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LINGUISTIC SILOS AS BARRIERS TO SUSTAINABLE ENVIRONMENT

John Mixon*

*Communication . . . is not a transmission of information, but rather a coordination of behavior among living organisms through mutual . . . coupling.*¹

I. LINGUISTIC SILOS IMPEDE COMMUNICATION AMONG VOTERS, SCIENTISTS, AND LAWYERS

What do linguistic silos have to do with sustainability? Everything. Scientists, lawyers, legislators, lay members of the community, and poets are essential players in the sustainability effort. Poets provide inspiration, scientists describe reality, the lay community speaks as voters and consumers, legislators set policies and priorities, administrators produce regulatory texts, and lawyers and judges try to interpret the texts as they manage conflicts between the regulators and the regulated. Language is the flawed mechanism through which communication among all these participants must occur.

The linguistic difficulties of crossing international cultural and language boundaries are obvious. What is not so obvious is that, within a given culture, linguistic silos may isolate professional subcultures and hinder communication across disciplinary boundaries. Even to a greater extent, professional silos may leave the lay community entirely outside the circle of understanding.

When a U.S. scientist, lawyer, or voter utters the very same words, the similarity of their common language may hide a chasm of difference in meaning. Some examples are easy to come by. Both lay members of the community and scientists regularly accuse lawyers of using language to confuse, not to communicate. Young lawyers may be equally frustrated when, for example, they ask a psychiatrist whether an accused knew right from wrong—a question no scientist can answer. Lay jurors, paradoxically, decide such issues handily. Legislators speak in ambiguous statutory texts, and administrators speak in confusing administrative texts, mostly to lawyers who must assign meaning or “intent” to their words. All the while, poets and artists stand aside and speak a language of their own. This article will not topple the tower of Babel. Instead, I propose a

* Law Alumni Professor, University of Houston Law Center. The author is indebted to several people who read and commented on early drafts, including Barbara Evans, Daniel Goldberg, K. Lance Gould, Evelyn Keyes, J. P. Singh, Ron Turner, and Donald Williamson.

1. Fritjof Capra, *The Web of Life: A New Scientific Understanding of Living Systems* 287 (Anchor Bks. 1996) (emphasis omitted).

conversation about epistemological differences with an eye toward facilitating discourse among scientists, lawyers, and the lay community. The discussion may be more useful to students and new professionals than to long-time practitioners who have worked out their own understanding and accommodations to these linguistic differences.

II. INTRODUCING LUDWIG WITTGENSTEIN AND *PHILOSOPHICAL INVESTIGATIONS*

A recent poll of professional philosophers named Ludwig Wittgenstein's 1953 book *Philosophical Investigations* the Twentieth Century's most influential book in philosophical thought.² Wittgenstein tells us we learn our community's language and its implicit rules as a "game."³

A. *We Learn Language as a Game.*

People learn games by watching others play and then participating as players. They do not start with a rule book. The same is true of language. Consider how a child learns the word "hot," along with the grammar of its mother's warning "Don't touch the stove; it is hot."⁴ The child says "Hot, mommy?" and touches the stove, thereby immediately absorbing the community meaning of *don't, touch, stove, it, is,* and *hot*, along with the grammar that combines those words in a meaningful sentence. The contraction "don't" introduces hints of authority, respect, negation, wisdom, cause and effect, and the possibility of rebellion, along with a nascent understanding of practical wisdom, law, and morality as rules of conduct. Discrete parts of the child's brain that are specialized to spoken language are physically changed by the experience.⁵ Newly formed neural patterns automatically assign meaning to the words and instill a working knowledge of the rules of grammar that can now be applied in other sentences.⁶ The language that is thus learned is self-referentially imbedded in its own use, and efforts to describe it by language itself are likely to fail.⁷

Contrary to popular understanding,⁸ words do not point to reality.⁹ The word

2. David G. Stern, *Wittgenstein's Philosophical Investigations: An Introduction* 1 (Cambridge U. Press 2004) (stating *Philosophical Investigations* was ranked first by the end-of-the-century poll of philosophers).

3. Ludwig Wittgenstein, *Philosophical Investigations* § 7, 5e (G.E.M. Anscombe trans., 3d ed., Macmillan Co. 1970) ("We can also think of the whole process of using words . . . as one of those games by means of which children learn their native language.).

4. This is not an example from *Philosophical Investigations*. For a recent, more technical description of the child's learning process, see Steven Pinker, *The Stuff of Thought: Language as a Window into Human Nature* 28–73 (Viking 2007).

5. See Steven Pinker, *The Language Instinct* 18, 299–306 (HarperPerennial 1994).

6. See *id.* at 317–22.

7. Ludwig Wittgenstein, *Tractatus Logico-Philosophicus* 8 (Routledge & Kegan Paul 1981) [hereinafter *Tractatus*] (referring to the introduction by Bertrand Russell, in which Russell comments about "perhaps the most fundamental thesis of Mr Wittgenstein's theory. That which has to be in common between the sentence and the fact cannot, so [Wittgenstein] contends, be itself in turn *said* in language." (emphasis in original)); cf. Wittgenstein, *supra* n. 3, at § 124, 49e ("Philosophy may in no way interfere with the actual use of language; it can in the end only describe it.").

8. Wittgenstein, *supra* n. 3, at ¶ 1, 2e.

These words . . . give us a particular picture of the essence of human language. It is this: the individual words in language name objects—sentences are combinations of such names.—In this picture of language we find the roots of the following idea: Every word has a meaning. This meaning is correlated with the word. It is the object for which the word stands.

Id.; see also Pinker, *supra* n. 4, at 11 ("A name . . . *points* to an entity in the world, because at some instant in

“hot,” for example, does not point to or refer to any event or fact. Instead, it is a convenient symbol that can be used to communicate many different ideas. Consider it in reference to a stove, a sexy person, the climate, a stolen car, a popular song, a fever, a dog, dogging, a menopausal flash, a damaged nuclear reactor, spicy salsa, etc. Words draw meaning from the context in which they are used, often by metaphor.¹⁰ Words work more by excluding other referents than by pointing at particular things.¹¹ The word “chair” does not point to a specific object, or even a class of objects, as much as it excludes horses, cows, cars, and everything the community does not associate with what we call chairs. It does not exclude the person who presides over a committee meeting, a death sentence, or a university honorific. Context may, however, imply or exclude these meanings.

B. Our Brains Are Hard-Wired by Evolution to Learn the Language of Our Community—and Its Moral Structure.

Children acquire language skills easily and automatically because evolution has hard-wired our brains to learn the words and other symbols, syntax, and contextual meanings that are commonly used in our community.¹² In his 2006 book, *Moral Minds*, Marc Hauser suggests that our brains are also hard-wired to absorb community morality.¹³ By exposing test subjects to hypothetical moral dilemmas,¹⁴ he discovered that implicit moral rules of their (sub)communities were embedded so deeply in their brains that they made moral choices automatically, without thought and without great variation—just as with language.¹⁵ The formal reasons that subjects gave for their choices were less immediate and congruent than the choices themselves, indicating that moral choices spring from deeply embedded, intuitive neural sources, not from logical reasoning.¹⁶

C. Our Language Is Infused with Metaphors That Embody Community Morality and Predetermine How We Evaluate New Data.

We can go one step beyond Wittgenstein and infer that since our understanding of community morality is so pervasive, morality itself is invisibly embedded in our language, even in sentences that appear to be completely descriptive. A statement such

time the entity was dubbed with the name and the name stuck.”).

9. Wittgenstein, *supra* n. 3, at § 29, 14e (providing numerous illustrations that destroy the notion that words refer to real objects or ideas and instead, maintaining throughout that the meaning of a word is in its use in the language).

10. See generally George Lakoff & Mark Johnson, *Metaphors We Live by* (U. of Chi. Press 1980).

11. Alexander Bain, *English Composition and Rhetoric* § 3, 243 (enlarged ed., D. Appleton & Co. 1890). (“When a word has a plurality of meanings, it should be placed in such a connexion as to exclude all but the one intended.”); Pinker, *supra* n. 4, at 91 (“You can only really understand something when you know what it is *not*.”).

12. Pinker, *supra* n. 5, at 18 (“Language is a complex, specialized skill, which develops in the child spontaneously, without conscious effort or formal instruction . . .”).

13. See Marc D. Hauser, *Moral Minds: How Nature Designed Our Universal Sense of Right and Wrong* 155–59 (HarperCollins 2006).

14. *Id.* at 112–31 (This moral sense test is available on line at <http://moral.wjh.harvard.edu/index.html>).

15. *Id.* at 36–53.

