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Edward J. Imwinkelried

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# ***Peer Dialogue: The How and What of “Appropriate Validation” Under Daubert: Reconsidering the Treatment of Einstein and Freud***

*Edward J. Imwinkelried\**

*“[I]n practice, a gatekeeping role for the judge, no matter how flexible, inevitably on occasion will prevent the jury from learning of authentic insights and innovations. That, nevertheless, is the balance that is struck by the Rules of Evidence designed not for the exhaustive search for cosmic understanding but for the particularized resolution of legal disputes.”*  
Justice Blackmun, *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 597 (1993)

In its landmark decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the Supreme Court announced that the trial judge must play a gatekeeping<sup>1</sup> or screening<sup>2</sup> role in deciding whether proffered expert testimony constitutes sufficiently reliable “scientific . . . knowledge”<sup>3</sup> to qualify for admission under Federal Rule of Evidence 702. The Court declared that the proponent of the testimony must lay a foundation establishing “appropriate validation”<sup>4</sup> for the expert’s underlying theory or technique.

In order to intelligently assess the adequacy of a validation foundation, the trial judge must address two questions: *what* must be validated, and *how* should it be validated?<sup>5</sup> In his article, Professor Crump touches on both questions. Having read his article several times, I come away convinced that although Professor Crump’s analysis of the second question is largely right, there is a serious problem with his analysis of the first question. On the one hand, Professor Crump is correct in arguing that the courts should not limit “appropriate validation” to controlled scientific experimentation and induction. On the other hand, his assertions about the judicial treatment of Einstein’s and Freud’s theories reflect an epistemological misconception—a misunderstanding

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\* Visiting Professor of Law, University College Dublin; Professor of Law, University of California at Davis; B.A. 1967, J.D. 1969, University of San Francisco.

1. 509 U.S. 579, 597 (1993).

2. *Id.* at 589.

3. *Id.* at 589-90.

4. *Id.* at 590.

5. Edward J. Imwinkelried, *The Meaning of “Appropriate Validation” in Daubert v. Merrell Dow Pharmaceuticals, Inc., Interpreted in Light of the Broader Rationalist Tradition, Not the Narrow Scientific Tradition*, 30 FLA. ST. U. L. REV. \_\_\_\_ (forthcoming April 2003).

relating to the state of knowledge in any given scientific discipline at a particular time.

### I. HOW SHOULD THE EXPERT'S THEORY OR TECHNIQUE BE VALIDATED?

As Professor Crump observes, unfortunately Justice Blackmun's opinion in *Daubert* is susceptible to the interpretation that to validate purportedly scientific testimony, the proponent must demonstrate that the underlying theory or technique has been validated by controlled scientific experimentation. The Justice's citations to Hempel<sup>6</sup> and Popper<sup>7</sup> lend themselves to that interpretation. Further, at the very beginning of the list of the factors the Justice suggested trial judges consider in evaluating the reliability of the proffered testimony, the Justice mentioned the "key question . . . of . . . whether [the theory] can be (and has been) tested."<sup>8</sup> These passages suggest that a showing of such experimentation is a "canonical"<sup>9</sup> or invariable requirement for validating a proffer of scientific evidence.

However, Professor Crump is right when he contends that *Daubert* need not and, more importantly, should not be read in that narrow manner. Justice Blackmun wrote that "[t]he inquiry envisioned by Rule 702 is, we emphasize, a flexible one."<sup>10</sup> More fundamentally, rather than naively lauding the scientific technique of controlled experimentation, in *Daubert* Justice Blackmun frankly acknowledged the limits of the scientific enterprise.<sup>11</sup> The experimental process is essentially inductive; and the process cannot yield certainty because there are always further experiments that could be conducted—and, thus, the unavoidable possibility of subsequent falsification of the theory.<sup>12</sup> The Justice's appreciation

6. *Daubert*, 509 U.S. at 593.

