

Minimizing Error and Bias in Death Investigations†

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One of the prominent developments in the forensic sciences is the emergence of attention to cognitive aspects of forensic examination. Notable in this regard is the recognition that forensic results can be swayed by the examiner's exposure to non-scientific background information that should arguably have no bearing on the result. To counter these effects, forensic agencies have introduced context management procedures, which are designed to withhold background information from the examiner during critical parts of the examination. Context management procedures are well-suited for some forensic disciplines but apply less obviously to disciplines that entail complex, sprawling, iterative, and open-ended reasoning processes. Notably, the procedures have been met with stern resistance from the field of death investigation. This Article sets out to explore whether and how context management can and should be implemented to the practice of death investigation.

As currently practiced, the death investigation environment is replete with background information that renders investigative conclusions susceptible to influences borne by non-medical information of unknown reliability. Such effects can occur through two routes: either by way of unconscious biasing of the investigation (the context bias) or through the conscious and deliberate incorporation of that information. Both effects could be mitigated by means of context management procedures. To

† The title borrows from Recommendation 5 of the National Research Council's report *Strengthening Forensic Science in the United States: A Path Forward*. See *infra* text accompanying note 8.

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complicate matters, however, background information also plays an important facilitative role in death examinations by way of enabling the generation of investigative hypothesis without which the process is unlikely to succeed. These conflicting effects of background information make it difficult to determine ex ante which information should be shared with the investigator and which should be masked. The Article proposes a nuanced three-part cost-benefit analysis, but finds that it produces only a series of murky judgments that result in a conundrum that defies a simple or uniform solution.

The Article seeks a way out of this conundrum. The framework proposes that cases referred to death examiner offices be triaged to identify the small category of ambiguous criminal cases, and that only those cases should be subjected to context management. Within that category of cases, death examiners should be free to receive the types of background information that tend to be within or proximate to their expertise, but not be exposed to types that fall outside of that range. The proposed framework is admittedly imperfect, but given the intractability of the topic, any step forward should be welcomed.

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I. INTRODUCTION

I would first like to express my sense of honor for being included in this venerable symposium dedicated to the lifelong contributions of D. Michael Risinger. I am thankful for the opportunity to celebrate and laude Michael for being a daunting scholar, a generous mentor, a piercing critic, a model public citizen, and a warrior for justice. I am also thankful to Michael for planting the seeds that spurred this Article.

This Article sets out to examine possible pitfalls within the practice of death investigation. Specifically, it seeks to explore whether and how death investigations might be skewed by exposure to background information about the decedent or the circumstances of the death, and what, if anything, can and should be done about that. As will soon be seen, these questions entail a rather complex array of normative, legal, cognitive, and practical dimensions. Over and above the scholarly dimensions of this inquiry, the Article is animated by a desire to play a constructive role in the ongoing conversation devoted to this issue within the field of forensic science, in particular between the death examiners community and the human factors community.¹ The Article's ultimate aim is to advance this conversation by suggesting justifiable, feasible and minimally intrusive procedures to maximize the accuracy of death investigations in the acute category of ambiguous investigations destined to be used in criminal proceedings.

The 2009 report composed by the National Research Council, *Strengthening Forensic Science in the United States: A Path Forward*² ("NRC Report" or "Report"), shook the forensic world to the core. The blue ribbon Committee on Identifying the Needs of the Forensic Sciences Community, which authored the Report, observed what critics had already known: imprecise, exaggerated, and outright invalid forensic work had been used with some regularity in criminal investigations, prosecutions, and

¹ Both communities participate actively in OSAC, currently operating under the NIST. The mandate of the Medicolegal Death Investigation Subcommittee is to "focu[s] on standards and guidelines related to sudden, unnatural, unexplained or suspicious deaths, including homicides, suicides, unintentional fatal injuries, drug-related deaths and other deaths that are sudden or unexpected; determination of the cause and manner of death." See *Forensic Science: Medicolegal Death Investigation Subcommittee*, NAT'L INST. OF STANDARDS & TECH., <https://www.nist.gov/topics/forensic-science/medicolegal-death-investigation-subcommittee> (last updated Oct. 2, 2018). The mandate of the Human Factors Committee is to "provide[] guidance throughout the OSAC on the influence of systems design on human performance and on ways to mitigate errors in complex tasks." See *Forensic Science: Human Factors Committee*, NAT'L INST. OF STANDARDS & TECH., <https://www.nist.gov/topics/forensic-science/human-factors-committee> (last updated May 21, 2018).

² COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCIS. CMTY., NAT'L RESEARCH COUNCIL, *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 1* (Nat'l Acads. Press 2009), <https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf> [hereinafter NRC REPORT].

criminal proceedings, leading at times to faulty outcomes. The Report noted the wide variability in the scientific soundness of various fields of forensic science, as well as the uneven and often inadequate oversight, staffing, certification, and accreditation of forensic agencies.

The Report's sweeping recommendations laid the foundation and provided the impetus for the array of efforts currently underway to reform and transform the forensic sciences. The Report broke new ground by acknowledging outright that "forensic science experts are vulnerable to cognitive and contextual bias."³ The Report drew attention to a slew of potential cognitive pitfalls that could impact forensic results in tasks that involve subjective judgment, including the dangers of overconfidence, ignoring base rates, suggestive and leading framing, confirmation bias, escalation of commitment, and overreliance on intuitive judgment.⁴ The Report laid the ground for the emergence of the field of human factors as an integral component in the transformation of the forensic sciences. A Human Factors Subcommittee was established under the Department of Justice's National Commission on Forensic Science,⁵ and a Human Factors Committee serves as one of the three resource committees of the Organization of Scientific Area Committees (OSAC) for Forensic Science, currently operating under the National Institute of Standards and Technology (NIST).⁶

The Report clarified that these cognitive biases "are not the result of character flaws; instead, they are common features of decision making, and they cannot be willed away."⁷ Indeed, one of the recommendations was to urge the development of "standard operating procedures . . . to minimize, to the greatest extent reasonably possible, potential bias and sources of human error in forensic practice."⁸ In particular, the NRC Report cited the groundbreaking research by Michael Risinger and colleagues⁹ that highlighted the disruptive potential of exposing forensic analysts to certain types of investigative information, a phenomenon known as *context bias*.¹⁰ As a general rule, the human factors community follows the adage that it is

³ *Id.* at 8 n.8.

⁴ *Id.* at 122–24.

⁵ See *Human Factors*, U.S. DEP'T OF JUSTICE ARCHIVES, <https://www.justice.gov/ncfs/human-factors> (last updated Nov. 6, 2017).

⁶ See *Forensic Science: Human Factors Committee*, *supra* note 1.

⁷ NRC REPORT, *supra* note 2, at 122.

⁸ *Id.* at 24.

⁹ See, e.g., D. Michael Risinger et al., *The Daubert/Kumho Implications of Observer Effects in Forensic Science: Hidden Problems of Expectation and Suggestion*, 90 CALIF. L. REV. 1 (2002); Michael J. Saks et al., *Context Effects in Forensic Science: A Review and Application of the Science of Science to Crime Laboratory Practice in the United States*, 43 SCI. & JUST. 77 (2003) [hereinafter Saks et al., *Context Effects in Forensic Science*].

¹⁰ See NRC REPORT, *supra* note 2, at 8 n.8.

more effective to control the situation than to debias the person.¹¹ That usually boils down to structuring the decision environment and flow of information in ways that are expected to minimize the risk of biased decisions. The most widespread mechanism used to address the risk of bias is directed towards restricting forensic examiners' exposure to information that is considered "task-irrelevant,"¹² an approach known as "context management."

Context management is often implemented by means of a "case manager model," which is designed to separate forensic functions between analysts and case managers. Case managers are exposed to the full picture of the case, which enables them to communicate effectively with other investigators, participate in decisions about the collection of specimens from the crime scene, decide which examinations should be performed, and manage the flow of work and information in the laboratory. Specifically, case managers assign the tasks to the analysts and provide them with the specimens to be tested accompanied only by information that is strictly needed for the performance of that task. This functional separation allows case managers to manage and steer the forensic examination required in the case, while keeping analysts blind—at least during critical phases of the investigation—to extraneous investigative facts that are unnecessary for the analyses they are assigned to perform.¹³ This approach has spawned the Linear Sequential Unmasking model, which guides the masking and unmasking of task-irrelevant background information over the course of process. According to this regimen, examiners are expected to perform their first testing or analysis prior to being exposed to the background information. At that time, they should document and explain their conclusion alongside a statement of confidence in it. Subsequent to that phase, the case manager can release the withheld information to the examiner. The examiner can then reexamine the evidence, and if needed, revise or change the conclusion, accompanied by a documented explanation of the reason for change.¹⁴

¹¹ Jack B. Soll et al., *A User's Guide to Debiasing*, in 2 THE WILEY BLACKWELL HANDBOOK OF JUDGMENT & DECISION MAKING 924 (Gideon Keren & George Wu eds., 2015).

¹² On the concept of task-relevance, see *infra* Part II.C.

¹³ See Reinoud D. Stoel et al., *Minimizing Contextual Bias in Forensic Casework*, in FORENSIC SCIENCE AND THE ADMINISTRATION OF JUSTICE: CRITICAL ISSUES AND DIRECTIONS 67 (Kevin J. Strom & Matthew J. Hickman eds., 2015); WILLIAM THOMPSON ET AL., AM. ASS'N FOR ADVANCEMENT OF SCI., FORENSIC SCIENCE ASSESSMENTS: A QUALITY AND GAP ANALYSIS, LATENT FINGERPRINT EXAMINATION 13 (2017), <https://www.aaas.org/report/latent-fingerprint-examination>; Bryan Found & John Ganas, *The Management of Domain Irrelevant Context Information in Forensic Handwriting Examination Casework*, 53 SCI. & JUST. 154, 156 (2013).

¹⁴ See Itiel E. Dror et al., *Letter to the Editor—Context Management Toolbox: A Linear Sequential Unmasking (LSU) Approach for Minimizing Cognitive Bias in Forensic Decision Making*, 60 J. OF FORENSIC SCI. 1111 (2015) [hereinafter Dror et al., *Letter to the Editor*].

Procedures designed to blind forensic examiners are routinely followed in the field of scientific experimentation. Indeed, one of the key features of scientific methodology is to manage the context, specifically, by way of insulating the scientists and preventing their hypotheses, goals, and expectations from affecting the data collection, measurement, and interpretation.¹⁵

In all, content management has become a mainstay in attempts to reform the forensic sciences. Linear sequential unmasking procedures have been implemented by prestigious forensic agencies including the FBI,¹⁶ and the Netherlands Forensic Institute.¹⁷ The National Research Council's call for context management has been adopted by prominent forensic regulatory and scientific bodies, including the Forensic Science Regulator in the United Kingdom,¹⁸ the National Commission on Forensic Science in the United States,¹⁹ and the President's Council of Advisors on Science and Technology.²⁰ The importance of curbing the impact of context bias in the forensic sciences has also been echoed by the broader scientific community, as manifested by coverage in major scientific journals such as *Science*²¹ and *Nature*.²²

In short, context management procedures have become a centerpiece of the human factors contribution to the practice of forensic science, particularly in the disciplines that go under the general rubric of pattern comparison, such as fingerprints, ballistics, tools marks, tires, fibers, and even DNA analysis. But not all forensic disciplines and not all forensic tasks are born equal, and the rationales that apply to one forensic field might not

¹⁵ See LARRY B. CHRISTENSEN, BURKE R. JOHNSON & LISA A. TURNER, RESEARCH METHODS, DESIGN, AND ANALYSIS (12th ed. 2014); Michael J. Saks & Jonathan J. Koehler, *The Coming Paradigm Shift in Forensic Identification Science*, 309 SCI. 847, 893 (2005).

¹⁶ See U.S. DEP'T OF JUSTICE, OFFICE OF THE INSPECTOR GEN., A REVIEW OF THE FBI'S PROGRESS IN RESPONDING TO THE RECOMMENDATIONS IN THE OFFICE OF THE INSPECTOR GENERAL REPORT ON THE FINGERPRINT MISIDENTIFICATION IN THE BRANDON MAYFIELD CASE 1 (2011), <https://oig.justice.gov/special/s1105.pdf>.

¹⁷ Stoel et al., *supra* note 13, at 79.

¹⁸ See FORENSIC SCI. REGULATOR, GUIDANCE: COGNITIVE BIAS EFFECTS RELEVANT TO FORENSIC SCIENCE EXAMINATIONS 67–69 (2015), <https://www.gov.uk/government/publications/cognitive-bias-effects-relevant-to-forensic-science-examinations>.

¹⁹ NAT'L COMM'N ON FORENSIC SCI., U.S. DEP'T OF JUSTICE, VIEWS OF THE COMMISSION: ENSURING THAT FORENSIC ANALYSIS IS BASED UPON TASK-RELEVANT INFORMATION 1–2 (2015), <https://www.justice.gov/ncfs/file/818196/download>.

²⁰ PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., EXEC. OFFICE OF THE PRESIDENT, REPORT TO THE PRESIDENT—FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC VALIDITY OF FEATURE-COMPARISON METHODS 10 (2016), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_orensic_science_report_final.pdf.

²¹ Kelly Servick, *Forensic Labs Explore Blind Testing to Prevent Errors*, 349 SCI. 456, 462 (2015).

²² Laura Spinney, *Science in Court: The Fine Print*, 464 NATURE 325, 344 (2010).

apply straightforwardly to tasks practiced in other forensic disciplines.²³ Indeed, while context management techniques are well-suited for bench examinations, they may not be suitable in forensic disciplines practiced in field settings, which entail dynamic and open-ended investigative processes that often involve close interaction with other investigative branches. Topmost in this category is the field of death investigation.²⁴

The proposed application of context management to death investigation has been met with stern resistance from the forensic pathology community. This position was articulated in an article co-authored by William Oliver and three leading figures in the field.²⁵ The thrust of the argument rests on the objection to a blanket importation of context management procedures from pattern comparison fields to the death investigation domain.²⁶ The objection hinges on four major claims. First, the authors argue, context management will hinder medical examiners' ability to reach correct conclusions.²⁷ Second, context management will be unworkable and will hamstring investigations.²⁸ Third, context management fails to address a host of issues that trouble and burden the field of forensic pathology, such as honest scientific disagreement, lack of uniform training and uneven professional competence, occasional unethical behavior, and political and institutional pressure.²⁹ Finally, Oliver and colleagues have pushed back against the proposition that cognitive bias might influence forensic conclusions in the domain of death investigation.³⁰

²³ As noted by Itiel Dror, for any type of task, a particular cognitive treatment could be deemed insufficient, well-calibrated, or overkill. See Itiel E. Dror, *Practical Solutions to Cognitive and Human Factor Challenges in Forensic Science*, 4 FORENSIC SCI. POL'Y & MGMT. 105, 110 (2013).

²⁴ Arguably, this category could also include fire investigation and crime scene investigation.

²⁵ William R. Oliver et al., *Cognitive Bias in Medicolegal Death Investigation*, 5 ACAD. FORENSIC PATHOLOGY 548 (2015).

²⁶ See *id.* at 549. This point was made also in a recent review that concludes: "Our current clinical diagnostic process has both merits and inadequacies; however, it is not readily amenable to debiasing by the blinding process." Joseph J. Lockhart & Satya Satya-Murti, *Diagnosing Crime and Diagnosing Disease: Bias Reduction Strategies in the Forensic and Clinical Sciences*, 62 J. FORENSIC SCI. 1534, 1537 (2017).

²⁷ Oliver et al., *supra* note 25, at 549–53.

²⁸ *Id.* at 557–59.

²⁹ *Id.* at 554–57.

³⁰ The authors argue

[t]here is no scientific study that demonstrates that "cognitive bias" is a severe or driving problem in medicolegal death investigation. It is not enough to show that 'cognitive bias' (however broadly and poorly defined) exists in some experimental situation. It needs to be shown that it is an actual and *significant* problem in practice.

Id. at 556.

