

“WHAT MAKES THE ENGINE GO?”¹
COGNITIVE LIMITATIONS AND CROSS-EXAMINATION

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1. HARRY CLIFFORD BROKAW & CHARLES ACKERMAN STARR, PUTNAM’S AUTOMOBILE HANDBOOK: THE CARE AND MANAGEMENT OF THE MODERN MOTOR-CAR 21, ch. IV [entitled “What Makes the Engine Go”] (1918).

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I. INTRODUCTION

More than a century has passed since Wigmore declared that cross-examination was “beyond any doubt the greatest legal engine ever invented for the discovery of truth.”² Despite the passage of so many years, the assertion remains one of the most regularly quoted and cited in all of evidence scholarship³—the title of this symposium being an important recent reference.

No doubt, the continuing prominence of Wigmore’s declaration is related to the longevity of Wigmore’s general influence. But Wigmore said many things. And one is, therefore, justified in looking to the quotation itself in trying to understand its lasting fame. Perhaps, specifically, the quotation owes some of its durability to its compelling invocation of the concept of an engine with its attendant connotations of power, inexorability, and ingenuity.

Unfortunately for evidence scholarship (but perhaps fortunately for good taste), Wigmore’s engine reference appears in his writing as a brief rhetorical flourish, and not the start of an extended metaphor on the actual mechanics of the truth-discerning engine that he supposed cross-examination to be. The rest of the shelf-length treatise in which the quote appears is fairly silent about how the engine of cross-examination actually runs.⁴ Similarly, most of those who have quoted Wigmore’s declaration over the years also seem to have been content to leave the engineering unexamined.⁵

2. 5 JOHN HENRY WIGMORE, EVIDENCE IN TRIALS AT COMMON LAW § 1367 (Peter Tillers ed., 4th ed. 1983).

3. FRANKLIN STRIER, RECONSTRUCTING JUSTICE: AN AGENDA FOR TRIAL REFORM 151 (1996) (referring to the passage as “probably the most quoted line in adversary system literature”).

4. 5 WIGMORE, *supra* note 2, § 1368 (“What is the theory of [cross-examination’s] efficiency? . . . Upon this we commonly reflect but little.”).

5. Richard O. Lempert, *Built on Lies: Preliminary Reflections on Evidence Law as an Autopoietic System*, 49 HASTINGS L.J. 343, 345 (1998) (“[T]he likely effectiveness of cross-examination in getting at the truth is seldom examined—numerous court opinions and commentaries rely on Wigmore’s conclusion . . . rather than on empirical evidence.”).

Other commentators have also been critical of Wigmore’s assertion, though for different reasons. Several scholars focus on cross-examination’s potential for “false positives,” wherein truthful witnesses are discredited. *See, e.g.*, Mirjan Damaska, *Presentation of Evidence and Factfinding Precision*, 123 U. PA. L. REV. 1083, 1094 (1975); John H. Langbein, *The German Advantage in Civil Procedure*, 52 U. CHI. L. REV. 823, 833-34 (1985).

Some scholars emphasize the lack of empirical evidence on cross-examination’s efficacy. *See* Roger C. Park, *Adversarial Influences on the Interrogation of Trial Witnesses*, in ADVERSARIAL VERSUS INQUISITORIAL JUSTICE 131 (Peter J. van Koppen & Steven D. Penrod eds., 2003); John S. Applegate, *Witness Preparation*, 68 TEX. L. REV. 277 (1989); Lempert, *supra* note 5, at 345; Roger C. Park, *Visions of Applying the Scientific Method to the Hearsay Rule*, 2003 MICH. ST. L. REV. 1149, 1170. Perhaps the closest that experimental research has come to testing the efficacy of cross-examination is the study by Peter Miene et al., *Juror Decision Making and the Evaluation of Hearsay Evidence*, 76 MINN. L. REV. 683 (1992) (reporting on one of the few

This essay is an attempt to shed light on one of the essential processes that drives the engine of cross-examination. Specifically, the essay puts forward several hypotheses regarding the important positive role that human cognitive limitations play in the functioning of cross-examination. In the process, the paper also offers a perspective on such mental limitations that is distinct from predominant approaches in cognitive psychology and law.⁶

Part II describes this different approach to cognitive limitations. Parts III and IV describe the approach's application to evidentiary procedure and cross-examination. Part V considers its manifestation in specific evidentiary rules regarding testimony and cross-examination. Part VI concludes.

II. COGNITIVE LIMITATIONS: A THIRD APPROACH

Cognitive psychology studies how humans process information. On its face, therefore, the field is potentially quite relevant to the study of law in general, and specifically to the study of how the judicial system processes information—which is to say, to evidentiary procedure.

The potential connection between law and cognitive psychology has hardly gone unnoticed. And the many existing realizations of this potential connection have been undeniably valuable, both conceptually and practically.⁷ Even so, the existing literature applying cognitive psychology to law provides an incomplete picture of what human cognitive limitations mean for law. This picture is especially incomplete with regard to evidentiary procedure and the specific institution of cross-examination.

The existing approaches to cognitive limitations are essentially two in number. The first approach—which, for reasons that will become clear, I will refer to as the “yes” approach—has both a positive and a normative component. The positive component consists chiefly of the assertion, and experimental demonstrations thereof, that the human capacity to process information is limited.⁸ Thus, we are bad at paying attention. We are bad at storing and retrieving that to which we do attend. And both abilities deteriorate markedly as we fatigue.

hearsay experiments with real eyewitnesses to a staged incident and actual cross-examination by participating attorneys).

6. My remarks in this essay build on two recent articles: Chris William Sanchirico, *Detection Avoidance*, 81 N.Y.U. L. REV. 1331 (2006); Chris William Sanchirico, *Evidence, Procedure, and the Upside of Cognitive Error*, 57 STAN. L. REV. 291 (2004).