7. *Id.*

8. *Id.*

9. Sheila Jasanoff, *Judging Science: Issues, Assumptions, Models*, in ROSCOE POUND FOUNDATION, *SCIENTIFIC EVIDENCE IN THE COURTS: CONCEPTS AND CONTROVERSIES* (Report of the 1997 Forum for State Court Judges) 9, 11-12 (1997). See generally Adina Schwartz, *A "Dogma of Empiricism" Revisited: Daubert v. Merrell Dow Pharmaceuticals, Inc. and the Need to Resurrect the Philosophical Insight of Frye v. United States*, 10 HARV. J. L. & TECH. 149 (1997).

10. *Daubert*, 509 U.S. at 594.

11. See Edward J. Imwinkelried, *Evidence Law Visits Jurassic Park: The Far-Reaching Implications of the Daubert Court's Recognition of the Uncertainty of the Scientific Enterprise*, 81 IOWA L. REV. 55, 59-65 (1995).

12. See generally Margaret G. Farrell, *Daubert v. Merrell Dow Pharmaceuticals, Inc.: Epistemology and Legal Process*, 15 CARDOZO L. REV. 2183 (1994); Bert Black, *The Supreme Court's View of Science: Has Daubert Exorcised the Certainty Demon?*, 15 CARDOZO L. REV. 2129 (1994).

of those limits prompted him to remark that “arguably, there are no certainties in science.”<sup>13</sup> *Daubert* repudiates the simplistic, popular notion that science yields certainty.<sup>14</sup> It consequently would be ironic to treat the opinion as mandating that the proponent of expert testimony rely exclusively on controlled experimentation and induction.

In that respect, Professor Crump’s criticism of an illiberal reading of *Daubert* hits the mark. Rather than interpreting “appropriate validation” in light of the narrow scientific tradition, the expression should be read in light of the broader rationalist tradition in Anglo-American evidence law.<sup>15</sup> To begin with, controlled scientific experimentation is not the only basis for empirical induction. In some disciplines such as geology, scientists must rely on controlled observation rather than experimentation:

There is very little we can do in the way of laboratory experiments that can answer questions about what has been happening on the earth over millions of years. We cannot control at will the enormous forces that shape the earth’s surface—the glaciers, the volcanoes, the drift of the continents—nor can we wait millions of years for the outcome of such an experiment.<sup>16</sup>

Nor does induction exhaust the possibilities of validation. Professor Crump notes that Newton “deduced” many of his propositions about the behavior of phenomena in the corporeal world. A contemporary rationalist would certainly accept deduction as appropriate validation.<sup>17</sup> Like Baconian induction, deductive reasoning is a recognized branch of logic.<sup>18</sup> A proposition deduced by strict mathematic logic may be regarded as demonstrated or proven.<sup>19</sup>

Professor Crump is a bit unclear as to whether he would regard theorizing falling short of deduction as adequate validation. If he believes that there is adequate validation when an expert describes a theory that is (1) not logically self-contradictory and (2) consistent with an empirically validated theory, we part

13. *Daubert*, 509 U.S. at 590.

14. Imwinkelried, *supra* note 11, at 59-65.

15. WILLIAM TWING, *RETHINKING EVIDENCE: EXPLORATORY ESSAYS* 35, 40, 47-48, 74, 83 (1990); *see also* Imwinkelried, *supra* note 5, at \_\_\_\_.

16. MARTIN GOLDSTEIN & INGE F. GOLDSTEIN, *HOW WE KNOW: AN EXPLORATION OF THE SCIENTIFIC PROCESS* 171 (1978).

17. JOHN ZIMAN, *RELIABLE KNOWLEDGE: AN EXPLORATION OF THE GROUNDS FOR BELIEF IN SCIENCE* 150, 163-64 (1978).

18. DAVID L. FAIGMAN ET AL., *SCIENCE IN THE LAW: STANDARDS, STATISTICS, AND RESEARCH ISSUES* § 4-1.0 (2002) (discussing the method of drawing inferences from empirical evidence).

19. ALBUREY CASTELL, *AN INTRODUCTION TO MODERN PHILOSOPHY* 176 (2d ed. 1963); ZIMAN, *supra* note 17, at 150, 163.

company. I favor a more rigorous standard. However, I endorse Professor Crump's essential point that purportedly scientific testimony need not be validated by controlled scientific experimentation.

