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**PROPOSAL TO REVERSE THE VIEW OF A CONFESSION:  
FROM KEY EVIDENCE REQUIRING CORROBORATION  
TO CORROBORATION FOR KEY EVIDENCE**

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*Both case law and legal literature have recognized that all, and not just clearly statistical, evidence is probabilistic. Therefore, we have much to learn from the laws of probability with regard to the evaluation of evidence in a criminal trial. The present Article focuses on the confession. First, we review legal and psychological literature and show that the probability of a false confession and, consequently, a wrongful conviction, is far from insignificant. In light of this, we warn against the cognitive illusion, stemming from the fallacy of the transposed conditional, which is liable to mislead the trier of fact in evaluating the weight of a confession. This illusion in evaluating the weight of a confession occurs when the trier of fact believes that, if there is only a low probability that an innocent person would falsely confess, then there is also only a low probability of innocence in each and every case where a person does confess guilt. The surprising truth is that even if there is only little doubt regarding the credibility of confessions in general, in some cases, this raises considerable doubt regarding the certainty of a conviction. We demonstrate this through the case of George Allen, who was convicted in 1983 of the rape and murder of Mary Bell. This is an example of a case in which the fallacy reaches extreme proportions, since nothing connected the accused to the crime, apart from his confession.*

*Following this, we turn to a Bayesian calculation of probability for evaluating the weight of a confession. First, we discuss the standard of proof required for a criminal conviction. We show that the optimistic expectation of the U.S. Supreme Court in *Kansas v. Marsh* regarding the rate of false convictions (0.027%) is inconsistent with Blackstone's famous approach, accepted by many judges, whereby it is better for ten criminals to be acquitted than for one innocent to be convicted (9.09% wrongful convictions). We then demonstrate the untenability of the optimistic estimate that it is possible to convict with a relatively low probability of guilt (approximately 91%) without paying a very heavy price in wrongful convictions. Considering this, we explain why we prefer the ratio proposed by Thomas Starkie, whereby it is better for a hundred criminals to be acquitted than for one innocent to be convicted. The probabilistic calculation that we perform based on this threshold of 1:100 dictates a new and surprising conclusion that calls for a significant*

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*reversal in how we view the confession: a confession should only be treated as corroboration of other solid evidence—if it exists—and not as key evidence for a conviction. Furthermore, even if we suffice with Blackstone’s familiar threshold of 1:10, the strength of the other evidence against the suspect, apart from the confession, must still be at least a balance of probabilities (51%) in order to achieve proof of guilt beyond a reasonable doubt, the burden required for a conviction. Given the real danger of convicting innocents, we call on law enforcement officials to refrain from interrogating a person, with the aim of extracting a confession, when there is no well-established suspicion against this person, and even when the law allows for such an interrogation. Moreover, we call on legislatures to amend the law so that such an interrogation would not be possible, and to set forth that a confession is insufficient to constitute the sole, or key, evidence for a conviction, but it can be used only as corroboration for other key evidence—if it exists.*

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## I. INTRODUCTION

Both case law and legal literature have recognized that all, not just clearly statistical, evidence is probabilistic.<sup>1</sup> Given the disclosure, in recent decades, of numerous cases worldwide,<sup>2</sup> there is no longer any reason to doubt that people sometimes confess to crimes that they have not committed and are even convicted on the basis of those confessions. In Parts II and III of this Article, we review the legal and psychological literature regarding false confessions and show that the probability of a false confession (and of a wrongful conviction based on it) is far from insignificant. Follow-

1. See *infra* note 197 and accompanying text.

2. See Boaz Sangero, *Miranda Is Not Enough: A New Justification for Demanding “Strong Corroboration” to a Confession*, 28 CARDOZO L. REV. 2791 (2007).

ing this, we examine what may be learned from probability theory with regard to the weight of the confession (Parts IV–VIII).

In a different article, we have warned against the cognitive illusion stemming from the fallacy of the transposed conditional in evaluating the weight of forensic as well as other types of evidence, when relying solely on this evidence for the purposes of a conviction.<sup>3</sup> In the legal context, this fallacy has been referred to as the “prosecutor’s fallacy.”<sup>4</sup> Despite the fact that statistical principles of medical diagnosis lead medical practitioners to take precautions against this fallacy, many still fall into its trap.<sup>5</sup> The need to avoid this fallacy has been identified in case law only in certain situations, primarily with regard to paternity tests,<sup>6</sup> the possibility of a random DNA match in a criminal trial,<sup>7</sup> and drug tests in the workplace.<sup>8</sup> However, in general, and particularly with regard to non-scientific evidence, courts are unaware of this fallacy. The significance of the fallacy is that the trier of fact errs by substituting the probability of the evidence given innocence (a probability that assumes what actually needs to be proven)<sup>9</sup> for the transposed conditional probability—the probability of innocence given (and despite) the evidence—which is the probability relevant to the legal decision. In Bayesian language,<sup>10</sup> in order to determine the likelihood of guilt or innocence given evidence that may be erroneous, one must take into consideration the prior odds of guilt—i.e., the probability of guilt without the key evidence against the suspect.

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3. Boaz Sangero & Mordechai Halpert, *Why a Conviction Should Not Be Based on a Single Piece of Evidence: A Proposal for Reform*, 48 JURIMETRICS J. 43 (2007). Regarding the fallacy of the transposed conditional, see Persi Diaconis & David Freedman, *The Persistence of Cognitive Illusions*, 4 BEHAV. & BRAIN SCI. 317, 333 (1981). An explanation of the fallacy of the transposed conditional follows *infra* Part IV.

4. William C. Thompson & Edward L. Schumann, *Interpretation of Statistical Evidence in Criminal Trials: The Prosecutor’s Fallacy and the Defense Attorney’s Fallacy*, 11 LAW & HUM. BEHAV. 167 (1987).

5. Amos Tversky & Daniel Kahneman, *Evidential Impact of Base Rates*, in JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES 153–54 (Daniel Kahneman, Paul Slovic & Amos Tversky eds., 1982). Moreover, in a German study, half of all counselors surveyed mistakenly believed that a positive HIV test result meant a 100% certainty that a subject from a low-risk group was a carrier. Most counselors mistakenly believed that a repeat HIV test negates all possibility of a false positive. Gerd Gigerenzer, Ulrich Hoffrage & Axel Ebert, *AIDS Counselling for Low-Risk Clients*, 10 AIDS CARE 197, 207 (1998).

6. *State v. Spann*, 617 A.2d 247, 254 (N.J. 1993).

7. *Brown v. Farwell*, 525 F.3d 787, 795 (9th Cir. 2008).

8. *Ishikawa v. Delta Airlines*, 343 F.3d 1129, 1131 (9th Cir. 2003); *Gonzalez v. Metro. Transp. Auth.*, 174 F.3d 1016, 1023 (9th Cir. 1999); see also Darold T. Barnum & John M. Gleason, *The Credibility of Drug Tests: A Multi-Stage Bayesian Analysis*, 47 INDUS. & LAB. REL. REV. 610 (1994).

9. See *Spann*, 617 A.2d at 252 (“[T]he trier of fact cannot convict a defendant of a crime through a formula that assumes the defendant committed the crime.”).

10. For an explanation of Bayes’ Theorem, see *infra* Parts VI & VII.

These prior odds derive from the remaining evidence in the case at hand, including exculpatory evidence. The lower the prior odds, the more extreme the cognitive illusion.

In the present Article, we focus on the confession. One possible case in which the prior odds would be very low is when an interrogation is initiated as a result of some suspicion, and the suspect indeed confesses. Later, it becomes clear that the original suspicion was unfounded, so that apart from the confession, there is nothing to link the accused to the criminal offense.<sup>11</sup> Another example occurs when the police take “a shot in the dark,” interrogating a person suspected of one crime with regard to a different offense, without any objective suspicion linking this person to the other crime.<sup>12</sup> When the suspect confesses to the second offense, his confession is the only significant piece of evidence against him. As we will see shortly, in such cases, the cognitive illusion reaches extreme proportions: when a conviction ensues, in most cases of this type it will be a wrongful conviction.

In Parts V and VI we demonstrate this through the case of George Allen, who was convicted in 1983 of the rape and murder of Mary Bell in St. Louis.<sup>13</sup> Allen was taken in for questioning by mistake when he was stopped by police and was unable to produce a photo ID in order to prove that he was not another individual who was wanted in the murder. By the end of his interrogation he had confessed to the crime and he was subsequently put on trial. George Allen was sentenced to life imprisonment for the murder, without any possibility of parole for a period of fifty years, and an additional forty-five years for rape and burglary. Had the danger of the fallacy of the transposed conditional been seriously considered in this case, it would have likely led to a determination that there was a very high probability that George Allen was innocent.

In Parts VII and VIII, we go on to analyze the confession in cases where the cognitive illusion is not as extreme. Current American law allows for a conviction based solely on a confession, whereas corroboration is required only to prove the actual occurrence of the crime.<sup>14</sup> In a previous article, one of the authors has proposed that this is not sufficient and that there should be a statutory re-

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11. In our opinion, such was the case of George Allen. *See State v. Allen*, 684 S.W.2d 417 (1984); *infra* Parts VI-VII; *see also* Geri L. Dreiling, *Best Evidence*, RIVERFRONT TIMES, July 2, 2003, <http://www.riverfronttimes.com/2003-07-02/news/best-evidence>.

12. In our opinion, such was the case of David Allen Jones. *See David Allen Jones*, THE INNOCENCE PROJECT, <http://innocenceproject.org/Content/191.php> (last visited Jan. 2, 2011).

13. *See Allen*, 684 S.W.2d at 417; Dreiling, *supra* note 11.

14. *See Sangero*, *supra* note 2, at 2803-06.

quirement for “strong corroboration”—i.e., independent evidence, extraneous to the accused, that links him to the commission of the offense.<sup>15</sup> In the present Article, we will see that even this is not enough.

We also discuss, in Part II, the standard of proof required for a criminal conviction. First, we show that the optimistic expectations of the U.S. Supreme Court regarding the rate of false convictions (0.027%) is inconsistent with Blackstone’s famous and leading approach, whereby it is better for ten criminals to be acquitted than for one innocent to be convicted (9.09% wrongful convictions). From here, we demonstrate the untenability of the optimistic estimate that it is possible to convict with a relatively low probability of guilt, of approximately 91%, without paying a very heavy price in wrongful convictions. We also show this under the assumption that the probability of guilt derived from the evidence is not fixed and for some defendants the inculpatory evidence is much more convincing (e.g., 99%) than the required threshold (91%). Considering this, we prefer the ratio proposed by Thomas Starkie, whereby it is better for a hundred criminals to be acquitted than for one innocent to be convicted. The probabilistic calculation that we perform based on this threshold leads to a new and surprising conclusion, which demands a significant reversal in how we view the confession: not only is a confession, on its own, far from sufficient for proving guilt beyond a reasonable doubt, but it should only be treated as corroboration of other solid evidence—if it exists—and not as key evidence for a conviction. Furthermore, even if we suffice with Blackstone’s familiar threshold of 1:10, the strength of the other evidence against the suspect, apart from the confession, must still be at least a balance of probabilities (51%) in order to establish a conviction.

In the Epilogue, given the real danger of convicting innocents, we call on law enforcement officials to refrain from interrogating a person, with the aim of extracting a confession, when there is no well-established suspicion against this person, and even when the law allows for such an interrogation. Moreover, we call on legislatures to amend the law so that such an interrogation would not be possible, and to set forth that a confession is unable to constitute the sole, or key, evidence for a conviction, but may only be used as corroboration for other key evidence—if it exists in the specific case.

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15. *Id.* at 2817–25. For another suggested resolution to the danger of using a false confession as a basis of conviction, see Talia Fisher & Issachar Rosen-Zvi, *The Confessional Penalty*, 30 CARDOZO L. REV. 871 (2008).

## II. THE POSSIBILITY OF FALSE CONFESSIONS

At the outset, we should remember that a confession of guilt is, in itself, puzzling. It is an act that is totally counter to a person's own interest. A central assumption of some who believe that confessions are almost always true is that a suspect has no reason to deny having committed a crime when he knows that the police have solid evidence indicating his guilt. However, in the type of case that the present Article is concerned with—where there is no significant evidence whatsoever against the suspect other than his own confession (which he has usually retracted)—the suspect has no such reason to confess. His confession is irrational and, therefore, also very suspicious.

In the past, many scholars have viewed a confession as the “queen of evidence.”<sup>16</sup> In recent decades, this view has been changing, as numerous studies have indicated the phenomenon of false confessions. Given the findings of the Innocence Project at the Cardozo School of Law,<sup>17</sup> this is no longer mere speculation. It is a proven fact that many suspects have falsely confessed and have been convicted on the basis of such confessions. In approximately one quarter of these cases, the wrongful conviction was based on a confession.<sup>18</sup> It should be noted that only in a small percentage of cases in which a claim of wrongful conviction is raised is there sufficient physical evidence to perform a post-conviction DNA test. Accordingly, we may assume that those cases in which wrongful convictions have been revealed through DNA testing only represent the tip of the iceberg.<sup>19</sup>

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16. See, e.g., Stephen C. Thaman, *Miranda in Comparative Law*, 45 ST. LOUIS U. L.J. 581, 581 (2001) (“Historically, confessions of guilt have been the ‘best evidence in the whole world’ . . .”).

