

CULTURAL REPLICATION THEORY AND LAW: PROXIMATE MECHANISMS MAKE A DIFFERENCE

Oliver R. Goodenough*

INTRODUCTION

Does law itself evolve? It has been widely suggested that culturally transmitted-behavioral information exhibits a Darwinian evolutionary dynamic.¹ The argument is straightforward. Darwinian evolution has three basic elements: (1) replicative descent with (2) variation, subject to (3) a form of selection.² Bundles of cultural information as diverse as language,

* Professor, Vermont Law School; J.D. 1978, University of Pennsylvania; B.A. 1975 Harvard University.

1. See, e.g., SUSAN BLACKMORE, *THE MEME MACHINE* 9 (1999) (“[M]any aspects of human nature are explained far better by a theory of memetics than by any rival theory yet available.”); ROBERT BOYD & PETER J. RICHESON, *CULTURE AND THE EVOLUTIONARY PROCESS* 2 (1985) (proposing a “dual inheritance theory” by linking “models of cultural transmission to models of genetic evolution”); L.L. CAVALLI-SFORZA & M.W. FELDMAN, *CULTURAL TRANSMISSION AND EVOLUTION: A QUANTITATIVE APPROACH* 362–66 (1981) (discussing an example of “how a cultural adaptation, and hence culture itself, can promote Darwinian fitness of a species”); RICHARD DAWKINS, *THE SELFISH GENE* 1 (2d ed. 1989) (exploring the consequences of Darwinian evolutionary theory in order “to examine the biology of selfishness and altruism”); PETER J. RICHESON & ROBERT BOYD, *NOT BY GENES ALONE: HOW CULTURE TRANSFORMED HUMAN EVOLUTION* 3–4 (2005) (arguing that culture and human biology are intimately intertwined); Robert Aunger, *Introduction to DARWINIZING CULTURE: THE STATUS OF MEMETICS AS A SCIENCE* 1, 1 (Robert Aunger ed., 2000) (examining the roles of memes in the social sciences generally); William H. Durham, *Advances in Evolutionary Culture Theory*, 19 ANN. REV. ANTHROPOLOGY 187, 187 (1990) (arguing that cultures do evolve and examining the leading theories of cultural evolution); Mark V. Flinn, *Culture and the Evolution of Social Learning*, 18 EVOLUTION & HUMAN BEHAV. 23, 24 (1997) (“[E]mpirical tests of evolutionary culture theory must build upon identification of apparent universals and examine individual variability by incorporating developmental psychology, environmental conditions, and social and historical context.”); Liane Gabora, *The Origin and Evolution of Culture and Creativity*, 1 J. MEMETICS: EVOLUTIONARY MODELS INFO. TRANSMISSION 29, § 1 (1997), available at <http://digbig.com/4rnhs> (“Thus ideas, like the strands of DNA that encode instructions for building and maintaining living organisms, seem to undergo a process analogous to biological evolution.”); Oliver R. Goodenough & Richard Dawkins, *The ‘St. Jude’ Mind Virus*, 371 NATURE, Sept. 1 1994, at 23, 23 (discussing the St. Jude chain letter as an example of a human-information parasite) [hereinafter Goodenough & Dawkins, *St. Jude*]; Oliver R. Goodenough, *Mind Viruses: Culture, Evolution and the Puzzle of Altruism*, 34 SOC. SCI. INFO. 287, 288 (1995) [hereinafter Goodenough, *Mind Viruses*] (exploring the significance of the St. Jude letter in human culture and concluding that cultures can be treated as “human information parasites”); Ward H. Goodenough, *Outline of a Framework for a Theory of Cultural Evolution*, 33 CROSS-CULTURAL RES. 84, 84 (1999) (stating the need to establish standards for the study of culture so a database can be created to produce a developed theory of cultural evolution); Daniel C. Dennett, *The Evolution of Culture*, The Charles Simonyi Lecture at Oxford University (Feb. 17, 1999), <http://digbig.com/4rnht> (explaining patterns found in culture from the standpoint of Darwinian evolution).

2. See ROBERT WRIGHT, *THE MORAL ANIMAL: EVOLUTIONARY PSYCHOLOGY AND EVERYDAY LIFE* 24 (1994) (quoting Darwin as summarizing his theory as “multiply, vary, [and] let the strongest live and the weakest die”). See generally CHARLES DARWIN, *THE ORIGIN OF SPECIES, reprinted in* 49 GREAT BOOKS OF THE WESTERN WORLD (Robert Maynard Hutchins ed., 1952)

religious practices, and how to bake bread pass with imperfect fidelity from generation to generation. Some of the variants created by these imperfections are passed, nonrandomly, to the next generation with greater frequency. Richard Dawkins suggested the term “meme” for such cultural elements,³ and a cluster of subdisciplines applying evolutionary theory to human culture has come into being.⁴ One flavor focusing on the evolution of the culture elements is sometimes called “memetics.”⁵ Another major strand, perhaps a bit more “holistic” in approach and often more rigorously presented, is called by some “[g]ene-culture coevolution.”⁶

But what about law? A growing—if still limited—number of authors have applied these kinds of approaches to legal systems.⁷ As E. Donald Elliott reminds us in his important 1985 survey *The Evolutionary Tradition*

(introducing the theory of natural selection).

3. DAWKINS, *supra* note 1, at 203.

4. See generally KEVIN N. LALAND & GILLIAN R. BROWN, SENSE AND NONSENSE: EVOLUTIONARY PERSPECTIVES ON HUMAN BEHAVIOUR 3 (2002) (outlining “the most prominent evolutionary approaches and theories currently being used to study human behaviour” and “explor[ing] to what extent human behaviour can legitimately be studied using evolutionary methods”); Flinn, *supra* note 1, at 53 (“The evolutionary approach advocated here views culture as an adaptive part of individual human phenotypes.”).