This Article takes seriously the first critique regarding the impact of context management on the accuracy of death investigations. Indeed, this point will be addressed throughout this Article. The Article will also address the second objection regarding the burden entailed by context management procedures.³¹ The third objection seems tangential to the issue at hand. Context management should not be perceived as purporting to solve every problem that weighs down on the field of forensic pathology. As such, this objection will not be discussed any further. Finally, the proposition that death examiners are not susceptible to cognitive bias is an untenable empirical proposition, and the notion that the prospect of bias cannot be posited absent research performed in this particular field is unsustainable.³² Still, this Article suggests that the justification for introducing context management to the field of death investigation does not hinge on the prospect of cognitive bias. Context management in this field is better justified as a measure to counter the explicit policy of incorporating certain types of non-medical background information in the investigative reasoning process.³³

The Article will proceed as follows. Part II will present a brief overview of the forensic field of death investigation and highlight some of the characteristics that bear on its investigative conclusions. Importantly, as currently practiced, background information—of both medical and non-medical nature—often plays an instrumental role in reaching death investigative conclusions. To assess the possible impact of this information on the process, the Article offers a typology of background information that varies according to its proximity to the forensic pathologists' expertise, its reliability and diagnosticity. This four-way typology—which includes medical history, death scene findings, social history, and information from the police investigation—will figure prominently in the proposed solution delineated in Part V. Part II seeks also to expand the prevailing conversation beyond the view that exposure to background information necessarily influences investigations by way of the context bias, that is, by means of unconscious and non-normative reasoning. Investigative conclusions can also be skewed through a different cognitive route, namely, via the conscious and deliberate incorporation of information that is of unknown reliability and questionable diagnosticity. Fortunately, both routes can be treated through the same mechanism of context management. This Part will also introduce the concept of task-relevance, which, in most forensic domains, serves as the reliable touchstone for distinguishing between information that should be masked and information that should be shared without restriction. Though, it must be acknowledged that in other domains—such as forensic

³¹ See discussion of feasibility *infra* notes 147–150 and accompanying text.

³² See *infra* notes 178–189 and accompanying text.

³³ See discussion *infra* note 82–85 and accompanying text.

pathology—the determination of task-relevance *ex ante* can be elusive or indeterminable. In the absence of a clear task-relevance determination, the introduction of context management will inevitably require a careful analysis of the competing risks and advantages that it will likely bear on the investigative task. In this vein, the Article proposes a cost-benefit framework for evaluating the appropriateness of introducing context management procedures. The three-part calculus focuses on the likely effect on the accuracy of investigations (an evaluation that hinges on the net balance between the anticipated reduction in error and the loss of accurate and diagnostic information), the likely effect on investigative efficacy (the risk that the intervention will result in a higher rate of incomplete or inconclusive outcomes), and on feasibility and logistical burdens entailed by the intervention.

Part III provides a review of the cognitive processes involved in conducting death investigations. The proposition is that death investigations—not unlike diagnostic medical decision making and most other investigative endeavors—are performed by means of a model known as abductive reasoning. Abductive reasoning is not a singular or well-defined cognitive task, but a framework that consists of multiple reasoning processes that serve three core functions: generating hypotheses, testing those hypotheses, and evaluating the surviving hypotheses to arrive at the best explanation. The model of abductive reasoning will set us up for examining how the unintended impact of context management could adversely affect the death investigation process.

Part IV sets out to apply the cost-benefit analysis to the death investigation task, only to reveal an intricate web of conflicting, unquantifiable, and incommensurable considerations. First, it seems clear that masking background information is bound to increase the accuracy of the process by way of reducing the ill-effects that might be harbored by that information. That, of course, is the policy's core justification. But at the same time, the measure might also deprive the death examiner of information that could be factually correct and diagnostic of the circumstances of the death. Second, masking background information runs the serious risk of depriving the death examiner of background information that could be instrumental for the generation of hypotheses. By undermining this crucial building block of abductive reasoning, context management could result in incomplete or inconclusive investigations. Third, adding a sequential information-masking process will naturally require additional personnel involvement, and will likely entail difficulties with timing and coordination. Notably, a blanket policy of context management would impose a disproportionate burden on the profession by imposing those costs on the entire breadth of death investigations in the vein of addressing the most acute

cases, which make up a minority of the overall portfolio. Evaluating and trading off these countervailing forces would require a nuanced and informed judgment of the frequency, weighting, probativeness, and practical implications of each piece of background information in the particular case at hand, an elusive judgment that might require obtaining even more background information. In sum, we are left facing a virtually intractable and incommensurable conundrum that defies a simple or uniform solution.

Part V offers an attempt to find a way out of this conundrum. In that vein, the Article offers a framework that is founded on two intersecting dimensions. First, the framework is premised on the notion that the most acute category of cases consists of those headed for criminal proceedings, in which the costs of investigative errors are particularly high and the prospect of incomplete or inclusive investigations is more tolerated, and in which the investigative task is non-obvious. The framework also assumes that the risk of error is weakest in obvious cases that present the death examiner with only minimal ambiguity. The proposed framework turns the disproportionate mix of cases to an advantage: context management policies will be suggested only for this narrow category of acute cases, which means that examiners would be subjected to context management rather rarely, perhaps once in every several months. In the vast majority of cases, examiners would remain unencumbered by informational restrictions. Second, even in that narrow category of acute cases, death examiners shall continue to be exposed to the medical history and death scene findings, but not to the less reliable types of information. The proposed framework is admittedly imperfect, and one can easily imagine that difficult cases might be misclassified or mistreated. But having a framework is arguably better than working with none. At a minimum, the framework will provide stakeholders with a vehicle for thinking constructively about this important and perplexing topic.

II. THE FIELD OF DEATH INVESTIGATION

Before we delve into the specifics of the possible causes of error in the practice of death examination, we must gain an understanding of how this forensic discipline is practiced. Medicolegal death investigations (“death investigations”) are led and supervised by *forensic pathologists*, who are also vested with the authority to make the certification of death. Forensic pathologists are fully-trained physicians (MDs or DOs) and have undergone extensive education in anatomical pathology, with a subspecialization (fellowship training) in death investigation and the performance of autopsies.³⁴ Forensic pathologists are associated under the National

³⁴ See Garry F. Peterson & Steven C. Clark, *Forensic Autopsy Performance Standards*, 27 AM. J. FORENSIC MED. & PATHOLOGY 200, 209, Standard B4 (2006). For the purposes of this review, the terms “medical examiner” and “forensic pathologist” will be used

Association of Medical Examiners (NAME).³⁵ In most medical examiner offices, forensic pathologists are aided by *medicolegal death investigators*, whose responsibilities include investigation of the death scene and collection of most of the background information that will be used in the investigation.³⁶ Given that the core investigatory responsibility and discretion are vested in the hands of the forensic pathologist, this Article will focus on that function, unless stated otherwise.

Medical examiners accept a death for investigation only after conducting a triage decision that determines their jurisdiction over it.³⁷ Jurisdiction is typically assumed when the death appears to have come about unnaturally or caused by violence, when infants and children die unexpectedly or inexplicably, and when people die in police custody.³⁸ Historically, death investigations were designed with the criminal process in mind, though over time death investigation has become increasingly focused on serving other public purposes.³⁹ These include the bureaucratic function of certifying death for the issuance of death certificates, epidemiological research, and the production of health statistics for public health policy. In their capacity as death certifiers, forensic pathologists serve effectively as ultimate decision makers. They also operate as “all-source experts,” in that they evaluate all the evidence—of both medical and non-medical kinds—and draw their best judgment from that evidence.⁴⁰

interchangeably.

³⁵ See *About NAME*, NAT’L ASS’N OF MED. EXAMINERS, <https://www.thename.org/> (last visited Sept. 6, 2018).

³⁶ See *Welcome to AMBDI*, AM. BD. OF MEDICOLEGAL DEATH INVESTIGATORS, <http://www.abmdi.org/> (last visited Sept. 6, 2018). Medicolegal death investigators are associated through the American Board of Medicolegal Death Investigators. *Id.* For a discussion of the regulation of the work of medicolegal death investigators, see TECH. UPDATE REVIEW COMM., U.S. DEP’T. OF JUSTICE, DEATH INVESTIGATION: A GUIDE FOR THE SCENE INVESTIGATOR (2011), http://www.abmdi.org/documents/deathinvestigation_guidelines.pdf.

³⁷ See Peterson & Clark, *supra* note 34, at 207, Standard A2.

³⁸ See *id.* at 208, Standard B3. The triage decision can determine whether the body needs to come to the medical examiner’s office for autopsy, whether the death certificate can be signed without an autopsy, or whether jurisdiction can be ceded to a treating physician (because the death is from natural causes). *Id.*

³⁹ Randy Hanzlick, *Medical Examiners, Coroners, and Public Health: A Review and Update*, 130 ARCHIVES PATHOLOGY & LABORATORY MED. 1274, 1274–75 (2006). It should be noted that statutory powers to conduct death investigations are vested in medical examiners in only a minority of jurisdictions across the United States. See MATTHEW J. HICKMAN ET AL., U.S. DEP’T OF JUSTICE, BUREAU OF JUSTICE STATISTICS SPECIAL REPORT: MEDICAL EXAMINERS AND CORONERS’ OFFICES, 2004, 1 (2007), <https://www.bjs.gov/content/pub/pdf/meco04.pdf>. About one half of the death investigations performed in the United States are conducted by coroners, who are often elected officials and typically have no medical training. See *id.*

⁴⁰ See William C. Thompson, *Determining the Proper Evidentiary Basis for an Expert Opinion: What Do Experts Need to Know and When Do They Know Too Much?*, in BLINDING AS A SOLUTION TO BIAS: STRENGTHENING BIOMEDICAL SCIENCE, FORENSIC SCIENCE, AND LAW

The death investigation process culminates in the death certification, which comprises of two separate determinations: cause of death and manner of death. The *cause of death* determination refers to the physical antecedent of death, such as disease or injury. Though for medicolegal forensic purposes, the ultimate physiological disturbance—such as a hemorrhagic shock or respiratory paralysis—is of limited value. We are interested rather in the “underlying” or “primary” event that brought about that disturbance, such as a drowning or a gunshot wound to the head. Determinations of *manner of death* pertain to the broader circumstances by which the death was brought about. This classification requires forensic pathologists to choose from a list of five categories: natural, accident, homicide, suicide, and undetermined. Manner of death determinations are intended to serve the public health function. Thus, classifying a death as a homicide can readily spill into the criminal domain, and thus make a strong impact on the criminal process.

The field of medicolegal investigation endures a number of hardships, including scientific disagreement, lack of uniform training, uneven professional competence, and political and institutional pressure.⁴¹ As described in the NRC Report, the field is characterized by “disparate and often inadequate educational and training requirements, resources, and capacities—in short, a system in need of significant improvement.”⁴² In performing their work, forensic pathologists are subjected to a range of adversities, including workplace stress,⁴³ vicarious trauma brought upon by repeated exposure to crime scenes and distressing case details,⁴⁴ exposure to institutional pressures from law enforcement agencies and other

133, 147 (Christopher T. Robertson & Aaron S. Kesselheim eds., 2016) [hereinafter Thompson, *Determining the Proper Evidentiary Basis*].

⁴¹ Oliver et al., *supra* note 25, at 555–56.

⁴² NRC REPORT, *supra* note 2, at 14 (citing HICKMAN ET AL., *supra* note 39).

⁴³ See Elizabeth Brondolo et al., *Work-Related Predictors of Psychological Distress Among Medical Examiner and Coroner Personnel*, 2 ACAD. FORENSIC PATHOLOGY 80 (2012).

⁴⁴ See Sharon Rae Jenkins & Stephanie Baird, *Secondary Traumatic Stress and Vicarious Trauma: A Validation Study*, 15 J. TRAUMATIC STRESS 423 (2002), for a discussion of vicarious trauma.

stakeholders,⁴⁵ a low tolerance for error,⁴⁶ and budgetary constraints.⁴⁷ Forensic pathologists have contributed to a number of mistaken prosecutions that resulted in apparent false convictions,⁴⁸ and some members of the profession have engaged in disturbingly unprofessional and unethical conduct.⁴⁹ This Article, however, focuses on the specific issue of investigative accuracy, and pertains to the work of forensic pathologists—undoubtedly, the vast majority of the members of the profession—who perform this vital social role in a most professional, dedicated, and honest manner.

A. Background Information

As mentioned, the core of this Article concerns the role and function of background information in the death investigation process. The term background information is used to denote any information that is not derived

⁴⁵ A survey of forensic pathologists reveals that over seventy percent of survey respondents reported that they had been subjected to pressures to influence their findings and that many had suffered adverse consequences for their refusal to do so. Judy Melinek et al., *National Association of Medical Examiners Position Paper: Medical Examiner, Coroner, and Forensic Pathologist Independence*, 3 ACAD. FORENSIC PATHOLOGY 93, 93 (2013). A separate study found that over thirty percent of respondents altered their diagnostic decision making out of a fear of litigation. *Id.* Forensic pathologists have also been threatened with termination because their testimony was favorable to the defense. *Id.* at 94. Pressure from law enforcement is most likely to occur when the death is a high profile case or when a suspect has been named, especially when the police investigation is running into difficulties. *Id.*

⁴⁶ See Amy M. Jeanguenat & Itiel E. Dror, *Human Factors Effecting Forensic Decision Making: Workplace Stress and Well-being*, 63 J. FORENSIC SCI. 258, 259 (2018). For a discussion on fingerprint analysts' fear of making errors, see David Charlton, Peter A.F. Fraser-Mackenzie & Itiel E. Dror, *Emotional Experiences and Motivating Factors Associated with Fingerprint Analysis*, 55 J. FORENSIC SCI. 385 (2010).

⁴⁷ See, e.g., Sarah Fowler, *The Shocking Realities of Underfunded State Crime Lab: "The Bodies Keep Stacking Up"*, CLARION-LEDGER (Oct. 19, 2018), <https://www.clarionledger.com/story/news/local/2018/10/19/bodies-autopsies-stacking-up-mississippi-crime-lab/978108002/>.

⁴⁸ See, e.g., *Vicente Benavides*, NAT'L REGISTRY OF EXONERATIONS, <https://www.law.umich.edu/special/exoneration/Pages/casedetail.aspx?caseid=5315> (last updated Nov. 2, 2018) (twenty-one-month-old victim probably died from an accident, not rape, sodomy and murder by Benevides); *Rodricus Crawford*, NAT'L REGISTRY OF EXONERATIONS, <https://www.law.umich.edu/special/exoneration/Pages/casedetail.aspx?caseid=5123> (last updated Nov. 19, 2017) (cause of death was likely bronchopneumonia, not suffocation by smothering); *Lynn Dejac*, NAT'L REGISTRY OF EXONERATIONS, <https://www.law.umich.edu/special/exoneration/Pages/casedetail.aspx?caseid=3169> (last updated May 4, 2018) (victim died from cocaine overdose, not strangulation); *Evin King*, NAT'L REGISTRY OF EXONERATIONS, <https://www.law.umich.edu/special/exoneration/Pages/casedetail.aspx?caseid=5231> (last updated Oct. 12, 2018) (errors in coroner's testimony and DNA profile was not of defendant).

⁴⁹ For a harrowing account of the workings of one medical examiner's office, see RADLEY BALKO & TUCKER CARRINGTON, *THE CADAVER KING AND THE COUNTRY DENTIST: A TRUE STORY OF INJUSTICE IN THE AMERICAN SOUTH* 51 (2018). For another recent example, see *Vicente Benavides*, *supra* note 48.

directly from the postmortem medical testing or autopsy. Death investigations become difficult when the postmortem examinations fall short of providing a strong indication for the reason of death, which occurs with some regularity. In such situations, the available evidence could point to a number of different explanations or offer no apparent explanation. Completing such investigations will invariably be assisted and enabled by the background information available in the case. Vernard Adams and Charles Hirsch punctate the role of background information in reaching resolute death classifications in the face of ambiguity in the anatomical state of the body: “the degree of certainty with which the pathological findings translate into a cause of death depends on the nature of the available background information.”⁵⁰

Take the hypothetical example of an autopsy of a sixty-five-year-old man that reveals signs of heart failure with no other suspicious physiological signs. The crux of the issue is that the autopsy findings readily fit a number of different explanations, each of which will hinge—to a large extent or exclusively—on background information.⁵¹ In one scenario, the examination seeks to explain the drowning of a person in the ocean. After learning that decedent’s business was failing or that he was recently diagnosed with an untreatable disease, the death examiner might lean towards classifying the death as a suicide. But upon learning that the decedent swam regularly in the ocean and that sea currents were treacherous on that fateful day, the death investigator may be led toward classifying the drowning as an accident. By the same token, the drowning could also be understood as a homicide upon learning that the decedent was seen standing on the rocks while engaged in a heated argument with another person. In a second scenario, the decedent—a jeweler—was found dead with traces of cyanide in his blood (a substance often used for cleaning jewelry). After learning from family members that the man was recently widowed and seemed to be depressed, the pathologist might be inclined to suspect suicide. Upon learning, however, that the decedent was embroiled in a nasty business dispute with his partners in the jewelry business, the investigation might shift towards a homicide route. In a third scenario, the death examiner learns that the decedent—a locksmith—collapsed and died while working with an electric drill. The pathologist might suspect that the man died from natural causes, but if the circuitry of the drill turns out to be faulty, the death might appear as an accident, and perhaps even a homicide. In the absence of any such background information, the pathologist will likely revert to the most

⁵⁰ See Vernard I. Adams et al., *Trauma and Disease*, in SPITZ AND FISHER’S MEDICOLEGAL INVESTIGATION OF DEATH: GUIDELINES FOR THE APPLICATION OF PATHOLOGY TO CRIME INVESTIGATION 175–98, 186 (Werner U. Spitz ed., 3d ed. 1993).