16. *Id.* at 156.

as “Kevin should not have hit Sidney” is clearly evaluative, and all community members would know it to be so, whether they agreed with it or not. But an implicit evaluation is likely to be embedded in the purely descriptive statements “Kevin hit Sidney,” “She got a tattoo,” “Gas went up 10 cents a gallon and oil executives salaries went up a million,” “Mable bought a Prius,” “He doesn’t recycle,” “She voted Republican,” “The new code will increase building costs,” and “The spotted owl is safe from logging.” The normativity implicit in these statements will differ greatly, depending on whether, for example, the communicant is a distressed parent or tattooed fellow teen, industrialist or environmental law professor.

George Lakoff asserts that people classify and evaluate data—and make decisions—according to metaphors and moral categories that are embedded deep within their brains.¹⁷ These personally-held mental categories ordinarily reflect those held within their (sub)communities, and they may be influenced by inherited differences in brain structure itself.¹⁸ Lakoff’s metaphors operate at an unconscious level, well beyond assessable thought and inquiry.¹⁹ Lakoff describes how politicians can frame issues strategically to connect with deep-seated metaphors that voters use to evaluate political rhetoric.²⁰ A conservative Republican politician frames environmental action differently from a liberal Democrat,²¹ as Karl Rove amply demonstrated.²² Voters’ commitments to artfully framed political propositions are virtually unshakable. Accordingly, reason and logic that conforms to the listener’s metaphor will be automatically accepted as valid.²³ Reason and logic that does not conform will be automatically rejected. In Lakoff’s world, it is useless to search for an objective or scientific “truth” when moral metaphors, firmly embodied in neural patterns, create impenetrable silos in the lay citizen-voter population.²⁴

In today’s terms, Lakoff labels the conservative metaphor “Strict Father” as

17. See generally Lakoff & Johnson, *supra* n. 10 (providing hundreds of examples).

18. See Laurence Tancredi, *Hardwired Behavior: What Neuroscience Reveals about Morality* 76 (Cambridge U. Press 2005) (“We must, therefore, conclude that brain biology affects both personality and the full panoply of intellectual features that shape [the brain].”).

19. George Lakoff, *Moral Politics: How Liberals and Conservatives Think* 4 (2d ed., U. of Chi. Press 2002).

20. *Id.* at 162–76 (Lakoff labels the conservative model “Strict Father” and the liberal model “Nurturant Parent.”).

21. See *id.* at 408 (“The strategy was to frame energy as the heart of the economy while destroying environmentalism in the process.” (referring to “the Bush energy plan”).).

22. *Id.* at 18 (“Because conservatives understand the moral dimension of our politics better than liberals do, they have been able not only to gain political victories but to use politics in the service of a much larger moral and cultural agenda for America . . .”).

23. *Id.* at 162.

A moral system defines how one views the world, how one comprehends hundreds of events, great and small, every day. . . . Each moral system creates a number of fixed major categories for moral action. Those major categories allow us to classify actions instantly into those that are moral and those that are not, with little or no reflection.

Id.

24. Pinker, *supra* n. 4, at 261. Steven Pinker, another cognitive scientist, challenges Lakoff’s pessimistic emphasis on metaphors as a complete explanation of political thought and action. Pinker offers more hope for rational voter response to objective truths about sustainability, stating “[p]eople certainly are affected by framing . . . [a]nd metaphors, especially conceptual metaphors, are an essential tool of rhetoric, ordinary communication, and thought itself. But this doesn’t mean that people are enslaved by their metaphors or that the choice of metaphor is a matter of taste or indoctrination.” *Id.*

“[p]romoting self-discipline, responsibility, and self-reliance” and the liberal metaphor “Nurturant Parent” as emphasizing “[e]mpathic behavior and promoting fairness,” “[p]rotecting those who cannot protect themselves,” and “[p]romoting fulfillment in life.”²⁵ Sustainable environment as an achievable reality will be viewed more suspiciously by the individualistic Strict Father (who believes that God provided natural resources for humans to exploit) than the more communitarian Nurturant Parent.²⁶ Advocates for sustainability face the challenge of framing issues so as to communicate with both.²⁷

We might assume from Wittgenstein, Hauser and Lakoff that a circle of like-minded conversationalists will at least understand both the descriptive and evaluative content of their propositions, but maybe not. Marvin Minsky’s *Society of Mind* warns “that we overestimate how much we actually communicate.”²⁸ The deficit in understanding within a (sub)community increases exponentially when communication reaches across silos—from one (sub)community to another—such as from the lay community to science and to law. Because linguistic silos are invisible and the words used inside and outside a silo are the same, people may not realize that outsiders do not share their understanding.

What is it that changes linguistic assumptions when lay community members enter a professional language silo? Although their political and fundamental moral metaphors may remain intact, students who study philosophy, science, or law learn to parse meanings and begin to draw sharp distinctions between statements of fact (is), and evaluations or judgments (ought).²⁹ From that moment forward, communication and thought itself change.

25. Lakoff, *supra* n. 19, at 162–65.

26. *Id.* at 409–10 (“From the perspective of conservative morality, nature exists for human exploitation Environmental regulations get in the way of profits and the use of private property, rewards for ‘the best people’—those who are disciplined, who pursue their moral self-interest in the marketplace, and who are able to succeed.”).

27. *Id.* at 385 (“There are no neutral concepts and no neutral language for expressing political positions within a moral context. Conservatives have developed their own partisan moral-political concepts and partisan moral-political language. Liberals have not. The best that can be done for the sake of a balanced discourse is to develop a meta-language—a language about the concepts and language used in morality and politics.”).

28. Marvin Minsky, *The Society of Mind* 67 (Simon and Schuster 1986).

29. George Edward Moore, *Principia Ethica* 13–15 (Cambridge U. Press 1903) (using the term “Naturalistic Fallacy” as shorthand for the position that it is inappropriate to define “ought” words such as “good, just,” by “is” references such as “pleasure”).

III. WITTGENSTEIN'S TRACTATUS LOGICO-PHILOSOPHICUS³⁰: THE LANGUAGE OF SCIENCE.³¹

Ludwig Wittgenstein, whose *Philosophical Investigations* told us in 1953 that we learn language as a game, had captured the attention of the scientific community in 1921 with *Tractatus Logico-Philosophicus. Tractatus*, which placed fourth in the professional philosopher's survey of the century's significant books,³² declared that most philosophical problems are problems of language,³³ and the primary use of philosophy should be to make propositions clear.³⁴ The book's aspiration to produce a logically perfect language entranced the Vienna Circle,³⁵ a group of philosophers determined to develop analytical propositions for science (Logical Positivism) that could be assigned unambiguous real world meanings.³⁶

A. Science Separates the "Is" of Description from the "Ought" of Evaluation.

Scientists are trained to describe and use facts as fact, and to develop, apply, and

30. Wittgenstein, *Tractatus*, *supra* n. 7.

31. A caveat: Daniel Goldberg, JD and PhD student reviewed an earlier draft and warned

I . . . wonder whether your articulation of the scientific silo conflates the epistemic with the ontological. That is, there is to my mind a very great difference between what scientists tend to perceive themselves as doing, and what is the actual nature of their practice. I hasten to add that my picture of meaning here is wholly Wittgensteinian—there is no 'truth' in the positivist sense of what scientific practice consists of. There is only a scientific language game, but I tend to think it's important to reflect critically on the difference between what this game looks like to nonpractitioners vs. what it appears to look like to practitioners.

E-mail from Daniel Goldberg, Graduate Student U. Houston, to John Mixon (June 2, 2008, 12:25 p.m. CDT). As Mr. Goldberg further stated,

[t]o paraphrase Wittgenstein and the Princess Bride, "I do not think it means what you [scientists] think it means . . ." Thus, scientists may believe—and I have no doubt they do—that their practices consist largely of unambiguous, deductive inferences, but there is much reason to believe that this deeply entrenched belief is also profoundly mistaken. Hence the title of Quine's famous essay: "Two Dogmas of Empiricism." There's further support for this idea in some of Kuhn's work, in Feyerabend, Hacker, and Evelyn Fox Keller, among others. Thus, the disconnect between the silos is not between scientific practice in itself and lay understanding, but rather turns on the common self-conception of what many scientists believe themselves to be doing in context of scientific practice. Of course, lay people tend to share this conception of what scientific practice consists of—that it is unambiguous, deductive, and less subject to the vagaries of human error than other social endeavors. There is significant reason to doubt this conception, however.

Id.