5. BLACKMORE, *supra* note 1, at 9; see also Journal of Memetics: Evolutionary Models of Information Transmission, <http://www.jom-emit.org/past.html> (providing a database of articles from the journal).

6. LALAND & BROWN, *supra* note 4, at 207.

7. See, e.g., J.M. Balkin, *Ideology as Cultural Software*, 16 CARDOZO L. REV. 1221, 1222 (1995) (discussing “some of the problems in the philosophy of culture through an extended metaphor—the metaphor of cultural software”); E. Donald Elliott et al., *Toward a Theory of Statutory Evolution: The Federalization of Environmental Law*, 1 J.L. ECON. & ORG. 313, 313 (1985) (exploring the evolution of statutory law from a biological perspective generally); Michael S. Fried, *The Evolution of Legal Concepts: The Memetic Perspective*, 39 JURIMETRICS J. 291, 292 (1999) (using the theory of memetics to analyze the law from an evolutionary perspective); Thomas Earl Geu, *Chaos, Complexity, and Coevolution: The Web of Law, Management Theory, and Law Related Services at the Millennium*, 65 TENN. L. REV. 925, 926 (1998) (explaining “that business-management theory, including economics, coevolves with the law of business associations, and that both, in turn, coevolve with the business of law”); Neal A. Gordon, *The Implications of Memetics for the Cultural Defense*, 50 DUKE L.J. 1809, 1810 (2001) (presenting the “new theory of cultural evolution, memetics,” in relation to “the cultural defense”); Owen D. Jones & Timothy H. Goldsmith, *Law and Behavioral Biology*, 105 COLUM. L. REV. 405, 410 (2005) (surveying evolutionary approaches in the law); 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, 852–53 (1996) (critiquing and suggesting reform of the law-and-society system based on complexity theory) [hereinafter Ruhl, *Complexity Theory*]; J.B. Ruhl, *The Fitness of Law: Using Complexity Theory to Describe the Evolution of Law and Society and Its Practical Meaning for Democracy*, 49 VAND. L. REV. 1407, 1408 (1996) (“Does law evolve? If so, why, how, and to where?”) [hereinafter Ruhl, *The Fitness of Law*]; Jeffrey Evans Stake, *Are We Buyers or Hosts? A Memetic Approach to the First Amendment*, 52 ALA. L. REV. 1213, 1214–15 (2001) (arguing the effectiveness of an evolutionary perspective in an analysis of law); Sam Vermont, *Memes and the Evolution of Intellectual Dishonesty in Law*, 22 LEGAL STUD. F. 655, 657 (1998) (arguing that memes are not subordinate to reason and explaining the forces that cause memes to replicate).

in *Jurisprudence*, the history of using evolutionary thinking in the study of law is remarkably long.⁸ A great deal of that tradition has occurred at the level of metaphor.⁹ Some, however, have attempted to use “formal theories of law based on self-conscious analogies to evolutionary theory in biology.”¹⁰ One of the most noted proponents in the U.S. tradition is Oliver Wendell Holmes. Evolutionary thinking is a strong theme in *The Common Law*¹¹ and an explicit one in *Law in Science and Science in Law*.¹² Unfortunately, Holmes’s work, like much of the early evolutionary thinking about society, shared in the flaws of Social Darwinism that helped lead to an eclipse of such approaches.¹³

The revival in the latter decades of the twentieth century of applying evolutionary analysis to cultural artifacts has reinvigorated its use in the law. Some have continued at the level of metaphor,¹⁴ others have made explicit claims based in memetics,¹⁵ and still others have drawn on complexity theory as well as evolution.¹⁶

8. E. Donald Elliott, *The Evolutionary Tradition in Jurisprudence*, 85 COLUM. L. REV. 38, 38 (1985) [hereinafter Elliott, *The Evolutionary Tradition*]; see also E. Donald Elliott, *Law and Biology: The New Synthesis?*, 41 ST. LOUIS U. L.J. 595, 595–96 (1997) (discussing the “Law and Biology” movement); E. Donald Elliott, *The Tragi-Comedy of the Commons: Evolutionary Biology, Economics and Environmental Law*, 20 VA. ENVTL. L.J. 17, 25–30 (2001) (arguing that viewing law from an evolutionary perspective can explain important phenomena that are difficult to explain from an economic perspective).

9. Elliott, *The Evolutionary Tradition*, *supra* note 8, at 38.

10. *Id.* at 39–40.

11. OLIVER WENDELL HOLMES, JR., *THE COMMON LAW* 1 (1881) (“The law embodies the story of a nation’s development through many centuries . . .”).

12. Oliver Wendell Holmes, Jr., *Law in Science and Science in Law*, 12 HARV. L. REV. 443, 447 (1899) (“We have evolution in this sphere of conscious thought and action no less than in lower organic stages, but an evolution which must be studied in its own field.”).

13. See, e.g., *Buck v. Bell*, 274 U.S. 200, 207 (1927) (“Three generations of imbeciles are enough.”). For a nuanced reappraisal of Holmes’s thoughts and the role of evolution in them, see ALBERT W. ALSCHULER, *LAW WITHOUT VALUES: THE LIFE, WORK, AND LEGACY OF JUSTICE HOLMES* (2000). See generally Oliver R. Goodenough, *Biology, Behavior, and Criminal Law: Seeking a Responsible Approach to an Inevitable Interchange*, 22 VT. L. REV. 263, 263 (1997) (suggesting “the useful role that biologically-informed views of human behavior can play in adding to our understanding” of the law).

