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Leveraging Bias in Forensic Science

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Roger Koppl

Abstract

Dr. Simon Cole calls for a more hierarchical organization of forensic science in his challenging Article, Acculturating Forensic Science: What is 'Scientific Culture', and How can Forensic Science Adopt it? Koppl thinks Dr. Cole is right to say that there are different roles in forensic science, but somewhat mistaken in his call for hierarchy.

KEYWORDS: forensic science, Cole, hierarchy, medicine

LEVERAGING BIAS IN FORENSIC SCIENCE

Roger Koppl[*Φ]

A Response to Simon A. Cole, *Acculturating Forensic Science: What Is 'Scientific Culture', and How Can Forensic Science Adopt It?*, 38 FORDHAM URB. L.J. 435 (2010).

Dr. Simon Cole calls for a more hierarchical organization of forensic science in his challenging Article, *Acculturating Forensic Science: What is 'Scientific Culture', and How can Forensic Science Adopt it?*[1] I think Dr. Cole is right to say that there are different roles in forensic science, but somewhat mistaken in his call for hierarchy.

Dr. Cole points out that the term "forensic science" covers a variety of activities that may require rather different skills. He divides forensic science into five groups of activities: (1) basic research, (2) evidence collection, (3) technical management, (4) analysis, and (5) interpretation.[2] He associates each group of activities with a different set of epistemic virtues. Basic researchers, for example, should "innovate" and "subject their innovations to

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1. Simon Cole, *Acculturating Forensic Science: What is 'Scientific Culture', and How Can Forensic Science Adopt It?*, 38 FORDHAM URB. L.J. 435, 468 (2010).

2. *Id.* at 454-57.

rigorous scrutiny."[3] By contrast, analysts (bench examiners) should be "careful, meticulous, and honest."[4]

Dr. Cole calls for "hierarchy" to empower basic researchers to make decisions that must be obeyed during the examination and interpretation of forensic evidence.[5] The best available option, Dr. Cole says, is "a 'hierarchical' model in which a 'knowledge elite' of researchers exerts control over practitioners."[6] Thus, Dr. Cole has not chosen an inappropriate or misleading term for his desired outcome. He really is calling for a genuine hierarchy that would empower an "elite" group within the general field. Medicine is the model. The medical profession has been organized hierarchically such that an elite of basic researchers controls the actions of practitioners. Dr. Cole thinks medicine is a good model in part because "society is reasonably content with the hierarchical model in medicine."[7]

The bare bones of the argument, then, seem to be that medicine is working pretty well and it is hierarchical. Knowledge cascades down from the research elite to practicing physicians. Similarly, forensic science should ensure that bench examiners do only what the knowledge elite allows. This division of intellectual labor will help to ensure that no bench examiner uses unreliable and perhaps improvised techniques. Presumably, some of the "research" in the Kirk Turner case provides an extreme example of what Dr. Cole wishes to prevent.[8]

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3. *Id.* at 457.
4. *Id.*
5. *Id.* at 468-69.
6. *Id.* at 468.
7. *Id.*
8. *See* Joseph Neff, *Agents' Secrets: Bloodstain Pattern Evidence*, NEWOBSERVER.COM, http://video.newsobserver.videos.vmixcore.com/vmix_hosted_apps/p/media?id=17182298&item_index=1&genre_id=1153&sort=NULL (last visited Dec. 29, 2011).

I like much of Dr. Cole's analysis, including his emphasis on the division of labor within forensic science. But, his call for hierarchy misses the mark, and he exaggerates both the degree of hierarchy in medicine and the quality of medical research. I will take up the example of medical research first and then discuss hierarchy in forensic science. My criticism of Dr. Cole's reform proposal does not imply that his analyses of infirmities in forensic science are equally flawed. On the contrary, I have learned a great deal from Dr. Cole and his co-authors, whose work I admire greatly. Dr. Cole has done important work in showing that forensic science, especially fingerprint analysis, is less reliable and less grounded in sound research than either its practitioners or the general public might have imagined. He has chronicled errors and explained how the universal cognitive architecture of humans can lead forensic scientists astray. But, to borrow Dr. Cole's medical analogy, diagnosis and therapy are not the same. I recognize and admire Dr. Cole's diagnostic skills even as I challenge the wisdom of his therapeutic advice.