32. Stern, *supra* n. 2, at 1.

33. Wittgenstein, *Tractatus*, *supra* n. 7, at 9 (referring to the introduction by Bertrand Russell in which Russell states, "[m]ost questions and propositions of the philosopher[s] result from the fact that we do not understand the logic of our language.").

34. *Id.* at § 4.112, 77 ("The result of philosophy is not a number of 'philosophical propositions', but to make propositions clear.").

35. Stan. Ency. Phil., *Vienna Circle* § 2.1, <http://plato.stanford.edu/entries/vienna-circle/> (updated Sept. 18, 2006) ("The Vienna Circle was a group of scientifically trained philosophers and philosophically interested scientists who met under the (nominal) leadership of Moritz Schlick for often weekly discussions of problems in the philosophy of science . . . in the years from 1924 to 1936.").

36. *Id.* at § 2.3 ("Extending Wittgenstein's insight about logical truths to mathematical ones as well, the Circle considered both to be tautological. . . . The synthetic statements of the empirical sciences meanwhile were held to be cognitively meaningful if and only if they were empirically testable in some sense."); Wittgenstein, *Tractatus*, *supra* n. 7, at 8 (referring to the introduction by Bertrand Russell, in which Russell states, "Mr Wittgenstein is concerned with the conditions of a logically perfect language The essential business of language is to assert or deny facts.").

test theories of cause and effect. They employ specialized language that carries precise meaning within, but not outside, their own professional silos.³⁷ Try, for example, understanding a doctor's technical description of an operation.

Today's scientific method and language remain heavily influenced by the empiricist epistemology described in the centuries-old writings of Thomas Hobbes,³⁸ John Locke,³⁹ David Hume,⁴⁰ and more recently reformulated by Wittgenstein⁴¹ and Karl Popper.⁴² Hobbes and Locke rejected rationalism and declared that humans learn about the world through their senses.⁴³ The early empiricists allowed that humans can give names to sense impressions and use symbols in computation, as in math and logic ($1+1=2$; All men are mortal; Socrates is a man; therefore Socrates is mortal).⁴⁴ But math and logic as such provide no information about the world of reality. To be useful to the empiricist, symbols in scientific propositions must be assigned precise meanings that all interested scientists can understand, ultimately through sense data confirmation. Empiricism gives information about the world of fact—not what ought to be. Truth may be defined as correspondence between propositions about reality and reality itself.

In this light, consider David Hume's⁴⁵ admonition,

If we take in our hand any volume; of divinity or school metaphysics, for instance; let us ask, Does it contain any abstract reasoning concerning quantity or number? No. Does it contain any experimental reasoning concerning matter of fact and existence? No. Commit

37. But even within science itself, misunderstandings occur. See e.g. Thomas S. Kuhn, *The Structure of Scientific Revolutions* 177 (3d ed., U. of Chi. Press 1996) ("Because the attention of different scientific communities is . . . focused on different matters, professional communication across group lines is sometimes arduous, often results in misunderstanding, and may, if pursued, evoke significant and previously unsuspected disagreement."). For a detailed current description of scientific method and criteria, see Nancy Levit, *Listening to Tribal Legends: An Essay on Law and the Scientific Method*, 58 Fordham L. Rev. 263 (1989).

38. See generally Thomas Hobbes, *Leviathan, or, The Matter Form, and Power of a Common-Wealth Ecclesiastical and Civil* (London: Printed for Andrew Croke 1651).

39. See generally John Locke, *An Essay Concerning Human Understanding* (29th ed., London: Printed for Thomas Tegg; B. Griffin & Co.; Tegg & Co.; & J. and S.A. Tegg 1841).

40. See generally David Hume, *A Treatise of Human Nature* (Ernest C. Mossner ed., Penguin Bks. 1987).

41. See generally Wittgenstein, *Tractatus*, *supra* n. 7.

42. Stan. Ency. of Phil., *Karl Popper*, <http://plato.stanford.edu/entries/popper> (updated Oct. 9, 2006) ("Karl Popper is generally regarded as one of the greatest philosophers of science of the 20th century.")

43. Hobbes, *supra* n. 38, at 3 ("[T]here is no conception in a mans mind, which hath not at first, totally, or by parts, been begotten upon the organs of Sense"); Locke, *supra* n. 39, at 13 ("The steps by which the mind attains several truths.—The Senses at first let in particular ideas, and furnish the yet empty cabinet." (emphasis omitted)).

44. Alfred Jules Ayer, *Language, Truth and Logic* 31 (2d ed., Dover Publications, Inc. 1952).

Like Hume, I divide all genuine propositions into two classes: those which . . . concern "relations of ideas," and those which concern "matters of fact." The former class . . . I allow to be necessary and certain only because they are analytic. That is . . . they do not make any assertion about the empirical world, but simply record our determination to use symbols in a certain fashion. Propositions concerning empirical matters of fact, on the other hand, I hold to be hypotheses, which can be probable but never certain.

Id.; Hobbes, *supra* n. 38, at 13 ("The manner how Speech serveth to the remembrance of the Consequence of causes and effects, consisteth in the imposing of Names, and the Connexion of them."); *id.* at 18 ("When a man Reasoneth, he does nothing else but conceive a Sum total, from Addition of parcels; or conceive a Remainder, from Subtraction of one Sum from another; which (if it be done by Words) is conceiving of the consequence of the names of all the parts.")

45. Hume, *supra* n. 40, at 43 ("And as the science of man is the only solid foundation for the other sciences, so the only solid foundation we can give to this science itself must be laid on experience and observation.")

it then to the flames: for it can contain nothing but sophistry and illusion.⁴⁶

A 2007 book on cosmology forthrightly restates Hume's empiricism by asserting

Many scientists, including the two of us, feel it is important to insist that science should remain based on the principle that statements have meaning only if they can be verified or refuted. Ideas whose assumptions can never be tested lie outside the realm of science.⁴⁷

B. Scientific Language and Scientific Method Create a Silo That Separates Science from the Lay Community's Language and Understanding of Reality.

A Logical Positivist's strict focus on facts denies meaning to terms such as love, duty, right, wrong, sin, just, fair, and pretty that the lay community understands perfectly well. These words can pass Hume's test only as references to emotive preferences of the speaker.⁴⁸ Individual scientists may have strong personal commitments to values outside their discipline, but scientific analysis is compromised if those values feed into and influence factual inquiry within their silo. Science today is less captured by Logical Positivism than in its heyday,⁴⁹ and most scientific inquiry is directed toward beneficial ends such as sustainability.⁵⁰ But the scientist's immediate, professional, meaningful world remains the world of "is," of nature, of cause and effect, of empirically testable propositions, and acquisition of new knowledge.⁵¹

Today's scientific community strictly follows Hume's insight that we do not

46. David Hume, *Enquiries Concerning the Human Understanding and Concerning the Principles of Morals* 165 (L.A. Selby-Bigge ed., 2d ed., Oxford U. Press 1963).

47. Paul J. Steinhardt & Neil Turok, *Endless Universe: Beyond the Big Bang* 234 (Doubleday 2007).

48. See C.K. Ogden & I.A. Richards, *The Meaning of Meaning: A Study of the Influence of Language upon Thought and of the Science of Symbolism* 125 (5th ed., Harcourt, Brace & Co. 1938) ("This peculiar ethical use of 'good' is, we suggest, a purely emotive use. When so used the word stands for nothing whatever, and has no symbolic function.")

49. See e.g. Karl Popper, *The Defence of Rationalism (1945)*, in *Popper Selections* 33 (David Miller ed., Princeton U. Press 1985) (See Karl Popper's forthright discussion).

50. Or, as tobacco scientists, trying to increase addiction to their deadly product, focus only on the mechanics of improving nicotine delivery.

51. A treasured commentator, Donald Williamson, who read the unpublished draft stated "I would take a more radical view when it comes to 'the social construction of reality.'" Ltr. from Donald Williamson to John Mixon (July 08, 2008).

[Humberto] Maturana is a Chilean neurobiologist who became fascinated with epistemology and has had great influence on social science thinking as impacted by systems theory. One of his key ideas is "structure determinism," meaning that any animal's biological structure determines how it "sees" the world. [He] points out that some creatures see the same objects in different sizes and colors than humans do. So we literally "construct" what we call "reality" rather than simply observe it. So the act of perception brings the world into being. That means cognition is the very process of life itself. The big conclusion [Maturana] draws is that science is not a theory about reality but an explanation, constantly evolving as instruments improve, for human experience. We can never directly know reality nor even what that might mean; we can only offer better and better explanations for our experience. So there goes the whole notion of objectivity, including any possibility for objective truth ever about anything. The best we can hope for is to be guided by the closest we can come to consensual agreement among the most informed observers, often a community of scientists. And so today the slowly emerging political consensus with regard to the environment and the species and sustainability. (That is growing consensus about the problem, not yet the solution.)