17. See BARRY SCHECK, PETER NEUFELD & JIM DWYER, *ACTUAL INNOCENCE: FIVE DAYS TO EXECUTION AND OTHER DISPATCHES FROM THE WRONGLY CONVICTED* (2000). This book, by the founders of the Innocence Project, reports and analyzes over sixty of the first cases of acquittal. For a more up-to-date picture, see THE INNOCENCE PROJECT, <http://www.innocenceproject.org> (last visited Jan. 2, 2010). See also Karen Christian, “*And the DNA Shall Set You Free*”: *Issues Surrounding Postconviction DNA Evidence and the Pursuit of Innocence*, 62 OHIO ST. L.J. 1195 (2001); David DeFoore, *Postconviction DNA Testing: A Cry for Justice from the Wrongly Convicted*, 33 TEX. TECH L. REV. 491 (2002); Keith A. Findley, *Learning from Our Mistakes: A Criminal Justice Commission to Study Wrongful Convictions*, 38 CAL. W. L. REV. 333 (2002); Elizabeth V. LaFollette, *State v. Hunt and Exculpatory DNA Evidence: When Is a New Trial Warranted?*, 74 N.C. L. REV. 1295 (1996).

18. See SCHECK, NEUFELD & DWYER, *supra* note 17, at app. 2, tbl. “Factors Leading to Wrongful Convictions in 62 U.S. Cases”; Findley, *supra* note 17. For a study analyzing the first two hundred acquittals of the Innocence Project, see Brandon L. Garrett, *Judging Innocence*, 108 COLUM. L. REV. 55 (2008).

19. GISLI H. GUDJONSSON, *THE PSYCHOLOGY OF INTERROGATIONS AND CONFESSIONS: A HANDBOOK* 174–78 (2003).

The existence of a phenomenon of false confessions has also been verified in the famous study by Bedau and Radelet.<sup>20</sup> Forty-nine out of 350 wrongful convictions analyzed were found to involve false confessions. Moreover, in seventeen of those cases, false confessions had been given voluntarily by interrogees, without any illegitimate coercion by police interrogators.<sup>21</sup> Therefore, it is not enough to attribute false confessions to external factors; we must address internal factors influencing the interrogee.

Another important study was conducted by Leo and Ofshe.<sup>22</sup> Their research contains findings regarding sixty instances of false confession in the United States following the landmark decision *Miranda v. Arizona*,<sup>23</sup> where it was held that the police must inform suspects of their constitutional right to remain silent, that if they choose to waive this right anything they say may be used against them in a court of law, and that they have a right to meet with a defense attorney (private or court-appointed) prior to an interrogation and to demand the presence of the attorney during the interrogation itself. Violation of a suspect's *Miranda* rights leads to the inadmissibility of a confession as evidence at trial.<sup>24</sup> Leo and Ofshe have shown that even following the establishment of the *Miranda* rules and a transition by the police from a coercive interrogation to a "psychological interrogation," there is still a phenomenon of false confessions (and convictions based on such confessions) in the United States.<sup>25</sup>

Research based on both the observation of interrogation videotapes and surveys conducted among police interrogators demonstrates that more than 80% of suspects waive their right to silence.<sup>26</sup> Moreover, in a lab experiment designed to simulate a police interrogation, it was found that 81% of the subjects who were designated as "innocent" waived their right to remain silent as opposed to only 36% of those designated as "guilty."<sup>27</sup> Kassin refers to this as the innocence-confession paradox,<sup>28</sup> since *Miranda* warnings do not sufficiently protect those most in need of them—the

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20. Hugo A. Bedau & Michael L. Radelet, *Miscarriages of Justice in Potentially Capital Cases*, 40 STAN. L. REV. 21 (1987).

21. *Id.* at 62–63.

22. Richard A. Leo & Richard J. Ofshe, *The Consequences of False Confessions: Deprivations of Liberty and Miscarriages of Justice in the Age of Psychological Interrogation*, 88 J. CRIM. L. & CRIMINOLOGY 429 (1998).

23. 384 U.S. 436 (1966).

24. *Id.* at 492.

25. Leo & Ofshe, *supra* note 22, at 492.

26. Saul Kassin, *The Psychology of Confessions*, 4 ANN. REV. L. SOC. SCI. 193, 200 (2008).

27. *Id.*

28. *Id.* at 206.

innocent.<sup>29</sup> Innocent persons think that, since they have done no wrong and have nothing to hide,<sup>30</sup> interrogators will be persuaded of their innocence,<sup>31</sup> and therefore, they waive their right to remain silent, which exposes them to the risk of false confession. Notably, people without a criminal past will be more inclined to waive the right to silence than those with such a past.<sup>32</sup>

In psychological literature, three categories have been proposed for classifying false confessions: voluntary, coerced-compliant, and coerced-internalized.<sup>33</sup> The first category—voluntary false confessions—includes those cases in which people come to the police at their own initiative and incriminate themselves for something that they did not do.<sup>34</sup> This often occurs in high-profile cases. Thus, for example, 200 people voluntarily confessed to the 1932 kidnapping of Charles Lindbergh's infant son,<sup>35</sup> while over fifty people confessed to the 1947 murder of Elizabeth Short.<sup>36</sup> In 2006, John Mark Karr confessed to the unsolved and widely publicized 1996 murder of JonBenét Ramsey.<sup>37</sup> There are various reasons for this type of confession, including "a pathological need for attention or self-punishment; feelings of guilt or delusions; the perception of tangible gain; or the desire to protect . . . someone else."<sup>38</sup>

The second category—coerced-compliant false confessions—includes those confessions elicited by the pressure of an interrogation. In such cases, someone will prefer to confess in order to obtain short-term benefits, like the possibility to sleep, to be left alone, or to be released.<sup>39</sup> An example of such a case occurred in 1989, when five youths confessed to the brutal rape and beating of

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29. *Id.* at 207.

30. *Id.*

31. *Id.* at 200, 207.

32. *Id.* at 200; Richard A. Leo, *Miranda's Revenge: Police Interrogation as a Confidence Game*, 30 LAW & SOC'Y REV. 259 (1996). For a very interesting analysis, arguing that the right to remain silent is desirable in order to increase the chance that triers of fact will believe the innocent, thus allowing them to make a distinction between innocent persons (who would usually choose to talk) and guilty persons (who would usually choose to remain silent), see Daniel J. Seidmann & Alex Stein, *The Right to Silence Helps the Innocent: A Game-Theoretic Analysis of the Fifth Amendment Privilege*, 114 HARV. L. REV. 430 (2000); Alex Stein, *The Right to Silence Helps the Innocent: A Response to Critics*, 30 CARDOZO L. REV. 1115 (2008).

33. SAUL KASSIN & LAWRENCE WRIGHTSMAN, *THE PSYCHOLOGY OF EVIDENCE AND TRIAL PROCEDURE* 77–78 (1985); Kassin, *supra* note 26, at 195–96.

34. Kassin, *supra* note 26, at 195.

35. *Id.*

36. *Id.*

37. *Id.*; see also Neal Karlinsky & Mary Kate Burke, *Does Karr Believe He Did It? The Truth in John Mark Karr's False Confession*, ABC NEWS, Aug. 30, 2006, <http://abcnews.go.com/US/LegalCenter/story?id=2372612&page=1>.

38. Kassin, *supra* note 26, at 195.

39. *Id.*



a female jogger in New York City's Central Park.<sup>40</sup> They were only released in 2002, after the actual rapist, Matias Reyes, voluntarily confessed—demonstrating knowledge of the details of the assault—and his confession was verified by a DNA test.<sup>41</sup> After their release, each of the five youths claimed that he had expected to go home following the interrogation.<sup>42</sup>

The third category—coerced-internalized false confessions—includes those cases in which, during the course of an interrogation, innocent persons become convinced that they are actually guilty.<sup>43</sup> This belief is sometimes also accompanied by false memories. Thus, for example, fourteen-year-old Michael Crowe confessed to the stabbing and murder of his sister after interrogators misled him into thinking that they had physical evidence of his guilt. He truly began to believe that he had committed the crime. The accusations against him were only dropped after investigators found stains of the victim's blood on the clothing of a neighbor.<sup>44</sup>

In a study of forty rape and murder convictions based on confessions that, with the help of post-conviction DNA evidence, were later revealed to be false, Garrett found that thirty-eight of the confessions were not merely admissions like “I did it,” but rather statements full of detail and a precise description of the actual commission of the offense.<sup>45</sup> Garrett describes how, in many cases, prosecutors argue in court that these are details that only the true culprit could have known, and that they were not revealed to the suspect by interrogators, either inadvertently or intentionally.<sup>46</sup> As an example, he discusses the case of Jeffrey Deskovic, who, based on his confessions to the police, was convicted of the rape and murder of a fifteen year-old classmate.<sup>47</sup> In the trial at which he was convicted, the prosecution argued that he had described three details from the scene of the murder unknown to the wider public. In particular, he had described how he “hit her in the back of the head with a Gatoraid [sic] bottle that was lying on the path.”<sup>48</sup> Police testified that, following this statement, they conducted a

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40. Saul M. Kassir & Gisli H. Gudjonsson, *True Crimes, False Confessions: Why Do Innocent People Confess to Crimes They Did Not Commit?*, SCI. AM. MIND, June 2005, at 24, 24–26.

41. *Id.* at 26.

42. Kassir, *supra* note 26, at 195.

43. *Id.* at 195–96.

44. *Id.*

45. Brandon L. Garrett, *The Substance of False Confessions*, 62 STAN. L. REV. 1051, 1054 (2010).

46. *Id.*

47. *Id.*

48. *Id.* at 1055 (quoting Trial Transcript at 1185, *People v. Deskovic*, No. 192-90 (N.Y. Sup. Ct. Nov. 30, 1990)).

careful search of the crime scene the next day and found the cap of a Gatorade bottle.<sup>49</sup> During closing arguments, in order to persuade the jury of the confession's credibility, the prosecutor stressed that the Gatorade cap had only been found after the accused spoke of it.<sup>50</sup>

Since we know today that a DNA test conducted in 2006 yielded a positive match to a different person—Steven Cunningham, a convicted murderer who, following the DNA test, confessed to this very same murder<sup>51</sup>—it is clear that Deskovic's confession was "contaminated."<sup>52</sup> Thus, many of the thirty-eight false confessions in Garrett's study—full of detail that, supposedly, only the true culprit could have known—were also necessarily contaminated, despite the fact that police testified that this was impossible. When Deskovic was asked why he had confessed to something that he did not do, he answered: "Believing in the criminal justice system and being fearful for myself, I told them what they wanted to hear."<sup>53</sup>

Even permissible methods of interrogation entail risk factors. One such risk factor is detention itself and the length of the interrogation. The longer the interrogation, the greater the risk of a false confession.<sup>54</sup> A second risk factor is the presentation of concocted evidence to the interrogatee, supposedly indicating his guilt, such as a fingerprint match. Such fabricated evidence constitutes a major risk factor for false confessions.<sup>55</sup> Actual cases and psychology experiments bore this out.<sup>56</sup> When an interrogatee is confronted with forensic evidence that supposedly proves his guilt, such as a fingerprint match, there are three dangers: (1) the interrogatee is liable to become convinced that he indeed committed the crime (especially if he was under the influence of alcohol or drugs during the incident and does not remember what actually happened);<sup>57</sup>

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49. *Id.*

50. *Id.*

51. Jeff Deskovic, THE INNOCENCE PROJECT, [http://www.innocenceproject.org/Content/Jeff\\_Deskovic.php](http://www.innocenceproject.org/Content/Jeff_Deskovic.php) (last visited Jan. 2, 2011).

52. Garrett, *supra* note 45, at 1056.

53. Kassin, *supra* note 26, at 206; Fernanda Santos, *DNA Testing Frees Man Imprisoned for Half His Life*, N.Y. TIMES, Sept. 21, 2006, at B1, B4, available at <http://www.nytimes.com/2006/09/21/world/americas/21iht-prison.2892402.html>.

54. Garrett, *supra* note 45, at 1095; Kassin, *supra* note 26, at 201–02; see also Leo & Ofshe, *supra* note 22.

55. Garrett, *supra* note 45, at 1097–99; Kassin, *supra* note 26, at 201–02.

56. Kassin, *supra* note 26, at 202–03.

57. Deborah Young, *Unnecessary Evil: Police Lying in Interrogations*, 28 CONN. L. REV. 425, 462 (1996). This might happen even without the influence of alcohol or drugs. See DAVID WOLCHOVER & HEATON ARMSTRONG, ON CONFESSION EVIDENCE 95 (1996); Welsh S. White, *False Confessions and the Constitution: Safeguards Against Untrustworthy Confessions*, 32 HARV. C.R.-C.L. L. REV. 105, 128 (1997).