I. MEDICINE

A. Who Chose the Current System?

I confess to some perplexity at Dr. Cole's claim that "society is reasonably content with the hierarchical model in medicine."[9] In what sense? Has "society" somehow surveyed the alternatives and chosen the current system as the least-worst option? The current system is not the product of any rational choice, even though the conflicting individual choices that led, higgledy-piggledy, to the current system may have all been perfectly "rational" in some sense.

9. Cole, *supra* note 1, at 468.

The organization of the market for health care, like the organization of most markets, is a product of the shifting politics of interest groups. Economists are nearly unanimous, for example, in the view that licensing restrictions in medicine have served physicians better than patients,[10] and many view the existing restrictions as mostly a sop to the special interests of the American Medical Association (AMA).[11] As the economic theory of "public choice" teaches, elected officials in a representative democracy have an incentive to concentrate benefits and disperse costs.[12] The contest of interests often produces a "system" that is not systematic at all. Understanding what the system is, who is benefitting, and so on requires more time than most voters can reasonably invest. Voters are "rationally ignorant" about the system, which makes it easier for the game to continue. I do not mean to deny that ideology and high principle also influence outcomes. I mean only to deny that the existence of a system implies that voters have somehow chosen the system or approved it.

B. How Hierarchical Is Medicine?

Dr. Cole identifies a "knowledge elite" in medicine, consisting of a group of researchers that "exerts control over practitioners."[13] "These researchers are engaged in basic research and the production of knowledge about the natural world. They may never see patients, never have seen a patient since medical school . . . or (in the case of Ph.D.'s) never have seen a patient at all."[14] Below this group of "biomedical researchers" are

10. *See* Shirley Svorny, *Licensing Doctors: Do Economists Agree?*, 1 ECON J. WATCH 219, 285-89 (2004) (citations omitted).

11. *See id.*

12. *See* 3 JAMES M. BUCHANAN & GORDON TULLOCK, THE CALCULUS OF CONSENT: LOGICAL FOUNDATIONS OF CONSTITUTIONAL DEMOCRACY (1962), *reprinted in* THE COLLECTED WORKS OF JAMES M. BUCHANAN 146-48 (1999).

13. Cole, *supra* note 1, at 468.

14. *Id.* at 464.

the "clinical physicians."[15] Members of this second group "need not . . . perform research themselves or even be competent to perform research."[16] Dr. Cole does not indicate how much of an overlap might exist between these two groups. But the supposed gold standard in medical research, the double-blind clinical trial, requires working with real human patients. Moreover, clinical practice does give rise to contributions to the literature in medical science. THE LANCET regularly runs articles under the heading "case report." A recent issue (15-21 October 2011) has a "case report" on the diagnosis of a cervical lump in a forty-four year-old Moroccan man.[17] It draws general inferences, including the importance of considering the geographical origins of patients.[18] The same issue of THE LANCET has several "cohort studies," in which a group receives medical treatment (or shares some condition) and long-term outcomes are chronicled. Picking one at random, I find that two of the co-authors performed surgery on 90% of the cohort.[19] Thus, medical practice and medical research are more mingled than Dr. Cole seems to suggest.

Although practice and "discovery science" may be more mixed than Dr. Cole suggests, some writers lament the gap between them. Persell et al., for example, note that patients may present combinations of conditions not represented in the research of the randomized controlled studies of medicine's "knowledge elite."[20] In their study of

15. *Id.* at 464-65.

16. *Id.*

17. *See* Alexander D. Coronet et al., *Cervical Lump? The Clue Is in the Hotspot*, 378 LANCET 1438, 1438 (2011).

