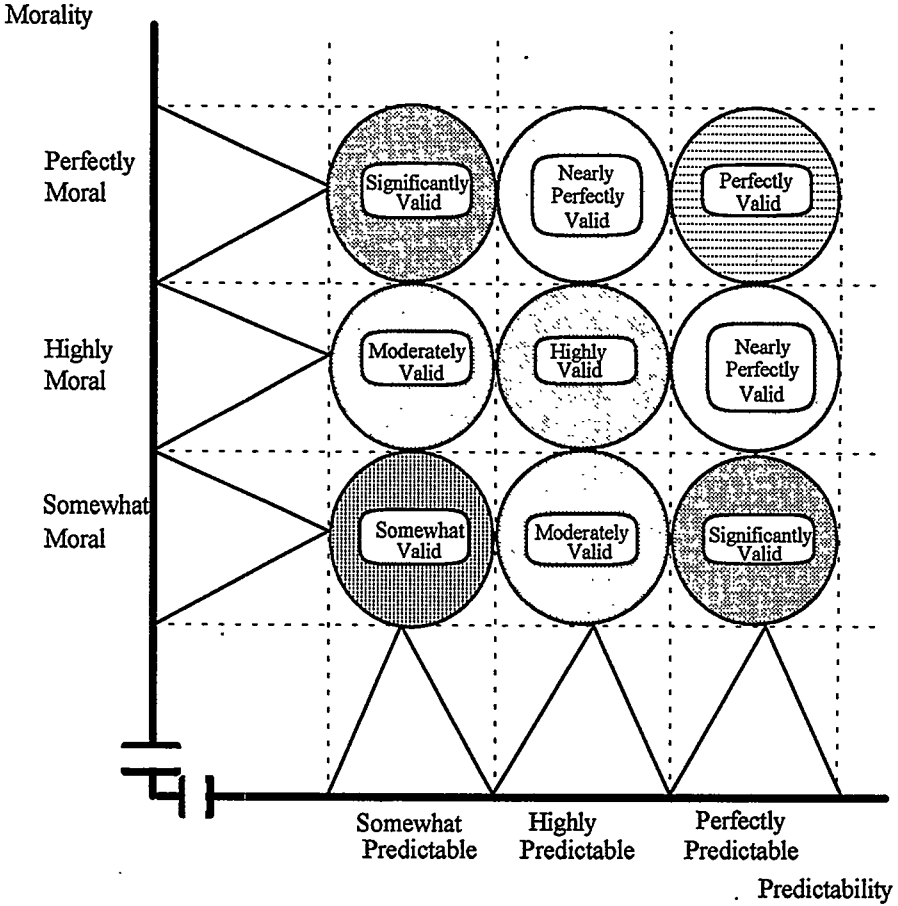 Rule 4: If the system is *highly predictable* and *highly moral*, then it is *highly valid.*
  Rule 5: If the system is *highly predictable* and *perfectly moral* or *perfectly predictable* and *highly moral*, then it is *nearly perfectly valid.*
  Rule 6: If the system is *perfectly predictable* and *perfectly moral*, then it is *perfectly valid.*
Illustration 7 below details the product of these fuzzy rules—our fuzzy system.

Illustration 7

Morality

Perfectly
Moral

Significantly
Valid

Nearly
Perfectly
Valid

Perfectly
Valid

Highly
Moral

Moderately
Valid

Highly
Valid

Nearly
Perfectly
Valid

Somewhat
Moral

Somewhat
Valid

Moderately
Valid

Significantly
Valid

Somewhat   Highly   Perfectly
Predictable   Predictable   Predictable

Predictability

As should be apparent, the fuzzy patches that are created by the system indicate areas of agreement between natural law theorist and positivist. They are, of course, merely one possible set of fuzzy patches. Yet, the utility of this exercise lies more in its process than in its results. The exercise itself helps build consensus where none existed previously. It outlines areas of agreement, thereby focusing and refining the debate on the remaining issues of disagreement. Lastly, it provides both parties with a methodology to build toward a system that they, and all the relevant interests, find acceptable.   .