(2) the interrogee becomes convinced that all claims of innocence will be of no avail;<sup>58</sup> (3) the interrogee gets caught up in a web of lies that reinforces the erroneous assumption that he is guilty. Apparently, given these dangers, the English Court of Appeals has held that a suspect cannot be actively misled, although there is no obligation to disclose all of the investigative material against him.<sup>59</sup>

A third risk factor is that of “minimization,” which is when an interrogator minimizes the severity of the offense and ostensibly empathizes with the interrogee, characterizing the act as accidental, spontaneous, or otherwise justifiable by external factors.<sup>60</sup>

One experiment attempting to simulate realistic conditions demonstrated the power of certain interrogation tactics to increase the number of false confessions.<sup>61</sup> Students participating in this experiment were each paired with a “confederate” and then instructed to solve some problems of logic individually and some problems jointly.<sup>62</sup> In what was defined as the “guilty condition,” the confederate asked his or her partner for help in solving a problem that was supposed to be solved individually, thus causing several participants to violate the rules of the experiment. In the “innocent condition,” the confederate did not make such a request, so that no participant in this group violated this rule.<sup>63</sup> In the end, both “innocent” and “guilty” participants were accused of violating the rules of the experiment, an act later characterized as “cheating.” They were then “interrogated” and asked to sign a confession.<sup>64</sup> When no interrogation technique was employed, only 6% of the innocent participants confessed, compared to 46% of the guilty.<sup>65</sup> When the minimization technique was applied, 18% of the innocent confessed, as opposed to 81% of the guilty.<sup>66</sup> When the deal technique (an offer of leniency) was used, 14% of the innocent confessed, compared to 72% of the guilty.<sup>67</sup> A combination of both interrogation methods led to a confession rate of 43% among the innocent and 87% among the guilty.<sup>68</sup> Thus, the use of

58. See *R. v. Oickle*, [2000] 2 S.C.R. 3, para. 43 (Can.).

59. See Case and Comment, *Evidence/Jury: R. v. Imran and Hussain*, 1997 CRIM. L. REV. 754.

60. GUDJONSSON, *supra* note 19, at 21.

61. Melissa B. Russano, Christian A. Meissner, Fadia M. Narchet & Saul M. Kassin, *Investigating True and False Confessions Within a Novel Experimental Paradigm*, 16 PSYCHOL. SCI. 481 (2005).

62. *Id.* at 482.

63. *Id.*

64. *Id.*

65. *Id.* at 484, tbl.1.

66. *Id.*

67. *Id.*

68. *Id.*

interrogation techniques indeed raises the probability that a criminal will confess (by double); however, there is a much more significant increase (sevenfold) in the possibility that an innocent person will confess.

There is a fundamental mistake that, in our view, underlies the tactics of police interrogations. As we shall see below, the appropriate weight of confessions as proof of guilt should be relatively low, both because false confessions are not rare and because fact finders are unable to distinguish between true confessions and false confessions. However, a confession is still erroneously conceived as very strong evidence, and therefore police interrogators invest much pain in extracting confessions. But here is the mistake: the more energy that is invested in extracting a confession through the use of doubtful tactics, such as jailhouse snitches or lying about incriminating evidence, the lower the reliability of the confession. Furthermore, the pains that interrogators take to extract confessions may not only bring about a false confession but also prevent the fact finders from recognizing a false confession. This would be the case, for example, when interrogators contaminate a confession by feeding the interrogatee with details, knowledge of which would strengthen the reliability of the confession in court.

Indirect indications of the rate of false confessions were also obtained in a survey of 631 police interrogators in the United States and Canada. In this survey, interrogators expressed a belief that confessions are elicited from 68% of all suspects and that 4.78% of these confessions are elicited from innocent persons.<sup>69</sup> Another study in Iceland revealed that 12% of the prisoners surveyed said that they had confessed to crimes that they did not commit.<sup>70</sup>

The personality of the interrogatee also entails risk factors for false confessions. Some interrogees are more vulnerable to external pressure than others and, therefore, are also at a higher risk of false confession.<sup>71</sup> Persons with a tendency for compliance in social situations are especially vulnerable. This is a result of their eagerness to please others and to avoid confrontation, particularly with regard to authority figures.<sup>72</sup> Moreover, persons with high levels of anxiety, fear, depression, delusions, or other psychological disorders are also at an increased risk.<sup>73</sup>

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69. See Saul M. Kassin et al., *Police Interviewing and Interrogation: A Self-Report Survey of Police Practices and Beliefs*, 31 *LAW & HUM. BEHAV.* 381, 392, 397 (2007).

70. See GUDJONSSON, *supra* note 19, at 176.

71. Kassin, *supra* note 26, at 203.

72. *Id.*

73. *Id.*

Juveniles have a heightened risk of confessing to something that they have not done.<sup>74</sup> Persons who are intellectually disabled or mentally retarded are also in a high-risk group.<sup>75</sup>

Research and reality both indicate that the reasons for false confessions are extremely diverse,<sup>76</sup> and some are even bizarre.<sup>77</sup> People have falsely confessed in order to avoid the burden of trial for a minor offense, to cover up for a friend, or to ensure that their families are taken care of by organized crime. Some have confessed with the hope that, in doing so, their name would not appear in the newspapers. Some have confessed in order to get quickly to a university exam or an important chess match. Some confessions are the result of mental illness. Some are given out of a fear of the death penalty. One person confessed in order to avoid being exposed as an adulterer. Some people have confessed because they were too drunk to remember what happened. One person confessed to a robbery that he did not commit to avoid being sent as a soldier to Northern Ireland. Another person confessed as a joke. There was even one individual who confessed in order to impress his girlfriend and, while in prison, confessed to another murder that he did not commit—only in order to prove that a wrongful conviction was possible—and he succeeded! Reality is stranger than fiction.<sup>78</sup>

Another major cause of false confessions is the suspect's mistaken belief that, having already provided one confession, elicited by interrogators through illegitimate means, any further confessions that he gives are meaningless. Sometimes the suspect is misled into believing this and further, ostensibly legitimate confessions are obtained without the use of illicit means.<sup>79</sup> Some have even pled guilty in court and were subsequently found to be innocent.<sup>80</sup>

In conclusion, today we know that false confessions are not rare and that many of them reach courts. Can the legal system adequately cope with false confessions?

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74. *Id.* at 203–05.

75. *See id.* at 206.

76. Arye Rattner, *Convicted but Innocent: Wrongful Conviction and the Criminal Justice System*, 12 LAW & HUM. BEHAV. 283 (1988).

77. Sangero, *supra* note 2, at 2799–800; *see also* ROYAL COMMISSION ON CRIMINAL JUSTICE, REPORT 57 (1993); Bedau & Radelet, *supra* note 20, at 58–63; Arye Rattner, *Convicting the Innocent: When Justice Goes Wrong* (1983) (unpublished Ph.D. dissertation, The Ohio State University) (on file with the University of Michigan Journal of Law Reform).

78. Sangero, *supra* note 2, at 2799–800.

79. Peter Mirfield, *Successive Confessions and the Poisonous Tree*, 1996 CRIM. L. REV. 554.

80. Nine out of the first 200 persons released as a result of the Innocence Project pled guilty in court and did not just confess during the interrogation. *See* Garrett, *supra* note 18, at 74 & n.71. Seven of them confessed to murder, and two confessed to rape.

## III. FROM A FALSE CONFESSION TO A WRONGFUL CONVICTION

In *Escobedo v. Illinois*, Justice Goldberg wrote:

We have learned the lesson of history, ancient and modern, that a system of criminal law enforcement which comes to depend on the “confession” will, in the long run, be less reliable and more subject to abuses than a system which depends on extrinsic evidence independently secured through skillful investigation.<sup>81</sup>

American law offers three central mechanisms to cope with false confessions: (1) the familiar *Miranda* rules; (2) the requirement of corroboration; and (3) the ability of the courts to distinguish between true and false confessions. Indeed, the *Miranda* rules seriously address the problem of involuntary confessions.<sup>82</sup> The *Miranda* rules are based on the assumption that a confession during a custodial interrogation is inherently involuntary, which dictates a need for procedural safeguards that include the requirement to inform the suspect of his right to remain silent, that anything he says may be used against him, and of his right to consult with an attorney. However, despite these rules, false confessions remain a significant phenomenon in the United States, and innocent persons are still convicted on the basis of such confessions.<sup>83</sup> First, a large number of interrogees validly waive their *Miranda* rights.<sup>84</sup> Second, the use of trickery, and even deceit, by police interrogators is not prohibited and does not render a confession inadmissible.<sup>85</sup> Finally, as we will show, American law does not seriously address the danger of confessions that, although voluntary, are still false.<sup>86</sup>

On its face, American law provides a rule that adequately addresses the fear that a confession—even if voluntary—might be false. This rule demands additional corroborative evidence at trial

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81. *Escobedo v. Illinois*, 378 U.S. 478, 488–89 (1964) (footnotes omitted).

82. *Miranda v. Arizona*, 384 U.S. 436 (1966).

83. See Leo & Ofshe, *supra* note 22.

84. Mandy DeFilippo, *You Have the Right to Better Safeguards: Looking Beyond Miranda in the New Millennium*, 34 J. MARSHALL L. REV. 637, 639–40 (2001); Amanda L. Prebble, *Manipulated by Miranda: A Critical Analysis of Bright Lines and Voluntary Confessions under United States v. Dickerson*, 68 U. CIN. L. REV. 555, 578–79 (2000).

85. See Prebble, *supra* note 84, at 583; see also Richard A. Leo, *From Coercion to Deception: The Changing Nature of Police Interrogation in America*, 18 CRIME L. & SOC. CHANGE 35 (1992); White, *supra* note 57.

86. In effect, the focus of American case law on the question as to whether the confession was voluntary, which is answered affirmatively as long as the *Miranda* rules have been followed, has led to an abandonment of the question of the truth of the confession. See *Rogers v. Richmond*, 365 U.S. 534, 544 (1961); see also Garrett, *supra* note 45, at 1092–94.

in order to convict someone based on a confession. Such a rule has been established in many American jurisdictions through both legislation and case law.<sup>87</sup>

The corroboration requirement as traditionally formulated in American law requires some evidence in addition to the confession that tends to establish the *corpus delicti*. It does not demand that such evidence proves the *corpus delicti* beyond a reasonable doubt—only “slight” corroborative evidence is required.<sup>88</sup>

The *corpus delicti* is literally defined as “the body of the crime.”<sup>89</sup> The American corroboration requirement pertains solely to the commission of the offense itself, and not to the identity of the perpetrator. In a criminal trial, the prosecution must prove three main elements: (1) the injury or harm constituting the crime; (2) the criminal nature of this injury or harm; and (3) that this injury or harm was inflicted by the defendant.<sup>90</sup> The definition of the *corpus delicti* only includes the first and second elements. Therefore, the corroborative evidence does not necessarily need to prove that the defendant was the guilty party.<sup>91</sup>

In fact, a requirement for evidence as to the actual commission of the offense—in addition to the confession itself—might refute some false confessions and thus prevent wrongful convictions. It would also save the legal system the embarrassment caused when a person is convicted and evidence later reveals that no crime was even committed—such as when a person is convicted of murder and the “victim” turns up alive. However, this type of situation represents only a small fraction of wrongful convictions. In most cases, the police have solid evidence of a crime, and the main question is whether or not a suspect who confesses is the actual perpetrator, a question that the existing corroboration requirement fails to address.

It is meaningless to ask whether or not a crime was actually committed if this question is asked with regard to a person who was not even involved. When the wrong person is in custody to start, then proof that the offense was committed says nothing about this individual’s involvement or guilt.<sup>92</sup>

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87. See, e.g., 1 CHARLES T. MCCORMICK, MCCORMICK ON EVIDENCE 212 (John W. Strong ed., 5th ed., Student ed. 1999).

88. *Id.* at 214.

89. *Id.*

90. *Id.*

91. *Id.*

92. To complete the picture, it should also be noted that the U.S. Supreme Court has provided an alternative approach to the corroboration requirement whereby, instead of evidence that supports the *corpus delicti*, it is necessary to present “substantial independent evidence which would tend to establish the trustworthiness of the statement.” *Opper v.*

In previous articles, we have proposed, as a solution, to establish a statutory requirement of “strong corroboration” as a necessary condition for convicting a person on the basis of a confession: strong, independent corroboration (with regard to the defendant) supporting the conclusion that the defendant is the one who committed the crime.<sup>93</sup> In the present Article, we will see that even this would not be enough to prove guilt beyond a reasonable doubt, given the low weight of the confession.

Supposedly—if they were capable of distinguishing between true and false confessions—we might be able to assume that police investigators, prosecutors, judges, and juries would screen out false confessions, and that convictions would only be based on genuine confessions. However, research shows that, contrary to the belief of many, police investigators, prosecutors, judges, juries—in effect, all of us—are incapable of distinguishing between true and false confessions.<sup>94</sup> For instance, research by Leo and Ofshe demonstrates that 73% of the false confessions that proceeded to trial in their study led to wrongful convictions.<sup>95</sup> Both juries and judges failed to identify these false confessions.<sup>96</sup> Furthermore, in a more comprehensive study conducted by Drizin and Leo, 86% of the false confessions that went to trial in their study led to wrongful convictions.<sup>97</sup>

Finally we want to suggest a focused response to the question, “Why do courts not identify false confessions?” Our explanation is complex: *First*, despite the latest studies pointing to the widespread phenomenon of false confessions and of wrongful convictions based on them, many judges and many juries still err in thinking that a person is not expected to confess to a crime he or she did not commit; therefore, if someone does confess to a crime, the chances that this person did commit it are very high, to the extent that the pos-

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United States, 348 U.S. 84, 93 (1954). This requirement is even weaker, 1 MCCORMICK, *supra* note 87, at 215–16, which, in our opinion, makes it even less satisfactory. Regarding other legal systems, in particular, the English and Israeli systems, see Sangero, *supra* note 2, at Parts III.B & III.C.

93. Sangero, *supra* note 2, at 2818–26; Sangero & Halpert, *supra* note 3, at 86–87.

94. See, e.g., Saul M. Kassir et al., “I’d Know a False Confession if I Saw One”: A Comparative Study of College Students and Police Investigators, 29 LAW & HUM. BEHAV. 211 (2005). For references to additional studies with similar results, see *id.* at 212, 222.

95. See Leo & Ofshe, *supra* note 22, at 482.

96. Richard A. Leo & Deborah Davis, *From False Confession to Wrongful Conviction: Seven Psychological Processes*, 32 J. PSYCHIATRY & L. 9, 19–20 (2010).