18. *See id.*

19. *See* Jane de Tsi et al., *The Long-Term Outcome of Adult Epilepsy Surgery, Patterns of Seizure Remission, and Relapse: A Cohort Study*, 378 LANCET 1388, 1388 (2011).

20. *See* Stephen D. Persell, M.D., et al., *Frequency of Inappropriate Medical Exceptions to Quality Measures*, 152 ANNALS INTERNAL MED. 225, 228 (2010) ("[P]ractice guidelines have

clinicians, Persell et al. found that deviation from "guideline-recommended care" was "valid most of the time."[21] Tonelli draws the inference from this study and others that "[t]here is no hierarchy of medical knowledge or medical evidence for clinical practice."[22] Tonelli exemplifies a literature that resists the very hierarchy of evidence-based medicine that Dr. Cole celebrates.

I do not know whether the critics of evidence-based medicine exaggerate the talents of clinicians. Two inferences from this literature seem reasonably safe, however. First, the hierarchical model of medicine does not enjoy universal acclaim or even acceptance. Second, medical practitioners can and do exercise judgment in applying the protocols and guidelines handed down from the knowledge elite of medicine. This role of judgment in medicine may be good or bad. It may or may not be desirable that bench examiners in crime labs exercise a similar judgment. In any event, however, medicine does not seem to be as good a model for Dr. Cole's desired system as he seems to suggest.

C. How Good Is Medical Research?

Whether or not "society *is* reasonably content with the hierarchical model in medicine,"[23] we may ask whether society *should* be. Is medical research in this country (and elsewhere) all that good? Unfortunately, medical research is probably not as good as we might have imagined.

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been criticized because the[ir] recommendations may be inappropriate for individual patients or because they may create undue burden for patients with many medical problems.").

21. *Id.*

22. Mark R. Tonelli, *Integrating Clinical Research into Clinical Decision Making*, 47 ANN. IST. SUPER. SANITÀ 26, 29 (2011) (It.).

23. Cole, *supra* note 1, at 468 (emphasis added).

Douglas A. Altman says "[t]here is considerable evidence that many published reports of randomized controlled trials (RCTs) are poor or even wrong, despite their clear importance."[24] He lists seven widespread problems including "[n]ot reporting an adequate method for generating random numbers" and "[i]nadequate information on harmful consequences of interventions."[25] Berger, Matthews, & Grosch give three examples in which experimental precautions against observer effects are compromised by "inappropriate yet regimented research methods."[26] In the most striking of the three examples, "run-in bias" is created by deleting adverse events prior to randomization.[27] "In randomized treatment trials," they explain, "it is common to pre-treat the patients with the active treatment, evaluate their outcomes, and determine which patients to randomize based upon those outcomes. Bad outcomes (even deaths) prior to randomization do not make it into the analysis and do not count against the active treatment under scrutiny."[28]

John P.A. Ioannidis explains why "most current published research findings are false."[29] I have reviewed his argument more carefully elsewhere.[30] The essence of his finding, however, is fairly straightforward. If many researchers are confident that, for example, sunspots cause

24. Douglas C. Altman, *Poor Quality Medical Research: What Can Journals Do?*, 287 JAMA 2765, 2765 (2002) (citations omitted).

25. *Id.* at 2766.

26. Vance W. Berger et al., *On Improving Research Methodology in Clinical Trials*, 17 STAT. METHODS MED. RES. 231, 231 (2008).

27. *Id.* at 234-35.

28. *Id.* at 234.

29. John P.A. Ioannidis, *Why most Published Research Findings Are False*, 2 PLOS MED. 0696, 0696 (2005), *available at* http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.0020124.