7. See, e.g., PATRICK M. WALL, EYE-WITNESS IDENTIFICATION IN CRIMINAL CASES (1965) (discussing how, in identifying suspects in a police lineup, eyewitnesses are apt to have “memory source confusion,” mistaking familiarity with a suspect due to prior viewing of police photos for familiarity due to sighting in relation to the crime). Wall's work was cited with approval in *United States v. Wade*, 388 U.S. 218, 228-30, 232, 234 (1967) and *Simmons v. United States*, 390 U.S. 377, 383, 386, 388 (1968). See also RONALD P. FISHER & R. EDWARD GEISELMAN, MEMORY-ENHANCING TECHNIQUES FOR INVESTIGATIVE INTERVIEWING: THE COGNITIVE INTERVIEW (1992) (applying “cognitive interview” techniques to improve the questioning of witnesses).

8. See *infra* note 10.

With regard to its normative component, this first approach to cognitive limitations at least implies, and often explicitly asserts, that such cognitive limitations are detrimental for law in general, and for evidentiary process in particular.⁹

Most of the articles that fall within this first category, including some of the earliest, are housed in a sizable sub-literature in evidentiary procedure.¹⁰

9. See *infra* note 10.

10. See, e.g. (in chronological order), WALL, *supra* note 7; I. Daniel Stewart, Jr., *Perception, Memory, and Hearsay: A Criticism of Present Law and the Proposed Federal Rules of Evidence*, 1970 UTAH L. REV. 1 (1970) (discussing eyewitness fallibility generally); Muriel D. Lezak, *Some Psychological Limitations on Witness Reliability*, 20 WAYNE L. REV. 117 (1973) (same); Evan Brown et al., *Memory for Faces and the Circumstances of Encounter*, 62 J. APPLIED PSYCHOL. 311 (1977) (discussing memory-source confusion in relation to eyewitnesses); ELIZABETH F. LOFTUS, *EYEWITNESS TESTIMONY* 20-109 (1979) (discussing eyewitness fallibility generally); Gary L. Wells et al., *Accuracy, Confidence, and Juror Perceptions in Eyewitness Identification*, 64 J. APPLIED PSYCHOL. 440 (1979) (identifying the “confidence-accuracy correlation” problem: the weak correlation between eyewitnesses’ confidence in the accuracy of their memories and the actual accuracy of those memories); Stephan Landsman, *Reforming Adversary Procedure: A Proposal Concerning the Psychology of Memory and the Testimony of Disinterested Witnesses*, 45 U. PITT. L. REV. 547 (1984) (discussing various memory faults in relation to witness coaching); Applegate, *supra* note 5, at 277 (same); R.C.L. Lindsay et al., *Mock-Juror Belief of Accurate and Inaccurate Eyewitnesses: A Replication and Extension*, 13 LAW & HUM. BEHAV. 333 (1989) (presenting findings on the confidence-accuracy correlation problem); Steven I. Friedland, *On Common Sense and the Evaluation of Witness Credibility*, 40 CASE W. RES. L. REV. 165 (1990) (arguing that jurors are poor at assessing the accuracy of testimony); Russell Korobkin & Chris Guthrie, *Psychological Barriers to Litigation Settlement: An Experimental Approach*, 93 MICH. L. REV. 107 (1994) (arguing that cognitive limits hamper the settlement of disputes); BRIAN L. CUTLER & STEVEN D. PENROD, *MISTAKEN IDENTIFICATION: THE EYEWITNESS, PSYCHOLOGY, AND THE LAW* (1995) (discussing the fallibility of eyewitness identification generally); Jeffrey J. Rachlinski, *A Positive Psychological Theory of Judging in Hindsight*, 65 U. CHI. L. REV. 571 (1998) [hereinafter Rachlinski, *Hindsight*] (arguing that judicial factfinders are prone to “hindsight bias,” defined *infra* note 12); Jeffrey J. Rachlinski, *Heuristics and Biases in the Courts: Ignorance or Adaptation?*, 79 OR. L. REV. 61 (2000) [hereinafter Rachlinski, *Adaptation?*] (arguing that factfinders are prone to “hindsight bias” as well as errors caused by use of the “representativeness heuristic,” defined *infra* note 13); Deborah Davis & William C. Follette, *Foibles of Witness Memory for Traumatic/High Profile Events*, 66 J. AIR L. & COM. 1421 (2001) (surveying research on eyewitness fallibility); Chris Guthrie et al., *Inside the Judicial Mind*, 86 CORNELL L. REV. 777 (2001) (discussing cognitive illusions in judges’ decisionmaking); Bennett L. Gershman, *Witness Coaching by Prosecutors*, 23 CARDOZO L. REV. 829, 838-44 (2002) (discussing various memory faults in relation to witness coaching); D. Michael Risinger & Jeffrey L. Loop, *Three Card Monte, Monty Hall, Modus Operandi, and “Offender Profiling”: Some Lessons of Modern Cognitive Science for the Law of Evidence*, 24 CARDOZO L. REV. 193, 194 (2002) (“[T]he last century has seen the accumulation of literally thousands of studies on the weaknesses of eyewitness testimony.”); AMINA MEMON ET AL., *PSYCHOLOGY AND LAW: TRUTHFULNESS, ACCURACY AND CREDIBILITY* 87-168 (2d ed. 2003) (surveying research on eyewitness fallibility); Erica Beecher-Monas, *Heuristics, Biases, and the Importance of Gatekeeping*, 2003 MICH. ST. L. REV. 987 (discussing heuristics and biases in jury decisionmaking); Michael J. Saks & D. Michael Risinger, *Baserates, the Presumption of Guilt, Admissibility Rulings, and Erroneous Convictions*, 2003 MICH. ST. L. REV. 1051 (discussing decisionmakers’ errors in revising their probabilistic assessments in light of new evidence—specifically, their failure to fully account for underlying population frequencies, or “baserates”).