97. Stephen A. Drizin & Richard Leo, *The Problem of False Confessions in the Post-DNA World*, 82 N.C. L. REV. 891, 993 (2004).



sibility of a false confession may even be disregarded, indeed almost avoided.<sup>98</sup>

*Second*, the literature supports the fact that police investigators, prosecutors, and judges do not know how to distinguish between a true confession and a false one.<sup>99</sup>

*Third*, studies show that confessions are contaminated (apparently by police investigators, sometimes consciously and at other times without being aware of having done so) by the details at the crime scene, which constitute, as it were, “inside information” and which are not made public, so that only the person who is connected to the crime is likely to know them.<sup>100</sup> This contamination makes it difficult, if not impossible, for judges and juries to identify a false confession.

*Fourth*, it seems that not only police investigators and prosecutors, but even judges and juries, are frequently captive of the distorted conception of the suspect’s guilt, according to which the suspect is assumed to be guilty and evidence of his guilt may be sought; all the more so, an accused person is assumed to be guilty.<sup>101</sup>

*Fifth*, under the influence of this conception, the correct details—especially “inside information”—which are integrated into the accused’s confession are interpreted as supporting the conclusion that the confession is true (notwithstanding the possibility of its contamination, of which there is insufficient awareness); but regarding mistaken details integrated into a confession or the investigation protocol, the tendency is to minimize their value or even to avoid them altogether.<sup>102</sup>

*Sixth*, whereas decisive weight is attributed to a confession that leads to a conviction, even when it is the only proof of the guilt of the accused, no significance of any kind is generally attributed to denials of having perpetrated the crime—during both the police interrogation and the court procedure—whether these denials preceded the confession or came after it or whether they existed throughout the process.<sup>103</sup>

*Seventh*, even when the interrogatee tells of other crimes, some admissions of which are unequivocally found to be false confessions, there is still a tendency to select the confession of a crime for

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98. Richard A. Leo, *False Confessions: Causes, Consequences, and Implications*, 37 J. AM. ACAD. PSYCHIATRY L. 332, 341 (2009).

99. See Kassin et al., *supra* note 94 and accompanying text.

100. Garrett, *supra* note 45, at 1090–92.

101. Leo, *supra* note 98, at 332, 341.

102. See Garrett, *supra* note 45, at 1088.

103. Akos Farkas & Erika Róth, *The Constitutional Limits of the Efficiency of Criminal Justice*, 37 ACTA JURIDICA HUNGARICA 139, 145 (1995–96).

which no proof exists that he had not committed it and to use it against him to gain a conviction.<sup>104</sup>

*Eighth*, since the selection of the confession introduced in court is made from among several confessions of different crimes, and since this selection consists only of incriminating statements while denials are ignored, and since the selection comprises the details that accord with the crime scene and those that do not fit are dismissed, the chances that the court would be able to identify the false confession are even smaller.

*Ninth*, the law-enforcement system considers itself highly redundant.<sup>105</sup> The expectation is that when one unit fails (for instance, the investigators force a false confession from a suspect), other units will give it backing (for example, the district prosecutor, who will identify that they are dealing with a false confession, or the trier of fact or the court of appeals). Rather, these units are dependent on one another, with one influencing the other. When one unit collapses, the back-up units also fail with it.<sup>106</sup> In the context of confessions, police investigators tend to rely on the prosecutors and on the judges, who follow them, to filter out the errors (false confessions that the interrogators extracted). The prosecutors tend to rely both on the police investigators, who carried out their work before the former (and with whom they have permanent working ties), and on the judges, who come after them (for they are the judges), to prevent wrongful convictions. The judges, on the other hand, who have a heavy workload, tend to rely on the law-enforcement people—the police investigators and the prosecutors—assuming they did their work faithfully and brought the guilty, and not the innocent, to trial. Similarly, appeals judges tend to rely on lower-court judges. Thus, from the moment critical errors are committed (the innocent targeted, a confession forced or contaminated<sup>107</sup>), all these dependent systems collapse, leading in the final analysis to a wrongful conviction.

In conclusion, false confession is a significant phenomenon and, when it occurs, in most cases it leads to a wrongful conviction. Therefore, probability theory should be used to properly evaluate the weight of the confession.

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104. See, e.g., Garrett, *supra* note 45, at 1088–90.

105. William C. Thompson, *Beyond Bad Apples: Analyzing the Role of Forensic Science in Wrongful Convictions*, 37 Sw. U. L. Rev. 1027, 1032 (2008).

106. See *id.* at 1033–49 (demonstrating these cross-failures in the wrongful conviction of Josiah Sutton).

107. Leo, *supra* note 98, at 334–38.

## IV. THE FALLACY OF THE TRANSPOSED CONDITIONAL

The fallacy of the transposed conditional relates to conditional probabilities. It occurs when the probability of Event A, given Event B, is substituted with the probability of Event B, given Event A. These transposed conditional probabilities could be different, by even several orders of magnitude. The larger the difference, the more extreme the cognitive illusion stemming from the fallacy.<sup>108</sup> Following are several examples.

*A. Medical Diagnosis*<sup>109</sup>

A manufacturer (correctly) reports that a home kit for HIV testing is very precise and that the probability of a false positive is only 0.1%. That is to say, if a thousand healthy people were tested with this kit, only one of them would yield a false positive (erroneously indicating an HIV carrier). Mr. Smith is tested with this kit and the result is positive. The belief that there is a 99.9% probability that Mr. Smith is an HIV carrier, and only a 0.1% probability that he is not a carrier, is a powerful cognitive illusion deriving from the fallacy of the transposed conditional. The truth is that the probability that Mr. Smith is an HIV carrier also depends on the prevalence of the HIV virus within the population to which he belongs (the “base rate”). If Mr. Smith belongs to a low-risk group (he has not received a blood transfusion, is not an intravenous drug user, and does not perform unprotected sex), in which the incidence of the HIV virus is only one out of ten thousand cases, and if the probability of a false negative is insignificant,<sup>110</sup> then the probability that he is a carrier is only about 9% (as opposed to 99.9%), while the probability that he is not a carrier is 91% (as opposed to 0.1%). This is so because, if 10,000 members of Mr. Smith’s low-risk group are tested, eleven tests would yield a positive result: one person who is indeed, unfortunately, an HIV carrier; and ten additional cases of testing error (1 out of 1000; 10 out of 9999). From among the eleven, only one person is actually an HIV carrier. Therefore, the probability that Mr. Smith is a carrier is only 1/11, about 9%, or, to put more optimistically: approximately a 91% probability

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108. See Diaconis & Freedman, *supra* note 3; Sangero & Halpert, *supra* note 3, at 47–56. For an example in a legal context, see Thompson & Schumann, *supra* note 4, at 170.

109. For an example regarding medical diagnosis, see Tversky & Kahneman, *supra* note 5. See also Sangero & Halpert, *supra* note 3, at 47–50.

110. The probability of a false negative is the probability that the test will erroneously indicate that the person tested is not a carrier when he is indeed a carrier.

that he is *not* an HIV carrier. This is an example of an extreme illusion, whereby a (correct) probability of 9% is expected to be a (mistaken) probability of 99.9%.<sup>111</sup>

### B. Urine Tests in the Workplace for Detecting Drugs<sup>112</sup>

Imagine that random testing of flight crews reveals that a particular stewardess used heroin. Let us assume that the probability of obtaining a false positive in this type of test is 1%, i.e., if one hundred people who have not used heroin were tested, one person would, on average, falsely test positive for heroin use. The fallacy of the transposed conditional leads to the belief that, given the positive test result, the probability that said stewardess used heroin is 99%, while the probability that she did not use the drug is only 1%. This is a mistake. The correct probability depends on the remaining evidence against the stewardess. According to a medical model, for example, given an incidence of heroin use of one user out of a thousand employees at said workplace, proximate to the time of the testing, and given that the probability of a false negative is zero, then, despite the positive result, there is a probability of 91% that said stewardess did *not* use heroin.<sup>113</sup>

### C. The Probability of a Random DNA Match

Let us assume that the probability of a random match between a DNA sample of the actual perpetrator taken from the crime scene and a DNA sample taken from an innocent suspect is 1/10,000. The belief that the probability of innocence for a given suspect whose DNA matches the DNA found at the scene of the crime is

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111. See Sangero & Halpert, *supra* note 3, at 47–50; Tversky & Kahneman, *supra* note 5.

112. See *Ishikawa v. Delta Airlines*, 343 F.3d 1129, 1131 (9th Cir. 2003); *Gonzalez v. Metro. Transp. Auth.*, 174 F.3d 1016, 1023 (9th Cir. 1999); Barnum & Gleason, *supra* note 8.

113. In a case involving drug testing in the workplace, a federal court held:

The substantive issue in this litigation was whether LabOne negligently tested and reported on Ishikawa's urine. Some testing defects are subtle, like the Bayes' Theorem problem we discussed in *Gonzalez v. Metropolitan Transportation Authority*. The Bayes' Theorem problem is that if a test gives false positives 1% of the time, and the tested population has genuinely "dirty" urine in one case out of ten, then out of a thousand tests, 100 of the "positive" reports will be true and ten false; but if the tested population has genuinely "dirty" urine in only one case out of a thousand, then the very same test performed with the very same care will yield ten false positives for every true positive.

*Ishikawa*, 343 F.3d at 1131 (footnotes omitted).

also only 1/10,000 is an excellent example of the fallacy of the transposed conditional.<sup>114</sup> Remember, a defendant's innocence also depends on the remaining evidence against him. If we assume that the offense was committed in a city with a population of one million people, then, on average, there are one hundred persons in this city with such a genetic profile. Without any other evidence against the suspect, and assuming that one of the city's residents is the perpetrator and that each of these one hundred people are suspect to the same extent, then the probability of the suspect's guilt is only about 1% and the probability of his innocence is about 99%.

#### *D. Discussion*

There is an intuitive explanation for these surprising results. In each of the above examples, we have tried to uncover a rare phenomenon by means of a test: the HIV test attempts to identify one carrier from among ten thousand people who are not carriers; the drug test tries to identify one heroin user from among ten thousand non-users; and the DNA test attempts to identify one offender who has committed the crime from among all of a city's residents. Thus, for instance, in the drug test example, the incidence of heroin use among flight crews is one in a thousand. The fallacy occurs when one ignores this fact regarding the frequency of heroin use. However, if 1000 employees are tested for heroin, then 11 positive results would be obtained, according to the following breakdown: one positive result would be obtained from a person who is actually a heroin user and ten additional positive results would be obtained as a result of testing error (one error for every 100 "clean" people means approximately 10 errors for 999 "clean" people). Thus, from among the 11 positive results, only one would be correct. Therefore, the probability that a person who has tested positive is indeed a heroin user is 1/11, only about 9%, while the probability that this same employee is "clean" (despite the positive result of the test) is 91%. The lower the incidence of heroin use that is ignored, the more extreme the cognitive illusion. If these were flight crews with a higher incidence of heroin use, for example, one out of ten persons, then the cognitive illusion would be much less. A simple calculation would show that, in this case, for every one hundred true positives, there would only be nine false positives.<sup>115</sup>

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114. *Brown v. Farwell*, 525 F.3d 787, 795 (9th Cir. 2008).

115. To explain briefly: If we assume a very high incidence of heroin use of one in ten (i.e., 100 out of 1000 employees are heroin users while 900 are not), then when we test the 100 employees who are heroin users, we should get 100 positive results (assuming that there

These surprising results may also be explained with the aid of conditional probabilities. We shall demonstrate this with regard to the probability of a random DNA match. A probability of 1/10,000 for a DNA match is a conditional probability. That is to say, it is the probability of a match between a DNA sample of the unknown perpetrator, found at the scene of the crime, and a DNA sample taken from the suspect, *given that the suspect is innocent*. This probability assumes what actually needs to be proven (innocence or guilt) and, therefore, should not be confused with the probability of innocence. What should be of more interest to the court is the probability of the transposed conditional: the probability of innocence *given a match* (and despite its existence).<sup>116</sup> In the aforesaid example, we have shown that there are 100 people in this city with the same genetic profile. Therefore, the probability that the suspect is actually the one who committed the crime, given the DNA match, is only 1%. Consequently, the probability of innocence given (and despite) the match is 99%. In this case, the fallacy of the transposed conditional is reflected in the treatment of the probability of a match, given innocence ( $1/10,000 = 0.1\%$ ), which assumes what actually needs to be proven, as if it is the probability of innocence, given a match (which, in fact, is about 99%). In the same manner, regarding the example of an HIV test, the fallacy occurs when the probability of a positive test result, given that a person is not a carrier (0.1%), is substituted for the probability that a person is not a carrier, given (and despite) the positive test result (which is, in fact, 91% and not 0.1%). In the case of the drug test, the fallacy is in the substitution of the probability of obtaining a positive test result, given that the person did not use heroin (1%), for the probability that the person did not use heroin, given (and despite) the positive result (91%).

As these examples demonstrate, conditional probabilities could be completely different, even by several orders of magnitude. The relationship between two transposed conditional probabilities is provided by Bayes' Theorem. This relationship requires knowledge of the prior odds of the events in question. In Part VII, we will explain Bayes' Theorem and use it for the purpose of evaluating the

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is no false negative). And when we test the 900 employees who do not use heroin, we should get 9 false positives (one false positive in every 100 tests would yield, on average, 9 errors for 900 employees). Consequently, we should get 109 positive results, only 9 of which are false. Therefore, the probability that said person (who has tested positive) has indeed used heroin is  $100/109$ , or 91%, while the probability that this person has not used heroin is 9%.