## II. WHAT MUST BE VALIDATED?

In order to expose the supposed weaknesses of a rigorous validation standard, Professor Crump poses a number of hypotheticals, notably ones involving two celebrated modern scientists, Albert Einstein and Sigmund Freud. One is a giant of the paradigmatic hard science of physics while the other was a pioneer in the soft science of psychiatry. Professor Crump asserts that the application of a rigorous admissibility standard would bar testimony by these scientific giants. In the course of his analysis of the Einstein hypothetical, Professor Crump states that a demanding validation standard would arguably "force [the trial judge] to exclude [Einstein] from the courtroom."<sup>20</sup> It is submitted that the analysis of these hypotheticals is flawed because it suffers from a misconception as to what must be validated.

In my comments on an earlier version of Professor Crump's article, I pointed him to a wonderful article by Professor Risinger.<sup>21</sup> In that article, Professor Risinger argues that *Daubert* should not be interpreted as requiring the judge to pass on the "global" reliability of the expert's discipline;<sup>22</sup> rather, the opinion ought to be read as mandating the judge to focus more narrowly on the reliability of the specific theory or technique the expert proposes relying on.

That reading of *Daubert* and its progeny is sound. Near the end of his opinion in *Daubert*, Justice Blackmun stated that the proponent's foundation must convince the trial judge that the theory or technique is sufficiently reliable to perform "the task at hand."<sup>23</sup> Earlier in the opinion, in the process of explaining the necessity that the theory or technique "fit" the case, the Justice elaborated that the theory or technique must have "a valid scientific connection to the pertinent inquiry."<sup>24</sup> The Court's 1997 decision in *General Electric Co. v. Joiner*<sup>25</sup> fits the same pattern. There, Chief Justice Rehnquist analyzed the question of whether the animal studies cited by the plaintiff were an adequate basis for the expert's opinion as to the cause of Joiner's small-cell lung cancer.

20. David Crump, *The Trouble with Daubert-Kumho: Reconsidering the Supreme Court's Philosophy of Science*, 68 MO. L. REV. 1, 22 (2003).

21. Michael D. Risinger, *Defining the "Task at Hand": Non-Science Forensic Science After Kumho Tire Co. v. Carmichael*, 57 WASH. & LEE L. REV. 767 (2000).

22. *Id.* at 773.

23. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 597 (1993).

24. *Id.* at 591-92.

25. 522 U.S. 136 (1997).

The Chief Justice initially listed the defense criticisms of the animal studies.<sup>26</sup> The Chief Justice then wrote:

Respondent [plaintiff] failed to reply to this criticism. Rather than explaining how and why the experts could have extrapolated their opinions from these seemingly far-removed animal studies, respondent chose "to proceed as if the only issue [was] whether animal studies could ever be a proper foundation for an expert's opinion." 864 F. Supp., at 1324. Of course, whether animal studies can ever be a proper foundation for an expert's opinion was not the issue. The issue was whether *these* experts' opinions were sufficiently supported by the [particular] animal studies on which they purported to rely.<sup>27</sup>

I was pleased to see that in the final version of his article, Professor Crump mentioned Professor Risinger's analytic approach. However, Professor Crump either rejects that approach or does not fully appreciate its significance. If that approach were applied to Professor Crump's Einstein and Freud hypotheticals, we could avoid the absurd consequence of barring these scientific giants from the courtroom.

At the macro level of a broad field of science, at any given time the discourse in the field will include a spectrum or mix of types of propositions. In some cases, the propositions circulating in the field will have such substantial supporting data that we can be relatively confident that we "know" the proposition to be true, at least as a working assumption. However, the discourse is also likely to include unsubstantiated conjectures and speculations that will later be exposed as invalid.<sup>28</sup> It would be premature to permit testimony about any theory circulating in the field simply because many, if not most, of the propositions current in the field's discourse have passed the muster of empirical validation. Inferring the truth of one proposition in the field from the truth of another proposition in the same field can be a classic *non sequitur*. Consider, for example, the discipline of forensic pathology. It is true that the courts routinely

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26. *Id.* at 144.