14. E.g., William H. Rodgers, Jr., *Where Environmental Law and Biology Meet: Of Pandas’ Thumbs, Statutory Sleepers, and Effective Law*, 65 U. COLO. L. REV. 25, 28 (1993) (“The purpose of this article is to introduce some of the recent findings of evolutionary biology to the legal community and to urge their consideration in developing a more effective law.”).

15. E.g., Fried, *supra* note 7, at 292; Goodenough, *Mind Viruses*, *supra* note 1, at 288; Stake, *supra* note 7, at 1214–15; Vermont, *supra* note 7, at 657.

16. E.g., Geu, *supra* note 7, at 926; Ruhl, *Complexity Theory*, *supra* note 7, at 852; J.B. Ruhl, *The Coevolution of Administrative Law with Everything Else*, 28 FLA. ST. U. L. REV. 1, 1–3 (2000) (concentrating on the fact that environmental lawyers need to consider the regulatory theory behind administrative law); J.B. Ruhl, *The Co-Evolution of Sustainable Development and Environmental Justice: Cooperation, Then Competition, Then Conflict*, 9 DUKE ENVTL. L. & POL’Y F. 161, 162–63

Many of the more general discussions of cultural evolution, and some of its specific applications to the law, have focused on the “downstream” consequences of this approach: What could we expect an evolutionary system of culture to produce in the way of specific memes and behaviors?¹⁷ But, as the DNA revolution taught us, in order to get the downstream end right, it is critical to identify the specific dynamics of the “upstream” replicative process itself. Furthermore, the study of cultural evolution has been slowed by a tendency to fall back on explicitly biological proximate models. Recent studies have recognized the need both for a more general approach to evolutionary phenomena, of which cultural and biological processes can be seen as specific cases, as well as for better, *sui generis* descriptions of the proximate mechanisms through which cultural elements replicate, vary, and have differential replicative success.¹⁸ A better description of the proximate mechanisms of cultural transmission will provide a clearer understanding of cultural evolution and of evolutionary approaches to the law itself.

One of my previous accounts of cultural evolution argues that human imitative processes—understood broadly—create the possibility of cultural transmission and therefore provide the starting point for this kind of detailed picture of culture.¹⁹ I also have previously suggested that cultural transmission occurs through the imitation of remembered actions, rather than of ideas, a process that leads to a significant bottleneck in what can be

(1999) (using principles from the fields of biological evolution and complexity theory to emphasize the coevolutionary nature of sustainable development and environmental justice); Ruhl, *The Fitness of Law*, *supra* note 7, at 1409–10; J.B. Ruhl, *Thinking of Environmental Law as a Complex Adaptive System: How to Clean Up the Environment by Making a Mess of Environmental Law*, 34 HOUS. L. REV. 933, 937 (1997); J.B. Ruhl, *Thinking of Mediation As a Complex Adaptive System*, 1997 BYU L. REV. 777, 783–84 (offering observations as mediation being a complex adaptive system).

17. I have been as guilty of this as anyone. See, e.g., Goodenough, *Mind Viruses*, *supra* note 1, at 288 (“The purpose of this paper is to take this argument further, examining some of the characteristics which culture should possess as a human information parasite and suggesting that such a theory of culture can help to solve one of the ongoing conundrums of human behavior: our capacity for ‘altruism.’”).

18. See, e.g., BLACKMORE, *supra* note 1, at 9 (“First, a theory must be able to explain things better than its rival theories; more economically or more comprehensively. And second, it must lead to testable predictions that turn out to be correct. Ideally, those predictions should be unexpected ones - things that no one would have looked for if they were not starting from a theory of memetics.”); LALAND & BROWN, *supra* note 4, at i (“The challenge for scientists will be to determine which facets of humanity are open to this kind of analysis, and to devise definitive tests of any hypotheses concerning our evolutionary legacy.”); Gabora, *supra* note 1, § 1 (“We may not yet know all the physiological details of how the information manifested in, say, a handshake between two individuals—with its unique arrangement of contact points, applied forces, and trajectory—can be traced back to these individuals’ mental representations of handshakes, each other, and the situation they are in. But let us proceed with the confidence that a solution exists and can be found.”).

19. Goodenough, *Mind Viruses*, *supra* note 1, at 288.

passed on culturally.²⁰ This approach further classifies the transmission of actions into three modes—nonlinguistic transmission, stories, and formulas—a development that helps to circumvent the bottleneck. If correct, such a dynamic will have implications for the kinds of information that a cultural process such as the law can transmit. This Essay will describe my suggested approach in some detail. It will then turn more briefly to the law, sketching examples of the explanatory power, and limits, of my approach.

I. REPLICATION IN CULTURE RESTS ON THE IMITATION OF ACTION

“Ideas” as such do not replicate. There is no direct brain-to-brain link that allows the transmission of the internalized information structure. Computers, of course, with the proper interconnection, can transfer data directly to each other. Even my son’s relatively simple Game Boy came with a cable that could connect it directly to others, allowing, during the fad, for a machine-to-machine trade of the more exotic Pokémon characters. Humans have no such intercranial pipe. What we do observe, and can recreate, is *action*. An idea must become an action if it is to spread. Reflecting this necessity, Gatherer has suggested that the entire “thought contagion” metaphor should be abandoned for cultural evolution.²¹

Of course, storage through mental modeling of the action in the brain of a human is also a critical link in the replicative chain. In this sense, the brain is part of the medium of copying, and this mental modeling, while not the focus of the model discussed in this Essay, is an object of lively study in its own right.²² Furthermore, the presence of this modeling in our cognition can both affect our thinking more generally and lead to other actions, actions that can be nonreplicative. Action-to-action imitative replication is not the sole realm of human cognitive functioning, nor is it the sole realm of learning. Nonetheless, cultural replication—the core of the memetic

20. Oliver R. Goodenough, *Information Replication in Culture: Three Modes for the Transmission of Culture Elements Through Observed Action*, in *IMITATION IN ANIMALS AND ARTIFACTS* 573, 573 (Kerstin Dautenhahn & Chrystopher L. Nehaniv eds., 2002). Significant portions of this Essay are adapted from these two treatments.

