

SCIENCE-DEPENDENT PROSECUTION AND THE PROBLEM OF
EPISTEMIC CONTINGENCY:
A STUDY OF SHAKEN BABY SYNDROME

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The path of scientific change is unforeseeable and may be marked by abrupt shifts in course. When these shifts occur, our criminal justice system is ill-equipped to respond expeditiously; it thus lags behind scientific frontiers. In an age where science-dependent prosecutions are proliferating, this failure is of particular concern. Because it is fully constructed by and dependent on medical expertise, Shaken Baby Syndrome (SBS) raises in stark form the problems that arise when science outpaces law—most troublingly, the prospect that we are imprisoning people who have committed no crime. The trajectory of SBS in the criminal courts reveals fundamental limitations of our system’s ability to absorb forensic advances in a manner consistent with the administration of justice. The law may ultimately align itself with the latest scientific thinking, but it is doing so slowly, arbitrarily, and in a wholly unreasoned (and unstudied) fashion. In the interim, we are witnessing patterned injustice.

This Article constructs a conceptual framework that describes and critiques how criminal justice evolves in the wake of scientific change. It thus begins the process of reforming institutions, laws, and practices to better account for the tentative nature of scientific orthodoxy. By priming the system to deal more effectively with epistemic contingency, we affirm our commitment to protecting the innocent.

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I. INTRODUCTION

Imagine that you are the parent of a young child who is just learning to crawl. When you look away for a moment, you hear a “thud” and turn to see your baby bump her head on the ground. She seems fine at first, but hours later, when she vomits, you become concerned and take her to the hospital. After performing a battery of tests, doctors inform you that they have detected cerebral edema (brain swelling), subdural hematoma (bleeding between the hard outer layer and the spongy membranes that surround the brain), and retinal hemorrhaging (bleeding of the inside surface of the back of the eye). You are told that these three symptoms—the diagnostic “triad”—are the telltale signs of Shaken Baby Syndrome (SBS), and that, because you were with the baby during the window of time when forceful shaking necessarily occurred, doctors *know* that you are the abuser. Within hours, the state has removed your baby—along with her sibling—from your custody, and you are being interrogated by police detectives.¹

Around the country, parents and caregivers confront a similar medical insistence that shaking caused their babies’ injuries and a criminal justice apparatus primed to respond accordingly. How will this scenario unfold for you? Based on cases like it, prediction is impossible, since the described facts—which are sufficiently common as to constitute their own paradigm²—may lead to the widest possible spectrum of outcomes. With the assistance of a skilled attorney or legal team and competent experts

1. These facts are based on the experiences of Julianna and Greg Caplan. Testimony of Greg and Julianna Caplan, *Annual Performance Oversight Hearing for the Child and Family Services Agency Before The Committee on Human Services*, Counsel of the District of Columbia (February 21, 2008) (on file with the *Alabama Law Review*); Marc Fisher, *A Case of Family Services Job Well Done, or Overdone?*, WASH. POST, Feb. 24, 2008, at C1.

2. See *infra* notes 11–15 and accompanying text.

able to offer alternative explanations for the baby's condition, you might persuade law enforcement that you have done nothing wrong. But there is a significant likelihood that you will be arrested and prosecuted. If so, you could be offered a sentence far less than the one you are facing and decide to plead guilty because you cannot risk conviction after trial.³ Perhaps, however, you will decide to go to trial; if so, you might be acquitted,⁴ or you might be convicted.⁵ If convicted, you might prevail on appeal⁶ or a motion for postconviction relief,⁷ but, then again, you might not.⁸ Across the system, the same story has dramatically different endings.⁹

Each year in this country, up to 1,500 babies are given an SBS diagnosis.¹⁰ While a portion of cases present medical corroboration of some type of abuse (e.g., long bone fractures and grip marks),¹¹ the classic formulation of SBS is based exclusively on the diagnostic "triad"—again, cerebral edema,¹² subdural hematomas, and retinal hemorrhages. Approximately 200 defendants a year are convicted of crimes related to SBS,¹³ and hundreds of people are currently serving lengthy prison sentences for shaking babies.¹⁴

With rare exception, SBS prosecutions rest entirely on the testimony of medical experts. All elements of the charge are proven by the claims of

3. See *infra* notes 156–196 and accompanying text.

4. See *infra* notes 130–139 and accompanying text.

5. See *infra* notes 68–97 and accompanying text.

6. To date, direct appeals in triad-only cases have been largely unsuccessful.

7. See *infra* notes 32–34 and accompanying text.

8. See *infra* notes 83–97 and accompanying text.

9. In the Caplans' case, after "two excruciating weeks" a family court judge ruled that there were no reasonable grounds to believe that abuse had occurred, and both girls were returned to the custody of their parents. Testimony of Greg and Julianna Caplan, *supra* note 1. Criminal charges were never pursued. The vindicated parents have said that they "shudder to think" about the plight of "innocent families without the resources to defend themselves effectively." *Id.*

10. National Shaken Baby Coalition, *Facts About SBS!!!*, [http:// www.shakenbabycoalition.org/facts.htm](http://www.shakenbabycoalition.org/facts.htm) (last visited Feb. 3, 2011).

11. It should be noted that what constitutes real, as opposed to apparent, corroboration in SBS cases is often a difficult question. See Deborah Tuerkheimer, *The Next Innocence Project: Shaken Baby Syndrome and the Criminal Courts*, 87 WASH. U. L. REV. 1, n.58 (2009) [hereinafter Tuerkheimer, *The Next Innocence Project*]. For the purposes of this Article, however, I focus largely on triad-only prosecutions—those resting solely on the presence of subdural hematoma, retinal hemorrhaging, and cerebral edema.

12. In virtually every case in which subdural bleeding, retinal bleeding, or both are present, brain swelling is as well. Because, in all likelihood, subdural hematomas could also cause the brain to swell (as opposed to requiring an external mechanism), the independent diagnostic significance of cerebral edema seems negligible. See Edward J. Imwinkelried, *Shaken Baby Syndrome: A Genuine Battle of the Scientific (And Non-Scientific) Experts*, 46 No. 1 CRIM. L. BULL. ART 6 (describing two "classic" symptoms of SBS: subdural hematomas and retinal hemorrhages).

13. Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 10 (estimating in the absence of a centralized database). This figure does not include the considerable number of defendants who plead guilty in these cases. See *infra* Part II.B.

14. Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 10 ("One might conservatively assume that the approximately 800 appeals reported since 1990 reflect about 1500 convictions after trial.").

science: testimony regarding the force necessary to cause the infant's injuries establishes the mechanism of death, as well as the perpetrator's criminal state of mind; testimony that the baby's symptoms would invariably present themselves immediately upon the infliction of injury demonstrates the killer's identity. In essence, SBS is a medical diagnosis of murder.

The construction of crime in this manner is rather extraordinary, particularly since— as a general proposition—scientific understandings develop over time.¹⁵ In the specific context of SBS, dramatic changes have occurred since the 1990s, when the prosecution template emerged.¹⁶ While forensic claims on this area remain highly contested,¹⁷ the science underlying SBS has decisively evolved. By this, I mean both that the evidentiary basis for SBS has been effectively challenged¹⁸ and—notwithstanding outstanding points of dispute—that large and highly significant areas of consensus surrounding SBS have shifted.¹⁹

Three areas of changed consensus are, from a criminal justice perspective, of critical importance.²⁰

First, research has shown that retinal hemorrhages²¹ and subdural hematomas²² can result from forces other than shaking.²³ In effect, the myth

15. See *infra* Part IV.B.1.

16. My perspective on this template is informed by my experiences prosecuting child abuse cases as an Assistant District Attorney in the New York County District Attorney's Office.

17. “[D]espite the progression of scientific discourse, the current debate about shaken baby syndrome is remarkably polarized. Scientists on each side of the controversy espouse their respective views with a passion and certainty matched in intensity by that of their opponents.” Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 16 (citations omitted).

18. As I have previously explained, application of “evidence based medicine” standards to the study of SBS in the late 1990s revealed a logical fallacy of profound importance: researchers had chosen subjects based on the presence of subdural hematoma and retinal hemorrhaging and, with little or no investigation into other possible causes of these symptoms, simply concluded that infants were shaken. Other studies used suspect “confessions” to establish mechanism of injury, an approach that is methodologically problematic. Once the edifice upon which SBS had been constructed cracked, researchers began looking to other disciplines for their expertise (particularly biomechanical engineering), which further eroded confidence in the diagnostic significance of the SBS triad. The advent of MRI and the high-profile prosecution of Louise Woodward may also have contributed to a sense that the dogma of SBS was without scientific support. Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 12–16.

19. *Id.* at 16.

20. For a more extensive discussion of these three areas, see *id.* at 17–22.

21. See, e.g., P.E. Lantz et al., *Perimacular Retinal Folds from Childhood Head Trauma*, 328 BRIT. MED. J. 754 (2004); Gregg T. Leuder et al., *Perimacular Retinal Folds Simulating Nonaccidental Injury in an Infant*, 124 ARCHIVES OPHTHAMOLOGY 1782 (2006); see also *supra* notes 1–9 and accompanying text (discussing facts of Caplan case, in which retinal hemorrhages were found in a child who had been observed knocking her head on the floor).

22. See, e.g., Marta C. Cohen & Irene Scheimberg, *Evidence of Occurrence of Intradural and Subdural Hemorrhage in the Perinatal and Neonatal Period in the Context of Hypoxic Ischemic Encephalopathy: An Observational Study From Two Referral Institutions in the United Kingdom*, 12 PEDIATRIC DEVELOPMENTAL PATHOLOGY 169 (2009); Julie Mack et al., *Anatomy and Development of the Meninges: Implications for Subdural Collections and CSF Circulation*, 39 PEDIATRIC RADIOLOGY 200 (2009); Eva Lai Wah Fung et al., *Unexplained Subdural Hematoma in Young Children: Is it Always Child Abuse?*, 44 PEDIATRICS INT'L 37 (2002); V.J. Rooks et al., *Prevalence and Evolution of Intracranial Hemorrhage in Asymptomatic Term Infants*, 29 AM. J. NEURORADIOLOGY 1082 (2008).

of pathomonony—which told that the diagnostic triad was necessarily and exclusively induced by shaking—has been debunked.²⁴

Second, the existence of lucid intervals has been established, proving that an earlier trauma (i.e., one occurring before the infant came under the suspect's care) can cause an infant's later symptoms.²⁵ Doctors now concede the possibility of a lag between injury and neurological manifestation.²⁶

Third, there has been increasing awareness of a variety of medical disorders that can “mimic” the symptoms of SBS. As a result, doctors must consider not only accidental trauma as a cause of the constellation of symptoms previously associated with SBS,²⁷ but also the possibility of congenital malformations, metabolic disorders, hematological diseases, infectious diseases, autoimmune conditions, birth effects, rebleeds, and hypoxia.²⁸ In sum, depending on the clinical picture presented, the “diffe-

23. A number of different terms are currently employed to describe the former SBS: shaken impact syndrome (SIS); inflicted childhood neurotrauma; abusive head trauma (AHT); inflicted traumatic brain injury (inflicted TBI); and nonaccidental head injury (NAHI). Robert M. Reece, *What Are We Trying to Measure: The Problems of Case Ascertainment*, 34 AM. J. PREVENTIVE MED. S116, S116 (2008). Acknowledging the move away from shaking as exclusive etiology, the Committee on Child Abuse and Neglect of the American Academy of Pediatrics (AAP) recently recommended that “[p]ediatricians should use the term ‘abusive head trauma’ rather than a term that implies a single injury mechanism, such as shaken baby syndrome.” Cindy W. Christian et al., *Abusive Head Trauma in Infants and Children*, 123 PEDIATRICS 1409, 1411 (2009). Notwithstanding the rise of various alternative diagnostic labels and the AAP's newly articulated recommendation, both the medical and legal establishments continue to employ the terminology of SBS. For the sake of clarity, I will do so here as well.

24. Along with widespread recognition that that the triad of symptoms is not necessarily caused by shaking, many scientists now believe that shaking cannot possibly cause the triad. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 19–20 (“New debate has emerged regarding whether shaking can generate the force levels sufficient to cause the injuries associated with SBS. Those who believe it cannot point to a number of biomechanical studies, as well as research using animal and computer models. Many of these scientists assume *arguendo* that rotational acceleration-deceleration forces can, in theory, cause retinal hemorrhage and subdural hematoma, but contend that shaking an infant with sufficient force to do so would necessarily damage the neck and cervical spinal cord or column. Since most infants diagnosed with SBS do not present this type of injury, they could not have been simply shaken.”). Whether shaking alone can cause the triad of symptoms exclusively is thus subject to debate. I take no position on this question, and the discussion that follows proceeds independently of its answer.

25. See, e.g., M.G.F. Gilliland, *Interval Duration Between Injury and Severe Symptoms in Non-accidental Head Trauma in Infants and Young Children*, 43 J. FORENSIC SCI. 723 (1998); Kristy B. Arbogast et al., In Reply to Letter to Editor, Initial Neurologic Presentation in Young Children Sustaining Inflicted and Unintentional Fatal Head Injuries, 116 PEDIATRICS 1608, 1608 (2005). See also *infra* note 26.

26. *Id.* See also Robert W. Huntington, *Letter, Symptoms Following Head Injury*, 23 AM. J. FORENSIC MED. & PATHOLOGY 105 (2002) (describing a case study in which an infant manifesting symptoms associated with SBS was observed by hospital personnel in a prolonged lucid state before dying). For a description of how this case caused the pathologist involved to change his opinion (and courtroom testimony) regarding lucid intervals, see Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at n.115.

27. See, e.g., John Plunkett, *Fatal Pediatric Head Injuries Caused by Short-Distance Falls*, 22 AM. J. FORENSIC MED. & PATHOLOGY 1 (2001).

28. Andrew P. Sirotnak, *Medical Disorders that Mimic Abusive Head Trauma*, in ABUSIVE HEAD TRAUMA IN INFANTS AND CHILDREN: A MEDICAL, LEGAL, AND FORENSIC REFERENCE 191 (Lori Frasier

rential diagnosis”²⁹ for symptoms previously associated exclusively with SBS now contemplates a wide range of nontraumatic possibilities.³⁰

Thus, with hardly any notice,³¹ scientific advances effectively undermined the validity of triad-based criminal convictions. In 2008, an appeals court in Wisconsin was the first to recognize this.³² In a ruling without precedent, the court concluded that “a shift in mainstream medical opinion” had eroded the basis of the SBS diagnosis.³³ Audrey Edmunds, a day care provider serving an eighteen-year sentence at the time, was freed.³⁴

The implications seemed enormous.³⁵ Edmunds’s case was prototypical of SBS prosecutions.³⁶ Now that she had been exonerated by the science that just a decade before had convicted her, what of the hundreds of convictions based on functionally indistinguishable factual predicates?

et al. eds., 2006); see also K. Hymel et al., *Intracranial Hemorrhage and Rebleeding in Suspected Victims of Abusive Head Trauma: Addressing the Forensic Controversies*, 7 CHILD MALTREATMENT 329 (2002).

29. In SBS cases, the differential diagnosis is a list of possible causes of the infant’s symptoms. It results from a methodology that seeks to eliminate those factors that cannot have contributed to the injuries. See Testimony of Patrick Barnes in Transcript of Evidentiary Hearing (Day One) at 12, 32, *State v. Edmunds*, 746 N.W.2d 590 (Wis. Cir. Ct. 2008) (No. 96 DF 555).

30. Even according to those who adhere to a belief in the legitimacy of SBS—or, “that what is now called abusive head trauma is real”—today’s best diagnostic practices are described as follows: “Doctors come to a diagnosis of abusive head trauma after taking a careful history, examining the child, ordering diagnostic tests, consulting the scientific literature, and, most important, considering and objectively excluding a range of other possible diagnoses.” John M. Leventhal & Andrea G. Asnes, Letter to the Editor, N.Y. TIMES, Sept. 24, 2010, A18. The letter, written by two pediatrics professors at Yale Medical School, responded to an op-ed focusing on the criminal justice implications of contemporary scientific understandings. Deborah Tuerkheimer, *Anatomy of a Misdiagnosis*, Op-Ed, N.Y. TIMES, Sept. 21, 2010, at A31.

31. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at n.148 (“SBS prosecutions, as a phenomenon of increasing importance, have gone largely unnoticed and data related to them correspondingly uncollected.”).

32. For a more thorough discussion of this development, see *id.* at 48–51.

33. *State v. Edmunds*, 746 N.W.2d 590, 598–99 (Wis. Ct. App. 2008). See *infra* notes 109–116 and accompanying text.

34. On July 11, 2008, the state announced its decision to dismiss charges against Edmunds. Ed Trevelen, *Citing Wishes of Baby’s Parents, Prosecutors Won’t Retry Edmunds*, WIS. STATE J., July 11, 2008.

35. In the immediate aftermath of the *Edmunds* decision, one court seemed to recognize its far-reaching significance, describing the case as “present[ing] a potential quagmire of epic proportions: the strong likelihood of constant renewed prosecution and relitigation of criminal charges as expert opinion changes and/or evolves over time.” See *Grant v. Warden*, No. TSRCV03004233S, 2008 WL 2447272, at *1 n.1 (Conn. Super. Ct. June 4, 2008).

36. I have described the Edmunds prosecution as falling “squarely within the ‘shaken baby’ prosecution paradigm that developed in the early 1990s,” and elaborated on this paradigm as follows:

The infant had no external injuries suggestive of abuse. The accused was unable to provide an explanation for the child’s condition. The medical evidence against the defendant consisted of the three diagnostic symptoms comprising the classic “triad”: retinal hemorrhages (bleeding of the inside surface of the back of the eye); subdural hemorrhages (bleeding between the hard outer layer and the spongy membranes that surround the brain); and cerebral edema (brain swelling). The presence of these three signs was understood to be pathognomic—or exclusively characteristic—of SBS.

Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 3–4 (footnotes omitted).

To put the question in starker relief, how does our criminal justice system absorb a body of science that raises the specter of innocence?

This Article pursues this inquiry along a number of dimensions, and concludes that institutional assimilation of new knowledge is defined by evolutionary stages. When I began researching SBS in early 2008,³⁷ the continuing prosecution of triad-based diagnoses was largely untouched by the latest forensic understandings. With only rare exception, the administration of criminal justice was proceeding as if the science of SBS was what it had always been.³⁸ Law appeared to have succumbed to inertia.³⁹

But just as science shifts, so too do the workings of criminal justice, as a present-day examination of SBS in the courts reveals. In relatively short order, an almost monolithic acceptance of triad-based prosecutions has dissolved. In its place has emerged a far more divergent response: no longer is SBS categorically embraced. Instead, we see a distribution of justice that is halting, unequal, and arbitrary.

I argue that this chaos has meaning. By situating the current state of affairs in broader context, I offer a conceptual framework that furthers understanding of how our criminal justice system shifts its orientation in response to new fields of knowledge. Viewed accordingly, transitory entropy is a hallmark of progress.

This Article begins a conversation about the nature of this change: what brings it about; what it looks like; and whether it ultimately comports with criminal justice norms. By assessing how our system is now incorporating changed scientific thinking, we may then evaluate whether it is up to the task of delivering justice in a growing category of prosecutions which rely on science. I conclude that the system is not up to this task and

37. This research resulted in an earlier treatment of the subject. Tuerkheimer, *The Next Innocence Project*, *supra* note 11.

38. *Id.* at 24–26. At the time, I wrote:

Despite the large numbers of potentially impacted cases—or perhaps, because of them—our criminal justice system has yet to respond to new scientific realities. Its failure to do so stands in marked contrast to other nations' recognition of the problematic nature of pure-triad prosecutions. The emphatic institutional responses of the United Kingdom and Canada are particularly instructive. Just as our criminal justice system has seemed to operate within a time bubble, largely untouched by scientific evolution, so, too, it remains insulated from unmistakable signs that, elsewhere in the world, other legal systems are assimilating new scientific understandings and adapting accordingly. When viewed in a global perspective, our continued adherence to a prosecution template that rests on discredited science is particularly jarring.

Id. (footnotes omitted).

39. This inertia can be attributed to various factors, including the massive size of the criminal apparatus; its balkanized, federalist structure; the absence of any centralized authority for disseminating information; and a fervent commitment to the finality of criminal judgments. In the SBS setting, these factors are compounded by the absence of a comprehensive distillation by a neutral body of the best available science. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 57 (calling upon National Academy of Science to engage in “comprehensive inquiry . . . apart from the fray.”)

that it must be retooled to better account for scientific evolution and the problem of epistemic contingency.

The remainder of the Article proceeds in three Parts. Part II depicts a justice system in disarray, using case outcomes⁴⁰ and negotiated pleas⁴¹ to illustrate the disorder that currently characterizes the legal treatment of SBS.

The discussion that follows places the problems raised by SBS in context, suggesting that skepticism of previously accepted scientific dogma is gaining traction at a unique moment in sociolegal history. Part III describes two broad movements that are converging⁴² to produce an unusual systemic vulnerability to change: first, powerful concerns about the prospect of convicting innocents, which is generally characterized as the “innocence movement”;⁴³ and, second, multipronged attacks on the validity of forensic science⁴⁴ (which I will refer to as the “failed science movement”).⁴⁵ These influences are catalyzing developments in the SBS context⁴⁶ while, at the same time, auguring a more widespread transformation in the administration of criminal justice.⁴⁷

This transformation is a necessary corollary of our increasing reliance on scientific expertise to do the work of criminal prosecution. Part IV places SBS against the backdrop of what I call “science-dependent prosecutions.”⁴⁸ While SBS has a number of distinctive attributes,⁴⁹ it exempli-

40. See *infra* Part II.A.

41. See *infra* Part II.B.

42. I do not mean to suggest that these movements were ever entirely separate. At the very least, there has always been significant substantive overlap between the two. Nevertheless, each may be considered an independent force.

43. See *infra* Part III.A. Cf. Daniel S. Medwed, *Innocentrism*, 2008 U. ILL. L. REV. 1549, 1549 (2008) (employing “innocentrism” to describe “the increasing centrality of issues related to actual innocence in courtrooms, classrooms, and newsrooms”).

44. See *infra* Part III.B.

45. I use this term to emphasize the collective nature of discrete challenges to particular forensic sciences. Disparate attacks on various fields of forensic science advance a descriptive critique with important commonalities across substantive divides; they share normative ambitions; and they leave a collective impact. A movement seeks change, capturing the essence of what we are seeing, which has thus far gone unnamed. The phrase “failed science” has been used by David Faigman, among others. David L. Faigman, *Anecdotal Forensics, Phrenology, and Other Abject Lessons from the History of Science*, 59 HASTINGS L.J. 979, 981 (2008) (exploring “[t]he [a]natomy of a [f]ailed [s]cience”).

46. Although I do not develop the point here, it is worth mentioning that this catalytic relationship may be bi-directional, insofar as developments in the SBS realm will likely energize these larger forces in ways that remain to be seen.

47. See *infra* notes 262, 301 and accompanying text.

48. See *infra* note 305 (refining term).

49. In particular, the death of an infant (or life in a state of severe and irreversible neurological impairment) and the intense level of emotionality which accompanies it are integral to the diagnosis’s emergence and continued hold on criminal justice. Consider, for instance, a familiar trope in the arguments of prosecutors: “We (were) here for [our] baby He doesn’t get a second chance. He’s not here to tell us what happened” Ebony Horton, *Fort Rucker Soldier Acquitted of Infant Son’s Death*, DOTHAN EAGLE, Dec. 9, 2009, available at http://www.gulfeast.com/dothaneagle/dea/news/crime_courts/article/fort_rucker_soldier_acquitted_of_infant_sons_death/100793/; “She cannot tell us what happened, but the medical evidence will tell us what happened to her.” Tonya

fies the dangers presented by a vast array of criminal prosecutions, especially those located at the intersection of science and law.⁵⁰ Science occupies an already significant, and likely growing, place of prominence in the field of criminal prosecution. SBS raises in potent form the question of how our system should be retrofitted to accommodate the inevitability of scientific contingency.