27. *Id.*; see also *Bourne ex rel. Bourne v. E. I. DuPont de Nemours*, 189 F. Supp. 2d 482, 496-97 (S.D. W. Va. 2002). The narrow focus is even clearer in the Court's 1999 decision involving non-scientific expert testimony, *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999). The Court emphasized that the expert Carlson had developed a "particular" method for determining whether a tire blowout was caused by a manufacturing defect. *Id.* at 154. Rather than relying on "the general theory that, in the absence of evidence of abuse, a defect will normally have caused a separation," Carlson "employed a more specific theory." *Id.* In Justice Breyer's words, "the question before the trial court was specific, not general." *Id.* at 156.

28. ZIMAN, *supra* note 17, at 130-33.

accept pathologists' testimony on a wide range of subjects.<sup>29</sup> Judicial receptivity to pathologists' opinions on many subjects, such as the estimation of stature from skeletal remains, is justifiable, because there is a substantial body of research investigating the accuracy of such estimations.<sup>30</sup> However, the literature in the pathology field also includes discussions of many novel conjectures, especially with respect to the determination of time of death.<sup>31</sup> Despite the respected status of the field of forensic pathology, it would be fallacious to leap to the conclusion that pathologists should be allowed to testify about any theory that has garnered a measure of attention in their field. Or, as Professor Risinger has argued, even if one posits the general reliability of the discipline of questioned document examination, that assumption does not dictate the admissibility of testimony identifying the individual author of handprinting by a native Japanese writer trained to eschew individuality and strictly follow a prescribed printing style.<sup>32</sup>

The same holds true at the micro level of the theorizing of an individual scientist. Although some of the expert's theories and techniques may warrant judicial acceptance, other conjectures by the scientist may not be ready for courtroom use. Consider Professor Crump's hypotheticals involving Einstein and Freud.

#### *A. Einstein*

As Professor Crump twice notes in his analysis of this hypothetical, a good deal of Einstein's theorizing about relativity has been empirically validated.<sup>33</sup> Astronomers' observations give us good, solid reason to believe in the gravitational impact of black holes. However, should we therefore conclude that Einstein would be entitled to testify about tachyons? Is it enough that the supposition of the existence of tachyons is consistent with other features of relativity theory?

That question should be answered in the negative. Induction lends little support to the supposition. Although there are data seemingly validating other aspects of relativity, there are apparently little or no data specifically pointing to the existence of tachyons. Moreover, the existence of tachyons cannot be "deduced" by strict logic. As a matter of logic, the tachyon supposition is

29. 2 PAUL C. GIANNELLI & EDWARD J. IMWINKELRIED, *SCIENTIFIC EVIDENCE* § 19-10(B) (3d ed. 1999).

30. *Id.* § 19-4(B).

31. *Id.* § 19-8(A).

32. Risinger, *supra* note 21, at 798-800 (citing *United States v. Fujii*, 152 F. Supp. 2d 939 (N.D. Ill. 2000)).

33. At one point, he states that "[m]any of the predictions of relativity theory have been verified by observation." Later, he refers to "relativity theory, much of which has been empirically verified." Crump, *supra* note 20, at 22.

consistent with other, validated features of relativity theory; but their validation does not dictate the truth of the supposition in the same manner in which Newton deduced physical laws. A scientist would find it relevant that the supposition is not self-contradictory and, better still, consistent with other, proven facets of relativity theory. However, without more, the appropriate scientific response is not to embrace the supposition but, rather, to characterize the supposition as a plausible theory worthy of serious investigation. In science, it is a grave mistake to equate the plausible and the proven. The scientist's basic mindset is skepticism.<sup>34</sup>

Professor Crump's analysis of the Freud hypothetical demonstrates the danger of accepting a theory simply because of its consistency with other, validated theories:

[S]ome of Freud's . . . hypotheses have been rejected by [subsequent] observation. His idea that personality development was concentrated in childhood stages . . . is contradicted by research indicating, instead, that development is lifelong, and his assertion that gender identity emerges from an "Oedipal complex" . . . is contradicted by evidence that gender identity emerges much earlier, and emerges in households without opposite-gendered parents.<sup>35</sup>

Does this mean, as Professor Crump fears, that a rigorous admissibility standard will force the courts to "exclude [Einstein] from the courtroom"? Of course not. What it means is that the attorney who calls Einstein to the stand would have to confine Einstein's testimony to the other physics theories that are supported by adequate validation—deduction or induction demonstrating that those theories are more than plausible speculations consistent with proven theories. Einstein would unquestionably be permitted to testify to those theories. For that matter, if on direct examination Einstein omitted any mention of tachyons, at least in the jury's presence, it is doubtful that the opposing attorney would even be allowed to question Einstein about his advocacy of a tachyon theory that lacked substantiation. An expert's advocacy of an unsubstantiated theory is certainly not recognized as a permissible method of impeachment in Article VII of the Federal Rules. If, albeit unsubstantiated, the theory is not self-contradictory and is consistent with other, validated theories, the tachyon theory is not outlandish. Hence, the expert's support for the theory has little probative value for the purpose of calling into question either the witness's mental competency or the witness's expertise. A judge with any degree of sophistication should realize that any scientist is likely to favor some theories that have not as yet been validated. Given that realization, many judges would

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34. ZIMAN, *supra* note 17, at 72, 109, 127.

35. Crump, *supra* note 20, at 25.



likely rule that under Federal Rule of Evidence 403,<sup>36</sup> the evidence has such minimal probative value that cross-examination about the tachyon theory should be precluded.

### B. Freud

Professor Crump fears that under a rigorous admissibility standard, Freud would suffer the same fate that he hypothesized for Einstein, namely, banishment from the witness stand. However, as in the case of Einstein, that fear is exaggerated.

Suppose that in a psychiatric malpractice case, the plaintiff alleged that the defendant psychiatrist was negligent in using psychoanalytic techniques to diagnose and treat the plaintiff. The defense calls Freud as a witness. Freud proposes testifying that his theories can be used effectively in treating disordered patients. Would that testimony necessarily lack “appropriate validation”? Here Freud would not be using his theories for predictive<sup>37</sup> purposes and attempting to testify that the patient’s disorder was probably caused by a disturbing childhood sexual encounter. Rather, Freud would simply be testifying that whatever the cause of the disorder, such disorders can sometimes be effectively treated by psychoanalytic techniques. Professor Crump states that Freud developed his dream process theory after “repeated empirical observations.”<sup>38</sup> We now have the benefit of the extensive, collective experience of many therapists who have relied on psychoanalytic techniques and witnessed an improvement in the mental health of numerous patients. That experience should be adequate validation in the malpractice case.<sup>39</sup>

Suppose, though, that in a rape prosecution, a psychiatrist was prepared to testify that the content of the alleged victim’s dreams is evidence that she was subjected to the rape alleged in the indictment. Professor Crump points out that in his work, Freud “did not pretend to be predictive.”<sup>40</sup> However, other mental health professionals have ventured into the predictive thicket and proposed

36. “Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence.” FED. R. EVID. 403.

37. Some have suggested that in this context, it would be preferable to use the expression “postdict,” rather than “predict.” See Deborah Davis & William C. Follette, *Rethinking Probative Value of Evidence: Base Rates, Intuitive Profiling, and the “Postdiction” of Behavior*, 26 LAW & HUM. BEHAV. 133 (2002). The inference is retrospective, inferring an earlier causal event from a currently existing condition or fact.