30. *See* Roger Koppl, *The Social Construction of Expertise*, 47 SOC'Y 220, 222 (2010).

baldness, there will be many studies examining this relationship. The few studies that generate a positive result by chance will be published. Sincere and honest researchers who get negative results may innocently cast about for reasons to doubt their own findings. Rather than attempting to publish the negative result, they search the space of regression equations, adding and dropping regressors, discarding "outliers," and so forth. If the search chances upon the "right" combination to generate a positive result, the researcher will be rewarded with a well-cited publication that strengthens the growing evidence for a link between sunspots and baldness. "The probability that at least one study, among several done on the same question, claims a statistically significant research finding," grows as the number of such studies grows.[31] Ioannidis says that "[t]he greater the number . . . of tested relationships in a scientific field, the less likely the research findings are to be true."[32] And, "[t]he greater the flexibility in designs, definitions, outcomes, and analytical modes in a scientific field, the less likely the research findings are to be true."[33]

The poor quality of medical research is reflected in the regular reversal of past results. Recently, for example, a well-publicized study has overturned the previous wisdom that vitamin E reduces the risk of prostate cancer in men.[34]

D. What About Outcomes?

The infirmities of biomedical research might matter less if patient outcomes were better.

31. *See* Ioannidis, *supra* note 29, at 0697.
32. *Id.* at 0698.
33. *Id.*
34. *See Vitamin E No Panacea for Prostate Cancer*, S. DIEGO UNION TRIB., Oct. 18, 2011, *available at* http://www.signonsandiego.com/news/2011/oct/18/vitamin-e-no-panacea-for-prostate-cancer/?page=1#article.

Unfortunately, the evidence suggests that modern medicine has relatively modest benefits in supporting patient outcomes.

Adverse events are relatively common. Brennan et al. found that at least 3.2% of hospital admissions in the U.S. result in errors that either prolong admission or produce a disability at the time of discharge.[35] Andrews et al. found a much higher rate of 17.7%.[36] One study found the rate of adverse drug events during hospitalization to be 4.2%.[37] A more recent study found a rate of at least 8%.[38] Adverse events are rather serious and were measured only in the hospital in the studies I have cited. Presumably, other cases of poor outcomes from medical practice occur in relatively high rates as well.

Hanson reviews evidence that medical care and expenses are not strongly correlated with health outcomes.[39] The Rand study seems to have been the only randomized controlled study of the relationship between healthcare expenditures and healthcare outcomes.[40] The study randomly assigned

35. *See* Troyen A. Brennan et al., *Incidence of Adverse Events and Negligence in Hospitalized Patients: Results of the Harvard Medical Practice Study I*, 324 NEW ENG. J. MED. 370, 370 (1991).

36. *See* Lori B. Andrews et al., *An Alternative Strategy for Studying Adverse Events in Medical Care*, 349 LANCET 309, 309 (1997).

37. *See* Bonnie L. Senst et al., *Practical Approach to Determining Costs and Frequency of Adverse Drug Events in a Health Care Network*, 58 AM. J. HEALTH-SYS. PHARMACY 1126, 1129 (2001).

38. *See* Mark L. Metersky et al., *Racial Disparities in the Frequency of Patient Safety Events: Results from the National Medicare Patient Safety Monitoring System*, 49 MED. CARE 504, 508 tbl. 3 (2011).

39. *See* Robin D. Hanson, *Showing That You Care: The Evolution of Health Altruism*, 70 MED. HYPOTHESES 725, 728-30 (2008).

40. ROBERT H. BROOK ET AL., RAND CORP., THE EFFECT OF COINSURANCE ON THE HEALTH OF ADULTS: RESULTS FROM THE RAND HEALTH INSURANCE EXPERIMENT 1 (1984), *available at* http://www.rand.org/pubs/reports/2006/R3055.pdf.

2,005 families to one of several insurance plans.[41] Some plans were more generous than others, and one plan offered free care.[42] The study showed little to no benefit of free care besides lower blood pressure and getting corrective lenses to improve "far vision."[43] The beneficial effect for both measures was low.[44] The other studies Hanson reviewed came to qualitatively similar results. Hanson says: "An optimistic accounting of the benefits of specific treatments attributes only five years of the 40 or more years of added lifespan over the last two centuries to medicine."[45] These studies may underestimate the importance of modern medicine in, for example, reducing the risks of childbirth. Even here, however, there is some ambiguity about the relative importance of medical innovations such as forceps and non-medical factors such as improved diet.[46] Overall, the evidence seems to support the view that Dr. Cole should be more skeptical about the relationship between medicine and health.