POSITIVUS: I see. You are suggesting that we introduce a graded concept of legal validity. But this will result in a considerable increase in complexity, so the returns had better be good.

MULTIVALUS: You are quite right, Positivus. I am suggesting that we trade simplicity for accuracy, which of course means that we get an increase in complexity. But I believe that we gain more than we lose in doing this. First, we are now in a position to offer a truer description of reality, and that in itself is, I think, a good thing. Second, and more importantly, we can connect this graded concept of legal validity to, among other things, our (alleged) moral obligation to obey the law. If we assume, as many people do, that we have a moral obligation to obey the law, we may safely conclude that this moral obligation will be of lesser weight in relation to a minimally legally valid law than in relation to a perfectly legally valid law. And this is, of course, of interest in cases of civil disobedience. Third, this graded concept of legal validity may be of some importance in cases where two or more rules of the system conflict with each other. Thus, if two legal rules are equally applicable to certain operative facts but yield different legal consequences, and if we cannot solve this conflict by invoking maxims of the type "higher law overrides lower law," we may argue that the more valid rule ought to override the less valid rule.

POSITIVUS: This analysis is quite interesting. However, I would like to see your theory applied to a concrete legal case.

MULTIVALUS: A good point. Let me do just that. Let us return to the German case we discussed earlier. In that case, you indicated that the post-war court found the soldier's wife guilty of the offence of illegally depriving the soldier of his freedom. You noted, Positivus, that the court's reasoning had been questioned by Hart,

who argued that the statutes on which the woman rested her defense—according to which it was illegal to utter statements critical of the Third Reich—were legally valid despite their gross immorality and, that consequently she acted in accordance with then-valid Nazi laws when she denounced her husband.[92] Naturalus, on the other hand, had no problem finding her guilty because, from his point of view, grossly immoral statutes simply lack legal validity.

NATURALUS: That is an accurate summation of our positions.

MULTIVALUS: Now, as we have already said, the statutes themselves were grossly immoral. Moreover, we may safely assume that the Nazi statutes at issue were not very predictable in their application, as it was difficult to determine what consequences would follow from, say, the act of criticizing Hitler and other Nazi party officials. Let us assume that this was so because many individuals who spoke against the Third Reich were not prosecuted, those who were prosecuted were given widely varying sentences, and those, in turn, were carried out to varying degrees depending on who uttered them, where, when and why they were uttered.

POSITIVUS: That is a reasonable supposition.

MULTIVALUS: Now, what I am saying is that if the statutes are of dubious predictability and also quite immoral with respect to their content, they have a rather low degree of legal validity. Remember our Rule 1 above: if the legal system or relevant statute is only somewhat predictable and somewhat moral, then it is only somewhat legally valid. We can, in this case, safely say that the statutes in question had a very low degree of legal validity and so could not constitute an adequate defense, which of course means that the woman's contention that she acted in accordance with then-valid statutes loses most, but not all, of its legal force. As should be clear, this approach blends predictability and morality, formal and substantial justice, legal positivism and natural law theory. It removes us from taking diametrically opposed positions on these issues and, instead, allows a gray resolution to a seemingly intractable black and white problem.

NATURALUS: Very interesting, indeed. But could you please go over the general idea of the argument once again?

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92. Hart, *Positivism and the Separation of Law and Morals, supra* note 1, at 619-20.

