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Repeat Play Evidence: Jack Weinstein, "Pedagogical Devices," Technology, and Evidence

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REPEAT PLAY EVIDENCE: JACK WEINSTEIN, "PEDAGOGICAL DEVICES," TECHNOLOGY, AND EVIDENCE

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The literary critic Raymond Williams published his influential volume *Keywords: A Vocabulary of Culture and Society*[1] in 1976, describing important words that captured key, complex, and often multivalent ideas about our shared culture and lived experience. These "keywords" were capacious and vexatious, meaningful and multifaceted. They inevitably had multiple meanings and sometimes-contradictory resonances. From "work" to "bureaucracy" to "modern" to "unconscious" to "capitalism"—these were words that mattered, powerful words that reflected the critical questions and key ideas that people, at the time of Williams' writing, grappled with, argued over, and found both puzzling and inspiring. Perhaps surprisingly, though several of his words related to politics, not a single one of the words Williams included in either his original or in his 1983 revised edition was explicitly connected to the law.[2]

As I began to consider this Symposium, I found myself thinking about "keywords" that we might meaningfully associate with the extraordinary Judge Jack Weinstein, in whose honor this Symposium was held. I am, of course, using "keywords" in a somewhat different sense from Raymond Williams, for he applied them not to an individual but to our collective culture. But I nonetheless began to ask myself what

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1. RAYMOND WILLIAMS, KEYWORDS: A VOCABULARY OF CULTURE AND SOCIETY (1976). Williams also published an expanded edition with a number of additional words in 1983.

2. Williams' keywords included, for example, "bureaucracy," *id.* at 49, "class," *id.* at 60, "democracy," *id.* at 93, "equality," *id.* at 117, "expert," *id.* at 129, "liberal," *id.* at 179, and "monopoly," *id.* at 209, among others. He did not include law, legality, constitution, evidence, justice, judicial, legislative, interpretation, or any other word that had particularly legal connotations. *See id.*

keywords should be associated with Judge Jack Weinstein. While there are, to be sure, many possibilities, I kept returning to four particular words. They were (1) innovation; (2) aggregation; (3) technology; and (4) justice. I hardly need to describe why each of these keywords applies to Judge Weinstein; this entire Issue—not to mention Judge Weinstein's extraordinary career—speaks to that in spades.

Judge Weinstein has never been afraid of being unconventional in the interest of justice, and his extraordinary willingness to innovate is one of the key themes of Professor Jeffrey Morris's thoughtful biography of him.[3] Would anyone disagree that he has often pushed the envelope procedurally, indeed sometimes well beyond traditionalists' comfort zones? One of his former colleagues once quipped, surely not more than half in jest, that indeed, Judge Weinstein "never saw an innovation he didn't like."[4] Judge Weinstein's innovations were often directed at trying to achieve reasonable justice for substantial groups of people harmed in a similar way, rather than attaining superior justice for a mere fraction. Many of his innovations relate to class actions, quasi-class actions, and mass torts—methods for, as his biographer puts it, "engineering big solutions to big problems"[5]—hence, aggregation is another appropriate keyword. In addition, from advocating televised judicial proceedings to welcoming computerized methods for retrieving evidence, Judge Weinstein has embraced technological innovation alongside procedural innovation.

Drawing, then, on these keywords, I aim to sketch out in this Essay two possible *innovations* with respect to technology and evidence that admittedly push the envelope, likely beyond the comfort zone of many in the field of evidence law, and both of which seem to me to fall within a Weinsteinian paradigm, broadly conceived. Both possible innovations involve leveraging *technology* to use information in unconventional, *aggregative* ways that go beyond their traditional methods of use within evidence law—for the purpose, of course, of aspiring to better achieve *justice*.

The first idea is to require that computer animations and simulations used as evidence be able to be "cross-examined," so to speak, by

3. *See generally* JEFFREY B. MORRIS, LEADERSHIP ON THE FEDERAL BENCH: THE CRAFT AND ACTIVISM OF JACK WEINSTEIN (2011). Morris calls Judge Weinstein "one of the nation's most innovative judges of the past fifty years," *id.* at 3, and describes how his entire career has "been marked by innovation and experimentation," *id.* at 105. The only quibble might be with the modifier "one of" before "most innovative," as it is difficult to think of who might equal him in this regard.

4. *Id.* at 105 (citing Judge Joseph McLaughlin), *quoted in* James L. Oakes, *Jack Weinstein and His Love–Hate Relationship with the Court of Appeals*, 97 COLUM. L. REV. 1951, 1951 (1997).

5. *Id.* at 321.

the opposing party, by insisting that they, as a precondition to admissibility, be constructed so that their key evidence-based inputs are modifiable. The opposing party could therefore test the robustness of the simulation by altering the factual assumptions on which it was built and seeing how changing these inputs affects the outputs.

The second idea is to encourage a well-respected nonpartisan organization to produce made-in-advance evidentiary modules, in which leading experts testify (and are cross-examined) about kinds of evidence regularly introduced at trial, such as psychological knowledge about eyewitness identification and line-up procedures, or expert evidence about risk factors and warning signs for false confessions. These kinds of evidence are frequently introduced by defendants in criminal trials, but the proffered evidence is mostly not actually case specific; that is, the core scientific information and assessments offered by the testifying experts largely do not change from trial to trial. Why, then, should the only way to introduce the testimony be in a one-off, case-by-case manner with a live expert (a method oftentimes prohibitively expensive)? Why not instead explore permitting defendants to introduce relevant pregenerated modules and show this prerecorded testimony to the jury? The prosecution, in turn, could make use of the prerecorded cross-examination, but would not be allowed to subpoena the actual witness who appears on camera, though would remain free to call a live witness of its own if it wanted to.

I certainly do not know if Judge Weinstein would embrace either of my specific ideas, but it is, I think, fair to say that the core idea that animates both is very much Weinsteinian. This core idea is that we should ask, in a searching way and without fear of novelty, how new technological possibilities might usefully be harnessed by the legal system to improve both the quality of evidence presented at trial and juror understanding. We should, to be sure, as Judge Weinstein himself certainly recognizes, make these inquiries thoughtfully and with nuance, not as technophiles eager to embrace razzle-dazzle or innovation as an end in itself, but with a sense of genuine openness to the ways that technologies might transform what is possible or practical within the trial process. We should search, in particular, for ways in which technology might improve the quality and presentation of information at trial, or make it fairer, or help to level the playing field when parties' resource differentials are radically disparate, especially in criminal cases.[6]

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6. In the year 2000, more than 80% of felony defendants charged with crimes in the country's 75 largest counties used publicly-appointed counsel, 68.3% public defenders and 13.7% other assigned counsel. CAROLINE WOLF HARLOW, U.S. DEP'T OF JUSTICE, DEFENSE COUNSEL IN

My two suggestions both fall under the umbrella of what I am calling "repeat play evidence."[7] By this I mean evidence that is introduced into trial *more than once*, repeated, either by different parties in the same case, or by different parties in altogether different cases. Just as a "repeat play" game within game theory is an interaction with more than one iteration, repeat play evidence is used more than a single time, either by opposing parties in the same case (albeit in somewhat modified form by each), or by entirely different parties in unconnected cases, but who face, fundamentally, the same underlying issues. Moreover, the two kinds of evidence I propose as forms of repeat play evidence have in common that they are both not only repeated but, quite literally, "played" for the factfinder. In both instances, the factfinder watches the display of evidence created elsewhere, out of court, and now displayed before them at trial.