21. Derek Gatherer, *Why the ‘Thought Contagion’ Metaphor Is Retarding the Progress of Memetics*, 2 *J. MEMETICS: EVOLUTIONARY MODELS OF INFORMATION TRANSMISSION* 135, § 1 (1998), available at <http://digbig.com/4rnhw>.

22. See, e.g., Aaron Lynch, *Units, Events and Dynamics in Memetic Evolution*, 2 *J. MEMETICS: EVOLUTIONARY MODELS OF INFORMATION* 34, § 3 (1998) (presenting a “memetic evolution theory”), available at <http://digbig.com/4rnhy>; Ken Richardson, *Hyperstructure in Brain and Cognition*, *PSYCOLOQUY*, Sept. 23, 1999, paras. 20, 32, <http://digbig.com/4rnrf> (mentioning that the brain sciences need “psychologically enlightened models of higher-order structures and principles governing perception and conception” and attempting to create such a model).

claim—occurs when an action (or in some cases, a result from which the action can be inferred)²³ is repeated by an observer and observed and repeated by others in their turn. Those aspects of culture that follow an evolutionary dynamic will necessarily reflect this pattern. The importance of action in the transmission of culture has been recognized by writers as diverse in time and subject matter as Jane Ellen Harrison²⁴ and Marvin Harris.²⁵

II. ROLE OF LANGUAGE IN AVOIDING A BOTTLENECK

In what looks like an “idea” transfer, actions can be linguistic, i.e., the repetition of a word formula. As will be more fully discussed below, these linguistic actions can, as stories or formulas, carry imbedded behavioral and cognitive messages piggybacked, as it were, on the linguistic action itself. But while a secondary meaning can be created through language and modeled in its turn if properly “decompressed” in the observer’s mind, the thing replicated from one person to the next is the linguistic action and not the meaning itself. Indeed, a chain of people can learn and relearn the linguistic action by rote, perhaps as a matter of ritual, ignorant of the language in which it is phrased.

As a boy living for a year on a small, traditional island in Micronesia, where most of the residents did not speak any English, I was on the receiving end of just such a chain. Shortly after my arrival, several children approached me and rhythmically chanted “Gary Cooper is an actor.” The coded content of this short sentence meant literally nothing to the speakers, but they knew it was English, and they wanted to make me feel welcome.

This action-to-action step in the transmission process creates a very narrow doorway through which human culture must pass, a true bottleneck. This kind of bottleneck has been described in the context of language.²⁶ It

23. A. Whiten & R. Ham, *On the Nature and Evolution of Imitation in the Animal Kingdom: Reappraisal of a Century of Research*, 21 *ADVANCES STUDY BEHAV.* 239, 250 (1992).

24. See JANE ELLEN HARRISON, *PROLEGOMENA TO THE STUDY OF GREEK RELIGION* 5 (1903) (“What a people *does* . . . must always be one clue, and perhaps the safest, to what it *thinks*.”).

25. See MARVIN HARRIS, *THEORIES OF CULTURE IN POSTMODERN TIMES* 19 (1999) (arguing that culture is comprised of both thought and behavior, not exclusively thoughts and ideas).

26. See, e.g., Simon Kirby, *Learning, Bottlenecks and Infinity: A Working Model of the Evolution of Syntactic Communication*, in 1999 *PROC. ARTIFICIAL INTELLIGENCE & SIMULATION BEHAV. [AISB] '99 SYMP. IMITATION ANIMALS & ARTIFACTS* § 2 (“The transformation between the internal and external domains of language . . . act as a bottleneck on information flowing through the system. Just as the bottleneck on transmission of genetic information in biological systems eventually has implications for the structure of organisms that emerge, we should expect that the equivalent bottleneck in the linguistic system to have a role to play in the explanation of parts of linguistic structure.”).

will also constrain other aspects of cultural transmission. In the absence of some way to encode or compress information, what can be passed on culturally will be limited to action/context combinations *actually observed* in a context of direct experience, imposing significant limitations on both the quantity and the type of information that can be passed. Human language, together with three important modes of its use, has provided powerful tools for the coding, compression, and preservation of behavioral information that would be difficult or impossible to transmit by nonlinguistic means.

A. Three Modes

Action-based transmission of cultural information between humans can be usefully classified into three general modes: nonlinguistic (uncoded), stories (partially coded), and formulas (fully coded). Other modes are certainly theoretically possible, and may well exist in practice, but these modes appear widely encompassing for human behavior as it exists. The approach suggested provides explanations for such legally relevant phenomena as hypocrisy and the separation of law and morals, but it has not yet been tested in a systematic way.

1. Nonlinguistic/Uncoded Transmission

Nonlinguistic, uncoded transmission depends upon the direct observation that forms the bottleneck described above. In its simplest form, an action by person *A* in a particular context is observed by person *B*. The action and the context for it are stored in the brain of *B*, waiting for the context to reoccur for *B*. When this contextual trigger happens, the behavior is reproduced, and, if observed by *C*, the context and behavior are stored again.