(Arguably, the precedence of evidence scholarship with regard to this first approach to cognitive limitations is insufficiently recognized throughout the rest of legal scholarship.) According to this sub-literature, our cognitive limitations make us terrible witnesses: witnesses who remember everything about the gun that was pointed at us, but remember nothing about the face behind it; witnesses who, staring at a lineup, fail to realize that the individual second from the left looks familiar not because we saw him commit the crime last month, but because we saw his face in a police photo array last week.

A more modern and perhaps more generally familiar sub-literature falling within this first approach bemoans our general cognitive limits once removed.¹¹ According to this sub-literature our general limits drive us to adopt rules of thumb—heuristics—when we make decisions. These heuristics, because they are not complete logical systems, but rough and ready guides, are often systemically erroneous. And these errors are, in turn, a serious liability for the legal system. Thus, within the realm of evidentiary procedure, we perform terribly as fact finders, subject to hindsight bias in judging negligence after the fact of an accident,¹² and incapable of accounting for base rates.¹³ Outside of evidentiary procedure, we are vulnerable consumers in the marketplace and vulnerable citizens at the polls.

The second approach in law to cognitive limits is in large part a reaction to the first.¹⁴ This second approach argues that the first approach, discussed

11. Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1477-78 (1998) ("We have limited computational skills and seriously flawed memories. . . . To deal with [this,] we use mental shortcuts and rules of thumb . . . [which, in turn,] lead us to erroneous conclusions."); Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCI. 1124, 1124-27 (1974) ("[P]eople rely on . . . heuristic principles which reduce . . . complex tasks . . . to simpler judgmental operations. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic errors.").

12. See Baruch Fischhoff, *For Those Condemned to Study the Past: Heuristics and Biases in Hindsight*, in JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES 335, 341 (Daniel Kahneman et al. eds., 1982) ("In hindsight, people consistently exaggerate what [they or others] could have . . . anticipated in foresight.").

13. The "representativeness heuristic," for example, induces fact finders to place too much weight on whether the evidence matches their mental picture of, for instance, negligent behavior, and too little weight on the base frequency of such behavior in the population. Rachlinski, *Adaptation?*, *supra* note 10, at 81-85; Saks & Risinger, *supra* note 10, at 1056-57.

14. See, e.g. (in chronological order), David C. Funder, *Errors and Mistakes: Evaluating the Accuracy of Social Judgment*, 101 PSYCHOL. BULL. 75, 84 (1987) (critiquing findings of error in social judgment); Gerd Gigerenzer, *How to Make Cognitive Illusions Disappear: Beyond "Heuristics and Biases"*, 2 EUR. REV. SOC. PSYCHOL. 83 (1991) (finding that errors are overstated); Gerd Gigerenzer & Peter M. Todd, *Fast and Frugal Heuristics: The Adaptive Toolbox*, in SIMPLE HEURISTICS THAT MAKE US SMART 3, 21-22, 29-31 (Gerd Gigerenzer et al. eds., 1999) (similar); Ebbe B. Ebbesen, *Some Thoughts About Generalizing the Role that Confidence Plays in the Accuracy of Eyewitness Memory* (Nov. 3, 2000), available at <http://psy.ucsd.edu/~eebbesen/confidence.htm> (critiquing the experimental design of confidence-accuracy correlation studies); Gregory Mitchell, *Taking Behavioralism Too Seriously? The Unwarranted Pessimism of the New Behavioral Analysis of Law*, 43 WM. & MARY L. REV. 1907, 1945-95 (2002) (faulting cognitive-errors literature for flawed experimental design, statistical method, and ecological validity); *People v. Legrand*, 747 N.Y.S.2d 733, 742-45 (N.Y. Sup. Ct. 2002) (holding expert testimony on eyewitness fallibility

above, overstates the existence and significance of mental shortcomings. Those who take this second approach maintain, for example, that it is too easy to statistically reject the null hypothesis that humans are on average dead-on-rational (even at a 95% significance level).¹⁵ They further argue that the mere finding that an effect is “statistically significant” tells us less than it should about the magnitude or prevalence of the effect. And, perhaps most fundamentally, they question the “ecological validity” of experiments that purport to uncover cognitive limitations, often suggesting that such experiments were specifically designed to trip up heuristics that, although logically incomplete, are otherwise useful and perhaps even clever.

The third way of viewing cognitive limitations that I would like to propose here is fundamentally different from the first two. If, with reference to the question of whether we are substantially cognitively limited, the first approach answers “yes” and the second “no,” then this third way answers “yes, but” *Yes*, experimental design notwithstanding, we are of course seriously limited as information processors—a point easily gleaned from introspection. *But*, thank goodness (to engage in some hyperbole), because what bounds our ability as individuals to process information extends the ability of the legal system to process information.

III. THE DOUBLE NEGATIVE OF COGNITIVE LIMITATIONS

What could possibly be the upside of a limitation? In answering this question, let us move from the general to the specific, taking up the general in this section and the specific in the next.

The normative status of a cognitive limitation turns on the normative status of the cognitive task to which such cognition is being directed. Fairly self-evident in many other contexts—like mystery novels with brilliant murderers, or horror films with evil geniuses—the point has largely escaped attention in the law and cognition literature.

The failure of the law-and-cognition literature to explicitly engage the task-contingency of cognitive limitations is no doubt related to the fact that the list of cognitive tasks considered in that literature is strangely askew. Within evidentiary procedure, for instance, an enormous amount of research investigates the cognitive tasks of assumed-to-be beneficent actors, such as impartial fact finders or disinterested eyewitnesses. The cognitive tasks of bad

not “generally accepted” under a *Frye* standard); Gregory Mitchell, *Mapping Evidence Law*, 2003 MICH. ST. L. REV. 1065 (critiquing applications of the errors in literature to evidence law).