Neither the general public nor anyone in particular chose the American medical system. Medical research is less hierarchical than Dr. Cole seems to suggest. The hierarchy that does exist seems to have created a gap between the findings of the research elite and the clinical needs of practitioners and their patients. The quality of research by the elite seems to be well below the standard Dr. Cole likely desires. And modern medical practice may have much less to do with health outcomes than Dr. Cole seems to implicitly assume. Overall, then, medicine may

41. *See id.* at 3-4.
42. *See id.*
43. *Id.* at 18-19.
44. *See id.*
45. Hanson, *supra* note 39, at 729 (citing John P. Bunker et al., *Improving Health: Measuring Effects of Medical Care*, 72 MILBANK Q. 225, 237-38 (1994)).
46. *See* Johanson et al., *Has the Medicalisation of Childbirth Gone Too Far?*, 324 BRIT. MED. J. 892, 892 (2002).

not represent an ideal for forensic science to emulate.

II. FORENSIC SCIENCE

It is not a coincidence that the actually existing hierarchy in medicine turns out, upon examination, to be less attractive than Dr. Cole seems to believe. I think Dr. Cole errs in trying to set up a system in which knowledge cascades downward from an elite. I will risk caricaturing Dr. Cole's position by characterizing it in plain terms. Dr. Cole recognizes that bench examiners may be led astray by cognitive bias. Bench examiners' lack of rigorous scientific training compounds the problem when they invent techniques ad hoc, deviate from protocol, or otherwise exceed their competence.[47] Dr. Cole wishes to fix the problem by creating an elite that will remove the exercise of discretion from the lower levels of the hierarchy.[48] Stripped of their discretion, bench examiners will not be able to unconsciously skew results in accordance with the bench examiners' cognitive biases. Unfortunately, Dr. Cole does not consider who will capture this hypothetical National Institute of Forensic Science (NIFS).[49] Nor does he recognize that the lower levels of the hierarchy, especially that of "technical management," will have to exercise discretion, the knowledge hierarchy

47. *See* Cole, *supra* note 1, at 459 (citation omitted) ("[T]hey are often not trained to do basic research, lack the resources typically available to researchers at university, industrial, and government laboratories, and lack the professional networks basic researchers use to test their research and generate innovation.").

48. *See id.* at 468-69 ("Researchers would have the last word on whether a method or technique is valid. Technicians would no longer be put in the awkward position of having to defend the validity of the techniques they apply.").

49. The proposal for an NIFS was made in NAT'L RES. COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 19 (2009), *available at* http://judiciary.house.gov/hearings/printers/111th/111-28_49681.PDF.

notwithstanding. Finally, Dr. Cole does not seem to have considered the possibility of creating a system of checks and balances in which one bias checks another.

A. Who Will Capture NIFS?

Dr. Cole says, "In proposing hierarchy, it should be noted that we are not proposing the creation of an elite 'priesthood' that would have a monopoly on the legitimation of knowledge."[50] He elaborates, "Basic Researchers would be expected to be a diverse group of scientists with diverse viewpoints, as medical researchers are today."[51] And he compares NIFS to the National Institutes of Health or the Food and Drug Administration.[52] As Ioannidis and others suggest, the viewpoints of medical researchers are not particularly diverse; research fashions come and go.[53]

It matters, I think, just what role NIFS would play and just who would be acting in that role. Presumably, NIFS would be the main source of funding for research in forensic science. If so, it is important to look into the incentives of NIFS officials. Dr. Cole *wants* "diverse viewpoints,"[54] but will NIFS deliver? The results of NIFS-sponsored research would vary depending on who reviews grant proposals. Imagine two scenarios. First, imagine scientists, who agree with Budowle et al. that "[a] community-wide error rate is not meaningful,"[55] dominate NIFS review panels. Now imagine that scientists who agree with Dr. Cole dominate NIFS review panels. In