While the behavior rests in the brain in a modeled, or symbolized, form and can be abstracted and generalized by the brain in connection with various thought processes, it is uncoded in the sense that the context/action pattern does not depend on language or some other form of coding to aid in its modeling or transmission. In this, it is somewhat analogous to phenotypic transmission, something observed in traditional biology in RNA replication.²⁷

27. See generally Gerald F. Joyce and Leslie E. Orgel, *Prospects for Understanding the Origin of the RNA World*, in *THE RNA WORLD* 49 (Raymond F. Gesteland et al. eds., 2d ed. 1999) (hypothesizing the possible role that RNA replication played in the evolution of contemporary organisms).

Language is not used directly in this mode, although it may be used secondarily to initiate a teaching session, to register approval and disapproval, and to help make corrections. Notwithstanding the usefulness of language for facilitation, this mode of transmission exists without it. Indeed, this kind of simple imitative process, which can be assumed to be developmentally “programmed” in humans, could be how language comprehension gets constructed in the developing brain, at least in the early stages.

2. Stories/Partly Coded Transmission

Once language enters the human repertoire, it can be used to tell a story. Of course this is only one of the many possible uses of language, but one that can be recruited into the process of cultural transmission. When the linguistic message is understood in the brain, the action/context mix carried by the story is “observed” in a virtual world of the represented experience. From this “observation,” a nonlinguistic behavioral model can be created, based on the implicit “moral of the story,” and this model can form the basis for an action in its turn. At the same time, a separate memory can be implanted of the story itself; it too becomes an item for replication, and its telling is an action for separate imitation. The transmission can become nonlinguistic again, when the action produced by the model (which was derived from the story) is observed by people who haven’t heard the story. Because the transmission is language-based but the behavioral model is not, this can be called partly coded transmission.

The story can be told and retold, and its imbedded-behavioral message can be passed on across generations, in contexts where the imbedded behavior itself is never called upon to occur. Sometimes, the action becomes impossible or obsolete—and yet the story gets attached to a context in which it is retold ritualistically for its own sake. Many children’s stories, set in far-off or even mythical contexts, have this characteristic. Nor must the “story” be a coherent narrative. Advertising jingles can work as partially coded transmissions. The overall point is this: there are often multiple streams of replication through stories—those relating to the actions taught by the story and those relating to the replication of the story itself. Different neural pathways and mechanisms may well be employed in the storage and re-creation of the story, on the one hand, and of the behavioral lessons imbedded in the story, on the other.

Several benefits accrue from even this level of linguistic transmission. Since it is no longer necessary to be an actual observer of an action/context

pairing in order to learn transmitted behavior, some of the subject-matter bottleneck that limits uncoded, nonlinguistic transmission can be avoided. Stories can preserve infrequently needed information, as well as infrequently needed vocabulary. After all, we do not need stories to pass on behavior for frequently experienced contexts. In this light, the somewhat exotic or out-of-date settings of many children's stories can be seen as preserving behavioral information for a "rainy day." There is also a safety factor. Stories about dangerous or unpleasant circumstances can teach survival lessons without the hearer having to witness or experience problematic episodes in person.

The human appetite for stories, and the ability to remember and tell them, suggests that this mechanism, like language itself, has had time to root itself in the genetic portion of our human inheritance.²⁸ For generations, people have paid good money, and lots of it, to consume stories, in contexts from *People Magazine* and *The National Enquirer* to *Pride and Prejudice* and *The Odyssey*. One reason for the prevalent use of stories may be that they require relatively little additional cognitive power once language is in place. The events need to be described, "observed," and modeled, but their underlying behavioral message need not be abstracted in the language system. The decision about action can still be made through the nonlinguistic pathways already established to direct conduct. *Describing* events in words probably has a long history in humans, involving highly developed neural structures. *Generalizing* events, abstracting principles, and making decisions about action through the language system may simply be more demanding and may work through a less-fully evolved piece of mental equipment. Drawing on the admittedly subjective observations of a number of years as a graduate-law teacher, I suggest that for most of us, stories are interesting and easy; word-based formulas are dull and hard.

3. Formulas/Fully Coded Transmission

The third mode, "fully coded" transmission through linguistic formulas, uses language to transmit abstracted behavioral information. Here the replication is of an explicit formula of context and action—a recipe, recommendation, or rule. The authority for these formulas can be varied—it might be legal, religious, parental, or simply observational.

28. See STEVEN PINKER, *THE LANGUAGE INSTINCT* 48–49 (1994) (discussing the possibility of language impairment having a genetic cause). "Language is not a cultural artifact that we learn the way we learn to tell time or how the federal government works. Instead, it is a distinct piece of the biological makeup of our brains." *Id.* at 18.

When it is functioning well, fully coded transmission can greatly increase both the type and the quantity of behavioral information passed through the bottleneck. There are drawbacks, however.

The very creation of such a formula is a task of some mental complexity. Good generalization into language may well require significantly more cognitive innovation than does simple linguistic description. In light of this kind of difficulty, it is no surprise that human, word-based analysis is so often flawed. Even trial and error correction is, at best, imperfect. Nor is up-front error the only source of inaccuracy. In such highly coded form, replication must be exact. Memory becomes crucial, particularly in a preliterate society. Stories can often be passed on successfully with some latitude in their need for word-by-word exactness; they are informationally robust. Formulas, however, are more fragile. Their benefit is that they are much more compressed, but, with such compression, even a relatively small transmission error can turn into a disaster. In a preliterate world, devices such as rhyme, rhythm, melody, and labeling could help to prevent mistakes. Remembering and passing on the Ten Commandments is helped by the repetition of “[t]hou shalt not” and by the fact that you need to come up with ten of them.²⁹ “Red [r]ight [r]eturning,” the formula for buoy coloration in ocean navigation, relies on alliteration to defend its accuracy in transmission and recall.³⁰ The development of writing, of course, greatly strengthened the ability to create and transmit durable recipes and rules of considerable length and complexity. Our formula-challenged brains are still struggling to catch up with this increase in stability.