15. One would “reject such a null hypothesis at a 95% significance level” if the *ex ante* probability that one would have seen such behavior, were the subjects rational, was less than 5%.

actors—those whom Holmes instructs us to keep in mind in designing law¹⁶—are largely ignored. Thus, while much attention has been paid to the witness who earnestly attempts to recover and recount what she saw, or the fact finder who conscientiously struggles to draw inferences from evidence, little attention has been paid to the individual who cogitates about evasion, who ruminates on deceit, who deliberates about how to break the law without a trace, who lies under oath, who alters phone logs, who shreds damaging documents.

Largely undiscovered, therefore, is what might be referred to as the “double negative” of cognitive limitations. When cognitive limitations detract from the conduct of a socially positive activity, they are a negative. But when they detract from a socially negative activity, they are a double negative—which is to say, a positive.

IV. SOME SPECIFICS

How specifically does the evidentiary upside of cognitive limitations manifest itself? In the description of specifics to follow, I divide evidentiary issues into two groups, the first having largely to do with real evidence, the second having to do with testimony. With respect to each of these evidentiary groups, I emphasize two themes: how the law exploits cognitive limitations of bad actors in ways that have significantly less impact on sincere actors; and how the law tilts the playing field to enable certain other actors, who are themselves cognitively limited, to better exploit the shortcomings of bad actors.

A. Cognitive Artifacts

Our cognitive shortcomings lead us to employ a host of compensating devices in our daily lives. Such devices, sometimes referred to as “cognitive artifacts,”¹⁷ include notes, calendars, correspondence, worksheets, logs, hard drives, and back-up tapes. The litter of such devices is the stuff of evidence. A paper trail is a trail of mental crutches. Recall that Martha Stewart was convicted partly on the basis of her phone log. Her broker, similarly, was

16. See Oliver W. Holmes, *The Path of the Law*, 10 HARV. L. REV. 457 (1897) (proposing that the law be analyzed from the perspective of the “bad man”); see also Charles R. Nesson, *Incentives to Spoliate Evidence in Civil Litigation: The Need for Vigorous Judicial Action*, 13 CARDOZO L. REV. 793, 795, 805 (1992) (advocating Holmes’s “bad man” approach in the context of evidentiary process).

17. See, e.g., Donald A. Norman, *Cognitive Artifacts*, in DESIGNING INTERACTION: PSYCHOLOGY AT THE HUMAN-COMPUTER INTERFACE 17, 17 (John M. Carroll ed., 1991) (“A cognitive artifact is an artificial device designed to maintain, display, or operate upon information in order to serve a representational function.”); but see Edwin Hutchins, *Cognitive Artifacts*, in THE MIT ENCYCLOPEDIA OF THE COGNITIVE SCIENCES 126, 127 (Robert A. Wilson & Frank C. Keil eds., 1999) (“There is no widespread consensus on how to bound the category ‘cognitive artifacts.’”).

convicted partly on the basis of the worksheets that he used to keep track of his customers' orders.¹⁸

There are, in fact, two distinct senses in which cognitive imperfection operates to the benefit of legal information processing with respect to cognitive artifacts. Our cognitive limitations not only cause us to create these artifacts in the first place, but also make it difficult for us to keep track of them after they are created (not to mention their electronic or photostatic progeny). The same limitations that lead us to litter the world with notes and backups also make it difficult for us to effectively rid the world of their ever-multiplying mess.

B. Testimony

Testimony is credited, and rightly so, when it is consistent, detailed, and robust to antagonistic probing.¹⁹ Cognitive limitations imply that the task of

18. See *United States v. Stewart*, 323 F. Supp. 2d 606, 622-24 (S.D.N.Y. 2004) (citing to the Redacted Superseding Indictment of Martha Stewart). For a complete version of the Superseding Indictment, see *Superseding Indictment, United States v. Martha Stewart*, 323 F. Supp. 2d 606 app. A (S.D.N.Y. 2004) (No. S1 03, CR. 717), available at <http://news.lp.findlaw.com/hdocs/docs/mstewart/usmspb10504sind.pdf>. The indictment charges, *inter alia*, violations of 18 U.S.C. § 1621 (2000) (false declarations before grand jury or court, including ancillary proceedings) and violations of 18 U.S.C. § 1505 (2000) (obstruction of proceedings before departments, agencies, and committees). According to the indictment,

On December 27, 2001, at approximately 10:04 a.m. (EST), within minutes after being informed of the sale and attempted sale of the Waksal Shares, [Peter Bacanovic] called [Stewart]. After being told that [Stewart] was in transit and unavailable, [Bacanovic] left a message, memorialized by [Stewart's] assistant, that "Peter Bacanovic thinks ImClone is going to start trading downward."

Id. at 7. The indictment also states that one week before the phone message, Bacanovic

printed a "worksheet" that listed each of the stocks held by [Stewart] at Merrill Lynch, including ImClone [Bacanovic] made handwritten notes in blue ballpoint ink on the Worksheet concerning transactions and planned transactions in [Stewart's] account. . . . [Bacanovic] made no notes on the Worksheet regarding any purported decision to sell [Stewart's] ImClone shares at \$60 per share.

Id. at 16; see also *id.* at 18 (discussing the allegation that Bacanovic later penned in "@60").

19. For evidence of the efficacy of relying on consistency and detail, as opposed to demeanor, see Bella M. DePaulo et al., *Cues to Deception*, 129 PSYCHOL. BULL. 74 app. A, at 115-17 (2003); ALDERT VRIJ, *DETECTING LIES AND DECEIT: THE PSYCHOLOGY OF LYING AND THE IMPLICATIONS FOR PROFESSIONAL PRACTICE* xiii (2000).

In addition to substantiating the weakness of demeanor cues, the meta-analysis conducted by DePaulo and her colleagues provides support for the proposition that detail and consistency *are* effective cues. Of the twelve deception cues that were based on a reliable

presenting consistent, detailed, and robust testimony draws a much heavier cognitive load for the fabricating witness than for the witness who honestly recounts her actual memories. Were humans closer to cognitive perfection, this difference in cognitive loads would be substantially compressed. As things are, the significant difference in cognitive loads acts as a *wedge* that separates the truthful from the fabricating witness. Because of this difference in difficulty, witnesses are more likely to make and defend a self-serving claim if it is truthful. And even when *insincere* witnesses choose to make self-serving claims, doing so is more costly for them than for sincere witnesses. This additional cost operates as a kind of differential tax on the sort of undesirable out-of-court behavior that inspires such in-court insincerity.

