CONCEPTS OF LAW

MATHEW D. MCCUBBINS*

MARK TURNER†

I. INTRODUCTION: VAST LEGAL THOUGHTS

All of law depends on vast concepts that stretch across time, space, causation, and agency. Far-reaching concepts make law possible from legislation and interpretation to enforcement and adjudication; from weighing evidence to establishing motive and intent; and from imposing fines or sentences to awarding compensation. But all of human thought and memory is just here and now. The vast dependencies of time, space, causation, and agency must exist in individual brains. How we manage to use here-and-now mental processes to produce legal concepts that stretch very broadly over vast expanses of our lives, institutions, and worlds is the point of this Article. We will discuss how human beings transform vast dependencies that stretch across time, space, causation, and agency into tractable, much smaller, and more compact concepts that we can hold onto, manipulate, and develop. We will explain how these compact concepts are "blends" for thinking about much larger mental webs of ideas that are too large to hold in mind themselves. We will also suggest a research agenda that may allow us to better understand what sorts of blends work, and which ones we discard and when.

Examples of blends are everywhere in law. A "decedent" in law, for example, is a kind of agent who exists (but does not live) in the present, who is imbued with some of the intentionality of a person who once existed, and for whom there are documentary records expressing this past intentionality. We refer to the decedent in the present tense: "The decedent

* Provost Professor of Business, Law, and Political Economy, Marshall School of Business, Gould School of Law, and Department of Political Science, University of Southern California.

† Institute Professor and Professor of Cognitive Science, Case Western Reserve University.

leaves his house to his spouse"; or in the present perfect: "The decedent has left his house to his spouse"; but not in the past tense: "The decedent left his house to his spouse." Thus, a decedent is not merely a dead person, but rather an agent who exists in the here and now, despite being dead, to whom we are obligated, and failure to execute these obligations can bring current penalties to those who are present.

There is a tradition, stretching over centuries, of considering the difficulties encountered in law that derive from the complexity of thinking over the vast conceptual expanses of time, space, causation, and agency. For example, assessing culpability depends on mentally juggling and comparing alternative ideas of complex events. This kind of counterfactual mental juggling of ideas that stretch across time, space, causation, and agency is a central subject of H.L.A. Hart and Tony Honoré's work on the consideration of causation in the law.[1] As an instance of the challenge that arises constantly in law from thinking with a vast scope, consider the standard sine qua non legal test (that is, the "but-for" test). The sine qua non test is conducted in the following way: to determine whether a causal connection can be ruled out between a certain agency and a specific harm, imagine that the agent had not acted (or failed to act) and ask yourself, would the harm still have happened?[2] Clearly, this is an imaginative exercise stretching across far-reaching concepts, some of them necessarily counterfactual.

Laws are also meant to apply across vast ranges of time, space, causation, and agency; indeed, the very foundation of common law is stare decisis.[3] We will briefly review these expanses. Many of our most cherished concepts of laws date back across many centuries. Parts of the Magna Carta, dated 1215 CE, that limit the power of the throne, remain on the books of England and Wales. No doubt, the conceivers of the charter in

1. *E.g.*, H.L.A. HART & TONY HONORÉ, CAUSATION IN THE LAW 4 (2d ed. 1985) ("The terminology of legal rules often tempts courts to consider these issues in the form of questions whether the harm was the 'consequence' or 'effect' or 'caused by' the wrongful act, or whether it was 'too remote' or 'insufficiently proximate' . . . ."). For a survey of the literature on causation in the law, see generally Antony Honoré, *Causation in the Law*, STANFORD ENCYCLOPEDIA OF PHILOSOPHY, (Nov. 17, 2010), http://plato.stanford.edu/archives/win2010/ entries/causation-law. For a broader survey of academic views of causation, see generally MENNO HULSWIT, FROM CAUSE TO CAUSATION: A PEIRCEAN PERSPECTIVE (2002).

2. *See, e.g.*, Gregory Mitchell, *Case Studies, Counterfactuals, and Causal Explanations*, 152 U. PA. L. REV. 1517, 1556 n.92 (2004) (citing MARK TURNER, COGNITIVE DIMENSIONS OF SOCIAL SCIENCES (2001)).

3. Amy Gutmann, *Preface to* ANTONIN SCALIA, A MATTER OF INTERPRETATION: FEDERAL COURTS AND THE LAW, at vii, xi (Amy Gutmann ed., 1997) [hereinafter A MATTER OF INTERPRETATION].

1215 CE could not have imagined the future specific details, but the principles of the Magna Carta are still taken as applying across eight centuries. The Bill of Rights of 1688 together with the Act of Settlement of 1701 are still in effect and are part of the main constitutional laws governing freedom of speech and the requirement of regular elections to parliament.[4] They also specify the rules for succession to the throne of the United Kingdom.[5] In the United States, while the Articles of Confederation and Perpetual Union were perpetual for only eight years,[6] the new Constitution of the United States, adopted in 1788, is still in effect more than two and a quarter centuries hence.[7]

The idea of a "legal person" was not invented in 2010 by the Roberts Court in *Citizens United v. FEC*.[8] On the contrary, it derives in part from the application of the contracts clause in Article 1, section 10 of the U.S. Constitution as established in *Trustees of Dartmouth College v. Woodward* nearly two centuries previous in 1819.[9] The Court recognized the standing of a chartered corporation (even though it was chartered by King George III of England in 1769) as a kind of legal person that has rights, standing, and obligations.[10] This chartered corporation did not count as exactly a person but rather as a legal person—a kind of blended entity. This legal fiction was expanded in *Santa Clara County v. Southern Pacific Railroad* in 1886,[11] but recently delimited by the Court in *FCC v. AT&T Inc.* in 2011, when the Court ruled that not all of the rights to privacy granted persons under the Freedom of Information Act apply to corporations.[12] While not widely understood, corporations not only own property but also

4. For further discussion on the impact of the Magna Carta, the Bill of Rights of 1688, and the Act Settlement of 1701, see THE CONCISE PRINCETON ENCYCLOPEDIA OF AMERICAN POLITICAL HISTORY 9 (Michael Kazin, Rebecca Edwards & Adam Rothman eds., 2011).

5. *See Succession and Precedent: Succession*, OFFICIAL WEBSITE OF THE BRITISH MONARCHY, http://www.royal.gov.uk/ThecurrentRoyalFamily/Successionandprecedence/Succession/Overview.aspx (last visited Mar. 28, 2013).

6. *See Primary Documents in American History: The Articles of Confederation*, LIBRARY OF CONGRESS (Mar. 19, 2013), http://www.loc.gov/rr/program/bib/ourdocs/articles.html; ARTICLES OF CONFEDERATION of 1781.

7. For a more thorough review of American political history, see generally THE CONCISE PRINCETON ENCYCLOPEDIA OF AMERICAN POLITICAL HISTORY, *supra* note 4.

8. *See* Citizens United v. FEC, 130 S. Ct. 876, 913 (2010) (returning to the principle that "the Government may not suppress political speech on the basis of the speaker's corporate identity," whether nonprofit or for profit).

9. Trs. of Dartmouth Coll. v. Woodward, 17 U.S. 518, 613–14 (1819).

10. *Id.* at 619.

11. Santa Clara Cnty. v. S. Pac. R.R., 118 U.S. 394, 396 (1886) ("[T]he Fourteenth Amendment to the Constitution, which forbids a state to deny to any person within its jurisdiction the equal protection of the laws applies to corporations.") (internal quotation marks omitted).

12. FCC v. AT & T Inc., 131 S. Ct. 1177, 1185 (2011).

are entitled to a vote, just as individuals, in referenda on special assessments across the country in proportion to the benefits they will receive from whatever the assessment is going to be used for.[13] This is so even if they are not American companies.[14]

There is also a plethora of examples of how laws stretch over vast spaces. Human beings live in the here and now. We are able to extend the empire of our law across vast ranges of the planet. A single legal entity (the sovereign United States) in a deal with another legal entity (France), in a transaction of questionable constitutionality,[15] annexed land to itself via the Louisiana Purchase, land that would eventually form part or all of fifteen states.[16] Later, the U.S. government, in the Treaty of Peace, Friendship, Limits and Settlement between the United States and the Mexican Republic, annexed territory that eventually formed part of ten states.[17] The Gadsden Purchase in 1853 annexed lands that were eventually added to Arizona and New Mexico.[18] The purchase of Alaska as a department of the federal government in 1867, and its subsequent reorganization as a district, then a territory, and finally a state,[19] along with annexation of the sovereign state of Hawaii as a territory of the United States under the Newlands Resolution in 1898,[20] also greatly extended the American empire and the reach of its laws. Most Americans at the time, and indeed, most lawmakers of the time, would never see the vast stretches of the American landscape added by these actions. Indeed, maps were not sufficiently detailed at the time to specify exact boundaries.[21]

In various ways, each state can also extend the reach of its laws far beyond the bounds of the state's geography and circumstances. For example, over 50 percent of U.S. publicly traded corporations and 60

13. Vladimir Kogan & Mathew D. McCubbins, *The Problem with Being Special: Democratic Values and Special Assessments*, 14 PUB. WORKS MGMT. & POL'Y 4, 8 (2009).

14. *See id.*

15. *See* THOMAS FLEMING, THE LOUISIANA PURCHASE 131–45 (2003) (discussing the "constitutional bending" involved in the Louisiana Purchase).

16. For an in-depth discussion of the Louisiana Purchase, see generally *id.*

17. *See* Treaty of Peace, Friendship, Limits, and Settlement with the Republic of Mexico, Feb. 2, 1848, 9 Stat. 922, T.S. No. 207.

18. *Gadsden Purchase, 1853-1854*, U.S. DEP'T OF STATE, OFFICE OF THE HISTORIAN, http://history.state.gov/milestones/1830-1860/GadsdenPurchase (last visited Mar. 28, 2013).

19. *Purchase of Alaska, 1867*, U.S. DEP'T OF STATE, OFFICE OF THE HISTORIAN, http://history.state.gov/milestones/1866-1898/AlaskaPurchase (last visited Mar. 28, 2013).

20. *Annexation of Hawaii, 1898*, U.S. DEP'T OF STATE, OFFICE OF THE HISTORIAN, http://history.state.gov/milestones/1866-1898/Hawaii (last visited Mar. 28, 2013).

21. For a geographical review of the United States and how the nation was mapped, see generally SUSAN SCHULTEN, MAPPING THE NATION: HISTORY AND CARTOGRAPHY IN NINETEENTH-CENTURY AMERICA (2012).

percent of the Fortune 500 companies, which we think of as individual entities, are in fact spatially incorporated in Delaware,[22] extending the laws of Delaware across the United States and, indeed, around the globe.

Returning to the core Hart and Honoré argument, laws and legal institutions require us to understand vastly complex chains of causation.[23] Take, for example, liability for environmental damages. The Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") was enacted by Congress to reduce the threat to public health and the environment posed by the widespread use and disposal of hazardous substances.[24] Its purpose was to ensure the prompt and effective cleanup of waste-disposal sites, and to assure that parties responsible for hazardous substances bore the cost of remedying the conditions they had created.[25] The Act assigned liability for cleanup to those parties that committed any of seven prohibited acts: discharged, deposited, injected, dumped, spilled, leaked, or placed hazardous substances.[26] But what of the case in which there was a passive migration of a substance from one property to another property, even in the face of state-of-the-art methods of containment? What is the chain of causation for passive migration and does "migration" fall neatly under the seven proscribed actions?

Carson Harbor Village Mobile Home Park v. UNOCAL presented an example of passive migration of underground oil sludge from a refinery to a mobile home park.[27] Added to the liability question there was a problem of agency, which we discuss next, as the owners of the refinery and the mobile home park changed while the migration took place unnoticed under their feet.[28] With logic similar to the sine qua non test, and despite the "logical cul-de-sacs" in the law and the "baffling language" Congress used, the Ninth Circuit, acting en banc and relying on a "plain-meaning interpretation of disposal," ruled that UNOCAL was liable.[29]

Human beings have a concept of an individual agent—typically a person or some natural object—but we also typically extend that notion to attribute agency to groups, collectives, institutions, governments,

22. *About Agency*, DEL. DEP'T OF STATE, http://www.corp.delaware.gov/aboutagency.shtml (last updated Mar. 24, 2013).

23. *See supra* note 1 and accompanying text.

24. CERCLA, Pub. L. No. 96-510, 94 Stat. 2767 (codified as amended at 42 U.S.C. §§ 9601–9675 (2006)); Carson Harbor Vill., Ltd. v. Unocal Corp., 270 F.3d 863, 880 (9th Cir. 2001).

25. *Carson Harbor*, 270 F.3d at 890–91.

26. 42 U.S.C. § 9607.

27. *Carson Harbor*, 270 F.3d at 868.

28. *Id.*

29. *Id.* at 883–84.

administrations, and so forth. For example, we think of collective will and agency when we talk of the intent of the framers,[30] legislative intent or will, or the Bush administration. In 1993, Congress passed, and President Clinton signed, a joint "Apology Resolution" regarding the overthrow of the Hawaiian Kingdom before the acquisition of the territory of Hawaii by the United States.[31] None of the people responsible or affected by the acquisition were still living, but the agents—the government of the United States and the counterfactual sovereigns of Hawaii—were the active parties.

In what follows, we pick up where H.L.A. Hart left off in his famous thesis in *The Concept of Law*. Hart was "concerned with the clarification of the general framework of legal thought,"[32] as are we. In the Part II, we will discuss ways in which human beings manage to think at vast scope across time, space, causation, and agency. They do so by creating compressed, portable "mental blends" and using them as the basis for vast ideas. In Part III, we give examples of how we compress vast legal concepts into concepts that we can use in the here and now. In Part IV, we offer some examples and experimental evidence that start to put boundaries on how well humans can undertake the compression and expansion processes needed to understand the compressions of vast concepts and the expansions from those back out into something vast and untouchable. In this part, we also present a research program to help us define the limits of human compression of vast concepts into concepts we can use in the here and now. In Part V, we discuss intellectual property, a highly topical area of law in which the compressions and expansions are still up for debate, and in which the very ground rules by which we will understand and debate the topic are still up for grabs. The concept of intellectual property is a blend: creating this blend draws on our idea of property law, but it draws on many other ideas, too. The way in which we draw on ideas to form the blend of intellectual property and the new features that arise just for this blend are very hotly disputed. We will review key elements of the debate about this blend. In Part VI, we draw some conclusions and define a research program for investigating how blending can go right in the law—to make strong, flexible, useful, and portable concepts of law—and also how blending can go wrong in the law.