Id.

observe cause and effect directly.⁵² The causal connection between a bat striking a ball and the ball's soaring into left field is not given to us through our senses, despite the lay community's common sense understanding. Hume does not deny cause and effect but would⁵³ note that all the observer *sees* is the ball headed for the bat, the bat in motion, and the ball sailing off in an arc. That is all an observer gets from the senses. The notion, the idea, the understanding, of cause and effect between the bat's contact with the ball and a home run comes from the observer's brain activity projected onto the personal perceptions of events. The lay person's assertion of cause and effect may be true or false. In the case of the home run, it is probably true.

Intuitive understanding of elementary cause and effect is undoubtedly instilled by evolution in humans as providing a survival advantage.⁵⁴ If our ancestors had missed the connection between (1) seeing a saber tooth tiger and (2) getting out of his way, we would not have survived as a species. But the important cause and effect relationships in today's science are much more subtle and more difficult to establish.⁵⁵ Reliable validation of less obvious cause and effect relationships requires meticulous experiments that subject postulated hypotheses of causation to rigorous empirical tests that either falsify or tentatively confirm the hypothesis. An epistemological silo is erected when science ascribes a cause and effect relationship to events that community members cannot see or understand intuitively, or when science denies a relationship that the community "knows" to be so.⁵⁶ Communication and trust may suffer unless science's findings are translated into common language and logic that fit both the strict father and nurturant parent's moral metaphors.

C. *Scientific Method is Based on Observation, Speculation, and Experiment.*

Scientists solve puzzles. Karl Popper described scientific method as beginning with a guess⁵⁷ as to what is going on, followed by experiments to confirm or falsify the speculation.⁵⁸ Consider global climate change. Popper's scientist learns that the world's

52. See Hume, *supra* n. 40, at 121–26 (The notion of cause and effect itself is a construct); see also Minsky *supra* n. 28, at 129 ("There can't be any 'causes' in a world in which everything that happens depends more or less equally upon everything else that happens.").

53. Hume, *supra* n. 46, at 29–30 (the example Hume uses is a pool cue and cue ball).

54. See Pinker, *supra* n. 4, at 218 ("A recent experiment by the psychologists Marc Hauser and Bailey Spaulding has shown that reasoning about causal powers without needing to see a long sequence of events beforehand is part of our primate birthright.").

55. See Minsky, *supra* n. 28, at 129 (Even the reality of cause and effect itself is suspect: "There can't be any 'causes' in a world in which everything that happens depends more or less equally upon everything else that happens. . . . To know the cause of a phenomenon is to know, at least in principle, how to change or control some aspects of some entities without affecting all the rest.").

56. Pinker, *supra* n. 4, at 217.

Even a glance at human behavior suggests that people often think of causation in terms of hidden powers rather than just correlations. Many psychology experiments have shown that when people have a pet theory of how things work (such as that damp weather causes arthritis pain), they will swear that they can see those correlations in the world, even when the numbers show that the correlations don't exist and never did.

Id.

57. Karl Popper, *The Problem of Demarcation*, in *Popper Selections*, *supra* n. 49, at 122) ("What the great scientist does is boldly to guess, daringly to conjecture, what these inner realities are like.").

58. See Karl Popper, *Scientific Method*, in *Popper Selections*, *supra* n. 49, at 133; see also Levit, *supra* n. 37.

average temperature is rising and wonders what may be causing it. The curious scientist makes a guess that increasing levels of CO₂ in the atmosphere trap the sun's heat, thereby contributing to long term warming. The scientist conducts experiments to see whether events that would be predicted or explained by the theory actually do occur. If the experiments support the theory's ability to explain or predict real world events, the hypothesis may become accepted doctrine within the scientific community.

Experimental evidence connecting human activity with global climate change is likely to be indirect and statistical, resting on statistical correlations between the hypothesis and measurable events that tend to confirm or negate the connection. An indirectly confirmed theory that is accepted inside science's silo may fail to convince voters, and legislators,⁵⁹ who are accustomed to direct, intuitive confirmation that is supported by events in their own experience.

E. The Inductivist Turkey Reminds That Scientific Theories Are Always Tentative.

Hume⁶⁰ and Popper⁶¹ remind us that confirmation of scientific theories is always tentative. We must remember the lesson of the inductivist turkey⁶² who guessed from past events that the farmer would always bring food in the early morning. The turkey confirmed his theory empirically day by day—all the way to Christmas morning when the farmer brought an axe. The turkey teaches that theories of cause and effect can never be conclusively proven to apply in all cases, no matter how often and how successfully the experiment is replicated. Theories may, however, be useful without ultimate confirmation.⁶³

Popper's standard for a proposition in science is whether it can be subjected to a test that can falsify it—only such theories satisfy the entry requirement to be a “scientific” explanation of reality. Useful, falsifiable propositions can be provisionally accepted and used until replaced by better, more complete, or at least different theories.⁶⁴

Science understands the inductive fallacy, and scientists do not trust inductive logic. But induction is ingrained in lay observers' brains by oft-repeated observations,

59. Cornelia Dean, *Physicists in Congress Calculate Their Influence*, 157 N.Y. Times F2 (June 10, 2008) (noting that the 535 senators and representatives in the 110th Congress have only 30 scientists by a broad definition, and only three physicists. According to the N.Y. Times, one of these physicists, Republican Vernon J. Ehlers from Michigan, stated, “[I]t is irksome to encounter people who ignore the scientific consensus that human activity contributes to global warming yet count on science to produce new sources of energy magically.” *Id.* The article further notes, “What is needed is not more advanced degrees . . . but a capacity to take the long view, what Mr. Ehlers called the scientists’ ability to see from the pre-Cambrian era to the space age.” *Id.*

60. See e.g. Hume, *supra* n. 40, at 140 (“[E]ven after experience has inform’d us of their constant conjunction, [i]tis impossible for us to satisfy ourselves by our reason, why we shou’d extend that experience beyond those particular instances.”).

61. Karl Popper, *The Problem of Induction*, in *Popper Selections*, *supra* n. 49, at 111 (stating “Hume’s negative result establishes for good that all our universal laws or theories remain forever guesses, conjectures, hypotheses”); *id.* at 101 (“For a brief formulation of the problem of induction we can turn to Born, who writes: ‘. . . no observation or experiment, however extended, can give more than a finite number of repetitions’; therefore, ‘the statement of a law—B depends on A—always transcends experience. . .’”).

62. Credited to Bertrand Russell.

63. See e.g. Kuhn, *supra* n. 37, at 99 (Kuhn notes that Newton’s laws of physics continue to work well in their special applications, even after having been superseded by Einstein’s more grand theory.).

64. *Id.* at 44 (noting that the shift from one scientific paradigm to another emerges first in the mind of one or a few individuals who first learn to see science and the world differently).

and perhaps by evolutionary forces. Accordingly, they may reject scientific knowledge that does not conform to everyday observation.

F. Thomas Kuhn Shakes up Science, but Confirms the Silos.

In 1962, Thomas Kuhn challenged conventional assumptions about how scientific theories originate, change, and disappear. His book, *The Structure of Scientific Revolutions*,⁶⁵ denies that science moves smoothly from one operating theory to another through a disciplined process of correction pursuant to increased understanding.⁶⁶ Instead, Kuhn describes science as operating peacefully within a commonly accepted paradigm of how things work⁶⁷ without seeking Popper-like incremental corrections of theory⁶⁸ until the old theory produces so many wrong answers that it has to be replaced. A new paradigm then emerges and becomes accepted dogma, as if by revolution. Kuhn's primary point reinforces the notion of scientific silos: scientists tend to do their work totally within the received beliefs—the operating paradigm—of their day, using that paradigm to determine significant facts, matching of facts with theory, and articulation of theory.⁶⁹

G. Reductionism is the Heart of Commonly Understood Science.

Most of what has been described to this point relates to “reductionist” science, that is, scientific analysis that breaks large systems down into pieces and determines the connections between the parts.⁷⁰ Reductionist science is linked to “Occam's razor,”⁷¹ an admonition that simple statements of cause and effect are ordinarily preferable to complex ones. The broadest, most elegant, most useful formulae tend to be the longest lived and most useful.

Community members can understand the fundamentals of reliable, predictable

65. See generally *id.*

66. *Id.* at 7 “[A] new theory, however special its range of application, is seldom or never just an increment to what is already known.” *Id.*

[A] few historians of science have been finding it more and more difficult to fulfill the functions that the concept of development-by-accumulation assigns to them. As chroniclers of an incremental process, they discover that additional research makes it harder, not easier, to answer questions like: When was oxygen discovered?