50. Cole, *supra* note 1, at 469 (citation omitted).
51. *Id.*
52. *See id.*
53. *See* Ioannidis, *supra* note 29, at 0700.
54. *See* Cole, *supra* note 1, at 469 ("Basic Researchers would be expected to be a diverse group of scientists with diverse viewpoints, as medical researchers are today.").
55. Bruce Budowle et al., *A Perspective on Errors, Bias, and Interpretation in Forensic Sciences and Direction for Continuing Advancement*, 54 J. FORENSIC SCI. 798, 801 (2009).

which scenario is research more likely to estimate error rates in forensic science? The Dr. Budowle group and the Dr. Cole group would earnestly strive to uphold the highest scientific standards. Given their prior views, however, the two different groups will assess competing research proposals differently and the results of the process will differ radically. Dr. Cole is right to extol "diverse viewpoints," but it might be hard for a homogeneous group, be they Dr. Budowle disciples or Dr. Cole disciples, to avoid skewing research awards toward scholars and scientists who seem to be leaning in the same direction. I appreciate Dr. Cole's aversion to "an elite 'priesthood' that would have a monopoly on the legitimation of knowledge,"[56] but the very existence of NIFS would seem to create a substantial risk of creating such a priesthood.

In part, I am raising the problem of regulatory capture. Dr. Cole recognizes that "[i]f [NIFS] is 'captured' by law enforcement, it becomes less obvious that it would be a force for improvement rather than stagnation."[57] He does not offer any suggestions, however, for avoiding this result.

Regulatory and oversight bodies are supposed to constrain special interests and protect the general interest. When regulatory and oversight bodies instead *serve* special interests, these bodies have been "captured." An industry must offer something in return if it is to capture a regulator. The reciprocation may consist of campaign contributions to members of Congress who provide oversight of the regulatory body. It may take any of an indefinitely large number of other forms. Capture is the norm, unfortunately, which makes beneficial change hard. The first great regulatory body in the U.S. was the Interstate Commerce Commission (ICC), which was established in 1887 to control railroads. The Interstate

56. Cole, *supra* note 1, at 469 (citation omitted).
57. *Id.* at 436.

Commerce Act prohibited price discrimination and required that "all charges . . . shall be reasonable and just."[58] This language seems to constrain the railroads, and yet the railroads supported the Act.[59] Posner explains: "The railroads supported the enactment of the first Interstate Commerce Act, which was designed to prevent railroads from practicing price discrimination, because discrimination was undermining the railroads' cartels."[60]

The interest that captures a regulator may not be the regulated industry. "Crudely put, the butter producers wish to suppress margarine and encourage the production of bread."[61] For example, the railroads sometimes used state regulators to suppress trucking.[62] In the 1930s, "Texas and Louisiana placed a 7000-pound payload limit on trucks serving (and hence competing with) two or more railroad stations, and a 14,000-pound limit on trucks serving only one station (hence, not competing with it)."[63]

The theory of supply and demand predicts that a commodity sold on a competitive market will end up in the hands of those who value it most, as measured by willingness to pay. The theory does not tell us, however, who is willing to pay the most. Similarly, the theory of regulatory capture does not tell us who will win in the contest of interests to capture a regulator. It is a continuous fight; victory may be partial and fleeting. Nevertheless, we can say that concentrated interests aid victory. Well-

58. Interstate Commerce Act, ch. 104, § 1, 24 Stat. 379, 379 (1887) (codified as amended in scattered sections of 49 U.S.C.).

59. *See* Richard A. Posner, *Theories of Economic Regulation*, 5 BELL J. ECON. & MGMT. SCI. 335, 337 (1974).

60. *See id.*

61. George Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3, 6 (1971).

62. *See id.* at 8.