The process by which a linguistic formula gets translated into its embedded action—requiring both decompression as to its sense and translation into motivation for the imbedded action—is also likely to involve complicated and relatively newly evolved neural pathways. There is certainly no guarantee that this translation will occur. One frequently effective step involves rehearsal, where a series of practice re-creations models the formula-inspired action in nonlinguistic, uncoded pathways as well. As with stories, the formula can be transmitted as a linguistic artifact separate from any role it may actually have in determining action on the express “content” of the formula.

B. Nonreplicating Information, Clusters, and Bundles

29. *Exodus* 20:1–:17 (King James).

30. Boatsafe.com, Identifying Aids to Navigation, <http://digbig.com/4mrh> (last visited Feb. 21, 2007).

It is important to recall that many—perhaps even most—linguistic messages are *not* replicating elements of cultural transmission. Among the other things that language does is to help exchange current information on the state of the world: the weather, what's for dinner tonight, where the predators are hiding right now, etc. Only when the message itself has the property of provoking its repetition by an observer, or is linked in a bundle that overall has such a property, will it enter the perpetuating culture stream. At the relatively raw end of this continuum, a “mind virus,” like a chain letter, can be as simple as a copying command and some kind of crude threat that creates a compulsion to obey.³¹

The contents of bundles need not be drawn from a single mode. All three modes of replication can mix, cluster, and combine into more or less tightly bundled packages of differing elements.³² Language itself, at least as learned in childhood by a native speaker, is largely a bundle of uncoded information that does not use language to form its mental model.³³ Some of the other elements in the cultural mix are best viewed as “junk memes” intertwined with more effective elements, unexpressed in action and along for the ride. Some linguistic actions may be excellent at their own replication as formulas or stories but quite ineffective at producing any behavior other than the copying of the story or formula itself. There are many rules, laws, and commandments that are observed “in the breach,” rather than “to the letter,” and many stories that are told but not acted upon. The old adage “do as I say, not as I do” represents a memorable and deeply ironic attempt in the language system to combat this tendency. Hypocrisy may be as much a reflection of the strengths and weaknesses of people's brain architecture as of the strengths and weaknesses of their character.

Indeed, the bundles themselves can carry inconsistent, even conflicting behavioral guides. In genetic replication, it should be remembered, the instructions of the different parts of the genome can be in direct conflict, a phenomenon sometimes linked to parental imprinting of the genes in question.³⁴ Source differentiation may also be a factor in the behavioral

31. Goodenough & Dawkins, *St. Jude*, *supra* note 1, at 23.

32. This idea was first communicated to me in an informal conversation with Professor Walter Fontana of Harvard University in 1998. *Cf.* Gabora, *supra* note 1, § 5 (exploring different modes of replication).

33. Goodenough, *Mind Viruses*, *supra* note 1, at 296–97; Oliver R. Goodenough, *Rethorising Privacy and Publicity*, 1 INTELL. PROP. Q. 37, 42–43 (1997) [hereinafter Goodenough, *Rethorising*].

34. *See generally* David Haig, *Genetic Conflicts in Human Pregnancy*, 68 Q. REV. BIOLOGY 495, 496 (1993) (exploring the conflicts that can exist between a mother's genes and that of her fetus and arguing that genetic conflict exists in pregnancy); David Haig & Alan Grafen, *Genetic Scrambling as a Defence Against Meiotic Drive*, 153 J. THEORETICAL BIOLOGY 531, 531–32 (1991) (discussing conflict within the genome and the ensuing consequences in recombination); Atsushi Mochizuki et al., *The Evolution of Genomic Imprinting*, 144 GENETICS 1283, 1283–84 (1996) (studying the evolution of

expression of culturally transmitted information.

The coded formulas on certain subjects—including those rules encoded in the law—may or may not be congruent with the model passed through uncoded transmission for behavior in the same context.³⁵ With this potential for discrepancy, it is almost inevitable that in some instances “the law is a ass—a idiot.”³⁶ The law is not the only example of cross-modal description. Ethnography in cultural anthropology can be viewed as an attempt to map models from the uncoded or partly coded system of the culture under study into coded rules in the language of the ethnographer.³⁷

C. External Storage

Each of the modes of cultural replication are strengthened by the development of relatively high-fidelity methods of external storage. The brain is prone to error as a medium of replication. If the actions can be preserved in decently accurate and durable external storage, the error rate will fall off considerably and the breadth of preserved experience increased. External storage removes yet another aspect of the bottleneck. Of course, the action of making and accessing the external storage must be passed on at least partly through unstored processes.

Sculpture and pictorial representations, with a history stretching back through stained glass to cave paintings and beyond, provide direct, uncoded messages and can also prompt and reinforce partially and fully coded transmission. Writing, by preserving language, has helped transmit both stories and formulas. The difficulty of re-creating infrequently practiced rituals in a preliterate society acts as a limit on cultural processes.³⁸ Literate cultures faced with a similar problem can invoke the aid of a prayer book or other written guide.

genetic imprinting to examine the “genetic conflict hypothesis,” which observes imprinting patterns based on the conflict between paternal and maternal alleles).