Why precisely does presenting consistent, detailed, and robust testimony generally draw a heavier cognitive load for the insincere than for the sincere witness? Consider a sampling of the cognitive tasks of preparing and performing testimony for the insincere witness, on the one hand, and the sincere witness, on the other.

The first task of the insincere witness is to construct her storyline. In doing so, she is caught in the vice of consistency and detail. With regard to consistency, her story must be, first, *internally* consistent, despite the fact that each new detail added to increase verisimilitude will sprout new logical implications and it will generally be difficult to insure that the tendrils do not cross. Secondly, her story must be *externally* consistent. That is, she must weave her story around what the other side can establish about the world,

number of independent samples and resulted in large effect sizes, a substantial portion concerned cues that may be considered components of detail and consistency. Specifically, the "prediction that liars would provide fewer details than would truth tellers was clearly supported . . ." DePaulo, *supra* at 91. "[L]ike good novelists, truth tellers sometimes describe the settings of their stories; liars were somewhat less likely to do this . . . and they provided nonsignificantly fewer unusual details . . ." *Id.* at 96. Regarding consistency, "the lies made less sense than the truths. They were less plausible . . . and more likely to be internally discrepant . . ." *Id.* at 92.

For evidence that consistency and detail are important in the way testimony is *actually* used in evidentiary procedure, consider first that two of the five modes of impeachment generally recognized in evidence law directly implicate detail and consistency testing. Thus, a witness's prior inconsistent statements are liberally admitted to impeach her credibility. Furthermore, a witness may be impeached by contradicting her testimony with the prior statements of other witnesses, with documents or other tangible evidence, or by judicial notice.

Second, what empirical evidence there is on the frequency with which various modes of impeachment are employed in court suggests the importance of consistency testing. Professor H. Richard Uviller, for instance, finds in his survey of trial judges that prior inconsistent statements and contradiction are the most often used ways of determining credibility. See H. Richard Uviller, *Credence, Character, and the Rules of Evidence: Seeing Through the Liar's Tale*, 42 DUKE L.J. 776, 816-17, 827 (1993). In accord with this finding, other experienced commentators make bold statements (though often not specifically substantiated) about the frequent employment of these two impeachment devices. See, e.g., CHRISTOPHER B. MUELLER & LAIRD C. KIRKPATRICK, EVIDENCE UNDER THE RULES 663 (4th ed. 2000) (stating that impeachment by contradiction "goes on every day"); 4 JACK B. WEINSTEIN & MARGARET A. BERGER, WEINSTEIN'S FEDERAL EVIDENCE § 607.06[1] (Joseph M. McLaughlin ed., 2d ed. 2007) (stating that impeachment by contradiction is "a well-recognized technique").

despite the fact that she may not know what this consists of until it is too late and she runs headlong into the obstacle on deposition or at trial. With regard to detail, if the witness wants a “high score” for her testimonial performance, she cannot simply play it safe by leaving out specifics. That would be like leaving out the jumps in a figure-staking routine. The scoring is by execution *and* difficulty.

The insincere witness’s second task is to try to anticipate what will be covered on cross-examination. Having decided on a storyline, that is, the insincere witness is well-advised to attempt to anticipate the spurs off that storyline that her opponent might attempt to explore. This is hard enough in the first instance. But note that the witness faces a daunting multi-level regress of question and answer. In addition to the questions that spring from her storyline, she must also try to anticipate the second order questions that spring from her answers to such questions, as well as the third order questions that spring from her answers to second order questions, et cetera. The relevant contingencies grow exponentially, and this renders completing the task virtually impossible. Even world-class chess players can only look a few moves ahead in the game. The amateur witness probably has a much harder time plotting out the question and answer tree of cross-examination, whose branches are both more numerous and harder to discern.

Given that the insincere witness will not be able to anticipate every contingency on cross, part of the cognitive task of effectively testifying consists in handling *unanticipated* questions. Preparing consistent, detailed, and robust testimony over the course of several months, as just discussed, is hard enough. Constructing testimony on the fly is considerably more difficult. Faced with an unanticipated question, the witness must spontaneously answer the question in a way that is not only externally consistent with whatever the other side knows and can prove about the world, but also internally consistent with both her planned story-line and the spurs off that story-line that she *has* planned for. If meeting all of these requirements on the spot it is too difficult, she can always change her planned story. But that is no easy out. In making the alteration she must know what portions of her planned story she has already related. Further, going forward, she must remember how her story has changed. And these are just the difficulties she encounters when presented with her *first* unanticipated question. When presented with her *nth* unanticipated question, she faces not only these same problems, but also the additional difficulty of being consistent with the answers she provided to past unanticipated questions.

Are the cognitive tasks faced by the *sincere* witness really any less difficult? Presenting consistent, detailed, and robust testimony is not easy, in any absolute sense, for the truth-telling witness either. Memory is not a shelf from which we simply pull down knowledge and experience. Recall can be

challenging. And cross-examination is daunting and dangerous even for those who have nothing to hide.