⁵¹ See *id.* at 185.

probable natural explanation of the death.⁵²

The range of non-medical information that gets incorporated into actual death investigations is captured by the work of sociologist Stefan Timmermans, who conducted an extensive field observation of a medical examiner office in action.⁵³ For example, in examining the death of a middle-aged man who suffered from diabetes, the examiner took into account half-written letters authored by the decedent that suggested emotional anguish, the content of his refrigerator, empty bottles of alcohol strewn around his apartment, and information regarding poor relationships with family members.⁵⁴ In examining the death of a woman by drowning, the examiner considered the woman's employment troubles, physical damage to her car, records of psychological treatment, her choice of music, and a letter that she wrote to her favorite band.⁵⁵ Timmermans reports other instances where death examiners incorporated into their decisions evidence of alcohol and drug use, gun ownership, driving record, criminal record, risk taking behaviors, logs of phone calls, current and past relationships, childhood trauma, financial hardship, emotional outbursts, and much more.⁵⁶ Various court decisions reveal that medical examiners have classified deaths as homicides based primarily on non-medical evidence, such as a police investigator's statements regarding an earlier fight between the defendant and the victim,⁵⁷ a police investigators' belief that the victim was pushed off his chair,⁵⁸ and the death examiner's own inferences about the defendant's reckless driving.⁵⁹

⁵² See STEFAN TIMMERMANS, *POSTMORTEM: HOW MEDICAL EXAMINERS EXPLAIN SUSPICIOUS DEATHS* 50 (2006).

⁵³ The medical examiner's office studied by Timmermans, which served a metropolitan area of about one million people, had two permanent forensic pathologists during the three-year period of observation. *Id.* at 33. At different points in time, one or two additional forensic pathologists were employed by the office. *Id.*

⁵⁴ *See id.* at 42, 92.

⁵⁵ *Id.* at 82–83.

⁵⁶ *Id.*; see also Thompson, *Determining the Proper Evidentiary Basis*, *supra* note 40. According to the standards promulgated by the NAME, members can take into consideration non-medical sources of information, including judgments of intent to harm and use of violence. See Peterson & Clark, *supra* note 34, at 225.

⁵⁷ *State v. Sosnowicz*, 270 P.3d 917, 925 (Ariz. Ct. App. 2012).

⁵⁸ *State v. Vining*, 645 A.2d 20, 20 (Me. 1994).

⁵⁹ *State v. Jamerson*, 708 A.2d 1183, 1189 (N.J. 1998). Note that in *Jamerson*, *Sosnowicz*, and *Vining*, the courts ruled that the examiners' conclusions were not admissible as expert testimony. *Id.* at 1193–94; *Sosnowicz*, 270 P.3d at 925; *Vining*, 645 A.2d at 21. Though in *Sosnowicz* and *Vining*, the faulty admission of testimony was considered harmless error, and thus did not affect the underlying convictions. *Sosnowicz*, 270 A.2d at 925; *Vining*, 645 A.2d at 21.

To help assess the possible effects of this vast array of information, this Article proposes a typology of the different varieties of background information that often make their way into medicolegal death investigations. These types of information can be clustered into four, somewhat rough, categories, one pertaining to the decedent's medical history and three to non-medical facets of the case:

1. **Medical history.** The decedent's medical history will often point the investigation to a likely illness or medical condition that helps explain the death. Medical history is typically gleaned from hospital records, primary care physicians, emergency response reports, and statements by family members, friends, and caregivers. The medical history can also include the decedent's mental and psychological history. In abovementioned hypothetical scenarios, the previously diagnosed untreatable disease would be a candidate explanation for the death of the drowned person, as would be a history of cardiac failures for the locksmith's death (assuming such were found in the records).
2. **Findings from the death scene.** These include the state of the body and its position relative to the death scene, blood markings, weapons, tools, drug paraphernalia, alcohol containers, medicine containers, syringes, and the like. Death scene information is derived mostly from observations and items of evidence collected by the medicolegal scene investigator (a member of the medical examiner's team) or by the police. In the abovementioned scenarios, the treacherous sea currents in the drowning case and the finding of the malfunctioning drill in the case of the electrocuted locksmith would amount to death scene findings. In the case of the deceased jeweler, the hypothesis of poisoning by cyanide might not have arisen absent the death scene finding of a residue of a colored liquid at the bottom of the jeweler's glass.
3. **Social history.** The social history typically pertains to the life circumstances of the decedent and other protagonists, including professional hazards, risk taking behavior, alcohol or drug use, sexual habits, social circles, financial hardship, employment status, and the like. The social history is typically collected from the decedent's family members, friends, associates or caregivers, or from phone records, social media, and the like. In the abovementioned scenarios, the failing business of the drowned person and the jeweler's depression and business dispute would count as social history.
4. **Information from the police investigation.** This typically pertains to reports about the progress of the police investigation, statements from witnesses, statements made by a suspect, other forensic findings, the detectives' theories, and the like. Investigative updates are typically

conveyed by the detectives to the forensic pathologist or the medicolegal scene investigator, either through ongoing communication or during the autopsy itself. In the abovementioned scenario concerning the drowning victim, the statement that the decedent was seen arguing with another person on the rocks prior to the death would usually originate from the police investigation.

These four types of information are listed in descending order of proximity to the scientific core of forensic pathology. As we move away from medical history towards social history and information from the police investigation, the information becomes further removed from the expertise of the forensic pathologist and the reliability of the sources becomes more difficult for her to discern. As discussed below, the decedent's medical history will invariably be reliable, relevant, and diagnostic for the task at hand. Similarly, information gleaned from the death scene investigation will often be essential to understand the basic facts about the occurrence of the death and, as long as it used for drawing of reasonable inferences, it will usually also be reliable. The same cannot be said, however, for the social history and information from the police investigation. These types of information will tend to be relatively unreliable, difficult to ascertain, and conducive to conjecture.⁶⁰ We will also see that the descent down this list marks a shift from information that serves mostly for making determinations of cause of death towards information used mostly in determinations of manner of death.⁶¹

B. *Two Routes of Potential Error*

To help illustrate the potential problems stemming from the effects of exposure to non-medical background information, we turn to the case of Hillary Lee Tyler, who was convicted by an Iowa court for the homicide of her newborn baby.⁶² Baby Tyler was found dead in a hotel room checked out to Hillary Tyler, where she admitted to having delivered the baby by herself.⁶³ The central issue was whether the baby was stillborn (or died immediately after birth), in which case the mother bore no criminal liability, or whether he was born alive and survived for a sufficient period for her to drown him, which would amount to homicide, namely, murder.⁶⁴ The baby's death was investigated by Dr. Jonathan Thompson, an Associate State Medical Examiner trained in the field of forensic pathology.⁶⁵ After

⁶⁰ See *infra* note 171-175 and accompanying text.

⁶¹ See text preceding note 155 *supra*.

⁶² State v. Tyler, 867 N.W.2d 136, 143-44 (Iowa 2015).

⁶³ *Id.* at 145.

⁶⁴ *Id.* at 150.

⁶⁵ *Id.* at 148.

performing the autopsy and conducting various pathological testing, Dr. Thompson could not determine conclusively whether the baby was stillborn or was drowned after taking his first breath, and thus listed both the cause and manner of Baby Tyler's death as "undetermined."⁶⁶ Dr. Thompson was subsequently informed by the detectives that they obtained statements from Hillary Tyler according to which she had drowned her child.⁶⁷ The statements, which Tyler subsequently recanted, were obtained during the police's interrogation of Tyler one day following the traumatic delivery, before she had received any post-partum medical care or psychological care relating to the loss of her newborn child.⁶⁸ In his final report, Dr. Thompson certified the cause of death as "bathtub drowning" and the manner of death as "homicide" and also testified to that effect in court.⁶⁹ After hearing the evidence, including Dr. Thompson's testimony, the jury convicted Tyler of second-degree murder and other charges.⁷⁰

The role that Dr. Thompson's investigation played in the prosecution of Tyler was rife with problems. For one, the linchpin of his determinations—the defendant's alleged confession obtained by the police detectives—is quintessentially non-medical information and thus lies outside the expertise of a forensic pathologist. The reliance on this non-medical information throws into question the admissibility of Dr. Thompson's conclusions as expert testimony under the rules of evidence.⁷¹ Second, the admission of Dr. Thompson's testimony rubs against the fundamental principle that the ultimate assignment of criminal liability is vested exclusively in the province of the jury. The jury should serve the function of the all-source expert, while the medical examiner's role should be limited only to providing the medical findings to assist in that determination.

⁶⁶ Dr. Thompson testified that he found fluid in Baby Tyler's lungs. *Id.* at 151. He also explained, however, that this fluid was, at least in part, amniotic fluid, and that because amniotic fluid is, in part, composed of water, there was no scientific basis for determining whether some of the fluid was bathwater. *Id.* Based on the autopsy, Dr. Thompson reported that Baby Tyler may have taken a breath because the alveoli in the lungs were partially expanded, a finding that would also be consistent with the production of methane gas by bacteria found in the body after death. *Id.*

⁶⁷ According to the police, Tyler was said to have stated that "she had given birth the previous day in the motel room and then placed the infant in a bathtub partially filled with water shortly after the birth. The baby reportedly moved and cried after birth." *Id.* at 148.

⁶⁸ *Tyler*, 867 N.W.2d at 146–47.

⁶⁹ It should be noted that the *Tyler* case is somewhat exceptional, in that the death examiner relied on the non-medical information in determining both the cause and manner of death. *Id.* In most cases, the non-medical information plays a role just in the manner of death determinations.

⁷⁰ *Id.* at 152.

⁷¹ FED. R. EVID. 702.

Third, exposing the jury to the expert's ultimate conclusion could distort the jury's decision by overweighting the confession information relied upon by the medical examiner. As suggested by Professor Bill Thompson (not to be confused with forensic pathologist Jonathan Thompson), background information might be double-counted by the fact finder: both as providing direct probative support for the ultimate conclusion (say, a confession strengthening the appearance of a suspect's guilt) and through its indirect effect on the forensic conclusion (relying on the forensic examiner's conclusion, which was colored by the same confession).⁷² The fact-finder will likely be unaware of the impact of the background information on the purported scientific conclusion offered by the forensic examiner, and will thus view those items as two independent pieces of evidence. In other words, the two items will likely be perceived as corroborative. True corroboration, however, requires that each item of evidence be conditionally independent of each other. Treating non-independent items as corroborative is a fundamental violation of the principle of corroboration, amounting to the hollow specter of *pseudo-corroboration*.⁷³ This prospect is particularly troubling in light of the fact that death determinations do not require high standards of proof, and often suffice with low thresholds, such as the fifty-one percent confidence rule.⁷⁴ Thus, juries that rely heavily on death examiners' determinations might be placing undue weight on weakly-formed conclusions.

Indeed, Tyler's conviction was overturned by the State's Supreme Court.⁷⁵ The Iowa Supreme Court did not find fault with Dr. Thompson's investigation, but with the trial judge's decision to admit it into evidence.⁷⁶

⁷² See William C. Thompson, *What Role Should Investigative Facts Play in the Evaluation of Scientific Evidence?*, 43 AUSTL. J. FORENSIC SCI. 123, 131 (2011) [hereinafter Thompson, *What Role Should Investigative Facts Play*]; see also Thompson, *Determining the Proper Evidentiary Basis*, *supra* note 40, at 134–35.

⁷³ DAN SIMON, IN DOUBT: THE PSYCHOLOGY OF THE CRIMINAL JUSTICE PROCESS 148, 181 (2012). Saul Kassin has similarly proposed the construct of *illusion of corroboration*. See Saul M. Kassin, *Why Confessions Trump Innocence*, 67 AM. PSYCHOL. 431, 437 (2012).

⁷⁴ See TIMMERMANS, *supra* note 52, at 92. The low thresholds seem to explain the fact that only about three percent of cases investigated by medical examination offices go unclassified (that is, they earn the classification of “undetermined”). See, e.g., ANDREW BAKER, HENNEPIN CTY. MED. EXAM'RS OFFICE, HENNEPIN CTY. MED. EXAM'R 2016 ANNUAL REPORT 11, 12 (2017), <https://www.hennepin.us/-/media/hennepinus/residents/public-safety/documents/me-annual-report-2016.pdf?la=en>; PATTY HAYES & RICHARD HARRUFF, KING CTY. MED. EXAM'RS OFFICE, KING CTY. MED. EXAM'R ANNUAL REPORT 2016 11, 12 (2017), <https://www.kingcounty.gov/depts/health/examiner/-/media/depts/health/medical-examiner/documents/King-County-Medical-Examiner-2016-Annual-Report.ashx>; GLENN WAGNER, CTY. OF SAN DIEGO DEP'T OF THE MED. EXAM'R, 2016 ANNUAL REPORT 1, 62 (2017), <https://www.sandiegocounty.gov/content/dam/sdc/me/docs/SDME%20Annual%20Report%202016.pdf>.

⁷⁵ State v. Tyler, 867 N.W.2d 136, 144 (Iowa 2015).

⁷⁶ *Id.*

The court ruled that admitting the autopsy report into evidence and allowing Dr. Thompson to testify to the cause and manner of Baby Tyler's death amounted to an abuse of discretion by the trial judge.⁷⁷ The crux of the reversal was that the medical examiner's conclusion rested to a large degree on the uncorroborated statements that the defendant allegedly made to the police, as opposed to objective, scientific, or medical evidence.⁷⁸ For the reasons mentioned in the preceding paragraph, it seems beyond dispute that the Iowa court reached the correct conclusion.⁷⁹

Still, finding fault with the judge's decision does little to shed light on the problem, if any, with Dr. Thompson's investigation itself. One possibility is to treat the Tyler investigation as an exemplar of an investigation that was affected by context bias. The critique would be that Dr. Thompson's exposure to the incriminating statements by the suspect could have compromised his ability to conduct this investigation and interpret the ambiguous evidence in a scientific and objective manner.⁸⁰ Indeed, the context bias does pose a risk of skewing conclusions of death investigations,⁸¹ and we should keep that risk in mind when devising future guidelines. But, the context bias is characterized by two features: it occurs beneath the level of conscious awareness and produces non-normative inferences, that is, inferences that examiners would not condone had they be made aware of them.⁸² Upon closer examination, neither of those features

⁷⁷ *Id.*

⁷⁸ *Id.* at 150.

⁷⁹ In April 2017, pending a retrial, Tyler pleaded guilty to child endangerment causing serious injury, first-degree criminal mischief, and abuse of a corpse. See Peter Kaspari, *Tyler Plea Deal Averts Another Trial*, MESSANGER (Apr. 12, 2017), www.messengernews.net/news/local-news/2017/04/tyler-plea-deal-averts-another-trial/. She was sentenced to serve up to twenty years in prison. *Id.*

⁸⁰ Indeed, in internal discussions within the OSAC, the Human Factors Committee has tended to treat the Tyler investigation as an exemplar of an investigation that was affected by context bias.