35. Goodenough, *Rethorising*, *supra* note 33, at 43.

36. CHARLES DICKENS, *OLIVER TWIST* 335 (Kathleen Tillotson ed., Oxford Univ. Press 1966) (1838).

37. *See generally* WARD H. GOODENOUGH, *DESCRIPTION AND COMPARISON IN CULTURAL ANTHROPOLOGY* (1970) (describing problems of cross-cultural comparison and description and setting forth a possible approach to overcome such problems); Ward H. Goodenough, *Toward a Working Theory of Culture*, in *ASSESSING CULTURAL ANTHROPOLOGY* 262 (Robert Borofsky ed., 1994) (asserting that a good working theory of culture is needed that will resolve the conflict between the uniqueness of individual cultures and the shared characteristics that ethnographers attribute to every culture and attempting to provide such a theory).

38. *See, e.g.*, F. E. WILLIAMS, *DRAMA OF OROKOLO: THE SOCIAL AND CEREMONIAL LIFE OF THE ELEMA* 422–37 (1940) (examining the decline of Hevehe, the ritualistic ceremony performed by the Eleman people in Orokolo, Papua New Guinea).

The effect of writing—particularly printed writing—on the preservation and transmission of recipes is striking, as anyone who has used a cookbook to make an exotic dish will recognize. The effect of writing on rules is even more dramatic, as anyone who has waded through such laws as the U.S. Internal Revenue Code can attest. The availability of writing to strengthen these two linguistic modes has been rivaled only recently in the arena of direct transmission by the development of film, television, and other means of audiovisual preservation. The possibilities raised by the external storage and dissemination of nonword-based cultural elements are striking and are likely to come at some expense to the word-based systems. The possibility of external storage strengthens and complicates the process of cultural replication in all three modes, but it does not change its basic foundation.

D. Variation and Selection

The focus of this Essay so far has been on the proximate mechanisms for replication in human culture. A full description of cultural processes will also suggest mechanisms of variation and selection.³⁹ Although an extended treatment of the selection process at work on human-cultural elements is beyond the scope of this discussion, the means of replication suggested here may be helpful in such a context. After all, the ultimate selection criterion is a failure to replicate. In the context of the approach suggested here, the key to cultural transmission is provoking the imitation of action by others. In the same way that sexual selection, so critically tied to reproduction, can imbed otherwise nonadaptive traits in genes, so too will psychological selection on the replaying of actions be critical in the passing on of cultural elements. Success at some task, accuracy, truth, and such other seemingly important criteria of selection⁴⁰ can take a backseat to pure action-producing compulsion.

A few years ago, my elder son received a computer chain letter whose sole informative content was:

39. See, e.g., BLACKMORE, *supra* note 1, at 9 (“[M]any aspects of human nature are explained far better by a theory of memetics than by any rival theory yet available.”); DAWKINS, *supra* note 1, at 1 (exploring the consequences of Darwinian evolutionary theory in order “to examine the biology of selfishness and altruism”); Agner Fog, *Cultural r/k Selection*, 1 J. MEMETICS: EVOLUTIONARY MODELS INFO. TRANSMISSION 14, § 1 (1997), available at <http://digbig.com/4rnja> (introducing a new cultural-selection-theory model for explaining social phenomena); Gabora, *supra* note 1, § 1 (exploring the patterns found in cultures as they evolve); Goodenough, *Mind Viruses*, *supra* note 1, at 288 (exploring the significance of the St. Jude letter in human culture and concluding that cultures can be treated as “human information parasites”); Dennett, *supra* note 1 (explaining that patterns found in culture from the standpoint of Darwinian evolution).

40. E.g., Gabora, *supra* note 1, § 3.

Five people actually got killed by not sending this piece of mail. The creator of this mail has a program that will track down everyone who sent this mail and whoever that didn't send it will DIE DIE DIE DIE DIE DIE DIE DIE DIE DIE DIE because this program can actually track down your address. Send this to 15 people within the next 15 minutes or you will die die die die, what do you have to lose? Your life?

While the proposition is patently ludicrous, its replicative success appears high. A number of long-lived and robust human belief systems with little demonstrable benefit to their adherents are propagated by only slightly more sophisticated psychological goads. The saving grace is that the purported content of these systems is often ignored, while the coded recitation is faithfully handed on.

III. REFLECTIONS ON LAW

So—what can this approach tell us about law, and what can law tell us about this approach? The purpose of this Essay is to put those questions on the table, rather than to answer them definitively—if at all. Nonetheless, if only by way of example, let me explore three specific legal topics in this light.

A. *The Learned Hand Test*

One of the most durable “memes” in the law is a purported test to be applied to decide if a particular action constitutes negligence—the famous “Learned Hand Test.” This quasi-scientific formula was advanced by the wonderfully named Judge Learned Hand in his opinion in the 1947 case *United States v. Carroll Towing Co.*⁴¹ Judge Hand proposed: “[I]f the probability be called P; the injury, L; and the burden, B; liability [for negligence] depends upon whether B is less than L multiplied by P: i. e., whether $B < PL$.”⁴² This crisp, little formula has been taught to just about every law student in the generally required torts class ever since. A computer search using the Shepard’s service yields 1170 citing references to the *Carroll Towing* case as a whole⁴³—a pretty good rate of memetic replication. Yet the formula itself is certainly useless as a call to specific

41. *United States v. Carroll Towing Co.*, 159 F.2d 169 (2d Cir. 1947).

42. *Id.* at 173.

43. Per Shepard’s search, Feb. 17, 2006. Shepard’s is available in the electronic-legal database LexisNexis.

action. The factors in the test are essentially unmeasurable. To do Judge Hand justice, he himself offered it by way of an example of a less exact idea: “Possibly it serves to bring this notion into relief to state it in algebraic terms.”⁴⁴

The conclusion that the supposed content of a linguistically based rule need not be followed to make the rule durable in memetic terms helps us to understand the separation of the replicative health of this particular formula from any actual role it may have in determining the outcome of a case. Its brevity and faux precision make it perfect for teaching and citation—a kind of legal chain letter. It even has some usefulness as an explanatory tool for an underlying concept. The fact that it will never explain a result through actual application is not necessary for its repetitive imitation in the law.