30. HARRY V. JAFFA, ORIGINAL INTENT AND THE FRAMERS OF THE CONSTITUTION: A DISPUTED QUESTION 113 (1994).

31. S.J. Res. 19, 103d Cong. (1993) (enacted).

32. H.L.A. HART, THE CONCEPT OF LAW, at vi (3d ed. 2012).

II. COMMON COMPRESSIONS OF TIME, SPACE, CAUSATION AND AGENCY

It is not surprising that human beings are often very poor at thought that ranges across time, space, causation, and agency. All thought is nothing but here-and-now biological processes under present conditions. Necessarily, that is all the organism has to work with. As Sir Charles Sherrington expressed almost three-quarters of a century ago, the brain and the central nervous system are an "enchanted loom" where "millions of flashing shuttles weave a dissolving pattern, always a meaningful pattern, though never an abiding one."[33] Memory does not produce an intersection of past times and the present moment, although it seems to us that it does. Our memories are not like a video camera, or Apple's backup system "Time Machine";[34] we cannot scroll from instance to instance, through our memories, back and forth, willy-nilly as suits us—far from it. Thought in its processes cannot stretch far over time, space, causation, or agency. Biologically, the reach of thinking is tiny.

But in its content, human thought goes very far. It is not just that we can have an individual memory of another time or place—for example, a waterfall we once saw while hiking—but that we can have concepts that stretch across and apply to vast ranges of time, space, causation, and agency that go utterly beyond any possible individual perception or memory. We can have ideas like "nation," "marriage," and "urban renewal." Somehow, present biology must be exploited into manufacturing present thought whose content is taken to be very expansive. This is a startling mismatch between production and result. Naturally, this mismatch produces difficulty, error, and failure.

The difficulties that arise from trying to use present biology to produce expansive ideas have to some extent been studied. The experimental record on our standard biases (of which the literature has produced a list of nearly four dozen so far) and failures is so well known and robust that there are commercial packages for presenting tutorials (including videos) to be used by companies who need to train security officers, guards, police, and, in general, supervisors.[35] The purpose of these

33. CHARLES SCOTT SHERRINGTON, MAN ON HIS NATURE 225 (Cambridge Univ. Press ed. 2009) (1940).

34. *See Mac Basics: Time Machine*, APPLE CO., http://support.apple.com/kb/HT1427 (last modified Nov. 16, 2012).

35. *E.g.*, *DVDs that Reveal the Surprising Limits of Perception, Attention, and Awareness*, VISCOG PRODS., INC., http://www.viscog.com (last visited Mar. 24, 2013).

packages is to convince viewers that what they think about thinking is often wrong and that the biases and failures of thought are incorrigible per se.[36] We can learn that we have these deficiencies and we can develop routines to compensate for these incorrigible deficiencies. Human beings, for example, have very selective attention[37] and memory.[38] They are largely blind to change in their environments.[39] They attribute elements to reality that is constructed mentally, such as color constancy[40] and pain.[41] They routinely engage in reconstructive memory.[42] Their perceptions change depending on their intentions to act.[43] In many ways, we are poor witnesses, despite the fact that we usually feel that we are very good witnesses.[44]

The basic questions are inevitable: How can there be law, which is concerned entirely with concepts that stretch expansively over great ranges of time, space, causation, and agency, if human brains cannot in their biologically processes directly stretch over time, space, causation, and agency? Given the inevitable mismatch between human brains and law, and the consequent struggle to fit one to the other, what techniques are available to improve the fit? We will begin to answer these questions by examining an everyday example drawn from outside the law.

A. AN EXAMPLE OF A COMPRESSED BLEND: THE CYCLIC DAY

Let us consider the cyclic day. In our experience, there is actually just

36. *See id.*

37. *See, e.g.*, ARTHUR LUPIA & MATHEW D. MCCUBBINS, THE DEMOCRATIC DILEMMA: CAN CITIZENS LEARN WHAT THEY NEED TO KNOW? 29–30 (1998); Michael I. Posner & Steven E. Petersen, *The Attention System of the Human Brain*, 13 ANN. REV. NEUROSCIENCE 25, 38 (1990).

38. *See, e.g.*, PATRICIA S. CHURCHLAND & TERRENCE J. SEJNOWSKI, THE COMPUTATIONAL BRAIN 240–44 (1994).

39. *See, e.g.*, Daniel T. Levin & Daniel J. Simons, *Failure to Detect Changes to Attended Objects in Motion Pictures*, 4 PSYCHONOMIC BULL. & REV. 501, 501–06 (1997) (describing studies that show "observers are surprisingly slow and often fail to detect changes to successive views of both natural and artificial scenes").

40. *See, e.g.*, DAVID H. HUBEL, EYE, BRAIN, AND VISION 183 (1995).

41. *E.g.*, V.S. RAMACHANDRAN & SANDRA BLAKESLEE, PHANTOMS IN THE BRAIN: PROBING THE MYSTERIES OF THE HUMAN MIND 22 (1998).

42. *See, e.g.*, F.C. BARTLETT, REMEMBERING: A STUDY IN EXPERIMENTAL AND SOCIAL PSYCHOLOGY 263–66 (1932) (explaining how a narrator might reconstruct a story based on his position within a group, and his relationship with the group).

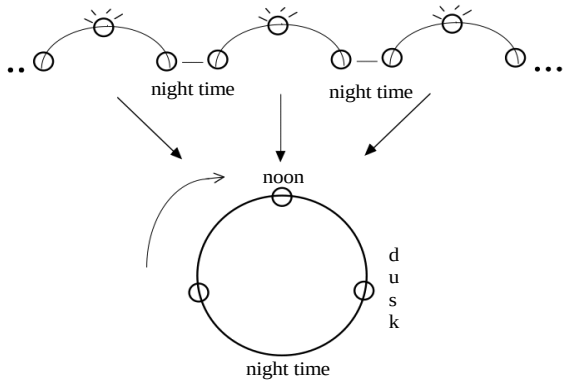
43. *E.g.*, Peter M. Vishton et al., *Planning to Reach for an Object Changes How the Reacher Perceives It*, 18 PSYCHOL. SCI. 713, 713–19 (2007) (describing studies demonstrating that a person's perception of distance to an object changes when intending to reach for the object).

44. *See* Jacqueline McMurtrie, *The Role of the Social Sciences in Preventing Wrongful Convictions*, 42 AM. CRIM. L. REV. 1271, 1275–77 (2005) ("[E]xtensive scientific research establishes that high confidence on the part of an eyewitness does not directly correlate with high accuracy.").

one day and then another day and then another day until we die. The days as we live them are all quite different. They do not repeat. If we woke up today and it was exactly the same as yesterday because it was in fact the same day in every detail, we would be sure we had lost our minds. Day after day after day indefinitely, with all those differences between days, is far too much to comprehend; too much to actually remember or imagine; too much to carry around and manage. It is not portable. It is not human scale.

As Gilles Fauconnier and Mark Turner discuss, it is obvious that we blend these different days into a conception of a cyclic day.[45] We do so by using one of many general templates for creating blends.

FIGURE 1. The Cyclic Day



Source: This figure is taken from FAUCONNIER & TURNER, *supra* note 45, at 197 fig.10.1.

There are analogies and disanalogies across different days in our experience. The analogies are packed to one thing in the blend: the day. The disanalogies are packed to change for that thing: the day starts over every dawn and repeats. This general mental pattern of compressing analogical connections to one thing and disanalogical connections to change for that one thing is the general template at work here. It is used very widely across human cognition. Note that the result—the cyclic day—is not just an abstraction. There is new meaning, "emergent structure," in

45. GILLES FAUCONNIER & MARK TURNER, THE WAY WE THINK: CONCEPTUAL BLENDING AND THE MIND'S HIDDEN COMPLEXITIES 195–97 (2002).

the blend that is not in any of the individual input days.[46] No one of these individual input days repeats or starts over. All the days that have ever happened or will happen can be blended into a single unit—the cyclic day, which repeats.[47] Thinking of the cyclic day, we can say, "Dawn is coming around again," or "It is time for my morning coffee," or "This park closes at dusk."[48] We know how these words and concepts apply to the blend, and we can expand from the blend to anything in the string of days that interests us. The cyclic day is a small, congenial blend for thinking about the vast sequence of days, a sequence itself too big to hold in mind all at once. This blend makes it possible for us to work with concepts of time that stretch across vast ranges of ideas that we would otherwise be able to manage.

B. ELEMENTS OF BLENDING

There are several questions we are addressing here: How do new concepts for law arise? How does new law arise? How do new ideas of law arise which human beings in a society can actually command, understand, and deploy?

One idea provided by cognitive science for the origin of new ideas is that we create new frames, schemata, or general notions, by creating abstractions of what we have encountered. David Rumelhart gives a summary of the history of the notion of this sort of schema and provides a summary of the work of Rumelhart, Norman, and Ortony.[49] Martin gives a fuller summary.[50] In this view, a conceptual schema, abstraction, or generalization, offers compressions of regularities in experience, guides future interaction, undergoes adjustment as we have further experience, and is subject to selection pressures.

Rumelhart analyzes three ways in which new meaning can arise (he calls this "learning").[51] All three ways involve conceptual schemata. First, there is accretion: learning happens when we lay down a memory of an

46. *Id.*

47. *Id.* at 195–96.

48. *Id.* at 196.

49. *See generally* David E. Rumelhart, *Schemata: The Building Blocks of Cognition*, *in* THEORETICAL ISSUES IN READING COMPREHENSION: PERSPECTIVES FROM COGNITIVE PSYCHOLOGY, LINGUISTICS, ARTIFICIAL INTELLIGENCE, AND EDUCATION 33 (Rand J. Spiro, Bertram C. Bruce & William F. Brewer eds., 1980).

50. *See generally* Ben Martin, *The Schema*, *in* COMPLEXITY: METAHPORS, MODELS, AND REALITY 263 (George A. Cowan, David Pines & David Melzer eds., 1999) (reviewing the history of schemata starting from the works of Aristotle and Plato through to the present).

51. Rumelhart, *supra* note 50, at 52.

experience as an instantiation of existing schemata.[52] For example, if we have a schema for "restaurant" and visit a new one, then we have a memory of the new restaurant; we remember it as an experience that conformed to the schema restaurant. Second, there is tuning: we slightly adjust an existing schema to make it match experience better.[53] For example, under inflation over years, we might slightly adjust our notion now and then of how much a dinner in a good restaurant should cost. Accretion and tuning, Rumelhart notes, do not lead to new schemata.[54] So they offer very little in the way of explaining the invention of new schemata.[55] Third, there is restructuring, of two kinds: patterned generation and schema induction.[56] Patterned generation happens infrequently and schema induction almost never.[57] Patterned generation is the construction of a new schema by making a slight change in an old one, where the possibilities for change are few: a constant can be replaced with a variable, a variable can be replaced with a constant, and so forth, as motivated by new experience.[58] For example, we may have begun with a frame for "restaurant" in which the maître d' is male, but, under experience, have come to change that constant into a variable: male or female. The second kind of restructuring is schema induction, which is the process of making a new schema that is simply the conjunction of old schemata.[59] So if we always follow dinner at the restaurant with a walk through the park to take coffee at a café, we may develop a "dinner-walk-coffee" schema.

The theory of conceptual schemata is useful for explaining how the making of meaning exhibits regularity. In fact, under the theory of conceptual schemata, regularity is inevitable. But the notion of a conceptual schema is nearly useless for explaining how a new schema can arise before it is manifest in our regular experience. Most of our ideas arise in our minds before they have referents in the world. It is fine to imagine that if we visit many restaurants, we acquire a compressed generalization of what happens in a restaurant. But this gives no explanation of how the idea of a restaurant was invented in the first place.

Just so, in the law, if we encounter very many rulings on property rights, for example, we might form a compressed notion of property. But

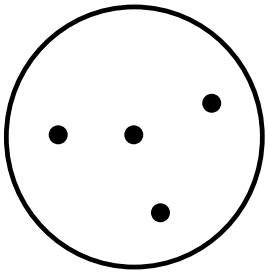
52. *Id.* at 52–53.
53. *Id.* at 53–54.
54. *Id.* at 54.
55. *See id.*
56. *Id.*
57. *Id.*
58. *Id.*
59. *Id.*

this provides no explanation of how those notions of property and rights arose in the first place.

Here, we are discussing how new concepts of law can arise, and the principles according to which useful versus failed concepts in law arise. Our proposal is that when we try to create new concepts of law, we do not merely compress, abstract, or analogize, but instead blend to create new emergent structure in the blend that is useful because it is mentally tractable, and can be carried within our mental competence and expanded as needed to think about particular situations.

That last paragraph is a mouthful of jargon, so let us cash it out here. Suppose we are actually thinking of the real world. In particular, we are thinking of "my brother-in-law, the stockbroker." In cognitive science, one would say that we are activating a "mental space." A mental space is a small array of related mental elements that one can activate simultaneously in the mind. In this case, "My brother-in-law, the stockbroker" prompts us to activate a mental space with the elements: one man (I, who is the speaker); another man A, the role stockbroker; a role-value connection from the role stockbroker to the value A; and a relation of brother-in-law between I and A. In cognitive science, such a mental space is usually represented as a circle with elements and relations within it, as shown in figure 2.

FIGURE 2. A Diagram of a Mental Space



Mental spaces exist in "mental webs." A mental web[60] is a set of mental spaces that are activated and connected as one is thinking about a topic. Consider the following statement as an example: "My brother-in-law, the stockbroker, will be traveling from San Francisco to Cleveland for

60. Alternatively, it is called a mental network, or conceptual network. Many other metaphors are available, each with its own deficits.

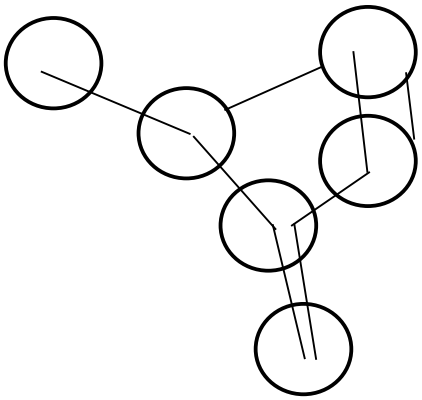
Thanksgiving for a massive family reunion, and we need to learn the time of his arrival so that we can go pick him up." This statement will prompt for many mental spaces such as a mental space in which I locate my car keys; another in which I travel to my car; another in which I drive through no doubt complicated holiday traffic; another in which I stop at the arrival deck of Cleveland Hopkins airport at gate five; and on and on. Typically, one cannot hold all these spaces equally active simultaneously in the mind. We will focus on one or another mental space at a time, but activate many as we think, and those we have activated recently will remain latent, which is to say, easier to activate.

The mental web will have many conceptual connections between the individual mental spaces in the web, the most frequent and important of which are the "vital relations."[61] Time, Space, Identity, Change, Cause-Effect, Part-Whole, Representation, Analogy, Disanalogy, Representation, Property, Similarity, Category, Intentionality, and Uniqueness are the vital relations of a mental web.[62] For example, in the mental web about my picking up my brother-in-law and family at the airport for the massive family reunion, there will be an agent in several of those mental spaces corresponding to I, and all of those elements in all of those mental spaces will be connected by Identity connectors. These mental spaces in the mental web will be connected by many other connectors. The pickup at the airport is connected by a Time connector so that the pickup is suitably prior in time to the mental space in which we all have the Thanksgiving feast. And that pickup at the airport is connected by a Space connector so that we understand that the airport is at a spatial remove from the house in which the Thanksgiving feast will be held in a vast dining room. Figure 3 shows such a mental web—it could and should, of course, be much, much larger.