Nevertheless, the truth-teller's tasks are *relatively* easy as compared to those of the fabricator.²⁰ Consistently, specifically, and robustly recalling an event or condition that one actually remembers is no cakewalk.²¹ But it is also not the fire walk of consistently, specifically, and robustly relating an *invented* event or condition. Certainly, the sincere witness has much to keep straight in her head. But no more, and probably much less, than the insincere witness—who must have at the ready her storyline, her contingent answering plans, and a general knowledge of the external world. Unlike the fabricating witness, the sincere witness is aided in providing consistent testimony by the fact that what she is relating did actually happen, and is therefore in accord with the laws of physics and chemistry almost by definition. If, for example, the witness really was in one place at one time and another place somewhat later, then it is

20. See generally George Mandler, *Hypermnesia, Incubation, and Mind Popping: On Remembering Without Really Trying*, in ATTENTION & PERFORMANCE XV: CONSCIOUS & NONCONSCIOUS INFORMATION PROCESSING 3 (Carlo Umiltà & Morris Moscovitch eds., 1994) (reviewing literature on hypermnesia and related phenomena); *Fanelli v. U.S. Gypsum Co.*, 141 F.2d 216, 217 (2d Cir. 1944) (Frank, J.) ("Common experience, the work of Proust and other keenly observant literary men, and recondite psychological research, all teach us that memory of things long past can be accurately restored in all sorts of ways."); *Baker v. State*, 371 A.2d 699, 705 n.11 (Md. Ct. Spec. App. 1977):

Marcel Proust, in his monumental epic *In Remembrance of Things Past*, sat, as a middleaged man, sipping a cup of lime-flavored tea and eating a [madeleine], a small French pastry. Through both media, two long-forgotten tastes from childhood were reawakened. By association, long forgotten memories from the same period of childhood came welling and surging back. Once those floodgates of recall were opened, seven volumes followed.

1 MCCORMICK ON EVIDENCE § 9 (John W. Strong ed., 4th ed. 1992):

It is clear from everyday observation that the latent memory of an experience may be revived by an image seen, or a statement read or heard The recall of any part of a past experience tends to bring with it the other parts that were in the same field of awareness The effect of a reminder, encountered in reading a newspaper or in the conversation of a friend, which gives us the sensation of recognizing as familiar some happening which we had forgotten, and prompts our memory to bring back associated experiences, is a frequently encountered process.

See also Mandler, *supra* at 3-4 ("In all of these cases, access to some mental content is increased with little deliberate effort, such as a delay or the mere request for another recall; the individual is not actually trying to improve on the performance.")

21. See generally Daniel L. Schacter, Kenneth A. Norman & Wilma Koutstaal, *The Cognitive Neuroscience of Constructive Memory*, 49 ANN. REV. PSYCHOL. 289 (1998) (reviewing recent research on constructive processes that distort memory); *see also id.* at 290 ("Contemporary cognitive psychologists have been especially concerned with constructive aspects of memory")

indeed possible to get from the first place to the second in that amount of time.

V. IMPLICATIONS FOR RULES GOVERNING TESTIMONY

Examining the differential effect of specific evidentiary rules and practices—on sincere versus insincere witnesses, and on witnesses versus questioners—leads to several useful insights concerning the legal doctrine surrounding testimony.

We generally require that witnesses testify from memory.²² This is such a fundamental feature of our system that it often goes unnoticed. Yet it is worth asking why we impose this requirement. In the sole light of the existing literature on eyewitness fallibility, which focuses almost exclusively on sincere witnesses, this is a puzzling requirement. If witnesses are sincere but fallible, perhaps we ought to encourage them to write their testimony down ahead of time, closer to the event or condition which they are called on to describe. We could then simply ask them to read to the fact finder what they had written earlier. Or perhaps they could simply submit the writing in lieu of taking the stand.

If, however, we depart from the existing literature on witnesses and explicitly take account of the possibility that not all witnesses are sincere, one possible reason for our apparently Luddite preference for memorized testimony begins to take shape. Although requiring testimony from memory makes consistent, detailed, and robust testimony harder to bring off for all witnesses, sincere and insincere, it makes such testimony *much* harder for the

22. This requirement is implicitly enforced by limits placed on both the witness's use of notes while testifying and the questioner's use of leading questions on direct examination. In the federal system, Federal Rule of Evidence 612 implicitly allows a witness to consult written records to refresh memory while testifying. Case law clarifies that such writings may be consulted only for the purpose of refreshing an exhausted memory and that refreshed memory, and not the medium, must be the true source of further testimony. *See* *United States v. Weller*, 238 F.3d 1215, 1221 (10th Cir. 2001) (noting that "the court has the discretion to withhold any writing from a witness where the judge believes that the document will be a source of direct testimony rather than the key to refreshing the witness' independent recollection"); *Thompson v. United States*, 342 F.2d 137, 139 (5th Cir. 1965) (noting requirements that witness's memory be exhausted and that writing refresh it); *NLRB v. Fed. Dairy Co.*, 297 F.2d 487, 488-89 (1st Cir. 1962) ("The witness should first testify . . . that the paper does in fact have that effect [i.e., of refreshing memory and] . . . that his recollection is exhausted. Prerequisites [in] prompting a witness, such as exhaustion of memory, are so axiomatic that they are rarely referred to except in passing.") (citations omitted).

Federal Rule of Evidence 611(c) stipulates that leading questions-- questions that suggest their answer—"should not be used on the direct examination of a witness" (though there are exceptions). Direct examination is consequently an exercise in recall, not merely recognition. Thus, instead of asking the passenger witness, "And then you saw the defendant's car weave into oncoming traffic, is that right?" the plaintiff's lawyers must ask something on the order of, "And then what happened?"

memory fabricator than for the memory retriever. There is a sense in which memorization is, by definition, already accomplished for the memory retriever. Not so for the fabricator, who, as discussed, must commit to memory not only her fabricated story-line, and not only her answers to anticipated questions, but also, on the spot as she goes along, her answers to unanticipated questions.

Of course, we do on occasion bend the general requirement that witnesses testify from memory.²³ Yet in the relatively rare event that witnesses are permitted to refer to notes to refresh their memories while testifying, we generally require them to turn over these notes to opposing counsel (even if otherwise privileged or protected).²⁴ Perhaps the reason for this disclosure requirement derives as well from its differential impact on sincere and insincere witnesses. The truthful memory retriever’s notes and memory aides would probably corroborate her testimony. By contrast, the memory fabricator’s notes and memory aides—or at least what notes and aids the fabricator would *like* to use, and might well use, but for this rule—would probably tend to be revealing of her fabrication.