The current iteration of justice—an erratic patchwork at best—cannot be sustained. As new scientific advances erode confidence in triad-only prosecutions, the macro-errors which have occurred in the SBS realm are bound to repeat themselves—unless we attend to the dynamics of systemic change in a deliberate manner.

I identify this occasion as a crossroads for criminal justice and conclude by offering a tentative map for reform.⁵¹

II. ENTROPY AND SYSTEMIC CHANGE

In this Part, I examine the criminal justice system's response⁵² to current scientific understandings of SBS.⁵³ Until recently, this approach to analyzing how similar factual predicates (i.e., triad-based SBS diagnoses)

Root, *Emotions Run High in Infant Death Trial*, MYRTLE BEACH SUN NEWS, Nov. 11, 2009, at 1C; "This little boy is not here to tell his story He has to depend on me;" *In the Jury's Hands: Closing Arguments Heard in Emotional Trial Over Infant's Death*, THE STAR (Shelby, N.C.), Dec. 5, 2009, at A1. These arguments tend to reverberate deep in the human psyche for obvious and understandable reasons.

It also bears mentioning that powerful (disappointed) expectations of caregivers and, in particular, of mothers, often lurk in the backdrop of SBS prosecutions. *See, e.g.*, *Webb v. State*, 685 S.E. 2d 498, 501 (Ga. Ct. App. 2009) (noting that "[t]he State's trial presentation focused heavily on Webb's alleged lack of motherly instincts and unusual behavior while [her baby] was in the hospital" and reversing because trial judge refused to allow the defense to call a particular expert witness); *see also* *State v. Humphries*, No. 06CA00156, 2008 Ohio App. LEXIS 315, at *23–24 (Ohio Ct. App. Feb. 4, 2008). In *Humphries*, the court affirmed the child endangerment conviction of Latasha Humphries for the death of her child, whose SBS diagnosis was based on subdural hematoma and cerebral edema alone. *Id.* at *12. *Humphries* was identified as the perpetrator based on a perceived impossibility of a lucid interval, as well as the defendant's "fail[ure] to provide a reasonable explanation for [the child's] injuries" *Id.* at *19–20. Particularly given the weakness of the state's evidence, the opinion's references to marijuana use, *id.* at *5, the defendant's status as an unmarried mother, and the impoverished environment in which the child was being raised (e.g., the "dingy one piece pajamas," and crib missing one side, *id.* at *9–10) strongly suggest that these are factors which disadvantaged *Humphries* at trial and on appeal.

50. *See infra* Part IV.

51. *See infra* Part V.

52. In contrast to my previous treatment of the subject, which disaggregated the criminal process in order to analyze the dynamics attending each stage of a prosecution, I focus here on case outcomes. Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 22–56 (separately examining investigations, prosecutions, evidentiary challenges, jury verdicts, insufficiency claims, and postconviction proceedings).

53. I am interested in whether legal outcomes are reflective of contemporary forensic understandings. As such, my analysis rests, not on those scientific questions that remain hotly contested, but, rather, on what is now generally accepted by those on both sides of a continuing debate. Conclusions drawn from this inquiry are necessarily tentative, given the quickly shifting nature of medical, popular, and legal discourses surrounding SBS.

are treated across the United States⁵⁴ would have provided little insight, since the system-wide response was largely uniform in its acceptance of the claims of science.⁵⁵ But the passage of a surprisingly brief amount of time has changed this picture in ways worthy of attention and explanation. Even today, while the classic triad-based SBS diagnosis continues to function as a powerful criminal justice construct, its universal hold is diminishing.⁵⁶

What follows is an effort to portray the ambiguity surrounding our criminal justice system's assimilation of the latest forensic developments—first by examining outcomes generally,⁵⁷ and then by focusing on negotiated pleas.⁵⁸ I draw two sets of conclusions from this inquiry.

First, as a normative proposition, the chaos that characterizes contemporary criminal justice treatment of SBS is indefensible. Beyond the prospect of injustice raised by any particular case,⁵⁹ the system in the aggregate is subject to legitimate critique when it functions in a manner that is inconsistent and arbitrary.⁶⁰

Second, as a descriptive matter, system-wide movement, albeit halting and sporadic, may be perceived. This collective shift marks a progression away from the random distribution of just outcomes in SBS cases—a state that is ultimately unsustainable—and toward greater rationality in allocat-

54. For a brief overview of how Canada, the United Kingdom, and Australia have responded to new scientific perspectives on SBS, see Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 24–26.

55. Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 24 (observing that “our criminal justice system has yet to respond to new scientific realities”); *id.* at 25 (noting that “our criminal justice system has seemed to operate within a time bubble, largely untouched by scientific evolution”).

56. The story is complicated by the fact that there are at least three differing SBS constructs relevant for our purposes, which can be generalized as follows: First is SBS in classic formulation, firmly embedded in the notion of a pathognomonic relationship between shaking and the triad. This is the version advanced in the 1990s with little controversy or dissent. Second is what is now referred to as Abusive Head Trauma, or even “SBS/AHT 2010.” This is the new SBS; it responds to challenges to the previous diagnosis by incorporating differential diagnosis and discarding shaking as an exclusive etiology. To date, this version of SBS has yet to penetrate the legal system in any significant way. It may, of course, have greater impact as a matter of clinical practice. In its stead, we see the third incarnation of the diagnosis: the SBS of old, seemingly immune to developments outside the law, still in courts today. *See infra* note 377 (testimony of prosecution experts).

57. *See infra* Part II.A.

58. *See infra* Part II.B.

59. Here I am referring to either or both of the following scenarios: (i) the criminal conviction of a factually innocent person; and (ii) conviction based on evidence falling short of proof beyond a reasonable doubt of guilt. For purposes of this discussion, it suffices to note the epistemological distinction without delving into its philosophical and legal implications. *See* Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 23 (“[A] significant number of people convicted in triad-only prosecutions are likely innocent of wrongdoing, but others are not, and we have no way of differentiating between these groups. Accordingly, we may rightly be troubled by the convictions of those whose factual innocence is unproven.”). *See generally* Larry Laudan, TRUTH, ERROR, AND CRIMINAL LAW: AN ESSAY IN LEGAL EPISTEMOLOGY (Gerald Postema ed., 2006).

60. The conceptual underpinnings of this claim are central to the foundations of our criminal justice system, and I do not defend them here. *See infra* note 371.

ing justice. What we are now witnessing is structural evolution that is incomplete.

A. *Fluky Justice*

As its default mode, the criminal justice system continues to process SBS cases as it has for decades, seemingly without regard to fundamental revision of the science once believed to support a diagnosis of shaking.⁶¹ Police and prosecutors still move forward based on the exclusive presence of retinal hemorrhages and subdural hematomas;⁶² judges still allow experts to testify to speculative claims;⁶³ juries still convict in triad-only cases;⁶⁴ courts still deny appeals⁶⁵ and motions for post-conviction relief.⁶⁶

61. See *supra* notes 20–30.

62. See *infra* notes 68–97 and accompanying text; *Autopsy Revealed Cause of Baby's Death*, NEWS-PRESS (Fort Myers, FL), Nov. 6, 2010, available at 2010 WLNR 22215600; Patrick Orr, *Kuna Man Charged with Felony Injury to Child in "Shaken Baby" Case Involving 11-Week-Old Son*, IDAHO STATESMAN, Dec. 15, 2010, available at 2010 WLNR 24795019; Ashley Meeks, *Mother Arrested in Shaken Baby Case*, LAS CRUCES SUN-NEWS, Nov. 10, 2010, available at 2010 WLNR 22437604; Ann McIntire, *Babysitter Charged in Death, Denied Bond*, WOWT.COM, Feb. 22, 2011, http://www.wowt.com/home/headlines/Update_Babysitter_Charged_in_Death_Denied_Bond_116688059.html. In addition, many cases are going forward on the basis of the triad and a caregiver's account. There are important reasons to question the validity of many of these putative confessions. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 30–31. Nevertheless, this fact pattern (retinal hemorrhages and subdural hematoma plus caregiver account) comprises a significant category of SBS prosecutions. For a small sample of cases in this category, see, e.g., Jenny Michael, *Police Say Baby Was Shaken*, BISMARCK TRIBUNE (Oct. 10, 2009), http://www.bismarcktribune.com/news/local/crime-and-courts/article_adeebd68-b552-11de-a030-001cc4c002e0.html (defendant told police that "he shook the baby . . . and the child's head struck his knee"); *Moore To Stand Trial in Death of Daughter*, ENID NEWS & EAGLE (Enid, OK), Oct. 1, 2009, available at 2009 WLNR 19315087 (defendant told police he was irritated from the baby's crying and shook her); Tracy Neal, *Rogers Man Jailed for Allegedly Shaking Son*, NORTHWEST ARK. ONLINE, Oct. 27, 2009, <http://www.nwaonline.com/news/2009/oct/27/rogers-man-jailed-allegedly-shaking-son-20091027/> (defendant told police he shook the baby because of the crying); Jim Phillips, *Medical Expert Disputes State's Version of Injured Baby Case*, ATHENS NEWS, Jan. 3, 2011, available at <http://www.athensnews.com/ohio/article-32890-medical-expert-disputes-staters-version-of-injured-baby-case.html> (alleged confession inconsistent with MRI results suggesting earlier presence of subdural fluid collections).

63. See, e.g., *State v. Anderson*, 684 S.E.2d 450, 454 (N.C. Ct. App. 2005) (allowing doctor's use of doll to "illustrate . . . amount of force necessary to cause the kind of injuries suffered by [the baby]"); *State v. Sam*, No. 26934-5-III, 2009 WL 3353313 (Wash. Ct. App. 3 2009) (permitting prosecution expert testimony that brain swelling is "what he would expect to see following a head-on collision on a freeway"). This type of testimony, which purports to quantify the threshold of force necessary to bring about the symptoms seen in SBS prosecutions, lacks scientific support. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 19–22, 28–30.

64. See *infra* notes 68–97 and accompanying text. See also *People v. Calderaro*, 910 N.Y.S.2d 673 (2010).

65. See *infra* notes 83–93 and accompanying text; *Santiago v. State*, No. 04-08-00788-CR, 2009 WL 4138952 (Tx. Ct. App. Nov. 25, 2009); *State v. Fortener*, No. E2008-01775-CCA-R3-CD, 2010 WL 1241629 (Tenn. Crim. App. Mar. 31, 2010).

66. See *infra* notes 143–149 and accompanying text; *Stein v. Eberlin*, No. 1:07CV3696, 2009 WL 650363, at *2 (N.D. Ohio Mar. 10, 2009).

What I have previously characterized as “massive institutional inertia”⁶⁷ thus remains the rule.

A few recent examples illustrate the point.

Trudy Munoz, a day care provider and mother of two girls, was charged in Virginia with shaking a four-month-old boy in her care.⁶⁸ The case proceeded on the basis of retinal hemorrhages and subdural hematomas.⁶⁹ According to Munoz, a Peruvian national with a “long record of excellent, patient child care,”⁷⁰ the baby choked on his milk and lost consciousness.⁷¹ At trial, prosecution experts testified that, even in the absence of neck or torso injuries, the bleeding found in the infant’s brain scans proved that he had been shaken.⁷² Defense experts noted that the child’s head had grown at an “abnormal” rate and explained that the acute symptoms were most likely caused by a rebleed⁷³ of an undetected chronic hematoma occurring at birth.⁷⁴ In January 2010, a jury found Munoz guilty.⁷⁵

Angel Sanchez was arrested in California for the murder of his girlfriend’s four-month-old baby.⁷⁶ Sanchez was the “only person home with [the baby] when he stopped breathing,” and “[f]orensic evidence [i.e., the diagnostic triad] show[ed] [that] the baby died from the type of traumatic head injury commonly known as shaken baby syndrome”⁷⁷

67. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 58.

68. Tom Jackman, *Shaken-Baby Syndrome at Center of Fairfax Trial*, WASH. POST, Jan. 12, 2010, at B1. The infant suffered permanent neurological injuries, including damage to his vision, and Munoz was charged with felony child abuse. *Id.*

69. Tom Jackman, *Existence of Shaken Baby Syndrome is Focus of Fairfax Trial*, WASH. POST, Jan. 19, 2010, at B1.

70. Jackman, *Shaken-Baby Syndrome*, *supra* note 68. The case involved the assistance of the Peruvian consulate and “attracted extensive media attention in South America.” *Id.*

71. Jackman, *Existence of Shaken Baby Syndrome*, *supra* note 69. Munoz’s exculpatory trial testimony was consistent with the version of events given to police investigators. Jackman, *Shaken-Baby Syndrome*, *supra* note 68; Tom Jackman, *Fairfax Jury Sentences Woman to 10 Years for Shaking Baby*, WASH. POST, Jan. 23, 2010, at B3. A social worker’s contention that Munoz had expressed some uncertainty about shaking the baby “about three times” was disputed, *id.*, and, in any event, seems sufficiently ambiguous – even if credited – to support a theory of causation.

72. Jackman, *Existence of Shaken Baby Syndrome*, *supra* note 69.

73. See *supra* note 28 and accompanying text (listing mimics of abuse); *infra* note 148 (summarizing research on rebleeding subdurals).

74. Jackman, *Existence of Shaken Baby Syndrome*, *supra* note 69.

75. Jackman, *Fairfax Jury Sentences Woman*, *supra* note 71. Munoz has appealed her conviction and ten-year sentence. Peter Vieth, *Virginia Appeals Court to Consider Shaken Baby Case*, VIRGINIA LAWYERS WEEKLY, FEB. 14, 2011.

76. *Man Arrested in Connection With Infant’s Death*, VALLEJO TIMES HERALD (Vacaville, Cal.), Oct. 15, 2009 (on file with the *Alabama Law Review*).

77. *Id.* See also *Denver Father Charged After Shaken Baby Stops Breathing*, DENVER POST, Oct. 14, 2009, available at http://www.denverpost.com/news/ci_13561802 (similar facts); *Dad Denied Bond in Infant Son’s Murder*, SUN TIMES GROUP, Sept. 11, 2009, available at http://www.myfoxchicago.com/dpp/news/metro/Ibrahim_Kibayasi_no_bond_death_Dylan_Kibayasi_five_month_old_don_Mount_Prospect_Illinois_blunt_head_trauma (same).

This same month, in Maryland, day care provider Gail Dobson was charged with killing a nine-month old baby in her care.⁷⁸ The charges followed the release of an autopsy report which concluded that the death resulted from “head trauma which medical evidence reveals as an injury consistently found with shaken baby syndrome.”⁷⁹

Also in the same month, Terry Lee Ledbetter was arrested in Oklahoma for the death of a seven-month-old baby in his care.⁸⁰ The attending physician concluded that the baby “is the victim of shaken baby syndrome” and that “the history offered by Ledbetter . . . did not match.”⁸¹ Ledbetter was charged with capital murder.⁸²

In California, Cesar Jovany Servin was convicted of child abuse and felony assault for shaking his two-month-old daughter.⁸³ The medical evidence consisted of subdural hemorrhaging and cerebral edema.⁸⁴ After the jury found the defendant guilty, Servin appealed on sufficiency grounds. In July 2009, an appellate court affirmed the conviction.⁸⁵

Zavian Thomas is serving fifty-five years in prison for injury to a child.⁸⁶ At trial, the prosecution’s expert testified that this was a “classic presentation of shaken baby syndrome”; other experts for the prosecution concluded that the baby was killed by some sort of nonaccidental head trauma.⁸⁷ On behalf of Thomas, a number of experts opined that the baby choked, which caused the brain to swell, leading to Disseminated Intravascular Coagulopathy (DIC) and the cessation of blood clotting, “which then manifested as brain and retinal bleeding.”⁸⁸ The defense experts uniformly “criticized the scientific underpinnings of shaken baby syndrome,”⁸⁹ particularly noting the absence of neck injuries that would be expected if a child was shaken with the force alleged.⁹⁰ According to a

78. Kye Parsons, *Talbot County Day Care Provider Charged in Infant's Death*, WBOC NEWS, <http://www.wboc.com/Global/story.asp?S=11365028> (last updated Nov. 11, 2009).

79. *Id.*

80. Cass Rains, *Ledbetter's Bond Set at \$1M*, ENID NEWS AND EAGLE (Enid, Okla.) Oct. 7, 2009, available at 2009 WLNR 19729320.

81. *Id.*

82. *Id.*

83. *People v. Servin*, No. B205748, 2009 WL 2036727, at *1 (Cal. Ct. App., July 15, 2009).

84. *Id.* at *1–2. The defendant testified but presented no expert witnesses on his behalf. *Id.* at *2.

85. *Id.* at *3.

86. *Thomas v. State*, No. 03-07-00646-CR, 2009 WL 1364348, at *1 (Tex. Ct. App. Austin, May 14, 2009).

87. *Id.* at *4–5. In addition to the triad of symptoms, the baby was found with broken ribs, which the prosecution experts claimed were further evidence of impact and the defense experts attributed to CPR compressions. *Id.* at *5–6.

88. *Id.* at *6.

89. *Id.* at *6 (One expert “joined . . . criticism of the lack of science underpinning shaken baby syndrome theory.” Another opined that “there is no scientific support” for the claims made by the state’s ophthalmologist). At least one of the prosecution’s experts agreed “that a serious scientific reexamination of the underpinnings of shaken baby syndrome is underway.” *Id.* at *5.

90. *Id.* at *6. One defense expert “testified that the child had no injuries consistent with an impact injury, and that the State’s witnesses may have added that theory to compensate for the challenges to

Texas appellate court, “[s]harply conflicting evidence was presented regarding the scientific basis of shaken baby syndrome and, consequently, the diagnoses of the State’s witnesses.”⁹¹ Nevertheless, the court concluded that “[o]nce admitted, this conflicting evidence present[ed] an issue for the jury to resolve.”⁹² In May 2009, Thomas’s appeal was denied.⁹³

Barbara Hershey was convicted in 2007 of manslaughter for the death of her four-month-old grandson.⁹⁴ The prosecution’s experts testified that “the baby’s . . . injuries were consistent with ‘shaken baby syndrome,’” while Hershey argued that the death was caused by “an undiagnosed medical condition.”⁹⁵ Recently, the defendant moved for a new trial, arguing that “new medical research has raised questions about the nature of ‘shaken baby syndrome,’” and “there has been a trend since the conviction to take a look at these types of cases more critically.”⁹⁶ A trial court in New York denied Hershey’s motion.⁹⁷

What these cases, and the many others like them, show is that our criminal justice system still continues to lag behind the cutting edge of science.⁹⁸ As we will see, however, exceptions to this generalization have become increasingly common.⁹⁹ Before turning to these “exceptional” cases and their significance, one final demonstration of the force of systemic inertia deserves mention.

In Houston, Cynthia Cash, a former nurse, was convicted in the late 1990s of fatally injuring a four-month-old baby in her care.¹⁰⁰ The autopsy report, concluding that the death was a homicide, was “used by prosecutors as a key piece of evidence” at Cash’s trial.¹⁰¹ Jurors heard from prosecution experts that the baby’s injuries—retinal hemorrhaging and cerebral edema—were signs of shaken baby syndrome.¹⁰² Cash maintained her innocence, insisting that she called 911 when she “found the baby blue in

shaken baby syndrome.” *Id.*

91. *Id.* at *7.

92. *Id.*

93. *Id.* at *9.

94. Mike Maslanik, *No New Trial for Grandma in Shaken Baby Case*, MPNNOW (Rochester, N.Y.) Sept. 30, 2009, <http://www.mpnnow.com/canandaigua/x1991992652/Judge-No-new-trial-for-grandma-in-shaken-baby-case>.

95. *Id.* It is unclear from press coverage of the case whether expert testimony was admitted on the point. *See id.*

96. *Id.*

97. *Id.* The district attorney went out of his way to characterize the defendant’s new trial request as the “flimsiest motion I’ve ever responded to.” *Id.*

98. Although much of this discussion has implications for family court (and child protection generally), these contexts raise their own set of discrete issues deserving scholarly attention. *See supra* notes 1–9 and accompanying text (discussing Caplan case).

99. *See infra* notes 109–154 and accompanying text.

100. Lise Olsen, *New Results of Autopsy Spur Plea: Woman Sent to Prison in Baby’s Death Based on Doctor’s Report is Seeking Release*, HOUSTON CHRONICLE, Sept. 14, 2009, at A1.

101. *Id.*

102. In her defense, Cash presented the testimony of a neurologist that the baby suffered from anaphylactic shock, an “extremely rare” reaction to the vaccines received earlier in the day. *Id.*

her crib.”¹⁰³ Almost a decade later, upon an unlikely “reclassification” of the autopsy to “undetermined,”¹⁰⁴ Cash’s attorney moved based on newly discovered evidence that the trial judge release Cash from prison or conduct a hearing.¹⁰⁵ In September 2009, the judge denied the motion without a hearing, stating that Cash “does not unquestionably establish her innocence.”¹⁰⁶

Apart from the question of injustice in any particular prosecution,¹⁰⁷ these cases evince a criminal justice system too unwieldy to correct its course even in response to dramatic scientific developments. Until recently, it seemed as if the institutional inertia manifested in (and propelled by) outcomes like these was unyielding.¹⁰⁸ But what we are now seeing—in cases involving remarkably similar (*i.e.*, triad-based) factual predicates—suggests otherwise.

For instance, in contrast to Cynthia Cash, Audrey Edmunds has been exonerated by a new evaluation of the science of SBS.¹⁰⁹ Like Cash, Edmunds was a day care provider convicted in the 1990s of shaking an infant to death.¹¹⁰ In both cases, the prosecution rested on the triad of symptoms;¹¹¹ each could fairly be described as a medical diagnosis of murder.¹¹² A decade later, Edmunds moved for a new trial based on the “newly discovered evidence” of SBS’s scientific invalidity—just as Cash did.¹¹³ But, unlike Cash—and even without a modified autopsy report to support her argument¹¹⁴—Edmunds prevailed on her motion.¹¹⁵ After an appellate court

103. *Id.*

104. *Id.* Specifically, the report indicates that “a diagnosis of trauma cannot be substantiated”; it concludes that “doctors who testified in Cash’s trial made some ‘erroneous’ conclusions, wrongly describing bleeding patterns found in the examination of the child’s brain as evidence of trauma.” *Id.*

105. *Id.*

106. Lise Olsen, *Judge Denies Baby Sitter’s Innocence Claim: Judge Rules Against Inmate in Baby’s Death Despite Autopsy Revision*, HOUSTON CHRONICLE, Sept. 18, 2009, available at <http://www.chron.com/dispatch/story.mpl/metropolitan/6624526.html>. The defense is appealing the ruling. *Id.*

107. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 10–22 (“As a categorical matter, the science of SBS can no longer support a finding of proof beyond a reasonable doubt in triad-only cases”); *id.* at 23 (“[A] significant number of people convicted in triad-only prosecutions are likely innocent of wrongdoing, but others are not, and we have no way of differentiating between these groups. Accordingly, we may rightly be troubled by the convictions of those whose factual innocence is unproven.”).