The two kinds of repeat play testimony I will describe have important structural differences in the degree and way that they are repeated across trials. One sort of repeat play evidence, prerecorded expert testimony about social science issues, would permit different parties in entirely unrelated cases to use portions of the very *same* evidence. This evidence would be repeat play in the sense that the very same module could literally be inserted in a whole variety of different trials when appropriate. Premade, canned testimony (consisting of both direct and cross-examination) about, say, the limits to

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CRIMINAL CASES (2000), *available at* http://www.bjs.gov/content/pub/pdf/dccc.pdf. In federal courts, about two-thirds of defendants used either a federal defender or a panel attorney. *Id.* While variations in funding among public defenders offices (and prosecutors) of course vary, it is fair to say that in general, prosecutors are better funded, often dramatically so. Though parity of resources is the ideal, it is often not the reality. One study examining this question in Tennessee, for example, found that total funding for the prosecution of indigent defendants was 2.5 times that available for indigent defense, without even factoring in the prosecution's access to a variety of federal, state, county, and local services that the defense lacks. *See* SPANGENBERG GRP., RESOURCES OF THE PROSECUTION AND INDIGENT DEFENSE FUNCTIONS IN TENNESSEE 11, 16 (2007), *available at* http://www.americanbar.org/content/dam/aba/administrative/legal_aid_indigent_defendants/ls_sclaid_def_tn_comp_study_final_7_30_07.authcheckdam.pdf. Moreover, assigned counsel (private attorneys assigned to represent indigent defendants) are often especially poorly compensated. *See, e.g.*, NAT'L ASS'N OF CRIMINAL DEFENSE LAWYERS, *Part 1—Rationing Justice: The Underfunding of Assigned Counsel Systems*, *in* GIDEON AT 50: A THREE-PART EXAMINATION OF INDIGENT DEFENSE IN AMERICA 12 (2013), *available at* http://www.nacdl.org/reports/gideonat50/rationingjustice/%E2%80%8E. Of course, resource differentials can be severe in civil cases too, but at least both contingent fee mechanisms and the (to be sure, diminishing) possibilities for case aggregation provide partial correctives.

7. The only prior use I have found for this particular phrase via either Google or HeinOnline is my own: I used it once, in passing, in Jennifer L. Mnookin, *Expert Evidence, Partisanship, and Epistemic Competence*, 73 BROOK. L. REV. 1009, 1032 (2008). However, I used it there to mean something different: to reference forms of evidence about which a judge might develop a degree of expertise due to regular and repeat exposure.

cross-racial eyewitness identification, or describing the empirical evidence showing a very limited relationship between confidence and accuracy for eyewitnesses, could be introduced by defendants on these repeat play questions that arise in virtually identical form in a great many trials. The other kind of repeat play evidence would be more case specific; it would permit opposing parties in the same case to use modified versions of the same computer-generated animation or simulation. This evidence would be repeat play in that the factfinder would see evidence generated by the same simulation, played again, but with some of the specific inputs—and hence potentially its output—modified, based on the parties' diverging factual assumptions or competing evidentiary claims about matters relevant to what the simulation shows.

I will first provide an overview of each kind of evidence, and then return to each in somewhat more detail. However, my intention here is not to delve deeply into either the practical or doctrinal difficulties that would, I recognize, attend efforts to use each of these innovations but rather, I aim to set them out together as possibilities worthy of additional, thoughtful consideration. While I do think those doctrinal issues are likely soluble were judges and attorneys motivated to find ways to do so, this Essay is not designed to take on the details of that challenge. For the moment, instead, I offer both ideas as "objects to think with"[8]; as ideas to spark our collective evidentiary imagination. These ideas can, I hope, encourage us to think expansively about how we might improve the quality of information to which juries have access, and how we might dislodge or denaturalize certain assumptions about how we produce and make use of evidence and produce legal knowledge in the interest of enhancing the fairness and accuracy of our adversarial process.

I. Two Kinds of Repeat Play Evidence

A. Cross-Examining Computer-Generated Evidence

The first kind of repeat play evidence involves visual, computer-based simulations and animations that are displayed to the jury. While courts have varied in their receptivity to such simulations as evidence, they are often permitted so long as they meet other evidentiary requirements (e.g., they must be relevant under Rule 401;[9] they cannot be substantially more prejudicial than probative under Rule

8. On the notion of "objects to think with," see, for example, Seymour Papert, Mindstorms: Children, Computers, and Powerful Ideas 11 (2d ed. 1993).

9. Fed. R. Evid. 401.

403;[10] if they are framed as something beyond "illutrative evidence," they must meet the validity and reliability strictures of *Daubert*[11] and Rule 702;[12] and they must be authenticated under Rule 901).[13] Sometimes animations or simulations are made using preexisting software packages;[14] in other instances, the simulation software itself might be built for the specific case.

Speaking broadly, these simulations and animations also raise two significant concerns. First, some worry that they will have too much cognitive sway with the factfinder.[15] As a form of visual storytelling, they may provide an especially vivid visual depiction of one side's version of key events. Dubious or controverted assumptions on which they depend may be buried deep within the computer code, or even if mentioned, may not be fully taken on board by the factfinder, who watches a compelling and persuasive visual depiction of one side's version of the case. Second, and relatedly, when resource disparities across parties are significant, this first concern is dramatically heightened because it may well be that only one party has the resources to produce—and "produce" is a word that I use advisedly—such an evidentiary display. Some courts and commentators have viewed that resource disparity as a source of such serious concern that it ought, in some circumstances, to warrant exclusion of the evidence even if would otherwise be admissible under the Federal Rules or their state equivalents.[16]

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10. FED. R. EVID. 403.

11. Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579 (1993).

12. FED. R. EVID. 702.

13. FED. R. EVID. 901. For a leading case analyzing the issues raised by the admissibility of computer-generated animations, see *Commonwealth v. Serge*, 896 A.2d 1170 (Pa. 2006).

14. For examples of software packages for car accident reconstructions and diagramming accidents, see *Faro HD*, ARAS 360, http://www.aras360.com/products/software/aras360-hd.html (last visited Apr. 28, 2015); *EdgeFX*, VISUAL STATEMENT, http://visualstatement.com/en/Products/EdgeFX.aspx (last visited Apr. 28, 2015); and *Crash Zone—Version 10*, FARO, http://www.cadzone.com/the-crash-zone (last visited Apr. 28, 2015).

15. For the argument that courts need to be attentive to the way that visual evidence may play on cognitive biases or provoke stronger-than-warranted affective responses, see Lucille A. Jewel, *Through a Glass Darkly: Using Brain Science and Visual Rhetoric To Gain a Professional Perspective on Visual Advocacy*, 19 S. CAL. INTERDISC. L.J. 237 (2010). The unease about the perhaps excessive power of visual evidence has a long history; indeed, as long ago as 1898, some judges expressed concern about how staged photographs, made by the party to depict its version of events (and in a sense the very earliest precursors of animations as evidence), could risk being too vivid and persuasive, and lead factfinders too quickly to believe these "tableaux vivants," brought "vividly before the mind's eye of the jury" in "striking and captivating fashion." Fore v. State, 23 So. 710, 712 (Miss. 1898). *See generally* Jennifer L. Mnookin, *The Image of Truth: Photographic Evidence and the Power of Analogy*, 10 YALE J.L. & HUMAN. 1 (1998).

16. This concern was raised, for example, in *Serge* and found by the court to be a legitimate criterion for courts to consider in determining whether to admit a computer generated animation of the crime scene into evidence. 896 A.2d at 1184–85. The concurrence in the case went so far

But perhaps there is a better way to think about this issue. What if, in order to be admissible as evidence, simulations and animations had to be produced in such a way that the key assumptions and inputs could be modified for use by the opposing party, and the simulation rerun or the animation reproduced with the altered inputs? For some kinds of simulation packages, like premade accident-reconstruction software, it may be technologically reasonably straightforward to permit the opposing party to make modifications to certain predefined inputs. In other instances, it may, I grant, be far more complex to build a simulation in a way that permits ongoing modification of the key variables, and with animations as well, the feasibility of easily modifying the assumptions built into the depiction may vary. In addition, deciding precisely which variables need to be modifiable, and to what extent, could well raise its own practical challenges. But the key idea is that courts should have the power to require simulations (and perhaps animations too) to be modifiable along key axes as a precondition for admissibility. This would permit the opposing party to be able to reveal directly to the factfinder the power of specific assumptions in generating what is shown, and would go a considerable ways toward ameliorating the difficulties raised by resource disparities, at least for this specific kind of evidence.