Kuhn, *supra* n. 37, at 2; *id.* at 92 (“[S]cientific revolutions are here taken to be those non-cumulative developmental episodes in which an older paradigm is replaced in whole or in part by an incompatible new one.”)

67. *Id.* at 80 (“Failure to achieve a solution discredits only the scientist and not the theory. . . . [T]he proverb applies: ‘It is a poor carpenter who blames his tools.’”).

68. See Karl Popper, *supra* n. 49 at 46, 53.

[I]f you are interested in the problem which I tried to solve by my tentative assertion, you may help me by criticizing it as severely as you can; and if you can design some experimental test which you think might refute my assertion, I shall gladly, and to the best of my powers, help you to refute it.

Id. at 53.

69. Kuhn, *supra* n. 37, at 34.

70. Marc H.V. Van Regenmortel, *Reductionism and Complexity in Molecular Biology*, 5 EMBO Rpt. 1016 (2004).

71. Attributed to Fourteenth Century English logician and Franciscan friar, William of Ockham. Einstein's formulation was “Everything should be made as simple as possible, but not simpler.” *The Oxford Dictionary of American Quotations* 621 (Hugh Rawson & Margaret Miner eds., 2d ed., Oxford U. Press 2006) (originally quoted in *Reader's Dig.* (Oct. 1977)).

reductionist formulae. But they (and many scientists) were not prepared for chaos and complexity theories when they arrived in the 1970s; lay observers are not likely ready now. Unfortunately, environmental problems may be more dependent on complexity analysis and management than on reductionist formulaic solution.

H. Reductionist Science Cannot Explain Dynamical Systems.

Reductionist science can solve many problems. Its precise formulae enabled scientists and their computers to land a spaceship on the moon in 1969 and bring it back to earth. Reductionist science works well in situations where effects are linear⁷²—that is, where an action creates a predictable effect that can be added arithmetically to another action in a linear string to produce a logical and predictable outcome that is the sum of all the actions.⁷³ Imagine the calculations of thrust required to get a spaceship into the stratosphere, nudge it into orbit, slow it down for descent, and gently return to earth. That's rocket science, and it is reductionist.⁷⁴

Apart from a few who still believe the space shots were an elaborate hoax, most members of the lay community both understand and accept reductionist science as a powerful tool for achieving useful ends. But as impressive as its achievements are, reductionist science breaks down when the task is to analyze and manage dynamical systems such as weather or environment.⁷⁵ Dynamical systems are nonlinear, and they do not produce predictable, arithmetic outcomes.⁷⁶ Their energy can produce strange attractors⁷⁷ that unexpectedly feed back onto and alter the system itself, sometimes catastrophically.

In the 1960s, Edward Lorenz and a team of scientists programmed reductionist formulae into computers, hoping to model the world's weather systems and predict weather weeks or months in advance.⁷⁸ The effort failed. There was nothing wrong with the formulae as such, but Lorenz's team found that tiny perturbations in the actual

72. M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos* 64 (Simon & Schuster 1992) ("The name 'linear' refers to the fact that if you plot such an equation on graph paper, the plot is a straight line.")

73. *Id.* ("If a system is precisely equal to the sum of its parts, then each component is free to do its own thing regardless of what's happening elsewhere.")

74. In fairness, maybe not entirely. The hot gases that propel the rocket may be subjected to the different analysis here called complexity.

75. Waldrop, *supra* n. 72, at 329.

"In a sense it's the opposite of reductionism. The complexity revolution began the first time someone said, 'Hey, I can start with this amazingly simple system, and look—it gives rise to these immensely complicated and unpredictable consequences.'" Instead of relying on the Newtonian metaphor of clockwork predictability, complexity seems to be based on metaphors more closely akin to the growth of a plant from a tiny seed, . . . or perhaps even the organic, self-organized flocking of simpleminded birds.

Id.

76. *Id.*

77. James Gleick, *Chaos: Making a New Science* 8 (Penguin Group 1987).

Tiny differences in input could quickly become overwhelming differences in output—a phenomenon given the name "sensitive dependence on initial conditions." In weather, for example, this translates into . . . the Butterfly Effect—the notion that a butterfly stirring the air today in Peking can transform storm systems next month in New York.

Id.

78. *Id.* at 11–31 (describing Lorenz's experience).

weather systems could feed energy back or forward, nullifying or accelerating system processes and changing the system itself with far greater impact than linear predictability could predict or handle. To add to the dynamical system's unpredictability, Lorenz's team found it virtually impossible to identify an initial state for systems such as weather or environment as a base point for predicting future states.⁷⁹

I. Environmental Systems Are Dynamical and Not Subject to Reductionist Analysis.

All, or virtually all, environmental systems exhibit the characteristics of nonlinear dynamical systems⁸⁰ with the consequence that efforts to change, correct, or rectify environmental problems by linear formulae are incapable of producing predictable outcomes. Any sustainable environment strategy is bound to produce unintended and unforeseeable circumstances. Achieving sustainable environment may be possible, but management to that end must be flexible, not rigid. Paradoxically, complex systems may be more stable when they are near the edge of chaos.⁸¹ Decisions must be based on the latest information about the state of the system and management decisions reviewed and revised quickly and sensitively when unanticipated undesirable consequences appear. It may be impossible to write the strict rules that lawyers expect, and law may have to adapt to case-by-case interventions made by authorized professionals using sound, fresh data.⁸²

The language and science of complex dynamical systems is different from the language and science of reductionism. Without metaphors to guide them, scientists did not routinely see the difference before the 1960s.⁸³ Scientists now communicate easily about complex systems, but their understanding has yet to become part of the language of law and lay communities, where "complex" may suggest complicated litigation to lawyers and mixed-up domestic affairs for the laity, but not the meaning given by science.

79. *Id.* at 8.

80. See generally J.B. Ruhl, *Law's Complexity: A Primer*, 24 Ga. St. U. L. Rev. 885 (2008); J.B. Ruhl, *Complexity Theory as a Paradigm for the Dynamical Law-and-Society System: A Wake-Up Call for Legal Reductionism and the Modern Administrative State*, 45 Duke L.J. 849 (1996) [hereinafter Ruhl, *Complexity Theory*] (provides a description of complexity theory applied to environmental issues).

81. Ruhl, *Complexity Theory*, *supra* n. 80, at 890.

82. *Id.* at 891–92.

When the degree of interdependence, or coupling, among the system components is sufficient to allow the three types of attractors to blend in the correct measures, optimal system adaptability therefore is achieved. That optimal system adaptability occurs in the region called complexity. Too many fixed point and limit cycle attractors drag the system into stasis. Too many strange attractors drag the system into chaos. Just the right blend of attractors keeps the system "on the edge" of chaos, capable of sustaining the surprises produced by chaos, emergence, and catastrophe as well as by the happenstance of forces external to the system. In short, "complex systems constructed such that they are poised on the boundary between order and chaos are the ones best able to adapt by mutation and selection. Such poised systems appear to be best able to coordinate complex, flexible behavior and best able to respond to changes in their environment."

Id. (footnote omitted).

83. Gleick, *supra* n. 77, at 262 ("You don't see something until you have the right metaphor to let you perceive it.") (quoting physicist Robert Shaw).

J. Lay Observers Do Not Understand Scientific Method.

The lay public may both expect too much of science and believe too little of its truths. Scientific conclusions must be tentative and cautious. The lay public suffers no such limitation. Lay observers, from oil industry executive to tree-hugging environmentalist have ready convictions about what does or does not cause global climate change, and who ought to bear the cost of remediation. Lay skepticism about science is reinforced by self-interest. If the public is not convinced that sustainability is essential, possible, and perhaps profitable, demagogues (and lawyers for the industry) have ample room to defy the scientific conclusions.⁸⁴ Short term empirical verification of, say, a proposed solution to world climate change is almost impossible. The unexpected consequences that are bound to result from environmental system management may prove embarrassing to scientists and regulators and diminish the trust of an already suspicious public.

Scientists speak within and from their own silos. They may assume that, once they establish something as fact, the issue is settled. Their resolution may mean nothing to a lay community that places every statement, even scientific statements, within a rigid interpretative schema that includes automatic moral evaluation of data and denial of things they do not want to believe. And many who have absorbed religion as a moral practice do not trust “Godless science.”