108. See *supra* notes 61–97 and accompanying text.

109. For a thorough examination of the Edmunds case, see Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 2–6, 48–51.

110. State v. Edmunds, 598 N.W. 2d 290, 293 (Wis. Ct. App. 1999).

111. *Id.*

112. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 5.

113. State v. Edmunds, 746 N.W. 2d 590, 592 (Wis. Ct. App. 2008).

114. See *supra* note 104 and accompanying text. At her postconviction relief hearing, Audrey Edmunds did have the testimony of the pathologist who performed the autopsy in the case, and who had testified on behalf of the prosecution at trial. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at n.115. Of course, Cynthia Cash’s motion was denied without a hearing. See *supra* note 106 and accompanying text.

115. See *Edmunds*, 746 N.W. at 599.

concluded that “a shift in mainstream medical opinion”¹¹⁶ had undermined the basis of the SBS diagnosis, raising the distinct possibility that Edmunds had done nothing whatsoever to harm the child, prosecutors in Wisconsin dismissed all charges against her.¹¹⁷

Throughout the criminal justice system, a similar skepticism about SBS in classic form is surfacing. These doubts are manifesting themselves in myriad ways, including prosecutorial decisions not to proceed with charges,¹¹⁸ lenient plea bargains,¹¹⁹ greater judicial scrutiny of the testimony of prosecution experts,¹²⁰ jury acquittals,¹²¹ judicial dismissals and reversals based on evidence insufficiency¹²² and other grounds,¹²³ and grants of new trials to defendants convicted on the basis of the diagnostic triad.¹²⁴

116. *Id.*

117. Ed Treleven, *No Second Trial in Baby-Shaking Case*, WIS. ST. J., July 11, 2008, at A1. Before she was released from prison, Edmunds had served eleven years of her eighteen-year sentence.

118. *See infra* notes 125–129 and accompanying text; *supra* note 9. *See also* Paul Rubin, *Phantom Murder: At the 11th Hour, Prosecutors Dropped a Murder Charge Against a Beloved Daycare Operator—Leaving the Death of Baby Dillon a Medical Mystery*, PHOENIX NEW TIMES, July 22, 2010, available at <http://www.phoenixnewtimes.com/2010-07-22/news/phantom-murder-at-the-11th-hour-prosecutors-dropped-a-murder-charge-against-a-beloved-daycare-operator-leaving-the-death-of-baby-dillon-a-medical-mystery/>.

119. *See infra* Part II.B.

120. *See, e.g.*, *Hamilton v. Commonwealth*, 293 S.W. 3d 413 (Ky. Ct. App. 2009); *Colorado v. Rector*, 226 P.3d 1170 (Colo. App. 2009). *See also* Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 32–37 (discussing successful evidentiary challenges to expert testimony regarding SBS).

121. *See infra* notes 130–139 and accompanying text; Angelina Perez, *Mary Bolin’s Attorney Speaks Out*, KFDA NEWSCHANNEL 10 (Jan. 21, 2011) (on file with the *Alabama Law Review*); *Dierks Found Not Guilty in Assault Trial*, KELOLAND.COM (July 1, 2009), <http://www.kelo.tv/NewsDetail/6162.cfm?Id=86734>. For a recent account of an acquittal by a judge, see David Owens, *Ex-DCF Worker Acquitted of Charges in Child’s Death*, HARTFORD COURANT, Mar. 30, 2010, at B1.

122. *See infra* notes 139–143 and accompanying text (Roach); *See also* *Smith v. Mitchell*, 437 F.3d 884, 889 (9th Cir. 2006); Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 43–46 (discussing *Smith*). For a rather unusual case involving an appellate reversal of the trial court’s dismissal for lack of probable cause, see *State v. Axelson*, No. 101,342, 2009 WL 5062403 (Kan. Ct. App. Dec. 18, 2009) (rev. denied, June 23, 2010).

123. For instance, the Nebraska Supreme Court recently reversed the conviction of April Rogers, a day care provider accused of shaking a six-month-old to death based on the presence of subdural hematomas and retinal hemorrhages. *State v. Rogers*, 760 N.W.2d 35 (Neb. 2009). *See infra* notes 224–238 and accompanying text (discussing *Rogers*). *See also* *State v. Paredes*, 775 N.W. 2d 554 (Iowa 2009); *Webb v. State*, 685 S.E.2d 498 (Ga. Ct. App. 2009) (finding error in precluding defense from calling expert witness); *infra* notes 134–139 and accompanying text (describing Melonie Ware’s successful ineffective assistance of counsel motion). In another recent case, a trial court reversed an earlier order denying bail after hearing expert medical testimony that suggested non-abusive explanations for the baby’s injuries. Todd Leskanic, *Defendant Out on Bail After Hearing Concludes*, TAMPA TRIBUNE, Dec. 24, 2010, available at 2010 WLNR 25765049.

124. *See infra* notes 144–150 and accompanying text; *supra* notes 110–116 and accompanying text; *see also* Gregory Pratt, *New Trial Ordered for Man Convicted in 1998 Shaken Baby Case; Attorneys Claim New Evidence Proves Innocence*, PHOENIX NEW TIMES, Feb. 9, 2011, http://blogs.phoenixnewtimes.com/valleyfever/2011/02/new_trial_ordered_for_man_in_1_1.php; Christine Ferretti, *Baby Abuse Case Reopens*, DETROIT NEWS, Dec. 9, 2009, available at 2009 WL 24809932. In this case, a new trial was granted by the same judge who had sentenced Julie Baumer to 10–15 years in prison for shaking her nephew, leaving him permanently blind. *Id.* After considering postconviction relief hearing testimony that the infant’s injuries were caused by venous sinus thrombosis (or “child stroke”), the judge ruled that Baumer received ineffective legal representation because her lawyer failed to retain a medical expert or investigate alternative causes of the baby’s symptoms.

I offer the following recent examples of this emerging skepticism.

In Arizona, William Rettig was arrested and charged with murder in the death of his girlfriend's nineteen-month-old son.¹²⁵ The infant had fallen and injured his head during a visit with relatives the weekend before his death.¹²⁶ But the medical examiner concluded that the boy's death was caused by shaking and that this shaking must have occurred while the infant was in Rettig's care.¹²⁷ Four years later,¹²⁸ however, in May 2009, prosecutors dismissed the charges against Rettig in the interests of justice.¹²⁹

In Illinois, after just three hours of deliberation, a jury acquitted day care provider Constance Rieken of first degree murder after a two week trial¹³⁰ involving the standard testimony of prosecution experts—i.e., that the presence of the SBS triad proved that the baby had been shaken to death while in the defendant's care.¹³¹

In Alabama, a court martial of Army soldier Dedrick Fisher for the killing of his seven-week-old son resulted in an acquittal,¹³² notwithstanding the introduction of testimony by prosecution experts that subdural hematomas and retinal hemorrhages meant that the baby had been shaken.¹³³

In Georgia, day care provider Melonie Ware was granted a new trial after being sentenced to life in prison for the death of a nine-month-old baby in her care.¹³⁴ Because Ware's trial attorney failed to present medical evidence suggesting an alternative explanation for the baby's death—in this

Id. After a second trial, at which the defense presented evidence that the baby had suffered venous sinus thrombosis, or "childhood stroke," Julie Baumer was acquitted. *Woman Accused in Baby's Death*, DETROIT NEWS, Oct. 16, 2010, available at http://www.law.umich.edu/clinical/innocence-clinic/Documents/julie_baumer_and_date_geq_.pdf. See also *People v. Jacobazzi*, No. 2-05-0902, 2009 WL 5895257 (Ill. App. Ct., Nov. 17, 2009) (remanding for further evidentiary hearing on defendant's postconviction relief petition).

125. Laurie Roberts, *Charges Dismissed in Tot's Death*, THE ARIZ. REPUBLIC (May 13, 2009), http://www.azcentral.com/arizonarepublic/news/articles/2009/05/12/2009_0512_roberts_0513.html.

126. *Id.* Defense experts determined that infant's head injury had occurred up to a week before death, and witnesses had observed child vomiting in days preceding death. *Id.* The prosecutor's delay in dismissing the charges was unexplained. *Id.*

127. *Id.*

128. During this period, Rettig was under house arrest and was not permitted to see his son. *Id.*

129. The prosecutor's delay in dismissing the charges was unexplained. *Id.*

130. Maurice Possley, *Faulty Science*, THE CRIME REPORT, JUNE 22, 2009, available at <http://www.thecrimereport.org/archive/faulty-science/>.

131. Testimony of Jill Glick in Transcript of Trial at 11–27, *Illinois v. Rieken*, Case No. 05-CF-75 (Feb. 19, 2009).

132. Ebony Horton, *Fort Rucker Soldier Acquitted of Infant Son's Death*, DOTHAN EAGLE (Dothan, Ala.) (Oct. 16, 2009), http://www2.dothanagle.com/news/2009/oct/16/fort_rucker_soldier_acquitted_of_infant_sons_death-ar-188992/. Here, in addition to the medical evidence, prosecutors introduced testimony that Fisher had admitted to shaking his son. *Id.*

133. As the prosecutor argued in summation: "only one story makes sense, and that is that Dedrick Fisher Jr. died from abusive head trauma." *Id.*

134. Ty Tagami, *Trial Done, Only Clarity Is Tot's Brutal Death*, ATLANTA J.-CONST., Oct. 7, 2009, at 1B.

case, complications related to sickle cell anemia¹³⁵—the sentencing judge was persuaded that Ware’s counsel had been sufficiently ineffective to warrant a reversal of her murder conviction.¹³⁶ The prosecution remained unconvinced,¹³⁷ and proceeded to retry Ware based on its triad-based theory of SBS.¹³⁸ This time around, the jury found Ware not guilty.¹³⁹

In North Carolina, a trial judge dismissed all charges against Mary Elizabeth Roach after the jury found the defendant guilty of first degree murder.¹⁴⁰ Ruling from the bench, the judge observed that “mere suspicion is not enough to demonstrate that there is more than a scintilla of evidence,”¹⁴¹ and concluded that the evidence was legally insufficient to establish that the baby was injured while in the defendant’s care.¹⁴² This order was affirmed on appeal.¹⁴³

In Wisconsin, Quentin Louis was sentenced to twenty years in prison for the death of his four-month-old daughter.¹⁴⁴ Just three years later, in August 2009, the trial judge granted Quentin Louis’s motion for a new trial “in the interest of justice.”¹⁴⁵ The court’s synopsis of the trial evidence is a virtual primer in the SBS prosecution paradigm:

135. Order Granting Motion For New Trial, *State v. Ware*, No. 04-CR-4839, at 2 (Dec. 6, 2006).

136. *Id.* at 3. After announcing her decision from the bench, the judge asked Ware’s attorney to submit a proposed order to the court granting a pretrial bond. Excerpt of Proceedings in *State v. Ware*, No. 04-CR-4839, at 3 (Dec. 5, 2006).

137. The prosecution first appealed the judge’s order to the state supreme court and, after losing, determined to try Ware for the second time. *State v. Ware*, 653 S.E.2d 21 (Ga. 2007).

138. Telephone Interview with Douglas Peters, Esq., Peters, Ruin & Reynolds, P.A., Decatur, GA (Nov. 23, 2009) (on file with author).

139. Tagami, *supra* note 134.

140. Transcript of Record at 1286, *State v. Roach*, 683 S.E.2d 466 (N.C. Ct. App. 2009) (No. COA08-720); see also *No Conviction if No Proof Beyond Reasonable Doubt*, CHARLOTTE OBSERVER Oct. 19, 2009, (on file with the *Alabama Law Review*) (noting that “[a] judge who overrules a jury, especially in a high-profile murder case, has to be very sure he’s right.”).

141. Transcript of Record at 1286, *State v. Roach*, 683 S.E.2d 466 (N.C. Ct. App. 2009) (No. COA08-720).

142. *Id.* Unlike most SBS cases, Roach’s defense—and the resulting judicial dismissal of charges—centered on the possibility of a lucid interval (i.e., the prospect that injury was inflicted at some point before the infant was in Roach’s care), rather than doubts about whether abuse occurred at all. See *id.* at 1288 (“it is with something of a heavy heart [that I dismiss the charges], because I don’t know who killed this young girl. And it’s also somewhat chilling to think that somewhere in this courtroom the murderer of this child may be sitting out there ... but I feel that I am doing what I am required to do under the law.”) For discussion of the research on lucid intervals and its relevance to criminal prosecution, see Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 18–19.

143. *State v. Roach*, 683 S.E.2d 466 (N.C. Ct. App. 2009).

144. Jeff Starck, *Shaken Baby Prosecutors Appeal New Trial*, MARSHFIELD NEWS, Sept. 30, 2009, at 7.

145. Post-Conviction Relief Decision at 11, *State v. Quentin Louis*, No. 05-CF-193 (Wis. Cir. Ct. Aug. 12, 2009), available at <http://www.scribd.com/doc/22325225/State-of-Wisconsin-v-Quentin-J-Louis>. See Wis. Stat. § 805.15(1) (2001). The state appealed the ruling, but the Wisconsin Appeals Court upheld the trial court’s decision. *Appeals Court Agrees to a New Trial in Shaken Baby Case*, WAUSAU DAILY HERALD, Mar. 16, 2011, available at <http://www.wausaudailyherald.com/article/20110316/WDH0101/110316023/Appeals-court-agrees-new-trial-shaken-baby-case>.

What the jury heard at trial from the medical experts was that from [the baby's] injuries alone, they could determine that (1) the only explanation for [the baby's] injuries was that she was shaken, (2) since SBS did not allow for a lucid interval and [the baby] was in Louis's care at the time she went limp, he must have shaken her and, (3) that Louis's shaking therefore was the cause [of the baby's] death.¹⁴⁶

After a postconviction relief hearing which included the testimony of two defense experts—a pediatric neuroradiologist and a forensic pathologist—the court concluded that the real controversy was not fully tried,¹⁴⁷ since the jury did not learn about challenges to the science of SBS, other possible causes of death,¹⁴⁸ the prospect of a lucid interval, or the significance of absent neck injuries.¹⁴⁹ Accordingly, the court concluded that “a jury should be afforded the opportunity to hear and evaluate this other evidence,” in order to “uphold the integrity of our system of justice.”¹⁵⁰

As reflected by these cases,¹⁵¹ and others like them, the system has begun absorbing developments in the forensic science of SBS; indeed at a

146. Yet interestingly (and likely in relation to the universe of prosecutions), the judge characterized the case as “exceptional.” *Id.* at 11.

147. *Id.* at 9 (quoting *State v. Harp*, 469 N.W.2d 210 (Wis. Ct. App. 1991) (holding that there is no need to show that retrial will produce different result)).

148. In this case, the baby had a chronic subdural hematoma, which may rebleed with little precipitation, causing further brain injury. *See, e.g.*, Cohen & Scheimberg, *supra* note 22; Mack et al., *supra* note 22; Fung et al., *supra* note 22; Rooks et al., *supra* note 22. *See also* Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at notes 91 and 306 (describing testimony to this effect during trial of Louise Woodward and at Audrey Edmunds's postconviction relief hearing).

149. Post-Conviction Relief Decision, *supra* note 145, at 11:

The jury did not hear any medical evidence challenging Shaken Baby Syndrome. It did not hear that [the baby] may have actually died due to chronic subdural hematoma covering a period of months. Nor did it hear about the possible significance of the lack of any neck injuries or the possibility of a lucid interval. Finally, the State ‘assertively and repetitively’ relied upon the tenants of the Shaken Baby Syndrome to prove its case.

150. Post-Conviction Relief Decision, *supra* note 145, at 12. Notwithstanding their shared roots in Wisconsin law, the *Louis* grounds for a new trial differ from those relied upon by the *Edmunds* court (again, newly discovered evidence). *Louis*'s rejection of newly discovered evidence as a basis for a new trial demonstrates how timing of the claim in relation to the perceived shift in science will be critical to those convicted in SBS cases. According to the *Louis* court:

The evidence that was ‘new’ in *Edmunds* is this [sic] same evidence considered by defense counsel at the time of the original trial here. In *Edmunds* the court had found that the shift in ‘mainstream’ medical opinion had occurred by 2006. The evidence introduced here was that the medical debate began around 1998, grew quickly between 2002 and 2004 and by 2005-2006 could no longer be considered just a small ‘fringe’ element of the medical community.

Id. at 6 (citation omitted). This reasoning encapsulates the limitations of newly discovered evidence arguments in the coming years; particularly for defendants whose convictions are relatively recent in time. *See* Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 55-56 (“At some point, unless a revolutionary breakthrough fatally undermines SBS, defendants convicted in this era of uncertainty will be hard-pressed to claim that evidence of the diagnosis's invalidity is new.”).

151. *See supra* notes 68-150 and accompanying text.

pace which seems to be accelerating.¹⁵² Whereas before, outcomes reflecting a rejection of yesterday's science were fairly characterized as outliers, this is no longer true. Instead, these cases now constitute a new category of their own.¹⁵³ While this legal treatment may portend an unequivocal shift, it also raises questions about whether the response is adequate, or whether the need for it could have been avoided altogether. Attending to the pattern that is emerging thus furthers our understanding of how criminal justice evolves,¹⁵⁴ just as it suggests the inadequacies of existing structures to account for the contingency of scientific claims.¹⁵⁵

B. *Plea Bargaining Around a Moving Shadow*¹⁵⁶

In an effort to assemble a coherent picture of the criminal justice system's treatment of SBS cases, I have until now focused largely on post-trial outcomes in order to question the adequacy of evidence of guilt. There is a logic to this emphasis. Defendants who exercise their right to a trial maintain their innocence and require the state to overcome this presumption, if it can, with evidence that persuades the trier of fact otherwise. Examining trials and postconviction outcomes allows for a critical analysis of this body of evidence along with the legal and factual arguments marshaled by a suspect population that professes to be innocent.

In contrast, guilty pleas seem on first glance to provide little information about the merits of a particular case. When an agreement is reached before trial, we know simply that the prosecutor was convinced of the defendant's guilt¹⁵⁷ and that the defendant believed it was in his or her best

152. Cf. Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 56 (observing that "a systemic assimilation of the evolved science" was not yet underway).

153. While still dwarfed in size by cases receiving the default treatment, this category is growing.

154. See *infra* notes 188–196 and accompanying text.

155. See *infra* notes 394–395 and accompanying text.

156. The "shadow of trial" theory of settlement dominates the discourse on plea bargaining. As Stephanos Bibas explains it, this theory:

predicts that parties strike plea bargains in the shadow of expected trial outcomes. In other words, parties forecast the expected sentence after trial, discount it by the probability of acquittal, and offer some proportional discount. . . . In short, the classic shadow-of-trial model predicts that the likelihood of conviction at trial and the likely post-trial sentence largely determine plea bargains.

Stephanos Bibas, *Plea Bargaining Outside the Shadow of Trial*, 117 HARV. L. REV. 2463, 2464–65 (2004). Bibas has critiqued this theory as "diverg[ing] from plea-bargaining reality," *id.* at 2467, and has offered a supplemental conceptual framework that takes into account the ways in which nontrial influences impact pleas. As I will argue, neither model—bargaining in the shadow of trial or outside of it—adequately describes plea bargaining in SBS cases, which are negotiated around a shadow that is moving.

157. Implicit in this statement is the assumption of an ethical prosecutor, which obviously does not hold true in all cases. However, since my overall argument is not affected by instances in which the assumption fails, I proceed on the basis of what I believe to be the most likely scenario—i.e., the prosecutor is proceeding with charges because she believes the defendant to be guilty. For an analysis of why the triad continues to exert an almost talismanic effect on prosecutors, see Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 26–32.

interest to accept the terms of the deal and forego trial. What cannot be fully evaluated are the strengths and weaknesses of the state's evidence, which may make negotiated pleas seem less attractive than trials as a unit of scholarly analysis. Moreover, defendants who plead guilty are easily viewed as guilty *in fact*; or at least exempted from the category of defendants who are quite likely innocent. If one is concerned about the prospect of injustice, a defendant who has admitted guilt as a matter of law presents a less obviously compelling case of wrongful conviction, and is therefore easily overlooked.

Despite the superficial appeal of these rationales, however, there are important reasons to attend to pleas in SBS cases.¹⁵⁸ As a general proposition, across categories of crime, the vast majority of convictions are of course obtained by plea.¹⁵⁹ In SBS cases, the incidence of plea bargaining is unknown. But by even the most conservative estimate, hundreds of defendants resolve these cases each year through negotiated deals before trial.¹⁶⁰ We know that many of these defendants are charged based solely on the basis of the SBS triad, that many maintain their innocence outside of court proceedings, and that all of these defendants face distinct risks in taking their cases to trial.¹⁶¹ Given these realities, we can reasonably conclude that some portion of those who plead guilty in SBS cases are in fact innocent.¹⁶²

158. It should be noted that “[v]ery few issues in the American criminal justice system generate such fierce controversy as plea bargaining—and very few allegations against the practice are as severe as the assertion that it leads to the conviction of innocent defendants.” Oren Gazal-Ayal, *Partial Ban on Plea Bargains*, 27 CARDOZO L. REV. 2295, 2297 (2006) (citations omitted). This discussion presumes the continued prominence of plea bargaining in our administration of criminal justice without taking a position on its merits.

159. See MATTHEW DUROSE & PATRICK LANGAN, BUREAU OF JUSTICE STATISTICS BULLETIN, FELONY SENTENCES IN STATE COURTS, 2000 (2003) (reporting that guilty pleas accounted for ninety-five percent of felony convictions in state courts).

160. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 10 (concluding that around two hundred SBS defendants a year are being convicted after trial, and suggesting that an estimated 1,500 SBS diagnoses per year may provide an outside parameter for assessing the number of guilty pleas).

161. According to Andrea Lyon, a law professor with experience representing clients in SBS cases, pleas in this type of prosecution are very much the norm given the likelihood that a jury will convict and the almost certain harshness of a post-trial sentence. Interview with Andrea D. Lyon, Assoc. Dean for Clinical Programs and Clinical Professor of Law, DePaul U.C. of Law, in Chi., Ill. (Oct. 16, 2008) (on file with author). A similar sentiment was voiced by one public defender, who articulated the dilemma faced by his SBS client: “if he went to trial and lost, [the sentence] was either 20 to 50 years, 20 years to life, or life without parole. Agreeing to confess to shaking the child . . . would considerably reduce any sentence.” Mark Anderson, *Does Shaken Baby Syndrome Really Exist?*, DISCOVER, Dec. 2, 2008, available at <http://discovermagazine.com/2008/dec/02-does-shaken-baby-syndrome-really-exist>.

162. In some cases, defendants who plead guilty may move to withdraw their pleas and, if the motion is denied, appeal this denial. See, e.g., *State v. Sadowsky*, Nos. 90696, 91796 (Ohio Ct. App. Jan. 29, 2009) (rejecting challenge to trial court's acceptance of plea in spite of defendant's profession of innocence during allocution). But, as a general proposition, estimating the incidence of what we might call “wrongful guilty pleas” is a practical impossibility. See Samuel R. Gross, *Convicting the Innocent*, 4 ANN. REV. L. & SOC. SCI. 173, 181 (2008) (“How frequently do innocent defendants in

Why would a defendant wrongly accused of shaking a baby plead guilty? The calculus is quite simple: punishment that is certain is more attractive than the risk that substantially more jail time will be imposed after conviction at trial.¹⁶³ Innocent defendants charged with killing or severely injuring a baby confront a high likelihood that a jury will return a guilty verdict.¹⁶⁴ If offered “a substantial discount—a discount big enough to compensate [the defendant] for foregoing the possibility of being found not guilty,”¹⁶⁵ a rational defendant will accept the terms of the offer,¹⁶⁶ notwithstanding factual innocence.¹⁶⁷

While this problem is hardly unique to the SBS context,¹⁶⁸ the pressures on an innocent defendant to plead guilty are exacerbated by factors

general plead guilty and receive reduced but still substantial prison terms? Needless to say, we don't know.”).