116. The probability of innocence given a match and the probability of guilt given a match adds up to 1.

proper weight of the confession. First, however, we will give an example of the fallacy of the transposed conditional in an actual case.

#### V. GEORGE ALLEN AS A TEST CASE

George Allen was convicted in 1983 for the rape and murder of Mary Bell.<sup>117</sup> The victim was a thirty-one year-old freelance court reporter who lived with her boyfriend in the LaSalle Park area of St. Louis. On the morning of February 4, 1982, following a two-day snowstorm, Mary Bell's boyfriend left for work at about 9:00 a.m. At around 10:00 a.m., her neighbor heard "angry male and female voices" and the sounds of a woman crying from Bell's apartment.<sup>118</sup> That lasted for about ten minutes.<sup>119</sup> At around 10:30 a.m., the neighbor heard the sound of someone knocking on a door.<sup>120</sup> Unable to determine whether it was Bell's front door or her own, the neighbor opened her door and saw a woman walking on the sidewalk after having left Bell's adjoining porch.<sup>121</sup> This woman turned out to be Pamela Richardson, a colleague of Bell's.<sup>122</sup> Richardson had spoken with Bell on the phone between around 10:00 a.m. and 10:15 a.m.<sup>123</sup> Bell interrupted the conversation briefly and, when she returned to the phone again, she explained that she had been in the middle of a shower and had to put on a robe.<sup>124</sup> Bell then agreed to Richardson's suggestion that she pick her up at home. When Richardson arrived at Bell's apartment, she knocked on the door several times without getting any answer.<sup>125</sup> She later reported that she heard "muffled bumping sounds" coming from inside.<sup>126</sup> According to Richardson, she called out to Bell, but still got no answer.<sup>127</sup> She even tried to reach Bell later on in the day, by phone, without any success.<sup>128</sup>

Bell's boyfriend also unsuccessfully tried reaching her by phone on the same day, and when he returned home, at 6:00 p.m., he

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117. *State v. Allen*, 684 S.W.2d 417, 419 (Mo. Ct. App. 1984).

118. Geri L. Dreiling, *Semen Says*, RIVERFRONT TIMES, October 6, 2004, <http://www.riverfronttimes.com/2004-10-06/news/semen-says>.

119. *Id.*

120. *Id.*

121. *Id.*

122. *Id.*

123. *Id.*

124. *Id.*

125. *Id.*

126. *Id.*

127. *Id.*

128. *Id.*

found her body.<sup>129</sup> Seminal fluid was found on Bell's robe, on her pants and on a chair.<sup>130</sup> The police concluded that she had been raped and sodomized prior to her murder.<sup>131</sup>

Nothing was turned up during a six-week investigation. The police were looking for a convicted sex offender named Kirk Eaton, who had been seen in Bell's neighborhood prior to the murder.<sup>132</sup> On March 14, 1982, about six weeks after the crime, George Allen was walking about nine blocks away from Bell's apartment<sup>133</sup> when he was stopped by two patrolmen. Allen told them that he lived in University City.<sup>134</sup> However, since he did not have a photo ID, he was asked to come to the police station in order to verify his identity. After it was established that Allen "was not the man wanted for questioning in Mary Bell's murder, [he] was released."<sup>135</sup>

According to the prosecution, before leaving the police station, Allen made incriminating statements that led to his interrogation and, eventually, his confession to the rape and murder of Mary Bell.<sup>136</sup> Based solely on his confession, Allen was charged without any other evidence linking him to the crime.

Allen's place of residence, University City, was about ten miles away from Mary Bell's apartment at 1014b Marion Street in St. Louis.<sup>137</sup> Allen's mother, his sister and sister's boyfriend testified, on his behalf, that on the morning of the murder he was at home in University City, where the streets were snowed in.<sup>138</sup> At his first trial, Allen's defense "attack[ed] the probity of the boyfriend's testimony and accuse[d] him [of being] the more likely candidate to have had the opportunity and access to kill Mary Bell, thereby hamstringing rebuttal evidence by the state."<sup>139</sup> The jury at Allen's first trial was unable to reach a verdict, and a new trial was scheduled. At the second trial, the police brought alibi witnesses in order to show that Bell's boyfriend could not have been the murderer.<sup>140</sup> This time, the jury found Allen guilty of capital murder, rape, sod-

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129. State v. Allen, 684 S.W.2d 417, 419–20 (Mo. Ct. App. 1984).

130. *Id.*

131. *See id.* at 424.

132. *Id.* at 421.

133. *See id.* at 419–20.

134. *Id.* at 421.

135. *Id.* at 420.

136. *See id.*

137. Dreiling, *supra* note 11. This distance is more or less correct when checked against a map.

138. *Id.*

139. *Allen*, 684 S.W.2d at 422.

140. *Id.*



omy, and burglary, sentencing him to life imprisonment, without the possibility of parole for a period of fifty years.<sup>141</sup>

On appeal, the defense argued several points, all of which were rejected. One argument was that Allen's confession should have been excluded in response to his motion to suppress and timely trial objections, on the argument that the initial warrantless arrest, resulting in his subsequent confession, was not based on probable cause. The defense also claimed that his confession was involuntary.<sup>142</sup> The latter argument was rejected for the following reasons: Allen resembled two persons suspected in the murder of Mary Bell, and he had no photo ID. He was wandering around an area close to the scene of the murder. Thus, the court found that Allen's initial arrest was reasonable within the context of the Fourth Amendment of the Constitution and, therefore, his confession was not the forbidden fruit of an illegal seizure.<sup>143</sup> Moreover, the court rejected the claim of an involuntary confession, since Allen was "advised of his *Miranda* rights upon his initial arrest, prior to his questioning by the sex crimes officer investigating the rape[, and prior to [his] interrogation by the homicide detective at department headquarters."<sup>144</sup> It was further held that Allen had not been subjected to any illegal pressure such as physical force, threats, or other prohibited coercive tactics.<sup>145</sup>

In addition, the court rejected the argument that Allen's indictment was based entirely on the confession without any other evidence linking him to the crime.<sup>146</sup> The judges held that evidence independent of the confession established the *corpus delicti* of the offense.<sup>147</sup> The seminal fluid and anal lacerations proved that the victim had been raped and sodomized. The inconsistencies in Allen's confession regarding the details of the crime were found to not be dispositive.<sup>148</sup> This was because certain aspects of the confession were consistent with the evidence. The prosecution argued that the police did not know that Richardson had called out Bell's name when she knocked at the door until Allen provided this detail;<sup>149</sup> and that only following his confession did they question

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141. *Id.* at 419. This was the sentence for the charge of murder. In addition he was sentenced to three consecutive fifteen year terms for the remaining counts. *Id.*

142. *Id.* at 420.

143. *Id.* at 421.

144. *Id.* at 422.

145. *Id.*

146. *See id.* at 423–24.

147. *Id.* at 424.

148. *Id.*

149. *See id.* Although, it should be noted that during his interrogation, Allen referred to her as Sherry, and not Mary: "Ah, no, Sherry or somethin' like Sherry. Somethin'—I don't

Richardson about this fact, who confirmed it.<sup>150</sup> The prosecution also argued that, in his confession, Allen said that he heard the neighbor open and close the window. However, following the incident, the neighbor was very afraid to discuss the case with the police. She told investigators that she knew nothing. She also moved to another apartment. Only after Allen was apprehended did she tell the police what she knew.<sup>151</sup>

If Allen's confession was a false confession, then a very likely explanation is that police interrogators misled him into believing that they had fingerprints incriminating him:<sup>152</sup>

Q. [a question] George, I can't understand you. You remember so much, so many of the little details as I'm askin' you questions. You remember about the big bust she had, and about her waist and about this—

A. [an answer] I'm rememberin' it 'cause you got the evidence. I don't—

Q. I showed you—

A. —remember nothin'.

Q. You mentioned the knife. You mentioned the knife. You said a knife in the kitchen.

A. Yeah, but you got the evidence and the fingerprints, you know. Before we started talkin' I said, no, I don't remember.

Q. But now you do. Do you remember now?

A. Yeah, I remember.<sup>153</sup>

Thus, prior to this interrogation, there had been another, unrecorded interrogation, during which interrogators apparently told

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know her name." Geri Dreiling, *Confession Transcript*, RIVERFRONT TIMES, July 2, 2003, <http://www.riverfronttimes.com/2003-07-02/news/confession-transcript/bestof/2008/section/sports-and-recreation-29271>. In our opinion, a possible explanation for this is that sometimes interrogees who wish to please their interrogators repeat details that interrogators have provided to them—however, due to the limits of human memory, their recollection is imprecise.

150. *Allen*, 684 S.W.2d at 424.

151. *Id.*

152. *See* Dreiling, *supra* note 149.

153. *Id.*

Allen that they had other evidence against him. Research shows that when interrogators lie to suspects, telling them that they have solid evidence against them—particularly forensic evidence, such as fingerprints, which is considered to be very reliable—there is a high likelihood that this could lead to false confessions. This is so either because the interrogee has become confused and believes his interrogators or because he believes that he has no real chance of being acquitted anyway.<sup>154</sup>

#### VI. THE FALLACY OF THE TRANSPOSED CONDITIONAL IN THE GEORGE ALLEN CASE

Allen was first linked to the Bell murder by the suspicion of patrolmen who believed that he might be Kirk Eaton. That is to say, his arrest and interrogation were the result of an error. If not for his confession, every person in St. Louis—a big city with a large population<sup>155</sup>—could have been a suspect to the same extent. Geographical proximity was not even a factor, since, during the same period, Allen lived in University City, about ten miles away from Mary Bell's apartment in St. Louis.

Allen's case is similar to that of a defendant against whom there is DNA evidence, which—even with a low probability of a random match of 1/10,000—is still insufficient, on its own, to link him to the crime. This is because there are many individuals in the populace with an identical genetic profile. For every ten thousand people there is, on average, one person with such a genetic profile. In a population of hundreds of thousands, there would be dozens; in a population of millions, hundreds. Moreover, there is the possibility of a lab error, which is much more likely than the possibility of a random match.<sup>156</sup> In exactly the same manner, even if there is a low probability that a confession with discernible signs of truth would still be false, Allen's guilt is highly doubtful, since there was no other

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154. *See supra* notes 55–59 and accompanying text. Moreover, the confession transcript shows that the interrogators' questions were very leading, and it gives the impression that they basically "fed" Allen the details of his confession. *See Dreiling, supra* note 149. Many of the details provided by Allen during his interrogation were incorrect and only after interrogators questioned him over and over, leading him on, did he hit on the correct details or their approximation.

155. The population of St. Louis is about 350,000. The population of the Greater St. Louis area, the location of both the scene of the murder and Allen's residence, is approximately 2,800,000. *See St. Louis, Missouri*, WIKIPEDIA.ORG, [http://en.wikipedia.org/wiki/St.\\_Louis,\\_Missouri](http://en.wikipedia.org/wiki/St._Louis,_Missouri) (last visited Jan. 2, 2010).

156. NATIONAL RESEARCH COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 4.8–4.9 (2009) [hereinafter FORENSIC SCIENCES COMMITTEE].

evidence whatsoever against him. Also, as we will see below, the probability of error when dealing with confessions is significantly higher than the probability of error in DNA evidence.

The significance of doubt regarding the veracity of confessions—even if only one out of a hundred confessions is false—is that on every street where there are more than one hundred adults, there would be (on average) at least one other adult who would confess to the murder of Mary Bell if only he were interrogated under the same conditions as Allen. Even if we were to assume that only one out of a thousand innocent interrogees would falsely confess, still, in a population of hundreds of thousands, we could expect hundreds of false confessions, while in a population of millions we could expect thousands. And, as we will see shortly, we estimate that at least one out of ten innocent interrogees would give a false confession if they were all interrogated under accepted conditions of police interrogation. The relevance of the statistics of false confessions, in the case at hand, is that it tells us that there are many other people who would have confessed to the murder of Mary Bell if only they were interrogated like Allen. How can we know that Allen's confession is in fact true and not just one of those many false confessions that would have been obtained if others were interrogated in the same fashion?

From the appellate decision in Allen's case, it is clear that the judges were impressed by the fact that he seemingly provided details that only the murderer could have known and that the investigators themselves were supposedly unaware of. This is why they failed to ascribe any significance to other details in the confession that were inconsistent with the facts of the case. However, as Garrett found in his study,<sup>157</sup> thirty-eight out of forty false confessions that led to convictions, uncovered by the Innocence Project through DNA post-conviction comparisons, were rich in detail. Many of these false confessions were "contaminated" by details that supposedly only the perpetrator could have known.

Just to make it simple and clear, we should note that the probability that Allen's detailed confession was false "competes" with another, lower, probability, whereby it was just a coincidence that, as a result of mistaken identification, the police picked up someone in the street and, wonder of wonders, it turned out that he was actually the murderer. A probabilistic calculation shows that in an overwhelming majority of these types of cases the confession is false.

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157. See Garrett, *supra* note 45 and accompanying text.

From news reports of the case, it emerges that, in 2003, a DNA test was performed on the semen traces found on Mary Bell's robe and jeans.<sup>158</sup> This test revealed that the semen belonged to Mary Bell's boyfriend and not George Allen.<sup>159</sup> No traces of Allen's DNA were found at the crime scene.<sup>160</sup> However, these findings were not considered to be exculpatory evidence, as in other Innocence Project cases, because they only proved that Mary Bell and her boyfriend had sexual relations.<sup>161</sup>

VII. APPLICATION OF BAYESIAN LOGIC TO CONFESSIONS—  
FROM KEY EVIDENCE REQUIRING CORROBORATION  
TO CORROBORATION FOR KEY EVIDENCE

We believe that the confession is always suspicious evidence, and of questionable reliability. However, even those who disagree with us, and view the confession as accurate evidence, must be very cautious in a case like that of George Allen, when a conviction is based solely on a confession, without any other significant inculpatory evidence.