61. *See* FAUCONNIER & TURNER, *supra* note 46, at 89–112 (discussing this phenomenon in a chapter entitled "Vital Compressions and Their Relations").

62. *Id.* at xiii, 93.

FIGURE 3. A Diagram of Part of a Mental Web

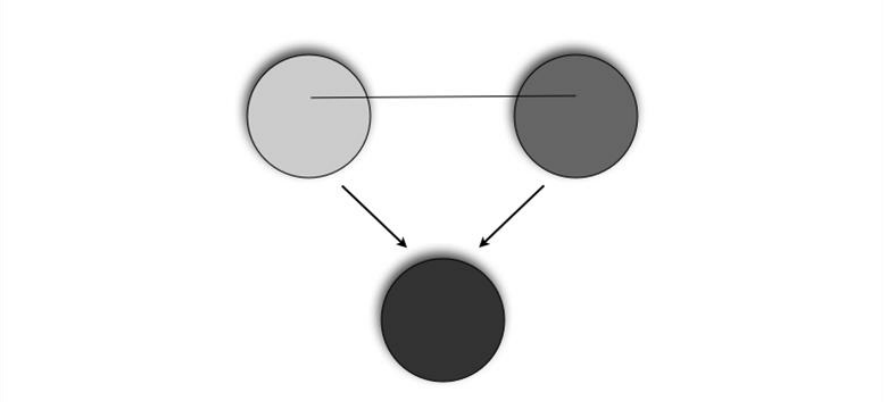


But now comes the crucial step for new concepts: we can blend mental spaces in this mental web. A blend is a new mental space that results from blending constituent mental spaces in this mental web. The blend is not an abstraction, an analogy, or anything else already named and recognized in common sense, although blending is the basis of the cognitively modern human mind. A blend consists of a partial combination of elements from different mental spaces but develops a new conceptual structure of its own not drawn from those spaces.[63] For example, "If I were a stockbroker, like my brother-in-law, who lives in San Francisco and so must rise every day the market is open at 5 a.m., I would be miserable" asks us to make a mental space in which there is one man (I) who is imbued with some of the speaker's attributes and some of the brother-in-law's attributes, and for whom we develop a new structure. In the blend, there is an element that has the personal identity of the speaker, but no longer has that person's job. This element is not available from any other space in the mental web. It is unique to the blend. This element is "emergent" in the blend. There are many other elements and properties in the blend that are not available from other spaces in the mental web (or network, or whatever metaphor one prefers for a set of connected ideas). Neither the speaker nor the brother-in-law is miserable in the mental spaces that are blended, but in the blend, the person is miserable. This is new in the blend. The mental spaces in the mental web that contribute to the creation of the blend are called by a number of names: inputs, contributors, donors, and so forth. All of these metaphoric names have their own

63. For a more detailed discussion, see generally *id.*

communicative deficits. Figure 4 shows the blend.

FIGURE 4. A Diagram of Blending



The elements and relations that come into the blend from the mental spaces that are blended are referred to as "projections."[64] These projections to a blend are always "partial" or rather "selective."[65] For example, in "If I were a stockbroker, like my brother-in-law, who lives in San Francisco and so must rise every day the market is open at 5 a.m., I would be miserable," we project to the blend the speaker but only a small part of what we know about the speaker. We do not project the speaker's current employment, for example, because then the speaker could not be a stockbroker. We project from the mental space with the stockbroker brother-in-law the role stockbroker and perhaps even "living in San Francisco and accordingly rising every weekday at 5 a.m.," but not of course the physical appearance of the brother-in-law, or his family relations, and so forth. We might project his lodging, but we might not, and this variation illustrates the fact that what we project to the blend as we build it is largely left up to the different members of the communicative scene. Disagreements and misunderstandings naturally arise. Blends are sometimes hotly contested in a culture, as we see in the current turmoil over how to conceive of the blend "intellectual property."[66]

In the blend, the speaker is a stockbroker and is miserable. In no other space is any of this true. This structure is emergent in the blend. It arises as

64. *See generally id.* (discussing projections and blends).
65. *Id.*
66. *See infra* Part V.

a consequence of making the blend.[67] Crucially, there is also new emergent structure in the web outside of the blend. Now we know, for example, that the speaker in his own reality has an aversion to rising early. This is new structure we build for the speaker in his own reality that we did not have there before. We build it for the speaker as a consequence of what we have learned by building the blend. There is also emergent structure in the connection between the speaker in his input mental space and the stockbroker in his input mental space, namely a Disanalogy connection between them. Of course, there always were disanalogies between them in the mental web: the brother-in-law lived in San Francisco but the speaker presumably lived somewhere else, like Cleveland; the brother-in-law was a stockbroker but presumably the speaker was not; and so forth. But now there is a new, emergent Disanalogy connection between these spaces having to do with disposition. It could have been different, and would have been if the sentence had been, "If I were a stockbroker, like my brother-in-law, who lives in San Francisco and so must rise every day the market is open at 5 a.m., I would be happy." When we project what we have learned in the blend back to original mental spaces in the mental web, we do not always project exactly what has arisen in the blend.

Some bundles of thought are tractable and manageable by the human mind; these we call "human-scale" bundles.[68] Other bundles of thought are not tractable, because we cannot grasp them mentally, or they go beyond our mental limits. Most mental webs for what we must think through would be utterly intractable for us were it not that we can make a human-scale blend drawing on different mental spaces in the web. The blend then gives us a tractable thing to think about. It helps us access, organize, manipulate, and adjust the mental web in which it now sits.[69] For example, in the vast mental web of thinking about life and possibilities, I can have a little blend in which I actually am a stockbroker, going through the motions. The blend in this case is a kind of human-scale mental simulation.

A blend is a "compression" of the mental state it serves. It is not a small abstraction of the mental spaces it blends and is not a partial cut-and-paste assembly either, because it contains emergent structure.[70] It is a compact idea containing much less information than is contained in the

67. There are many kinds of emergent structure discussed by Fauconnier and Turner, and elsewhere. For example, emergent structures from "composition," "completion," and "running the blend." *See, e.g.*, FAUCONNIER & TURNER, *supra* note 46, at 47–48.

68. *See id.* at xvi (discussing blends at "human conceptual scale").

69. *See id.* at xvi, 30.

70. For examples and further discussion of emergent structures, see generally *id.*

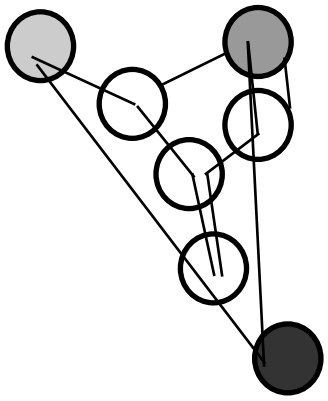
mental web it serves, and in particular it is a compression from which we can access the rest of the mental web in which it sits.

We "expand" tractable blends to help us think about larger mental webs, or mental networks. We might say, metaphorically, that we carry small, compressed blends with us mentally, and unpack or expand them as needed to connect up to what we need to think about.[71] For example, the pithy, compressed little blend with the miserable stockbroker can be used to help the speaker think about any job in a time zone other than the Eastern Time Zone (GMT - 5) and help him be vigilant about inquiring into demands that any job might impose because of events that lie outside its time zone.

This example about the stockbroker is provided to furnish some vocabulary, but it is crucial not to over-generalize from it. Although this example is obvious as a blend, essentially all blending is invisible to consciousness and does not look at first like blending. The counterfactual "If I were . . ." is only one very tiny example of a linguistic prompt for blending, and many other kinds of products arise from the operations of blending. Blends need not be counterfactual, hypothetical, false, or fictional. On the contrary, many blends constitute what we feel in common sense to be ground truth. Although a great deal of new thought is not directly tied to the world—abstract mathematics, fiction, fantasy, and so forth—nonetheless a great deal of new thought is indeed tied to the world, as in law. What is new in the thought arises from making a compressed blend of what we know of the world, a blend whose construction brings about new thought in the blend and in the mental web it serves. This new, emergent structure in the blend gives us a way of capturing, managing, and developing that mental web. Figure 5 shows a suggestive cartoon of this process.

71. *See id.* at 210, 213, 333, 339.

FIGURE 5. A Diagram of Blending in a Mental Web



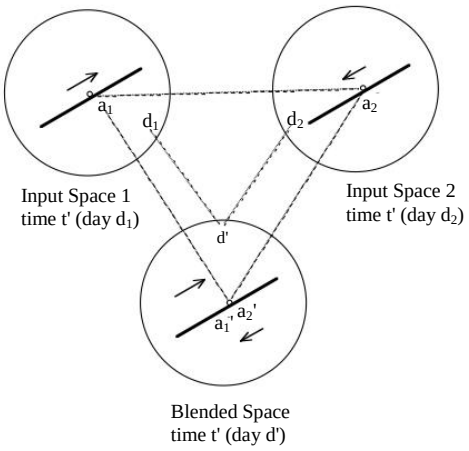
We can give a quick diagram illustrating all these—mental space, mental web, connectors between spaces, emergent structure, projection, compression, expansion, human-scale blend. It is a diagram from Fauconnier and Turner.[72] Consider the riddle of the Buddhist Monk:

> A Buddhist monk begins at dawn one day walking up a mountain, reaches the top at sunset, meditates at the top for several days until one dawn when he begins to walk back to the foot of the mountain, which he reaches at sunset. Make no assumptions about his starting or stopping or about his pace during the trips. Riddle: Is there a place on the path, which the monk occupies at the same hour of the day on the two separate journeys?[73]

One way to solve this riddle is to blend the monk's ascent with the monk's descent, so that in the blend, at dawn, there are two monks, one at the foot of the mountain, the other at the top. They then take their journeys, each arriving at the opposite end of the path at sunset. They must meet somewhere, and where they meet is the spot on the path that they occupy at the same hour of the day on the two separate journeys, as shown in figure 6.

72. *Id.* at 39.
73. *Id.*

FIGURE 6. Blending to Solve the Riddle of the Buddhist Monk



Source: This figure is a simplified version of a figure taken from FAUCONNIER & TURNER, *supra* note 45, at 45 fig.3.5.

The connected set of ideas for solving this riddle is a mental web. It contains at least three mental spaces.[74] There are connectors between mental spaces, such as Identity connectors between the path in the mental space for the ascent and the path in the mental space for the descent. Some but not all the information from those two mental spaces is projected to a blended mental space.[75] We do not, for example, project the date of the ascent and the date of the descent, or the weather on those days, or the fact that the monk is aware of what is around him and would surely be shocked to find himself approaching himself on the path. We do not project the fact that a person cannot be in two places (foot and summit) at the same time. The blend is a compression of parts of its mental web, and it is at human scale because it is a little vignette about two people approaching each other on a path; this is a simple and familiar scene of human walking.[76] But this compressed blend also has emergent structure.[77] It has two monks, and a meeting. We can use the compressed blend to think about and work on the mental web. We can expand or unpack the blend and connect it back up to elements in the larger mental web. Some of the emergent structure in the blend, namely, the fact that there is a meeting, leads us to project back to

74. *Id.* at 40–42.
75. *Id.* at 47.
76. *Id.* at 48.
77. *Id.*

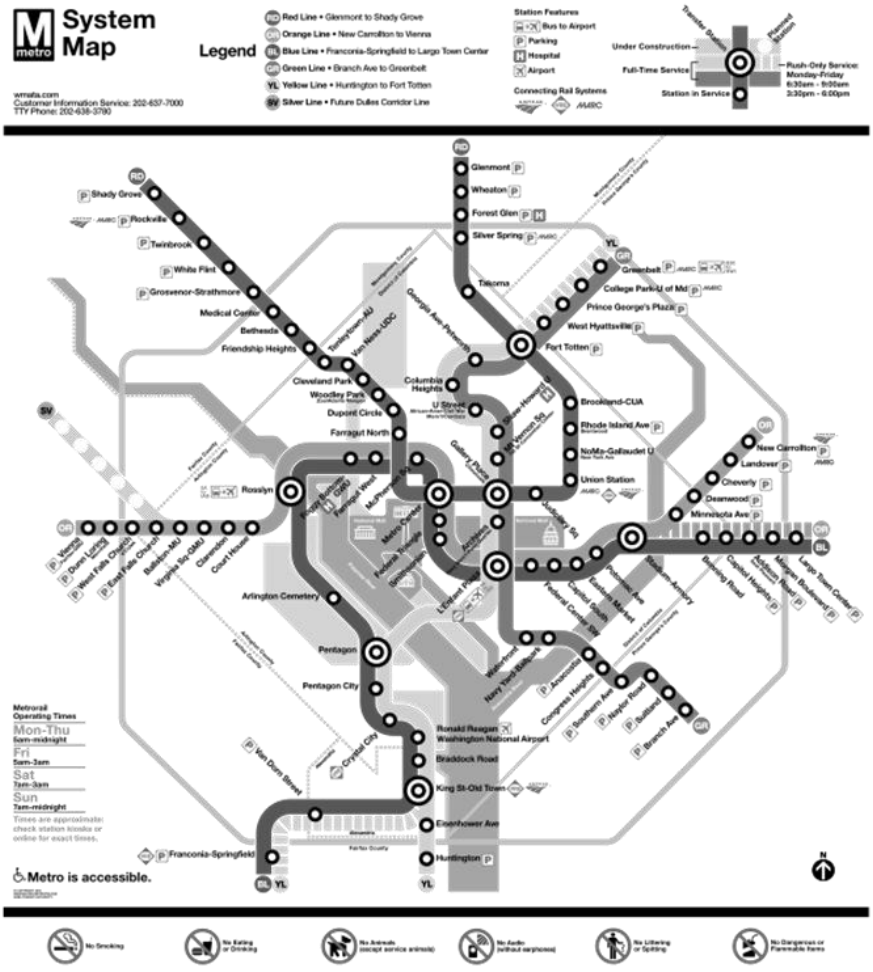
create new structure in the mental web itself: now, for example, there is an Identity connection between some spot on the path in the ascent mental space and a spot on the path in the descent mental space such that the monk is located at that spot in his travel at the same time of day on the two separate days.

In what follows, we will propose that new concepts in law result from blending to create new emergent structure in the blend that can be used to organize vast mental conceptions, which would otherwise lie beyond our mental powers of invention and understanding.

C. HOW TO BRIDGE THE MISMATCH BETWEEN LIMITED HUMAN BRAINS AND VAST LEGAL THOUGHTS

Perhaps the most obvious and familiar example of a compression is a map, of the kind we hold in our hand or the kind we hold in our head. In figure 7, we reproduce the map of the Washington D.C. Metro system. A map of a metro rail system, for example, compresses all the space over the entire city into one snapshot at human scale, something small enough to hold in the mind's eye. A great deal of detail in this geographical space is dropped out. Instead, we have in the mental map that there are five rail lines which intersect. We do not care much about accuracy of path from any station to another, but rather only about connectivity. All the time it takes to travel is also compressed down to the time it takes for our mind's eye to scan along the compressed, zoomed-out rail line from one station to another. All the causation is compressed to a few simple causal steps: we board the train and it carries us from one station to another. All the agency in the metro rail system is compressed to one agent: the train. We say, "The train will take you from Virginia Square to the Capitol Building."