163. See Gross, *Convicting the Innocent*, *supra* note 162, at 181 (suggesting that “[t]he main reason [defendants] pled guilty is that in return they received a small fraction of the punishment they would have received after conviction at trial.”). See also Josh Bowers, *Punishing the Innocent*, 156 U. PA. L. REV. 1117 (2008).

164. For a discussion of jury decision making in SBS cases, see Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 37–40.

165. Gazal-Ayal, *supra* note 158, at 2299. In one rare glimpse into the plea bargaining calculus actually engaged in by individual defendants and their attorneys, one lawyer was emphatic that his client was innocent, and indicated that he “planned to challenge the scientific basis of [SBS]” in court. But because “the state may have [had] enough evidence to get a homicide conviction,” the defendant pleaded guilty on the eve of trial. Noelle McGee, *Suspect in Baby's Death Pleads Guilty to Manslaughter*, NEWS GAZETTE (Monticello, Ill.), Oct. 28, 2009, available at <http://www.news-gazette.com/news/courts-police-and-fire/2009-10-28/suspect-babys-death-pleads-guilty-manslaughter.html>.

166. For some defendants, of course, even a steep discount is insufficient to induce a guilty plea. See, e.g., Alan Prendergast, *Shades of Guilt*, WESTWORD (Denver, Colo.), Nov. 25, 2004, available at <http://www.westword.com/2004-11-25/news/shades-of-guilt> (describing case of Karen Voss, who rejected a sentence of up to five years in prison despite facing a life sentence; Voss was convicted after trial and is now serving a twenty year prison term).

167. Outside the SBS context, scholars have strongly critiqued the ethical implications of this type of disposition. See, e.g., Albert W. Alschuler, *The Prosecutor's Rule in Plea Bargaining*, 36 U. CHI. L. REV. 50, 64 (1968) (“The practice of responding to a weak case by offering extraordinary concessions . . . represents, at best, a dangerous allocation of institutional responsibility.”); Ronald F. Wright & Marc L. Miller, *Dead Wrong*, 2008 UTAH L. REV. 89, 105 (2008) (“When prosecutors become profligate with the use of murder charges combined with probation sentences, they avoid the risk of losing at trial, and they avoid criticism for declaring that murder charges are not provable at trial. Sometimes, however the prosecutorial duty to see that justice be done entails a willingness to embrace risk.”). A number of commentators have suggested various ways of institutionally disincentivizing bargains of this nature. See generally Alschuler *supra* note 167; Bibas, *supra* note 156; Bowers, *Punishing the Innocent*, *supra* note 163; William J. Stuntz, *Plea Bargaining and Criminal Law's Disappearing Shadow*, 117 HARV. L. REV. 2548 (2004); Gerard E. Lynch, *Our Administrative System of Criminal Justice*, 66 FORDHAM L. REV. 2117 (1997). Other scholars have suggested various system-wide remedies for the perceived injustices presented by this type of case. See, e.g., Ronald Wright & Marc Miller, *The Screening/Bargaining Tradeoff*, 55 STAN. L. REV. 29, 85–88 (2002) (recommending the internal adoption of strict screening policies by prosecutors offices); Gazal-Ayal, *supra* note 158, at 2313 (proposing partial ban on plea bargains to reduce the incidence of bargaining in weak cases). My focus here is rather different, as I am interested in what the appearance of this plea structure might reveal about the trajectory of the criminal justice system.

168. See Gazal-Ayal, *supra* note 158, at 2306–07 (“When a defendant takes into account the probability of being falsely convicted and the severity of the post-trial sentence, he may decide he is better off pleading guilty to an offense he did not commit.”).

that tend to be present in triad-based prosecutions: first, regardless of guilt, a significant probability of conviction; and, second, a substantial disparity between the sentence being offered¹⁶⁹ and the sentence likely to be imposed upon conviction after trial.¹⁷⁰ In short, the dynamics of SBS prosecutions compound problems generally understood to raise discomfiting questions about plea bargaining by innocent defendants.¹⁷¹

At times, the “truth value” of pleas seems particularly suspect. Gretchen Marie Kruger, a mother and day care provider, was charged—based on the triad—with shaking and permanently injuring a sixteen-month old baby in her care.¹⁷² Kruger unfailingly expressed her innocence and appeared likely to present expert testimony challenging the SBS diagnosis.¹⁷³ She ultimately pleaded guilty to child endangerment, however.¹⁷⁴ According to her attorney, Kruger “couldn’t risk the possibility of being away from her own four children,” and therefore “took advantage of the plea agreement” which allowed her to avoid jail altogether.¹⁷⁵ At the time, Kruger was facing a sentence of twenty years in prison.¹⁷⁶

169. I do not distinguish here between charge bargains and sentence bargains. See David Starkweather, *The Retributive Theory of “Just Deserts” and Victim Participation in Plea Bargaining*, 67 IND. L. J. 853, 858 (1992) (“There are two general classifications of plea bargaining, a sentence bargain and a charge bargain. In a *sentence* bargain, a defendant pleads guilty to the charges in exchange for a prosecutor’s recommendation of a lenient sentence or for a specified sentence. A *charge* bargain may take three forms. A defendant may plead guilty to a charge or charges in return for a prosecutor’s dismissal of other charges filed, a defendant may plead guilty to a charge or charges in return for a prosecutor’s promise not to file other charges, or a defendant may plead guilty to a lesser included offense in return for either a prosecutor’s dismissal of the more serious charge or a prosecutor’s promise not to file the more serious charge.”).

170. See Alschuler, *supra* note 167, at 60 (“[T]he greatest pressures to plead guilty are brought to bear on defendants who may be innocent. The universal rule is that the sentence differential between guilty-plea and trial defendants increases in direct proportion to the likelihood of acquittal.”). A number of scholars have examined the prosecutor’s role and ethical responsibilities in securing pleas from innocent defendants. See, e.g., Gazal-Ayal, *supra* note 158, at 2332–34; Wright & Miller, *Dead Wrong*, *supra* note 167, at 33; Alschuler, *supra* note 167, at 64; Lynch, *supra* note 167, at 2123–24.

171. One additional factor present in many SBS cases deserves mention. When law enforcement offers convey to a suspect their certainty that the baby was shaken to death and suggest that “who did it” is the only remaining question, a powerful motivation to accept responsibility—regardless of guilt—is created. See *infra* note 219 and accompanying text. In particular, interrogation techniques of this nature may pressure defendants to confess to protect their loved ones from prosecution regardless of the guilt of either party. I leave for another day further discussion of the various dynamics involved in charging a non-offending partner. See, e.g., *Newark Couple Indicted in Shaken-Baby Case*, NEWARK ADVOCATE, Oct. 24, 2009 (on file with the *Alabama Law Review*) (“The husband is accused of shaking a 2-month-old infant, and his wife is accused of lying about it,” because she “concocted an inaccurate story” when questioned about her husband’s culpability); WOOD TV, *Woman Arraigned in Shaken Baby Case*, (Oct. 29, 2009) http://www.woodtv.com/dpp/news/local/grand_rapids/woman_arraigned_in_shaken_baby_case (Grand Rapids, Michigan woman charged with “failing to report” that her son was shaken by her boyfriend).

172. Alex Friedrich, *Woman Guilty in Baby’s Injury: Child-Care Provider Enters Plea, Likely to Serve Probation*, ST. PAUL PIONEER PRESS, Jan. 24, 2007, available at <http://www.highbeam.com/doc/1G1-158220262.html>.

173. *Id.*

174. *Id.*

175. *Id.*

176. Alex Friedrich, *Caregiver Accused of Assault*, ST. PAUL PIONEER PRESS, Apr. 1, 2006, avail-

Consider, as well, the case of Vincent Dias, who was accused of shaking his two-and-a-half-month-old son to death.¹⁷⁷ Dias consistently maintained his innocence, and his lawyer was prepared to introduce expert testimony challenging the prosecution's version of the science of SBS.¹⁷⁸ But on the eve of trial, the defendant pleaded guilty in exchange for six months incarceration.¹⁷⁹ He had faced up to forty years in prison.¹⁸⁰

Cases like these¹⁸¹ indicate a likely decoupling of formal guilty pleas from factual guilt. Given what we know about plea bargaining,¹⁸² it is entirely predictable that innocent defendants would forego the possibility of acquittal at trial in exchange for dramatic sentence reductions.¹⁸³ Perhaps

able at 2006 WLNR 5443589.

177. Randall Beach, "Shaken Baby" Case Ends With Plea Deal, NEW HAVEN REGISTER, Sept. 14, 2009, available at http://www.nhregister.com/articles/2009/09/14/news/new_haven/a3-shakenbaby_mon.txt.

178. One of the four expert witnesses expected to testify on behalf of Dias would have explained that the infant "had benign external hydrocephalus, causing fluid to collect in the brain. The increased pressure stretches blood vessels, which tear and leak blood. . . ." causing seizures and death. *Id.*

179. More precisely, Dias was offered a five-year sentence to be suspended after six months served. *Id.*

180. *Id.*

181. In another case of alleged shaking, Justin Snow was charged with manslaughter in the death of his seven-week-old son. On probation for a sex crime at the time, Snow was not a defendant who should have expected leniency in sentencing. Yet on the morning his trial was set to begin, the prosecution allowed him to plead guilty (while maintaining his innocence) to one charge of endangering children in exchange for a sentence of up to five years in prison. D.A. Wilkinson, *Leetonia Man Gets Plea Deal in Death of 7-Week-Old-Son*, VINDY.COM Oct. 7, 2009, <http://www.vindy.com/news/2009/oct/07/leetonia-man-gets-plea-deal-in-death-of-7-week-old/>. See also Katie Merlie, *Sheridan Mother Gets Prison Time in Death of Chaeli Kyrie*, INDY.COM Jan. 24, 2009, <http://www.indy.com/posts/sheridan-mother-gets-prison-time-in-death-of-chaeli-kyrie> (guilty plea in murder case in exchange for six years in prison with credit for two years served); Greg Smith, *Norwich Man gets 7 Years in Death of Toddler*, NORWICH BULLETIN, Nov. 3, 2009, available at <http://www.norwichbulletin.com/news/x880802203/Norwich-man-gets-7-years-in-death-of-toddler> (guilty plea in negligent homicide case in exchange for seven years in prison); Scott Rapp, *Auburn Babysitter Sentenced to Weekends in Jail in Shaken Baby Case*, SYRACUSE.COM, Oct. 13, 2009, available at http://www.syracuse.com/news/index.ssf/2009/10/auburn_babysitter_to_be_senten.html (facing seven years in prison, defendant pleaded guilty to assault charges in exchange for sentence of three months of weekends in jail, plus probation and community service); Paul T. Rosynsky, *Surprising Deal Reached in Case Against Man Accused of Killing Son*, OAKLAND TRIBUNE, Feb. 2, 2011, available at http://www.insidebayarea.com/oaklandtribune/localnews/ci_17275256?source=rss (facing life sentence, defendant pleaded no contest in exchange for ten month sentence). In contrast, see *infra* note 186.

182. See *supra* notes 155–167 and accompanying text.

183. "When a defendant takes into account the probability of being falsely convicted and the severity of the post-trial sentence, he may decide he is better off pleading guilty to an offense he did not commit." Gazal-Ayal, *supra* note 158, at 2306–07. See Alschuler, *supra* note 167, at 60 ("The universal rule is that the sentence differential between guilty-plea and trial defendants increases in direct proportion to the likelihood of acquittal."). Recently, the Court of Appeal for Ontario set aside the guilty plea of an SBS defendant (who was sentenced to ninety days of intermittent imprisonment in exchange for his plea) and entered a judgment of acquittal, concluding: "There is no circumstantial evidence to support a finding that the appellant was responsible for his child's death and the medical evidence is inconclusive. What evidence there is shows the appellant to have been a loving parent who pleaded guilty because of the enormous stress he was under at the time.... [T]he pressure proved too much." *R v. Kumar*, 2011 ONCA 120, available at <http://www.canlii.org/en/on/onca/doc/2011/2011onca120/2011onca120.pdf>

more surprising is that prosecutors have become willing to offer these bargains to defendants charged with murder or other extremely serious crimes¹⁸⁴—defendants who, at least until recently, faced a high likelihood of conviction based on expert testimony regarding the diagnostic significance of the SBS triad.¹⁸⁵ These types of pleas are not (yet) typical.¹⁸⁶ But it is reasonable to expect that, as the legal system slowly accommodates scientific developments, we will see a rise in SBS pleas reflecting dramatic sentencing discounts.¹⁸⁷

The conceptual underpinnings of this prognosis are fairly straightforward. On a micro-level, lopsided¹⁸⁸ pleas in SBS cases tend to suggest simply that the prosecutor has concerns about the likelihood of conviction.¹⁸⁹ But when placed against the backdrop of recent scientific and legal developments, prosecutorial discounting has significance beyond the case. Because triad-based prosecutions are grounded in a functionally equivalent fact pattern,¹⁹⁰ individual case assessments capture a growing skepticism about this category of prosecution in general.¹⁹¹ SBS pleas reflecting steep

184. Given the paucity of available data, it is difficult to gauge the distribution of negotiated sentences in SBS cases. My point here is not that all, or even most, SBS defendants are receiving dramatically discounted plea offers. See *infra* note 186. Rather, I am suggesting that steep discounts may have particular significance when evaluated in context, even absent quantitative measures of relative frequency. See *infra* note 188.

185. Although admittedly impressionistic, my sense from collecting data over the past two years is that pleas of the sort I am describing here are becoming more commonplace.

186. The norm is better reflected by the case of Joshua Swain, who was sentenced to twenty-five years in prison after pleading guilty to intentional injury to a child in a case involving the alleged shaking death of Swain's two-month-old son. *Dad Pleads Guilty in Shaken Baby Death*, MY FOX AUSTIN, Sept. 9, 2009, available at http://www.myfoxaustin.com/dpp/news/local/090909_hutto_dad_pleads_guilty_in_shaken_baby_death.

187. Plea structures of this nature—particularly when they recur across a category of prosecution—are worthy of attention. Cf. Wright & Miller, *Dead Wrong*, *supra* note 167, at 106 (“Homicides that result in probation make a gripping story, and they deserve coverage.”).

188. By “lopsided”, I am referring to a decided asymmetry between the formal charge and the ultimate disposition. Oren Gazal-Ayal terms these “exceedingly lenient bargains.” Gazal-Ayal, *supra* note 158, at 2313. See also Wright & Miller, *Dead Wrong*, *supra* note 167, at 106 (using “steep discounts” to convey this concept).

189. As Oren Gazal-Ayal explains, “[u]sually, prosecutors cannot obtain guilty pleas in weak cases unless they offer substantial concessions. When a defendant knows he has a good chance for acquittal at trial, he will only plead guilty in return for considerable leniency. Therefore, the disparity between the expected sentence after a trial conviction and the bargained-for sentence signals the strength of the case.” Gazal-Ayal, *supra* note 158, at 2300.

190. See *supra* note 36 (describing paradigm).

191. This phenomenon may reflect the reversal of what I have previously identified as the prosecutorial reification of SBS:

If, across the country over the years, defendants have been proven guilty of shaking babies to death based on the presence of retinal hemorrhages, subdural hematomas and cerebral edemas, then the presence of these symptoms must mean that someone is guilty of shaking a baby to death. All that remains is to identify the last person with the conscious child. That person becomes the suspect, who can then be confidently pursued. In this manner, the triad-based crime constructed by the medical establishment has been reified—its existence affirmed—by the systematic conviction of its apparent perpetrators.

Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 32. I am now suggesting that this reification process may be in the early stages of dissolution, as prosecutors recalibrate the likelihood of triad-

sentencing discounts¹⁹² may thus be bellwethers of a change in course, as systemic inertia gives way to the latest scientific understandings.¹⁹³

In sum, the emergence of lopsided negotiated pleas is one possible mark of a regime in transition.¹⁹⁴ Prosecutors and defendants alike must bargain in a rapidly shifting context,¹⁹⁵ while, at the same time, new uncertainty regarding trial outcomes in an entire category of prosecution exacerbates the problems associated with an already inefficient market.¹⁹⁶ If the testimony of prosecution experts is in flux (as it has yet to conform to new understandings of the diagnosis), juries are becoming more doubtful, and trial judges and appellate courts are beginning to scrutinize carefully the claims made on behalf of classical SBS, then prosecutors and defendants face a formidable challenge in calibrating their trial risks. What we see reflects these unsettled times in the administration of justice.

III. EVOLUTIONARY FORCES

Part II showed how a virtually monolithic criminal justice response to SBS is now breaking down in response to new scientific understandings. It observed that our legal system's adaptation to the progression of science has been slow and haphazard, resulting in an untenable distribution of just outcomes. By suggesting that the status quo cannot be maintained, and that the helter-skelter quality of justice may propel the system toward a new stasis, this discussion placed the current legal treatment of SBS in a sort of evolutionary context.

Of course, the developments I have described do not occur in isolation. This Part adopts a broader perspective on the movement that we are witnessing. As we will see, the law's preliminary absorption of new scien-

only convictions in light of new systemic agnosticism. See James Meikle, *Murder Convictions for Child Head Injuries To Require Extra Evidence*, GUARDIAN.CO.UK., Jan. 7, 2011, available at 2011 WLNR 332605 (British Crown Prosecution Service provided updated guidelines to reflect "that it is unlikely a charge for a homicide or attempted murder or assault could be justified where the only evidence is the triad of injuries").

192. See Wright and Miller, *Dead Wrong*, *supra* note 167, at 106.

193. Put differently, the prosecutor's difficulty in calculating the worth of her case for bargaining purposes manifests a system in the throes of change. See Rosynsky, *supra* note 181 (prosecutor who agreed to ten month sentence for defendant facing life in prison justified the plea by citing the prospect of "conflicting medical evidence," the "lack of certain corroborating evidence," the defendant's lack of criminal, and the need for accountability and "certainty"). The arbitrariness that characterizes the treatment of triad-based prosecutions across the country is amplified by vast disparities in case outcomes (negotiated and nonnegotiated). In this manner, SBS pleas not only reflect, but contribute to, the dismantling of a monolithic systemic response to the diagnostic triad.

194. I limit this claim to the realm of SBS prosecutions.

195. See *supra* note 156 (describing the concept of a moving shadow of law).

196. For a discussion of case-specific information deficits related to defendants' limited discovery entitlements, see Bibas, *supra* note 156, at 2493-96. The uncertainty that I have been discussing is somewhat different because it confronts prosecutors as well as defendants and, more importantly, because it is rooted in the system's highly differential (and still unfolding) treatment of like fact patterns. See *supra* note 36 (discussing SBS paradigm).

tific perspectives on the SBS triad coincides with the ascendance of two powerful forces: the innocence movement and what I will call the “failed science movement.” The convergence of these influences, which I address in turn, creates a unique systemic receptivity to transformative change.

A. *Newly Discovered Innocence*

Our criminal justice system is currently in the process of reconfiguring itself in response to mounting evidence that innocent people have been, and continue to be, imprisoned for crimes they did not commit.¹⁹⁷ The rise of the “innocence movement”¹⁹⁸ is an outgrowth of hundreds of DNA exonerations¹⁹⁹ which have given meaning to the iconic “innocent man convicted.”²⁰⁰

Undisputed proof that false convictions occur²⁰¹ has raised the prospect that they occur with considerable frequency.²⁰² Notwithstanding continuing

197. See Medwed, *supra* note 43, at 1549 (“American criminal law is undergoing a transformation due to the increasing centrality of issues related to actual innocence in courtrooms, classrooms, and newsrooms.”); Susan A. Bandes, *Framing Wrongful Convictions*, 2008 UTAH L. REV. 5, 5 (2008) (“Concern over wrongful convictions has led to an ‘innocence movement’ that has managed to bridge ideological divides, rouse people to action, and achieve unprecedented success in reforming the operation of the death penalty.”); Josh Bowers, Response, *The Unusual Man in the Usual Place*, 157 U. PA. L. REV. PENNUMBRA 260, 267 (2009), available at <http://www.pennumbra.com/responses/05-2009/Bowers.pdf> (“A veritable cottage industry has grown up around the innocence movement, producing commissions, articles, books, documentaries, websites, law-school clinics, and public interest organizations—all devoted to the exoneration of innocent convicts in high-stakes felony cases.”).

198. See generally Bandes, *Framing Wrongful Convictions*, *supra* note 197. Daniel Medwed has used the term “innocentrism” to describe the impact of this movement. Medwed, *supra* note 43, at 1549.

199. According to the Innocence Project, “There have been 266 post-conviction DNA exonerations in the United States;” 198 of these have occurred since 2000. Innocence Project, *Facts on Post-Conviction DNA Exonerations*, available at <http://www.innocenceproject.org/Content/351.php> (last visited Feb. 3, 2011). As Sam Gross notes, “[i]n addition, we have learned about several major scandals in which police officers systematically framed dozens, or in one case hundreds, of innocent defendants who were ultimately exonerated en masse.” Gross, *Convicting the Innocent*, *supra* note 162, at 174. In the coming years, non-DNA exonerations will likely become more frequent. See, e.g., John Eligon, *Man Jailed for ‘91 Murder is Innocent, Judge Declares*, N.Y. TIMES, Nov. 13, 2009, at A23 (Recent ruling dismissing murder charges after the defendant had served 18 years in prison “was one of the rare instances in New York in which a judge had ruled that a defendant was innocent without the presence of exonerating DNA evidence.”).

200. United States v. Garsson, 291 F. 646, 649 (D.C.N.Y. 1923) (our criminal justice system “has been always haunted by the ghost of the innocent man convicted. It is an unreal dream.”). See Bandes, *Framing Wrongful Convictions*, *supra* note 197, at 8–9 (“The development that finally roused people to anger . . . was the mounting evidence that innocent people had been sent to death row.”); Medwed, *supra* note 43, at 1549 (“[I]nnocentrism[]’ derives mainly from the emergence of DNA testing and the subsequent use of that technology to exonerate innocent prisoners.”).

201. Cf. Medwed, *supra* note 43, at 1563 (“Proving a person’s innocence definitively is essentially impossible—even in DNA cases, a prosecutor could always claim . . . potential contamination of the evidence as a source of doubt regarding innocence.”).

202. See Gross, *Convicting the Innocent*, *supra* note 162, at 173 (arguing that false convictions “are commonplace events, inconspicuous mistakes in ordinary criminal investigations that never get anything close to the level of attention that sometimes leads to exoneration”); *id.*, *supra* note 162, at

disagreement among commentators regarding the extent of the problem,²⁰³ known exonerations—both the fact of their existence²⁰⁴ and what we have learned about their causes²⁰⁵—have shined a spotlight on innocence.²⁰⁶ In tangible ways, the DNA exonerations have impacted legislative reform,²⁰⁷ popular opinion,²⁰⁸ and investigative best practices.²⁰⁹

189 (asserting that “we do know that convictions of innocent defendants are a regular occurrence in the most serious criminal cases.”).