38. Crump, *supra* note 20, at 24.

39. Edward J. Imwinkelried, *Expert Witness: Beyond “One Size,”* NAT’L., Aug. 28, 2000, at A18.

40. Crump, *supra* note 20, at 24.

testifying that a patient's subsequent conduct and mental state evidenced an earlier, causal event such as a rape.<sup>41</sup> Now the "task at hand" differs. In this variation of the hypothetical, our Freud is being invited to draw a different inference. The witness's theory is being pressed into service as a fact-finding tool.<sup>42</sup> Even if the witness's other theories have been verified and other applications of dream theory have been validated, the judge would be entitled to bar this testimony absent a stronger foundation.<sup>43</sup>

In short, Professor Crump is correct in thinking that Einstein and Freud would suffer the same fate. However, it is not the fate Professor Crump fears. They would not be altogether barred from the courtroom simply because some of their theories did not satisfy a rigorous admissibility test for scientific testimony. Rather, the judge would focus on the "task at hand," the evaluation of the specific theory or technique that the expert contemplated relying on to make the determination to which the expert was called to testify. If the foundation for that theory or technique comported with a broad rationalist understanding of "validation," the testimony should be ruled admissible. However, the admissibility of that testimony would not mandate or justify Einstein's or Freud's testimony about unsubstantiated theories that are nothing more than plausible hypotheses worthy of systematic scientific investigation.

### III. CONCLUSION

Professor Crump has done us an important service by demonstrating the danger of equating "appropriate validation" with controlled scientific experimentation and induction. *Daubert* does not demand that equation. The analysis of the reliability of proffered scientific testimony ought to be informed by the broader rationalist tradition in Anglo-American evidence law. Controlled experimentation, controlled observation, and deduction all would be satisfactory to a skeptical rationalist.

However, Professor Risinger has done us an equally important service by demonstrating the wisdom of focusing on the specific "task at hand" in evaluating the reliability of scientific testimony. Professor Crump loses sight

41. 1 GIANNELLI & IMWINKELRIED, *supra* note 29, § 9-4 (a discussion of rape trauma syndrome).

42. *See* State v. Saldana, 324 N.W.2d 227, 230 (Minn. 1982).

43. Imwinkelried, *supra* note 39, at A18. In *Daubert*, Justice Blackmun commented:

The study of the phases of the moon . . . may provide valid scientific "knowledge" about whether a certain night was dark . . . . However, . . . evidence that the moon was full on a certain night will not assist the trier of fact in determining whether an individual was unusually likely to have behaved irrationally on that night.

*Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 591 (1993).

of that focus in his analysis of the Einstein and Freud hypotheticals. Without a better foundation, as a trial judge I would bar even an Einstein from testifying about the existence of tachyons. However, I would still permit him to testify about other, substantiated facets of relativity theory. His support for the tachyon supposition would not preclude his testimony about those other facets, and under Rule 403 I would be strongly inclined to prevent the cross-examiner from even questioning Einstein about his tachyon theory.

By the same token, as a trial judge I would prevent even a Freud from giving predictive testimony, based on a psychiatric theory which is merely plausible. The theory might relate to an important enough question to warrant the time and expenditure of subsequent scientific study, but again, without more the trial judge should not allow the expert to draw a predictive inference based on the theory. Yet, as the psychiatric malpractice example illustrates, if the "task at hand" changes, the same expert ought to be permitted to testify about other theories which are supported by adequate validation; and sometimes collective, successful clinical experience will constitute adequate foundation. The theories of neither a discipline nor even an individual expert within the discipline should be assessed "globally." The most sensible approach is to demand validation for the specific theory or technique the expert invokes. That approach is consistent with the scientific tradition. Even when a theory is plausible, a scientist should regard it with skepticism<sup>44</sup> rather than accepting the theory at face value. After announcing the relativity theory, Einstein himself wondered out loud whether the theory would later be "proven correct."<sup>45</sup> In Einstein's words, "[t]he important thing is not to stop questioning."<sup>46</sup>

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44. ZIMAN, *supra* note 17, at 72, 109, 127.

45. Address at the Sorbonne, Paris, December 1929, *quoted in* THE OXFORD DICTIONARY OF MODERN QUOTATIONS 73 (T. Augarde ed., 1991).

46. Personal memoir of William Miller, Editor, LIFE (May 2, 1955), *quoted in* THE GREAT QUOTATIONS 225 (G. Seldes ed., 1993).