63. *Id.*

organized groups with relatively large and homogeneous interests have an advantage in the contest. Considering who fits that bill for NIFS, the answer may be law enforcement. According to Bureau of Labor Statistics data, in 2008 the number of police and detectives, corrections officers and jailers, first-line supervisors and managers of corrections officers, bailiffs, and probation officers was 1,505,200.[64] These people are part of a relatively large, concentrated, well-organized, and homogeneous interest group. Is there any other interest group, such as the innocence movement,[65] in a good position to compete with law enforcement? And if so, for how long?

B. Hierarchy Does Not Eliminate Discretion

Dr. Cole's appeal to hierarchy may have another limit. As in medicine, there is a gap between the needs of practitioners and the general results produced by the knowledge elite. In medicine, the patient may have unique or unusual combinations of characteristics, such as concurrent diseases. In forensic science, the evidence may have unique or unusual combinations of characteristics, such as material substrates. Thus, validation studies in fingerprint analysis may not help the bench examiner to evaluate a latent print deposited on wood grain or a pebbled lampshade. The advocates of sequential unmasking recognized the importance of case specific judgment by separating the task of a case manager (a part of "technical

64. There were approximately 883,600 employed police and detectives in 2008. *See* BUREAU OF LABOR STATISTICS, OCCUPATIONAL OUTLOOK HANDBOOK 2010-11 EDITION, BULLETIN 2800, 476 (2010), *available at* http://www.bls.gov/oco/oco2008.htm. 454,500 were employed as jailers or correctional officers; 43,500 as first-line supervisors and managers thereof; and 20,200 as bailiffs in 2008. *See id.* at 469. And, there were 103,400 employed probation officers and correctional treatment officers in 2008. *See id.* at 243. The sum of these numbers is 1,505,200.

65. *See, e.g.*, INNOCENCE PROJECT, http://www.innocenceproject.org (last visited Nov. 2, 2011).

management," presumably) from that of a bench examiner.[66] Context information is not hidden from the case manager who determines what potentially biasing information is revealed to the bench examiner in what sequence.[67] This separation of tasks may reduce the element of discretion in the work of bench examiners, though it will probably not eliminate it.

To effect sequential unmasking and the separation of tasks between the case manager and the bench examiner *requires* the exercise of discretion by the case manager, whose job cannot be reduced to a routine. I do not understand how increased hierarchy can solve the problems in forensic science when a crucial worker in the system, the case manager operating well below the level of Basic Research, must use judgment and discretion in her daily work. Recall that Dr. Cole favors "a 'hierarchical' model in which a 'knowledge elite' of researchers exerts control over practitioners."[68] But to exert control means to pre-decide, and thus, to eliminate judgment and discretion, and the infinite variety of case particulars prevents the elite from making all decisions in advance. It therefore prevents the elite from exercising effective control over practitioners.

66. *See* Dan E. Krane et al., *Letter to the Editor: Sequential Unmasking: A Means of Minimizing Observer Effects in Forensic DNA Interpretation*, 53 J. FORENSIC SCI. 1006, 1006 (2008), *available at* http://www.bioforensics.com/sequential_unmasking/ ("A simple protocol would dictate a separation of tasks between a qualified individual familiar with case information (a case manager) and an analyst from whom domain-irrelevant information is masked.").

67. *See id.*; D. Michael Risinger et al., *The* Daubert/Kumho *Implications of Observer Effects in Forensic Science: Hidden Problems of Expectation and Suggestion*, 90 CALIF. L. REV. 1, 35-38 (2002).

68. Cole, *supra* note 1, at 468.

C. Why Not Leverage Bias?

Dr. Cole does not discuss the possibility of *leveraging* bias to achieve more satisfactory results by strengthening the defense right to expertise.[69] A defense right to forensic expertise is the single best way to reduce the incidence of false and misleading forensic science testimony. E. James Cowan and I explain why competition between "strongly opposed" experts tends to improve the quality of information they provide to third parties such as juries.[70] "If the interests of the competing information suppliers are strongly opposed then one of them always has an incentive to provide additional information."[71] If some bit of relevant information has not been revealed, then, by virtue of the fact that it is relevant, it will help one side or the other. Accordingly, one side or the other will have an incentive to reveal it.[72] This logic works even if both sides are biased. It requires only that their interests in the case be strongly opposed. Thus, the adversarial system of Anglo-American jurisprudence allows for pitting one bias against another to produce results that more closely resemble the consequences of unbiased analysis. Although it is important to attempt to *reduce* bias by measures such as sequential unmasking, all such measures are incomplete. The remaining biases