203. “The frequency of false convictions is sometimes described as a ‘dark number’—an unknown quantity—and it is. Worse, it cannot be estimated from any information we do know.” Gross, *Convicting the Innocent*, *supra* note 162, at 175 (citation omitted). For competing approaches to the empirical question, see, e.g., D. Michael Risinger, *Innocents Convicted: An Empirically Justified Factual Wrongful Conviction Rate*, 97 J. CRIM. L. & CRIMINOLOGY 761 (2007); Brandon L. Garrett, *Judging Innocence*, 108 COLUM. L. REV. 55 (2008); Ronald J. Allen & Larry Laudan, *Why Do We Convict As Many Innocent People as We Do?*, 41 TEX. TECH L. REV. 65 (2008).

204. Sam Gross has observed that,

[i]n theory, we should have known all along that false convictions happen and that they are caused by false or misleading evidence But knowing that something must be true is not the same as seeing that it is true; knowing abstractly that innocent people are convicted is a far cry from knowing their names and faces and learning how their lives were destroyed.

Gross, *Convicting the Innocent*, *supra* note 162, at 174.

205. See Gross, *Convicting the Innocent*, *supra* note 162, at 186 (the “canonical list of factors that lead to false convictions [includes] eyewitness misidentification; false confession; misleading, false, or fraudulent forensic evidence; testimony by highly motivated police informants such as ‘jailhouse snitches’; perjury in general; prosecutorial misconduct; ineffective legal defense.”). See also Innocence Project, *supra* note 199 (citing most common causes of wrongful convictions).

206. See Medwed, *supra* note 43, at 1551 (“All of the attention paid to actual innocence by litigators, academics, legislators, authors, and even television executives signals a new era in which fact-based arguments surrounding guilt or innocence may begin to trump or at least hold their own with the traditional rights-based arguments that have been the norm in criminal law for generations.”). For recent explorations of the relative merits of, and tensions between, due process models of criminal procedure and an innocence-centered framework, see GEORGE THOMAS, *THE SUPREME COURT ON TRIAL: HOW THE AMERICAN JUSTICE SYSTEM SACRIFICES INNOCENT DEFENDANTS* (2008); Susan A. Bandes, *Protecting the Innocent as the Primary Value of the Criminal Justice System*, 7 OHIO ST. J. CRIM. L. 413 (2009) (reviewing GEORGE THOMAS, *THE SUPREME COURT ON TRIAL: HOW THE AMERICAN JUSTICE SYSTEM SACRIFICES INNOCENT DEFENDANTS* (2008)),

207. See Gross, *Convicting the Innocent*, *supra* note 162, at 174 (recent exonerations have led to a “spate of new laws that make post-conviction DNA testing more readily available”); Medwed, *supra* note 43, at 1550 (“A number of states have even gone beyond the realm of DNA and implemented legislation designed to address the root causes of wrongful convictions, for instance, by modifying the manner in which eyewitness identification procedures are conducted.”). See also Dist. Att’y’s Office for the Third Judicial Dist. v. Osborne, 129 S. Ct. 2308, 2312 (2009) (“DNA testing has an unparalleled ability both to exonerate the wrongly convicted and to identify the guilty. It has the potential to significantly improve both the criminal justice system and police investigative practices. The Federal Government and the States have recognized this, and have developed special approaches to ensure that this evidentiary tool can be effectively incorporated into established criminal procedure—usually but not always through legislation.”).

208. See Gross, *Convicting the Innocent*, *supra* note 162, at 174 (“across the country, concern about executing the innocent has been the major cause for a substantial reduction in support for capital punishment”); Bandes, *Framing Wrongful Convictions*, *supra* note 197, at 7 (“It is no exaggeration to say that wrongful convictions spurred and defined a movement—the most successful death penalty reform movement in our lifetime.”).

209. See Gross, *Convicting the Innocent*, *supra* note 162, at 174 (recent exonerations have “sparked moves to reform basic aspects of criminal investigation, including eyewitness identification and custodial interrogation procedures; testimony by jailhouse informants; and the preservation, testing, and use of physical evidence”) (citations omitted).

The emergence of false convictions as a central concern for the administration of justice has also prompted a systemic reevaluation of certain basic tenets of our criminal law and procedure.²¹⁰ In various doctrinal settings, existing legal rules and their underlying conceptualizations are proving inadequate to accommodate a newfound prospect of false convictions. Across doctrinal divides, we see pressure on our system to account for innocence.²¹¹ In the following sections, I identify two such areas with special importance for the evolution of SBS in the courts.

1. *Doubting Confessions*

In recent years, as wrongful convictions have been uncovered and analyzed, it has become abundantly clear that false confessions are a real and significant problem.²¹² During this time, researchers have made great strides toward understanding what causes a suspect to confess to a crime he did not commit²¹³ and commentators have proposed a number of recommendations for reform,²¹⁴ some of which have already been adopted.²¹⁵

It remains to be seen how efficiently, and in what ways, the latest body of knowledge about confessions is penetrating the law.²¹⁶ For instance, we might expect that judicial determinations²¹⁷ regarding the ad-

210. See Osborne, 129 S. Ct. at 2323 (“DNA evidence will undoubtedly lead to changes in the criminal justice system. It has done so already.”); *supra* notes 258–260 and accompanying text.

211. The majority opinion in *Osborne*, authored by Chief Justice Roberts, reflects the Court’s most recently articulated perspective on this conundrum: “The dilemma is how to harness DNA’s power to prove innocence without unnecessarily overthrowing the established system of criminal justice.” 129 S. Ct. at 2316.

212. See Brandon L. Garrett, *The Substance of False Confessions*, 62 STAN. L. REV. 1051, 1082 (2009) (“For decades, commentators doubted that a crime suspect would falsely confess. . . . That understanding has changed dramatically in recent years, as, . . . postconviction DNA testing has exonerated 252 convicts, forty-two of whom falsely confessed to rapes and murders. There is a new awareness among scholars, legislators, courts, prosecutors, police departments, and the public that innocent people falsely confess, often due to psychological pressure placed upon them during police interrogations.”) (citations omitted). See also Saul M. Kassir, et al., *Police-Induced Confessions: Risk Factors and Recommendations*, 34 LAW & HUM. BEHAV. 3 (2010) (pointing to research suggesting that false confessions are present in 15–20% of all DNA exonerations and noting that “the cases that are discovered most surely represent the tip of an iceberg”).

213. A recent White Paper provides an excellent distillation of existing research that helps to explain what the authors call “police-induced” confessions. Kassir, *supra* note 212. See also Garrett, *The Substance of False Confessions*, *supra* note 212; *infra* notes 219–223 and accompanying text (summarizing relevant research).

214. See, e.g., Kassir, *supra* note 212, at 25.

215. See Innocence Project, *False Confessions and Recording of Custodial Interrogations*, <http://www.innocenceproject.org/Content/314.php?phpMyAdmin=52c4ab7ea46t7da4197> (last visited Feb. 3, 2011) (over 500 jurisdictions have voluntarily adopted policies to record interrogations; a number of state legislatures and state supreme courts had required taping under specified circumstances).

216. This discussion does not address the admissibility of expert testimony regarding false confessions. See Danielle E. Chojnacki et al., *An Empirical Basis for the Admission of Expert Testimony on False Confessions*, 40 ARIZ. ST. L.J. 1 (2008).

217. It bears emphasizing that criminal justice participants other than judges – primarily prosecutors and jurors – must also evaluate the validity of alleged confessions. See generally Richard A. Leo

missibility of a suspect's statements to law enforcement officers would be informed by the best available empirical research.²¹⁸ But the legal constructs which are applied to the admissibility determination—voluntariness, custody, invocation, and waiver of rights—do not easily map onto the more complicated picture presented by false confessions.

Research has shown that the following are risk factors for false confessions: the presentation of supposedly incontrovertible evidence of guilt;²¹⁹ depressed mood;²²⁰ minimizing remarks by interrogators;²²¹ stress-compounded needs for social support;²²² and even innocence itself.²²³

Bearing these factors in mind, consider the interrogation of April Rogers, a day care provider suspected—based on the presence of the diagnostic triad—of shaking a six-month-old infant to death.²²⁴ According to Rogers's initial account, after leaving the children unattended for a short time, she returned to find a toddler sitting on the neck of the baby, who was having trouble breathing.²²⁵ After waiving her *Miranda* warnings, Rogers was told by the interrogating officer (Wheeler) that: according to a “panel of doctors . . . a child could not have caused [the baby's] injuries;”²²⁶ that “with all the children [Rogers] was watching, anyone could have been pushed ‘over the top[,]’”²²⁷ and “[i]f Rogers was just overwhelmed, then that was ‘explainable’”;²²⁸ that Wheeler “already knew something ‘aggressive’ happened, but now she just needed to know why;”²²⁹ that “only an adult could have inflicted the force necessary to hurt [the baby] in this manner and that the injury occurred close to the time that [the baby] began seizing,” when only Rogers was present;²³⁰ that “if [police] could not go to the doctors with a logical explanation for what happened, then it looked

& Deborah Davis, *From False Confession to Wrongful Conviction: Seven Psychological Processes*, 38 J. PSYCHIATRY & L. 9 (2009) (discussing psychologically biasing influences on investigators, prosecutors, defense attorneys, juries, and judges). See Kassir, *supra* note 212, at 24 (“[C]onfessions have more impact than other potent forms of evidence . . . and that people do not fully discount confessions—even when they are judged to be coerced.”).

218. The recent White Paper, Kassir, *supra* note 212, relies on studies of proven false confessions, research on core principles of psychology, and forensic literature on confessions (which includes both analysis of actual cases and laboratory experiments).

219. Kassir, *supra* note 212, at 6.

220. *Id.* at 22.

221. *Id.* at 18.

222. *Id.* at 16.

223. *Id.* at 22.

224. *State v. Rogers*, 760 N.W.2d 35 (Neb. 2009).

225. *Id.* at 43.

226. *Id.* at 44.

227. *Id.* at 45.

228. *Id.*

229. *Id.*

230. *Id.*

‘very, very bad’ for Rogers;²³¹ and that her story “had to match the medical evidence.”²³²

Two hours after the interview began, Rogers confessed to shaking the baby and (“she thought”) repeatedly slamming his head on the floor.²³³ She was arrested, charged, and convicted of intentional child abuse resulting in death and sentenced to life imprisonment.²³⁴

In a rather unusual decision—one perhaps reflecting a growing judicial skepticism about “police-induced confessions”²³⁵—the Nebraska Supreme Court reversed the defendant’s conviction based on the admission of the statement.²³⁶ The court held that Rogers had invoked her right to silence, and that this invocation was not “scrupulously honored” by the police, resulting in a violation of the right against compelled self-incrimination.²³⁷ Rogers’s articulation of a desire not to speak further was critical to her constitutional claim; without it, Rogers would have lost her appeal. Since many of the factors known to bring about false confessions were present whether or not Rogers invoked her right to silence, this may be problematic. But, put bluntly, falsity has not been the law’s preoccupation.²³⁸

This is likely because, until recently, false convictions have not been at the forefront of modern legal consciousness.²³⁹ Now, with new reason to believe that suspects who admit to guilt might in fact be innocent, the law’s treatment of confessions may adapt accordingly. What this evolution might look like doctrinally is beyond the scope of this discussion. As a conceptual matter, however, the latest developments highlight a need to give meaning to a presumption of innocence in the interrogation room.

A fundamental shift in legal stance is required if a suspect who ultimately admits guilt is not assumed to be guilty when the truth of his or her confession is later evaluated.²⁴⁰ Empirical research suggests that this im-

231. *Id.*

232. *Id.* at 46.

233. *Id.*

234. *Id.* at 47.

235. *See* Kassir, *supra* note 212, at 3.

236. *State v. Rogers*, 760 N.W.2d at 63.

237. *Id.* at 62–63.

238. *See* Keith A. Findley, *Innocence Protection in the Appellate Process*, 93 MARQ. L. REV. 591, 604 (2009) (noting that “Supreme Court doctrine similarly fails to provide meaningful safeguards against false confessions”).

239. *But see, e.g.*, *Spano v. New York*, 360 U.S. 315, 320 (1959) (remarking on the “inherent untrustworthiness” of coerced confessions).

240. SBS interrogations often present a compelling case for this shift in orientation. For instance, this account of one mother suspected of shaking her infant suggests a number of troubling dynamics: “I was not capable of logical thought. [The interrogating officer] told me specific things to write down. I thought he was going to take me away from my child. . . . I did what he told me to do because I wanted to leave that room and get back to [my child] . . . I felt like I was walking on the bottom of the ocean, and nothing seemed real. I know now anything is possible when a mother hasn’t slept and her baby is dying.” Prendergast, *supra* note 166. *See, e.g.*, *State v. Hawkins*, No. M2008-01611-CCA-R3-CD, 2009 WL 2448296, slip op. at *4 (Tenn. Crim. App. 2009) (suspect told that “if the cause of the injury could not be determined, [his]children would have to come into State

aginative exercise is epistemologically justified. What we know—and what we will continue to learn—about false confessions should move the law in this direction.

2. *Dethroning Finality*

The “problem of finality”²⁴¹ is endemic to criminal law. For generations, courts and scholars have confronted various procedurally-framed iterations of this question: “When *has* justice been done?”²⁴²

The privileged status of finality in our system has been defended on a number of different grounds.²⁴³ Finality is thought to be inexorably linked to the proper functioning of punishment, based on both retributive and utilitarian rationales.²⁴⁴ It has also been said to “enhance[] the quality of judging,”²⁴⁵ “to preserve the federal balance,”²⁴⁶ to preserve resources,²⁴⁷ and to allow closure on the part of the State and crime victims, so that all may “move forward knowing the moral judgment will be carried out.”²⁴⁸ While not always expressly articulated, commitment to the finality of criminal convictions is deeply embedded in our criminal law structures and jurisprudence.²⁴⁹

custody”). In the SBS context, a presumption of innocence requires one to consider that interrogations often take place against the backdrop of unimaginable grief and the disregard for consequences that invariably attends it.

241. Paul M. Bator, *Finality in Criminal Law and Federal Habeas Corpus for State Prisoners*, 76 HARV. L. REV. 441 (1963). On the significance of Bator’s article to the development of habeas jurisprudence, see Susan Bandes, *Simple Murder: A Comment on the Legality of Executing the Innocent*, 44 BUFF. L. REV. 501, 509 (1996).

242. Bator, *supra* note 241, at 443. For practical purposes, this question finds its main outlet in the law of habeas corpus, which over the decades has been the focus of a voluminous body of scholarship.

243. See Bandes, *Simple Murder*, *supra* note 241, at 509 (“The interest in finality encompasses several overlapping concerns, which can be summarized as judicial economy, repose, deference to the court issuing the initial judgment, and the appearance of orderly process.”).

244. “Finality is essential to both the retributive and the deterrent functions of criminal law. ‘Neither innocence nor just punishment can be vindicated until the final judgment is known.’” *Calderon v. Thompson*, 523 U.S. 538, 555 (1998) (quoting *McCleskey v. Zant*, 499 U.S. 467, 491 (1991)). See also Bator, *supra* note 241, at 452 (finality is a “crucial element of [the] effectiveness” of the substantive criminal law).

245. *Thompson*, 523 U.S. at 555. See also Bator, *supra* note 241, at 451.

246. *Thompson*, 523 U.S. at 555.

247. Bator, *supra* note 241, at 451 (discussing conservation of resources beyond the economic, encompassing “all of the intellectual, moral, and political resources involved in the legal system”).

248. *Thompson*, 523 U.S. at 556. See also Bator, *supra* note 241, at 452 (“Repose is a psychological necessity in a secure and active society, and it should be one of the aims—though, let me make explicit, not the sole aim—of a procedural system to devise doctrines which, in the end, do give us repose, do embody the judgment that we have tried hard enough and thus may take it that justice has been done.”).

249. See Bator, *supra* note 241, at 452 (“The idea of just condemnation lies at the heart of the criminal law, and we should not lightly create processes which implicitly belie its possibility.”); Henry J. Friendly, *Is Innocence Irrelevant? Collateral Attack on Criminal Judgments*, 38 U. CHI. L. REV. 142, 146 (1970) (“For many reasons, collateral attack on criminal convictions carries a serious burden of justification.”).

The problem, of course, is that other important values are in tension with this commitment. In the criminal law, the possibility that justice *has not* been done²⁵⁰ is sufficiently disturbing to outweigh, at times, the desire for finality.²⁵¹ In these cases, the need for a just outcome requires that an unjust outcome be revisited.²⁵²

Over time, as the courts have struggled to strike the appropriate balance between these competing norms, finality has almost invariably emerged on top.²⁵³ But the conflict between finality and actual innocence has proven especially vexing. The theoretical issues at stake frame a set of decidedly practical questions which must be resolved: Under what circumstances should a prisoner be permitted to introduce new evidence of innocence? Should actual innocence be considered even in the absence of new evidence? When should a federal court be allowed to reverse a final state court judgment? By what standard of certainty should innocence claims be judged? Though inexact, the answers to these questions go some way toward establishing a systemic equilibrium between finality and justice.

For our purposes, it is important to see that the determination of a proper balance is *judicio-legislative* in nature²⁵⁴ and that it results from a process that is dynamic. Unsurprisingly, new legal and factual claims,²⁵⁵ as well as underlying social and political conditions,²⁵⁶ affect the relative weight accorded to the norms at issue. It is predictable, then, that the innocence movement would tend to undermine the “desideratum of finality.”²⁵⁷ One obvious manifestation of this influence is legislation to require

250. The question of how high the probability of injustice must be in order to warrant subordinating the premium placed on finality is of course critical to implementing these constructs. *See infra* notes 252–261 and accompanying text (posing practical considerations).

251. *See* Bator, *supra* note 241, at 441 (“[W]e must be sure before we proceed to the end, that we will not write an irrevocable *finis* on the page until we are somehow truly satisfied that justice has been done.”).

252. Although this premise is simple, its operationalization has proven to be one of the thorniest jurisprudential tasks.

253. *See* *Brecht v. Abrahamson*, 507 U.S. 619 (1993) (writ of habeas corpus an “extraordinary remedy”).

254. Judicial interpretations of the habeas right must be considered alongside the legislative creation of statutory grounds for a new trial.

255. *See supra* notes 199–209 and accompanying text (discussing impact of DNA exonerations on legal landscape).

256. Paul Bator, writing in 1963, made this observation: “our century has peculiarly sensitized us to and made us fearful of abuses of power exercised through the legal process. . . . The notion that a criminal litigation has irrevocably ended may have been an acceptable one in an age with a robust confidence in (or, if you prefer, complacency about) the rationality and justice of the basic process itself. But no such confidence or complacency can be said to exist today.” Bator, *supra* note 241, at 442.

257. Susan Haack, *Irreconcilable Differences? The Troubled Marriage of Science and Law*, 72 LAW & CONTEMP. PROBS. 1, 20 (2009) (citing the “desideratum of finality” as one salient feature of our legal system).

access to DNA testing for convicts.²⁵⁸ Another is the United States Supreme Court's recent order to remand a habeas corpus petition for a hearing on innocence.²⁵⁹ Still another is the Court's latest decision purporting to clarify the standard of federal habeas review of sufficiency claims.²⁶⁰

In each of these developments, we may glimpse the possibility that legal structures are responding to new concerns about innocence. Finality surely remains a powerful oppositional force.²⁶¹ But the balance may be shifting toward justice.²⁶² Until equilibrium is once again reached, here too, we find ourselves in transition.

To fully appreciate the extent to which the innocence movement is a potentially transformative force of criminal justice evolution, we must consider the separate impact of recent challenges to the tenets of forensic science.

B. *The Failed Science Movement*

In the past few decades, a significant body of applied forensic science²⁶³ has been discredited.²⁶⁴ As a result, the conceptual foundations upon which these now-undermined sciences—or so-called “pseudo

258. See *supra* note 207 and accompanying text. Cf. Dist. Att'y's Office for the Third Judicial Dist. v. Osborne, 129 S. Ct. 2308, 2316 (2009) (noting that state legislatures are “currently engaged in serious, thoughtful examinations of how to ensure the fair and effective use” of DNA testing, and declining to recognize a constitutional right of inmates to access DNA for the purposes of such testing) (quoting *Washington v. Glucksberg*, 521 U.S. 702, 719 (1997)).

259. *In re Davis*, 130 S. Ct. 1, 2 (2009). Justice Scalia, joined by Justice Thomas, dissented from the brief unsigned decision. For a helpful discussion of the case, see Myrna S. Raeder, *Postconviction Claims of Innocence*, 24 CRIM. JUST., no. 3, 2009, at 14. After a district court denied Davis habeas relief, he once again petitioned the U.S. Supreme Court for review, but his petition was denied. *Davis v. Humphrey*, No. 10-949, 2011 WL 220685 (U.S. Mar. 28, 2011).

260. *McDaniel v. Brown*, 130 S. Ct. 665, 673 (2010) (concluding that the appellate court's “recitation of inconsistencies in the testimony shows it failed” to apply the deferential standard of review required). As David Kaye has succinctly noted, “[t]he open question is whether and when exaggeration of probabilities [of a DNA match] amounts to a due process violation.” E-mail from Professor David Kaye, Penn State University, to Evidence Listserv (January 18, 2010, 21:25 EST) (on file with author). After issuing *Brown*, the Court reinstated the SBS-based conviction of Shirley Ree Smith and remanded the case to the Ninth Circuit for reconsideration in light of its latest guidance on the proper standard of review. *Court Sends Shaken Baby Case Back to Ninth Circuit*, N.Y. TIMES, Jan. 19, 2010. See Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 43–45 (discussing substance and extraordinary procedural path of Smith's case).

261. See, e.g., *In re Davis*, 130 S. Ct. at 2 (Scalia, J., dissenting).

262. See generally Findley, *supra* note 238.

263. As Simon Cole explains, forensic science is “hardly a unitary concept. Rather, it encompasses a wide variety of disciplines and techniques . . . Although generalization is difficult, it is nonetheless possible to speak in broad terms about some commonalities that persist across the nexus of practice called ‘forensic science.’ Perhaps chief among these stems from the word ‘forensic’ itself: the notion that forensic science is science that ‘speaks’ in court. Ultimately, all forensic practice, no matter how wide-ranging, has as its *telos* some sort of ‘speaking’ about the results of its analysis in some sort of legal tribunal.” Simon A. Cole, *Speaking of Evidence: An Empirical Study of the Reporting of Forensic Conclusions in U.S. Criminal Trials* 1–2 (CELS 2009 4th Annual Conference of Empirical Legal Studies Paper, 2009) available at <http://ssrn.com/abstract=1443630>.

264. See *infra* notes 285–300 and accompanying text.

sciences”²⁶⁵—rested have themselves been weakened in important ways. This reality has now become widely accepted, and extremely influential, as evidenced by a groundbreaking report by the National Academies of Science,²⁶⁶ a recent decision by the United States Supreme Court,²⁶⁷ the adoption by the American Bar Association of new policies related to forensic science,²⁶⁸ and extensive commentary by legal academics.²⁶⁹

I do not intend to comprehensively catalogue the many discrete challenges to the forensic sciences.²⁷⁰ Rather, my aim here is to note the combined potential of wide ranging efforts to reform legal perceptions²⁷¹ of “anecdotal forensics.”²⁷² The “failed science movement”²⁷³ seeks to alter the frameworks which govern the regulation, admissibility, and general embrace of forensics writ large. While this movement will not stall the advance of science-dependent prosecution,²⁷⁴ it will certainly shape it in the coming years.