In a particular car accident, for example, there may be no disagreement about road conditions or the weather, but conflicting admissible claims about the speed of a vehicle at the moment of impact. If one party depicts the accident by introducing an animation based on its evidence about the speed, the question becomes how would the animation visibly change if the assumption about the vehicle's speed were altered. Testing the assumptions of the animation or the simulation to see how robust it is, by permitting the opposing party to replace given assumptions with alternative ones (all of which must, of course, for both sides, be reasonable inferences from admissible evidence) is, conceptually, akin to a form of cross-examination of the simulation itself. To be sure, we do not normally imagine that ma-

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as to declare the "wisest course" exclusion if the defendant is not situated as to be able to produce an equivalent animation of its own, *id.* at 1190 (Castille, J., concurring); the majority opinion, by contrast, saw it only as one factor deserving of consideration among many in its evaluation of the relationship between probative value and prejudice, *id.* at 1185 (majority opinion). For the argument that the Federal Rules of Evidence do not provide for legitimate exclusion of computer-generated animations for reasons relating to the resource disparity between the parties, see generally Edward J. Imwinkelried, *Impoverishing the Trier of Fact: Excluding the Proponent's Expert Testimony due to the Opponent's Inability To Afford Rebuttal Evidence*, 40 CONN. L. REV. 317 (2007).

chine-generated evidence requires cross-examination, but it may be time to begin thinking in those terms.[17]

In a different context, we already permit cross-examination of a precisely parallel sort. In the nineteenth century, the consummate (though widely criticized) method for examining expert witnesses was via the hypothetical question. Based on facts presented in evidence, the attorney would ask the expert, in essence, "Assuming A, B, C, and X," what would you conclude about the cause of death, or the sanity of the defendant, or whatever question happened to be at issue.[18] On cross-examination, it was (and indeed remains, though hypothetical questions are no longer such a typical modus operandi for expert testimony) permissible for opposing counsel to change the hypothetical, and to inquire whether the expert's opinion would change if some of the foundational facts and assumptions were also modified. Computer-simulation evidence operates, structurally, much like a hypothetical question, where an underlying model conjoins with case-specific facts to produce, say, a depiction of an industrial accident, or a bullet's trajectory, or a car crash, or the environmental diffusion of a contaminant. Just as the opposing party may reframe some of the evidentiary inputs to an expert's hypothetical on cross-examination, to-

17. Justice Goodwin Liu makes a somewhat similar point in the context of the Confrontation Clause, where the conventional understanding is that machine-generated evidence cannot be hearsay, and hence does not implicate the Constitution. He writes,

> The United States Supreme Court has not decided whether machine-generated results invariably lie beyond the reach of the confrontation clause, and I express no ultimate view on this issue here. I simply note that as a result of ever more powerful technologies, our justice system has increasingly relied on ex parte computerized determinations of critical facts in criminal proceedings—determinations once made by human beings. A crime lab's reliance on gas chromatography may be a marked improvement over less accurate or more subjective methods of determining blood-alcohol levels. The allure of such technology is its infallibility, its precision, its incorruptibility. But I wonder if that allure should prompt us to remain alert to constitutional concerns, lest we gradually recreate through machines instead of magistrates the civil law mode of ex parte production of evidence that constituted the "principal evil at which the Confrontation Clause was directed."

People v. Lopez, 286 P.3d. 469, 494 (Cal. 2012) (Liu, J., dissenting) (quoting Crawford v. Washington, 541 U.S. 36, 50 (2004)). The problem of machine-generated data under the Confrontation Clause is, to be sure, somewhat distinct from the issues surrounding visual depictions depending on a blend of evidentiary inputs and computer programming. But the recognition that it may be time to interrogate machine-generated evidence in novel ways may well apply to both.

18. For discussion of hypothetical questions in the nineteenth century and why experts came to despise them, see Jennifer L. Mnookin, *Idealizing Science and Demonizing Experts: An Intellectual History of Expert Evidence*, 52 VILL. L. REV. 763 (2007). For a modest defense of the hypothetical question as a method for gaining information from experts, see Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 53 n.2 (1901).

day, litigants should be able to recast the assumptions of simulation evidence to "repeat play" it from their own evidentiary point of view.

B. Premade, Modular, Expert Testimony

The second kind of repeat play evidence involves expert evidence of a certain stripe. In at least some circumstances—the boundaries of which are, to be sure, somewhat fuzzy—experts do not in fact testify in a case-specific way, but instead provide general, background, educational expertise, designed to help the factfinder better understand some phenomenon in the world, or some framework related to the case. The idea, in a nutshell, draws upon the recognition that there are a number of significant forms of expert evidence that are, at their core, not actually case specific in any significant way. For these kinds of expert evidence, at least a significant portion of their value is as what we might term "meta-expertise," where the testifying expert comments, in a general, non-case-specific way, on the meaning, authority, strength, and limitations of a *category* of evidence, or offers the factfinder an overview of the findings of an area of academic inquiry and research that relates to evidence presented in the case.[19] I have in mind evidence such as expert testimony about what psychological research has taught us about eyewitness identification; or social science testimony about the phenomenon of false confessions; or research findings about implicit bias; or evidence about the existence of post-traumatic stress disorder as a psychological phenomenon; or expert testimony about the scientific foundations and degree of validation of fingerprint evidence or bitemark evidence.[20] Many of these kinds of evidence, though perhaps not all, fall into what John Monahan and Larry Walker have named "social framework testimony."[21]

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19. Two previous law review articles discuss the concept of "meta-expertise." *See generally* Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535 (1998); Simon A. Cole, *Out of the Daubert Fire and into the Fryeing Pan? Self-Validation, Meta-Expertise, and the Admissibility of Latent Print Evidence in* Frye *Jurisdictions*, 9 MINN. J.L. SCI. & TECH. 453 (2008).

20. For reasons I explain in Part II, my focus in this Essay for the possible use of modular testimony is on criminal cases. There are certainly forms of meta-testimony or framework testimony in civil cases as well, but (1) the structural reasons that experts may be underutilized in criminal cases are far less applicable in civil disputes; (2) other forms of structural aggregation (that may also end up aggregating expert evidence) are far more widespread in civil disputes; and (3) the "access-to-justice" justifications for innovation are therefore significantly less acute in civil cases for experts.

21. Laurens Walker & John Monahan, *Social Frameworks: A New Use of Social Science in Law*, 73 VA. L. REV. 559, 559 (1987). For further detail on the relation between meta-expertise and social framework evidence, see *infra* Part IV. While meta-evidence and social framework evidence are overlapping categories, they are not identical.

What is especially striking about these forms of evidence is that the "expert framework testimony" provided typically changes rather little from one case to the next. If an expert is describing key empirical studies showing that cross-racial identification may be less reliable than same-race identification, these studies, and their relevance, are the same in any case in which cross-racial identification is an issue. Similarly, if an expert describes the social science that establishes the existence of false confessions as a phenomenon, and explains what we know about situations that increase the risk factors for false confessions, this evidence too will be the same from one case to the next. To be sure, over time, there may be new studies or other relevant information that an expert would incorporate into her testimony, but this changing empirical foundation will typically be quite gradual.

But if in fact the substance of some kinds of expert testimony is general rather than specific, and even virtually identical from one case to the next—then why reinvent the wheel each time it is offered? Why not instead turn it into repeat play evidence and harness the efficiencies and the quality control that could result from aggregation? To be sure, the specifically relevant meta-issues will certainly vary to some extent across cases; evidence about empirical research examining the extent to which a "weapons focus" risks distracting an observer or victim from noticing other details would not be relevant in a case not involving a weapon, and issues of the relative weakness of cross-racial identification would not arise in a case involving same-race identification, and so on.[22] So clearly the preproduced, "canned" testimony of an eyewitness identification expert could not simply be used whole cloth in trial after trial. But in this age of digital technologies, surely that poses no substantial obstacle. Why not create testimonial "modules" for each subarea of evidence that regularly repeats, and then permit a defendant to use, via video testimony, whatever modules are relevant to the specific case at hand? Cross-examination could, and indeed would have to be, modular as well, available for each distinct subarea; hence these premade forms of meta-testimony could be tailored and semicustomized, as needed, to the case at hand.

22. There is a voluminous literature on each of these issues, as well as a host of other inquiries relating to the potential causes and explanations of eyewitness misidentification. For a recent overview of what social science research has shown, as well as some of the issues still requiring further research, see generally NAT'L ACAD. OF SCIS., IDENTIFYING THE CULPRIT: ASSESSING EYEWITNESS IDENTIFICATION (2014) [hereinafter IDENTIFYING THE CULPRIT].

II. Repeat Play Evidence as a Pedagogical Device

A. A Weinsteinian Interlude

Having now described each of these possible evidentiary innovations in very broad strokes, in this next section, I return to both forms of repeat play testimony in somewhat more detail. But before doing so, I will circle back to Judge Weinstein. Although he has not proposed either of these particular repeat play innovations, he has—unsurprisingly—written thoughtfully from the bench about the use of sophisticated visual technologies in the courtroom, and an interlude to examine his thoughts is instructive.