In some cases, the law of evidence requires the disclosure even of documents used not while testifying, but *in preparation for testimony*.²⁵ Yet no such requirement pertains to *oral* preparation and coaching.²⁶ Perhaps the

23. See FED. R. EVID. 612.

24. See *James Julian, Inc. v. Raytheon Co.*, 93 F.R.D. 138, 144-45 (D. Del. 1982); see also *Berkey Photo, Inc. v. Eastman Kodak Co.*, 74 F.R.D. 613 (S.D.N.Y. 1977) (stating that if an attorney shows work product to a lay or expert witness prior to a deposition, then the work product becomes discoverable) (dictum). WEINSTEIN & BERGER, *supra* note 19, § 612.06[2]:

When a witness has refreshed his or her recollection with privileged materials *before* testifying, most courts . . . appear to hold that use of the material constitutes waiver of the privilege. Likewise, when a witness consults a writing embodying his or her own communication to counsel, and the testimony discloses a significant part of the communication, most courts find that the attorney-client privilege has been waived.

Not all courts have taken this “strict waiver” approach. See *id.*, § 612.05, for a discussion of alternative approaches, including the “balancing approach” adopted by some courts.

25. See FED. R. EVID. 612. Such disclosures must be in the “interests of justice.” *James Julian, Inc.*, 93 F.R.D. at 144.

26. The disclosure provisions in Federal Rule of Evidence 612 apply only to writings, not to the content of oral preparation. WEINSTEIN & BERGER, *supra* note 19, § 612.02[3]. Oral preparation generally retains opinion work product protection. *Ford v. Philips Elecs. Instruments Co.*, 82 F.R.D. 359, 361 (E.D. Pa. 1979) (establishing guidelines for the questioning of a nonexpert deponent regarding preparatory conversations with counsel, including, *inter alia*, that “[s]uch inquiry may not . . . include questions that tend to elicit the specific questions posed to the witness . . . , the general line of inquiry pursued . . . , the facts to which . . . counsel appeared to attach significance, or any other matter that reveals . . . counsel’s mental impressions”).

If the deponent is counsel’s client, such conversations will also be protected by attorney-client privilege. However, courts have held that conversations between counsel and an expert witness are not protected. See, e.g., *Intermedics, Inc. v. Ventritex, Inc.*, 139 F.R.D. 384, 387 (N.D. Cal. 1991):

differential efficacy of oral preparation across sincere and insincere witnesses also helps to explain this difference. Oral preparation is often sufficient to find “retrieval paths” to actual memories—that is, it is often sufficient to remind. When used for actual memory retrieval, oral preparation is leveraged against the existence of actual memories, and often little is required to produce a Proustian blossom of remembrance. Purely oral preparation is, on the other hand, probably insufficient for purposes of graphing out a consistent and detailed story along with all conceivable interrogation contingencies.

These restrictions (including their limited exceptions) regarding the witness’s use of cognitive artifacts—both in the preparation for and the performance of testimony—stand in marked contrast to the rules surrounding the use of cognitive artifacts by *the questioner*. While the witness’s cognitive artifacts must often be turned over to the other side, the questioner’s are *especially protected* as work product.

Consider how this plays out in one particularly telling scenario: expert testimony. A trial expert, Mankin, mentions the Millwater deal on deposition. The examining attorney consults her private notes regarding this deal. Better yet, following the trend in modern litigation, she turns to her notebook computer, currently running a software program like Summation and Trial Director; she types in “Millwater w/10 of Mankin” and thus gains access to any prior recorded connection between Mankin and the Millwater deal, including any letters, paper, books or memoranda she wrote, any references in other testimony by other deponents in this and earlier cases, or any similar prior statements by Mankin himself. The attorney who hired Mankin most likely does not even bother to ask to see the questioning attorney’s notes or computer files, a largely futile request under the work product doctrine. Mankin himself, on the other hand, is required to either bring to the deposition, or submit prior to it, not only his expert report, and not only all rough drafts of his report, but also the very copy of each article he may have read in preparing his report, so that the opposing side can check his margin notes for compromising “uh oh’s” and exclamation points.²⁷

Why this striking discrepancy in the treatment of cognitive artifacts across questioner and questioned? Perhaps the discrepancy in treatment reflects an implicit recognition that all we have to exploit the limits of the imperfect mind are other imperfect minds. Perhaps the difference in treatment is, accordingly,

[A]bsent an extraordinary showing of unfairness that goes well beyond the interests generally protected by the work product doctrine, written and oral communications from a lawyer to an expert that are related to matters about which the expert will offer testimony are discoverable, even when those communications otherwise would be deemed opinion work product.

27. See FED. R. EVID. 705; FED. R. CIV. P. 26(a)(2)(B).

an attempt to tilt the playing field and so to mitigate the imperfections of the questioner while exacerbating the imperfections of the questioned.

Lastly, evidence scholarship often says that the law has a strong preference for "live testimony." Such a preference is particularly salient in recent Supreme Court Confrontation Clause jurisprudence.²⁸ But why precisely is "live" testimony so important? Indeed, what does the word "live" mean in this context? Is a deposition upon written questions "live"? Is testimony "live" if, like a film that is created scene by scene over the course of many months, it proceeds at a pace of one question per day?

Conceiving of testimony in terms of the relative exploitation of the cognitive limits of the insincere helps to add meaning to the word "live," and in doing so helps to explain why it is such an important quality. There are at least three separate senses of the word "live" that implicate the law's exploitation of cognitive shortcomings.