IV. THE SILOS OF SCIENCE EXCLUDE COMMUNITY RELIGIOUS BELIEFS.

A. Scientists Do Not Accept Metaphysical Causes.

Formal religion shapes much of community morality, and religious belief plants implicit linguistic assumptions in their minds.⁸⁵ When people interviewed after a tragedy say “this had to happen for a purpose,” scientists disagree; metaphysical cause does not fit their discipline.⁸⁶ The current battle to introduce “intelligent design” into school science curricula shows the depth of epistemological difference between scientists and the lay community.⁸⁷ Part of the argument concerns not only whether intelligent design can be shown to be false, but also whether falsification itself is a legitimate test for accepting it as an alternative explanation of reality.⁸⁸

84. Newsmax, Special Edition, *Al Gore Spins Global Warming* (May 2008) (characterizing Gore’s movie *An Inconvenient Truth* as a “Convenient Lie.”).

85. Harris Interactive, *The Religious and Other Beliefs of Americans* 2005, http://www.harrisinteractive.com/harris_poll/index.asp?PID=618 (accessed Mar. 15, 2009) (A 2005 Harris poll found that 82 percent of U. S. adults believe in God and 73 percent believe in the virgin birth of Jesus).

86. Guardian, *Childish Superstition: Einstein’s Letter Makes View of Religion Relatively Clear* (May 13, 2008) (available at <http://googlemail.com/attachment?ui=2&ik=3932bd303a&view=att&th=120afa2c368866db&attid=0.1&disp=safe&realattid=0.1&zw&saduie=1egnamclyc1v2lmm3r0bvweesea3heg&sadet=1240259282360&sads=77ca1968dea71759a22a721c39fe3051>) (explaining that a recently auctioned letter written by Albert Einstein described belief in God as “childish superstition”).

87. See generally *Kitzmiller v. Dover Area Sch. Dist.*, 400 F. Supp. 2d 707, 764–66 (M.D. Pa. 2005) (holding the effort unconstitutional).

88. Danny Priel, *In Search of an Argument*, 86 Tex. L. Rev. 141, 153–54 (2008) (reviewing Ronald Dworkin, *Is Democracy Possible Here?: Principles for a New Political Debate* (Princeton U. Press 2006)). “Dworkin’s first argument is that ‘science depends on the possibility of verification or falsification, and there can be no evidence that a superhuman power that is unconstrained by natural laws either has or has not caused

B. Is There a Common Ground between Science and Religion?

The walls between science and religion are constantly challenged by hot (remember that word?) button matters such as genetics research. Religion infuses community understandings throughout the world, both limiting and perhaps (if harnessed) enabling comprehension and commitment to sustainability. Does sustainability require science to accommodate its own language to this reality, perhaps by benign acceptance of poetic characterizations of environmental stewardship and God's handiwork? Head-on conflict between science and the religions of the world may produce intellectual victory within the scientific silo,⁸⁹ but not sustainable environment. Could scientists legitimately and productively think and write in terms that include, for example, the Gaia notion of interconnectedness and sustainability⁹⁰ without interfering with their work?

The easy answer is "no." The work of solving nature's puzzles is too important to sacrifice to the politics of religion. But another answer is that both science and religion might focus on sustainability as a shared endeavor and tap the strength of both inquiry and belief without questioning fundamental assumptions of the other.

C. A Linguistic, Not a Functional, Accommodation May Be Required to Enhance Understanding of Scientific Conclusions.

Science's primary function is to provide hard facts and hard answers to solve puzzles. If scientists become too political or begin to shape their answers or language to the strategic needs of even so vital a goal as sustainability, they lose credibility and fundamental usefulness. If not scientists, someone else needs to find common ground with world religions and political metaphors to enlist the strong feelings that they capture. Lawyers are not likely prospects.

V. THE GAME CALLED LAW HAS ITS OWN LANGUAGE, USING WORDS THAT ARE ALWAYS HEADED SOMEWHERE.

A. Law Can Be Viewed as a Game.

Wittgenstein's insight in *Philosophical Investigations* can be extended to characterize the language of law, and even law itself, as a game, albeit a very serious

anything at all.' This is a mistake." *Id.* (quoting from Dworkin, *supra* n. 88, at 82).

89. See e.g. Daniel C. Dennett, *Breaking the Spell: Religion as a Natural Phenomenon* 18 (Penguin Group 2006) ("Up to now, there has been a largely unexamined mutual agreement that scientists and other researchers will leave religion alone . . . I propose to disrupt this presumption, and examine it.") (confrontation is beginning to appear).

90. Capra, *supra* n. 1, at 22 ("More recently, the idea of a living planet was formulated in modern scientific language as the so-called Gaia hypothesis, and it is interesting that the views of the living Earth developed by eighteenth-century scientists contain some key elements of our contemporary theory." (footnote omitted)); Stuart Kauffman, *At Home in the Universe: The Search for Laws of Self-Organization and Complexity* 69 (Oxford U. Press 1995) ("God . . . should welcome our struggles to find his laws . . . and the concept of catalytic closure in collectively autocatalytic sets of molecules will begin to appear as a deed feature of the laws of complexity, reemerging in our understanding of ecosystems, economic systems, and cultural systems.").

one.⁹¹ The term “game” is used here as an ordinary language, a non-frivolous, metaphor. A more formal metaphor describes law as an autopoietic⁹² system that perpetuates, reinforces, and adaptively modifies its own behavior. The legal system and the people who play the law game obey implicit and explicit rules. There are defined roles for players, for example, as advisor, advocate, judge, client, legislator, administrator, and policeman, and there are wins and losses. As with baseball, the rules are fairly stable, but they do change over time as a product of interactions within the system.⁹³ A number of moral and ethical assumptions define play in the law game, but they are not the same moral assumptions that infuse the language of the laity.

First year students learn to play the law game the way they learn to play baseball, checkers, or chess—by playing it, beginning with their very first day in a law class. Students learn the language and practices of the law game by reading reported appellate opinions, absorbing the vocabulary, and discussing the explicit rules and analytical techniques in class,⁹⁴ all the while subconsciously absorbing law’s implicit rules.⁹⁵ By their second week, many law students discover that longstanding pre-law friendships (along with some marriages) have dissolved—victims of the students’ unrelenting preoccupation with a new language and the powerful rhetoric of law.

Rules and legal constructs account for a big part of law practice. But students pick up intuitively that the language of law is always in action—words are always used for a purpose.⁹⁶ Whether spoken in class or written in a deed, a will, statute, or appellate

91. Jack L. Sammons, “Cheater!”: *The Central Moral Admonition of Legal Ethics, Games, Lusory Attitudes, Internal Perspectives, and Justice*, 39 Idaho L. Rev. 273, 276–77 (2003) (placing lawyers’ conduct within the definition of “games” and describing some common strategies as “cheating”); Charles Yablon, *On the Contribution of Baseball to American Legal Theory*, 104 Yale L.J. 227, 229–33 (1994) (in a less serious vein, makes a more direct tongue-in-cheek comparison).

92. Moshe Hirsch, *The Sociology of International Law: Invitation to Study International Rules in Their Social Context*, 55 U. Toronto L.J. 891, 918 n. 167 (2005) (“An ‘autopoietic system’ is a system that produces and reproduces its own elements by the interaction of its elements.”) (citing Gunther Teubner, *Introduction to Autopoietic Law in Autopoietic Law: A New Approach to Law and Society* 1 (Gunther Teubner ed., Walter de Gruyter 1988)).

93. Dennis M. Patterson, *Law’s Pragmatism: Law as Practice and Narrative*, 76 Va. L. Rev. 937, 940 (1990).

The account I offer builds upon the philosophy of the later Wittgenstein, in particular his claim that following a rule is a practice. . . . My claim is that law is an interpretive enterprise whose participants engage in the production of, and debate about, explanatory narratives—narratives that account for the history of the practice and are produced in the service of argumentation about how to resolve legal problems. In short, law is an activity and not a thing. Its “being” is in the “doing” of the participants within the practice.

Id.

94. James Boyd White, *Law as Language: Reading Law and Reading Literature*, 60 Tex. L. Rev. 415 (1982).

The lawyer must read the statutes, cases, and other documents that it is his task to understand, to interpret, and to make real in the world. . . . His reading is by nature a communal activity, and he must be always alert to the readings that may be proposed by others. . . . [R]eading a legal text is often not so much reading for a single meaning as reading for a range of possible meanings.

Id.

95. Duncan Kennedy, *Legal Education and the Reproduction of Hierarchy*, 32 J. Leg. Educ. 591, 596 (1982) (giving an unflattering description of the classroom’s implicit messages).

96. Jonathan Yovel, *What is Contract Law “About?” Speech Act Theory and a Critique of “Skeletal Promises”*, 94 Nw. U. L. Rev. 937, 939–41 (2000).