⁸¹ Recall that Dr. Thompson received the information from the police after having conducted the medical examination and having written a preliminary autopsy report. See *supra* notes 66-69 and accompanying text. But it is not hard to imagine a different scenario in which Dr. Thompson first learned about Tyler's alleged confessions prior to performing the medical examination. It is quite possible that exposure to the apparently damning information would have led Dr. Thompson to believe in Tyler's guilt, which could set the stage for interpreting the ambiguous medical exam as supportive of homicide. In such a scenario, the single official record would indicate "death by drowning" as the cause of death and "homicide" as the manner of death, and we might never have learned that these determinations were in fact driven by non-medical background information. Such an eventuality would have amounted to a classic instantiation of the context bias.

⁸² See William C. Thompson, *Interpretation: Observer Effects*, in WILEY ENCYCLOPEDIA OF FORENSIC SCIENCE 171 (Allan Jamieson & Andre A. Moenssens eds., 2009) [hereinafter Thompson, *Interpretation*]; Steve D. Charman et al., *Cognitive Bias in the Legal System: Police Officers Evaluate Ambiguous Evidence in a Belief-Consistent Manner*, 6 J. APPLIED RES. MEMORY & COGNITION 193 (2017); Itiel E. Dror et al., *When Emotions Get the Better of*

were present in Dr. Thompson's investigation. Rather, Dr. Thompson frankly acknowledged in his documentation and courtroom testimony that he based his final conclusion on the suspect's putative confession, namely, on non-medical information.⁸³ On cross examination, Dr. Thompson confirmed that the various medical tests he conducted—including the autopsy, the toxicology test, the examination of the lungs, the examination of the stomach contents—had all led him to an inconclusive determination. Then, in response to the following question:

And the only way that you reached the conclusion of homicide as the manner of death, as drowning as a cause of death, is through observing and watching the videotapes that the law enforcement officers supplied to you, correct?

Dr. Thompson replied "Yes, it is."⁸⁴

Dr. Thompson's frank report makes it clear that he was not subconsciously biased by the putative confession, but rather that he relied on that crucial information consciously and deliberately. Thus, Baby Tyler's death investigation had little to do with the context bias. The concern is much simpler and it lies in plain sight. The issue is whether death examiners ought to incorporate non-medical background information of unknown reliability into their decision mix. The crux of the issue, then, is not cognitive in nature, but relates more to the legal and normative aspects of death examination.

Hence, this Article proposes that there are two different coexistent routes by which reliance on background information can lead to mistaken death investigative conclusions: first, the cognitive route via the context bias, wherein exposure to illicit information skews death investigations towards non-normative conclusions without the investigator being conscious of that effect. Second, via the conscious and deliberate incorporation of non-medical information of unknown reliability into the decision. For illustration, it seems uncontroversial that radiologists consciously and deliberately rely on x-rays, hiring committees rely on letters of recommendation, and weather forecasters use models of prior weather data to make predictions. Yet, that reliance becomes problematic when a

Us: The Effect of Contextual Top-Down Processing on Matching Fingerprints, 19 APPLIED COGNITIVE PSYCHOL. 799, 801 (2005) [hereinafter Dror et al., *When Emotions Get the Better of Us*]; Peter A.F. Fraser-Mackenzie et al., *Cognitive and Contextual Influences in Determination of Latent Fingerprint Suitability for Identification Judgments*, 53 SCI. & JUST. 144 (2013) [hereinafter Fraser-Mackenzie et al., *Cognitive and Contextual Influences*]; Saul M. Kassir et al., *The Forensic Confirmation Bias: Problems, Perspectives, and Proposed Solutions*, 2 J. APPLIED RES. MEMORY & COGNITION 42, 44 (2013) [hereinafter Kassir, *The Forensic Confirmation Bias*]; Larry S. Miller, *Bias Among Forensic Document Examiners: A Need for Procedural Change*, 12 J. POLICE SCI. & ADMIN. 407 (1984).

⁸³ See *supra* note 78 and accompanying text.

⁸⁴ *State v. Tyler*, 867 N.W.2d 136, 150 (Iowa 2015).

radiologist reads an x-ray that is blurry or that might not be of the correct patient, when a hiring committee values a letter of recommendation that bears signs of inauthenticity, and when a weather forecaster uses data collected by means of a defunct technology. Such practices are simply inadequate and unsuitable for the task, regardless of whether they trigger context bias.

As it will turn out, we need not belabor the arduous task of distinguishing between the two routes, as they can both be addressed by means of the same mechanism, namely, context management. Still, for both conceptual and practical purposes, this Article will focus the debate on the conscious-deliberate route. Following Occam's razor principle,⁸⁵ this explanation should be preferred for its simplicity and directness. Still, it is important to stay attuned to the context bias because the risk of unconscious bias is ever-present in forensic investigations, as it is throughout all forms of human judgment.

C. *Task-Relevance and the Cost-Benefit Calculus*

In most forensic context, the concept of *task-relevance* is the touchstone for determining which information to manage.⁸⁶ The concept embodies the notion that information should be used only when it is necessary for the performance of the forensic task, and should be withheld when it serves to reach a conclusion through an inferential path that lies outside of the established forensic science.⁸⁷ In pattern comparison disciplines, the contours of task-relevance are strict and consistent and are thus determinable *ex ante*. Pattern comparison analysts are charged with testing the specific specimens and those specimens alone, and with employing a methodology that is well-defined in advance. Any information that falls outside the contours of that task and confines of that methodology will invariably be deemed irrelevant to the task. One could easily imagine that knowing the type of surface from which a latent print was lifted could be relevant to the task by helping the analyst examine and interpret the print

⁸⁵ See, e.g., Dorothy Walsh, *Occam's Razor: A Principle of Intellectual Elegance*, 16 AM. PHIL. Q. 241, 241–44 (1979).

⁸⁶ See Thompson, *Determining the Proper Evidentiary Basis*, *supra* note 40.

⁸⁷ In formal terms, information is considered task-relevant if it is necessary for drawing conclusions about the propositions in question, from the physical evidence that has been designated for examination through the correct application of an accepted analytic method by a competent analyst. Information is task-irrelevant if it is not necessary for drawing conclusions about the propositions in question, if it assists only in drawing conclusions from something other than the physical evidence designated for examination, or if it assists only in drawing conclusions by some means other than an appropriate analytic method. See NAT'L COMM'N ON FORENSIC SCI., U.S. DEP'T OF JUSTICE, VIEWS OF HUMAN FACTORS SUBCOMMITTEE: ENSURING THAT FORENSIC ANALYSIS IS BASED UPON TASK-RELEVANT INFORMATION 7 (2015), <https://www.justice.gov/ncfs/file/641676/download>.

correctly. But aspects of the case that do not bear directly on the examination and interpretation of the specimens—for example, a suspect’s criminal record, a confession, or an eyewitness’ account—cannot be considered relevant to the comparison of the friction ridges of the prints. The neat demarcation of task-relevance in this type of task makes the decision to apply context management easy and straightforward.⁸⁸

Task-relevance, however, does not always yield definitive conclusions. For one, in some situations, the demarcation of relevance might not be clear-cut. This is particularly true for forensic disciplines that entail complex, sprawling, iterative, and open-ended reasoning processes. Moreover, information might be considered task-relevant, yet still capable of biasing the conclusion in one way or another. In these situations, the appropriateness of context management should hinge on a more nuanced and contextualized analysis of how the treatment would impact the investigation.⁸⁹ This calculus can be boiled down to the following three components:

1. The effect on investigative accuracy. Context management will be justified to the extent that the overall impact of withholding it from the examiner will contribute to the accuracy of the investigation. Withholding information that is inaccurate is likely to sway the investigation toward an accurate conclusion, whereas that same intervention could also withhold accurate information and thus reduce the accuracy of the investigative conclusion. Hence the need to balance out the measure’s countervailing effects. As discussed below, the concern over inaccurate conclusions stems not only from the accuracy of the information itself, but also from its susceptibility to be over-interpreted.⁹⁰
2. The effect on investigative efficacy. Background information can also serve the investigative function by enabling the generation of investigative hypotheses that would not be contemplated in its absence.

⁸⁸ It is also noteworthy that much of the pattern comparison bench work is performed after the passage of time since the commencement of the investigation. By that point, the police are more likely to have accumulated evidence about the criminal event and have possibly named a suspect, and they might also be feeling pressure to solve the case. In other words, pattern comparison tasks are often performed in an environment wherein the examiner is subjected to an expectation to provide a conclusion that is supportive of a particular theory. On the concept of “case construction,” see Martin Innes, *The ‘Process Structures’ of Police Homicide Investigations*, 42 BRITISH J. CRIMINOLOGY 669, 672 (2002). MIKE McCONVILLE, ANDREW SANDERS & RICHARD LENG, *THE CASE FOR THE PROSECUTION: POLICE SUSPECTS AND THE CONSTRUCTION OF CRIMINALITY* 11-13 (1991).

⁸⁹ Dror et al., *Letter to the Editor*, *supra* note 14, at 276 (“For forensic science to successfully take on the issue of contextual bias, it is important that one correctly considers the risks, that measures are taken when needed, and that they are proportionate and appropriate.”).

⁹⁰ See *infra* note 173-174 and accompanying text.

To the extent that withholding such information will prevent the generation of hypotheses and result in incomplete or inconclusive outcomes, context management hinders the efficacy of the investigative effort.

3. Feasibility and logistical burdens. Context management procedures will not be justified if they undermine the feasibility of the investigative process or impose undue burdens on it. Such impediments include logistical burdens, personnel requirements, coordination difficulties, extra costs, and the like.

As will be discussed below, for all its nuance, this cost-benefit framework falls short of offering a decisive solution regarding the justification of context management in death examinations. It does, however, help flush out the complexity of the issues involved and thus demonstrates the intractability of the issue at hand.

III. ABDUCTIVE REASONING

An intuitive and appealing suggestion to correct for the possible influences of background information is to treat death investigation like other forensic disciplines and subject it to a blanket requirement of context management. This temporary masking should serve to prevent task-irrelevant information from affecting investigative outcomes, regardless of whether that information would have been consciously incorporated into the forensic decision or whether it would have biased the decision unconsciously. Though, before we attempt to transpose a corrective measure from one domain to the next, it is incumbent on us to gain a close understanding of the cognitive processes entailed in the performance of each task. Pattern comparison is comprised primarily of straightforward cognitive tasks, such as characterization of stimuli,⁹¹ choosing thresholds,⁹² as well as

⁹¹ See Thomas A. Busey & Itiel E. Dror, *Special Abilities and Vulnerabilities in Forensic Expertise*, in U.S. DEP'T OF JUSTICE, THE FINGERPRINT SOURCEBOOK 15-3 (Alan McRoberts ed., 2011), <https://www.ncjrs.gov/pdffiles1/nij/225320.pdf>; Saks et al., *Context Effects in Forensic Science*, *supra* note 9, at 79.

⁹² See Itiel E. Dror, *Human Expert Performance in Forensic Decision Making: Seven Different Sources of Bias*, 49 AUSTL. J. FORENSIC SCI. 541 (2017).

reasoning by way of *induction*⁹³ and *deduction*.⁹⁴ The death investigation task, however, cannot be adequately addressed by these reasoning processes. Rather, death investigations are better understood as requiring a far more complex, sprawling, iterative, and open-ended form of reasoning. The model of reasoning that is best suited to capture this type of mental process is *abductive reasoning*. This Part of the Article is devoted to familiarizing ourselves with this model of reasoning.

A. *The Abductive Reasoning Process*

The theory of *abductive reasoning* emanates from the work of the American philosopher Charles Sanders Peirce. Abductive reasoning provides a good account of how people go about conducting investigations into the occurrence of events, that is, how they infer the correct cause from the many possible ones. As we will soon see, the process is comprised of three sub-processes, or functions: the generation of hypotheses, the testing of hypotheses, and the evaluation of hypotheses.

Most contemporary philosophers, including Gil Harman,⁹⁵ Paul Thagard,⁹⁶ Peter Lipton,⁹⁷ and Igor Douven⁹⁸ focus on the evaluation phase of the process, which is known as the *inference to the best explanation*. At its core, hypothesis evaluation follows the logic of “[g]iven evidence *E* and candidate explanations H_1, \dots, H_n of *E*, infer the truth of *that* H_i which best explains *E*.”⁹⁹ Peter Lipton offers a slightly more nuanced definition: “Given our data and our background beliefs, we infer what would, if true, provide the best of the competing explanations we can generate for those data (so

⁹³ See Lorenzo Magnani, *Abductive Reasoning: Philosophical and Educational Perspectives in Medicine*, in *ADVANCED MODELS OF COGNITION FOR MEDICAL TRAINING AND PRACTICE* 21 (David A. Evans & Vimla L. Patel eds., 1992); Vimla L. Patel et al., *Thinking and Reasoning in Medicine*, in *THE CAMBRIDGE HANDBOOK OF THINKING AND REASONING* 727, 730–31 (Keith J. Holyoak & Robert G. Morrison eds., 2005) [hereinafter Patel et al., *Thinking and Reasoning in Medicine*]; Anton E. Lawson & Erno S. Daniel, *Inferences of Clinical Diagnostic Reasoning and Diagnostic Error*, 44 *J. BIOMEDICAL INFORMATICS* 402–12 (2011); James Hawthorne, *Inductive Logic*, *STAN. ENCYCLOPEDIA OF PHIL.*, <https://plato.stanford.edu/entries/logic-inductive/> (last updated Mar. 19, 2018).

⁹⁴ See Lawson & Daniel, *supra* note 93, at 404; Magnani, *supra* note 93, at 21–23; Patel et al., *Thinking and Reasoning in Medicine*, *supra* note 93, at 730–31. On reasoning by induction, see Stewart Shapiro & Teresa Kouri Kissel, *Classical Logic*, *STAN. ENCYCLOPEDIA OF PHIL.*, <https://plato.stanford.edu/entries/logic-classical/#3> (last updated Mar. 11, 2018).

⁹⁵ Gilbert H. Harman, *The Inference to the Best Explanation*, 74 *PHIL. REV.* 88, 88–95 (1965).

⁹⁶ Paul R. Thagard, *The Unity of Peirce’s Theory of Hypothesis*, 13 *TRANSACTIONS CHARLES S. PEIRCE SOC’Y* 112, 112–21 (1977); see also Igor Douven, *Abduction*, *STAN. ENCYCLOPEDIA OF PHIL.* (Mar. 9, 2011), <https://plato.stanford.edu/archives/spr2011/entries/abduction/>.

⁹⁷ PETER LIPTON, *INFERENCE TO THE BEST EXPLANATION* 56 (1st ed. 1991).

⁹⁸ Douven, *supra* note 96.

⁹⁹ *Id.*

long as the best is good enough for us to make any inference at all).”¹⁰⁰ The criteria for determining the soundness of an explanation do not lend themselves to a formal definition. Peirce recommended favoring hypotheses that seem simple, natural, and plausible, preferring theories that explain wide ranges of phenomena, employing analogous theories that have proved successful in other areas of inquiry, and conserving resources.¹⁰¹ Other choice indicia include simplicity, generality, and compatibility with well-established theories.¹⁰² To be sure, the task must also entail a thorough appreciation of the diagnostic and explanatory potential of the object of inquiry; that is, the causal and statistical relationship between the observed phenomenon and the proposed explanatory hypothesis. The best explanation would be the hypothesis which, on balance, meets these criteria sufficiently and more so than any other hypothesis.¹⁰³

It must be acknowledged that hypotheses do not present themselves out of thin air. Rather, they must be generated by the investigator. But herein lies a paradox. The simple truth is that it is absolutely prohibitive to explore the inordinate number—trillions according to one account¹⁰⁴—of hypotheses or to conduct every conceivable test. Without evidence, one cannot draw any inferences about the validity of the hypotheses, but without a hypothesis, one cannot know which evidence to test. Hence the need for an initial set of hypotheses. Indeed, Peirce himself focused less on the evaluation of hypothesis and more on the *discovery* aspect, namely, the “process of forming an explanatory hypothesis.”¹⁰⁵ With the exception of obvious cases, there is no reason to expect that an examiner’s first attempt will reliably strike the only true hypothesis out of the many that could conceivably shed

¹⁰⁰ LIPTON, *supra* note 97, at 58.