FIGURE 7. Map for Washington, D.C. Metro, 2012



Source: This figure is from *System Map*, WASH. METRO. AREA TRANSIT AUTHORITY, http://www.wmata.com/rail/docs/colormap_lettersize.pdf (last visited Mar. 24, 2013).

Mentally, to think about making a trip on the metro rail, we do not need to call up even the entire map, much less all the information that we happen to know about Washington D.C. but that is not coded in any way on the map, such as elevation, weather, pleasantness of neighborhoods, and so forth. Instead, we can start from the compressed, very partial knowledge that there are five lines which intersect. We expand our little notions only as much as we need to solve the problem that we face. Suppose we want to know how to get to the Capitol Building from Arlington. We would need to be able to activate enough of the map—perhaps with the use of inference

from memory—to activate the idea that they are both on the orange line. So all we need to do is get to the metro station near Arlington, get on the train going east, and get off at the Capitol Building. We do not need to carry the vast idea of the landscape of Washington D.C. with us. On the contrary, we can expand just the elements we need from our compressed map of five intersecting rail lines.

The vast mental network we assemble with the help of expansions from our mental map of the metro will include many things that are not coded in the map: whether we have enough time available for the trip; how tired, weak, or strong we are for the trip; whether we can get a reasonable bite to eat along the way; whether our friend can join us as we make our trip; and so forth. These things and much more may be crucial as we build the mental network of vast scope, and the little compressed blend of the map helps us build that network. The law, as we will show, is similar: we have compressed, portable blends for law that provide tractable, human-scale concepts that we can then expand as needed to help us think at great scope.

Mental networks with vast extent of time, space, causation, and agency can be provided with compressed blends. Much like the D.C. Metro System Map in figure 7, these compressed blends, if successful, will allow us to hold vast thoughts at human scale in the here and now. Here, we present what we think is the crucial mental operation needed for vast thought. It is the operation we use to manufacture compressed blends that can be used to generate, access, and manipulate parts of a much bigger mental network. A useful compressed blend is one that, cognitively, fits relatively well inside our limited thinking. It is used as a key, a gnomon, and a generator for the complex network.

III. EXAMPLES OF COMPRESSED BLENDS IN LAW

Consider the idea in U.S. constitutional law of a "person." The concept of a person is one of the most congenial concepts for human thought. There is a particular compressed blend in law that uses the concept of a person as one of its inputs. But the blend has many other inputs, and we project only some of the information from each of these inputs to the blend, and the blend develops some structure of its own. This blend constitutes a legal person, and it does not apply to a human being. There is an entity in the blend that is a kind of person, a blended person, a legal person. But a legal person does not have to be an individual, for example. Various other kinds of information that stretch over time, space, causation,

and agency are projected into this blend. In the blend, a corporation, church, or charity can be a person.[78] One of the most central features of a person—that it must die within a canonical span of years—is not in the blend: a blended legal person can be hundreds of years old. The University of Southern California, the Vatican, and the Guggenheim Foundation are all blended legal persons. This blend is congenial because it fits the limitations of the human mind. We can expand this blend to access, manipulate, and consider ranges of information in a vast mental network of concepts that would otherwise not fit the human mind. The blend is a stable mental platform on which we can stand to reach up to things in the vast mental network that would otherwise elude us.

This blend is very well established in law. From *Woodward*,[79] to *Santa Clara County*,[80] to *Citizens United*,[81] the U.S. Supreme Court has routinely ruled that specific constitutional rights that protect persons also protect legal persons, such as corporations and other organizations.[82] The Fourteenth Amendment forbids a state to deny any person within its jurisdiction equal protection of the laws.[83] Using the legal person blend, this provision applies to corporations. First Amendment rights apply to all legal persons. For example, Congress may not make a law restricting the free speech of a group, a church, a political organization, or a corporation.[84] On the basis of the legal person blend, the due process clause proscribes a state government's taking of a corporation's property without either due process or just compensation.[85]

The blend has emergent structure that is not originally in any of the inputs, but we project it back to the inputs, changing our ideas about them. In the inputs, a person is an individual with constitutional protections, and a corporation is a group. But in the blend, the corporation has protections it would not otherwise have, and we project those protections back to the input corporation.

78. *See, e.g.*, Citizens United v. FEC, 130 S. Ct. 876, 882–83 (2010) (applying First Amendment protections to corporations); Santa Clara Cnty. v. S. Pac. R.R., 118 U.S. 394, 396 (1886) (including corporations as protected "persons" under the Fourteenth Amendment); Trs. of Dartmouth Coll. v. Woodward, 17 U.S. 518, 613–14 (1819) (expanding rights to chartered corporations).

79. *Woodward*, 17 U.S. at 613–14.

80. *Santa Clara Cnty*., 118 U.S. 394, 396 (1886) ("[T]he Fourteenth Amendment to the Constitution, which forbids a state to deny to any person within its jurisdiction the equal protection of the laws applies to corporations.") (internal quotation marks omitted).

81. *Citizens United*, 130 S. Ct. at 882–83.

82. *See supra* notes 9–13 and accompanying text.

83. *See* U.S. CONST. amend. XIV, § 1; *Citizens United*, 130 S. Ct. at 882–84.

84. U.S. CONST. amend. XIV, § 1

85. *Id.*; U.S. CONST. amend. V.

Of course, it is in the nature of compressed blends that they do not include everything from the inputs. The projection to the blend from the inputs is selective, and emergent structure arises in the blend that is not in any of the inputs. For example, the blend does not include personal privacy rights. In *FCC v. AT & T Inc.*, the U.S. Supreme Court ruled unanimously that the Freedom of Information Act's definition of person, which of course now includes corporations, does not thereby extend the right of a "personal privacy" exemption to corporations.[86] On the other hand, in *Citizens United*, the Court, using the legal-person blend, ruled 5-4 that when corporations or unions pay for political ads, First Amendment protections apply to them.[87] Justice Stevens, dissenting, writes,

> It might also be added that corporations have no consciences, no beliefs, no feelings, no thoughts, no desires. Corporations help structure and facilitate the activities of human beings, to be sure, and their "personhood" often serves as a useful legal fiction. But they are not themselves members of "We the People" by whom and for whom our Constitution was established.[88]

The Court in 2012 reaffirmed its ruling in *Citizens United* in overturning a Montana statute:

> A Montana state law provides that a 'corporation may not make . . . an expenditure in connection with a candidate or a political committee that supports or opposes a candidate or a political party.' . . . [T]his Court struck down a similar federal law, holding that "political speech does not lose First Amendment protection simply because its source is a corporation." The question presented in this case is whether the holding of *Citizens United* applies to the Montana state law. There can be no serious doubt that it does.[89]

The blended concept of a legal person can, however, be manipulated and adjusted. The compression is not static. Indeed, much of legal reasoning consists of arguing over what goes into the blend, what new structure it develops, and how it is to be expanded out to apply to specific cases and other ranges of information. Courts can refine or clarify just what elements are to be projected from the inputs to the compressed blend, and

86. FCC v. AT & T Inc., 131 S. Ct. 1177, 1178 (2011).

87. *Citizens United*, 130 S. Ct. at 882–83. The First Amendment reads, "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances." U.S. CONST. amend. I.

88. *Citizens United*, 130 S. Ct. at 972 (Stevens, J., dissenting).

89. Am. Tradition P'ship v. Bullock, 132 S. Ct. 2490, 2491 (2012) (per curiam) (citations omitted).

how the compressed blend is to be expanded as we try to work with the network.

Property assessments, for example, are commonplace across the United States and elsewhere. Assessments are used to fund, among other things, transportation systems, sidewalks, parks, parkways, recreational areas, sanitary sewers, drainage systems, street lighting, fire protection systems, flood protection, geologic hazard abatement or prevention, water and gas supply systems, retaining walls, ornamental vegetation, navigational facilities, and land stabilization. In 1996, Californians passed Proposition 218, governing the process by which assessments are enacted.[90] According to California's *A Planner's Guide to Financing Public Improvements*,

> Prior to creating an assessment district, the city, county, or special district must hold a public hearing and receive approval from a majority of the affected property owners casting a ballot. All owners of property within the assessment district must be mailed a detailed notice of public hearing and a ballot with which to voice their approval or disapproval of the proposed district at least 45 days prior to the hearing (Section 4(e), Article XIII D, California Constitution). The notice must contain: the total amount of money chargeable to the assessment district, the amount chargeable to each parcel in the district, the duration of the payments, the reason for the assessment, the basis upon which the proposed assessment was calculated, and a summary of the ballot procedure, as well as the date, time, and location of the public hearing. The notice must also disclose that a majority protest will result in the assessment not being imposed.[91]

Among other constitutional rights in California, corporations may own property and thus, under California's Proposition 218 and laws dating back nine decades, corporations may vote on ballot measures regarding assessments.[92] Not only do assessment laws extend the franchise to corporations (without checking their citizenship or age, as brand new corporations headquartered out of state, or even out of the country, get to vote), but their votes are also in proportion to the benefit they are predicted to receive from the infrastructure to be funded by the assessment.[93] So, in

90. Antero Rivasplata, *Chapter 1: General Taxes*, A PLANNER'S GUIDE TO FINANCING PUBLIC IMPROVEMENTS (June 1997), http://ceres.ca.gov/planning/financing/chap1.html#chap1.

91. Antero Rivasplata, *Chapter 3: Special Assessments*, A PLANNER'S GUIDE TO FINANCING PUBLIC IMPROVEMENTS (June 1997), http://ceres.ca.gov/planning/ financing/chap3.html#chap3.

92. Antero Rivasplata, *Chapter 4: What Must A Local Government Do to Raise New Revenues*, A PLANNER'S GUIDE TO FINANCING PUBLIC IMPROVEMENTS (June 1997), http://ceres.ca.gov/planning/ financing/chap4.html#chap4; MARIANNE O'MALLEY, UNDERSTANDING PROPOSITION 218 (1996).

93. *See* Kogan & McCubbins, *supra* note 14, at 8.

creating the legal fiction of a corporation as a legal person in California and elsewhere, we violate both the one-man, one-vote ideal and the ideal of a private ballot.

We see in these blends the creation of quasi-agents. Many different individual people may be involved, such as a firm's shareholders, bondholders, lenders, suppliers, employees, and management. The vast mental network involved may indeed have agents in different locations, spread across space, and the individuals within this vast network may come and go, spread across time. We do not project down to the blend any of the biological realities of these human agents, such as birth, maturity, or indeed most of the things that Justice Stevens listed in his dissent to *Citizens United*.[94] We do, however, project the ability to have intentions, interests, and ambitions to the single quasi-agent in the blend, so that the "owner" or the corporation now has aspects of mindedness. The quasi-agency in the blend is also imbued, in the case of assessment districts, with voting privileges and other central features of political agency, such as, most notably, the right to political speech under the First Amendment.[95]

Of course, once we notice the compression of agency to create human-scale agents, in cases like corporations and decedents, it becomes obvious that there are even more routine examples of agency compression, as in the blending of parent and child, so that the parent speaks for the child, and is in many ways responsible for the consequences of the child's actions. Parents can be held liable if the child is truant from school, for example. Such agency compression is not exotic; it is routine in everyday life.

In making these observations, we emphasize that our purpose in this Article is not at all to argue that such compressed blends in law always make for good law, good policy, accurate representation, superior society, or anything else that is thought valuable. Rather we seek to explain that because they fit the human mind, they can be used to ground legal thinking in ways that make law amenable to human thought. Fitting law that arches over time, space, causation, and agency to the human mind is difficult, and institutions of the law have labored to find solutions.

Let us consider a second example of a compressed blend widely used in law. In Western legal systems, especially the United States, we often encounter the compressed blend of "adversarial jurisprudence." More than two millennia ago, Aristotle analyzed the conceptual basis of our concept of jurisprudence. The foundation is force dynamics of the sort human

94. *See supra* note 92 and accompanying text.
95. *See* U.S. CONST. amend. I.

beings understand very well: two forces oppose each other. Two balanced opposing forces are in equilibrium. In Aristotle's words, they are in "stasis."[96] Real-world arguments can be amazingly complicated in their reach over time, space, causation, and agency. But, as Dieter argues[97] and Turner analyzes,[98] this complexity can be anchored in a simple, force-dynamic concept: an argument is constituted by a conflict of claims, where the claims are mapped onto opposed forces.

There are the four major grounds on which stasis can be constituted.[99] One sort of ground concerns "Fact or Being," also called "Existence or Conjecture" ("an sit"), as in the opposed claims, "You injured me!" versus "I didn't do anything!" The second ground concerns "Definition" ("quid sit") as in the opposed claims, "You injured me!" versus "What I did does not count as an injury!" This is the ground of interpretation, including legal interpretation of a statute. It is sometimes called the legal ground. The third ground concerns "Quality" ("quale sit") as in the opposed claims, "You injured me!" versus "And a good thing too, since I did it to stop you from committing treason!" This is a ground of right versus wrong, and is sometimes called the juridical ground. The fourth and last ground concerns "Objection," as in the opposing claims, "You injured me!" versus "This court is not the appropriate place to consider such a charge!"[100]

How will the stasis be broken? How will one force overcome the other? This is where adjudication comes in. Adjudication is the breaking of the equilibrium. The result is a limited, compact, and force-dynamic situation, with a limited, dynamic resolution: there is equilibrium, and adjudication breaks it in one direction or the other.

This gives judiciary action a basic narrative arc, of competing agents with competing, indeed diametrically opposed, goals. The competing agency makes competing roles in the story. In medieval Europe, the judiciary was sometimes reduced to one of the simplest forms of this competition, trial by combat, with the victor in combat being declared the victor in law.[101]

96. *See generally* Yameng Liu, *Aristotle and the Stasis Theory: A Reexamination*, 21 RHETORIC SOC'Y Q. 55 (1991).

97. Otto Alvin Loeb Dieter, *Stasis*, 17 SPEECH MONOGRAPHS 345, 348 (1950).

98. MARK TURNER, READING MINDS: THE STUDY OF ENGLISH IN THE AGE OF COGNITIVE SCIENCE 101 (1991).

99. *See* Dieter, *supra* note 102, at 348.

100. TURNER, *supra* note 103, at 110.

101. For more information regarding trials by combat, see generally GEORGE NEILSON, TRIAL BY COMBAT (Lawbook Exchange ed. 2009) (1858).

This basic narrative of adversarial jurisprudence, with limited roles and a familiar arc, is a special form of a cycle, that of a repeating contest. Two forces oppose to make a stasis, then two sides contest over which force will win. In trial by combat, the two agents are the deciding forces. In judicial proceedings, judges and juries are the deciding force. Two sides compete, one side wins. This happens every time the court comes to order, at least in principle.