The case on which I will focus was a 2004 bench trial involving claims of false and misleading advertising: Verizon Directories was suing Yellow Book USA.[23] Both parties presented large number of exhibits in computer-generated formats, as well as in hard copy, and the issue in this memorandum order was whether these scores of computerized exhibits were going to be permitted to be used illustratively, and also whether they were going to be formally admitted into evidence.[24]

After a quick but thoughtful tour describing the various kinds of computer-displayed visual evidence often used at trial (from static images projected on a screen to complex computer simulations), Judge Weinstein took up the question of whether they could be formally admitted into evidence or ought only to be used as illustrative aids for a testifying witness. He recognized that many courts have found that these demonstrative aids are not themselves understood as evidence, but instead operate more like an argument in that they organize, restate, summarize, or draw attention to evidence, rather than offering independent evidence of their own.[25] Often, the issue at stake in deciding whether these forms of visual evidence are "merely" demonstrative or are in fact officially deemed evidence is whether they will be permitted to go to the jury room.[26] In *Verizon*, Judge Weinstein ruled that for the most part, these forms of computer evidence can indeed be deemed evidence, subject to Rule 403 and an

23. Verizon Directories Corp. v. Yellow Book USA, Inc., 331 F. Supp. 2d 136 (E.D.N.Y. 2004). The case was just a decade ago, but how times change: does anyone actually use physical phone books anymore in this age of smartphones and Google?

24. *Id.* at 137–39.

25. I have argued elsewhere that this ambivalence about demonstrative evidence, and whether it is "merely illustrative" or a powerful form of substantive proof on its own has its origins in the history of the legal reception of photography. *See* Mnookin, *supra* note 15, at 1.

26. *See, e.g.*, Robert D. Brain & Daniel J. Broderick, *The Derivative Relevance of Demonstrative Evidence: Charting Its Proper Evidentiary Status*, 25 U.C. Davis L. Rev. 957 (1992). Note however that *Verizon* was not before a jury.

evaluation of any potential prejudice.[27] But for our purposes, what is especially interesting is not the conclusion itself, but three specific aspects of his reasoning.

First, and most significantly, throughout the opinion, Judge Weinstein preferred to call these forms of computer generated visual evidence "pedagogical devices."[28] I have not traced the origin of this term in this context definitively, but I believe it may be Judge Weinstein himself, along with Professor Margaret Berger, who coined the description of summaries and charts used in trial as "pedagogical devices," in their 1983 edition of Judge Weinstein's Evidence.[29] While it is possible that the term has an earlier origin, what I do know is that the earliest judicial cases to refer to charts and evidence summaries as pedagogical devices cite Judge Weinstein and Berger for the label.[30]

However, in *Verizon*, he has changed his views about these "pedagogical devices" since his treatise description twenty years earlier. In the treatise, Judge Weinstein and Berger used the term "pedagogical device" in contradistinction to "evidence"; they described them as a form of advocacy, closer to argument than evidence.[31] In the treatise, pedagogical devices are a method by which a party may pull out especially significant aspects of the evidence into a summary or chart, or make inferences from the evidence manifest to the factfinder. They are thus quite different, and more partisan, than a summary or chart used simply as a management device for overly voluminous material, which does nothing more than accurately and neutrally summarize the whole—and hence, which may properly be seen as evidence under Federal Rule of Evidence 1006.[32]

In *Verizon*, however, twenty years later, Judge Weinstein not only has a more capacious view about what may properly be seen as evidence, but he seems to understand the role of "pedagogical devices"

27. *Verizon*, 331 F. Supp. 2d at 142.

28. *See, e.g.*, *id.* at 137.

29. JACK B. WEINSTEIN & MARGARET A. BERGER, WEINSTEIN'S EVIDENCE § 1006 (1983).

30. *See, e.g.*, Pierce v. Ramsey Winch Co., 753 F.2d 416, 431 (5th Cir. 1985) (citing WEINSTEIN & BERGER, *supra* note 29, § 1006) ("Neither party has bothered to cite to the evidentiary rules governing the admissibility of charts and summaries. When considering the admissibility of exhibits of this nature, it is critical to distinguish between charts or summaries *as evidence* and charts or summaries *as pedagogical devices*."); United States v. Drougas, 748 F.2d 8, 25 (1st Cir. 1984) (citing WEINSTEIN & BERGER, *supra* note 29, § 1006) ("Care must be taken to insure that summaries accurately reflect the contents of the underlying documents and do not function as pedagogical devices that unfairly emphasize part of the proponent's proof or create the impression that disputed facts have been conclusively established or that inferences have been directly proved.").

31. MCLAUGHLIN, WEINSTEIN & BERGER, *supra* note 29, § 1006.04.

32. *Id.* § 1006.

at trial—that is, evidence that at least implicitly serves a kind of teaching function—rather differently. In *Verizon*, it struck him that teaching is at the very heart of the trial and the production of evidence.[33] He wrote:

> The purpose of a trial is to reveal the relevant real-world facts and to draw inferences leading to proof or disproof of operative elements of a cause of action; it is essentially a teaching learning process. As the eminent professors Jerome Michael and Mortimer Adler put the matter:
>
> > In its logical aspect the trial of an issue of fact can be viewed as a process of teaching: By their proof and disproof of the contradictory propositions of which the issue is constituted, the litigants impart to the jury the knowledge which it needs in order to resolve the issue. . . . The process which, from the point of view of jurors, is a passive affair of learning or inference and, from the point of view of litigants, an active affair of teaching or proof, is a single process.[34]

So long as the computer-generated exhibits are not blatantly unfair (in which case they run afoul of Federal Rule of Evidence 403), the fact that these pedagogical devices may go beyond purely neutral summary and clarification, and may direct the factfinder's attention in particular ways and lead her toward specific inferences, no longer seemed to Judge Weinstein to be a reason to refuse to treat them as evidence. He has come to recognize explicitly that when lawyers present evidence to the jury, they are inevitably engaged in a teaching function through their very interaction with the evidence, thereby shaping the jury's understanding.[35]

What has changed to make Judge Weinstein more comfortable with the notion that even quasi-argument-like pedagogical devices can officially be evidence? The reasons for his shift are the second aspect of his opinion worth noting. Judge Weinstein has now recognized the fact that people—including, of course, potential jurors—use communications technology and computers ever more frequently necessarily affects how the courts ought to think about their use as well.[36] He wrote, "In light of ever-changing technology, wide ownership of personal computers, expanding use of the internet, and personal digital assistant devices, among other electronic innovations, the lay person is increasingly immune to confusion by the encroachment of technology

33. *Verizon*, 331 F. Supp. 2d at 141.

34. *Id.* (citations omitted) (quoting Jerome Michael & Mortimer J. Adler, *Real Proof: I,* 5 VAND. L. REV. 344, 344–46 (1952)).

35. *Id.*

36. *Id.* at 142.

into heretofore primitive communication zones such as the jury room."[37] No Luddite he, Judge Weinstein imagined that it will not be long before jurors all bring their notebook computers to the trial itself, and he gently mocked those who wish to keep technology at bay.[38] While recognizing that technology in the courtroom may "sometimes be distracting," he also emphasized that it could "strengthen the ability of courts to seek truth," and courts would therefore be well-advised to embrace the possibilities thoughtfully, rather than engage in avoidance, especially in cases where the complex issues at stake require particular kinds of jury education.[39]

That said, and this is the third point, Judge Weinstein did also recognize the dangers of a too-quick technological embrace. He saw not only the risk that technological displays might have heightened emotional power, but also that subtle visual decisions about color choice and the specifics of how images are displayed may unconsciously affect viewer's understanding in concerning ways.[40] Furthermore, he explicitly noted that admissibility decisions may also be impacted by resource differentials.[41] In this case, a lawsuit between two major corporate defendants, the "parties have the financial wherewithal to present comparable computer-generated evidence," but he was quite cognizant that, at times, "[t]he district court's normal discretion can be utilized to mitigate situations in which parties have vastly different resources, creating an uneven technological playing field."[42]

What we see, then, is Judge Weinstein embracing the greater use of technology in court for the explicit purpose of *teaching* the factfinder; he understands that when parties provide information in an accessible way, they will enhance both the jury's attention and understanding. Judge Weinstein reminds us not to infantilize the factfinder, who "need not be treated as illiterates as under the old English practice,"[43] but at the same time, he urges us to recognize the need for substantial, thoughtful judicial management of the use of pedagogical devices, to protect against both resource differentials and the potential prejudice

37. *Id.*

38. *Id.* He notes, for example, that "[t]he suggestion that trials are turning into legal smoke and mirror laser light shows, lacking real substance, has no merit where the court exercises appropriate control." *Id.* No one familiar with Judge Weinstein could doubt that, at least in his courtroom, that control is fully exercised.