265. See David A. Faigman, *Anecdotal Forensics*, *supra* note 45, at 980–81. David Faigman identifies an “anecdotal forensic science” as:

[A]ny specialty area that leads to expert testimony that is based primarily on inductive experience (“experience-based”) to develop and test its hypotheses and contains a substantial degree of subjective judgment in its application. Although it is possible to have subject areas that suffer only one of these deficiencies in method—that is, subjectively based but objectively applied or objectively based but subjectively applied—the two together are particularly noxious to truth. This double-barreled subjectivism permits forensic experts wide latitude in practice while rendering the subject areas largely invulnerable to falsification. Simply put, anecdotal forensics are pseudo sciences.

Id. See also Michael J. Saks & Davis L. Faigman, *Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It*, 4 ANN. REV. L. & SOC. SCI. 149, 150 (2008) (discussing the “soft forensic sciences, or what might be more accurately described as the nonscience forensic sciences”); *infra* note 284 and accompanying text (elaborating on the notion of “nonforensic sciences”).

266. NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMIES, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD (2009) [hereinafter NAS FORENSIC SCIENCE REPORT].

267. *Melendez-Diaz v. Massachusetts*, 129 S. Ct. 2527, 2537 (2009) (“Serious deficiencies have been found in the forensic evidence used in criminal trials. One commentator asserts that ‘[t]he legal community now concedes, with varying degrees of urgency, that our system produces erroneous convictions based on discredited forensics.’”) (quoting Pamela R. Metzger, *Cheating the Constitution*, 59 VAND. L. REV. 475, 491 (2006)).

268. AM. BAR ASS’N, *Policies Concerning Wrongful Conviction: Forensic Evidence*, 37 SW. U. L. REV. 832 (2008).

269. See, e.g., Paul C. Gianelli, *The NRC Report and Its Implications for Criminal Litigation*, 50 JURIMETRICS J. 53 (2009).

270. See *infra* notes 287–297 and accompanying text (providing nonexhaustive list of forensic science which have been effectively challenged).

271. The popular conception of forensic science is a separate, but related issue. See Saks & Faigman, *supra* note 265, at 150 (“The public appears to consider the various forensic sciences as one whole, believing them all to be flawless applications of sound basic science to problems of law . . . The trust that is laid upon the forensic sciences generally falls somewhere between uncritical faith and manufactured myth.”).

272. See *infra* note 284 (defining term).

273. I do not contend that this movement has been coordinated, though it is reasonable to anticipate greater organization of this sort in the wake of the NAS Forensic Science Report.

274. See *infra* notes 311, 327 and accompanying text (defending proposition that this type of prosecution will continue to proliferate).

Broadly speaking, failures of forensic science may be traced to faulty application or to inherent conceptual limitations.²⁷⁵ While this distinction is somewhat artificial,²⁷⁶ it provides a helpful way of classifying the proven problems with various forensic fields.²⁷⁷

With respect to application, serious problems with crime laboratories²⁷⁸ and the false testimony of technicians have been uncovered in recent years.²⁷⁹ A number of “well-publicized crime laboratory scandals,”²⁸⁰ as well as other documented cases of laboratory abuse, have led to increasingly urgent calls for the imposition of more rigorous standards and controls.²⁸¹ At the risk of oversimplifying, it may be said that this category of concerns is largely organizational. As such, it seeks greater oversight to ensure technical compliance with best practices.

In contrast, a separate critique has been leveled at the substance of various fields of forensic science, as well as their underlying methodologies.²⁸² Challenges to the conceptual underpinnings of the targeted field

275. Cf. Peter J. Neufeld, *The (Near) Irrelevance of Daubert to Criminal Justice and Some Suggestions for Reform*, 95 AM. J. PUB. HEALTH S107 (2005) (“Forensic science can fail in two ways: (1) lacking reliability (i.e., the inability to reproduce valid results; and (2) bias, incompetence, or a lack of adequate internal controls for the evidence introduced by the forensic scientists and their laboratories.”).

276. See Saks & Faigman, *supra* note 265.

277. According to the Innocence Project,

Unvalidated or improper forensic science played a role in approximately 50 percent of wrongful convictions later overturned by DNA testing. While DNA testing was developed through extensive scientific research at top academic centers, many other forensic techniques—such as hair microscopy, bite mark comparisons, firearm tool mark analysis and shoe print comparisons—have never been subjected to rigorous scientific evaluation. Meanwhile, forensics techniques that have been properly validated—such as serology, commonly known as blood typing—are sometimes improperly conducted or inaccurately conveyed in trial testimony. In other wrongful conviction cases, forensic scientists have engaged in misconduct.

INNOCENCE PROJECT, *supra* note 199.

278. See Neufeld, *supra* note 275, at S107.

279. See, e.g., Paul C. Giannelli, *Forensic Science*, 34 J. L. MED. & ETHICS 310, 311–12 (2006); Neufeld, *supra* note 275, at S108–S109. See generally Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1 (2009).

280. Giannelli, *Forensic Science*, *supra* note 279, at 310. See also Paul C. Giannelli, *Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs*, 86 N.C. L. REV. 163, 172–208 (2007).

281. According to a recently adopted Resolution of the American Bar Association, “[c]rime laboratories and medical examiner offices should be accredited, examiners should be certified, and procedures should be standardized and published to ensure the validity, reliability, and timely analysis of forensic evidence.” AM. BAR ASS’N, *supra* note 268, at 837. See also Giannelli, *Wrongful Convictions*, *supra* note 280, 208–234; Garrett & Neufeld, *supra* note 279 at 94–96; NAS FORENSIC SCIENCE REPORT, *supra* note 266, at 193–216.

282. The “nonscience forensic sciences” are “scientific failures in the sense that science (either in substance or in methodology) played little more than a rhetorical part in the development of these fields,” and they are “technological failures,” insofar as “[t]he specific techniques that have been developed and deployed in these fields make unknown numbers of errors” Saks & Faigman, *supra* note 265, at 150–151.

expose putative scientific knowledge as essentially manufactured.²⁸³ As Michael Saks and David Faigman have observed:

The nonscience forensic sciences, as the paradoxical phrase suggests, are those fields within forensic science that have little or no basis in actual science. They neither borrow from established science nor systematically test their hypotheses. Their primary claims for validity rest on anecdotal experience and proclamations of success over time. . . . Whereas in most scientific fields experience and observation are designated as the first steps of the scientific method, for many forensic fields they constitute the final stages of confirmation. Indeed, in a way, many practitioners of the forensic arts have turned the scientific method on its head. So long as their hypotheses and suppositions have not been tested, they are assumed true.²⁸⁴

In recent years,²⁸⁵ research has cast doubt upon a number of established fields of forensic science,²⁸⁶ undermining generally accepted truths about voiceprints,²⁸⁷ compositional bullet lead,²⁸⁸ handwriting,²⁸⁹ hairs,²⁹⁰ fibers,²⁹¹ bite marks,²⁹² tool marks,²⁹³ shoe prints and tire tracks,²⁹⁴ latent

283. See Faigman, *Anecdotal Forensics*, *supra* note 45, at 979 (challenging “claims [by practitioners of some forensic sciences] to the mantle of science”).

284. Saks & Faigman, *supra* note 265, at 150. See also Faigman, *Anecdotal Forensics*, *supra* note 45, at 983 (“[A]necdotal forensic scientists do not, and have not, tested their hypotheses in any serious manner. They look only for confirmations of their practices and rationalize or ignore contradictory evidence. Experience is the *leitmotif* of their methodology.”); *id.* at 999 (“[A]necdotal forensics, therefore, possess the patina of science, but there is no scientific community filling in the substance.”).

285. See Giannelli, *Forensic Science*, *supra* note 279, at 310 (describing developments in the 1990s which catalyzed efforts to reform the forensic sciences). To be clear, this recent period of time is not the first in which an established body of forensic science has been effectively undermined. See, e.g., Faigman, *Anecdotal Forensics*, *supra* note 45, at 981–85 (discussing the nineteenth century rise of phrenology); Mary E. Cowan & Patricia L. Purdon, *A Study of the “Paraffin Test,”* 12 J. FORENSIC SCI. 19, 35 (1967) (challenging the validity of the paraffin test, which was routinely admitted in court to indicate the probability of exposure to gunfire residue). But this is the first era in which the impact of discrete challenges to particular fields of forensic science has had such collective significance. See *supra* notes 263–274 and accompanying text (describing concept of the failed-science movement).

286. The forensic identification sciences—which purport to match crime scene evidence with its source—have proven especially problematic. See Saks & Faigman, *supra* note 265, at 150 (explaining that the identification sciences are “those subfields that often are referred to as criminalistics and that involve pattern matching in an effort to associate a crime scene mark or object with its source The ultimate objective, and postulated achievement, of forensic identification science is individualization, the process of placing an object in a category which consists of a single, solitary unit. Individualization implies uniqueness.”) (internal quotations omitted).

287. See, e.g., NAS FORENSIC SCIENCE REPORT, *supra* note 266, at 47 (citing DAVID L. FAIGMAN, ET. AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 31 (2002)); Saks & Faigman, *supra* note 265, at 156.

288. See, e.g., NAS FORENSIC SCIENCE REPORT, *supra* note 266, at 150–55.

289. See, e.g., *id.* at 165–67.

290. See, e.g., *id.* at 156–62.

291. See, e.g., *id.* at 162–64.

292. See, e.g., *id.* at 174–77.

fingerprints,²⁹⁵ bloodstain patterns,²⁹⁶ and fires.²⁹⁷ In short, across a wide spectrum of forensic methodologies, scientific validity has now become suspect,²⁹⁸ leading to what has aptly been referred to as “a national crisis in forensic science.”²⁹⁹ This crisis has prompted a reexamination of the very tenets upon which previously trusted scientific knowledge purports to rest,³⁰⁰ augmenting a growing skepticism about previously accepted evidence of guilt. New conceptual frameworks for evaluating future scientific claims thus embody a far more cautious orientation.³⁰¹

From a criminal justice perspective, these frameworks have not yet been fully operationalized. Just as in the SBS context, there is a tension between the criminal law’s treatment of forensic science claims and what scientists now know about the validity of these claims. After some period of lagging behind, the law will eventually recalibrate itself in response to the failed science movement and resolve the tension which has propelled the system forward.

But this dialectic is a poor mechanism for achieving meaningful correspondence between the best available science and its criminal law application. We ought to be concerned about the inadequacy of this response, especially because the conditions which triggered it will recur.

IV. THE INTERSECTION OF SCIENCE AND CRIMINAL JUSTICE

Previously, I suggested that the legal evolution of SBS is best viewed in the context of more far-reaching pressures for systemic change. I now elaborate on the dynamics which make this change essential.

This Part is divided into two related discussions. First, I explore various features of SBS that mark it as a quintessential science-dependent prosecution.³⁰² By using SBS as a vehicle for exploring surfacing tensions between science and criminal law, I mean to suggest that seemingly unique

293. See, e.g., *id.* at 150–55.

294. See, e.g., *id.* at 145–50.

295. See, e.g., *id.* at 136–45; Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. CRIM. L. & CRIMINOLOGY 985 (2005).

296. See, e.g., NAS FORENSIC SCIENCE REPORT, *supra* note 266, at 177–79.

297. See, e.g., *id.* at 170–73; *infra* notes 314–323 and accompanying text.

298. “With the exception of nuclear DNA analysis . . . no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source.” NAS FORENSIC SCIENCE REPORT, *supra* note 266, at 7.

299. Neufeld, *supra* note 275, at S107.

300. It has also informed critique of emerging forensic claims. See, e.g., Erin Murphy, *The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence*, 95 CALIF. L. REV. 721, 724–26 (2007).

301. It should be noted that DNA evidence occupies a uniquely elevated stature in the hierarchy of forensic sciences. That said, we should expect that certain forensic claims made on behalf of DNA will be subject to greater scrutiny in the coming years.

302. See *infra* Part IV.A.

features of these cases may, in fact, be shared by other crime prosecution models that we see today and, more importantly, that we will confront in the future. The location of SBS at one end of a spectrum representing the merger of science and criminal prosecution³⁰³ raises the prospect that fundamental characteristics of this prosecution paradigm are possessed by other types of crime which fall elsewhere on this continuum.

After considering how SBS embodies the scientific construction of crime and defense, I adopt a more generalized perspective on the science/law interface.³⁰⁴ As I will argue, we can expect certain features of science-dependent—or even, in weaker form (and to a somewhat lesser extent), science-reliant³⁰⁵—prosecutions to almost invariably recur. This is because particular problems are endemic to the very enterprise of basing criminal prosecution on a body of knowledge which, by its nature, is tentative and subject to unexpected revision.³⁰⁶ Moreover, dependence on science entails dependence on experts, which presents a host of separate concerns.³⁰⁷

To be clear, I do not advocate a retreat from scientific knowledge or minimize the extent to which it may be used beneficially to investigate and prosecute crime. On the contrary, recognition of the endurance of science-based prosecution is one move toward grappling with the fundamental challenges it poses. Conundra at the science/law interface may be intractable, but our system's approach to these problems can nonetheless be refined in a manner that is most consistent with our notion of justice. To this end, a thoughtful and deliberate response is warranted.

A. *SBS: The Scientific Construction of Crime and Defense*

SBS is a case study in the scientific construction of crime and defense.³⁰⁸ Here, I use it to interrogate the increasingly close relationship between science and criminal prosecution.

303. See *infra* note 305 (defining *science-dependent* and *science-reliant* prosecutions).

304. See *infra* Part IV.B.

305. I adopt the terms *science-dependent prosecution* and *science-reliant prosecution* to convey the degree to which any given prosecution relies on the claims of science for its success. We may conceive of this relationship as existing on a continuum. At one end (e.g., SBS), scientific expertise is essential to proving the case. At the other, science is irrelevant. Between the two extremes, science helps to establish (though may not be necessary to establish) some, but not all, of the elements of the crime or crimes charged. There are undoubtedly other helpful ways of framing these concepts, but the vocabulary of science-dependent and science-reliant prosecution is offered as a starting point.

306. See *infra* Part IV.B.1.

307. See *infra* Part IV.B.2.

308. Defense challenges to the scientific claims made on behalf of SBS have developed rather recently. Perhaps this is not surprising where, as here, the science said to prove the state's entire case once seemed infallible to all concerned. Cf. Robert P. Mosteller, *Why Defense Attorneys Cannot, But Do, Care About Innocence*, 50 SANTA CLARA L. REV. 1, 3 (2010) (“[D]efense attorneys have no special and reliable ways to know innocence.”).

1. *Medically Diagnosed Murder*

The SBS prosecution paradigm is utterly dependent on the claims of science.³⁰⁹ As I have explained:

With rare exception, the case turns on the testimony of medical experts. Unlike any other category of prosecution, all elements of the crime—*mens rea* and *actus reus* (which includes both the act itself and causation of the resulting harm)—are proven by the science. Degree of force testimony not only establishes causation, but also the requisite state of mind. Unequivocal testimony regarding timing—i.e., that symptoms necessarily would appear instantaneously upon the infliction of injury—proves the perpetrator’s identity. In its classic formulation, SBS comes as close as one could imagine to a medical diagnosis of murder: prosecutors use it to prove the mechanism of death, the intent to harm, and the identity of the killer.³¹⁰

SBS is unique in its exclusive reliance on medicine to establish the commission of a crime, to determine the perpetrator, and to prove his guilt. Indeed, this total conflation of the realms of science and criminal prosecution may be without precedent. But scientific expertise plays an increasingly important role across a wide spectrum of prosecutions.³¹¹ Indeed, if we conceive of crime as sitting on a continuum that describes its relation to science—a dependence–reliance spectrum³¹²—SBS sits at one extreme. But this end of the range is occupied by a number of other crimes, and the position will likely become even more crowded in the future.³¹³

309. See *supra* notes 11–15 and accompanying text (explaining significance of diagnostic triad).

310. Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 5 (footnotes omitted).

311. Criminal justice commentators seem to share a unanimous view of the central (and undiminishing) importance of science in the realm of prosecution. See, e.g., Keith A. Findley, *Innocents at Risk: Adversary Imbalance, Forensic Science, and the Search for Truth*, 38 SETON HALL L. REV. 893, 934 (2008) (“Most of the forensic sciences . . . have become fixtures in criminal cases . . .”); Murphy, *supra* note 300, at 723 (“[C]urrently on the horizon are a new generation of forensic sciences capable of uncovering and inculpat[ing] criminal offenders at an order of magnitude greater than that afforded by traditional forensic techniques. This array of exciting new methods . . . represents a marked advance over the rudimentary techniques of old, and will surely stake a central and indispensable role in the future administration of criminal justice.”); Andrea Roth, *Safety in Numbers? Deciding When DNA Alone is Enough To Convict*, 85 N.Y.U. L. REV. 1130, 1184 (calling this “the modern age of statistics and science-based prosecutions”). Speaking generally about the enduring importance of the science-law interface, Scott Brewer has remarked that “few topics . . . will be more important to the health of the polity and its citizens than the close investigation of how the law *ought*—from legal, moral, and other closely related practical *points of view*—to keep up with science.” Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L. J. 1535, 1679 (1998). See *infra* note 327 (providing additional support for this proposition).

312. See *supra* note 305.

313. See *supra* note 311 and accompanying text.

For instance, the crime of arson has striking parallels to SBS.³¹⁴ In fire investigations, as in forensic medicine, “mistakes can lead to the belief that there is a crime when none was committed.”³¹⁵ Here, too, expert testimony establishes the *actus reus*—the damaging of real property by means of fire or explosive. The requisite *mens rea*—typically knowledge—is proven by the fire investigator’s conclusion that the fire was purposely set.³¹⁶ In contrast to a diagnosis of SBS, which effectively demonstrates the perpetrator’s identity by framing a small temporal window in which the injuries could have been inflicted,³¹⁷ techniques of fire investigation do not generally allow for a determination of who perpetrated the alleged arson. But, notwithstanding this distinction,³¹⁸ arson shares with SBS an enormous dependence on a body of technical knowledge—which may or may not be scientific—thought to prove guilt beyond a reasonable doubt.

I raise the arson example to make a fairly modest point: SBS is not the only crime that is almost fully embedded in the domain of science.³¹⁹ However, it should also be noted that, apart from this similarity, the two areas of criminal justice share a dependence on scientific claims that have been undermined.³²⁰ As is becoming more widely known,³²¹ the science of fire investigations has evolved dramatically³²² raising many of the same issues that have arisen in the SBS context, in particular, the problem of innocence.³²³

314. I am grateful to Sam Gross for this insight, and to John Lentini for sharing his perspective on it.

315. Maurice Possley, *Arson Myths Fuel Errors: Debunked Theories Plague Fire Probes, Lead to Wrongful Arrests, Prosecutions*, CHI. TRIBUNE, Oct. 18, 2004, available at http://www.chicagotribune.com/news/watchdog/chi-0410_80222oct18_0_1571511.story.

316. See, e.g., 720 ILL. COMP. STAT. ANN. 5/20-1 (West 2003) (“[A] person commits arson when, “by means of fire or explosive, he knowingly . . . [d]amages” property).

317. See *supra* note 28 and accompanying text (discussing lucid interval research and its significance).

318. The practical importance of the distinction is questionable. According to one leading expert, since an obvious suspect is typically present in arson cases, identity is rarely disputed. Conversation with John Lentini, Fire Investigator, Applied Technical Services, Peaks Island, Me. (June 21, 2009) (on file with author).

319. See *supra* note 309.

320. For an overview of how previously accepted lore regarding fire investigation was officially repudiated, see John J. Lentini, *Fires, Arsons, and Explosions: Scientific Status*, in MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY §§ 39.21–54 (Faigman et. al. eds., 2009). See also *United States v. Hebshie*, No. 02CR10185-NG, 2010 WL 4722040 (D. Mass. Nov. 15, 2010) (vacating arson and mail fraud conviction). Insofar as it departs from the trajectory of SBS in the medical community, this account has important sociological and institutional implications for the revision of established truths.

321. A 2009 New Yorker article drew new attention to much of what Maurice Possley’s investigative journalism had identified as problematic five years earlier. David Grann, *Trial By Fire: Did Texas Execute An Innocent Man?*, THE NEW YORKER, Sept. 7, 2009, at 42. See *supra* note 315.

322. See Lentini, *supra* note 320, at § 39.21; Marc Price Wolf, *Habeas Relief from Bad Science: Does Federal Habeas Corpus Provide Relief for Prisoners Possibly Convicted on Misunderstood Fire Science?*, 10 MINN. J. L. SCI. & TECH. 213, 220–27 (2009).

323. See generally Possley, *Arson Myths Fuel Errors*, *supra* note 315; Grann, *supra* note 321; Wolf, *supra* note 322, at 227–28.

As a general proposition, the tighter the nexus between scientific expertise and criminal prosecution, the more acute the problems for justice if or when scientific paradigms decisively shift.³²⁴ This reality does not require that science should be shunned, but that we attend to the rise and fall of criminal prosecution which is, either at its inception³²⁵ or in any of its incarnations,³²⁶ bounded by scientific expertise. The lure of science is sufficiently powerful that we can expect to encounter more, not fewer, science-dependent prosecutions going forward.³²⁷ Past experience teaches that this phenomenon—both in its entirety and in its particulars—is worthy of critical and sustained analysis.

2. *Crimeless Prosecution*

Triad-based SBS convictions raise the distinct possibility that, notwithstanding a criminal judgment to the contrary, no crime whatsoever occurred.³²⁸ Just as new scientific consensus regarding the diagnosis undermines the proposition that the three symptoms establish the identity of a perpetrator,³²⁹ it also belies the notion that the triad is necessarily caused by shaking.³³⁰ Put differently, in some cases, the “wrong” suspect may have been pursued by law enforcement,³³¹ but in many, there is no killer because there was no homicide. Here, the old science has (falsely) constructed a crime.

The challenge that this presents for an innocent defendant can hardly be overstated. In a helpful account of “no-crime” cases,³³² Sam Gross has

324. See *infra* Part IV.B.1.

325. By this, I mean that SBS is a wholly scientific construct; without the claims of forensic medicine, it would not (and could not) have emerged as a category of criminal prosecution.

326. See *supra* notes 314–318 (discussing arson investigations).

327. See *supra* note 311. An interesting example of what the future holds is offered by Andrea Roth:

[The] emerging phenomenon of “pure cold hit” [or “naked trawl”] DNA prosecutions in which the entirety [or near-entirety] of the government’s case . . . is a DNA profile match . . . [has been fueled] by law enforcement’s increased reliance on DNA databases to investigate crimes, the newfound ability to develop DNA profiles on old, degraded, and mixed evidence samples, and the modern practice of securing so-called “John Doe” indictments against DNA profiles of yet-unknown suspects.

Roth, *supra* note 311, (internal citations omitted). See also Brewer, *supra* note 311, at 1681 (describing this as an “age in which culture will increasingly take advantage of the massive intellectual power of science”).

328. I am contemplating cases in which there is no criminal act, as opposed to those in which there is no criminal state of mind (i.e., no *mens rea*).

329. See *supra* notes 25–26 and accompanying text.

330. See *supra* notes 21–24; 27–30 and accompanying text.

331. See *supra* note 329 and accompanying text.

332. See Gross, *Convicting the Innocent*, *supra* note 162, at 182–86. Gross divides this category of false convictions into those resulting from perjury and those caused by mistakes. In addition to one arson case, the documented mistakes include a number of murder exonerations in which victims were ultimately found alive, were determined to have committed suicide, or were proven to have died of natural causes. *Id.*

noted the great difficulties inherent in exonerating a suspect convicted of a crime which never took place.³³³ My focus here is on the trial itself, when fact finders are asked to determine whether guilt has been proven beyond a reasonable doubt. I contend that the “no crime” trial materially departs from jurors’ expectations in ways that disadvantage the innocent defendant.³³⁴ To understand why this is so, consider the “whodunit” model of criminal investigations and the prominent role it occupies in our collective psyche.