This is a brilliant compressed blend that produces a simple narrative of contest. Citizens can apply it, repeatedly, to any case. They use the blend to organize a vast mental network of information involving the specific case, a network that would otherwise be intractable to the mind. The result of using the blend to make sense of and work on that vast mental network often leads to deep misunderstanding of specifics, such as, for example, the difference between a trial court and an appellate court. But it provides a basis for generating an understanding of the complexity in the vast mental network. Those who are trained will expand the compressed blend to organize the mental network of information in ways regarded as more accurate than others.

The power of this adversarial jurisprudence blend as an organizer of vast mental networks can be seen, for example, in its biblical use, where the entire history and condition of humankind is understood as anchored in this compressed blend: Humankind is the defendant; Satan is the accuser and prosecutor, before the judgment seat of God. Translations of *Job*, perhaps the oldest book of the Bible, typically translate ha-Satan, "The Satan," הַשָּׂטָן, with an expression that is the equivalent of "the accuser" or sometimes "the prosecutor."[102]

We see similar patterns of compression and expansion using the same blend of simple contest in the realms not of jurisprudence but of election and legislation. For example, election campaigns that span an entire continent, lasting for more than a year, involving tens of millions of people and hundreds of millions or billions of dollars, and in the case of the electoral college, arcane rules for deciding who wins, or in the case of primary elections, nominating conventions, debates, and decisions nested within other decisions, are ultimately compressed into a simple blend, typically akin to a horse race. Complicated matters of ideology, platforms, party registration, turnout, endorsements, and the like are absent from the blend. They are present in the vast mental network that the blend organizes, and we use the blend to help access and make sense of them, and to

102. *See, e.g.*, *Job* 1:6 (New Living Translation).

manipulate parts of that conceptual network. The use of simple contest blends involving simple force dynamics of opposition and equilibrium is evident in the complicated way we conceive of a government based on checks and balances.

One of the overarching difficulties in law, and perhaps the one of greatest magnitude, is that sometimes law has not yet produced, for a given part of law, a congenial and efficient compressed blend that all parties involved agree on and whose application they also agree on. Below is a general list of ways in which the great mental instrument of blending can fail to work in actual legal practice. After this list, we will discuss various cases and circumstances in law that illustrate these difficulties. The attempted blend may fail to fit the constitutive and governing principles for blending analyzed in Fauconnier and Turner.[103]

(1) Blending is a basic mental operation running across all human cognition and subject to general structural requirements and constraints. Almost all of the work of blending is unconscious; very few of these blending attempts survive the constraints on the process; most of those that do attach to no purpose and so evaporate; and of the very few that survive the process, very few are ever detected in consciousness. Accordingly, blending can fail produce a good blend in many ways that are unrecognized by the thinker.

(2) Mathematics, for example, illustrates how it can require centuries or millennia of familiarity with a domain before even enough compression occurs to make it possible for a blurry view of an interesting problem to begin to come into consciousness, and several more centuries before good compressions are achieved.

(3) There may be conflicting candidate compressions. In such a condition, good and useful blends have been achieved and are widely available. Either can be used, but they are not compatible and can lead to opposed inferences.

(4) Even for a strong, portable, compressed blend that is widely shared, there may be insufficient consensus on how that compressed blend is to be expanded to fit particular circumstances and situations.

(5) People may have an existing, entrenched compressed blend that law cannot easily displace. Simply providing a mass of information is, cognitively, a weak strategy for displacing an entrenched, compressed blend.

103. *See supra* Part II.B.

For conflicting compressions, consider the "body politic" versus the "ship of state" as blends for thinking about the system of governance. Either can be used but they are not compatible and can lead to opposed inferences. In the ship-of-state blend, one can always get a new, improved skipper. But in the body-politic blend, decapitation is a bad idea. A topical example of conflicting compressions is "majority rule" versus "United States" for presidential elections. In the majority-rule blend, we have the structure of "one man, one vote," summation of the votes, and victory for the majority. In the United States blend, it is fundamentally the states that are voting, and the District of Columbia was added to the crew, so there are fifty-one popular elections that send electors to the Electoral College for choosing the president. There are many strong arguments on either side, but the conflict is absolute, and accordingly, it is common to encounter absolute positions; for example, that the Electoral College is a brilliant mechanism that has saved the country from fraud and violence or that the Electoral College is indefensible in a democracy.[104] There are so many complexities in expanding either of these compressed blends to think about actual presidential elections as to have resulted in a vast literature on the little-known details.

For lack of consensus on how to expand and apply a strong and available compressed blend, consider the current turmoil over the status of "same-sex marriage."[105] Little in life can be as complicated as the reality of the billions of marriages that are in our world and in our history, but we have available a compressed blend for marriage and we do not feel that we have any difficulty in sharing that idea with others. Mostly, it can be activated, decompressed, and expanded to fit the great ranges of detail we encounter in thinking about actual marriages or categories of marriage. Of course, we all recognize some cases of shaky or uncertain application, cases in which what counts as marriage in one place does not count as marriage in another, of polygamy and polyandry, and so forth. But there is great controversy in law at the moment over whether and how to use this blend in applying to same-sex relationships.[106] The arguments range across the full spectrum, from those on the ends who feel that it is simply obvious that the blend does or does not apply to that case, to those somewhere in

104. *See, e.g.*, Tara Ross, *The Electoral College: Enlightened Democracy*, HERITAGE FOUND. (Nov. 1, 2004), http://www.heritage.org/research/reports/2004/11/the-electoral-college-enlightened-democracy.

105. For more analysis, see FAUCONNIER & TURNER, *supra* note 46, at 269–74.

106. *See, e.g.*, *Debate Club: Should Gay Marriage Be Legal Nationwide?*, U.S.NEWS.COM, http://www.usnews.com/debate-club/should-gay-marriage-be-legal-nationwide (last visited Mar. 24, 2013).

the middle who are laboriously working to modify the blend incrementally or to create other blends to handle the case.

Such lack of consensus on expanding a blend is one of the most challenging areas of any legal system. If different individuals have quite different expansion schemes, then they cannot be assumed to know the same law or to be able to predict who will expand what legal statutes in what way. For example, notoriously, the Bill of Rights and the Fourteenth Amendment offer only the most absolute compressed blends: "cruel and unusual punishment,"[107] "due process of law,"[108] and "equal protection."[109] How to expand these notions is an overarching problem of our democracy. The expansion schemes must be widely shared if law is to count as a societal institution. Sharing the expansion scheme includes agreeing on the interpretive role of a particular institution and its warrant to deliberate over the appropriate expanding schemes. A strict constructionist prefers expansion schemes that operate in the context of those who framed the Constitution.[110] Others contend that the expansion scheme should take place afresh in each generation, based on current contexts.[111]

This difficulty of moving from the compressed blend to the vast mental network presents challenges in all walks of life, including the simple activity of telling time. The compressed blend of the cyclic day does not indicate what time zone one is in, or that times vary depending on geographical location. Accordingly, another compressed blend for time-zone relation is needed, and it must be blended with the cyclic-day blend itself to deliver a more complicated hyperblend in which the cyclic day is at different times in different longitudes around the earth. And even worse, time zones are political creations—the Central European Time Zone includes everything from Corunna, Spain on the Atlantic Ocean to Hungary and Serbia. Places like Newfoundland and Bangalore, India are not even an integer number of hours away from Greenwich Mean Time.[112] There is no compressed blend we can expand to give us time zone.

To further complicate our notions of time, at various times of the

107. U.S. CONST. amend. VIII.

108. U.S. CONST. amend. V, XIV.

109. U.S. CONST. amend. XIV.

110. ANTONIN SCALIA, *Common-Law Courts in a Civil-Law System: The Role of United States Federal Courts in Interpreting the Constitution and Laws*, *in* A MATTER OF INTERPRETATION, *supra* note 3, at 3, 23.

111. *E.g.*, James L. Oakes, *Strict Construction Eschewed: Values Redevivus*, 99 HARV. L. REV. 862, 864 (1986) (reviewing LAURENCE TRIBE, CONSTITUTIONAL CHOICES (1985)).

112. *See World Time Zone Map*, TIME.GOV, http://www.timeanddate.com/time/map/ (last visited Mar. 24, 2013).

year—but not always the same day for all places—time shifts from standard to daylight-savings time. To prevent massive coordination failures, many organizations and machines expend considerable resources to get everyone to change the clock. There are household clocks and watches with hour and minute hands that receive radio signals from government sites that adjust them automatically. It is quite bizarre to see the clock move quickly when it is first plugged in, or when there is a shift between standard and daylight-savings time: the quick jumping of the clock does not fit our compressed blend for the cyclic day, and we must expand to the fuller network, probably with a chuckle, as we watch it. Coordinated Universal Time ("UTC") was created for use in systems like computers that time-stamp events, so as to create stability, undisrupted by changes between standard and daylight-savings time, or changes from one geographical location to another.[113] In any particular place or moment, the local population that hopes to interpret UTC needs to know the system of relationships between local timekeeping and UTC, but those who stay within UTC need no such additional transformations. Their compact cyclic day works just fine as it is.

And of course, the cyclic-year compressed blend sometimes requires expert expansion to fit the realities. It turns out that packing time into cyclic years accurately is complicated and takes societal force. The problem is to make the cyclic year "start again" with the same kinds of conditions every time. If we kept our years at exactly 365 days, then after about 360 years, fall would replace summer. To use the word "replace" on the compact "cyclic-year" blend—there would of course be, outside of the blend, no "replacement" in the input years themselves—what we mean is that during the part of the twelve-month calendar that we associate with summer conditions, we would experience fall conditions. Winter would come very early indeed, and earlier and earlier each time. To force all this complexity into one packed cyclic year, we must assign to every fourth year in the sequence not 365 days but rather 366. We say we "add a day to February." This is quite congenial to human thinking. We have coffee in front of us, and we add milk. It is a little changed. Now, in the blend, the year is like coffee. Instead of adding milk, we add a day. Of course, in the expanded network, no "day" is added: there is just one day and then another and so forth, and no new day gets inserted. But adding a leap day is not enough. Children learn, for example, that it is not the case that every fourth year is a leap year. Exceptions are years that end in 00, unless they

113. For more information see *About This Service*, TIME.GOV, http://www.time.gov/about.html (last visited Mar. 24, 2013).

are exact multiples of 400. But almost no one except someone born on February 29 ever remembers which year is a leap year or knows when the next leap year will be.

Luckily, in all these cases, we can hand the job over to instruments like clocks and calendars or personal digital assistants that are equipped with Internet connections to atomic clock and global-positioning systems. Because the problems are mainly just problems of coordination for efficiency, we have no hesitation to turning to the machines for the answer.

But the case is quite different with law. Different compressed blends and different packing and expansion schemes result in different social realities, and these are often contested. Consider, for example, Shay's Rebellion, in 1786 and 1787. It was driven in part by the conception that the rights of the federal government as given in the Articles of Confederation did not expand to include the mechanisms of tax and debt collection and government to which citizens in Massachusetts felt they were being subjected.[114]

Constitutions raise many questions related to packing and expanding schemes in learning: Why do some constitutions work and others do not? More interesting, why does a constitution work in one place at one time and the same, or very similar, constitution fail to work in other places at other times? One answer is that constitutions are compressed blends for vast mental networks, and that in adopting them, there must be some sort of consensus about how these compressed blends are to be expanded. The American colonies, on winning their independence from England, adopted a constitution that was unanimously accepted by the colonial legislatures but was replaced—after only a decade of use—with the present Constitution.[115] Yet, so well understood were the expansions of the ideas of confederation that they were readopted in the Confederate States Constitution some seventy years later[116] and in the Charter for the United Nations some ninety years after that.[117] Even so, confederations, wherever adopted, have proved to be relatively ungovernable.[118] It cannot be that the countries themselves are ungovernable (after adopting the new

114. For more information, see generally LEONARD L. RICHARDS, SHAY'S REBELLION: THE AMERICAN REVOLUTION'S FINAL BATTLE (2002).

115. *See Primary Documents in American History: The Articles of Confederation*, *supra* note 6.

116. *See* ARTICLES OF CONFEDERATION of 1781. *Cf.* CONST. OF THE CONFEDERATE STATES OF AM. of 1861.

117. *See generally* U.N. Charter.

118. Barry R. Weingast, *Self-Enforcing Constitutions: With an Application to Democratic Stability in America's First Century* 19–21 (Soc. Sci. Research Network, 2005), *available at* http://ssrn.com/abstract=1153527.

Constitution, for example, the U.S. government has been able to function, to write and enforce laws, to tax and spend, and so forth).

There have been numerous explanations of why some constitutional forms succeed and others fail. One part of the answer, as we see in contrasting the Articles of Confederation and the Constitution of the United States of America on the subject of taxation, is that the compressions found in some constitutional forms do not have well understood or accepted expansions, while other forms of governance do have compressions that are understood because they involve compressions with basic concepts that are widely understood. The delegates to the Constitutional Convention in Philadelphia in 1787 are often understood as having been influenced by the events of Shay's Rebellion to strive for clearer and more widely accepted expansion schemes. In general, a culture can generate many different compressions and expansion schemes, and it is often the role of lawyers and legislators to argue about their status and desirability.

Once law has achieved a new candidate blend, it can still be resisted because it is too weak to displace an existing, entrenched blend. The doctrine of contributory negligence was dominant for most of the nineteenth and twentieth centuries, but the Supreme Court of California overturned it in *Li v. Yellow Cab Co. of California* in favor of a doctrine of comparative negligence.[119] One reason it gave for overturning the doctrine of contributory negligence was that juries did not understand or agree to it.[120] Juries, contrary to the legal instructions offered by presiding judges, would often reach decisions that used a standard of comparative negligence, an already existing, entrenched compression.[121] So, even though the legislature wanted to adopt and use one scheme for packing and expanding, and the courts tried for one hundred years to follow it, the people themselves refused to follow it, and the Supreme Court of California eventually recognized this impasse and changed the law.[122] Evidently, popular learning of the law and of all societal codes favors some kinds of compressed blends, despite the conflicting preferences of authorities.

Our emphasis on blending and compression over time, space, agency, and causation in the development of concepts of law is offered as an improvement on the view that law is extended through analogy. Law

119. Li v. Yellow Cab Co. of Cal., 532 P.2d 1226, 1243 (Cal. 1975).
120. *Id.* at 1231.
121. *Id.*
122. *See id.*

professors have long taught that statutory reasoning, the use of precedent in legal and regulatory decisions, and so forth, are applications of reasoning by analogy.[123] This claim has echoes in cognitive science[124] and pedagogy.[125] Legal reasoning, it is taught, is based on expanding legal principles that are understood in one setting to new settings. But analogical reasoning in law often fails, and when it does succeed, the engine of success is not so much analogy but rather blending and compression to make new structures. It is actually well known that difficulties often arise in attempting to reason and argue analogically.[126] Justice Scalia introduces the conception of the common law—and the casebook method of teaching it in the first year of law school—by recounting the famous case of *Hadley v. Baxendale*, "decided a century and a half ago by the English Court of Exchequer."[127] He walks sedulously through the ways in which, for this case and others, the supposed analogical extension from one case to another actually requires great creativity, including the making of new law that is not already decided.[128]

In our terms, *Hadley v. Baxendale* makes a new compressed rule of law—that only reasonably foreseeable damages are recoverable.[129] This rule is not contained in any of the input-contract cases on the basis of which the court was considering this new case. One could not map analogically from those very many previous cases—which stretched across time, space, causation, and agency—to deliver a resolution in the new case. Analogical mapping itself would have produced nothing. Moreover, there were many different ways, as Justice Scalia discusses, to arrange the mapping and the emergent compression in the blend. Legal reasoning often works on distinguishing a previous case, which is to say, of tinkering with the mappings between it and the present case. If a previous case can be distinguished, then the rule it established cannot be mapped directly to the

123. *See, e.g.*, JOHN H. FARRAR, INTRODUCTION TO LEGAL METHOD 63 (1977).