Moreover, the probabilistic calculation that we perform demonstrates that it is not just when the confession is the sole evidence that we need to be wary of the possibility that an innocent person will be convicted. The proper weight of the confession is so low that even strong corroboration is not necessarily sufficient in order to achieve a secure conviction.

*A. The Odds Form of Bayes' Theorem*

Let us take a case in which a suspect is interrogated with regard to a particular crime and has confessed. In a probabilistic analysis, we shall present this case as two hypotheses and one given event.<sup>162</sup> The first hypothesis assumes the suspect's guilt (indicated by "G"),

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158. Dreiling, *supra* note 118.

159. *Id.*

160. *Id.*

161. At Allen's trial, the prosecution claimed that the semen on the victim's clothing was Allen's, while the defense argued that it belonged to her boyfriend. About twenty years later, it was revealed that the semen could not have been Allen's and that it was "consistent" with the DNA of Bell's live-in boyfriend. As a result, the prosecution changed its version of the crime, admitting that the semen came from consensual relations between the victim and her boyfriend. *Id.*

162. For a similar analysis regarding the suggestibility of children, see Stephen J. Ceci & Richard D. Friedman, *The Suggestibility of Children: Scientific Research and Legal Implications*, 86 CORNELL L. REV. 33 (2000).

while the second hypothesis assumes the suspect's innocence (indicated by "*I*"). The given event is the suspect's confession to the crime during the interrogation (indicated by "*E*"—for "evidence").

Bayes' Theorem, presented in odds form, holds that:<sup>163</sup>

(1) Likelihood Ratio X Prior Odds = Posterior Odds.

The likelihood ratio is the probability ("P") that the interrogee would confess given the fact that he is guilty divided by the probability that he would confess given the fact that he is innocent.

$$(2) \text{ likelihood ratio} \equiv \frac{P(E | G)}{P(E | I)}$$

This is the mathematical expression of the strength of the evidence (in our case, the confession). For example, a likelihood ratio of 10 means that the probability that a guilty interrogee would confess is ten times greater than the probability that an innocent interrogee would confess. However, the likelihood ratio, on its own, is not a sufficient measure of the suspect's guilt or innocence, since it does not take into account any other evidence apart from the confession, but rather, assumes what actually needs to be proven (the numerator of the likelihood ratio assumes guilt and the denominator assumes innocence).

The prior odds are the probability of guilt divided by the probability of innocence, without taking the confession into consideration, based on the other admissible evidence before the court:<sup>164</sup>

$$(3) \text{ prior odds} \equiv \frac{P(G)}{P(I)}$$

The product of the likelihood ratio multiplied by the prior odds allows us to calculate what we are seeking in a criminal trial—the posterior odds (posterior odds = likelihood ratio X prior odds). This represents the weight of the confession together with the other evidence, defined as:

163. COLIN G.G. AITKEN & FRANCO TARONI, STATISTICS AND THE EVALUATION OF EVIDENCE FOR FORENSIC SCIENTISTS 95 (2d ed. 2004); Sangero & Halpert, *supra* note 3, at 49; William C. Thompson et al., *How the Probability of a False Positive Affects the Value of DNA Evidence*, 48 J. FORENSIC SCI. 47 (2003).

164. Thus, for instance, if a crime occurs on a deserted island (no one enters and no one leaves) with a population of 100 people, each of whom is a suspect to the same extent, then the prior odds of guilt would be 1/100 while the prior odds of innocence would be 99/100. The mathematical expression of the prior odds in such a case would be as follows:

$$\text{prior odds} = \frac{P(G)}{P(I)} = \frac{1/100}{99/100} = 0.0101$$

$$(4) \text{ posterior odds} \equiv \frac{P(G | E)}{P(I | E)}$$

When the posterior odds yield a value of 1, the probability of guilt given the confession is identical to the probability of innocence given the confession. When these odds are greater than 1, the probability of guilt is higher than the probability of innocence. Therefore, the greater these odds, the stronger the proof of guilt. When these odds are less than 1, the probability of innocence given (and despite) the confession is higher than the probability of guilt. Therefore, the lower these odds, the higher the probability of innocence.

In Bayesian language it is said that, to reach a verdict in a criminal trial, one must calculate the posterior odds of guilt. Bayes' Theorem shows us the tremendous significance of the prior odds, which are determined by evidence apart from the confession. Thus, for example, when a person is interrogated without any solid suspicion and, in the end, there is no other evidence against him apart from his own confession, and, assuming that all other citizens are just as likely to have committed the crime, then the prior odds of guilt could be as low as one in a million.<sup>165</sup> To ignore such a low probability is to ignore a sixth-order factor when calculating the probability of guilt. To neglect such prior odds is an extreme form of the fallacy of the transposed conditional.

### *B. The Likelihood Ratio of a Confession*

How do we determine the likelihood ratio of a confession? As we have seen, studies show that a phenomenon of false confessions does exist: many interrogees actually confess to crimes that they did not commit. It is reasonable to assume that the numerous cases of false confessions that have been revealed may be just the tip of the iceberg.<sup>166</sup> Unfortunately, there are no proven statistics for false confessions. However, in an experiment examining the phenomenon of academic cheating, 43% of those students subjected to a

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165. *R. v. Adams*, (1996) 2 Crim. App. 467 (noting that the defense expert, Prof. Donnelly, estimated the prior odds that the defendant was the perpetrator to be approximately 1/3,600,000); *see also R. v. Adams*, (1998) 1 Crim. App. 377; Sangero & Halpert, *supra* note 3, at 55 n.48.

166. GUDJONSSON, *supra* note 19, at 173; Richard A. Leo & Richard J. Ofshe, *The Social Psychology of Police Interrogation: The Theory and Classification of True and False Confessions*, 16 *STUD. L. POL. & SOC'Y* 189, 191 (1997).

combination of interrogation methods signed false confessions.<sup>167</sup> And, in a survey of 603 police interrogators in the United States, these professionals held a belief that the rate of false confession among innocent persons stood at 4.78%.<sup>168</sup> Similarly, in a study conducted in Iceland, 12% of those prisoners interviewed reported that they had confessed to crimes that they did not commit.<sup>169</sup>

Given these studies, given the false confessions that have been revealed, and given the inherent effect of conditions of interrogation (and detention) on suspects, we are willing to take a risk by estimating that at least one out of every ten innocent interrogees can be expected to give a false confession during a police interrogation. As we will see below, even based on much more optimistic estimates, whereby the probability of a false confession is only one out of a hundred or even one out of a thousand, there is still a considerable danger of a wrongful conviction in cases where the prior odds of guilt are low.

Are the courts able to identify these false confessions? As we have seen in Part III above, studies show that the answer is negative.

It should be made clear that, while regarding forensic evidence, such as DNA and fingerprints, the likelihood ratio should also reflect—along with the possibility of a random match—the possibility of a laboratory testing error or an expert's mistake;<sup>170</sup> regarding confessions, it is accepted that the court is essentially the expert. Therefore, we must address the possibility of error on the part of the court in determining the veracity of a confession.<sup>171</sup>

In our opinion, the likelihood ratio with regard to confessions is influenced by both the possibility of a false confession as well as the possibility of an error by the court in evaluating the veracity of a confession. In order to illustrate this quantitatively, let us assume that we have a proven statistic whereby the probability of a false confession by an innocent person is one in ten. Let us further assume that there is a 50% chance that the court will successfully identify a false confession (in light of the research discussed above, such as that of Leo and Ofshe (27%) and by Drizin and Leo (14%), this is an optimistic, conservative estimate). Therefore, the probability that a given confession is a false confession which will not be discovered by the court is one out of twenty (0.05). This figure is placed in the denominator of the likelihood ratio. In order

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167. See *supra* notes 61–68 and accompanying text.

168. Kassin, *supra* note 26; text accompanying *supra* note 69.

169. GUDJONSSON, *supra* note 19, at 176.

170. FORENSIC SCIENCES COMMITTEE, *supra* note 156; Sangero & Halpert, *supra* note 3, at 73–78; Thompson et al., *supra* note 163, at 48–49.

171. See Sangero & Halpert, *supra* note 3, at 87–88.



to determine the numerator of the likelihood ratio, we must calculate the probability that a guilty person would confess. As we know, the absence of a confession (a denial) is not considered evidence of innocence, since guilty persons often deny their guilt. Therefore, the probability that a guilty person would confess can be assigned a value of no more than 0.5.<sup>172</sup> If we place this value into the numerator of the likelihood ratio, we get:

$$(5) \text{ likelihood ratio} = \frac{P(E | G)}{P(E | I)} = \frac{0.5}{0.05} = 10$$

For the sake of those skeptics who believe that a confession is a very reliable piece of evidence, we will return to these calculations below, even for a likelihood ratio greater than 10.<sup>173</sup>

### *C. The Posterior Odds Necessary for a Criminal Conviction*

How are we to determine the posterior odds necessary for a criminal conviction? The accepted rule is that for the purposes of a conviction we require proof of guilt beyond a reasonable doubt.<sup>174</sup> The justification for this important rule is based on the gap in power between the state and the defendant, on the need to balance the presentation of alleged guilt, on the principle protecting the innocent and its reasoning, on the state's breach of the social contract vis-à-vis innocent persons—and even the guilty when they are convicted without a sufficient evidentiary basis—and on other weighty considerations.<sup>175</sup>

The proper definition of reasonable doubt is not quantitative, but rather qualitative: if at the conclusion of a trial the trier of fact is left with a doubt based on the evidentiary material, which the prosecution has not succeeded to remove, then, even if the probability of innocence is very low, the defendant must be acquitted.<sup>176</sup> Many find it hard to digest and apply this rule. Thus, there is a tendency to try to quantify reasonable doubt in percentages. Given the impossibility of reaching absolute certainty, guilt beyond a

172. Namely, the probability of a false negative for confessions is less than 50%.

173. And for the sake of those who are extremely skeptical, we will even deal with a likelihood ratio 100 times greater (a likelihood ratio of 1000).

174. PATRICK J. FITZGERALD, CRIMINAL LAW AND PUNISHMENT 192 (1962); Ronald J. Allen, *The Restoration of in Re Winship: A Comment on Burdens of Persuasion in Criminal Cases after Patterson v. New York*, 76 MICH. L. REV. 30, 37 (1977); Gerry Maher, *The Verdict of the Jury*, in THE JURY UNDER ATTACK 40, 45 (Mark Findlay & Peter Duff eds., 1988).

175. See Rinat Kitai, *Protecting the Guilty*, 6 BUFF. CRIM. L. REV. 1163 (2003).

176. See *Coffin v. United States*, 156 U.S. 432, 453 (1894).

reasonable doubt is assumed to be the highest standard of proof that is realistic and within the bounds of human knowledge.<sup>177</sup> One possible translation of this rule into percentages is a requirement of a certainty of guilt approaching 99%.<sup>178</sup>

According to Blackstone's famous dictum, it is better that ten criminals will be acquitted than that one innocent will be convicted; for our purposes, it is possible (and common) to say that out of eleven convictions we would tolerate, at most, one wrongful conviction. Thus, a conviction is only justified on the basis of a probability

of guilt of  $\frac{10}{11} = 90.91\%$ .<sup>179</sup>

However, this threshold of 1:10 significantly detracts from the certainty intended by the rule demanding proof of guilt beyond a reasonable doubt. In 1923, Judge Learned Hand wrote:

Our dangers do not lie in too little tenderness to the accused. Our procedure has been always haunted by the ghost of the innocent man convicted. It is an unreal dream. What we need to fear is the archaic formalism and the watery sentiment that obstructs, delays, and defeats the prosecution of crime.<sup>180</sup>

More recently, Justice Antonin Scalia expressed a certain degree of skepticism with regard to the data yielded by a study of 340 wrongful convictions.<sup>181</sup> In doing so, he cited the opinion of District Attorney Joshua Marquis, who argued that the percentage of wrongful convictions in a worst-case scenario is only 0.027%:

[L]et's give the professor the benefit of the doubt: let's assume that he understated the number of innocents by roughly a factor of 10, that instead of 340 there were 4,000 people in prison who weren't involved in the crime in any way. During that same 15 years, there were more than 15 million felony convictions across the country. That would make the error

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177. Laurence H. Tribe, *An Ounce of Detention: Preventive Justice in the World of John Mitchell*, 56 VA. L. REV. 371, 388 (1970); see also Kitai, *supra* note 175, at 1164.

178. See ALEX STEIN, FOUNDATIONS OF EVIDENCE LAW 16 (2005).

179. See Alexander Volokh, n *Guilty Men*, 146 U. PA. L. REV. 173, 174 (1997). Compare the "Blackstone ratio" with Volokh's survey of possible thresholds, ranging from 1:1 to 1:5,000. *Id.* at 187-92. Thus, for example, Maimonides has written that "it is better and more satisfactory to acquit a thousand guilty persons than to put a single innocent man to death." 2 MAIMONIDES, SEFER HA'MITZVOT [BOOK OF COMMANDMENTS] 270 (Charles B. Chavel, trans., Soncino Press 1984) (Negative Commandment 290). And for another discussion regarding this threshold, see Ceci & Friedman, *supra* note 162, at 76-80.