39. *Verizon*, 331 F. Supp. at 142.

40. *Id.* at 144.

41. *Id.* at 142.

42. *Id.*

43. *Id.* at 143.

that may result from depictions, unfair either in their substance or in their perhaps excessive emotional punch.

We can return now to repeat play evidence of the two sorts I am suggesting, and we can now recognize that they also both fit squarely into Weinstein's rubric of pedagogical devices. Both innovations offer the potential to provide better information for jurors than the status quo, and both offer the potential to contribute to the "teaching learning process" at the heart of the trial.[44] Meta-experts clearly offer a form of educational expertise, giving the jury background in relevant research that the jury can then apply to its understanding of the case-specific questions. And simulations and animations are used both to clarify complex data, and also to produce a comprehensible narrative that depicts a party's claims about the evidence. As we circle back to these two kinds of repeat play evidence, we can certainly also benefit from the reminders Judge Weinstein provides in *Verizon* about the need for judges to manage the use of technology in the court with an explicit eye to the effects of resource differentials.

B. Repeat Play Simulations

Simulations, animations, and other elaborate visual forms of evidence become an especially significant concern when resource differentials are substantial. When parties both lack the funding to make use of elaborate computer-generated visual evidence, so be it. And when parties are both sufficiently well resourced to be able to produce them if they care to, if one party invests in elaborate visual evidence and the other elects an alternative trial strategy, we can view it as merely a matter of different tactical choices by equally situated counsel rather than is a problem for the court.

But when resource disparities are significant, and the better resourced party invests in elaborate visual evidence of any kind, it is a potential concern for the fair operation of the adversarial system.[45] To be sure, even then, it is just a specific instantiation of the more general problem of resource differentials—but given the potentially substantial emotional and persuasive power of well-honed visual rhet-

44. *Id.*

45. As mentioned earlier, not all commentators agree that the Rules of Evidence regularly permit exclusion based on concerns about resource differentials. *See generally* Imwinkelried, *supra* note 16. But Imwinkelreid is nonetheless concerned about resource differentials, and even he recognizes that in rare cases, resource disparities coupled with the inadequacies of other potential remedies (such as jury instructions) may lead to a risk of such substantial overvaluation of the proffered evidence that Rule 403 warrants exclusion.

oric, and the complexity of unpacking it effectively, it may be a specific instantiation with which we should be particularly concerned.[46]

Moreover, as with all substantial resource differentials within the adversarial system, we ought to ask whether there are any possible cures. One, of course, would be to exclude many forms of visual evidence on fairness grounds.[47] In *Verizon*, Judge Weinstein intimates that on occasion, this may well be an appropriate stance.[48] But that feels potentially excessive, throwing out the baby with the bathwater, especially if we frame visual evidence, like Judge Weinstein, as a pedagogical device. Visual evidence can be powerful, and perhaps on occasion too vivid and emotionally affecting. It can create the danger of playing on jurors' emotions, or making them believe they know something that is, in fact, more uncertain than they realize. But it can also be powerful in a positive way, presenting information in a way that a viewer is more likely to retain than if it had been depicted aurally alone. Visual evidence can overpower, muddle, and mislead, yes—but visual evidence can also clarify, illuminate, teach, and (legitimately) persuade.[49]

The important issues surrounding visual evidence as a pedagogical device do not apply to simulations and animations alone. As Judge Weinstein explained in *Verizon*, there are a great variety of ways for litigants to make use of visual evidence in court—they range from photographs to charts to maps, from animations to simulations, from day-in-the life films to enhanced or modified images designed to point out particular details or to draw attention to specific items of evidence. Some forms of visual evidence are static and some are not. Some even let the factfinder manipulate the point of view or explore an elaborate visually produced world.[50] Some exemplars of visual evi-

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46. For an argument about the critical importance of law students' developing visual literacy skills, see Richard K. Sherwin et al., *Law in the Digital Age: How Visual Communication Technologies Are Transforming the Practice, Theory, and Teaching of Law*, 12 B.U. J. SCI. & TECH. L. 227 (2006). For an interesting experiment on lawyers' use of PowerPoint and how it effects legal outcomes, see Jaihyun Park & Neal Feigenson, *Effects of a Visual Technology on Mock Juror Decision Making*, 27 APPLIED COGNITIVE PSYCHOL. 235 (2013). Not only did the study find that the use of PowerPoint did affect mock jurors' assessments of responsibilities, but it also found that effects were most pronounced when only one side made use of the technology.

47. This is the approach suggested by the concurring opinion in *Commonwealth v. Serge*, 896 A.2d 1170 (2006).

48. *Verizon*, 331 F. Supp. 2d. at 143–44.

49. *See* Sherwin et al., *supra* note 46, at 263–64. *See generally* NEAL FEIGENSON & CHRISTINA SPIESEL, LAW ON DISPLAY: THE DIGITAL TRANSFORMATION OF LEGAL PERSUASION AND JUDGMENT (2009).

50. *See generally* Carrie Leonetti & Jeremy Bailenson, *High-Tech View: The Use of Immersive Virtual Environments in Jury Trials*, 93 MARQ. L. REV. 1073, 1075–77 (2010); Damian Schofield, *Animating Evidence: Computer Game Technology in the Courtroom*, 2009 J. INFO. L. & TECH 1,

dence are rendered in detail and are highly realistic; others are merely schematic. Courts vary in regard to how they view realism—some courts admit high levels of detail in visual depictions if they have an evidentiary basis; others worry that too much realism risks manipulating the factfinder.

Just how much power does visual evidence have? There is not yet a great deal of experimental evidence addressing this question, but the limited direct empirical evidence we do have largely, though not entirely, suggests that it does significantly influence viewers.[51] Moreover, a great deal of research in nonforensic settings suggests that visual evidence can have substantial vividness and persuasiveness effects. And on top of this social science data, there is a good deal of marketplace evidence that suggests that visual evidence is widely believed to have power; many parties with means are quite willing to pay for it. Numerous firms exist that focus on producing visual evidence for litigation. Some of these are primarily graphic design firms or visual communication companies; others have substantial engineering and scientific expertise. Parties who can afford it are often willing to spend substantial sums to produce these forms of visual evidence; that does not in and of itself prove their power, but it does suggest that those with experience *believe* it to be powerful.

While animations and simulations—visual depictions that depend in part on specific evidentiary inputs and computer programming or design software—are certainly not the only important category of visual evidence, they are the category most structurally amenable to the repeat play possibility. Simulation evidence often involves providing specific inputs for certain key variables into a system. This could be an off-the-rack accident reconstruction program, or it could be a simulation produced in its entirety by a litigation consulting firm. But the key point is that many, if not all, simulations involve incorporating assertions about specific aspects of the evidence into a model that partly or wholly predates the specific litigation at hand.

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available at http://www2.warwick.ac.uk/fac/soc/law/elj/jilt/2009_1/schofield/; Damian Schofield, *Playing with Evidence: Using Video Games in the Courtroom*, 2 ENT. COMPUTING 47 (2011).

51. *See, e.g.*, Meghan Dunn et al., *The Jury Persuaded (and Not): Computer Animation in the Courtroom*, 28 LAW & POL'Y 228, 229–36 (2006); Saul Kassin & Meghan Dunn, *Computer-Animated Displays and the Jury: Facilitative and Prejudicial Effects*, 21 LAW & HUM. BEHAV. 269, 279–80 (1997); G. Daniel Lassiter et al., *Videotaped Confessions: Is Guilt in the Eye of the Camera?*, 33 ADVANCES IN EXPERIMENTAL SOC. PSYCHOL. 189, 197 (2001); Park & Feigenson, *supra* note 46, at 239–40; Vincenzo A. Sainato, *Evidentiary Presentations and Forensic Technologies in the Courtroom: The Director's Cut*, 9 J. INST. JUST. & INT'L STUD. 38, 38–39 (2009). For an early (and equivocal) study, see Robert B. Bennett, Jr. et al., *Seeing Is Believing; or Is It? An Empirical Study of Computer Simulations as Evidence*, 34 WAKE FOREST L. REV. 257 (1999).