Given this archetype, a natural assumption on the part of jurors is that the involvement of law enforcement in the case on trial was triggered by the commission of a crime. As a result, juries focus their deliberations on testing the connection between the crime and the defendant, as opposed to questioning whether a crime occurred at all. Trial defenses may be constructed accordingly³³⁵ since innocent defendants confront the choice of pointing a finger at another possible suspect—which nicely resonates with the familiar trope—or arguing that no one is to blame for a tragedy.³³⁶

One final observation relates to the larger implications of a “no crime” crime construct. On an institutional level, those concerned about the validity of SBS-based convictions suffer from an inability to invoke the discourse of crime control. As Keith Findley has described, “[t]he innocence literature is replete with references to the fact that every wrongful conviction also represents a failure to convict the guilty—a failure of crime control.”³³⁷ Politically and rhetorically, the innocence movement has gained considerable traction with its appeal to popular law enforcement urges.³³⁸ It is no exaggeration to suggest that the unapprehended “real perpetrator” has advanced the cause of innocence substantially.

333. *Id.* at 183 (“If a crime has actually been committed, an innocent defendant can sometimes prove that someone else did it Proving that someone else committed the crime is by far the most common method of achieving an exoneration, but it’s unavailable if there was no crime at all [A] defendant who is convicted of a crime that never occurred faces the nearly impossible task of proving a negative in a context in which very strong proof is required.”).

334. See generally Dan A. Simon, *A Third View of the Black Box: Cognitive Coherence in Legal Decision Making*, 71 U. CHI. L. REV. 511 (2004).

335. See, e.g., Brief of Appellant at 28, *State v. Ware*, 653 S.E.2d 21 (Ga. 2007) (No. S07A1423), 2007 WL 5004039 at *28 (describing a failed trial strategy which involved keeping the case “simple and straightforward [for] the jury”—blaming the mother for the baby’s injuries— rather than making the more medically complex argument that sickle cell anemia was the cause of death).

336. See *supra* note 49 (noting emotional grip of underlying factual predicate).

337. Keith A. Findley, *Toward a New Paradigm of Criminal Justice: How the Innocence Movement Merges Crime Control and Due Process*, 41 TEX. TECH L. REV. 133, 141 (2008).

338. See, e.g., Myrna S. Raeder, *Introduction to Wrongful Convictions Symposium*, 37 SW. U. L. REV. 745, 747 (2008) (“In addition to the injustice to the person, the victim of the crime and society also suffer because the actual perpetrator remains at large, who, in many instances, commits further offense, often rapes and murders.”); Neufeld, *supra* note 275, at S109 (“Bad forensic science is bad law enforcement. Each time unreliable science, incompetent scientists or crime lab misconduct is used to arrest, indict, or convict an innocent person, the real perpetrator remains free to commit more crime.”).

But concerns for the injustices of SBS-based prosecutions and convictions are not well represented by established conceptual frameworks.³³⁹ Indeed, what is true of individual cases applies categorically: the inability to point to a villain may undermine the success of actual innocence claims. Here, too, SBS subverts conventional models of criminal justice problems and their solutions.

3. *A Non-Unified Theory of Innocence*

Apart from the difficulty of identifying a (non-existent) alternative suspect, those accused of shaking babies confront the improbability of establishing an alternative mechanism of death or injury. Here, criminal justice encounters the limits of existing forensic understandings,³⁴⁰ constrained as they are by the bounds of episodic scientific progress.³⁴¹

As a general proposition, science has not advanced a single replacement for shaking as *the* cause of the SBS triad. Instead, possible explanations for the symptoms vary from case to case.³⁴² Given the appeal of parsimony, the argument for innocence inevitably suffers by virtue of the complexities of this forensic landscape.

More problematic still is that the clinical picture presented by any individual case involving the SBS triad is often ambiguous and easily lends itself to differing interpretations. Thus, even when a number of physicians conclude that an infant's symptoms have a nontraumatic etiology, these same experts may disagree among themselves regarding the specific cause at issue.³⁴³ Moreover, a doctor who feels confident that the baby's symptoms have nontraumatic origins may herself admit uncertainty regarding the causal mechanism.³⁴⁴ In short, forensic experts often point to retinal hemorrhaging and subdural hematomas as the "mimics of abuse"³⁴⁵ without offering a unitary explanation for their presence.

339. I am obviously not suggesting that those who have made crime control arguments to support innocence-focused reforms lack concern for SBS or other kinds of "no crime" convictions. To the contrary, many of these scholars and practitioners are at the forefront of efforts to advance the causes of the innocent (Keith Findley, Myrna Raeder, and Peter Neufeld chief among them). My point is to note the exclusivity of the default rhetoric and how it cannot be severed from the political realities, which have made it tactically sound and largely successful.

340. To posit that an unknown measure of indeterminacy is attributable to the developing nature of research into alternative causes of the triad is not to deny that, to some extent, the multitude of SBS mimics may simply mirror underlying diagnostic realities. *See infra* note 351 and accompanying text.

341. *See infra* Part IV.B.1.

342. *See supra* notes 29–30 and accompanying text (discussing differential diagnosis).

343. *See* Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 39 (explaining that in the *Edmunds* postconviction relief hearing, defense experts offered competing explanations for the infant's death).

344. *See id.* (noting that in the *Edmunds* postconviction relief hearing, no defense expert testified to certainty regarding any particular theory of death).

345. *See supra* notes 27–28 and accompanying text.

The lack of a unified forensic theory of innocence has implications for all stages of the criminal process. Regardless of how burdens of proof are legally allocated, as a practical matter—from the investigative phase³⁴⁶ to trial³⁴⁷ to postconviction relief proceedings³⁴⁸—the probability of guilt is assessed against the account put forth by the accused.³⁴⁹ In the absence of a grand unified theory, this account frequently falls short, even if it consists of the best that science can furnish.

Over time, research advances may somewhat alleviate the diagnostic challenges associated with pediatric neurology.³⁵⁰ But the workings of babies are mysterious.³⁵¹ For the foreseeable future, a measure of indeterminacy will remain.

346. Police officers and prosecutors are subject to a number of powerful cognitive biases relevant to this inquiry. See *supra* note 217.

347. I have previously written:

[T]he differential diagnosis—or, from the perspective of the prosecution, ‘a veritable laundry list of alternative medical possibilities which are commonly proffered’ by the defense—has become a critical area of contention in SBS trials.

The defense must concede that it cannot definitively prove a mechanism of injury. According to the accused in an SBS case, testimony regarding other plausible diagnoses is important not because it definitively establishes the occurrence of a scenario other than the one hypothesized by the prosecution, but because it casts doubt on the claim that no other scenario *could* explain the symptoms.

This mode of argument tends to be deeply unsatisfying to the human psyche and, as a consequence, problematic for jury decision making. It is widely recognized that “fact finders look for stories, not just discrete nuggets of fact to fit into a set of legal rules.” Burdens of proof notwithstanding, a consensus that identifies a single narrative will almost invariably trump an amalgam [sic] of possibilities that challenge it. In SBS cases, what the defense asks the jury to do is surmount this psychological barrier and acquit.

Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 39–40 (internal citations omitted).

348. In the postconviction relief hearing in *Edmunds*, the prosecutor made this appeal: “the primary flaw [in the defendant’s theory of postconviction relief] is the fact -- and it’s not an opinion; it is a fact -- that no one on this defense team could agree on the cause of death in this case.” Transcript of Oral Argument at 75–76, *State v. Edmunds*, 746 N.W.2d 590 (Wis. Ct. App. 2008). The prosecutor reiterated this point later in the argument: “[t]he mud balls; throw, throw, see if something sticks. Differential Diagnosis.” *Id.* at 87–88.

349. As I have described:

In a typical SBS case, as a matter of law, the prosecution must establish that the presence of retinal hemorrhages, subdural hematoma, and cerebral edema proves beyond a reasonable doubt that the defendant on trial shook the baby to death. If the science cannot bear this burden, the jury must acquit—even in the absence of a known cause. The reality is quite different on the ground, where, to prevail at trial, a defendant must disprove the validity of a medical diagnosis with impressive establishment *bona fides*.

Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 40.

350. See *infra* Part IV.B.1.

351. The persistence of SIDS as a “diagnosis of exclusion” stands as powerful testament to this reality. Kent P. Hymel, *Distinguishing Sudden Infant Death Syndrome from Child Abuse Fatalities*, 118 AM. ACAD. PEDIATRICS 421, 422 (2006) (“A diagnosis of SIDS reflects the clear admission by medical professionals that an infant’s death remains unexplained.”).

B. Beyond SBS: Intractable Problems at the Science/Law Interface

As we have seen, SBS is situated precisely where science meets criminal law; indeed, the correspondence between the two is as close as can be. In the discussion that follows, I further examine this location. This exploration reveals that neither scientific change of course nor the legal system's faulty response to it are unforeseeable. Rather, they each derive from enduring features of science and law. Careful consideration of these salient features is a necessary step toward reforming our criminal justice system's response to them. Without sustained attention, other categories of science-dependent prosecution may be doomed to SBS-like fates.

1. Scientific (R)evolution

It is uncontroversial to observe that scientific knowledge undergoes a process of unrelenting revision. Whether or not this movement invariably entails greater advance toward "truth,"³⁵² it has the potential to upend previously accepted orthodoxy in sudden, unpredictable ways, ways that present formidable challenges to our criminal justice system.

In the latter half of the twentieth century, a central concern of philosophical inquiry into the foundations of science was this process of change. In the most influential account,³⁵³ Thomas Kuhn advanced the notion that "paradigms"³⁵⁴ suddenly shift,³⁵⁵ dramatically transforming the world view of the scientific community.³⁵⁶ According to Kuhn, periods of relative intellectual tranquility are punctuated by recurrent bursts of conceptual "retooling."³⁵⁷ Surveying history, Kuhn observed that "normal science repeatedly goes astray."³⁵⁸ He further explained:

And when it does—when, that is, the profession can no longer evade anomalies that subvert the existing tradition of scientific practice—then begin the extraordinary investigations that lead the profession at last to a new set of commitments, a new basis for the

352. See *infra* note 359.

353. See ALEX ROSENBERG, PHILOSOPHY OF SCIENCE: A CONTEMPORARY INTRODUCTION 156 (2d ed. 2005) ("The Structure of Scientific Revolutions was published in 1962. The impact of its doctrines within and beyond the philosophy of science is difficult to overstate.").

354. THOMAS S. KUHN, THE STRUCTURE OF SCIENTIFIC REVOLUTIONS, at viii (2d ed. 1970) (defining paradigms as "universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners.").

355. *Id.* at 150 ("Just because it is a transition between incommensurables, the transition between competing paradigms cannot be made a step at a time, forced by logic and neutral experience. Like the gestalt switch, it must occur all at once (though not necessarily in an instant) or not at all.").

356. *Id.* at 7. ("[T]he scientist's world is qualitatively transformed as well as quantitatively enriched by fundamental novelties of either fact or theory.").

357. *Id.* at 76.

358. *Id.* at 6.

practice of science. The extraordinary episodes in which that shift of professional commitments occurs are the ones known . . . as scientific revolutions. They are the tradition-shattering complements to the tradition-bound activity of normal science.³⁵⁹

Over time, a number of competing theories of the progression of science have been propounded. What matters for present purposes is that philosophers of science (as well as scholars in the field of science and technology)³⁶⁰ have consistently viewed change as a fundamental unit of analysis and that there is widespread agreement that scientific evolution need not be gradual. Abrupt, episodic bursts of knowledge-generating research activity are in one sense extraordinary, insofar as they disrupt the normal pace of scientific development; but they are also typical, in that they recur with sufficient frequency to be studied and theorized.

From an interdisciplinary perspective, then, it is hardly news that science is contingent—that “scientific inquiry is by nature tentative and thoroughly fallibilist.”³⁶¹ And yet, our extant approach to science-dependent prosecutions overlooks what is not merely a possibility, but a certainty: namely, that new research will require us to revisit basic assumptions that are unquestioned today.³⁶² While not every scientific “truth” we now embrace will someday be upended, some not insignificant number will indeed be turned on their head, and importantly, we cannot predict which will stand and which will fall or how dramatically the re-thinking will unfold.

359. *Id.* at 6. By insisting that shifting paradigms do not invariably advance scientific knowledge toward truth, Kuhn’s theoretical framework upended a long line of established thinking that equated scientific progress with rationality. *See id.* at 170 (“We may . . . have to relinquish the notion, explicit or implicit, that changes of paradigm carry scientists and those who learn from them closer and closer to the truth.”) This aspect of Kuhn’s work has generated important debate. *See* Larry Laudan, *Dissecting the Holistic Picture of Scientific Change*, in *PHILOSOPHY OF SCIENCE: THE CENTRAL ISSUES* 139 (Martin Curd & J.A. Cover eds., 1998) (explaining that Kuhn’s work “posed in a particularly vivid form some direct challenges to the empiricism we were learning from the likes of Hempel, Nagel, Popper, and Carnap. Philosophers of science of that era had no doubts about whom and what the book was attacking. If Kuhn was right, all the then reigning methodological orthodoxies were simply wrong.”).

360. “This movement is generally associated with the sociology of scientific knowledge, or even more specifically with ‘the strong programme in the sociology of scientific knowledge,’ and it is to this movement that scholars often refer when they talk about S&TS or ‘science studies.’” Simon A. Cole, *Where the Rubber Meets the Road: Thinking About Expert Evidence as Expert Testimony*, 52 *VILL. L. REV.* 803, 813 n.37 (2007). For one of the seminal works within this field, see SHEILA JASANOFF, *SCIENCE AT THE BAR: LAW, SCIENCE, AND TECHNOLOGY IN AMERICA* (1995).

361. Haack, *supra* note 257, at 12.

362. As Susan Haack has generally observed, there are “deep tensions between the goals and values of the scientific enterprise and the culture of the law, especially the culture of the U.S. legal system . . . [including] between the pervasive fallibilism of the sciences—its openness to revision in the light of new evidence—and the concern of the law for prompt and final resolutions.” Haack, *supra* note 257, at 2.

The implications for science-based prosecutions are considerable. In a sense, our criminal justice system is perpetually chasing science.³⁶³ This endeavor is complicated when—as is often, if not typically, the case—major scientific developments are episodic and divisive rather than incremental and consensual. Yet we have not configured our laws and institutions in a manner that accounts for the structure of scientific change.

The troubling case of SBS illustrates the dangers inherent in this systemic neglect.

2. *Expertise and Epistemic Competence*

A corollary of prosecutorial dependence on science is reliance on expertise, which raises a set of separate concerns. In this discussion, I put to one side the substantive basis for scientific evidence³⁶⁴ in order to examine the epistemological issues—those “concern[ed] with warranted belief”³⁶⁵ surrounding expert testimony. It should be noted that I am also declining to treat the question of admissibility, which has been the subject of abundant academic commentary.³⁶⁶ Instead, my focus here is on the evaluation of expert testimony once it has been received in evidence, which is part of a larger inquiry into what “can be believed with sufficient justification for the purposes of the [criminal justice] system.”³⁶⁷ As we will see, the capacity of nonexperts to arrive at rational judgments in the face of compet-

363. See *supra* notes 35–39 and accompanying text.

364. Simon Cole draws an important distinction between “what the evidence says,” and “what the expert says to the fact finder,” and persuasively advocates a scholarly and judicial focus on the courtroom use of evidence, as opposed to the process of producing the underlying body of knowledge upon which this testimony draws. Cole, *Where the Rubber Meets the Road*, *supra* note 360, at 818.

365. Brewer, *supra* note 311, at 1590 (“The distinctive mark of the *epistemic* is the concern with warranted belief.”). See *infra* note 367.

366. For an admittedly eclectic sample of articles helpfully treating the admissibility of scientific expertise, see, e.g., Erica Beecher-Monas, *The Heuristics of Intellectual Due Process: A Primer for Triers of Science*, 75 N.Y.U. L. REV. 1563 (2000); Simon A. Cole, *Toward Evidence-Based Evidence: Supporting Forensic Knowledge Claims in the Post-Daubert Era*, 43 TULSA L. REV. 263 (2007); Mark P. Denbeaux & D. Michael Risinger, Kumho Tire and Expert Reliability: *How the Question You Ask Gives the Answer you Get*, 34 SETON HALL L. REV. 15 (2003); David L. Faigman, *The Law’s Scientific Revolution: Reflections and Ruminations on the Law’s Use of Experts in Year Seven of the Revolution*, 57 WASH. & LEE L. REV. 661 (2000); Richard D. Friedman, *Squeezing Daubert Out of the Picture*, 33 SETON HALL L. REV. 1047 (2003); Edward J. Imwinkelried, *The Relativity of Reliability*, 34 SETON HALL L. REV. 269 (2003); Randolph N. Jonakait, *The Meaning of Daubert and What That Means For Forensic Science*, 15 CARDOZO. L. REV. 2103 (1994). For an interesting comparative perspective, see LAW COMM’N, *The Admissibility of Expert Evidence in Criminal Proceedings in England and Wales*, (The Law Commission, Consultation Paper No. 190, 2009), available at <http://www.lawcom.gov.uk/docs/cp190.pdf>. For a recent analysis of admissibility issues in the SBS context, see Edward J. Imwinkelried, *Shaken Baby Syndrome: A Genuine Battle of the Scientific (and Non-Scientific) Experts*, 46 CRIM. L. BULLETIN 156 (2010).

367. Brewer, *supra* note 311, at 1540–41 (defining the “law’s epistemology” as “the set of rules and institutions that determine what, from a legal point of view, can be believed with sufficient justification for purposes of the legal system”).

ing expert testimony is limited, at best.³⁶⁸ This raises particular concerns about prosecutions which effectively require fact finders to defer, rather than reason.³⁶⁹

SBS-based convictions, which rest entirely on scientific expert testimony, present in pristine form a direct challenge to the notion that they are epistemically sound judgments. Various conceptual frameworks advanced in legal scholarship³⁷⁰ help to explain why verdicts based exclusively on contested expert testimony should give us pause.³⁷¹

But, until now, no category of criminal prosecution has provided a functional test of the predictive value of a theory of limited epistemic competence.³⁷² SBS is this crucible, and it proves the worth of the model which instructs that, given the structure of the SBS prosecution paradigm, we should expect precisely the disturbing pattern of verdicts which has emerged. In other words, the epistemically arbitrary judgments that result from SBS trials are an inevitable byproduct of the input that factfinders are receiving.

Consider that in the typical SBS case, jurors³⁷³ are called upon to pass judgment on the validity of an SBS diagnosis.³⁷⁴ They are supposed to do this either by relying on the testimony of prosecution experts—in the ab-

368. *Id.* at 1539 (“[N]onexpert judges’ and juries’ lack of understanding of the cognitive aims and methods of science and their reliance on such indicia of expertise as credentials, reputation, and demeanor to choose between competing scientific experts thus yield only *epistemically arbitrary* judgments.”). See *infra* notes 390–392 and accompanying text (elaborating on these proxies for truth).

369. Expert testimony may also serve a variety of non-assessing functions, including observation and instruction. Samuel R. Gross & Jennifer L. Mnookin, *Expert Information and Expert Evidence: A Preliminary Taxonomy*, 34 SETON HALL L. REV. 141 (2003).

370. See, e.g., Brewer, *supra* note 311, at 1538; Jennifer L. Mnookin, *Expert Evidence, Partisanship, and Epistemic Competence*, 73 BROOK. L. REV. 1009, 1014 (2008). Epistemically-based concerns about the decision making capabilities of jurors faced with experts are not new. See Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 55 (1901) (“[W]hen any conflict between really contradictory propositions arises, or any reconciliation between seemingly contradictory propositions is necessary, the jury is not a competent tribunal.”). For a vivid description of the problem, see Samuel R. Gross, *Expert Evidence*, 1991 WIS. L. REV. 1113, 1185–86 (1991).

371. For instance, Scott Brewer has suggested that an “*intellectual due process*” norm requires that legal decision making processes not be epistemically arbitrary. Brewer, *supra* note 311, at 1539. He has further suggested that “nonexpert judges and juries often fail to satisfy the demands of intellectual due process when they . . . rely upon scientific expert testimony.” *Id.*

372. Mnookin, *supra* note 370, at 1010 (identifying “the problem of epistemic competence” as one of two fundamental problems in the use of experts; the other problem is partisanship).

373. Much of this discussion also applies to judges, who may be no more capable than lay people when it comes to evaluating disputed scientific claims. See Brewer, *supra* note 311, at 1677–79; Gross, *Expert Evidence*, *supra* note 370, at 1180 n.210.

374. See *supra* Part IV.A.1.

sence of defense experts³⁷⁵—or by comparing the testimony of prosecution experts to the testimony of defense experts in order to pick a winner.³⁷⁶

The first scenario is problematic for fairly obvious reasons.³⁷⁷ Outside the courtroom, the classical formulation of SBS has been formally (albeit quietly) discarded,³⁷⁸ and considerable controversy attends even the latest incarnation of Abusive Head Trauma.³⁷⁹ But jurors who do not hear from defense experts are unlikely to learn about this perspective—at least not in its most powerful distillation.³⁸⁰ In theory, cross-examination should provide some indication of the weaknesses in the prosecution's expert testimony,³⁸¹ but a defense attorney seeking to attack questionable scientific

375. Access to experts for indigent defendants is an important issue. See generally Paul C. Gianneli, *Ake v. Oklahoma: The Right to Expert Assistance in a Post-Daubert, Post-DNA World*, 89 CORNELL L. REV. 1305, 1307 (2004). Even for defendants who are not indigent, the ability to retain expert witnesses is typically quite limited.

376. See, e.g., *People v. Granados*, No. H032175, 2009 WL 426229, at *9 (Cal. Ct. App. Feb. 20, 2009) (prosecution presented the testimony of a bioengineer, forensic neuropathologist, ophthalmologist, and pediatricians; defense presented the testimony of a pediatric ophthalmologist, forensic pathologist and neuropathologist, pediatric neurologist, and biomechanical engineer).

377. See Gross & Mnookin, *supra* note 369, at 185 (“As long as we do depend on the adversarial system, we need to have one that actually is what it claims to be: a contest with two sides, where each serves as a check on the other. In many criminal cases, there is only one side on expert issues: the prosecution. The result is a national scandal.”).

378. As I have already suggested, a review of recent appellate opinions suggests that the testimony of prosecution experts has not generally conformed to the medical profession's understanding of AHT 2010 (as expressed outside of the law) and the best clinical practices surrounding the diagnosis. Put differently, prosecution experts continue to testify in a manner that diverges from contemporary scientific knowledge even as expressed by defenders of the AHT diagnosis. See, e.g., *State v. Fortener*, No. E2008-01775-CCA-R3-CD, 2010 WL 1241629, at *4, *9 (Tenn. Crim. App. Mar. 31, 2010) (describing testimony of prosecution experts that “[n]othing else causes these three particular injuries together, other than perhaps a violent accident such as a car crash,” and that “in order to get the shearing injuries . . . there needed to be rotation in the force.”); see also *supra* notes 21–30.

This troubling disconnect between the best available science and reality on the ground is typified by the recent arrest of a baby sitter in Florida. According to the press account: “It took an autopsy to reveal the true cause of 7-month-old David Landron's death. Emergency room doctors and first responders didn't observe physical signs of the trauma the baby had received. They believed he had choked on food given to him by his baby sitter, Maria Corsa-Hernandez. But the medical examiner report showed evidence of something else: David had massive internal head trauma that proved he died of shaken baby syndrome. When questioned, Corsa-Hernandez denied having battered or abused David. But investigators say the baby could only have received the injuries while he was alone with the sitter.” *Autopsy Revealed Cause of Baby's Death*, *supra* note 62. Discussion of possible explanations for the perseverance of discredited medical lore is beyond the scope of this article.