Theories of performative language all share a basic insight: that language is not primarily about meaning in the traditional, semantical sense associated with representationalism (and much of

brief, law words are always directed strategically toward an end that advances some interest or another, not layman's justice or scientists' truths.

B. The Language of Law Is Pragmatic and Performative.

Law language is pragmatic,⁹⁷ sometimes used in amoral, spirited advocacy for some client or position, and sometimes peacefully and cooperatively too, for example, in the conveyance of a land title from a seller to a buyer. Fact as fact and truth, by some definition and in some circumstances, are vitally important to lawyers and to the profession. But truth is not a particular goal of legal method.⁹⁸ Truth may be important to an advocate only to the extent rules of the law game require that it not be too seriously

standard structural linguistics). Rather, in this view, language is primarily about action—speech and texts are *acts*, and they *perform* things in the social world and bring about different kinds of effects.

Performative language is the premier and paradigmatic agent of action in law. As the eminent legal philosopher Karl Olivecrona—avowedly mystified by performative language's effects—put it,

We talk as if the law had the power to establish a causal relationship between the operative facts and the legal effects. Rights and duties are created; rights are transferred through verbal declarations. Legal properties or powers are conferred on persons or things through ceremonies or through declarations of the authorities. . . . In using this language, we seem to be moving in another sphere of reality than that of the sensible world.

Lawyers should think of performatives as those communicative acts that generate moves on the “dynamic” branch of the matrix described by Hohfeld; that is, they translate *in rem* legal relations to arrays of *in personam* relations of powers, subjections (or, to use Hohfeld's term, “liabilities”), immunities, liberties, duties, and so on. Hohfeld supplied a Saussurian-style analytic syntax whereby legal concepts are defined through their relation to other concepts. He defined legal power as the ability to bring about a change in a person's array of rights, liberties, powers, subjections, immunities, etc. A promise may seem a paradigmatic form of exercising this power (I think of any transactional context, broadly taken). However, Hohfeld never asked *how* such performative moves are generated, only what it means for them to take effect.

Id. at 939–41 (footnotes omitted).

97. Richard A. Posner, *How Judges Think* 40 (Harv. U. Press 2008) (“‘Pragmatism,’ . . . refers to basing judgments (legal or otherwise) on consequences, rather than on deduction from premises in the manner of a syllogism.”).

98. Williamson, *supra* n. 51. Williamson in commenting on this point stated,

What does the theory and practice of law have to do with the understanding of the idea of “truth” and therefore truthfulness? Bottom line is of course what obligation, if any, does the practicing attorney have to pursue ‘the truth’ in any given circumstance? Maybe the prior question is whether the lawyer has any obligation whatsoever to pursue justice as distinct from advantage? If the answer is no, what are the implications?

If the answer is yes, then since justice like beauty resides in the eye of the beholder, does this require some disciplined pursuit of at least truthfulness? I hypothesize that the broad public distrust of the legal profession grows out of the public perception (construction) of how the profession, in general, deals with this question. I'm struck by your comment, . . . “truth may be important to an advocate only to the extent rules of the law game require that it not be too seriously abused.” Would you say that that meets professional standards and if yes, is that acceptable? For me the answer to this question is more predictive of the future impact of the profession upon society than the constraints implied by linguistic silos, though these are considerable. I think this because of a belief that as sustainability issues now illustrate, integrity is the nature of Nature itself. Integrity is about wholeness, reciprocity, ecosystems, interdependence, etc. At the level of human consciousness it pivots around our attitude to justice. The big complication is that any approximation of justice requires a commitment to a sincere pursuit of truthfulness. The problem here is that it begins (and ends) with truthfulness with the self about the self. And as Maturana has noted, we only have mind with which to try to understand mind.

Id.

abused.⁹⁹ And facts are always in play. Scientists accustomed to looking for truths or facts may be confounded by lawyers' performative use of words. The laity may simply be disgusted and angry judging by the prevalence of lawyer jokes.

Many, perhaps most, ordinary words acquire community meaning by triggering mental associations with some *activity or practice*.¹⁰⁰ The same is true of law words. The word "hot," as learned by the child, includes the activity of touching, the activity of searing flesh, the activity of neural impulses transmitted to the brain, the activity of neural response in the brain, etc. Similarly, in law the word "right" refers to an entire activity of claim, analysis, presentation to authority, decision, appeal, and enforcement. The legal term "right" carries no particular moral content for lawyers who are prepared to argue either side. Lay observers, however, see the term as infused with morality. A scientist may miss the moral content, but believe, incorrectly, that lawyers (as if they were scientists) can look at facts, apply accepted legal rules, and predict accurately how a conflict will turn out. There is no easy way to explain law usage to either group without invoking cynicism.

C. *Lawyers Use Both Scientific and Lay Language Strategically within Their Own Silo.*

Lawyers use the language of science and the language of the lay community strategically and effectively when it advances their cause to do so. The best lawyers know how to communicate scientific constructs to a lay jury or a law judge in words both can understand, but for a purpose. Lawyers also know how to use the findings of science subversively without worrying about logical consistency, public trust, or ultimate truth. A scientist who employs scientific method as described by Karl Popper will be mystified when the legal system delegates cause and effect issues to a lay jury, asking, for example, whether the defendant's action caused the plaintiff's injury, whether the defendant's breach of a contract caused plaintiff's economic loss, and whether a particular pollutant caused plaintiff's lung disorder. In the latter case, the jury is likely to sit in judgment whether one scientist or the other is more credible,¹⁰¹ far removed from the peer review the scientific community would require.

Lawyers' statements of cause and effect, offered as "policy" reasons for a decision are equally unrelated to scientific content. For example, the proposition that potential tort liability discourages negligent behavior is not based on experiments or fact.¹⁰² It is

99. See generally Sammons, *supra* n. 91. This is a position that Jack L. Sammons finds uncomfortable.

100. See generally Wittgenstein, *supra* n. 3. The "activity" aspect of meaning is inferred from Wittgenstein's tendency to explain the meanings acquired by use in terms of activities. For example, the builder in Ludwig Wittgenstein, *Philosophical Investigations* 3 (G.E.M. Anscombe trans., 50th Anniversary Commemorative ed., Blackwell Publ. 2001), the learning of a foreign language in Wittgenstein, *supra* n. 3., at § 207, 82e ("Let us imagine that the people . . . carried on the usual human activities and in the course of them employed, apparently, an articulate language. If we watch their behaviour we find it intelligible, it seems 'logical.'"). Also as Wittgenstein states in *id.* at § 208, 83e, "if a person has not yet got the *concepts*, I shall teach him to use the words by means of *examples* and by *practice*.—And when I do this I do not communicate less to him than I know myself."

101. See *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 585–87 (1993) (To some extent, the legal system tries to minimize the purely strategic use of scientific testimony).

102. Timothy B. Fitzgerald, *The "Inherent Risk" Doctrine, Amateur Coaching Negligence, and the Goal of Loss Avoidance*, 99 Nw. U. L. Rev. 889, 898 (2005).

simply advanced to support the position that damages should be awarded or not.

D. Lawyers' Language Employs Words Used in Lay and Science Communities, but with Different Meanings and Purposes.

When lawyers apply legal formulae to predict or manipulate legal outcomes, scientists may be even more confused than the laity. Scientists employ deductive logic when they reason from one analytically true linear equation to another. Their formulae acquire semantic meaning through rigorous empiricism. The same is not true of legal propositions, even though some rules of law resemble formulas of science. Consider a claim by a landowner against a nearby industry that is dumping effluent into a stream.

Lay observers, scientists and lawyers might initially read the words in *Restatement (Second) of Torts* § 832 (1979) with some comprehension that

[a]n invasion of one's interest in the use and enjoyment of land or water resulting from another's pollution of surface waters, ground waters or water in watercourses and lakes may constitute a nuisance under the rules stated in §§ 821A–831 of this Chapter.¹⁰³

And *Restatement (Second) of Torts* § 821F, stating

[t]here is liability for a nuisance only to those to whom it causes significant harm, of a kind that would be suffered by a normal person in the community or by property in normal condition and used for a normal purpose.¹⁰⁴

All three readers would seem to be on the same page with a formula that defines liability for pollution. But here is where the similarity ends. The lay reader may automatically conclude that polluters must or should pay damages. The scientist may assume the formula defines a determinable legal reality, and a lawyer can look at facts and tell whether a discharge imposes liability. But the lawyer knows that the analytical, formulaic statement of the Restatement provides no direct or empirical contact with reality. Each word, *nuisance*, *invasion*, *interest*, *use*, *enjoyment*, *resulting*, and *harm*, acquires meaning only within the play of the game of law—with conflicting texts, stories, evidence, witnesses, and presentations to decision-makers, finally leading to a final decision that is not predictable. For the scientist, the reference is *Tractatus*;¹⁰⁵ for the lawyer, *Philosophical Investigations*.¹⁰⁶

There is general consensus that a fault-based tort system (such as the American negligence system) contains at least some intrinsic deterring force. Professor Schwartz explains,

The economic rationale for tort liability emphasizes the extent to which tort rules can achieve deterrence. The basic point of the deterrence claim on behalf of tort liability is clear: By imposing the threat of liability on tortious conduct, the law can discourage parties from engaging in that conduct.