The idea, then, is that these simulations should be *designed* to permit tinkering with the inputs. This way, the opposing party could instead enter in its own assumptions, to see how these evidentiary modifications changed the depiction. In a car accident case, there might be diverging testimony about the speed the car was going at the time of the crash, or different memories of the intensity of the wind, or competing claims about the placement of another relevant vehicle at the time of the accident. The basic idea is that instead of having to build its own simulation, a party should be able to petition the court for access to the opposing party's simulation, in a form that is, so to speak, "open-source." The simulation should be provided in a form that lets the party modify the assumptions, and perhaps even change aspects of the underlying computer code (if constructed for the particular case), and see how these changed assumptions change the result, if at all. With animations as well, the idea would be to insist that the opposing party have the opportunity to have the animation remade (within reason), with key variables altered, albeit only in ways supported by the expected evidence.

Requiring simulations and animations to be produced in a way that permits this form of repeat play would greatly benefit the party with fewer resources. What could be the doctrinal hook whereby a judge could insist upon such a design? Federal Rule of Evidence 403 probably provides the most obvious option.[52] The argument would have to be that unless the simulation or animation permitted "cross-examination" via modifying key assumptions in light of contrary evidence, the computer-generated depiction risks misleading the jury, or is unduly prejudicial because it is likely to be overweighed, or is likely to be taken as substantially more probative than warranted.

To be sure, this effort at equalizing the playing field through repeat play testimony raises a number of significant questions. These include:

- How technologically plausible is it to insist that animations and simulations be designed in a way that permits the opposing party to modify them? Is it differentially plausible for simulations as opposed to animations? If the plausibility varies, ought the rule apply only when feasible, or would an "infeasibility" escape clause be

52. Rule 403 permits the court to "exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence." FED. R. EVID. 403.

unworkable or produce an incentive for parties to design their visual evidence precisely to make it infeasible?

- Who decides precisely which components of the simulation need to be available for modification? Is it every aspect that the party—or those it has hired—has developed? What if some aspects are relatively unimportant or simply background? Is it only the most important variables? How should courts understand and police this boundary line?
- Should such a repeat play policy apply only when there are resource differentials across parties? Or would more transparency in simulations across the board improve the adversarial process?
- What practical or technological obstacles might there be? Should they literally be modifiable by the opposing party itself, or can the designing party retain control of the process, modifying the simulation in accordance with the new variables provided? If the latter, how would the timing interact with the iterative dynamics of the trial process? Any inputs into the simulation or animation need to be evidence-based, but parties are not going to want to disclose all aspects of their evidence to the opposing party in advance.
- Simulations are typically introduced by an expert who runs them, explains what is shown, and narrates the process. Who will do that for the opposing party? Does the opposing party therefore need to hire its own expert to assess and run the simulation?

Clearly, there are numerous questions—technological, legal, and conceptual—that would need to be addressed to make repeat play simulations genuinely workable. The point, for the moment, is not to argue strongly that repeat play simulations are a practicable or complete solution to the problems of resource differentials, potentially undue persuasive power, or the hidden assumptions that may be buried within computer-generated visual evidence. It may well be that all of these questions about repeat play animation and simulation could be satisfactorily addressed—or perhaps not. The broader point is that as visual evidence gains in significance, we need to think about how to innovate our courtroom procedures in ways that can match the technological innovations being introduced by savvy parties.

C. Modular Testimony

We turn back now to the second kind of repeat play evidence, modular testimony. The central question spurring us to consider the use of modular testimony is as follows: if some forms of meta-expert testi-

mony will largely be the same from one case to the next, why should it be provided separately, distinctly, and individually in case after case? Might there be ways to increase efficiency—and perhaps also to improve quality—through a kind of evidence aggregation, in which expert testimony in a particular area is taken once, recorded as a series of modules, with high quality attorneys conducting both the direct and the cross-examination portions? This digital version of the testimony could then be used multiple times and distributed across cases involving different litigants, different courtrooms, different factual scenarios—but all of which implicate precisely the same kind of meta-expertise.

To be sure, the use of prerecorded repeat play video testimony by expert witnesses in criminal trials may seem jarring, given our typical highly individualized framework for criminal adjudication. But the real question is whether there is any legitimate reason to insist on individually-produced evidence for issues that are not in fact particularized and specific, not actually limited to the individual case, and which can legitimately and practically be disaggregated from the case-specific issues.

Specifically, can we imagine a workable method for producing an array of video-recorded expert evidence "modules" on often-used topics of meta-evidence? To make any such system plausible, these modules would need to be produced by a well-regarded, nonpartisan entity with legitimacy across the entirety of the bench and bar. This well-respected organization could oversee the production of the modules, making use of some of the best regarded experts in each area, with extremely high-quality, experienced lawyers engaging in both direct and cross-examination. Modules could be produced topic by topic, so that even within a given area—such as eyewitness identification expert testimony—there might be a dozen or so different modules on various repeat play subareas. The relevant direct evidence portions of these prerecorded modules could then be introduced by defendants who wished to do so in cases where the expertise was relevant and otherwise admissible. Prosecutors could then elect to use all or part of the relevant prerecorded cross-examination of these videotaped experts, and could also elect (in addition or instead) to introduce their own traditional—that is to say live and in person—expert testimony on the topic. Clearly, however, a prosecutor could not be permitted to subpoena the expert depicted on video, or the efficiency advantages (and workability of this model) would break down entirely.

It is important to note that modular testimony would be an available *supplement* rather than a *substitute* for live testimony on the same subject, though the reality, perhaps, is that most defendants would be unlikely to make use of both. In any event, these evidentiary modules could be repeat play—that is to say, they could be used, in part or whole, in a large variety of cases involving different defendants and different underlying factual circumstances. Nothing about these cases would be aggregated apart from their shared use of an evidentiary resource.

On the civil side, when the same legal or factual question arises across many litigants, it is, of course, possible to aggregate the cases, either via a class action,[53] or for a more modest purpose like consolidated discovery or a joint hearing on a legal issue.[54] Procedural aggregation is far less commonplace on the criminal side, where the norm of individualized trials runs very deep. But even there it is not wholly unheard of. Indeed, Brandon Garrett has described in a recent article both the underrecognized ways that aggregation does, at least occasionally, occur in criminal trials, as well as the reasons its development should, in his view, be encouraged, albeit with care to protecting defendants' due process rights.[55]

Part of Garrett's motivation for wishing to see greater aggregative possibilities in criminal cases is the DNA revolution, and the discovery over the last decade of the many confirmed cases of wrongful conviction, as well as, more generally, the systemic limitations of our current criminal justice system in operation and its quite partial protection of defendants' constitutional procedural rights.[56] One of the potential benefits Garrett sees in aggregation is that defendants might, through certain forms of procedural consolidation, have better access to experts, whom they could not afford to hire by themselves, or whom

53. Class actions are, of course, governed by FEDERAL RULE OF CIVIL PROCEDURE 23.

54. FEDERAL RULE OF CIVIL PROCEDURE 42(a), for example, gives a judge significant discretion to consolidate actions involving common questions of law and fact to whatever degree is helpful, for the purpose of enhancing speed and efficiency.

55. *See generally* Brandon L. Garrett, *Aggregation in Criminal Law*, 95 CALIF. L. REV. 383 (2007).

56. *Id.* at 402–03. On wrongful convictions in general, see BRANDON L. GARRETT, CONVICTING THE INNOCENT: WHERE CRIMINAL PROSECUTIONS GO WRONG (2011); SAMUEL R. GROSS & MICHAEL SHAFFER, NAT'L REGISTRY OF EXONERATIONS, EXONERATIONS IN THE UNITED STATES, 1989–2012 (2012), *available at* https://www.law.umich.edu/special/exoneration/Documents/exonerations_us_1989_2012_full_report.pdf; Richard A. Leo & Deborah Davis, *From False Confession to Wrongful Conviction: Seven Psychological Processes*, 38 J. PSYCHIATRY & LAW 9 (2010).

their inexperienced defense counsel might not have the skills or know-how to hire or to use effectively.[57]

However, Garrett only considers forms of *procedural* aggregation, not methods for achieving similar goals via novel approaches to the creation of evidence, which would operate as a limited form of *substantive* aggregation. Repeat play expert evidence could achieve some of the same goals to which Garrett aspires, by distributing far broader access to excellent experts in a low-cost fashion—albeit only for those forms of evidence that are sufficiently "meta" that they need not be presented in a case-specific way.