180. *United States v. Garsson*, 291 F. 636, 649 (S.D.N.Y. 1923).

181. *Kansas v. Marsh*, 548 U.S. 163, 197-98 (2006) (Scalia, J., concurring).

rate .027 percent—or, to put it another way, a success rate of 99.973 percent.<sup>182</sup>

A survey conducted in the United States found that greater than 70% of criminal justice officials questioned believed that wrongful convictions are rare occurrences—less than 1% of all cases.<sup>183</sup> In England, as well, many believed that wrongful convictions are very rare, but this view has changed.<sup>184</sup>

Therefore, the legal system ascribes a high degree of reliability to a legal approach based on reasonable doubt—i.e., an ultimate rate of wrongful convictions lower than 0.027%. This view grants almost absolute certainty to the reasonable doubt rule.

At the same time, American law easily adopts Blackstone's threshold of 1:10—which means a burden of proof of about 90.91% (10/11) certainty. And, indeed, in a survey conducted among 171 judges, it emerged that the most frequent choice was a threshold of proof of 90%, chosen by fifty-six judges, with forty-five judges understanding the reasonable doubt rule as a level of proof of less than 90% certainty, while seventy judges felt that it was greater than 90% (the average choice was 90.3% and the median was 90%).<sup>185</sup>

However, this accepted adoption of Blackstone's threshold could lead to results significantly different from the optimistic expectations regarding the nearly absolute reliability of the reasonable doubt threshold. In 2008, there were 2,310,984 inmates in U.S. prisons.<sup>186</sup> Such a threshold of 1:10 means that we are supposedly willing to tolerate a situation in which 9.1% of these 2,310,984 inmates, namely, 210,089 prisoners, are innocent.

However, the calculation should be slightly refined and made more precise: within the group of inmates, there are those whose probability of guilt, arising from the evidence adduced at trial, is

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182. Joshua Marquis, Op-Ed., *The Innocent and the Shammed*, N.Y. TIMES, Jan. 26, 2006, at A23, available at [http://www.nytimes.com/2006/01/26/opinion/26marquis.html?\\_r=1](http://www.nytimes.com/2006/01/26/opinion/26marquis.html?_r=1).

183. C. Ronald Huff, Arye Rattner & Edward Sagarin, *Guilty Until Proved Innocent: Wrongful Conviction and Public Policy*, 32 CRIME & DELINQ. 518, 522–523 (1986).

184. JUSTICE IN ERROR 16 (Clive Walker & Keir Starmer eds., 1993).

185. C.M.A. McCauliff, *Burdens of Proof: Degrees of Belief, Quanta of Evidence, or Constitutional Guarantees?*, 35 VAND. L. REV. 1293, 1324–27 (1982). Fifty-six judges chose a threshold of 90%, twenty chose 85%, fourteen chose 80%, eight chose 75% and another three judges were willing to suffice with a lower threshold. *Id.* at 1325. Three judges chose between 92–94%, thirty-one quantified the threshold as 95%, one judge chose 97%, six chose 98%, eight chose 99%, and twenty-one judges felt that the threshold is 100%. *Id.* For a review of additional surveys with similar results, see Lawrence M. Solan, *Refocusing the Burden of Proof in Criminal Cases: Some Doubt About Reasonable Doubt*, 78 TEX. L. REV. 105, 125–29 (1999).

186. Stacy A. Hickox, *Justifying Rejection of Applicants with Convictions*, 8 DARTMOUTH L.J. 39, 43 (2010).

higher than the minimum threshold for a conviction, which—according to Blackstone’s formulation—is 90.9%. Let us assume that the probability of guilt derived from the evidence against all 2,310,984 inmates is uniformly distributed,<sup>187</sup> from a threshold of 90.9% up to a maximum of 100%. That is to say, at each threshold there will be an identical number of cases. This makes it possible to calculate that 4.54% of the 2,310,984 inmates—namely, 105,044—are actually innocent!<sup>188</sup> Intuitively, this may also be presented as follows: the average conviction would have an average certainty of 95.45%—which is between the chosen threshold of 90.9% and 100%. According to Joshua Marquis’s figure of 15 million convictions in fifteen years,<sup>189</sup> we would be talking about 681,181 false convictions.

Therefore, a serious logical contradiction exists between the supposed willingness to set the minimum threshold of reasonable doubt at 1:10, which predicts 681,181 wrongful convictions over a period of fifteen years, and the optimistic belief that during these fifteen years “only” 4,000 false convictions have occurred. A simple calculation demonstrates that in order to limit the number of wrongful convictions to only 4,000 out of a total of 15 million convictions requires a reasonable doubt threshold of 1:1,874—i.e., a rule whereby it is better to set 1,874 criminals free in order to avoid one wrongful conviction.<sup>190</sup>

187. For such an assumption, see David Hamer, *Probabilistic Standards of Proof, Their Complements, and the Errors that Are Expected to Flow from Them*, 1 U. NEW ENG. L.J. 71, 90 (2004).

188. If we use *NFC* to signify the number of false convictions, *N* to signify all of the cases in which defendants are convicted ( $N=2,310,984$ ), *p* to signify the probability of guilt deriving from the overall evidence presented at trial against a given defendant (which varies from case to case), *T* to signify the minimum threshold for a conviction ( $T=10/11=90.9\%$ ), and assuming that the probability of guilt arising from the evidence is uniformly distributed, then we would get:

$$NFC = N \times \int_T^1 \frac{1}{1-T} \times (1-p) dp$$

Performing the integration would lead to the following result:

$$NFC = \frac{N \times (1-T)}{2}$$

When discussing a uniform distribution, it is easy to see (intuitively) the logic in the result: in order to calculate the number of false convictions, we need to multiply *N* by the average probability of guilt  $\frac{(1-T)}{2}$  between the chosen threshold *T* and 1 (the equivalent of 100% certainty).

Inserting the numbers will produce:

$$NFC = \frac{11}{242} N = 0.0454 N = 105044$$

The rate of false convictions would be 4.54%.

See *id.* at 89–96.

189. Marquis, *supra* note 182, quoted in *Marsh*, 548 U.S. at 197–98.

190. This result is obtained when *NFC* (number of false convictions), *supra* note 188, is defined as a constant and *T* (the threshold) is defined as a variable that must be calculated.

Moreover, in our opinion, there is no basis whatsoever for Marquis's choice of a factor of 10 as a multiple for these 340 cases. This is because these are 340 cases that a few professors—with their naturally limited powers—have succeeded to identify, and they only constitute the tip of the iceberg regarding the overall phenomenon. As the authors of the research wrote: “it is certain—this is the clearest implication of our study—that many defendants who are not on this list, no doubt thousands, have been falsely convicted of serious crimes but have not been exonerated.”<sup>191</sup>

Recently, Michael Risinger has examined the percentage of wrongful convictions in a more precise fashion than Marquis.<sup>192</sup> His analysis of Innocence Project data reveals a minimum factually wrongful conviction rate of 3.3% for capital rape-murder in the 1980s, and a “fairly generous likely maximum of 5%.”<sup>193</sup> These results totally disprove the Supreme Court's optimistic attitude, even regarding offenses that might carry the death penalty. However, there is no reason to believe that the numbers are lower for other offenses. Therefore, we do not share the optimistic view that it is possible to convict with a relatively low probability of guilt of 90% without paying a heavy price in wrongful convictions.

For the purpose of our Bayesian calculation, we would not go so far as a threshold of 1874, and not even a threshold of 1000, as proposed by Maimonides.<sup>194</sup> Instead, we shall adopt the ideological determination of Thomas Starkie, whereby it is better to acquit one hundred criminals than to convict one innocent;<sup>195</sup> namely, out of

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Removing  $T$  from the equation linking  $NFC$  to  $T$ , provided in *supra* note 188, results in the following:

$$T = 1 - \frac{2 \times NFC}{N} = 1 - 2 \times FCR$$

When the  $FCR$  (false conviction rate) appearing to the right of the value for  $T$  is defined as  $FCR \equiv \frac{NFC}{N}$  in the example provided by the Supreme Court, its value would be:

$$FCR = \frac{4,000}{15,000,000} \approx 0.027\%$$

Consequently, the threshold must be:

$$T = 1 - 2 \times FCR = \frac{1874}{1875}$$

In terms of posterior odds, this is equivalent to an extremely high threshold of 1,874.

191. See Samuel R. Gross et al., *Exonerations in the United States 1989 Through 2003*, 95 J. CRIM. L. & CRIMINOLOGY 523, 527 (2005).

192. D. Michael Risinger, *Innocents Convicted: An Empirically Justified Factual Wrongful Conviction Rate*, 97 J. CRIM. L. & CRIMINOLOGY 761, 762 (2007).

193. *Id.* at 780.

194. See *supra* note 179.

195. See *Schlup v. Delo*, 513 U.S. 298, 325 (1995) (quoting T. STARKIE, *EVIDENCE* 756 (1824) (“The maxim of the law is . . . that it is better that ninety-nine . . . offenders should escape, than that one innocent man should be condemned”)); see also *United States v. Cole*,

101 convictions we would tolerate, at most, one false conviction. In other words, it is justifiable to convict only on the basis of posterior odds of at least 100, or a probability of guilt of  $\frac{100}{101} = 99.1\%$ .

However, as we will see below, even someone who chooses a lower threshold of proof, such as 90%, will find that a confession is not evidence with the potential to prove guilt in accordance with this threshold.

*D. The Prior Odds Necessary for a Conviction Based on a Confession*

In the previous sections we have established a likelihood ratio of 10 for confession evidence and have proposed the choice of a minimum threshold of 100 for posterior odds, while we are aware of the fact that American law, apparently, accepts a threshold of 10. It remains for us to determine what prior odds are required in order to prove guilt beyond a reasonable doubt. When we insert the relevant numbers into Equation (1), the prior odds necessary to convict based on a confession must be at least 10:

$$(6) \quad \text{prior odds} = \frac{\text{posterior odds}}{\text{likelihood ratio}} \geq \frac{100}{10} = 10$$

Therefore, we must demand that:

$$(7) \quad \text{prior odds} = \frac{P(G)}{P(I)} \geq 10 \Rightarrow P(G) \geq 10 \times P(I)$$

To put it in words: the probability of guilt without a confession, derived from the remaining evidence, must be at least 91% in order to achieve proof of guilt beyond a reasonable doubt (a posterior odds threshold of 100) based on a confession.

Therefore, the conclusion that will certainly surprise many readers is that it is more correct to treat a confession as corroboration for other solid evidence—if it exists—and to no longer view it as the key evidence for a conviction that only lacks corroboration.

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25 F. Cas. 493, 509 (D. Ohio 1853) (“For it is better, far better, that ninety-nine guilty persons should escape human punishment, than that one innocent person should suffer it.”); *Finchim v. Commonwealth*, 3 S.E. 343, 344–45 (Va. 1887) (“We have accordingly given to the case, and to the arguments of counsel, the most careful consideration; mindful all the time that it were better, in the eye of the law, that ninety-nine guilty men should go unpunished, than that one innocent man should be condemned.”); Ceci & Friedman, *supra* note 162, at 76–80; Volokh, *supra* note 179.

This requires a significant reversal in the accepted view of the role of the confession in criminal law.

Even if we assume that a confession is much more precise evidence and that only one out of a hundred cases in which an innocent person is interrogated will yield a false confession, the likelihood ratio in Equation (5) should increase from 10 to 100. In such a case, the prior odds in Equation (6) must be greater than 1:

$$(10) \text{ prior odds} = \frac{\text{posterior odds}}{\text{likelihood ratio}} \geq \frac{100}{100} = 1$$

That is to say:

$$(11) \text{ prior odds} = \frac{P(G)}{P(I)} \geq 1 \Rightarrow P(G) \geq P(I)$$

In other words, even if we assume that a confession is ten times more precise than we have estimated, then, in order to achieve a conviction beyond a reasonable doubt we must still demand that the probability of guilt *without* the confession is greater than the probability of innocence.

The following table illustrates the significance of a conviction under various conditions and with different figures:

<b>Prior Odds</b> (based on the remaining evidence, apart from the confession)	<b>Likelihood Ratio</b> (strength of confession evidence)	<b>Posterior Odds</b> (the final conclusion)	<b>Probability of Guilt</b> (in percentages)
1/1 ("50:50")	10	10/1 ( 1 out of every 11 such convictions is wrongful)	91%
1/10	10	1/1 (1 out of every 2 such convictions is wrongful)	50%
1/100	10	1/10 ( 10 out of every 11 such convictions are wrongful)	9%
1/1000	10	1/100 (100 out of every 101 such convictions are wrongful)	0.99%
1/10,000	10	1/1000 (1000 out of every 1001 such convictions are wrongful)	0.099%
1/10,000	100 (assuming the confession to be 10 times stronger than our estimate)	1/100 (100 out of every 101 such convictions are wrongful)	0.99%
1/10,000	1000 (assuming the confession to be 100 times stronger than our estimate)	1/10 (10 out of every 11 such convictions are wrongful)	9%

The first five lines of the above table illustrate various prior odds for a likelihood ratio of 10 (which reflects, in our estimation, the realistic power of the confession as proof of guilt). The first line represents a case in which, without the confession, the probability of guilt (the prior odds, based on the other evidence) is 50%. That is to say, there is other, significant evidence against the defendant. In such a case, the posterior odds (the final conclusion) are 1:10, or, in other words, out of eleven convictions, one is a wrongful conviction. This is an illustration of the choice of a threshold derived from Blackstone's approach. This means that, even at such a relatively low, dangerous threshold, the extent of evidence without the confession still must be at least a balance of probabilities in order to convict—a far cry from the case of George Allen, where his probability of guilt without the confession was very low. When the prior odds are one in ten thousand, then the (final) probability of guilt is less than 0.1%, while the probability of innocence is greater than 99.9%.