B. Separation of Law and Morals

A recurring question in jurisprudence, and indeed, much of philosophy, concerns the separation of law and morals.⁴⁵ I have previously argued that this distinction in all likelihood reflects different processing pathways in the human brain,⁴⁶ and preliminary indications suggest that neurological experimentation will support this approach.⁴⁷ The distinction may also

44. *Carroll Towing Co.*, 159 F.2d at 173.

45. *See, e.g.*, JOHN AUSTIN, *THE PROVINCE OF JURISPRUDENCE DETERMINED* 10 (Wilfrid E. Rumble ed., Cambridge Univ. Press 1995) (1832) (distinguishing positive law from all other forms of law, in particular natural law or divine law); H.L.A. HART, *THE CONCEPT OF LAW* 1 (1961) (arguing the distinctiveness of legal theory compared to other social sciences, even when ignoring the “nature” of law); IMMANUEL KANT, *THE METAPHYSICAL ELEMENTS OF JUSTICE* 45–48 (John Ladd trans., 1965) (1797) (discussing the division of the metaphysics of morals in the philosophical tradition); HANS KELSEN, *INTRODUCTION TO THE PROBLEMS OF LEGAL THEORY* 1 (Bonnie Litschewski Paulson & Stanley L. Paulson trans., Clarendon Press 1992) (1934) (developing a legal theory separate from politics and science); LLOYD L. WEINREB, *NATURAL LAW AND JUSTICE* i (1987) (conducting an historical inquiry into natural law and a philosophical inquiry into justice in order to ascertain the difference between natural and positive law); Oliver R. Goodenough & Kristin Prehn, *A Neuroscientific Approach to Normative Judgment in Law and Justice*, 359 *PHIL. TRANSACTIONS OF THE ROYAL SOC'Y B: BIOLOGICAL SCI.* 1709, 1709 (2004) (discussing various academic approaches to the interaction between laws and morals); Margaret Gruter, *An Ethological Perspective on Law and Biology*, in *THE SENSE OF JUSTICE: BIOLOGICAL FOUNDATIONS OF LAW* 95, 95–104 (Roger D. Masters & Margaret Gruter eds., 1992) (examining justice as a limit on positive law, first by discussing social order among nonhuman and early humans species, and second, by discussing interactions between man-made law and human behavior).

46. *E.g.*, Oliver R. Goodenough, *Law and the Architecture of Human Intelligence*, in *BAUSTEINE ZU EINER VERHALTENSTHEORIE DES RECHTS [COMPONENTS TO A BEHAVIORAL THEORY OF THE RIGHT]*, at 436, 439 (Interdisziplinäre Studien zu Recht und Staat No. 19, Fritjof Haft et al. eds., 2001); Oliver R. Goodenough, *Mapping Cortical Areas Associated with Legal Reasoning and Moral Intuition*, 41 *JURIMETRICS J.* 429, 433–34 (2001); Goodenough & Prehn, *supra* note 45, at 1709–10.

47. *E.g.*, Antonio R. Damasio, *Neuropsychology: Toward a Neuropathology of Emotion and Mood*, 386 *NATURE* 769, 769 (1997); Raymond J. Dolan, *On the Neurology of Morals*, 2 *NATURE*

reflect different transmission pathways at the cultural level. Our “moral” picture may be formed through direct observation and through stories, while law is explicitly formulaic, language-based rules.⁴⁸ One of the strengths of the common law system may be a cross-fertilization between these two normative streams.

C. Cruel and Unusual Punishment and Other Reasonableness Standards

The different modes of transmission—and the possibility of cross-fertilization—are put to use by the law in such formulations as the U.S. Constitution’s prohibition against “cruel and unusual punishments,”⁴⁹ or the “reasonable person” standards common in the law of torts. These formulas, on their face, completely lack the kind of objective detail that could make them self-sufficient, normative declarations. While some argue that one must go back into history to find the details for such formulations in some kind of retrospective snapshot,⁵⁰ I offer a counter-suggestion—these are explicit instructions in the language-based-rule stream to go and consult the transmissions, and mental pathways, of the other information-replicating mechanisms. In this light, such an apparently deficient rule is a compressed and coded message, which must be decompressed and decoded by reference to the “subjective” information of nonlinguistic and story-based modeling in the reader’s head.

CONCLUSION

Progress in understanding the evolution of culture, and applying it to law, will depend in large part on the elaboration of increasingly concrete and accurate understandings of the replicative mechanisms that make culture possible. Viewing cultural transmission as the replication of actions, rather than of ideas, focuses us on a key bottleneck. In humans, replicating actions can be broadly categorized into three modes: nonlinguistic transmission, stories, and formulas. Decoupling the transmission of language-based elements from their translation into action can help us to understand such human questions as hypocrisy and failures in the legal system and suggests pathways for further application in the law.

NEUROSCIENCE 927, 927 (1999), available at <http://digbig.com/4rycw>.

48. See Goodenough, *Mind Viruses*, *supra* note 1, at 299 (“In the field of jurisprudence, this process explains the relation between natural law, which draws on the unarticulated model for authority, and positive law, which is embodied in an articulated text.”).

49. U.S. CONST. amend. VIII.

50. See, e.g., *Reves v. Ernst & Young*, 494 U.S. 56, 76–82 (1990) (Rehnquist, C.J., dissenting) (examining the meaning of a term at the time a statute was enacted in 1934 to determine its legal effect).