Part of why we ought seriously to consider a turn to modular, repeat play expert testimony as an option for defendants is the reality that in numerous instances when framework testimony could be helpful to the factfinder, it nonetheless does not get introduced at all. Why so? Primarily either because of (1) the prohibitive cost of consulting with and using an expert; (2) the inadequate expertise or knowledge base of (often overworked) defense attorneys; or (3) a combination of both limited resources and limited attorney knowledge.

While indigent defendants are sometimes able to get court funding for these kinds of meta-experts, their access to such funding is uncertain and inconsistent at best, and many requests are simply denied.[58] In addition, some defendants who are too wealthy to receive a court-appointed lawyer may nonetheless not have the means to hire those experts who would strengthen their case. In other instances, the defense attorney, whether privately hired, publicly appointed, or a public defender, may lack sufficient training or background to realize the potential value of certain forms of meta-expertise.[59] Or she may lack the know-how to pursue or develop a given kind of expert evidence effectively, and may therefore not even attempt to secure expert assistance. To be sure, judges have on some occasions been reluctant to permit, or have even excluded, the use at trial of some of these forms of meta-expertise, but I think it is fair to say that the general trend is toward an increasing willingness to admit these forms of meta-evi-

57. Garrett, *supra* note 55, at 430–32.

58. *Ake v. Oklahoma*, 470 U.S. 68, 83 (1985), recognized that at least in some circumstances, defendants have a constitutional right to expert assistance, but *Ake*, which involved psychiatric evaluation in a capital case, did not delineate either the scope of this right or its limitations. *See generally* Paul C. Giannelli, Ake v. Oklahoma*: The Right to Expert Assistance in a Post-*Daubert*, Post-DNA World*, 89 CORNELL L. REV. 1305 (2004).

59. Many attorneys, for example, do not recognize the possibility of mounting a challenge to some forms of pattern identification evidence.

dence or framework testimony, presuming they otherwise meet the appropriate tests for relevance and reliability.[60]

Nonetheless, the stark reality is that in many cases where an eyewitness identification expert, a false confession expert, or an expert in the scientific foundations of a given forensic science pattern evidence area would be admitted into evidence if called, and would genuinely help the factfinder better understand the strengths and weaknesses of the case-specific evidence by putting it into a broader context, there simply is no expert used. Partly because of the recognition of this reality—the fact that it is simply not feasible to introduce live meta-experts in each and every criminal trial in which they would be relevant—some courts, particularly in the eyewitness identification area, have attempted to find creative alternatives to make up for the defendant's practical inability to educate the jury via an expert.[61] For example, some jurisdictions have decided to present framework evidence via jury instructions that describe—albeit in a sentence or two—some of the key findings of several decades of social science research in the area.[62] Consider the oddness of this: social science evidence is being presented as instruction. There is no opportunity to describe, or to challenge on cross-examination, the strength of the evidence, its effect size, or its limitations. By using an instruction instead of actual evidence, the material is presented in a strikingly cursory way.[63]

Thus, there are three imaginable possibilities for these forms of evidence. One option is to introduce them in the conventional way, through live testimony by an expert, with direct and cross-examination. The second is to begin to develop modules that could be used by any defendant who chose to, so long as the judge ruled it relevant and otherwise admissible. The third is to turn framework evidence into a matter for jury instruction rather than evidence.

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60. For an overview of the reception of expert testimony in the eyewitness context, where experts are increasingly permitted, see generally IDENTIFYING THE CULPRIT, *supra* note 22. In other areas, reception is more mixed. In the pattern identification area, for example, "meta-experts" (who testify about the scientific foundation of fingerprinting, as I myself have done on a small number of occasions) are sometimes allowed and sometimes excluded. *See generally* 4 DAVID FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY §§ 33.1–33.58 (2014-2015 ed. 2014) (discussing fingerprinting); Cole, *supra* note 19; Jennifer L. Mnookin, *The Courts, the NAS, and the Future of Forensic Science*, 75 BROOK. L. REV. 1209, 1251 n.125 (2010).

61. See, for example, the landmark opinion in *State v. Henderson*, 27 A.3d 872 (N.J. 2011).

62. *See, e.g.*, Press Release, State of New Jersey, Identification: In-Court Identification Only, (Sept. 4, 2012), *available at* http://www.judiciary.state.nj.us/pressrel/2012/jury_instruction.pdf.

63. For further exploration of the problems with using jury instructions in this fashion, see Jennifer L. Mnookin, *Constructing Evidence and Educating Juries: The Case for Modular, Made-In-Advance Evidence About Eyewitness Identifications and False Confessions*, 93 TEX. L. REV. (forthcoming 2015).

For those few litigants able to call a live witness on these topics if relevant, that may well be the best option. Not only does the defendant benefit from the potential vividness and focus benefits of a live witness (as opposed to introducing the information via someone not in the room and whose words were recorded at some previous point), but that expert may also be able to advise on broader aspects of expert-related trial strategy, and may also be able to give counsel—or, depending on the circumstances, perhaps even testify—about more case-specific matters. So for defendants with the option of calling a high-quality expert live and in person, that may well be the best option.[64]

But the financial and practical reality is that most defendants do not actually have that option. Modular testimony therefore offers a compelling, if perhaps second-best, solution. It provides a way to introduce pedagogical testimony about relevant meta-evidence to the factfinder without having to pay an expert's hourly rate. It offers a direct examination by an attorney with substantial expertise in the area, without requiring the defendant's attorney having to get wholly up to speed. And it provides an expert cross-examination as well, by an attorney quite possibly more knowledgeable than the actual prosecutor.

It is worth reiterating that in order for any such system to be practicable, whenever the defendant chooses to make use of these modules, the prosecutor would *not* have the right to insist on bringing in the prerecorded expert for a live cross-examination; she would have to accept the surrogate lawyer's video cross-examination of the witness, just as the defendant would have to make do with the surrogate lawyer's elicitation of the direct testimony. This would, I recognize, be a partial abrogation of our traditional approach to cross-examination. But so long as the initial choice to use a modular expert rested with the defendant, and so long as quality, substituted cross-examination was provided, it is likely that the use of repeat play testimony could be squared with constitutional values—but I grant that this set of questions deserves significantly more careful consideration.[65]

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64. There may, however, be arguments that live experts tend to go too far in the direction of presenting case-specific information, and perhaps premade modules would better "cabin" the evidence. This argument is explored further in *id.*

65. The argument, in brief, is that while the criminal defendant has a right under the Confrontation Clause to cross-examination, the prosecutor's right is only based in notions of due process. Therefore, if the process of module production was fair and unbiased, given that the defendant is making do with substituted direct examination, why would equivalently substituted cross-examination violate the prosecutor's due process rights? While the choice to make use of the module in the first place would, thanks to the Confrontation Clause, need to rest with the defendant

Overall, systemically, the existence of modular expert evidence would tremendously expand access to certain important forms of expert information for the factfinder. Furthermore, it would likely, in many cases, improve—or at least not significantly reduce—the quality of that expert information provided. Those cases that would otherwise have called live experts on the same topic, and now make use of prerecorded testimony, would benefit from a significant cost reduction without a substantial loss of informational content for the factfinder. In those cases in which the defendant would not otherwise have been able to call a live expert—for either lack of funding, lack of lawyer expertise, or both—prerecorded testimony could provide access to this information at extremely low cost. Additionally, modular expert testimony could leverage the expertise of the lawyers who produced it and therefore reduce (though not wholly eliminate) the need for the defense attorney and the prosecutor to master the relevant content. It can at least be hoped that frequent use of these kinds of framework testimony and meta-evidence, when appropriate, would improve the factfinder's ability to understand and weigh critical case-specific evidence. Modular expert video evidence could thus meaningfully improve the quality of informational inputs provided in criminal trials; it would certainly operate as a valuable pedagogical device; and though this is speculative, its widespread use might even reduce the number of wrongful convictions within our system, many of which have included erroneous eyewitness identifications, false confessions, and faulty forensic science evidence.[66]

To be sure, I have not addressed a substantial host of questions about this idea. To name a few of the most salient:

- Is it truly the case that many forms of expert framework testimony do not have a case-specific component as well? Modular testimony is only a sensible approach if there are a variety of areas, or cases, in which case-specific testimony is either prohibited or inessential. The dynamic of determining the relationship between a general or group claim and an individual one is thorny; what David Faigman and his co-authors have termed "the G2i problem," the problem of determining when and how we can go from a general inference (G) to a specific, individual one (i), is a central difficulty

alone, once that choice was made, the two parties would be situated equally, which suggests that from the point of view of procedural fairness, the prosecutor's rights are not abrogated. Additionally, nothing would prevent the prosecutor from calling its own live rebuttal witness if it wished to do so.