For those who believe the confession to be much more precise evidence than our estimate (a likelihood ratio of 10), we have added to the table the possibility of a likelihood ratio of 100, and the imaginary possibility of a likelihood ratio of 1000. And, even under such assumptions, when the prior odds are as low as one in ten thousand (i.e., there is no other significant evidence against the defendant apart from the confession), the probability of guilt is only 1% and 9% (respectively)—such that the prosecution would not even be able to prevail in a civil trial, based on a preponderance of the evidence. Moreover, even those who believe a threshold of 90.91% to be sufficient (derived from Blackstone's dictum) would not reach a conclusion of guilt.

#### VIII. POSSIBLE CRITIQUES OF THE PROBABILISTIC ANALYSIS OF A CONFESSION

Various critiques of our proposition and the basis for it will likely be advanced. We have anticipated these and provide responses to them. One possible critique is the argument that a confession is not statistical evidence and, therefore, not conducive to the probabilistic analysis that we are conducting through the use of Bayes' Theorem. Since the probability of false confession is not insignificant, it is necessary to determine what we can learn from probability theory in assessing the proper weight of the confes-



sion.<sup>196</sup> In Supreme Court judgments, the approach that has taken shape negates the metaphysical certainty of a legal decision and views error as an occurrence with a probability greater than zero.<sup>197</sup> Since all evidence is probabilistic, including the confession, a reliance on probabilistic logic, particularly Bayesian logic, could help us considerably to reach legal decisions while avoiding cognitive illusions.<sup>198</sup>

A second possible critique would be that the statistics of false confession (even if such statistics were reliable) are irrelevant to an examination of the veracity of a confession in a given case. According to this argument, the relevant question is whether or not the specific confession is false, and not the percentage of false confessions in other cases. In a given case, the trier of fact can determine whether the confession is true in isolation from the remaining evidence or despite its absence. This is accomplished through an impression of the confession, the interrogation tapes, the defendant's testimony, his tone of voice, his body language, the cross-examination of his interrogators regarding any illegitimate pressure that might have been exerted, and other "signs of truth" regarding the confession.

This argument is similar in nature to the "case specific" argument regarding DNA evidence, which states that the statistics of lab error are unimportant when trying to determine the possibility of error in a given case, since the trier of fact is able to examine the conduct of the laboratory that performed the test and to decide

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196. Bayesian analyses of other, non-forensic evidence also exists in legal literature. Thus, for example, a Bayesian analysis of the incriminating testimony of children with regard to sexual exploitation has appeared in the Cornell Law Review. See Ceci & Friedman, *supra* note 162, at 80–89; see also Sangero & Halpert, *supra* note 3.

197. See *Victor v. Nebraska*, 511 U.S. 1, 14 (1994) ("But the beyond a reasonable doubt standard is itself probabilistic."); see also *United States v. Veysey*, 334 F.3d 600, 606 (7th Cir. 2003) ("Statistical evidence is merely probabilistic evidence coded in numbers rather than words."); *Riordan v. Kempiners*, 831 F.2d 690, 698 (7th Cir. 1987) ("All evidence is probabilistic—statistical evidence merely explicitly so."). This view has also been expressed in legal literature. See, e.g., Richard A. Posner, *An Economic Approach to the Law of Evidence*, 51 STAN. L. REV. 1477, 1508 (1999) ("It is now generally recognized, even by the judiciary, that since all evidence is probabilistic—there are no metaphysical certainties—evidence should not be excluded merely because its accuracy can be expressed in explicitly probabilistic terms . . .").

198. Despite the fact that, in his article, Posner does not propose that Bayes' Theorem be introduced into the law, he does view it as a guide for decision-making in conditions of uncertainty: "The process by which evidence is obtained, presented, and evaluated in a trial can be fruitfully modeled in economic terms, using either a search model or a cost-minimization model and incorporating Bayes' theorem as a guide to rational decision making under uncertainty." Posner, *supra* note 197, at 1542 (emphasis added).

whether a lab error actually occurred even when there is no additional evidence against the defendant.<sup>199</sup>

There are several good arguments to refute this claim. First of all, the statistics of false confession are relevant to a given case because it tells us how many other possible suspects would have confessed if only they were interrogated in said case. As we have seen, the set of evidence in the rape of the Central Park jogger,<sup>200</sup> considered persuasive enough to convict five youths beyond a reasonable doubt, lost its credibility in favor of more convincing evidence against a different suspect—Matias Reyes. Similarly, if the trier of fact was faced with not just two sets of evidence, each of which, on its own, could have led to the conviction of a different defendant, as in the case of the Central Park jogger, but instead with 10 or 100 or even 10,000 sets of evidence, each of which, on its own, could, under the present legal situation—in which the confession is considered to be key evidence—have been sufficient for the conviction of a defendant, then no one would argue that the trier of fact is able to determine whether, in a given case, the confession is true. In such a case, in order to distinguish between the competing confessions, the trier of fact would have to demand independent, strong corroboration, extraneous to the defendant, connecting the defendant to the commission of the crime. The trier of fact could not pretend that he is able to choose the true confession, from among the many false confessions that might be expected according to the general statistics of false confession, solely based on the specific characteristics of the case at hand. There is only one reason why the confession of just one defendant is before the trier of fact, and not these other sets of evidence: the police do not interrogate (and are not supposed to interrogate) all members of the population in an attempt to elicit confessions.

Secondly, normative theories of prediction state that in order to determine the occurrence of error in key evidence it is necessary to address the overall evidence in the case, which in Bayesian language is referred to as the prior odds. On this subject, Nobel laureate Daniel Kahneman and his research colleague, Amos Tversky, have written that “[t]he failure to appreciate the relevance of prior probability in the presence of specific evidence is perhaps

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199. “The question to be decided is not the general error rate for a laboratory or laboratories over time but rather whether the laboratory doing DNA testing in this particular case made a critical error.” NATIONAL RESEARCH COUNCIL, *THE EVALUATION OF FORENSIC DNA EVIDENCE* 85 (1996); see also Jonathan J. Koehler, *Why DNA Likelihood Ratios Should Account for Error (Even When a National Research Council Report Says They Should Not)*, 37 *JURIMETRICS J.* 425, 431 (1997); Sangero & Halpert, *supra* note 3, at 56–59.

200. See *supra* note 40 and accompanying text.

one of the most significant departures of intuition from the normative theory of prediction."<sup>201</sup>

As we have seen,<sup>202</sup> there are cases in which low prior odds could reduce the certainty in a conviction based on a confession by several orders of magnitude. Ignoring such low prior odds is an extreme form of the fallacy of the transposed conditional. This is so even if the impression of a particular confession (without any other external evidence), derived from elements such as the interrogation tapes and the defendant's testimony in court<sup>203</sup> support the belief that the confession is true.<sup>204</sup> The lower the prior odds derived from the remaining facts of the case, the greater the probability that the defendant is innocent and that an error has occurred. In other words, the greater the doubt regarding the defendant's guilt, isolated from the confession, the greater the probability that this is actually a false confession.

Moreover, the corroboration for a confession must be so strong that not only will it distinguish the person who has confessed from those same ten thousand people who would have confessed had they been interrogated, but it must also establish the defendant's guilt beyond a reasonable doubt. This corroboration must reduce the probability of innocence given (and despite) the confession, which, in some cases is greater than 99.99%, to less than 1% (since

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201. Daniel Kahneman & Amos Tversky, *On the Psychology of Prediction*, 80 *PSYCHOL. REV.* 237, 243 (1973).

202. See *supra* note 165 and accompanying text.

203. Characteristics which, in our estimation, may be found in every single case if only one wishes to find them.

204. See the instructive explanation by Jonathan J. Koehler, who criticizes the view that lab error statistics in the field of DNA testing are irrelevant for a determination as to whether an actual error occurred in the case at hand:

By this reasoning, one should predict that nearly all newly married couples will stay married, that most major-college football players will play professional football, and that most law professors who submit articles to the Harvard Law Review can expect an acceptance letter. Why? Because, in each case, it is easy to identify a host of individuating features that support the favorable outcome. The Jones newlyweds love each other deeply, Smith the college football player has an influential agent, and Taylor the law professor is working in a hot area of the law.

But depressing base-rate frequency statistics tell us that 50% of marriages end in divorce, 99% of major college football players do not make it into professional football, and more than 99% of articles submitted to the Harvard Law Review are rejected. Surely a person who takes these base-rate statistics into account will make more accurate judgments than a person who relies solely on a select sample of individuating information that is consistent with the favorable outcome.

Jonathan J. Koehler, *On Conveying the Probative Value of DNA Evidence: Frequencies, Likelihood Ratios, and Error Rates*, 67 *U. COLO. L. REV.* 859, 873 (1996).

it is better that a hundred criminals go free than for one innocent to be convicted); or—according to a different view, which we do not share—to less than 10% (in accordance with Blackstone’s ratio). This corroboration should be very strong. It is highly doubtful that it is proper to continue referring to it as “corroboration”: given the very limited weight of the confession, it seems that the key evidence necessary for a conviction is lacking.

This might be the place to stress that we are not suggesting that the trier of fact must calculate probabilities and reach a decision based on such calculations. In our opinion, the possibility of error that exists for all evidence, whether this is a lab error in DNA testing or a false confession, leads to a reasonable doubt that the prosecution must overcome by means of other evidence. This is so regardless of the quantification of this probability. However, without the formal-mathematical description and without an understanding of the importance of prior odds, even evidence with a low probability of error (such as DNA or fingerprints) could, in certain cases, appear much stronger than it actually is. This is the case, even more so, with regard to weaker evidence, including a defendant’s confession.<sup>205</sup>

## IX. EPILOGUE

In this Article, we have illustrated the danger of wrongful convictions resulting from false confessions. Given the fact that the probability of a false confession is not insignificant, we have shown the importance of an awareness of the fallacy of the transposed conditional. The probabilistic analysis that we have conducted shows that there is a need to alter the perception of the confession: a confession should no longer be viewed as key evidence capable of supporting a conviction, which only require some sort of corroboration. Instead, a confession must be viewed solely as corroboration for other key evidence, if it exists.

We have demonstrated this through the case of George Allen. The prior odds of George Allen’s guilt were very low. Without his confession, there was no significant evidence linking him to the rape or the murder of the victim and every other person in the same city was suspect to the same degree. In such a situation, in order to overcome such low prior odds of guilt,<sup>206</sup> it was neces-

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205. This is also the case with eyewitness testimony. See Sangero & Halpert, *supra* note 3, at 90–94.

206. See *supra* table in Part VII.D.

sary—based on the laws of probability—for the key evidence (in this case, the confession) to be more reliable. The research in this field leads to the conclusion that confessions are very far from being sufficiently reliable for this purpose.

We have also shown that the legal system's expectations regarding the reasonable doubt threshold—a (supposedly) negligible number of false convictions—are inconsistent with the willingness to choose a threshold of guilt sufficient for a conviction such as that implied by Blackstone's approach (1:10). Therefore, we prefer the higher threshold proposed by Starkie (1:100). Based on this threshold, we have shown that there is a need to alter the perception of the confession: a confession should no longer be considered to be key evidence, but only corroboration for other key evidence. This conclusion is also valid for the lower conviction threshold derived from Blackstone's ratio. When the prior odds of guilt (based on the other evidence, apart from the confession) are low, then the posterior odds of guilt (calculated by the overall facts) are also low. The laws of probability teach us that there is a very high probability that the defendant is innocent. That is to say, in cases like George Allen's, where the confession is the only evidence of the defendant's guilt, a trial ending in a conviction is likely a wrongful conviction. Unfortunately, this matter was not properly addressed in the judgments sentencing George Allen to life imprisonment, and it is not properly addressed in many other similar cases.

The court of appeals held that, since there was probable cause for George Allen's arrest, the confession should not be viewed as the illegitimate fruit of an illegal arrest. We believe that the legislature should require that the interrogation of a suspect is conditional on the existence of a strong, well-established suspicion against him regarding the crime for which he is being interrogated, regardless of whether or not the *Miranda* rule has been followed. In our opinion, the police should not be allowed to conduct fishing expeditions in an attempt to elicit confessions from "suspects." The results of such interrogations, which are not accompanied by key, extraneous evidence, are simply unreliable. Similarly, given the limited reliability of eyewitness testimony, there is a reform proposal, which also makes use of a Bayesian calculation, to not conduct a lineup when there is no reasonable suspicion against a person that he is the perpetrator.<sup>207</sup>

In the Middle Ages, when confessions were elicited through torture, it was recognized that the confession alone did not carry

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207. Gary Wells, *Eyewitness Identification: Systemic Reforms*, 2006 WIS. L. REV. 615, 635–40.

much weight and, therefore, probable cause was required as a precondition for interrogations by torture. In fact, a rule was even established disqualifying confessions obtained without such probable cause.<sup>208</sup> It seems that we have taken a step backwards at this point; it is time to take a step forward and permit *confessions to be viewed solely as corroboration for other key evidence*.

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208. JOHN H. LANGBEIN, PROSECUTING CRIME IN THE RENAISSANCE: ENGLAND, GERMANY, FRANCE 179–88 (1974). For an approach whereby the detention of modern times has replaced the torture of the Middle Ages, see Rinat Kitai-Sangero, *Detention for the Purpose of Interrogation as Modern "Torture"*, 85 U. DET. MERCY L. REV. 137 (2008).