124. *See* KEVIN D. ASHLEY, MODELING LEGAL ARGUMENT: REASONING WITH CASES AND HYPOTHETICALS 207–11 (1990) (discussing case-based, analogical reasoning in artificial intelligence research).

125. *See* Peter Suber, *Analogy Exercises for Teaching Legal Reasoning*, 17 J.L. & EDUC. 91, 95–98 (1988) (developing exercises that simulate legal reasoning to teach nonlawyers about legal reasoning and drawing analogies).

126. *See* GERALD N. ROSENBERG, THE HOLLOW HOPE: CAN COURTS BRING ABOUT SOCIAL CHANGE? 420 (2d ed. 2008) (arguing that "on the most fundamental level, courts depend on political support" to produce reform, and pointing at the "disappointing results of attempts to use the courts to produce significant social reform" on issues such as civil rights, abortion, women's rights, and the environment).

127. SCALIA, *supra* note 115, at 4–8.

128. *See id.*

129. Hadley v. Baxendale, (1854) 156 Eng. Rep. 145 (Ct. Exch.).

new case; rather, new compressions are required. Justice Scalia writes,

> Assume, for example, that a painter contracts with me to paint my house green and paints it instead a god-awful puce. And assume that not I, but my *neighbor*, sues the painter for this breach of contract. The court would dismiss the suit on the ground that (in legal terminology) there was no "privity of contract": the contract was between the painter and *me*, not between the painter and my neighbor. Assume, however, a later case in which a company contracts with me to repair my home computer; it does a bad job, and as a consequence my wife loses valuable files she has stored in the computer. *She* sues the computer company. Now the broad rationale of the earlier case (no suit will lie where there is no privity of contract) would dictate dismissal of this complaint as well. But a good common-law lawyer would argue, and some good common-law judges have held, that that rationale does not extend to this *new* fact situation, in which the breach of a contract relating to something used in the home harms a family member, though not the one who made the contract. The earlier case, in other words, is "distinguishable."[130]

Reasoning by analogy in the law is—in the interesting cases in which new law is incrementally made—actually reasoning by blending and compression. A powerful example of why the notion of reasoning by analogy misses much of what law must do to fit the human mind is provided by Justice William O. Douglas's invention of a policy expressed in his opinion in a 1954 case concerning the constitutionality of the Federal Urban Renewal Program in Washington, D.C.[131] This ruling set policy and changed law on a truly grand scale in a contested arena. It altered the urban landscape and cost an enormous amount of money. Douglas needed to justify a policy according to which the federal government would be authorized to condemn and destroy entire urban areas, even though nearly all of the privately owned properties and buildings to be destroyed met the relevant legal codes, and most of those codes themselves were in fact individually unobjectionable. Douglas hit upon a new compressed blend: just as an entire crop, nearly all of whose individual plants are healthy, must be destroyed and entirely replanted when some small part of it is blighted, so an urban area, nearly all of whose individual buildings, utilities, and roads are satisfactory, must be completely destroyed and redesigned from scratch when it has become socially unsavory. The following paragraph suggests his reasoning:

> The experts concluded that if the community were to be healthy, if it were not to revert again to a blighted or slum area, as though possessed

130. SCALIA, *supra* note 115, at 8 (emphasis in original) (footnote omitted).

131. Berman v. Parker, 348 U.S. 26, 34 (1954).

> of a congenital disease, the area must be planned as a whole. It was not enough, they believed, to remove existing buildings that were unsanitary or unsightly. It was important to redesign the whole area so as to eliminate the conditions that cause slums—the overcrowding of dwellings, the lack of parks, the lack of adequate streets and alleys, the absence of recreational areas, the lack of light and air, the presence of outmoded street patterns. It was believed that the piecemeal approach, the removal of individual structures that were offensive, would be only a palliative. The entire area needed redesigning so that a balanced, integrated plan could be developed for the region including not only new homes but also schools, churches, parks, streets, and shopping centers. In this way it was hoped that the cycle of decay of the area could be controlled and the birth of future slums prevented.[132]

It might seem as if this invention of a justification for policy is the product of straightforward analogy: agricultural blight, a biological scenario, is mapped analogically onto urban distress, a social scenario. That analogy, if it worked, would already lead to a compressed blend. But actually, much more than mere analogical matching is going on in this cognitive circus. Suppose we were actually trying to match blight to urban condition, so as to select the strongest analogical match. To do that, we should look first for causal structure in blighted crops: there are organisms that inhabit the crop and that directly cause the problem. Are there organisms that inhabit the slum and that directly cause the problem? Certainly: the slum-dwellers. For the blighted crops, there is a solution: destroy the crop completely so as to destroy the organisms completely, and then replant the crop identically, so that it becomes exactly what it was before it was inhabited. Projecting this to slums, we have a straightforward solution: raze the slum areas entirely so as to kill all the residents, and then rebuild the area identically so that it becomes what it was before it was inhabited, with no residents.

Of course, this analysis, when spelled out this way, is absolutely outrageous, and completely backward. Douglas began instead with distinct preferences in thinking about the slums: the residents must not be harmed, and even inconvenience to them must be attenuated; they are not to be stigmatized or viewed as the important cause of the problem, even though the causal chain must inevitably run through their actions; the federal government is to be viewed as responsible for correcting such problems; the extension of power to the federal government in its dealing with social

132. *Id.* at 34–35; DONALD A. SCHÖN & MARTIN REIN, FRAME REFLECTION: TOWARD THE RESOLUTION OF INTRACTABLE POLICY CONTROVERSIES 24 (1994).

ills is desirable; and so forth.[133]

Justice Douglas's blend leads to emergent structure not contained in the input spaces in the vast mental network. For example, before this blending, the concept of urban distress does not by itself yield the policy of razing perfectly acceptable buildings and ripping up useful roads that are in good repair. In Douglas's urban blight blend, the agents that cause blight are blended not with the biological agents in the area of urban distress but rather with the area itself. So in the blend, but in neither of the preexisting input spaces, the problem is handled by saving the resident organisms but razing the crop area. A summary of Douglas's argument as "areas with slums are like crops with blight, so we should do to them what we do to the crops"[134] misses the complicated conceptual work of blending in the invention of this policy. The purpose of this blend is to create new law and new inferences for the domain of urban conditions.

Legal pedagogy also depends on fitting the human mind, in this case, the mind of the law student; compressed blends help us deal with selective attention and memory; and a powerful biological instrument for driving attention and memory is emotion. Neurological studies confirm that emotional tags markedly increase the likelihood of learning and memory, in a process often linked to amygdala function.[135] The *Paper Chase*–style classroom,[136] with its anxiety-producing interaction, may be a design feature of pedagogy dedicated to ensuring that the subject matter of the class remains active in the student's brain while the daily process of managing vast networks by creating compressed blends goes forward. Pedagogy in law schools is an area of what might be called cognitive legal science—the cognitive scientific analysis of how the human mind deals with vast legal networks.

Appropriate compressed blends make information memorable. Before printing, the limited availability of manuscripts and heavy reliance on memory created a bottleneck that only such compression could

133. *Berman*, 348 U.S. at 28–29, 32.

134. *See id.*

135. Mark G. Baxter & Elisabeth A. Murray, *The Amygdala and Reward*, 3 NATURE REVIEWS: NEUROSCIENCE 563, 563 (2002); Larry Cahill & James L. McGaugh, *Mechanisms of Emotional Arousal and Lasting Declarative Memory*, 21 TRENDS IN NEUROSCIENCE 294, 297–98 (1998); Michela Gallagher & Geoffrey Schoenbaum, *Functions of the Amygdala and Related Forebrain Areas in Attention and Cognition*, 877 ANNALS N.Y. ACAD. SCI. 397, 397 (1999). *See generally* 3 STEVENS' HANDBOOK OF EXPERIMENTAL PSYCHOLOGY: LEARNING, MOTIVATION, AND EMOTION (Randy Gallistel & Hal Pashler eds., 3d ed. 2002) (providing comprehensive explanations of "key methodological concepts of experimental psychology").

136. Referencing the classic film, THE PAPER CHASE (1973).

circumvent.[137] The great triumph of compression in the law involved maxims. These compressed norms have been with us from antiquity, as the Justinian Code illustrates: "The precepts of the law are these: to live honestly, to injure no one, and to give every man his due."[138]

The availability of the printed word, however, created the ability to contain and transmit relatively large doses of information, intact and to a wide audience. The effect of this advance on the law was to lessen the need for extreme compression, by replacing memory with printed text. The importance of such chestnuts as "caveat emptor," "possession is nine tenths of the law," and "he who seeks equity must have clean hands" has diminished in recent years.[139] Still, legal maxims provide a rich domain for the study of compressed blends and the way they are expanded to manage vast legal thought. They can also provide guidance in how to teach the law more effectively to the general public.

IV. A NEW RESEARCH AGENDA: EMPIRICAL INVESTIGATION OF GOOD AND BAD BLENDS

So far in this Article, we have used the existing science of blending to make after-the-fact observations about blends in law that seem to have worked well and other candidate blends that have worked less well. In principle, legal scholars could develop before-the-fact empirical and perhaps even experimental inquiries into what makes for a good or bad blend in the law. As an illustration of these before-the-fact empirical inquiries, let us take a simple and clear case from the very common idea of an infinite sequence. Obviously, no mind can hold such a sequence explicitly in working memory: they are infinite! The counting numbers or the passage of time are both infinite sequences that we compress to small working blends and that we expand as needed to make it possible for us to work with any part of the sequence. We can make hypotheses about the ease or difficulty with which a human being will be able to make a compressed blend that lets us manage an infinite sequence.

For example, here is a demonstration, which we thought up, and which we have run many times in many groups. We made a hypothesis before running these demonstrations in groups. First, the task, which you

137. MERLIN DONALD, ORIGINS OF THE MODERN MIND: THREE STAGES IN THE EVOLUTION OF CULTURE AND COGNITION 323 (1991); Oliver Goodenough, *Cultural Replication Theory and Law* 11–12 (The Gruter Inst. Working Papers on Law, Econ., and Evolutionary Biology, Vol. 1, Art. 3, Oct. 9, 2001), *available at* http://www.bepress.com/giwp/default/vol1/iss1/art3.

138. THE INSTITUTES OF JUSTINIAN 1.1.3 (John Baron Moyle ed., trans., 2002).

139. *E.g.*, HERBERT FUNK GOODRICH, HANDBOOK ON THE CONFLICT OF LAWS 274, 307 (1927).

can try for yourself: take the sequence 1, 3, 5, 7, 9, ... What is the next number? It is easy: 11, followed by 13, 15, 17 . . . . Now take a second sequence: 2, 4, 6, 8, 10, ... What is the next number? It is easy: 12, 14, 16, ... Hold those two sequences in mind. Now construct a third sequence by blending these two sequences, in which this third sequence alternates by first choosing an element from the first sequence, namely 1, then the first element from the second sequence, 2, then the second element from the first sequence, then the second element from the second sequence, and so forth, like this: 1, 2, 3, 4, 5, 6, 7, ... How does the sequence continue? It is easy: 8, 9, 10, 11.

But now, use the same two sequences, and blend them again by alternating between them, but this time start with the second sequence rather than the first, so we get, 2, 1, 4, 3, . . . How does the sequence continue? 6, 5, 8, 7 . . . . Very smart people often have great difficulty doing this on the fly, ending up laughing as they stumble over the sequence. Even when they concentrate hard and manage to do it correctly, at least for a while, it takes them much longer to produce the sequence in the second case.

Before we ran these demonstrations, we made the prediction that subjects would stumble and laugh and take longer with the second task than the first. This is before-the-fact prediction, although not run in an experimental setting as yet. We made this prediction on the hypothesis that if one can work directly in the blend with a simple compression (that is, add one to the last element to get the next element) instead of having to work in the mental network, alternating between the two sequences, then one will perform better. Actually, there is a compression for the second task, although it is not so readily apprehended: subtract one, then add three, then subtract one, then add three, and repeat indefinitely. Even so, this is a more complicated compression.

Why do people have difficulty, stumble, and take longer for the second task? Both tasks have the identical input sequences. Both tasks ask people to construct a third sequence using the identical rule: alternate in choosing the next item in the sequence between the two infinite input sequences. The only difference in the two task is which of the two infinite input sequences we begin with—the even counting numbers or the odd input sequences. To that extent, the tasks place identical demands on working memory. So the problem is not a problem of memory. It is also not a problem for even a basic computing machine because it is not a problem of computational difficulty.

The difference, we propose, is that for the first task, there is a unified blend defined by a simple procedure: just add one to the last number (for the positive integers, the formula x=n, in which "x" is the output defining the third sequence, and "n" is the position in the constructed sequence). In the blend, all one needs to do is hold the last number in mind and do something simple to it. This blend can be held in mind all at once, and the blend can be used to access and juggle the two inputs. In the first task, one does not need to work in the mental network of input spaces; instead, one can work directly in the compressed blend. But in the second task, it is much harder to get a single, unified blend that can be used to juggle and access the inputs. The simplest formula for the sequence would be $x=n-(-1)^n$, in which "x" is the output and "n" is the position number in the sequence starting with 1. This is the rule that would be used by a computer, but no human being uses or would use that rule, and it is human thought we must study if we want to make sense of what works and what does not work in law.

If we want to store stuff in a room but it does not all fit, there are generally two different ways to succeed: get a bigger room, or transform the stuff so that it will fit. These are very different, if complementary, strategies. Transforming the stuff can include folding it, packing it, stacking it, filtering the stuff so as to throw away what you do not need to keep, and so forth. Most interesting, transforming the stuff can include adding things to it, like, say, stackable storage bins. If we want to stack a lot of quality wine in a small space, it might be best to construct the right kinds of racks. This may look backwards: it depends on adding yet more stuff to the stuff we already cannot get into the room. But that is often the right strategy. The specific details of the packing can vary. In Robert Crichton's novel, *The Secret of Santa Vittoria*,[140] the Italian villagers have hidden very many bottles of local wine underground from the German army at the end of the Second World War. They stacked it very tightly. To mislead the Germans, they also stacked a lot of wine bottles above ground, in plain view, but they stacked it using a method that requires a great deal of space per bottle.[141] Another strategy is to filter out what you do not need to fit into the room: in the case of the wine, for example, we might want to dispense with storing all the plonk. Think of mastering the combination of the two inputs sequences 1, 3, 5, . . . and 2, 4, 6, . . . by creating the anchoring blend 1, 2, 3, 4, 5, . . . as one way of projecting the inputs to a packed blend that can be handled in working memory. The other way of

140. ROBERT CRICHTON, THE SECRET OF SANTA VITTORIA (1966).

141. *See generally id.*

projecting, which creates the blend 2, 1, 4, 3, . . . produces something that does not fit so well into working memory.