69. *See* Paul C. Giannelli, Ake v. Oklahoma: *The Right to Expert Assistance in a Post-*Daubert*, Post-DNA World*, 89 CORNELL L. REV. 1305, 1358 (2004) ("Under a Sixth Amendment theory, an expert should be appointed whenever necessary for counsel to render effective assistance 'whenever the [expert] services are necessary to the preparation and presentation of an adequate defense.'") (footnote omitted) (internal quotations omitted).

70. *See* Roger Koppl & E. James Cowan, *A Battle of Forensic Experts Is Not a Race to the Bottom*, 22 REV. POL. ECON. 235, 253 (2010) (citing Milgrom & Roberts, *Relying on the Information of Interested Parties*, 17 RAND J. ECON. 18, 25, 26 (1986)).

71. *Id.*

72. *See id.*

should also be *leveraged* by pitting one expert against the other. We need checks and balances.

The existence of defense experts in forensic science would also create a self-renewing foundation for continuous improvement in forensic science. Many reforms do not stick. A new reform is generally effective only when it is first applied, and perhaps not even then. If the reform works initially, it is because the affected parties have no coping strategies. Over time, however, those affected parties learn compensating strategies and the reform loses its beneficial effects. The reform does not stick. For example, affected parties may capture an oversight body. A body of scientific experts similar to public defenders and allied with them would, however, act to preserve its own existence in much the way that public defenders are unlikely to be subverted from their adversarial role. The reform creating such a group is, therefore, a self-sticking reform. The reform creates an organized body of persons with a direct interest in maintaining the reform. Once this reform is in place, each criminal case will have two forensic experts with strongly opposed interests. Each side will have an incentive to document the upstream deficiencies of the system and bring them to the attention of the court whenever that is strategically appropriate. In this way, competing forensic experts become the central self-regulatory element of the system. Such a reform would be truly transformative of the criminal justice system in America.

In an earlier article, I have suggested a suite of reforms that would make forensic science a self-governing system that reduces bias through measures such as sequential unmasking, but also leverages biases through competing experts.[73] Redundancy is an essential feature of my

73. *See generally* Roger Koppl, *How to Improve Forensic Science*, 20 EUR. J. L. & ECON. 255 (2005).

proposal.[74] Unfortunately, I cannot expand on the important principle of redundancy in this already lengthy Response.

III. TWO PATHS FORWARD

The subtitle of the 2009 National Academy of Sciences (NAS) report was A PATH FORWARD.[75] In recommending oversight through NIFS the report did reveal a path forward. It revealed the path of oversight, command, and control.[76] But there is a second path neglected by both the authors of the NAS report and Dr. Cole. That is the path of checks and balances, the path that leverages the biases and infirmities of the real human actors in the system to generate results that are better than the results any one person could have produced.

Discovery science is such a system. Discovery science advances by the rivalry of theories, schools, and individual personalities. Every physicist since Galileo and before has had his or her personal limits, quirks, and intellectual prejudices. And yet the corpus of physical theory is one of the greatest achievements of the human intellect. The system is better than any of its parts. The forensic science community should seek out ways to make the social structure of forensic science more nearly resemble the social structure of discovery science, rather than the questionable social structure of medicine. Command and control systems of the sort Dr. Cole recommends are vulnerable to take-over by elites that may represent narrow interests or simply lack the talents required to make the system work well. No matter who runs the show, command and control systems cannot be better than the elites that control those systems, and may be a good deal

74. *See id.* at 467-69.
75. NAT'L RES. COUNCIL, *supra* note 49.
76. *See id.* at 78-79.

worse. We should think more about the path not taken by the NAS.