66. *See generally* GARRETT, *supra* note 56.

for many kinds of expert evidence.[67] Are there truly any kinds of experts that are (or should be) completely on the "G" side of the equation? If not, is the inevitability, in the case of modular repeat play testimony, of losing the ability to say anything about the individual, case-specific side of the equation made up for by the benefits of access?

- In addition to the potential due process issues raised by forcing the prosecutor to live with substituted cross-examination when a defendant elects to make use a module, might there also be hearsay issues involved in the use of repeat play modules? Certainly the modules are out-of-court statements being introduced for their truth,[68] and they do not fit obviously into any hearsay exception. Would we need to make use of the residual exception, or admit them via some kind of stipulation by both parties, or would their use necessitate a new exception to the rules?[69]

- Would there not be difficulties if the prosecution wished to challenge the admissibility of the modular testimony under *Daubert* (or *Frye*)? Would modular testimony also be available to describe the issues that arise in a *Daubert* hearing, which could be used to defend a *Daubert* challenge? Or would a defendant need to use live testimony in a *Daubert* hearing? The latter would obviously risk substantially reducing the benefit of modular testimony.[70]

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67. *See generally* David Faigman et al., *Group to Individual (G2i) Inference in Scientific Expert Testimony*, 81 U. CHI. L. REV. 417 (2014); David L. Faigman & Claire Leskiar, *Organized Common Sense: Some Lessons from Judge Jack Weinstein's Uncommonly Sensible Approach to Expert Evidence*, 64 DePaul L. Rev. 421.

68. For the basic definition of hearsay under the Federal Rules of Evidence, see FED. R. EVID. 801(c).

69. For the residual exception, see FED. R. EVID. 807, which permits hearsay which does not fit into any delineated exception if it has "equivalent circumstantial guarantees of trustworthiness" as hearsay admissible under various exceptions; it is "more probative on the point for which it is offered than any other evidence that the proponent can obtain through reasonable efforts"; and its use will "serve the purpose of these rules and the interests of justice." At least arguably, modular expert testimony would fit, especially when a court denied a defendant funds for a live witness. More generally, the key purpose of the rule against hearsay, as a protection against unreliable out of court statements, is strikingly inapplicable to modular evidence of this sort—in this instance, there is no danger of misreporting the out-of-court statement, as it is presented via videorecording, and the adequate reliability of the substance of the evidence itself could be vetted by the organization producing it, and perhaps through some method of peer assessment or review as well. So the evidence does not, it seems to me, run afoul of the purposes of the hearsay rule, but I do grant that it does not fit comfortably in any of our current exceptions. I thank Ron Allen for pushing me to more careful consideration of this point.

70. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), requires federal judges (and state judges in those states that have adopted *Daubert*) to serve as "gatekeepers" to ensure that expert and scientific evidence is adequately valid and reliable. *Daubert* hearings are often

- If modular testimony became commonly used, would judges become stingier about *Ake* funding for experts? Currently, some indigent defendants are able to access the funding necessary to call live framework experts. Would that possibility be reduced or eliminated? If it would be reduced, are the aggregate gains worth the potential costs to this group of defendants?

- What would modular testimony do for the market for experts? Would it have any effect on the likely price of live testimony? Would it have any effect on the production of underlying research in the relevant areas?

- Precisely how would modular evidence be produced? Presumably, it would need to be created in some official way, in partnership with a respected science-based or criminal justice institution, for the sake of both credibility and quality control. How would the experts and the lawyers be selected? Should there be multiple expert modules on the same topic, to give defendants a modicum of choice? Should the content of the modules be vetted by others within the relevant expert community? If the contents were to undergo some form of "peer review" to enhance both accuracy and legitimacy, should the direct examination be scripted in advance to ensure precision and maximize accuracy, or should it be, like real testimony, prepared but presumably unscripted?

- How could judges be spurred to permit modular testimony? Would there be any practical possibility of some cases in which prosecutors and defense attorneys could agree to stipulate to its admissibility, or would prosecutors, and perhaps defense attorneys too, fight against its use?

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discretionary and can range from brief to extremely elaborate. For some of these kinds of evidence, where admissibility has become the norm, like eyewitness identification expertise, it is not clear that there would often be any legitimate need for a *Daubert* hearing—and again, if the modules themselves could be meaningfully vetted by the relevant expert community, this could provide an alternative grounds for establishing adequate reliability, and perhaps would discourage judges from granting a prosecutor's request for a hearing. Admittedly, using such a "vetting" process as a way of warranting adequate validity would be relegating the reliability judgment to the expert community itself. This approach is much like the main criterion under the *Frye* test, in which courts determined whether expert knowledge was "generally accepted" by the relevant community in order to determine admissibility. Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923). For expert communities with well-developed research cultures, this relegation may be at least as legitimate as having judges assess the validity directly, but for expert communities that do not themselves have research cultures, it can be problematic indeed.

As with repeat play simulations, for this Essay, my purpose is not to answer these numerous questions about repeat play modular evidence so much as to suggest that they are questions worth thinking about. I am less wedded to any specific version of modular evidence than I am to the idea that we should be willing to imagine expert evidence as something more variable and variegated than simply a live witness testifying at a single trial.

III. Conclusion

Repeat play simulations and modular testimony are both, at root, designed to create a slightly more level playing field, especially for indigent defendants or in other instances of substantial resource disparities. An adversarial process where one of the adversaries lacks access to key evidentiary ingredients—from fancy visual evidence to necessary experts—is not likely to produce either fair processes or accurate outcomes. Both of these innovations are unabashedly unconventional, quasi-guerilla methods by which to leverage technological possibilities to improve defendants' access to evidentiary inputs. They both work, in fact, to strengthen the adversarial system by enhancing parity, but they each fit slightly uneasily into our ordinary evidential and adversarial paradigms, where parties do not typically have to build evidence in a form that will help their opponents too, and where party-controlled direct and cross-examination is a mainstay of the system. Whether either of these innovations will actually prove workable is, I acknowledge, far from clear. I do not suggest them merely as provocations—I think they both could end up being practically feasible and of genuine benefit. But I also, self-consciously, offer them as "objects to think with," to spur our sense of the possible, and to provoke us to think in outside-the-box ways about what evidence means and how it is and should be produced.

Of the two innovations, my own view is that the second, modular testimony, is perhaps the more important, especially given that erroneous eyewitness identification, false confessions, and faulty forensic science are the three most frequently identified causes of wrongful conviction, and all three are areas where meta-evidence might be effectively put to use.[71] But when elaborate visual and computer-generated evidence is used by one party, it can certainly have powerful effects as well,[72] and the importance of visual evidence in the trial

71. *See* Garrett, *supra* note 55, at 402–03.

72. Consider, for example, the use of elaborate visual displays (though not a simulation) by the prosecution in the trial of Michael Skakel. While many factors may have produced his conviction, the powerful visual evidence was certainly a factor, and some commentators saw it as

process is only growing. We need, therefore, to think about ways to achieve parity in this domain as well. Making simulation and animation evidence modifiable would be a meaningful, albeit incomplete, beginning.

I conclude with these final questions: Is it plausible to imagine that some judges would be supportive of these innovations, and would actually recognize that they have the power to create significant efficiencies, to help level the playing field for parties with fewer resources, and perhaps even to produce epistemically *better* evidence? Is it plausible to imagine that some judges would be courageous enough to admit modular testimony notwithstanding that the prosecution would have to settle for substituted cross-examination and the judge would have to make liberal use of the residual exception to the hearsay rule? Is it imaginable that some judge would only admit a simulation or animation into evidence contingent on key variables being able to be modified by the opposing party?

Perhaps it is wishful thinking, but it is, I think, plausible to imagine that some judges *would* be supportive of these innovations—or, more precisely, it is plausible, I think, that at least one judge just might be. His name is familiar indeed: Judge Jack Weinstein. Let us hope that in his commitments to innovation, aggregation, technology, and justice—critical keywords all—Judge Jack Weinstein does not stand alone.

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central. *See, e.g.*, Brian Carney & Neal Feigenson, *Visual Persuasion in the Michael Skakel Trial: Enhancing Advocacy Through Interactive Media Presentations*, CRIM. JUST., Spring 2004, at 22; Jewel, *supra* note 15, at 295.