To be sure, we have heard and memorized the sequence 1, 2, 3, 4, . . . many times, and never heard or memorized the sequence 2, 1, 4, 3, ... So, the following questions could legitimately be asked: Is the difference in our ability to manage the two sequences just that for the first we are reciting from long-term memory, and in the second we do not have that assistance? Is the only thing that this exercise shows that we know what we know but do not know what we do not yet know? We can run the demonstration differently to resolve this question. We can show the same effect without calling in long-term memory, by working with sequences that we have never heard or memorized. Consider a sequence defined by this rule: take every other even integer, beginning at 256, so 256, 260, 264, ... What is the next number? It is easy to generate because there is a unitary rule: just add four to the last number. This rule makes the sequence seem like one thing. Now hold that sequence in working memory. At the same time, consider a very similar sequence with an identical rule: take every other even number beginning at 254, so 254, 258, 262, ... What is the next number in this sequence? It is easy to generate it, because there is a unitary rule, and it is the same unitary rule: just add four to the last number. This rule makes this second sequence seem like one thing. Now hold that second sequence in working memory along with the first sequence. What is the sequence that consists of numbers taken sequentially in alternation from the two sequences, beginning with 256, so, 256, 254, 260, 258, 264, 262, . . . ? What is the next number? Everyone finds it difficult not to stumble almost immediately.

Why do we stumble? We have no difficulty holding each of the sequences in working memory. If we could hold them both in working memory, and go back and forth between them, choosing at each turn the next number for the new sequence, we could answer the question and just keep going indefinitely, switching back and forth in working memory.

Let us contrast this difficulty with the ease of performing a very similar task. This time, start the new sequence at 254 and switch back and forth. Then the resulting sequence is 254, 256, 258, 260, ... What is the next number? Of course, the answer is 262, and then 264, and then 266, and so forth forever. Everyone finds it very easy to continue this sequence indefinitely, even though we have not forgotten that the inputs are two separate sequences, the first one being 256, 260, 264, . . . and the second one being 254, 258, 262, ... Why is it so difficult to run the sequence 256, 254, 260, 258, 264, 262, . . . but so easy to run the sequence 254, 256,

258, 260, . . . ? The answer is not, as many have suggested for the positive integers in the first example, that we have already heard one but not the other. It is not that in one case we are reciting from long-term memory but in the other case we are not. It is not that they are put together from different inputs. A computer would not have the slightest difficulty running any of these sequences, and indeed, a mathematical ranking of the two sequences would assign them equal computational complexity. How does the human mind work so that running the two sequences feels so different?

Everyone knows the answer immediately. In both cases we have the same two input sequences, and in both cases, we have the same sequence rule: take numbers sequentially in alternation between the two input sequences. That is how a computer would do it, by creating two sequences and alternating between them. But that is not how we do it. For the human being, there is a big difference between the two tasks: starting with one of the two inputs makes it very difficult to keep going and starting with the other makes it very easy. This is because in the second case, there is a packed blend—namely a single, unitary sequence defined by a rule: start at 254 and keeping adding 2 to the last number. There is a congenial, unitary blend in this case, and running the blend makes immediate sense. The blend anchors the entire network, and lets us keep connected to not only the blend but also the two input sequences we started with. So now, we are running in working memory three things rather than two, but running three things is easier than running two because the third thing is a compressed blend that connects to and organizes the network involving the other two. More is easier if the more is packed in a congenial way. More is easier if the more is a packed blend that lets us grasp and manipulate whatever we were trying to hold in mind. For working memory, more is better if the more comes about by good blending. Blending changes the task.

Beginning at 254 provides a packed, unitary, congenial blend. We can master the network by "thinking in the blend" rather than "thinking in the network." Beginning at 256 does not let us do that; that is why we stumble. Or rather, working in the blend in the case of beginning at 256 requires some further work to grasp the blend. Once we think of it, we see that the combined sequence beginning at 256 actually does have a rule. The rule is: begin at 256, then subtract 2, then add 6, then repeat the pattern of subtracting 2 and adding 6. Grasping this blend can make it somewhat easier to generate the difficult sequence, although not as easy as generating the sequence produced by starting at 254 and adding 2 at every step.

A. EMPIRICAL INVESTIGATIONS INVOLVING INFINITE SEQUENCES WITH SHORTER VERSUS LONGER PERIODS

We have run some empirical investigations to investigate fitting vast, indeed infinite, sequences to the human mind. We have several hypotheses: (1) human beings do well with an infinite sequence that can be compressed to a short periodic cycle with no changes in the cycle that fits perfectly the various parts of the vast mental network it compresses; (2) they will do less well with longer periods; (3) they will do less well with cyclic blends where something in the network changes at each iteration of the cycle; and (4) they will do least well with cyclic blends where it is the inside of the cycle that changes with each iteration. These are all hypotheses having to do with the ease or difficulty of compressions and expansions.

We presented thirty-one subjects with information taken from periodic cyclic blends. For each piece of information, we posed a question, with five multiple-choice answers. For some questions, there was only one right answer. That is, subjects had enough information to eliminate four of the possible multiple-choice answers. For other questions, there was no right answer, but the answers followed different patterns. These questions let us investigate subject preferences in guessing the sequence. We emphasize that our investigations were not memory tests: subjects had all the time they want, had the information in front of them, and were provided with pencil and paper. Our investigations were also not a math quiz. In most cases, there was no right answer. It is, of course, impossible to hold any of these infinite sequences explicitly in mind: they are infinite! We investigated instead what compressed blends for the sequence were congenial to the human mind.

Consider an infinite sequence that has a period equal to 1, namely -2, -2, -2, ... We told subjects, "The following five questions all concern the same sequence. There is a rule that defines this sequence." One of the questions is, "What is the second missing item in the following? -2, -2, -2, __, -2, __." A subsequent question is, "What is the missing item in -2, -2, -2, -2, __, -2, -2, -2, -2?" Subjects had already seen that the fifth item is -2, so there was a right answer. But the first question we asked was, "What is the missing item in the following? -2, -2, -2, __ ?" The multiple-choice answers offered were -2, -1, 0, 1, 1. All the answers were possible. The *Online Encyclopedia of Integer Sequences*[142] has not the slightest difficulty identifying a sequence containing that answer in the sequence. For

142. *The On-Line Encyclopedia of Integer Sequences*, OEIS.ORG, http://oeis.org/ (last visited Mar. 24, 2013).

example, -2, -2, -2, 0 is a subsequence of the periodic sequence of order 4 whose period consists of that subsequence. We asked a variety of such questions.

How did subjects do? For the sequence of -2 repeating, which was a sequence of period 1, 100 percent of subjects answered perfectly all the questions for which there was a right answer, and 100 percent of subjects preferred -2 as the answer for all other questions, even though all the other answers were mathematically possible. The data were consistent with the hypothesis that subjects had a powerful grasp of infinite sequences with periods of 1, and that subjects prefer to grasp such a sequence as a cycle of 1 with an unchanging interior cycle if it is not clearly wrong.

Now consider an infinite sequence of a period equal to 3, namely Blue, Red, Green, Blue Red, Green, ... We told subjects, "The following five questions all concern the same sequence. There is a rule that defines this sequence. Consider the following sequence: Green, Blue, Red, Green, Blue, Red, Green. The first item in the sequence is Green. What is the twelfth item in the sequence?" The multiple-choice answers from which they could choose were Yellow, Green, Red, White, and Blue. Then, we asked them, "What is the missing item in Green, Blue, Red, Green, __, Red, Green, Blue, Red?" They could choose Green, Brown, Orange, Red, or Blue. We had already shown them that the fifth item was Blue, so there was a right answer. All but one subject (97 percent) answered correctly. Similarly, consider the question, "Here is the rule that defines the sequence: Periodic sequence with period {1,-1,0} where Red=1, Green=-1, Blue=0. Which of the following terms belongs to the sequence?" Subjects could choose Yellow, Azure, Green, Brown, or Orange. Only Green could be correct. 94 percent of subjects answered correctly. Similarly, 94 percent of subjects answered the following question correctly: "Recall that all five questions in this unit concern the same sequence. Here is part of that sequence: Blue, Red, Green, Blue, Red, Green. What is the rule that defines the sequence?" and subjects could choose, for Red=1, Green=-1, Blue=0, the periodic sequence with period {1, 1, -1, 0}; {1, -1, 0, -1}; {0, 1, 0, -1, 0}; {1, -1, 0}; or {1, -1, 1, 0}.

For questions about this sequence where there was no right answer, what percentage of subjects preferred the answer that fits a period of order 3? 94 percent of subjects preferred to see this pattern in response to the following question: "What is the missing item in the following? Blue, Red, Green, __?" They could choose Green, Brown, Orange, Red, or Blue. 94 percent preferred to see a pattern of order 3 (BRG) in response to the following question: "Consider the following sequence: Green, Blue, Red,

Green, Blue, Red, Green. The first item in the sequence is Green. What is the twelfth item in the sequence?" They could choose Yellow, Green, Red, White, or Blue. 87 percent preferred to see the BRG pattern in response to the following question: "What is the second missing item in the following? Blue, Red, Green, __, Red, __?" They could choose Green, Orange, Red, Blue, or Black. 100 percent preferred to see BRG pattern in response to the following question: "Consider the following sequence: Blue, Red, Green, __, Red, __. The first item in the sequence is Blue. What is the twelfth item in the sequence?" They could choose Yellow, Green, Orange, Red, or Blue.

While we did not give the subjects enough information to deduce the correct answer (there was one; it is the case, however, that higher order sequences, including extravagant blends, can create sequences in which any choice is correct), the data presented were consistent with the hypothesis that subjects had a good grasp of infinite sequences of short period. In this case, the period equaled 3. These data were also consistent with the hypothesis that subjects preferred to grasp such a sequence as a cycle of the shortest unchanging period they can.

But now what happens with an infinite sequence with a longer period, 7, and identical values in different positions of the period: 2, 2, 1, 2, 2, 2, 1 . . . . This is the sequence of semitones between notes of the diatonic major scale. 1 equals 1 semitone. 2 equals 2 semitones. This sequence is otherwise known as a repeating cycle—whole, whole, half, whole, whole, whole, half, now repeat. And here is another such sequence: 2, 1, 2, 2, 1, 2, 2 . . . . This is the sequence of semitones between notes of the natural minor scale. This sequence is in fact the same infinite sequence as the previous one, but beginning in a different spot (sixth note or sixth interval). Mathematically, they are identical as infinite sequences. Human beings, of course, hear the two scales very differently.

For both the major and natural minor sequences, when we wrote out the elements of the period and told subjects that it repeats, and asked them which of five choices can belong to the sequence, everyone scored 100 percent. They could just check whether the choice is in the list and eliminate all but one.

Otherwise, subjects had various preferences in guessing the sequence. For 2, 2, 1, 2, 2, 2, 1 . . . , we asked them: "The following five questions all concern the same sequence. There is a rule that defines this sequence. What is the missing item in the following? 2, 2, 1, __?" They could choose -2, -1, 0, 1, 2. 87 percent (twenty-seven subjects) chose 1. 6.5 percent (two subjects) chose 2. 6.5 percent (two subjects) chose something else. While

all of these answers could be correct, 93.5 percent preferred 1 or 2.

Perhaps the 87 percent were preferring two cycles of period 2, alternating: 2, 2, 1, 1, 2, 2, 1, 1, 2, 2, 1, 1, ... Indeed, for the following question: "What is the second missing item in the following? 2, 2, 1, __, 2, __?" (they could choose -1, 0, 1, 2, or 3), 81 percent (twenty-two subjects) of those twenty-seven subjects who chose 1 now chose 2, which would make the sequence 2, 2, 1, 1, 2, 2, ...

What these experiments demonstrate is that people seem to be able to handle tolerably well cycles that have unchanging interior structure in which each repetition of the cycle changes a tally outside the cycle. The tally gives us information about where we are in the sequence. Suppose it is January 1, 2012. Cycle through a year and start over. Now, it is 2013. Do it again and it is 2014, and so forth. Suppose you are thirty years old. Cycle through a year and start over. Now, you are thirty-one years old. Do it again and you are thirty-two years old, and so forth. In dealing cards, the dealer will sometimes recite **1**, 2, 3, 4, 5, 6, 7, **2**, 2, 3, 4, 5, 6, 7, **3**, 2, 3, 4, 5, 6, 7, **4**, 2, 3, 4, 5, 6, 7, **5**, 2, 3, 4, 5, 6, 7. This replacing of the first item in the period with the number of the cycle in which the dealer is located helps provide information about where the dealer is in the sequence.

Each of the infinite sequences considered so far can be thought of as composed of repetitions of a single invariant cycle, like the cyclic day. By contrast, our subjects had greater difficulty dealing with cyclic sequences in which the cycle has a parameterized change inside the cycle from iteration to iteration. For example, consider the "sequence of sequences": 1, 1, 2, 1, 2, 3, 1, 2, 3, 4, 1, 2, 3, 4, 5, 1, ... Again, notice that for a computing machine, this is a trivially easy infinite integer sequence. We can program a computer in a minute to generate this sequence, check on questions about it, and so forth. Not so for the human being. Below is a suite of questions we asked subjects. By the end of the third question, only {4, 1} fit the rule of the choices offered to the subjects, but only 48 percent of our subjects answered the third question correctly.

The following three questions all concern the same sequence.

There is a rule that defines this sequence.

(1) Consider the following sequence: 17, 18, 19, 1, 2, 3, 4 . . . . The first item in the sequence is 17. What is the twelfth item in the sequence? (Multiple choice: 10, 9, 8, 7, 6).

(2) What is the missing item in 13, 14, 15, 16, __, 18, 19, 20, 1? (Multiple choice: 16, 17, 18, 1, 2).

(3) Here is the rule that defines the sequence: The infinite sequence composed of successive finite sequences each consisting of the integers from 1 to n+1 for n=0, 1, 2, 3, . . . Which of the following subsequences belongs to the sequence? (Multiple choice: {7, 2}; {5, 4}; {4, 1}; {28, 14}; {3, 2}).

We saw a great deal of varied choice when subjects tried to grasp the underlying sequence. Here was a suite of questions we asked:

The following five questions all concern the same sequence.

There is a rule that defines this sequence.

(1) What is the missing item in the following? 3, 4, 1, __.

[55 percent of our subjects chose 2.]

(2) What is the second missing item in the following? 3, 4, 1, __, 3, __.

[90 percent chose 4.]