379. See *supra* note 23.

380. In *Schoonmaker*, the New Mexico Supreme Court noted that “[e]xpert testimony was critical to the defense to call into question the State's expert opinions that Child's injuries could only have been caused by shaking of a violent nature.” *State v. Schoonmaker*, 176 P.3d 1105, 1113 (N.M. 2008). Based on the testimony of defense experts in other cases and published scientific research, the court found that “disagreement exists in the medical community as to the amount of time between when injuries occur and when the child becomes symptomatic, and whether injuries like Child's can be caused by short-distance falls.” *Id.* at 1114. It was clear, therefore, that the defendant's failure to call experts to testify on his behalf was due not to the absence of supporting science, but to poverty. *Id.* at 1114–15. In a remarkable opinion, the court concluded that because of the trial courts' role in “deny[ing] counsel access to the necessary funding,” the defendant was entitled to a new trial. *Id.* at 1114–16. See *supra* note 375; *supra* note 98.

381. But see Gross, *Expert Evidence*, *supra* note 370, at 1173 n.194 (discussing the limitations of

claims is at a significant disadvantage without the benefit of her own expert witness, who can educate the lawyer and inform her strategy.³⁸² Moreover, even effective cross-examination of prosecution experts will rarely, if ever, present jurors with an innocent explanation for the baby's symptoms that is more than grudgingly conceded to be a remote possibility.³⁸³

Outside of the courtroom, a nonabusive explanation for the SBS triad may exist undiscovered.³⁸⁴ Without a doubt, the articulation of a plausible alternate forensic version of events can mean the difference between conviction and acquittal.³⁸⁵ But factfinders cannot be expected to divine scientific truths from an evidentiary lacuna. One clear conundrum is that the jury's knowledge base—as received from designated experts—does not adequately represent that possessed by the medical community at large.

Yet aligning these two bases of knowledge proves complicated from an epistemological standpoint because it necessarily requires fact finders to engage in the task of evaluation.³⁸⁶ The second scenario described above (in which both sides introduce expert testimony) presents this quandary.³⁸⁷

cross examination of experts).

382. See, e.g., Post-Conviction Relief Decision, *supra* note 145 at 3 (in evidentiary hearing on new trial motion, defendant's trial attorney admitted "'lack of familiarity' with the extent of the changing medical opinions"); Brief of Appellee at 8 *State v. Ware*, 653 S.E.2d 21 (Ga. 2007) (No. S07A1423), 2007 WL 4979383 at *8 (in *Ware's* postconviction relief hearing, "[w]hen asked if he felt pretty comfortable with the science involved in the issue of Shaken Baby Syndrome," trial attorney candidly replied, "No, I don't think anybody would feel comfortable with the science in this field unless they were a medical doctor or had one sitting next to them."). I have had numerous communications with lawyers defending SBS cases who have admitted to possessing little or no knowledge about the relevant science, and to feeling overwhelmed at the prospect of mastering it to the extent necessary to take case to trial.

383. See, e.g., Post-Conviction Relief Decision, *supra* note 145, at 2 (Louis's trial lawyer "cross-examined the State's experts under a differential diagnosis theory, exploring other possible causes of [the baby's] death. All denied any other cause was possible other than shaking for the injuries").

384. See *supra* notes 29–30 and accompanying text. Differential diagnosis and greater recognition of a range of possible explanations for the triad of neurological symptoms in infants has obvious clinical implications, and may have public health significance as well. This suggestion has yet to be explored.

385. See *supra* notes 134–139 and accompanying text.

386. Although the deliberative process may be suspect in both instances (i.e., where the jury hears two sides of a debate and where it hears just one) and each may be deficient on intellectual due process grounds, I do not mean to suggest that the two are equally likely to bring about convictions. Indeed, it seems that "the most important predictor of an acquittal is the defense presentation of nationally prominent experts who challenge the science, [although] the presentation of this type of evidence still results in conviction more often than acquittal." Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 37–38. See also *infra* note 391 and accompanying text (discussing credentials as proxy for correctness).

387. It should be emphasized, however, that both scenarios call for the exercise of judgment. Even in the absence of a conflict in expert opinion, jurors must evaluate the testimony of an expert. Indeed, Sam Gross has generally described this as "the essential paradox in the use of expert evidence." Gross, *Expert Evidence*, *supra* note 370, at 1182 ("We call expert witnesses to testify about matters that are beyond the ordinary understanding of lay people . . . and then we ask lay judges and jurors to judge their testimony."); see also Mnookin, *supra* note 370, at 1012 ("If the jury lacks the knowledge that the expert provides, how, then, can it rationally evaluate the expertise on offer?") Of course, this

Under these circumstances, jurors are effectively called upon to resolve an outstanding dispute between two scientific camps.

Unsurprisingly, scholarship reflecting a number of different orientations³⁸⁸ supports the proposition that factfinders simply cannot do this job.³⁸⁹ Because they lack the competence to judge the competing testimony on its merits, jurors rely on “proxy criteria, like demeanor or credentials”³⁹⁰ to choose between experts. Despite the inadequacies of these criteria as substitutes for rational deliberative processes,³⁹¹ they may be all that are available to nonscientists placed in the untenable position of choosing sides in a courtroom debate about the validity of an SBS diagnosis.³⁹² Where expert testimony *is* the case, we should be especially wary of the outcomes that result.³⁹³

problem becomes even more visible when jurors must judge the testimony of competing experts. *See Hand, supra* note 370, at 54–55 (“The trouble with all this is that it is setting the jury to decide, where doctors disagree. The whole object of the expert is to tell the jury . . . general truths derived from his specialized experience. But how can the jury judge between two statements each founded upon an experience confessedly foreign in kind to their own? . . . What hope have the jury, or any other layman, of a rational decision between two such conflicting statements each based upon such experience.”).

388. *Compare* Gross, *Expert Evidence, supra* note 370, at 1183 n.215 (discussing relevant empirical studies and noting unfortunate dearth of research examining medical testimony in particular) *with* Brewer, *supra* note 311, *passim* (philosophical treatment) *and* Hand, *supra* note 370, at 50–58 (more traditional legal analysis).

389. “Resolving differences between experts is notoriously difficult even for other experts; to expect lay people to do it is unrealistic under the best of circumstances, not to mention in court.” Gross, *Expert Evidence, supra* note 370, at 1185. *See also* Brewer, *supra* note 311, at 1680 (“[T]here are crucial steps that a nonexpert judge or jury is, in a great many instances, not capable of performing in an epistemically nonarbitrary manner.”).

390. Mnookin, *supra* note 370, at 1013. *See also* Gross, *Expert Evidence, supra* note 370, at 1185–87; Brewer, *supra* note 311, at 1670.

391. *See* Mnookin, *supra* note 370, at 1013 (noting that the “power of proxy criteria . . . to discriminate between reliable and unreliable experts is likely to be quite limited indeed”).

392. *See* Tuerkheimer, *The Next Innocence Project, supra* note 11, at 40 (“Until only recently, SBS had been embraced nearly unanimously by the scientific community, and it still commands the faithful adherence of a majority of physicians. To the general public, the diagnosis has come to be understood as a meaningful marker of criminality. Substance aside, these measures of acceptance serve as powerful proxies for truth, enabling jurors to discount the insights of the skeptics and the challenges raised by their research.”).

393. In these cases, there is an especially grave “danger that jury verdicts will be erratic and completely unpredictable, which would be inconsistent with evenhanded justice.” Brewer, *supra* note 311, at 1674 (quoting *In re Japanese Elec. Prod. Antitrust Litig.*, 631 F.2d 1069, 1084 (3d Cir. 1980)). Brewer elaborates on this proposition as follows:

[F]actfinding, including factfinding regarding matters that are the special epistemic province of expert scientists, must be conducted in a coherent and rational manner in order that this epistemic process meet the normative requirements of a legal system that operates to grant or deprive people of life, liberty and property.

. . . If I am right that practical epistemic deference to expert scientists is doomed, on average, to generate in nonexpert judges and jurors beliefs that are only accidentally and arbitrarily true at best and thus are not epistemically *justified* beliefs, then this process perforce does not produce legally legitimate decisions.

Id. at 1676–77.

In important respects, the system-wide chaos which has materialized in the SBS context³⁹⁴ derives from the quintessentially science-dependent nature of the crime. Because it is fully situated in the domain of expertise, SBS is an object lesson in the tensions that thrive where science and criminal justice meet.

V. CONCLUSION

When the leading edge of science outpaces the criminal law, our system of justice becomes disordered. Rejecting a static interpretation of the current disarray allows us to construct a conceptual framework that describes how criminal justice evolves. We may then analyze deficiencies in this process and begin to compensate for them.

In the current stage of the developing institutional response to SBS, we glimpse an erratic response that ultimately cannot be sustained. Over time, the randomness created by wildly disparate treatment of like factual predicates places pressure on the system to forge a new equilibrium—one which better accounts for now-discordant scientific knowledge. Put differently, the jumble of SBS case outcomes that we see to date manifests progress toward eliminating a pronounced lag between scientific and legal advancement.

But the strange history of SBS betrays fundamental failures in our system's ability to assimilate science in a manner that comports with bedrock criminal justice norms. The response we are seeing is far too dilatory, as evidenced by the continuing stream of triad-based prosecutions and convictions; it is unacceptably arbitrary, as manifested by wildly differential treatment of functionally identical facts; and, with rare exception, it comes too late for those who have already been convicted by science that has now been discredited.

The acknowledgment of these inadequacies is a prerequisite to improving our system's treatment of science-dependent prosecutions. As I have suggested, there are good reasons to believe that now is an especially opportune time for deliberate and focused reform efforts. This is an era of new perspectives on the relationship between science and criminal law, an era in which powerful forces are converging to bring about fundamental challenges to the workings of our criminal justice system.³⁹⁵ In unprecedented ways, the science-criminal law interface is being contested.

Without purporting to propose a comprehensive program of reform, I offer here a few tentative thoughts about ways of better arming the legal

394. See *supra* Part II.

395. Related to the inevitable legal response to these challenges is the prospect of cultural adaptation, as actors within and outside of the system become increasingly skeptical of dogmatic forensic science, expert-dependant prosecutions, police-induced confessions, and the primacy of finality.

system to deal proactively with the prospect of scientific change and retrospectively with change that has occurred.³⁹⁶ I treat these endeavors in turn.³⁹⁷

Outside of the courtroom, we should create ways of efficiently disseminating reasonably neutral, authoritative information about scientific developments to judges, prosecutors, and defense attorneys.³⁹⁸ While the decentralized nature of state prosecutions obviously complicates this task, it need not preclude it.

At the same time, it is critical that we design new institutional mechanisms for evaluating—or the very least, tracking—emerging prosecution paradigms which rely on scientific claims. Had such mechanisms been in place in the 1990s, SBS might never have gained its foothold in the criminal justice system.³⁹⁹

Science performs a unique function when employed in the criminal justice realm. Accordingly, the metrics used to evaluate the worth of new (and old) scientific theories offered to prove guilt should themselves take into account criminal law (as opposed to scientific) norms. Even likely hypotheses—i.e., those whose status as truths remains to be proven—have a place in their appropriate domains. In the medical field, for instance, consensus around the cause of a particular disease may be sufficient to warrant a change in course vis-à-vis best treatment practices.⁴⁰⁰ And yet, this same consensus might be treated with justifiable skepticism if serving as a predicate for criminal prosecution. Put differently, certain advances may gain acceptance in the scientific community before they are ready for introduction to the legal system. Evaluation of developments in particular fields of forensic science must, then, be appropriately contextualized. We ought to ask, not simply whether the claims advanced have scientific value, but whether they are suitable for determining guilt.

No matter how successful our efforts to ensure that scientific claims are systematically vetted before their introduction to the adversarial process, competing interpretations of science will continue to mark the

396. I focus on injustices in the SBS realm, though most of the discussion that follows has broader applicability.

397. These ideas—which may raise more questions than they answer—are meant to prompt a wider conversation that takes up the difficult question of where we go from here. Debate and discourse around specific proposals (those sketched here, and others) will constitute a significant mark of progress as they start from the proposition that the status quo is untenable.

398. See NAS FORENSIC SCIENCE REPORT, *supra* note 266, at 25.

399. Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 12–16 (describing fundamentally flawed methodologies underpinning SBS diagnosis at its inception).

400. For a recent discussion of the contingent nature of “best practices,” see Jerome Groopman, *Health Care: Who Knows “Best?”*, 57 N.Y. REV. BOOKS, Feb. 11, 2010, at 12–13, available at <http://www.nybooks.com/articles/archives/2010/feb/11/health-care-who-knows-best/>. See also David H. Freeman, *Lies, Damned Lies, and Medical Science*, THE ATLANTIC, Nov. 2010, available at <http://www.theatlantic.com/magazine/archive/2010/11/lies-damned-lies-and-medical-science/8269/> (generally questioning the scientific validity of medical research).

prosecution and defense of crime. Given this reality, a number of important changes at the trial level might diminish the odds of wrongful conviction (and, as consequence, reduce the incidence of innocents pleading guilty).⁴⁰¹

Courts should more rigorously subject the content of proffered expert testimony to exacting analysis in order to ensure that the particular claims being advanced are indeed supported by valid science.⁴⁰² Judicial control may take the form of outright exclusion or, if a court is reluctant to preclude an expert from testifying altogether, restriction in the scope of permissible testimony.⁴⁰³ For instance, in an SBS case, a prosecution expert should be prohibited from testifying that the diagnostic triad can only result from shaking or impact or that a lucid interval cannot occur.⁴⁰⁴ In triad-only prosecutions, appropriately circumscribed admissibility determinations will likely result in a record that cannot sustain a guilty verdict.⁴⁰⁵

To further the goal of accurate decision making, a number of additional evidentiary reforms of evidence law and practice are worthy of mention. When contested expert testimony is admitted, jurors could be given guidance about how to weigh that testimony (i.e., in the form of a cautionary instruction).⁴⁰⁶ Where relevant, evidence pertaining to police-induced con-

401. See *supra* notes 157–171 and accompanying text (explaining the impact of projected trial outcomes on plea negotiations).

402. The Court's framework for the admission of expert testimony expressly contemplates this type of scrutiny. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) (“[C]onclusions and methodology are not entirely distinct from one another. Trained experts commonly extrapolate from existing data. But nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert. A court may conclude that there is simply too great an analytical gap between the data and the opinion proffered.”). *But see* Cole, *Where the Rubber Meets the Road*, *supra* note 360, at 816–18 (suggesting that the requirement of “fit”—that the *particular* expert claim asserted is supported by the evidence—is a “neglected issue” and an “overlooked gem in the *Daubert* Trilogy.”) See *supra* note 366 and accompanying text.

403. See Friedman, *supra* note 366, at 1063–64 (identifying problem of “over-claiming”); Cole, *Where the Rubber Meets the Road*, *supra* note 360, at 819 (suggesting that judges “carefully calibrate the strength of the testimonial claim to the strength of the warrants that support that claim”). Richard Friedman has persuasively argued that decisions to admit expert evidence should be subject to *de novo* appellate review, rather than the abuse of discretion standard announced by *Joiner*. See Friedman, *supra* note 366, at 1065–69.

404. See *supra* notes 21–30 and accompanying text.

405. Whenever the evidence does not support a “beyond a reasonable doubt” finding of guilt, a judge must grant a defendant’s sufficiency motion and dismiss the charges. See Friedman, *supra* note 366, at 1055–57 (advocating greater reliance on judicial sufficiency rulings in cases of questionable expert scientific evidence, particularly in the criminal context); Samuel R. Gross, *Substance and Form in Scientific Evidence: What Daubert Didn’t Do*, in REFORMING THE CIVIL JUSTICE SYSTEM 234, 252 (Larry Kramer, ed., 1996) (“The basic problem seems to be that judges do not want to look as though they are abrogating the role of the jury as trier of fact. The legal sufficiency of evidence is, technically, a question of law, but it looks and sounds like a judgment on the weight of the evidence—it is a judgment on the weight of the evidence, only an extreme one.”).

406. See Friedman, *supra* note 366, at 1064–65.

fessions should be admitted.⁴⁰⁷ And, finally, measures should be taken to ensure that defendants are able to retain qualified experts.⁴⁰⁸

Even with the most effective safeguards in place to guard against wrongful science-based convictions, however, it is exceedingly unlikely that we will dispense with the need to correct systematic injustices. The past teaches that universally accepted tenets of science can be upended in surprising ways. The future assures the continued proliferation of science-based prosecutions. These realities lead inexorably to the conclusion that our criminal justice system will never catch science, and that mistakes of justice will recur with sufficient frequency to demand a more effective fix.

SBS urgently raises this demand. Triad-only prosecutions may ultimately become a historic relic, as prosecutors decline to pursue charges, juries acquit, judges more closely regulate expert testimony, and trial and appellate courts overturn convictions. But, in the meantime, tremendous injustice will continue to be done. How should our system respond to the casualties of scientific evolution?

With regard to the hundreds of convictions whose validity has now been undermined, Innocence Commissions with quasi-judicial authority⁴⁰⁹ are a particularly attractive model for institutional reform.⁴¹⁰ In the future, if science far outpaces law—despite systemic checks designed to avoid this scenario⁴¹¹—such bodies should be in place to react accordingly.

407. See *supra* Part III.A.1.

408. See *supra* Part IV.B.2.

409. The stated mission, organization, and workings of Innocence Commissions vary widely. For discussions of these differences and analysis of their relative merits, see David Horan, *The Innocence Commission: An Independent Review Board for Wrongful Convictions*, 20 N. ILL. U. L. REV. 91 (2000); Barry C. Scheck & Peter J. Neufeld, *Toward the Formation of "Innocence Commissions" in America*, 86 JUDICATURE 98 (2002). See also Stephanie Roberts & Lynne Weathered, *Assisting the Factually Innocent: The Contradictions and Compatibility of Innocence Projects and the Criminal Cases Review Commission*, 29 OXFORD J. LEGAL STUD. 43 (2009) (describing the United Kingdom's approach); Brandon L. Garrett, *Aggregation in Criminal Law*, 95 CALIF. L. REV. 383, 435 (2009) (addressing institutional reform for "systemic problems not rising to the level of constitutional violations," including "innocence commissions, prosecutorial review of wrongful convictions, appointment of a special master to review a district court's habeas corpus petitions, and a two-tiered system of appeal."). See generally David Wolitz, *Innocence Commissions and the Future of Post-Conviction Review*, 52 ARIZ. L. REV. 1027 (2010).

410. An Innocence Commission could be charged with reviewing postconviction cases involving SBS allegations based largely or entirely on the diagnostic triad. Where there is sufficient doubt about the defendant's guilt, a conviction would be overturned. While its mandate is not specifically limited to SBS cases, North Carolina has established a similar body—a "new interdisciplinary entity to conduct post-conviction review of potential innocence cases," and, when clear and convincing evidence supports factual innocence, to overturn a conviction. Garrett, *Aggregation in Criminal Law*, *supra* note 409, at 437 n.278. See also Raeder, *Postconviction Claims of Innocence*, *supra* note 259, at 25 (describing North Carolina's Commission). For a brief overview of other states' efforts in this regard, see *Innocence Commissions in the U.S.*, INNOCENCE PROJECT, http://www.innocenceproject.org/Content/Innocence_Commissions_in_the_US.php (last visited Feb. 3, 2011). For a compelling discussion of prosecutorial post-conviction integrity units and their function in reviewing claims of factual innocence, see Barry Scheck, *Professional and Conviction Integrity Programs: Why We Need Them, Why They Will Work, and Models for Creating Them*, 31 CARDOZO L. REV. 2215 (2010).

411. See *supra* notes 400–408 and accompanying text.

Beyond serving the ends of individualized justice, Innocence Commissions also provide a mechanism for system-wide critique,⁴¹² which would beneficially impact the “upstream” problem of continuing triad-based prosecutions.⁴¹³ If adopted to review SBS convictions,⁴¹⁴ this model would confront a macro-error with a fitting aggregate response.⁴¹⁵

Apart from the creation of Innocence Commissions, various avenues of postconviction relief present themselves as promising means of accommodating the law’s need for finality to the demands of scientific contingency: most notably, reduced barriers to habeas relief (including recognition of a freestanding innocence claim⁴¹⁶ and greater judicial scrutiny of evidence sufficiency⁴¹⁷) and novel grounds for granting new trials—particularly the “interests of justice.”⁴¹⁸

The cautionary tale of SBS demonstrates the need to shift our system’s orientation to better harmonize the realities of science and the dictates of criminal justice. Various features of our process for determining guilt are antithetical to the dictates of justice. A reasoned response is past due.

412. See *supra* notes 409–410. See also Kent Roach, *The Role of Innocence Commissions: Error Discovery, Systematic Reform or Both?* 85 CHI.-KENT L. REV. 89 (2010) (identifying tension between error correction and systemic reform).

413. I am grateful to Judge D. Brock Hornby for this helpful formulation.

414. Given the federalist, decentralized character of our justice system, Innocence Commissions would necessarily be implemented state by state, though groups like the National Association of Criminal Defense Lawyers and the Innocence Network might well serve an important coordinating function. Admittedly, the review enterprise is daunting—which is how it has been described by Ontario’s chief forensic pathologist who is involved in the province’s ongoing examination of SBS cases dating back twenty years. Theresa Boyle, *Baby Death Review Daunting*, TORONTO STAR, Oct. 7, 2008, at A19. In April 2007, the Province of Ontario established an inquiry into pediatric forensic pathology and appointed Justice Stephen Goudge of the Court of Appeal as its Commissioner. Seventeen months and \$8.3 million later, Justice Goudge issued a 1,000 page report which told what he called a “tragic story of pediatric forensic pathology in Ontario from 1981 to 2001.” STEPHEN T. GOUDGE, INQUIRY INTO PEDIATRIC FORENSIC PATHOLOGY IN ONTARIO 20 (2008), available at http://www.attorneygeneral.jus.gov.on.ca/inquiries/goudge/report/v1_en_pdf/Vol_1_Eng_ES.pdf. For an account of these developments and their impact on SBS cases in Ontario, see Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 25 n.150. Tellingly, the Attorney General leading the Province’s investigation has also used the word “daunting” in explaining that “[h]owever daunting the task . . . it would be unsafe to rest a judgment’ on an old scientific theory that is now in question.” Boyle, *supra*. Whether a similar calculus will come to characterize the U.S. response to the progression of science remains to be seen.

415. See generally Garrett, *Aggregation in Criminal Law*, *supra* note 409.

416. Over the decades, a number of scholars have advocated for this recognition. See, e.g., Vivian Berger, *Herrera v. Collins: The Gateway of Innocence for Death-Sentenced Prisoners Leads Nowhere*, 35 WM. & MARY L. REV. 943 (1994); Jordan Steiker, *Innocence and Federal Habeas*, 41 UCLA L. REV. 303 (1993). See also *supra* note 259 and accompanying text.

417. See *supra* note 405. See also D. Michael Risinger, *Unsafe Verdicts: The Need for Reformed Standards for the Trial and Review of Factual Innocence Claims*, 41 HOUS. L. REV. 1281 (2004); Tuerkheimer, *The Next Innocence Project*, *supra* note 11, at 47–48 (critiquing existing framework for sufficiency review).

418. See *supra* notes 144–150 and accompanying text.