¹⁰¹ See CHRISTOPHER HOOKWAY, PEIRCE: THE ARGUMENTS OF THE PHILOSOPHERS 225–26 (1985); CHARLES SANDERS PEIRCE, COLLECTED PAPERS OF CHARLES SANDERS PEIRCE, VOLUMES 1–8 (Charles Hartshorne, Paul Weiss & Arthur W. Burks eds., 1932–1958).

¹⁰² See Douven, *supra* note 96; LIPTON, *supra* note 97; Thagard, *supra* note 96.

¹⁰³ See Harman, *supra* note 95; LIPTON, *supra* note 97; Thagard, *supra* note 96. To be sure, choosing the best available hypothesis cannot be justified when it fails to meet independent indicia of validity. If that were the case, inference to the best explanation could lead to trust “the best of a bad lot.” BAS C. VAN FRAASSEN, LAWS AND SYMMETRY 143 (1989); see also Douven, *supra* note 96.

¹⁰⁴ K.T. FANN, PEIRCE’S THEORY OF ABDUCTION 42 (1970); see also William H. B. McAuliffe, *How Did Abduction Get Confused with Inference to the Best Explanation?*, 51 TRANSACTIONS CHARLES S. PEIRCE SOC’Y 300, 304–05 (2015).

¹⁰⁵ 5 CHARLES SANDERS PEIRCE, THE COLLECTED PAPERS OF CHARLES SANDERS PEIRCE: PRAGMATISM AND PRAGMATICISM 171 (Charles Hartshorne & Paul Weiss eds., 1935) [hereinafter PEIRCE VOL. 5]; see also CHARLES S. PEIRCE, THE NATURE OF MEANING (1903), reprinted in 2 THE ESSENTIAL PEIRCE: SELECTED PHILOSOPHICAL WRITINGS (1893–1913) 208, 216–17 (Peirce Edition Project ed., 1998) [hereinafter PEIRCE, THE NATURE OF MEANING]; Daniel G. Campos, *On the Distinction Between Peirce’s Abduction and Lipton’s Inference to the Best Explanation*, 180 SYNTHESIS 419, 427 (2011); Douven, *supra* note 96.

explanatory light on the decision. Thus, abduction serves as a “selection function,”¹⁰⁶ a “search strategy.”¹⁰⁷ Peirce’s solution to the paradox was to offer a bootstrapping mechanism, driven by the process of generating hypotheses and subjecting them to empirical testing.¹⁰⁸

Naturally, the inferential process cannot progress without the testing of evidence. Hypotheses will be chosen if they offer feasibly testable propositions, and the corresponding tests will be chosen if they have diagnostic potential and are strongly associated with the hypotheses. Throughout the testing phase, some hypotheses will receive empirical support and thus be deemed worthy of further testing and evaluation.¹⁰⁹ Other hypotheses will be ruled out and set aside, as new ones should be generated and put to the test.¹¹⁰ In all, the process of generation and testing of hypotheses operates as a selection mechanism to determine which of the possible causes are to be considered promising explanatory propositions and passed on for further consideration.¹¹¹

¹⁰⁶ Douven, *supra* note 96.

¹⁰⁷ Gerhard Schurz, *Patterns of Abduction*, 164 *SYNTHESE* 201, 205 (2008).

¹⁰⁸ CHARLES S. PEIRCE, *DEDUCTION, INDUCTION, AND HYPOTHESIS* (1878), *reprinted in* 3 *WRITINGS OF CHARLES S. PEIRCE: A CHRONOLOGICAL EDITION (1872–1878)* 323, 331–32 (Christian J. W. Kloesel et al. eds., 1986) [hereinafter *PEIRCE, DEDUCTION, INDUCTION, AND HYPOTHESIS*]; *see also* McAuliffe, *supra* note 104, at 307; Schurz, *supra* note 107, at 201–34.

¹⁰⁹ *See* Harry G. Frankfurt, *Peirce’s Notion of Abduction*, 55 *J. PHIL.* 593 (1958).

¹¹⁰ In Peirce’s words:

If that supposition be correct, a certain sensible result is to be expected under certain circumstances which can be created, or at any rate are to be met with. The question is, will this be the result? If Nature replies “No!” the experimenter has gained an important piece of knowledge. If Nature says “Yes,” the experimenter’s ideas remain just as they were only somewhat more deeply engrained. If Nature says “Yes” to the first twenty questions, although they were so devised as to render that answer as surprising as possible, the experimenter will be confident that he is on the right track, since 2 to the 20th power exceeds a million.

PEIRCE VOL. 5, supra note 105, at 168; *see also* *PEIRCE, DEDUCTION, INDUCTION, AND HYPOTHESIS, supra* note 108, at 217–21; *see also* *PEIRCE, THE NATURE OF MEANING, supra* note 105, at 217–18; McAuliffe, *supra* note 104, at 304–05.

¹¹¹ *See* Douven, *supra* note 96; Schurz, *supra* note 107, at 205. Anderson and Twining define abductive reasoning to be a “creative process of using known data to generate hypotheses to be tested by further investigation.” *TERENCE ANDERSON & WILLIAM TWINING, ANALYSIS EVIDENCE: HOW TO DO THINGS WITH FACTS BASED ON WIGMORE’S SCIENCE OF JUDICIAL PROOF* 443 (3d ed. 1998).

Eventually, the process will evolve into hypothesis evaluation.¹¹² This phase will come to a quicker close when just one hypothesis receives overwhelming empirical substantiation, thus offering an investigative conclusion. Additionally, the process can come to an end when none of the explored hypotheses has been empirically substantiated and the stock of hypotheses has been exhausted. In such instances, the investigation will remain unsolved. The evaluation function is most consequential when a number of hypotheses have received partial empirical support and appear to be viable candidates. At this point, the decision maker engages in an inference to the best explanation seeking to identify the best (and good enough) explanation. While abductive reasoning is hardly perfect—and, indeed, is not immune from cognitive biases and errors—one would be hard pressed to propose a more reasonable, feasible, and effective method for conducting complex investigative tasks.

B. *Abductive Reasoning in Medical Decision Making*

Before taking a closer look at how abductive reasoning serves the discipline of forensic pathology, it is worth noting that it plays in the broader field of medical diagnostic reasoning. To help demonstrate this observation, one can follow an illustration offered by Anton Lawson & Erna Daniel of a thirty-five-year-old female patient who presents for evaluation due to malaise and abdominal discomfort in the right upper quadrant. The symptoms had worsened gradually over a period of ten days. Naturally, to treat the patient, the physician first needs to make a diagnosis, that is, to discern the cause of the symptoms. Based on the complaint alone, the physician could have generated a slew of hypotheses. For now, however, the physician might suffice with six viable hypotheses that make up the differential diagnosis. The primary methods of testing the hypotheses include taking the patient's medical history, performing a physical examination, conducting laboratory and imaging tests, observation, and the treatment itself.¹¹³

¹¹² See McAuliffe, *supra* note 104, at 303. Lipton characterized abductive reasoning as consisting of two “epistemic filters,” with one filter serving to select a group of plausible explanations from a vast pool of possible explanations, and the second filter selecting the best explanation from that group. LIPTON, *supra* note 97, at 60–61; see also Campos, *supra* note 105, at 434. In reality, it seems, the two processes are somewhat intermeshed. See Paul Thagard, *Abductive Inference: From Philosophical Analysis to Neural Mechanisms*, in *INDUCTIVE REASONING: EXPERIMENTAL, DEVELOPMENTAL AND COMPUTATIONAL APPROACHES* 226 (Aidan Fenney & Evan Heit eds., 2007); McAuliffe, *supra* note 104, at 303–04.

¹¹³ See Lawson & Daniel, *supra* note 93, at 407.

One leading hypothesis is that the patient is suffering from a gallbladder disease. To test that prospect, the physician should obtain the patient's medical history, with an eye towards ascertaining whether the discomfort appeared acutely, whether it radiates to the shoulder, whether the area is tender, and whether the patient has fever or chills. The possibility of a gallbladder disease could also be tested by a physical exam, in that applying pressure on the gallbladder should reproduce the patient's pain. The gallbladder hypothesis could also be tested diagnostically, in that an ultrasound should reveal abnormalities, such as a gallstone or a distended gallbladder. Other hypotheses include an abnormal accumulation of gas in the hepatic flexure, a gastrointestinal ulcer, an inflammation of the rib junction, a variety of liver diseases caused by excessive alcohol intake or other toxic exposure, or by hepatitis A, B, C or any other viral infection.¹¹⁴ Since each hypothesis is associated with different physical symptoms and is expected to produce different results on diagnostic examinations, the physician will need to conduct different testing procedures for the different hypotheses.¹¹⁵ The impact of each incoming test result on the respective hypothesis will be assessed based on the inferential support it provides, its verification, adequacy, parsimony, and falsifiability.¹¹⁶

At the culmination of the rounds of testing, the physician engages in the phase of hypothesis evaluation. She might find that only one of the hypotheses is strongly supported by the tests. That hypothesis will normally be deemed as the diagnosis, which will thereafter dictate the course of treatment. It is possible also that all six hypotheses are refuted by the evidence, which could lead the physician to dig deeper to generate additional hypotheses or to refer the patient to a specialist. It is also possible that more

¹¹⁴ To be sure, this list of hypotheses is not exhaustive. Lawson and Daniel also list an injury to the ribcage, the Fitz-Hugh-Curtis Syndrome, kidney problems (such as a renal tumor or kidney stones), a pleurisy/lung source, and other possible explanations that were not yet considered. See Lawson & Daniel, *supra* note 93, at 407.

¹¹⁵ For example, the discomfort from an abnormal accumulation of gas in the hepatic flexure should be reduced by bowel movements or by taking milk of magnesia or laxatives. A gastrointestinal ulcer should be relieved by taking antacids, and the laboratory results should show blood in the stool. An inflammation of the rib junction should be accompanied by tenderness in the ribcage margin, and the symptoms should respond to administration of moist heat and anti-inflammatories. A patient suffering from a liver disease caused by excessive alcohol intake or other toxic exposure should report heavy drinking habits or exposure to toxic substances without taking medication, and the lab results should reveal elevated liver chemistries. Finally, the possibility of a liver disease caused by hepatitis A, B, C or any other viral infection could be supported by a history of drug use, or by blood tests that reveal high enzyme levels, serum levels, or a chronic hepatitis virus. See Lawson & Daniel, *supra* note 93, at 405.

¹¹⁶ See Pat Croskerry, *Achieving Quality in Clinical Decision Making: Cognitive Strategies and Detection of Bias*, 9 ACAD. EMERGENCY MED. 1184, 1195, 1200 (2002) [hereinafter Croskerry, *Achieving Quality in Clinical Decision Making*].

than one hypothesis is consistent with the various tests, even if none is fully supported. The physician will then be called upon to make an inference to the best explanation in order to determine which hypothesis, if any, should be considered the diagnosis. This inferential task will oftentimes be performed in the face of somewhat noisy and partially contradictory test results.¹¹⁷

This model of abductive reasoning is implicit in much of the literature on medical reasoning. As early as the middle of the last century, Robert Ledley and Lee Lusted proposed a two stage model of clinical reasoning involving a hypothesis-generation stage followed by a hypothesis-evaluation stage.¹¹⁸ Following Arthur Elstein and colleagues, this model came to be known as “hypothetico-deductive” reasoning,¹¹⁹ that is based on the “rapid generation of a small set of hypotheses to account for the patient’s problem, which are then tested against incoming data (e.g., further history findings or lab results).”¹²⁰ It has been suggested that the sequence of history, physical exam, and lab tests are each designed to test the hypotheses that survived the previous step.¹²¹ This approach has also become known as the *select and test* method.¹²²

Special attention has been devoted at the crucial phase of generating a comprehensive initial set of viable hypotheses. As explained by Pat Croskerry, premature diagnostic closure can result from features that present

¹¹⁷ For illustration, the blood tests could be positive for hepatitis C as the carrier state, but negative for the other viruses tested, which would make the physician inclined to infer that the hepatitis C carrier state is at least part of the problem. If the carrier state is the cause of the patient’s entire condition, however, the symptoms should have existed for a considerable time period. It follows, then, that if the symptoms occurred only recently, the carrier state is an unlikely explanation for the entire condition. See Lawson & Daniel, *supra* note 93, at 409.

¹¹⁸ See Robert S. Ledley & Lee B. Lusted, *Reasoning Foundations of Medical Diagnosis*, 130 SCI. 9, 9 (1959); see also Patel et al., *Thinking and Reasoning in Medicine*, *supra* note 93, at 728.

¹¹⁹ See ARTHUR K. ELSTEIN ET AL., *MEDICAL PROBLEM SOLVING: AN ANALYSIS OF CLINICAL REASONING* (1978); see also Judith L. Bowen, *Educational Strategies to Promote Clinical Diagnostic Reasoning*, 355 NEW ENG. J. MED. 2217, 2217–25 (2006).

¹²⁰ See Vimla Patel et al., *Diagnostic Reasoning and Decision Making in the Context of Health Information Technology*, 8 REV. HUM. FACTORS AND ERGONOMICS 149, 155 (2013) [hereinafter Patel et al., *Diagnostic Reasoning and Decision Making*].

¹²¹ Adams et al., *supra* note 50, at 185

In clinical medicine, it is axiomatic that the physician first takes a history, then performs a physical examination, and lastly orders laboratory tests. During this sequence, the physician is forming hypotheses, testing them, refining them and rejecting some of them. The physical examination is focused to confirm or refute hypotheses developed during the taking of the history. The laboratory tests are selected to confirm or refute hypotheses still under consideration at the conclusion of the physical examination.

Id.

¹²² See Patel et al., *Thinking and Reasoning in Medicine*, *supra* note 93, at 730.

themselves vividly and thus may be convincing for a particular diagnosis, or by anchoring on salient features early in the presentation.¹²³ Higgs and Jones point out that cognitive error in medical diagnostics is frequently caused by over-emphasis on findings that support an existing hypothesis and rejection of findings that do not support a favored hypothesis.¹²⁴ Indeed, one study found that the most common type of medical diagnostic errors (twenty-four percent), was the failure to consider the correct diagnosis.¹²⁵ Generating the list of all viable hypotheses is instrumental in that it “reduc[es] the problem space of possible diagnoses and enable[s] clinicians to selectively solicit and attend to incoming data.”¹²⁶

¹²³ Anthony E. Voytovich et al., *Premature Conclusions in Diagnostic Reasoning*, 60 J. MED. EDUC. 302 (1985); see also Croskerry, *Achieving Quality in Clinical Decision Making*, *supra* note 116, at 1195. For illustration, recall the female patient who reported abdominal discomfort. Assume that she arrived at the doctor’s office insisting that her problem was caused by gallstones. Several of her family members had suffered from gallstones, and she was advised that she probably had the same problem. That familial history could lead the physician to lean towards believing that gallstones were the cause of the patient’s condition. This belief could be further strengthened by the fact that the patient ran blood tests at the urgent care department a couple of days earlier and the tests showed somewhat elevated “liver tests” and a slightly high white blood cell count. The strength of the physician’s conviction in the gallbladder hypothesis might be enough to refer the patient to a surgeon for the removal of the affected gallbladder. But assume that it turns out that the gallbladder was not the true cause of the problem. In hindsight, it appears that the physician might have placed too much weight on the family members’ medical history, and over interpreted the ambiguous results of the blood test. Moreover, the physician might have felt attracted to a diagnosis that avoided a conflict with the adamant patient.

¹²⁴ Joy Higgs & Mark A. Jones, *Clinical Decision Making and Multiple Problem Spaces*, in *CLINICAL REASONING IN THE HEALTH PROFESSIONS* 10 (3d ed. 2008). Studies show that diagnostic hypotheses can skew interpretation of clinical tests. See Vicki R. Leblanc et al., *Believing is Seeing: The Influence of a Diagnostic Hypothesis on the Interpretation of Clinical Features*, 77 ACAD. MED. S67, S68 (2002); see also Jess M. Pines, *Profiles in Patient Safety: Confirmation Bias in Emergency Medicine*, 13 SOC’Y ACAD. EMERGENCY MED. 90, 91–93 (2005).