Thus, tort law can be viewed in economic terms as an incentive-based behavioral model, in which reasonably safe conduct is left alone while antisocial conduct is discouraged through the imposition of liability.

Id. (footnotes omitted).

103. *Restatement (Second) of Torts* § 832 (1979).

104. *Id.* at § 821F.

105. Wittgenstein, *supra* n. 7, at § 4.121, 79 (stating “propositions *show* the logical form of reality. They exhibit it.”); *id.* at § 4.25, 91 (“If the elementary proposition is true, the atomic fact exists; if it is false the atomic fact does not exist.”).

106. Wittgenstein, *supra* n. 3, at § 43, 20e (“For a *large* class of cases—though not for all—in which we employ the word ‘meaning’ it can be defined thus: the meaning of a word is its use in the language.”)

Predicting whether dumping waste into the stream is a nuisance is like asking baseball umpire Bill Klem whether the pitch was a ball or a strike. His response, per Stanley Fish, was “It ain’t nothing until I call it.”¹⁰⁷ The lawyer’s preliminary characterization serves to frame the case from his or her client’s point of view, but it is just the beginning of a process that may take years before a final decision that the polluter is or is not liable. Until then, the dumping was both nuisance and not nuisance, both wave and particle, both ball and strike, waiting for a final measurement to tell which. An appellate court that provides the final answer will, however, write an opinion that reads as if the decision were logically derived from the (almost scientific) application of legal rules to the facts. The appearance of logical, formulaic, deductive process confuses people outside, but not inside, the silo of law.¹⁰⁸

Law words have only limited predictive power because they refer to human activity, not (as with science) to intractable facts of nature. Law and legal constructs operate only in the heads and practices of the lawyers and judges who play the law game. They do not reside as realities in nature. They are not imbedded within the facts that precipitated a controversy, just waiting to be extracted by some explanatory formula. They are not like rules of mathematics and nature that may be viewed as Platonic ideals, with some claim to existence independent of human thought. Rules of law are influenced by politics, and they have no independent existence or scientific validation.¹⁰⁹ Moreover, the rules of law that appear as logical, linear statements of cause and effect may be balanced by contradictory rules that can justify diametrically opposed outcomes, depending on a chance categorization of a “fact” that is produced by purely strategic, not scientific argument.

Keeping the words of law open-ended allows the legal system to accommodate justice in particular cases without disturbing the formal content of law. It is not clear whether this flexibility is either a strength or a weakness of law. But whichever it is, it is dramatically different from the precise formulae that scientists apply unambiguously, and from the immediate, value-laden characterization the lay community makes intuitively, holistically, and without thought.

Consider what would happen if lay observers, a scientist (a doctor), and a lawyer saw a car hit a pedestrian? Would the lay observers start discussing who was at fault; the doctor assess the injury and administer aid; and the lawyer hand a business card to the pedestrian¹¹⁰ and the driver, ready to characterize the event as driver’s negligence, pedestrian’s fault, or unavoidable accident, as appropriate to an end? Lay observers and scientists may have an easier time understanding each other than either has understanding lawyers—or the texts and narratives that lawyers call law.

107. Stanley Fish, *Foreword* xiii, in Gary A. Olson, *Justifying Belief: Stanley Fish and the Work of Rhetoric* (SUNY Press 2002).

108. The Senate’s effort to get Supreme Court nominees to commit to following the Rule of Law is understood within the silos of law to be futile. The President knows the appointment is political; the nominee knows the right answers to give, and some Committee members are trying to get an admission that provides political cover for trashing the nominee. Imagine a scientist’s trying to make sense out of it.

109. This lack of predictive power helps explain why the win-loss average of trial lawyers as a class is only 50 percent.

110. This actually happened to a colleague (a teacher of professional ethics) who was hit by car in downtown Houston. When he recovered consciousness, he found a lawyer’s card in his shirt pocket.

Individual lawyers can be effective advocates for sustainability. But lawyers are not united in sustainability as a goal, and they will never be, so long as an opposing interest can pay the fee.

VI. POETS AND ARTISTS MAY BRIDGE SILOS.

The language of poets and artists is different from that of lawyers or scientists. Poets and artists see the future before the rest of us do, and they communicate what they see in code.¹¹¹ They seldom speak with “subject, verb, object” clarity.¹¹² Instead, they communicate by indirection, by metaphor, by narrative with double meaning, and by pictures that invite interpretation, not quick understanding. But they are essential. They inspire us as they warn us, and they give us the images to sell ideas to ourselves as well as to others. After all, what would our attitudes about environment be without Rachael Carson’s *Silent Spring*¹¹³ and without Buckminster Fuller’s reminder that we must view earth as a spaceship with limited resources, a constantly expanding crew, and an uncertain destination?¹¹⁴ Consider further the impact of Smokey Bear, whose long-running image provided one of the most effective icons in environmental history.¹¹⁵

Apart from poets and artists, anyone trying to convince the community to embrace sustainability should consult the “Nation as a family” metaphor in George Lakoff’s *Moral Politics*. Lakoff is both a scientist and a poet—or at least a convincing writer. His liberal Nurturant Parent is a pushover for sustainability. The challenge is to convince Lakoff’s conservative Strict Father model who holds that natural resources exist for human exploitation, and that communitarian interests hold little, if any, moral priority.¹¹⁶

Politicians are artists in their own right. They can be persuasive, and they have formal power to harness government and move the country toward sustainability. They are sensitive to the metaphors that prevail among their constituents, but they are not always responsive to their constituents’ unperceived needs. Do politicians have the will to lead instead of react? Only if scientists, environmental lawyers, and poets can find the words to appeal to the politicians’ own moral metaphors.¹¹⁷

The story of sustainability must be told in a language that can be understood across and inside all silos. Plain language is called for. Neither scientists nor lawyers, with their highly technical and strategic vocabularies, can be as effective as the purveyors of

111. Oscar Wilde, *The Soul of Man under Socialism* 51 (The Porcupine Press 1948) (“For the past is what man should not have been. The present is what man ought not to be. The future is what artists are.”).

112. Emily Dickinson, *The Poems of Emily Dickinson* 398 (R.W. Franklin ed., Reading ed., Belknap Press 1999) (What, for example, is to be made of Emily Dickinson’s “An Everywhere of Silver With Ropes of Sand To keep it from effacing The Track called Land?”).

113. See generally Rachel Carson, *Silent Spring* (25th Anniversary Ed., Houghton Mifflin Co. 1987).

114. R. Buckminster Fuller, *Operating Manual for Spaceship Earth*, <http://www.futurehi.net/docs/OperatingManual.html> (accessed Mar. 16, 2009).

115. See Smokey Bear, *Get Your Smokey on*, <http://www.smokeybear.com/?gclid=CIGXteKts5MCFRRhnAodfzHMcg> (accessed Mar. 16, 2009).

116. Lakoff, *supra* n. 19, at 162–76; George Lakoff, *Don’t Think of an Elephant! Know Your Values and Frame the Debate* 86 (Collette Leonard, Jennifer Nix, Marcy Brant & Robin Catalano eds., Chelsea Green Publishing Co. 2004) [hereinafter Lakoff, *Elephant*].

117. See generally Lakoff, *Elephant*, *supra* n. 116 (providing a handbook for framing political issues such as sustainability).

catchy tunes and artfully framed admonitions in convincing people to save their planet.¹¹⁸ Sustainability is itself a game with a single stake—survival of the planet and ourselves as a species. We are all players—and communicators—and only our words, our actions, and our commitments will keep Spaceship earth aloft. Or not.

118. For a spot effort to bridge the liberal-conservative gap, see the dialogue between Al Sharpton and Pat Robertson at You Tube, *Pat Robertson and Al Sharpton Commercial on Climate Change*, <http://www.youtube.com/watch?v=NhmpsUMdTH8> (accessed Mar. 16, 2009).