First, as already discussed, the special difficulty for the fabricating witness of maintaining consistency and detail when facing unanticipated questions is crucial to insuring that successful testimony is a more difficult enterprise for the insincere witness. The possibility that questions will be unanticipated is one sense in which testimony (whether in court or on deposition) may be, and

28. Crawford v. Washington, 541 U.S. 36, 43 (2004) (citations omitted):

The right to confront one's accusers is a concept that dates back to Roman times. The founding generation's immediate source of the concept, however, was the common law. English common law has long differed from continental civil law in regard to the manner in which witnesses give testimony in criminal trials. The common-law tradition is one of live testimony in court subject to adversarial testing, while the civil law condones examination in private by judicial officers.

Davis v. Washington, 547 U.S. 813, 828 (2006).

We conclude from all this that the circumstances of McCottry's interrogation objectively indicate its primary purpose was to enable police assistance to meet an ongoing emergency. She simply was not acting as a *witness*; she was not *testifying*. What she said was not "a weaker substitute for live testimony" at trial . . .

The *Davis* Court also stated:

Both declarants were actively separated from the defendant—officers forcibly prevented Hershel from participating in the interrogation. Both statements deliberately recounted, in response to police questioning, how potentially criminal past events began and progressed. And both took place some time after the events described were over. Such statements under official interrogation are an obvious substitute for live testimony, because they do precisely *what a witness does* on direct examination; they are inherently testimonial.

Id. at 830.

is, “live.” The word “live” here stands for the phrase “potentially unrehearsed for the answerer.”

A second component of testimony’s “liveness” might be called “closed-loop questioning”—a term borrowed from engineering.²⁹ The questioner may in real time adjust the *n*th question based on the answers given to questions 1 through *n*-1. This aspect of liveness is different from that just considered: questions can be unanticipated by the answerer even if the questioner had to submit them to a third party ahead of time.

The ability to adjust questions in response to past answers serves to exploit the imperfections of the fabricating witness, who is thus unable to play the odds, like the student who hopes that the topic she feels uneasy about will not appear on the test. If the witness is shaky on one particular facet of her story, she cannot rely on the possibility that this will not be “on the test.” The test will be adjusted to focus in on this facet once her shakiness becomes apparent.

Note also that at the same time that closed-loop questioning hurts the cognitive limited witness, it also helps her cognitively limited questioner. The questioner, unlike the witness, does not have to think of all contingencies ahead of time. If contingencies arise that she has not anticipated, she can adjust her line of questioning on the spot. With regard to closed-loop questioning, the term “live” then means “allowing for instantaneous follow up.”

The third component of testimony’s “liveness” concerns the operation of fatigue. One of the chief flaws of the human information processor is that its battery is quick to run down, at which point its limitations are greatly exacerbated.³⁰ Fatigue has a greater effect on the operation of working memory than on retrieval of long-term memory, and this serves to further separate the fabricator from the truth teller, the former needing working memory more than the latter. (Remembering the antecedents for “former” and “latter” is an example of a task that would be handled by working memory, and to the extent that these were unclear in the last sentence, the

29. ROBERT N. BATESON, INTRODUCTION TO CONTROL SYSTEM TECHNOLOGY 8 (7th ed. 2002).

30. See, e.g., Alan Hobbs & Ann Williamson, *Associations Between Errors and Contributing Factors in Aircraft Maintenance*, 45 HUM. FACTORS 186, 196 (2003) (demonstrating a correlation between fatigue and cognitive error in aircraft maintenance); Dennis H. Holding, *Fatigue, in STRESS AND FATIGUE IN HUMAN PERFORMANCE* 145 (Robert Hockey ed., 1983) (reviewing the effects of fatigue on cognition). According to Holding, “[i]t appears that the visual and auditory tasks showing declines in sensitivity are those which present a high event rate, with stimuli occurring every 2 or 3 seconds, and which demand an ability to make rapid perceptual comparisons involving memory.” *Id.* at 152. Also, Holding reviewed the “Cambridge Cockpit” studies and noted that “[a]ttention began to be reserved for items of central importance, like the course heading and speed indicators, while peripheral items like the fuel gauge were neglected.” *Id.* In reviewing the COPE tests, Holding noted that “[w]e can be virtually certain that, other things being equal, fatigued subjects will choose to exert less effort” and that this implies “a tendency towards carelessness or ‘cutting corners.’” *Id.* at 159.

reader may speculate whether this is due to the onset of fatigue in reading this essay.) Three hours in to the deposition, the witness faces an unanticipated question and, already tired, must construct her answer and commit it to memory, all on the fly. Even worse, three hours after *that* she faces another related question whose answer might conflict in complicated ways with her earlier answer.

With regard to fatigue, then, “live” implies a lack of intermittency for the witness, the way theater performance is “live” and film performance is not. This aspect of liveness differs from the two just considered: unanticipated, spontaneously adjusted questions might well be spaced at lengthy intervals.

The operation of fatigue also implicates the tilt of the playing field as between questioner and witness. While the witness is largely on her own, she often faces a tag team of lawyers—one who is currently questioning her, one who is running the software, one who is out playing gopher to follow up on new material, and one who is resting on the cot in the room next door and will soon be refreshed and ready to take over the questioning.

VI. CONCLUSION

The foibles of sincere witness memory and impartial fact-finder decision-making have been ably documented. And the pages of law reviews are brimming with the fascinating dialogue among lawyer-psychologists, lawyer-economists, and litigators about whether individual rationality is a valid working hypothesis for legal analysis. Largely unexamined, however, is an equally fundamental, yet fundamentally distinct, point about the implications of cognitive imperfection for evidentiary procedure and law in general. True, the law of evidence in some respects suffers from and is forced to adapt to human cognitive imperfections. But it also, in other important respects, relies upon and exploits such imperfections. Testimony, and specifically cross-examination, are major instances where exploitation and reliance are at least as important as constraint and adaptation. Recognizing and further investigating the ways in which the institution of testimony makes use of cognitive limitations may help carry evidence scholarship a step closer to finally answering Wigmore’s begged question regarding cross-examination. Great engine it may be, but what precisely makes it run?