¹²⁵ See Pat Croskerry, *The Importance of Cognitive Errors in Diagnosis and Strategies to Minimize Them*, 78 ACAD. MED. 775, 777 (2003) [hereinafter Croskerry, *The Importance of Cognitive Errors*]; Gordon D. Schiff et al., *Diagnostic Error in Medicine: Analysis of 583 Physician-Reported Errors*, 169 ARCH. INT. MED. 1881, 1884 (2009); Thomas S. Wallsten, *Physician and Medical Student Bias in Evaluating Diagnostic Information*, 1 MED. DECISION MAKING 145, 162 (1981); see also ELSTEIN ET AL., *supra* note 119, at 407. Similar observations have been made with respect to the use of abductive reasoning in criminal investigations. See David Carson, *The Abduction of Sherlock Holmes*, 11 INT’L J. POLICE SCI. & MGMT. 193, 198–99 (2009) [hereinafter Carson, *The Abduction*]; Keith A. Findley & Michael S. Scott, *The Multiple Dimensions of Tunnel Vision in Criminal Cases*, 2006 WIS. L. REV. 291, 292–96 (2006); INNES, *supra* note 88, at 127.

¹²⁶ Patel et al., *Diagnostic Reasoning and Decision Making*, *supra* note 120, at 155. Indeed, the construction of an initial set of diagnoses is a mainstay of the classic hypothetico-deductive method of diagnostic decision making. DAVID L. SACKETT ET AL., *CLINICAL EPIDEMIOLOGY: A BASIC SCIENCE FOR CLINICAL MEDICINE* (2d ed. 1991); Croskerry, *Achieving Quality in Clinical Decision Making*, *supra* note 116, at 1200. As explained by Patel and colleagues, the process commences with “cue acquisition” by the diagnostician.

C. Abductive Reasoning in Death Investigation

It should come as no surprise that abductive reasoning is the process routinely used also in death investigations. In their important contribution to the field, Adams and Hirsch set out to dispel the widely-held misconception that the cause of death is always revealed by structural changes that are observable at the autopsy.¹²⁷ In actuality, the autopsy findings alone provide the necessary foundation for a cause-of-death opinion in just a minority of death investigations. Most examined deaths involve lethal mechanisms that are functional derangements that are not structurally demonstrable.¹²⁸

Without the ability to discern the cause of death directly and reliably from the morphology of the body, understanding the circumstances that led to the death requires collecting and analyzing a wider array of evidence surrounding the death. This could include conducting sexual assault kits, drug tests, toxicology tests, radiological tests, the collection of special specimens,¹²⁹ and running a variety of tests on those specimens.¹³⁰

Conceptually, abductive reasoning progresses in an iterative manner, but death examiners cannot afford that sequential luxury. Autopsies must be performed within a short time span, to enable a prompt release of the body to the family.¹³¹ Moreover, there may be no second opportunity to collect specimens, as vital clues are bound to be destroyed and contaminated by the autopsy itself.¹³² Needless to mention, evidence collection is largely impossible once the body has been embalmed or buried, not to mention cremated.¹³³ This temporal compression means that the process of hypothesis generation must transpire almost simultaneously, rather than in an iterative fashion. As characterized by Adams and Hirsch, the best contemporary definition of a complete autopsy is an autopsy that “answers

Patel et al., *Thinking and Reasoning in Medicine*, *supra* note 93, at 731. Cue acquisition can come as early as the moment the physician shakes the patient’s hand. ELSTEIN ET AL., *supra* note 119, at 402 (citing JEROME GROOPMAN, *HOW DOCTORS THINK 12* (2007)).

¹²⁷ Adams et al., *supra* note 50, at 184.

¹²⁸ *Id.*

¹²⁹ For example, various diseases such as pneumonia, meningococemia, meningitis, influenza, tuberculosis, viral gastroenteritis, and food-borne illness call for the collection of different specimens. These specimens could include nasopharyngeal swabs, deep tracheal swabs, blood cultures, lung swabs, spinal tap for cerebrospinal fluid, stool culture, and more.

¹³⁰ For example, gram stain, bacterial culture, viral isolation, electron microscopy, and immunoassay. Moreover, some tests are mutually exclusive which requires that the examiner choose to do one at the expense of another.

¹³¹ Another reason for the prompt examination is that preliminary findings can be crucial to the ongoing police investigations, which are often conducted under time pressure. See SIMON, *supra* note 73, at 21.

¹³² Oliver et al., *supra* note 25, at 557.

¹³³ *Id.*

all the anticipated later questions.”¹³⁴

Applying the abductive framework to death investigation implies a distinction between two categories of tasks that are involved in medical examinations. Forensic pathologists are engaged in performing and interpreting concrete medical tests, such as histology, microbiology, toxicology, radiology and, of course, the autopsy itself, which has been described as a “battery of laboratory tests.”¹³⁵ These tasks constitute discrete procedures conducted in relatively known and contained informational environments. In that sense, these tasks bear a resemblance to the bench work performed across other forensic disciplines. A second cluster of tasks pertains to the meta level of the investigative process. Medical examiners are also responsible for the strategic management of the death investigation, which typically takes the form of generating the hypotheses that will be the subject of the abovementioned testing and evaluating those hypotheses in light of the results of those tests. In this latter function, forensic pathologists act in a capacity akin to that of case managers. As discussed below, this role dualism can constrain the feasibility of context management in death investigations.

IV. CONTEXT MANAGEMENT AND DEATH INVESTIGATION

The next two Parts of the Article address its core question, namely, whether and how context management can and should be applied to death investigations. It should be kept in mind that context management intervention is predicated on its potential to improve the accuracy of the investigation, and that prospect is predicated, in turn, on the proposition that death investigations entail a degree of subjectivity and an exercise of human judgment. Where there is no room for judgment, the investigative conclusion is unlikely to be affected by any sort of background information. A casual observer might be tempted to believe that medicolegal death investigation is driven entirely by objective scientific findings. Indeed, in some instances, the results of medical testing will yield objectively clear conclusions. In other situations, however, the pathological findings will be murkier: internal organs can be only slightly discolored, disfigured or congested, histological patterns can be ambiguous, and x-rays abnormalities can be blurry or faint. That means that forensic pathologists need to deploy their training, knowledge and experience in the service of exercising subjective judgment. The subjective nature of the task is captured by Timmermans’ account of disagreements between forensic pathology experts about death

¹³⁴ Adams et al., *supra* note 50, at 185.

¹³⁵ *Id.*

determinations.¹³⁶

A. *Applying the Cost-benefit Calculus to Death Investigations*

As mentioned above, it seems abundantly clear that death investigations are currently performed in an environment that is rife with medical and non-medical background information. In most forensic disciplines, especially in pattern comparison fields, such information would be ruled wholly task-irrelevant and thus would be subject to strict context management. However tempting, one must be cautious of reflexively transposing that measure to the field of death investigation. In this vein, it would be instructive to recap some of the differences between the two domains.

Recall that pattern comparisons are performed within a narrow and encapsulated space and timeframe. The informational universe is confined to two samples and little else. The task is well defined in that it boils down to drawing a discrete conclusion about a single proposition and is subjected to testing by means of a singular predetermined methodology. The task can be conveyed to the examiner in a single communication and rarely requires subsequent interactions with the investigative team. The division of labor in most forensic service providers is amenable to the masking of information in that bench analysis and case management are naturally performed by different people. Thus, it is rather convenient and virtually costless to withhold the information from the examiner while retaining it for the subsequent unmasking and for reevaluation once the examination has been performed and documented. There is also no reason for bench examiners to be involved in any discussions or triage decisions about the case before it is assigned to them.

Virtually none of these features hold true in the field of death investigation. Death investigations inhabit an expansive and fluid universe of evidence, methodologies, and investigative routes. Rather than examine a single pre-determined proposition (“did the specimens originate from the same source?”), death investigations require generating a swath of hypotheses and winnowing them down to the single correct explanation (“what are the plausible explanations for this death, and which is the correct one?”). Death investigations often entail conducting different tests using different methodologies, all chosen by the examiner to fit the particular case. Death investigation also defies the traditional division of labor that pervades

¹³⁶ See TIMMERMANS, *supra* note 52, at 30–31, 91–92, 121–22; see also Randy L. Hanzlick & Jeremy Goodin, *Mind Your Manners. Part III: Individual Scenario Results and Discussion of the National Association of Medical Examiners Manner of Death Questionnaire, 1995*, 18 AM. J. FORENSIC MED. & PATHOLOGY 228 (1997) (observing a certain diversity of interpretations in a study of ambiguous and relatively rare cases conducted with 198 members of NAME).

other forensic disciplines, in that the forensic pathologist typically serves both functions of analyst and of case manager.

The most important differences between the forensic domains revolve around the role, function, and disruptive potential of background information. First, in pattern comparison disciplines the confines of task-relevance are generally beyond dispute, are easily determined ex-ante, and apply almost uniformly to every case. In contrast, in death investigations the contours of task-relevance defy ex-ante delineation and vary dramatically from one case to the next. For example, in the scenarios discussed above, the sea currents, the failing business, and the argument on the rocks helps illuminate the death in the first scenario, but not to the second and third scenarios. By the same token, the decedent's state of depression and business dispute provides insight only in the scenario of the poisoned jeweler, and the condition of the circuitry of the electric drill helps to understand the death in the third scenario, but not in the other two. By the same token, the wide variety of background information used in death examinations—including a history of a medical condition; a syringe found by the body; and the decedent's sexual habits, mental state, and financial difficulties—could be deemed helpful in some cases, but wholly immaterial and potentially biasing in most others. In short, there seems to be no possible way to determine ex-ante the relevance of all possible pieces of information that might be instructive for the evaluation of all possible explanations of a death, both contemplated and unknown.

Second, in both domains, background information is capable of skewing the investigative outcome towards particular—at times, erroneous—conclusions. But recall that in pattern comparison disciplines, information that goes beyond the specimens has virtually no forensic value. As discussed below, in death investigations background information can also serve a vital facilitative function by enabling and guiding the generation of hypotheses, without which evidence cannot be sought and examined. Thus, nestled at the heart of the conundrum that we will soon face is the fact that background information can have contradictory effects on the death investigative task: it is potentially truth-thwarting but can also be essential for the performance of the task. To obtain a better sense of these contradictory forces, we turn to the abovementioned cost-benefit analysis.¹³⁷ En route to that analysis, we should remind ourselves that the death investigative task requires performing a wide range of reasoning processes that can typically be clustered into the three core functions of the abductive process: the generation of hypotheses, the testing of hypotheses, and the evaluation of the hypotheses' explanatory power. Assessing the costs and

¹³⁷ See *supra* Part II.C.

benefits of any intervention will require being mindful of those respective functions.

Recall that the first prong of the cost-benefit analysis focuses on the likely effect of context management on the accuracy of the death investigation. As mentioned, the routine reliance on a broad array of background information in death investigations is troubling in light of the information's unknown reliability and unclear diagnosticity. Background information—especially social history—will often originate from family members, friends, caregivers, and other people. These sources might simply be wrong or, given their possible stakes in the outcome of the investigation, might be driven by ulterior motives. The same applies to information provided by police detectives, whose work is susceptible to a host of biases and mistakes and who often have a stake in the investigative outcome.¹³⁸ Most ominously, some medical examiner offices confer with prosecutors during ongoing investigations.¹³⁹ Moreover, even if accurate, background information might appear to be more diagnostic than it really is, which could lead medical examiners to draw unwarranted inferences. By their nature, these types of information tend to pertain to rather common life circumstances—such as romantic heartbreak, trouble at work, and financial hardship—yet, they are used to infer highly infrequent events, such as homicide and suicide. As explained below, drawing low base rate conclusions from high base rate predictors can readily lead to wrong conclusions.¹⁴⁰ At the same time, much of the background information will likely be accurate and diagnostic of the conditions that led to the death. As such, this information is bound to sway the investigation towards the correct conclusion, and withholding it will reduce the accuracy of the investigative conclusion.

Thus, medical examiners are bound to be faced with a mix of accuracy-promoting and accuracy-thwarting information, and will often be incapable of distinguishing between the two. Medical examiners cannot be expected to have the tools, resources, expertise, or motivation to reliably expose all of the mistaken information. While some errors will hopefully be caught through the post mortem medical tests themselves, others are bound to go undetected and might even lead the investigation astray. To evaluate the countervailing forces, one must engage in a nuanced and informed judgment of the frequency of correct versus incorrect background information, the respective weights assigned by the examiner, and the respective inferences

¹³⁸ See SIMON, *supra* note 73, at 17–49.

¹³⁹ See TIMMERMANS, *supra* note 52, at 105, 123, 140, 164 (reporting that in office he observed that examiners would occasionally meet with prosecutors to discuss ongoing investigations and to generate a consensus about the evidence).

¹⁴⁰ See *infra* note 173 and accompanying text.

drawn by her, all of which defy quantification. In other words, it is difficult to assess whether, on balance, withholding background information will contribute to the accuracy of the investigation or hinder it.

The foregoing analysis applies rather straightforwardly to the second function of the abductive process, namely, to the performance of the autopsy and the interpreting of the other medical tests. Recall that those tasks bear a resemblance to bench work performed in other forensic disciplines that warrant context management.¹⁴¹ That analysis also seems to apply to the final phase of the abductive process, where the examiner determines which of the viable hypotheses, if any, has withstood the testing and offers the best explanation.¹⁴²

The second prong of the cost-benefit analysis concerns the effect of context management on investigative efficacy, that is, on the examiner's ability to complete the investigation and reach a conclusive determination. In this regard, we focus on the first function of the abductive process of hypothesis generation. Recall that without evidence one cannot reach an investigative conclusion, but it is plainly impossible to test every possible piece of evidence that might have a bearing on the case. Consistent with the model of abductive reasoning, death examiners solve this quandary by way of generating hypotheses. The generation of hypotheses expands the search and thus increases the likelihood that the true explanation will be explored, and it directs the examiner's attention to the collection of the suitable evidence.¹⁴³ This is where background information becomes essential to the endeavor: hypotheses cannot be generated without an inferential lead and, invariably, leads cannot be developed absent the good services of background information. As Adams and Hirsch explain:

A good medical examiner first considers the medical history, social history, and terminal circumstances and then forms hypotheses. If no single hypothesis is particularly supported by the background information, more information is probably required.¹⁴⁴

In the absence of a well-developed set of hypotheses, the investigation may never get off the ground, the correct hypothesis might not be examined, and the correct evidence might not be sought and tested.¹⁴⁵ In metaphoric

¹⁴¹ See *supra* Part I.

¹⁴² Still, as a practical matter, this issue might be moot. Even under a context management regimen, by this stage of the investigation the examiner might have already become privy to all background information via its sequential unmasking.

¹⁴³ See *supra* Part III.A; see also Croskerry, *Achieving Quality in Clinical Decision Making*, *supra* note 116, at 1200; ELSTEIN ET AL., *supra* note 119, at 153.

¹⁴⁴ Adams et al., *supra* note 50, at 185.

¹⁴⁵ Moreover, in the absence of a well-developed set of hypotheses, the investigator might be attracted toward a superficial explanation which increases the risk of an erroneous

terms, background information can be said to provide the bootstraps from which the death examiner lifts the investigative process. Thus, depriving examiners of the appropriate information could put the investigation at risk of being rendered incomplete or inconclusive.¹⁴⁶

Once again, we face a difficult tradeoff, one that could pit the first and second prongs of the cost-benefit analysis against each other. Even if we could determine that withholding background information has a positive net effect on the accuracy of the information—that is, when the biasing potential of the information exceeds its diagnostic value—that effect might be offset or even overwhelmed by the negative impact on the efficacy of the investigation. Again, assessing these countervailing forces in the abstract is virtually impossible, which leaves us in yet another difficult place.