MULTIVALUS: Certainly. What we are really discussing here is which theory, legal positivism or natural law theory, offers the most accurate and, hence, true description of what law is. Natural law theorists and legal positivists alike contend that their theory is the most accurate; the true theory. Their positions are like 0 and 1, A or Not-A, that is, diametrically opposed. Yet, do either of these theories accurately describe the respective positions of the parties, much less a system that functions today or may function in the future? Are they not factually false? Are these theories not akin to suggesting that "My lawn is green?" That is, do they not fail to correspond to reality? Have there not been laws enacted that are not moral? And, must not laws be morally right in order to obligate? Fuzzy logic, on the other hand, recognizes that these views trade accuracy for simplicity and are therefore not accurate descriptions of the law. We need a system that is more accurate, closer to the truth—one that recognizes that .5, and A *and* Not-A, are closer to the truth than these two views recognize. But what is truth? For both of you, "the pursuit of truth comes down to how truth behaves, what shadows it casts on the math wall."[93] Truth is either 0 or 1, legal positivism or natural law theory. For fuzzy theorists, truth is somewhere in the continuum of gray values between 0 and 1.

NATURALUS: I see what you are saying, Multivalus.

MULTIVALUS: Good. Now if we stop rounding off, we can create fuzzy rules and ultimately a fuzzy system, as detailed earlier. The strength of fuzzy logic is not only that it gets us to this compromise by allowing us to abandon our previous reliance on rounding off, but that it then allows us to create a system that functions with rules that are precise within a range of degrees. In sum, fuzzy logic both allows us to formulate a decision-making system for addressing the views of legal positivists and natural law theorists that is more accurate than bivalent models, and, at the same time, reduces that system to a limited number of rules. In our earlier example, for instance, you will recall we reduced our decision-making system to six easy rules.

NATURALUS: I find your ideas reasonable. We really should try to view things from a more open perspective. Yet, what you have just said is hardly new, is it?

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93. KOSKO, *supra* note 29, at 80.

MULTIVALUS: To be sure, I am not the first one to suggest that natural law theory and legal positivism share some common ground. For example, having performed a penetrating analysis of Hart's "internal point of view,"[94] MacCormick concludes that "[w]e can set up caricatures or ideal types of so-called legal positivism and natural law theory,"[95] but then we "delude ourselves in supposing that there remains nowadays any sharp division between the approaches so named."[96] In my opinion, however, suggestions like this do not take us very far. When one tries to understand exactly what this common ground is and what consequences flow from it, one tends to get lost. At least, that is my opinion. Now, what I offer here is a new conceptual apparatus—that of fuzzy logic—which transcends the traditional bivalent way of looking at things, and with the help of which we can express old and new insights in a coherent manner.

NATURALUS: The hour is late. Let us adjourn for now and return tomorrow to discuss fuzzy logic again. My interest is piqued, Multivalus, but I am unconvinced.

Fuzzy logic and fuzzy concepts are increasingly coming to dominate both modern technology and the sciences. Fuzzy logic rejects the search for certainty and instead seeks consensus. It is at the same time both highly practical and yet keenly precise. The increasing acceptance of fuzzy logic can no longer be ignored by academics in any field. For decades, scholars have sought truth with the bivalent tools of Aristotle.[97] Fuzzy logic offers us an opportunity to seek solutions with the tools of tomorrow. As Lotfi Zadeh has noted in this regard:

> Classical logic is like a person who comes to a party dressed in a black suit, a white, starched shirt, a black tie, shiny shoes, and so forth. And fuzzy logic is a little bit like a person dressed informally, in jeans, tee shirt, and sneakers. In the past, this informal dress wouldn't have been acceptable. Today, it's the other way around.[98]

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94. NEIL MACCORMICK, AN INSTITUTIONAL THEORY OF LAW: NEW APPROACHES TO LEGAL POSITIVISM 141 (1986).

95. *Id.*

96. *Id.*

97. Aristotle is arguably the father of modern bivalent logic. *See generally* ARISTOTLE, ETHICS (Penguin Classics 1955); ARISTOTLE, THE ORGANON (Penguin Classics 1955); ARISTOTLE, THE POLITICS (Penguin Classics 1962).

98. *Coping With the Imprecision of the Real World: An Interview With Lotfi A. Zadeh,* 27 COMM. ASS'N COMPUTING MACHINERY 304, 310 (1984).