(3) Consider the following sequence: 3, 4, 1, __, 3, __ The first item in the sequence is 3. What is the twelfth item in the sequence?

[29 percent chose 5.]

(4) What is the missing item in 4, 5, 6, 7, __, 2, 3, 4, 5 ?

[100 percent chose 1.]

(5) Recall that all five questions in this unit concern the same sequence. Here is part of that sequence: 10, 11, 12, 1, 2, 3 What is the rule that defines the sequence?

[The choices are: Hours struck by a clock in order; The infinite sequence composed of successive finite sequences each consisting of the integers from 1 to n+1 for n=0, 1, 2, 3, ...; For whole numbers "n," sum of digits "n" written in base 7; For whole numbers "n," sum of digits "n" written in base 13; n7 mod 14.]

[45 percent chose the sequence of sequences.]

Again, this investigation was not a memory test. Subjects had all the time they wanted and were provided with pencil and paper. Neither was it a math test per se. Our subjects were undergraduates at an elite California research university and we had their SAT scores. An algorithm recognizes these sequences immediately and, for the questions that have no uniquely correct answer, the algorithm finds acceptable sequences for all of the

answers.[143] But the human subject is not the robot. These are vast, infinite sequences. Obviously, none could be held in mind explicitly. Accordingly, the following questions become crucial: For vast mental networks, such as in the case of these integer or repeated categorical sequences (such as a sequence of colors), which kind of compressed blends are congenial to the way human beings think? What makes a vast mental network manageable in limited working memory? These are central questions for law as well. For law, policy, ruling, and interpretation, what kind of compressed blends can best be managed by people? How can we construct and present those compressed blends when we construct laws, policies, rulings, and interpretations? What kind of testimony is based on compressed blends that make it reliable? What kind is not, making it unreliable? This is not a standard way of doing research in the law, but it could become a research program. This is not a standard way of teaching law, but it could become a line of teaching in law schools.

Research looking at how we might bridge the mismatch between vast legal mental networks and the proclivities of the human mind can help us inquire into a number of questions in the law. What testimony can we reasonably expect to be accurate? Which arguments can we reasonably expect to be memorable and persuasive? Which rulings can we reasonably expect to be understood, learned, and reactivated? Which laws can we reasonably expect to be intelligible, memorable, tractable, and have a system for consensual expanding?

Actually, the beginnings of legal theory, in Aristotle's *Rhetoric*, were cognitive to the core, asking questions much like these, and proposing answers on the basis of anecdotal experience and intuition.[144] What we are proposing is a revival of that approach to law, but with the benefit of the empirical and experimental techniques of modern cognitive science.

V. AN EXAMPLE OF THE STRUGGLE TO ACHIEVE A COMMON AND EFFICIENT COMPRESSED BLEND: INTELLECTUAL PROPERTY

Because economic growth often depends on profiting from innovation, intellectual property is a crucial concern to lawmakers crafting domestic

143. Examples of how the algorithm works are available at *The On-Line Encyclopedia of Integer Sequences*. *See id.*

144. *See* Alexander Nehamas, *Introduction* to ARISTOTLE'S RHETORIC: PHILOSOPHICAL ESSAYS, at xiii (David J. Furley & Alexander Nehamas eds., 1994) (discussing "methods of persuasion that are proper to a systematic field, the character of the speakers who use those methods, and the emotions appropriate for speakers to induce in their listeners so that they will be convinced and react positively").

and treaty law.[145] Strengthening these rules has been an explicit priority of the United States.[146] Compliance remains a huge problem, not only in countries such as Russia[147] and China,[148] but also in the United States.[149]

Property law is an input to the blend of intellectual property, but not all elements of the idea of property are projected to the blend, and there are strong disagreements about what projections are appropriate and what new elements should emerge from the blend. If someone takes a bound book, then the owner does not have it, and so cannot read it or give it to a friend or bequeath it. But if the book is digital, and someone "takes" it, the owner still has it and can read it and give it to friends and so forth. Which projections would be needed from the input of "property" to the blend for "intellectual property" in order for an action in the blend to count as "theft." Can a thing that was neither created nor purchased by its "owner"—such as a gene—be his patentable intellectual property? As Justice Scalia discussed, the extension of structure from one space (in our current discussion, real and personal property) to others (for example, creative works and genes) is anything but straightforward.[150] New law will be needed in the blend, but that law has not yet been settled.

145. *See* MICHAEL P. RYAN, KNOWLEDGE, DIPLOMACY: GLOBAL COMPETITION AND THE POLITICS OF INTELLECTUAL PROPERTY 9 (1998); Michael H. Armacost, *Foreword* to *id.* at vi; Michael L. Doane, *Trips and International Intellectual Property Protection in an Age of Advancing Technology*, 9 AM. U. J. INT'L L. & POL. 465, 465 (1994); Gerald J. Mossinghoff, *National Obligations Under Intellectual Property Treaties: The Beginning of a True International Regime*, 9 FED. CIR. B.J. 591, 592 (2000); Ruth Gana Okediji, *Copyright and Public Welfare in Global Perspective*, 7 IND. J. GLOBAL LEGAL STUD. 117, 119 (1999); Keshia B. Haskins, Note, *Special 301 in China and Mexico: A Policy Which Fails to Consider How Politics, Economics, and Culture Affect Legal Change Under Civil Law Systems of Developing Countries*, 9 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 1125, 1126–27 (1999); Andrea Morgan, Comment, *Trips to Thailand: The Act for the Establishment of and Procedure for Intellectual Property and International Trade Court*, 23 FORDHAM INT'L L.J. 795, 796 (2000); Todd Dickinson, Under Sec'y of Commerce for Intellectual Prop. and Director of the USPTO, Remarks at the US/WIPO Conference on Intellectual Prop. Enforcement in a Knowledge-Based Econ. for the Asia-Pac. Region (Sept. 18, 2000), *available* http://www.uspto.gov/web/offices/ac/ahrpa/opa/bulletin/wipoconthai.pdf.

146. *See Intellectual Property Enforcement*, U.S. DEP'T OF STATE ARCHIVE, http://2001-2009.state.gov/e/eeb/tpp/c22886.htm (last visited Mar. 17, 2013) (stating that the Office of International Property Enforcement participates in efforts to "strengthen the fight against trade in counterfeit and pirated goods worldwide").

147. David E. Miller, *Combating Copyright Infringement in Russia: A Comprehensive Approach for Western Plaintiffs*, 33 VAND. J. TRANSNAT'L L. 1203, 1204–05 (2000).

148. John R. Allison & Lianlian Lin, *The Evolution of Chinese Attitudes Toward Property Rights in Invention and Discovery*, 20 U. PA. J. INT'L ECON. L. 735, 766–67 (1999); Jennifer S. Fan, *The Dilemma of China's Intellectual Property Piracy*, 4 UCLA J. INT'L L. & FOREIGN AFF. 207, 217–18 (1999).

149. *See, e.g.*, A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004, 1013–14 (9th Cir. 2001).

150. *See supra* text accompanying notes 127–30.

Even when lawmakers agree on how to compress many input-domains into the intellectual-property blend and codify this compression in law, compliance rests on the ability of citizens to expand that compression. The compressed blend called "property" works as well as it does for tangible items because citizens can easily expand it for application to their individual circumstances, and because actions that violate the standard expansion of this blend usually trigger indignation among observers.[151]

In the case of intellectual property, it appears that citizens have difficulty expanding the blend for application to their individual circumstances. Very few Americans know their "fair-use" rights when it comes to excerpting printed material, and the laws regarding digital reproduction and rights management are especially arcane: the Digital Millennium Copyright Act ("DMCA"), which implements two 1996 Intellectual Property Organization Treaties, alone is fifty-nine pages long (double-spaced);[152] bureaucratic agencies from the Library of Congress's Copyright Office to the Austin Community College District have published administrative rules to govern its implementation;[153] and at least half a dozen important court opinions interpret the law.[154] Moreover, citizens appear to carry a range of competing compressions (for example, the idea that whatever does not discernibly harm another is okay) which expand to guide behavior in ways that would seem to clearly violate the law, but do so without triggering indignation among most observers.[155]

VI. CONCLUSION

Legal concepts are the result of a creative process of cognitive blending. Blending is a process unique to cognitively modern humans, and

151. There are, of course, exceptional cases in which competing blends may be allowed: Robin Hood is beloved because he violates the property blend to activate a more compelling blend—justice.

152. Digital Millenium Copyright Act, Pub. L. No. 105-304, 112 Stat. 2860 (1998) (codified as amended in scattered sections of 17 U.S.C.).

153. *E.g.*, *Laws and Regulations*, U.S. COPYRIGHT OFFICE, http://www.copyright.gov/laws (last visited Mar. 25, 2013); *Administrative Rules*, AUSTIN CMTY COLL., http://www.austincc.edu/admrule/4.02.007.htm (last visited Mar. 25, 2013).

154. *E.g.*, RealNetworks, Inc. v. DVD Copy Control Ass'n, Inc., 641 F. Supp. 2d 913 (N.D. Cal. 2009) (interpreting the anticircumvention and antitrafficking provisions of the DMCA); IO Grp., Inc. v. Veoh Networks, Inc., 586 F. Supp. 2d 1132 (N.D. Cal. 2008) (interpreting the safe-harbor provision of the DMCA); Lenz v. Universal Music Corp., 572 F. Supp. 2d 1150 (N.D. Cal. 2008) (interpreting what constitutes fair use under the DMCA); Vernor v. Autodesk, Inc., 555 F. Supp. 2d 1164 (W.D. Wash. 2008) (interpreting the first-sale doctrine under the DMCA).

155. *See* LAWRENCE LESSIG, FREE CULTURE: HOW BIG MEDIA USES TECHNOLOGY AND THE LAW TO LOCK DOWN CULTURE AND CONTROL CREATIVITY 200–02 (2004), *available at* http://www.free-culture.cc/freeculture.pdf ("The more often, and more repeatedly, we as citizens experience violating the law, the less we respect the law.").

allows us to implement rules that span time, space, causation, and agency. There are many signs of this blending in law, but we will conclude by discussing three: compression, selective projection, and emergent structures.

A. COMPRESSION

The rule of law is impossible without the compression of vast mental networks into human-scale cognitive blends. John Marshall argued that no human could hold in working memory the vast scope of the U.S. government, and he wrote this nearly two hundred years ago, when that government had a tiny fraction of the scope of modern national governments:

> A constitution, to contain an accurate detail of all the subdivisions of which its great powers will admit, and of all the means by which they may be carried into execution, would partake of the prolixity of a legal code, and could scarcely be embraced by the human mind. It would probably never be understood by the public.[156]

For the Constitution to be comprehensible to citizens, the framers had to compress a massively complex system into a description of fewer than five thousand words, and yet be specific enough that citizens, lawmakers, and judges could expand it to guide their behavior. To put this achievement in perspective, the terms of service for iTunes, a piece of free software from Apple Co., is more than three times as long as the Constitution.

B. SELECTIVE PROJECTION

Legal concepts are created and maintained through a highly creative mapping process that requires the compression of a messy reality into a simple logic that can be expanded again to guide decisionmaking in other messy environments. Stare decisis—without which no citizen could have confidence in the stability of his rights and responsibilities—is itself an exercise in projecting past decisions into a blend with present facts. This point could be viewed as an extension of Justice Scalia's argument that common law is not based on simple analogies but careful and creative adaptations.[157]

In describing the creative adaptation of common law, Justice Scalia offers the example of an attorney arguing that his client has standing to sue

156. M'Culloch v. Maryland, 17 U.S. 316, 407 (1819).
157. *See* SCALIA, *supra* note 115, at 8.

a computer-repair firm hired by her husband. In a previous case, an aggrieved neighbor was denied the right to sue a house painter for painting the house next door the wrong color, because of the doctrine of "privity of contract"—that is, because he was not a party to the violated contract. Justice Scalia writes that the attorney in the new case should argue that the old case is "distinguishable," and therefore does not preclude his client from suing the computer-repair firm despite not being a party to the contract.[158] Distinguishability is a key feature of cognitive blending, which differs from simple analogical reasoning in that it projects inputs selectively into the blend.

C. EMERGENT STRUCTURE

Imagine you own a factory, and I pay you to take me on a tour of the factory. If I were to steal a widget while I was in your factory, I could be prosecuted for theft. Now imagine that you own a film-production company and I pay you to watch your film. If I were to copy down the dialogue while watching your movie and produce an exact replica of your movie, I would again be liable for stealing—this time, for stealing your intellectual property. As discussed above, the notion of intellectual property is a blend that includes, among other things, inputs from the mental network of property law and inputs from the mental network of speech. This blend also has emergent structure.

As an example of the emergent structure of the intellectual-property blend, if I make a movie that copies elements of your movie, it may be permissible if I am engaging in satire or criticism, because in that case my work is protected speech.[159] If, on the other hand, I am simply reproducing your work with the goal of profiting off your idea, this is theft. The difference between these two might be as little as the difference between presenting the material as a sarcastic response or presenting the material as a sincere reproduction. When it comes to real or personal property, generally, if I take something of yours that you are not willing to give, it is theft. But an emergent quality of the intellectual-property blend is that theft depends on my attitude and intentions. If I take some dialogue and repeat it sarcastically, intending to edify an audience in some innovative way, I may not be stealing, even though you are not willing to give me your dialogue.

Conceptual compression through blending is the essence of law as an institution and the engine of our concepts of law, necessarily: law always

158. *Id. See also supra* note 130 and accompanying text.

159. *See, e.g.*, Hustler Magazine v. Falwell, 485 U.S. 46, 50–52 (1988).

concerns multiple ideas that stretch across time, space, causation, and agency, and requires for its structure compressions tractable for the human mind. We have proposed a research program according to which one could conduct systematic empirical investigations into what makes good and bad blends.

In general, good blends are those that compress large mental networks to human scale, and those where the choice of which inputs to project to the blend is widely agreed on and the emergent structures are clear. The fitness of a blend, however, can only be measured in a particular context. For example, most European Americans have historically had no problem with the blend of personal property and geography, called real property. Many American Indians, by contrast, have long rejected this blend. The Sauk leader, Black Hawk, expressed this rejection eloquently in his autobiography:

> My reason teaches me that land cannot be sold. The Great Spirit gave it to his children to live upon, and cultivate, as far as necessary for their subsistence; and so long as they occupy and cultivate it, they have the right to the soil—but if they voluntarily leave it, then any other people have a right to settle upon it. Nothing can be sold but such things as can be carried away.[160]

Since real property is primarily distinguished from personal property by its immobility, this constitutes an explicit endorsement of personal property and rejection of real property. But Black Hawk's view of land rights, while diametrically opposed to the European view of real property, is also familiar and compelling: every child is familiar with a similar set of rules governing the use of communal toys. This shows that even the most entrenched legal concepts may have compelling alternatives.

160. BLACK HAWK, LIFE OF BLACK HAWK, OR MA-KA-TAI-ME-SHE-KIDA-KIAK: DICTATED BY HIMSELF 56 (J. Gerald Kennedy ed., Penguin Books 2008) (1833) (originally translated by Antoine LeClaire).