To complete the cost-benefit analysis, we must consider the feasibility of applying context management to death investigations and any logistical burdens that it may impose on them. However important, improving the accuracy of investigations might not be justified if it is purchased at too high a cost. In this regard, we must consider the extent to which context management imposes logistical burdens, personnel requirements, coordination difficulties, extra costs, and the like.¹⁴⁷

For one, it seems inevitable that introducing context management will require additional human power devoted to each investigation, a prospect that will undoubtedly exacerbate the already tight shortage of forensic pathologists.¹⁴⁸ Recall also that context management typically takes the form

conclusion. See Lawson & Daniel, *supra* note 93, at 402. Premature closure is a common pitfall in criminal investigations. See David Carson, *Models of Investigation*, in HANDBOOK OF CRIMINAL INVESTIGATION 407 (Tim Newburn et al. eds., 2007); NAT'L POLICING IMPROVEMENT AGENCY, ASS'N OF CHIEF POLICE OFFICERS, PRACTICE ADVICE ON CORE INVESTIGATIVE DOCTRINE 100 (2d ed. 2012), <https://www.whatdotheyknow.com/request/387377/response/948818/attach/2/Core%20Investigative%20Doctrine%202012.pdf>; Carson, *The Abduction*, *supra* note 125, at 198 (stating that abductive reasoning is also viewed as a means to reduce the possibility of case construction). To complicate matters, it should be acknowledged that, while exposure to background information widens the range of hypotheses generated and thus protects against premature closure, it can also have the opposite effect of uncovering an attractive though erroneous option, thus diverting the investigation away from the pursuit of the correct hypotheses.

¹⁴⁶ It is also worth noting that background information also serves an important role in the triage decision that precedes the forensic investigation itself. In order to assume jurisdiction over a case, forensic pathologists “must . . . ascertain enough history and circumstances and may need to inspect the body to decide whether a forensic autopsy is indicated and to direct the forensic autopsy toward relevant case questions.” Peterson & Clark, *supra* note 34, at 13.

¹⁴⁷ As mentioned, the forensic pathology community views the practice as a hindrance on their ability to perform their function. See *supra* note 28 and accompanying text.

¹⁴⁸ See SYS. INFRASTRUCTURE COMM., SCI. WORKING GRP. ON MEDICOLEGAL DEATH INVESTIGATION, INCREASING THE SUPPLY OF FORENSIC PATHOLOGISTS IN THE UNITED STATES I (2012), https://www.nist.gov/sites/default/files/documents/2018/04/24/swgmd_i_increasing

of linear sequential unmasking, by which each hypothesis is tested separately before the case manager unmask the respective background information, only to be repeated for the next hypothesis. This sequential process is bound to increase coordination costs, especially given the abovementioned need to conduct the range of medical tests in short succession.¹⁴⁹

Medical examiners highlight the fact that imposing context management procedures will have a disproportionate impact on their work. They argue convincingly that the risk of error is highest in a narrow category of cases.¹⁵⁰ This disproportionality becomes even more skewed if it is agreed, as suggested below, that we should be concerned most acutely with investigations that are headed to criminal proceedings and which present the death examiner with an appreciable amount of uncertainty. This disproportionality throws into question the rationale for burdening of the entire work load of death examiners for the sake of this limited category of cases. Though, on the upside, the disproportionality also opens the door to a potential solution, as will be discussed below.

Herein lies the third difficult tradeoff. Even if it is maintained that context management passed muster under the first two prongs of the cost-benefit calculus—that is, withholding the information contributes more to an accurate conclusion than it detracts, and that net advantage is stronger than any constraints it imposes on investigative efficacy—we must still inquire whether the sum of these benefits justifies the feasibility and logistical constraints imposed by context management.

B. *The Conundrum*

The foregoing cost-benefit analysis leaves us facing three difficult tradeoffs which make for a virtually intractable and incommensurable conundrum.¹⁵¹ It may seem to the reader that this analysis did more to complexify than to clarify the issue; that would be a fair conclusion, and a very instructive one too. The question of applying context management to death investigations has baffled the forensic community for good reason: allowing an unfettered flow of background information is likely to skew some investigations away from reaching accurate conclusions, but blocking access to that information is bound to stifle and skew other investigations, while also burdening the workload in all death investigations. In sum, the

[_the_supply_of_forensic_pathologists_in_the_us.pdf](#).

¹⁴⁹ See *supra* notes 131–133 and accompanying text.

¹⁵⁰ See Oliver et al., *supra* note 25, at 553 (“Only a relatively small proportion of deaths are medical examiner or coroner cases; only a very small proportion of that small proportion display any ambiguity; in only a very small proportion of that very small proportion is that ambiguity not dealt with by some policy (as with drunk driving deaths).”).

¹⁵¹ Recall also that the task defies the feasibility of an ex-ante determination of task-relevance. See discussion *infra* Part V.A.

issue is replete with contradictory facets, most of which defy quantification and assessment. In the next Part, this Article will suggest ways that might get us partially out of this morass. Before embarking on that attempt, we should acknowledge two features of the conundrum that make it particularly difficult to solve.

First, it should be noted that to a large extent, the controversy is stirred primarily by one type of background information: social history.¹⁵² Recall that social history is used widely in death investigations and is frequently instrumental to the reaching of investigative conclusions.¹⁵³ But relying on social history tends to be far removed from the scientific core of forensic pathology and its reliability is often difficult to ascertain. Moreover, social history tends to offer a fertile basis for the spurring of conjectural inferences.¹⁵⁴ In sum, the conundrum is exacerbated by the routine reliance of death investigations on information that can be instrumental to the successful completion of the investigation, but also relatively unreliable and of questionable diagnosticity.

Second, to a large extent, the roots of the conundrum stem from an unfortunate mismatch between the dual roles that forensic pathologists play in the service of public health and the criminal process. The mismatch is disconcerting in light of the fact that non-medical background information is used mostly for the purpose of making manner of death determinations, which lie at the heart of the public health function. It must not be overlooked that manner of death determinations have no rightful place in criminal proceedings. As stated above, in their public health capacity, forensic pathologists serve as the effective final decision maker and are free to use low standards of proof in reaching their decisions, whereas in the criminal domain the final decision making authority is vested in the jury and should be made using the high threshold of beyond a reasonable doubt.¹⁵⁵

Recall that the critical manner of death determination—classifying a death as a homicide—is strictly for the jury to make. As mentioned, any statement by the expert that goes beyond the cause of death determination amounts to a violation of the province of the jury and thus should be deemed unconstitutional. Such statements should be barred also because they do not meet the criteria for admissibility as expert testimony, and because of the risk that they will be double-counted by the jury.¹⁵⁶ This results in a sad

¹⁵² See *supra* Part II.A.

¹⁵³ Social history was instrumental in distinguishing among the possible conclusions in the abovementioned scenarios of death by drowning, cyanide poisoning, and electrocution. See *supra* notes 51–56 and accompanying text.

¹⁵⁴ See *infra* notes 173–174 and accompanying text.

¹⁵⁵ See *supra* notes 72–74 and accompanying text.

¹⁵⁶ See *supra* notes 71–72 and accompanying text.

irony: criminal proceedings are subjected to the potential ill effects of non-medical background information, which is used primarily to reach conclusions that are superfluous—if not outright inimical—to the criminal process.

V. IN SEARCH OF POSSIBLE SOLUTIONS

It is now time to attempt to seek a way out of this conundrum. One might be tempted to believe that the problems could be averted by limiting the scope of death investigations to determinations of cause of death, which tend to be based more directly on medical history and death scene findings. Indeed, doing away with manner of death determinations would likely reduce the conjectural aspects of death investigation and thus increase the accuracy of cause of death determinations. But at the same time, this measure would severely undermine the public health function of death investigation, and is thus bound to yield a negative net societal benefit. Another tempting suggestion is to separate the two death certification functions, so that risky background information will be withheld during the determination of the cause of death, and be unmasked for the manner of death determination. From a practical point of view, this proposal will be difficult to implement. While the death investigative function does indeed produce two separate determinations, the process itself does not unfold in two separate steps. Rather, hypotheses are generated and tested iteratively in toto. Repeating the process, once for each determination, is not only very costly, but is also bound to result in poor investigative findings, not least because one gets to conduct only one good autopsy. Moreover, both of the foregoing proposed solutions will likely be received by the medical examination community as a severe, even debilitating, interference with their ability to perform their job. This could readily result in resentment that is likely to compromise compliance.

A more promising way to alleviate the conundrum is to mend the legal side of the equation, namely, by barring all statements concerning manner of death determinations from the criminal process. Indeed, this position has been adopted by some courts across the U.S., as manifested, for example, by the Iowa Supreme Court's decision to overturn the conviction in the *Tyler* case.¹⁵⁷ Still, there are three difficulties with this approach, which render it an incomplete solution. First, it has been endorsed in only about one-half of American jurisdictions. Manner of death determinations are admitted regularly into evidence in the other half of jurisdictions, a state of affairs that is lamented and decried by the legal, human factors, and forensic pathology

¹⁵⁷ See *State v. Tyler*, 867 N.W.2d 136, 143–44 (Iowa 2015).

communities alike.¹⁵⁸ In light of this uniformity of discontent, lawmakers and judges in those jurisdictions are strongly encouraged to alter this legal situation and purge the criminal process of all references to manner of death determinations. In the same vein, it would also be helpful if forensic pathologists declined to testify about manner of death determinations.¹⁵⁹ Second, this proposition does not address cases in which the same item of background information influences both cause of death and manner of death determinations, as seen for example in the case of Baby Tyler.¹⁶⁰ Third, the impact of forensic science findings on the legal system goes well beyond courtroom adjudication. Even if death investigation findings are never exposed to the jury, they are bound to play a role in upstream decision making, such as by police detectives, prosecutors, and perhaps also judges. The solution, then, cannot be entrusted entirely with the court system. The next best option is to devise a framework that focuses on the investigative process and seeks to provide guidance as to when and how context management should be applied and when it should not.

A. *The Proposed Framework: Two Dimensions of Differentiation*

The proposed framework is premised on the intersection of two, admittedly imperfect, dimensions of differentiation: case differentiation and information differentiation. Case differentiation is intended to limit context management just to the most acute cases, and information differentiation is intended to minimize the informational restrictions within that small category of cases. This framework is conceived with the objective of promoting accuracy in the acute cases while limiting the burden imposed on the profession to a minimum.

First, recall the medical examiner community's objection call for differentiating the discipline of death investigations from pattern comparison disciplines.¹⁶¹ That sensible approach ought to be taken one step further. Corrective measures might need to be differentiated not just between entire forensic fields, but also among types of cases within those fields. The fault line that this Article proposes runs along the boundary between non-obvious cases that are forecasted to be the subject of criminal proceedings and all

¹⁵⁸ See, e.g., Oliver et al., *supra* note 25, at 552.

¹⁵⁹ There is reason to suspect that forensic pathologists might feel reluctant to turn down pressure from prosecutors to testify. Medical examiners face pressure from law enforcement agencies and may face consequences for refusing to succumb. See Melinek et al., *supra* note 45, at 94. As described by Timmermans, medical examiner offices and law enforcement authorities share an "organizational ecology." See TIMMERMANS, *supra* note 52, at 159, 165, 170, 182–83, 191, 214, 253–59.

¹⁶⁰ See Tyler, 867 N.W.2d at 148–49.

¹⁶¹ See Oliver et al., *supra* note 25, at 549; Lockhart & Satya-Murti, *supra* note 26, at 1537.

other cases. It seems fair to say that the need for accuracy is particularly acute in criminal cases. True, death determinations matter also in non-criminal cases, whether to insurance companies, workers' compensation programs, and perhaps other stakeholders. But nowhere are the costs of an investigative error as high as they are in the criminal domain, whether the error results in a conviction of an innocent person or a guilty person who is escaping punishment. Moreover, criminal law prioritizes false negatives over false positives,¹⁶² which means that it is more amenable to the risk of incomplete or inconclusive death investigations. Finally, in most criminal investigations, the state has an effective monopoly on the death investigation, which limits the prospect of errors being detected and corrected by third parties.¹⁶³

The category of acute cases shrinks even further if we focus only on ones that present the death examiner with an appreciable amount of ambiguity. In many instances, including criminal cases, the death determination is rather obvious from outset. This is true, for example, when the decedent was found riddled with bullet holes or hanging near a verifiable suicide note. Even though the death examiner is obliged to perform a complete autopsy and full examination in all cases, the diagnostic demands from these cases is minimal, as is the risk of the conclusion being skewed by background information. It should be noted that the category of acute cases should expand to accommodate a small group of criminal cases that are particularly sensitive and susceptible to background information, including the suspicious death of a child, deaths in custody, and deaths that result from police-involved shootings.

The proposed differentiation leaves us with a very small category of cases. Medical examiner offices tend to accept jurisdiction in between one third to one half of the cases referred to them, and of that group, only about five percent will be determined to be criminal.¹⁶⁴ According to one

¹⁶² See *In re Winship*, 397 U.S. 358, 374 (1970) (Harlan, J., concurring).

¹⁶³ One might be concerned with the effect of an erroneous conclusion on the accuracy of the public health statistics. Oliver and colleagues explain, however, that the small number of ambiguous deaths does not bear an appreciable effect on the statistical analysis: "Thus, if every single case where the manner is disputed had been incorrectly determined by the medical examiner or coroner's pathologist, it would be statistically irrelevant. From the perspective of the purpose of manner determination, it simply *does not matter* whether or not some individual case in litigation is determined incorrectly." Oliver et al., *supra* note 25, at 553 (emphasis in original).

¹⁶⁴ See, e.g., ANDREW BAKER, HENNEPIN CTY. MED. EXAM'RS OFFICE, HENNEPIN CTY. MED. EXAM'R 2016 ANNUAL REPORT 11, 12 (2017), <https://www.hennepin.us/~media/hennepinus/residents/public-safety/documents/me-annual-report-2016.pdf?la=en>; PATTY HAYES & RICHARD HARRUFF, KING CTY. MED. EXAM'RS OFFICE, KING CTY. MED. EXAM'R ANNUAL REPORT 2016 11, 12 (2017), <https://www.kingcounty.gov/depts/health/examiner/~media/depts/health/medical-examiner/documents/King-County-Medical-Examiner-2016-Annual-Report.ashx>; GLENN WAGNER, CTY. OF SAN DIEGO DEP'T OF THE

admittedly rough estimation, only about five percent of the criminal cases will present the examiner with an ambiguous or contestable investigation.¹⁶⁵ In all, the category of nonobvious criminal deaths amounts to about one in every 400 deaths that are subjected to medical examination. As mentioned above, imposing context management on all death investigations for the sake of these few acute cases seems unduly burdensome.¹⁶⁶ But this disproportionality can be approached from a different angle. The upshot of the relative scarcity of the acute cases is that we can target context management to just these cases and thus impose a minimal burden on the overall workload of death examiners. Given NAME's recommendation that an examiner perform no more than 250 autopsies per year,¹⁶⁷ this would amount to about one case in every nineteen months. True, the cautious examiner will probably elect to approach more cases as potentially sensitive, but even such a prudent approach should not produce a case of this nature more frequently than once in every few months.

Thus, it is proposed that the triage that is already conducted for determining jurisdiction,¹⁶⁸ will be used also to funnel the incoming cases into two different treatments. The vast majority of cases will be designated to be handled in the prevailing manner, that is, without any formal context management requirement (though, as discussed below, medical examiners are encouraged to engage voluntarily and privately in self-administered attempts to soften the possible effect of background information in all cases that come their way). Cases that appear ex-ante to be criminal in nature and wherein the occurrence of death seems to have been brought about by nonobvious circumstances should be marked by a clear label, say, *precaution alert* and be designated for special treatment. Whenever possible, the triage should be performed by someone other than the examiner who will be assigned to the case.

But even within this category of cases, we need to be attuned to the efficacy of the investigative process, as limiting access to all background information will likely stifle a large proportion of those cases. Hence, the second dimension of differentiation is between types of information that should be shared with death examiners and types that are best withheld from

MED. EXAM'R, 2016 ANNUAL REPORT 1, 62 (2017), <https://www.sandiegocounty.gov/content/dam/sdc/me/docs/SDME%20Annual%20Report%202016.pdf>.

¹⁶⁵ E-mail from Andrew Baker, Former President, Nat'l Ass'n of Medical Exam'rs, to the author (July 26, 2018 4:33 PM) (on file with author).

¹⁶⁶ See Oliver et al., *supra* note 25, at 558 and accompanying text.

¹⁶⁷ AD HOC COMM. FOR THE PREPARATION OF THE 180-DAY STUDY, NAT'L ASS'N OF MEDICAL EXAM'RS, PRELIMINARY REPORT ON AMERICA'S MEDICOLEGAL OFFICE 4 (2004), <https://www.ncjrs.gov/pdffiles1/nij/grants/213421.pdf>.

¹⁶⁸ See *supra* notes 37–38 and accompanying text.

them. Recall the four-way classification of background information.¹⁶⁹ Medical history is typically reliable, highly relevant, and diagnostic of the decedent's medical condition, both by way of pointing the forensic pathologist towards likely causes of death and by way of excluding non-viable explanations. Second, findings gleaned from the death scene will often be essential for grasping the basic facts about the occurrence of the death, whether it concerns the exact position of the body, the blood spatter, the rope wrapped around the decedent's neck, the syringe, the knife, or the empty medicine container. True, death scene findings can be susceptible to over-interpretation,¹⁷⁰ though when made in a professional and cautious manner, they will tend to be reliable. It follows that medical history and death scene findings will invariably promote reaching the correct investigative conclusion, and that these types of information should not normally be withheld from examiners.

Reliance on background information becomes more complicated when it comes to the remaining two categories of background information. Recall that the third category of social history pertains to a wide range of life circumstances, such as the decedent's professional hazards, risk taking behavior, sexual preferences, alcohol and drug use, social circles, financial hardship, employment status, love life, travel history, recent intake of unfamiliar foods, or encounters with exotic animals.¹⁷¹ Death examiners might also incorporate the social history of other protagonists, such as family members, former and current lovers, roommates, business partners, nemeses, and the like. As mentioned, social history will often be instrumental in reaching investigative conclusions,¹⁷² but it also originates from suspicious pedigree. It is typically derived from sources within the decedent's inner circle and who may have a stake in the investigative outcome, and it is far removed from the scientific core of forensic pathology. Perhaps more than other types of background information, social history also lends itself more readily to conjectural inferences. As suggested by Deborah Davis and William Follette, people tend to draw unwarranted inferences about rare events from commonly observed evidence, a phenomenon labeled *intuitive profiling*.¹⁷³ The tendency to over-interpret the prevalence of extant

¹⁶⁹ See *supra* Part II.A.

¹⁷⁰ For example, the death scene could be manipulated by the perpetrator, and the death could have left no visible signs. One must also be careful not to over-interpret death scene findings. See Deborah Davis & William C. Follette, *Rethinking the Probative Value of Evidence: Base Rates, Intuitive Profiling, and the "Postdiction" of Behavior*, 26 L. & HUM. BEHAV. 133, 137–58 (2002).

¹⁷¹ See *supra* Part II.A.

¹⁷² See Adams et al., *supra* note 50 and accompanying text.

¹⁷³ For example, people commonly infer that if people who murder their spouses were also unfaithful to them, then people who are unfaithful to their spouses are likely to murder

information is captured also by Kahneman and Tversky's representative heuristic.¹⁷⁴

Similar, if not more grave, concerns apply to the fourth category of information from the police investigation. Recall that information from the police investigation includes facts such as a suspect's confession, a suspect's criminal history, information provided by an eyewitness about the criminal event, an eyewitness' identification of the suspect at a lineup, results of other forensic examinations, the prevailing investigative hypothesis, and the expected impact of the forensic examination on the investigative outcome.¹⁷⁵ This type of information typically lies well beyond the expertise of death examiners, which renders them incapable of assessing its veracity. And, as articulated by the Iowa Supreme Court in the *Tyler* case, relying on such information raises a host of legal objections.¹⁷⁶ In sum, the proposed differentiation suggests that forensic pathologists should have relatively unlimited access to the decedent's medical history and findings from the death scene, but be kept temporarily blinded of the social history and information from the police investigation.

B. Handling "Precaution Alert" Cases

Cases designated as belonging to the narrow category of *precaution alert* should be approached with extra sensitivity to the prospect of error, particularly to the risk of being influenced by background information. Following are some specific suggestions for handling *precaution alert* cases:

- The forensic pathologist should inform the detectives and the medicolegal scene investigator of the *precaution alert* status of the case and its sensitivity, the risk of error and bias, and the need for controlling background information.
- All information flowing to the forensic pathologist should be funneled through the medicolegal scene investigator.
- The forensic pathologist should brief the medicolegal scene investigator on the types of information that should be temporarily

them. This inference has an intuitive appeal that might sway an investigator or juror upon learning that a man suspected of killing his wife had previously been unfaithful to her. But, as demonstrated by Davis and Follette, the base rate of men who are unfaithful is rather high (to the tune of twenty-six percent), and the rate of men who murder their wives is very low (to the tune of 240 per million based on an assumption of sixty years of marriage at four per million per year), which makes the unfaithful conduct a poor prognostic of the suspect's culpability (yielding a probability of murder given unfaithful behavior = .000923). See Davis & Follette, *supra* note 170, at 137–58.

¹⁷⁴ See Daniel Kahneman & Amos Tversky, *Subjective Probability: A Judgment of Representativeness*, 3 COGNITIVE PSYCHOL. 430, 430–54 (1972).

¹⁷⁵ See Jeanguenat & Dror, *supra* note 46, at 4.

¹⁷⁶ See *supra* notes 75–79 and accompanying text.

withheld.

- In case of any doubt concerning the masking of information, the medicolegal scene investigator should seek the opinion of a death examiner who is not involved in the case.
- With few exceptions, the forensic pathologist should have access to all available medical history and findings from the death scene.
- With few exceptions, information pertaining to the social history of the decedent should be masked from the forensic pathologist.
- With few exceptions, information pertaining to the police investigation should be masked from the forensic pathologist. This type of information will typically include facts such as a suspect's confession, a suspect's criminal history, an eyewitness's statements about the criminal event, an eyewitness' identification of the suspect at a lineup, results of other forensic examinations, the detectives' investigative hypotheses, and the expected impact of the forensic examination on the investigative outcome.¹⁷⁷
- Information that was masked should be conveyed to the death examiner upon the completion of the respective test. At various points, the forensic pathologist and the medicolegal scene investigator should confer to ensure that the relevant information has been unmasked.
- Throughout the investigation, the forensic pathologist should maintain a meticulous record of the procedure, including the exposure to and the masking of background information, the tests performed and their results, viable hypotheses under consideration and the emerging conclusions.
- Police officers should not be present in the autopsy room in *precaution alert* cases, particularly in cases involving police related deaths. Police detectives should make themselves available to take calls from the forensic pathologist for the sole purpose of responding to queries from the pathologist. Detectives should also be available to receive updates from forensic pathologists, especially under exigent circumstances, such as when the autopsy results are deemed essential to protect lives or to help the police conduct a hot pursuit.
- Forensic pathologists who have doubts about their judgments and conclusions or who feel that the background information was not properly managed would be encouraged to request that the testing and interpretation of results be performed by a peer or colleague. Whenever possible, the peer consultant should be blinded to the

¹⁷⁷ For an example of an exception, one could imagine that a witness stated to the police that a suspect was seen approaching the death scene carrying a certain poison that would not normally have been included in the toxicology tests.

background information as well as to the death examiner's theories, leanings, and investigative conclusions.

- *Precaution alert* cases should be submitted for verification by a fellow death examiner (peer review). Whenever possible, the peer consultant should be blinded to the background information as well as to the death examiner's theories, leanings, and investigative conclusions.
- Personnel participating in the death examination should be insulated from any request, demand, or expectation conveyed by any agency or stakeholder.
- Prosecutors should never be involved in or briefed on ongoing death investigations and should not be permitted to communicate with death examination personnel on any such investigation.
- Any pressure to provide a particular investigative conclusion should be rebuffed and reported.
- Any deviation from these procedures should be documented and explained in the investigative report.
- Medical examiner offices should inculcate a culture of frank scientific inquiry to ensure unfettered exchange of opinions in the course of peer consultations and peer review.

C. *Open-Mindedness and Self-Masking*

One of the obvious features of the proposed framework is that it is designed to be executed and administered at the local level of the medical examiner's office and even of individual examiners. The success of such a self-administered endeavor relies on the acceptance and internalization by the forensic pathology community of the potential ill-effects of exposure to background information. As mentioned, some voices in the community express a certain skepticism towards the mere proposition that death investigation is susceptible to the effect of cognitive bias.¹⁷⁸ But recall that cognitive bias is not the only route via which exposure to background information can influence investigative outcomes. That influence can readily occur whenever an investigator consciously and deliberately incorporates background information into the decision mix, typically in the honest belief that it is relevant, reliable and diagnostic. Thus, even if the skepticism were warranted, it would not obviate the need to introduce context management procedures to the field of death investigation.

Moreover, it must be emphasized that skepticism towards the prospect of bias rests on shaky empirical grounds. True, the adverse effects of cognitive bias have not been demonstrated experimentally in the specific practice of death investigation. But that lack of research is hardly proof that

¹⁷⁸ See, e.g., Oliver et al., *supra* note 25, at 556–57.

the risk of cognitive bias is non-existent. Rather, it is best understood as stemming from daunting methodological and logistic constraints that all but preclude any such endeavor. Laboratory studies are bound to be hampered by the immense difficulty of simulating the complex environment of death examinations, and naturalistic studies in the real world are fraught with ethical and pragmatic difficulties, and undermined by the lack of access to the ground truth.

It should be clear by now that the forensic pathology community's resistance to a blanket imposition of context management to the field seems warranted. But this agreement is based on an appreciation of the high costs and unclear benefits associated with such a policy. That, however, is not the same as agreeing with the rejection of the prospect of cognitive pitfalls in this vital line of work, whether in the form of relying consciously on non-medical background information or in the form of unconscious bias. There is good reason to doubt that any professional group is immune to the errors and systemic biases that have been documented so consistently in scores of research studies conducted across vast arrays of experimental paradigms and tested on a wide variety of both lay¹⁷⁹ and professional populations.¹⁸⁰

The forensic pathology community's rejection of the prospect of cognitive bias seems odd given the open and broad acknowledgement of the risk of bias in medical decision making—the mother of forensic pathology. That frank recognition was best articulated in the monumental report *To Err is Human: Building a Safer Health System*, issued in 1999 by the Institute of Medicine.¹⁸¹ Cognitive biases have featured prominently across a variety of medical fields,¹⁸² notably, in the work of Jerome Groopman,¹⁸³ Lucian Leape and colleagues,¹⁸⁴ Mark Graber and colleagues,¹⁸⁵ Pat Croskerry,¹⁸⁶ and Jesse Pines.¹⁸⁷ Tellingly, context bias has been demonstrated within the subfields

¹⁷⁹ See Dror et al., *When Emotions Get the Better of Us*, *supra* note 82, at 806–08; Miller, *supra* note 82, at 409.

¹⁸⁰ See Charman et al., *supra* note 82, at 198; Fraser-Mackenzie et al., *Cognitive and Contextual Influences*, *supra* note 82, at 152; Kassin, *The Forensic Confirmation Bias*, *supra* note 82, at 43, 45–48.

¹⁸¹ INST. OF MED., *TO ERR IS HUMAN: BUILDING A SAFER HEALTH SYSTEM* (Linda T. Kohn et al. eds., 1999).

¹⁸² Penny Whiting et al., *Sources of Variation and Bias in Studies of Diagnostic Accuracy: A Systematic Review*, 140 *ANNALS INTERNAL MED.* 189, 189–202 (2004).

¹⁸³ JEROME GROOPMAN, *HOW DOCTORS THINK* (2007).

¹⁸⁴ Lucian L. Leape, *A Systems Analysis Approach to Medical Error*, 3 *J. EVALUATION CLINICAL PRAC.*, 213, 213–22 (1997); Lucian L. Leape & Donald M. Berwick, *Five Years After to Err is Human: What Have We Learned?*, 293 *J. AM. MED. ASS'N* 2384, 2384–90 (2005).

¹⁸⁵ Mark Graber et al., *Reducing Diagnostic Errors in Medicine: What's the Goal?*, 77 *ACAD. MED.* 981, 981–92 (2002); Berner & Graber, *infra* note 187.

¹⁸⁶ Croskerry, *The Importance of Cognitive Errors*, *supra* note 125.

¹⁸⁷ See Pines, *supra* note 124. It is worth noting that the error rate in clinical diagnostic

of medical pathology,¹⁸⁸ and surgical pathology and cytology.¹⁸⁹

Due to its unconscious nature, cognitive bias can distort investigative conclusions even when the death examiner is acting in an honest and professional manner. It thus behooves the forensic pathology community to relax the unwavering trust in the conclusions of its work and consider an approach that is open to the prospect of self-doubt, a core principle of the scientific method. Even when dealing with cases that do not fall into the category of precaution alert, forensic pathologists should be encouraged to seek feasible and creative ways to manage their exposure to background information in a voluntary and private fashion. As noted in the work of Timmermans, while conducting an autopsy under the suspicion of a heart failure, some death examiners would sequence the autopsy such that the heart dissection (the most likely locale of organ failure) would be kept for last, as a means of forcing themselves to pay close attention to all other organs.¹⁹⁰

As a small scale example, a physician friend of the author follows three self-made and self-administered techniques to manage her own exposure to both medical and non-medical background information. First, when consulted for a second opinion, she instructs patients to withhold the prior physician's opinion until she has completed the exam and informed them of her diagnosis and treatment plan. Second, she refrains from reading the patients' home address and any other non-medical information. Third, she blinds herself to all aspects of her remuneration, such as the patients' type of

decisions is hardly negligible—estimated at about fifteen percent, of which eighty percent of errors are attributed to physician's thought processes (as opposed to organizational errors, technical errors, or patient-related errors). See Anne M. Stiggelbout et al., *Medical Decision Making*, in 2 THE WILEY BLACKWELL HANDBOOK OF JUDGMENT & DECISION MAKING 775, 777 (Gideon Keren & George Wu eds., 2015); Eta S. Berner & Mark L. Graber, *Overconfidence as a Cause of Diagnostic Error in Medicine*, 121 AM. J. MED. S2, S2–S23 (2008); Troyen A. Brennan et al., *Incidence of Adverse Events and Negligence in Hospitalized Patients: Results of the Harvard Medical Practice Study I*, 324 NEW ENG. J. MED. 370, 370–76 (1991); Pat Croskerry & Geoff Norman, *Overconfidence in Clinical Decision Making*, 121 AM. J. MED. S24, S24–S29 (2008). As stated by Lawson and Daniel, “It seems that doctors do not often stumble because of their ignorance of clinical facts. Instead, they miss diagnoses because they subconsciously fall into any number of cognitive ‘traps.’” Lawson & Daniel, *supra* note 93, at 402.

¹⁸⁸ See Frederick A. Meier, *The Landscape of Error in Surgical Pathology*, in ERROR REDUCTION AND PREVENTION IN SURGICAL PATHOLOGY 3–26 (Raouf E. Nakhleh ed., 2015); Andrew A. Renshaw & Edwin W. Gould, *Measuring Errors in Surgical Pathology in Real-life Practice: Defining What Does and Does Not Matter*, 127 AM. J. CLINICAL PATHOLOGY 144, 144–52 (2007); Andrew A. Renshaw et al., *Results of Multiple-Slide, Blinded Review of Papanicolaou Slides in the Context of Litigation: Determining What Can Be Detected Regularly and Reliably*, 105 CANCER 263, 263–69 (2005).

¹⁸⁹ See Raouf E. Nakhleh et al., *Interpretive Diagnostic Error Reduction in Surgical Pathology and Cytology: Guideline from the College of American Pathologists Pathology and Laboratory Quality Center and the Association of Directors of Anatomic and Surgical Pathology*, 140 ARCHIVES PATHOLOGY & LABORATORY MED. 29, 29–40 (2016).

¹⁹⁰ See TIMMERMANS, *supra* note 52, at 59.

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medical insurance or other form of payment. As this friend explains, these self-blinding rules protect her from the risk of being influenced by opinions of other physicians, the socio-economic status of the patient, or her financial stake in providing the care. Given the enormity of the impact of death investigations on people's fates, it would be heartening to see greater openness and sensibility to such measures in the field of forensic pathology.

VI. CONCLUSION

The question of exposure to background information in death investigations raises an intricate web of difficult questions and tough quandaries. Failing to find a neat and hermetic solution, this Article has proposed an admittedly rough framework that inevitably relies on contestable assumptions, debatable classifications, and ex-ante judgments that might turn out to be mistaken. But seeking second best solutions seems preferable to settling for none. To be sure, if the framework is ever put into effect, it is bound to gain much from the insight and experience borne by reflective practice. At a minimum, the framework will hopefully facilitate the ongoing conversation within the forensic science community and bring us closer to the elusive balance among the accuracy, efficacy and feasibility of death investigations.