GAVIN PUBLISHERS

Journal of Forensic studies

Abímbọ́lá K. Forensic Stud: FSTD-110.

DOI: 10.29011/FSTD-110. 100010

Review Article

The Historical Nature of Forensic Inference

Kọ́lá Abímbọ́lá*

Department of Philosophy, Howard University, USA

***Corresponding author:** Kọ́lá Abímbọ́lá, Associate Professor, Department of Philosophy, Howard University, USA. Tel: +15717337700; Email: kolapo.abimbola@howard.edu

Citation: Abímbọ́lá K (2017) The Historical Nature of Forensic Inference. Forensic Stud: FSTD-110. DOI: 10.29011/FSTD-110. 100010

Received Date: 05 June, 2017; **Accepted Date:** 10 July, 2017; **Published Date:** 17 July, 2017

Introduction

This paper examines the role of history in forensic inference. It maintains that forensic reasoning has a structure that is understandable only if we pay attention to the evolution of inference in adjudication. In developing this point, a distinction is made between two types of history, and it is argued that both histories are crucial to the validity and cogency of forensic conclusions.

Knowing the Facts

What exactly do we mean by "Inference"? John Henry Wigmore discussed this very question, and his answer was dual: the one general, the other technical. In its general sense, inference is "The process of thinking about a piece of evidence, not the result" [1]. Here the term signifies the thought process by which we extract information or conclusion from evidence. It does not describe the piece of evidence, (which is the basis for our thought processes). Nor does it describe the result (i.e. conclusion) we arrive at from our evidence. Rather, it describes the mental act of drawing conclusions from items of information.

Wigmore's technical definition of inference takes it offshoot from the fact that reasoning within forensic contexts always involves more than one step. All forensic reasoning is cumulative. It involves a series of steps that form a chain of reasoning in which a latter step is inferred from an earlier one [2]. As Schum and others have emphasized, we need to distinguish E (the occurrence or non-occurrence of an event) from E^* (someone's testimony that an event did or did not occur). So, suppose we designate Ian Williams' testimony as: E^*. Williams' testimony to event E (i.e. E^*) is not the same as event E itself. The mere fact that Williams testifies to E does not provide conclusive evidence of the occurrence of event E. Williams may be lying or mistaken in his testimony. Simply put, E (the occurrence or non-occurrence of an event) is distinct and distinguishable from E^* (someone else's claims that event E occurred). $E \neq E^*$

If E is not equal to E^*, then, whenever we infer that an event has occurred (or that a fact is true) from the evidence proffered, there will be multiple chains of reasoning connections that form bridges between the conclusion (E) and evidence adduced (E^*).

Indeed, in the legal context it is inconsistent to equate E with E^* because there are always two sides to a trial. Typically, the prosecution wants the judge or jury to infer E from a series of evidence presented, but the defence wants the judge or jury to infer not-E (which, henceforth, will be written as E^c) [3].

Suppose E^* is equated with E. If this equation holds, then whenever a witness testifies that E, we will have to take that testimony as conclusive evidence for the occurrence of E. If this jump from a witness's testimony that E to the occurrence of E is legitimate, then whenever a prosecution witness asserts E, we will be justified in asserting that E occurred. But by the same token, we should be justified in asserting E^c whenever a defence witness asserts E^c. But this would be contradictory because E and E^c cannot both be conclusively true. E and E^c (in the same trial, and when asserted of the same piece of evidence) cannot both be true. To assert that ($E\&E^c$) is true is a contradiction. Hence, we can also infer that it is logical contradictory to equate E^* with E^{*c}.

The thrust of the foregoing is this. Whenever we are urged that, due to certain considerations, we have legitimate grounds for inferring E, we are well advised to distinguish E^* (the evidence proffered) from E itself. Unfortunately, in the legal process, evidence is often equated with facts. Jurors are for instance called fact finders, presumably because their decisions and verdicts are drawn from objective evidence (and not just drawn because of speculation, guess, or intuitions). The whole trial process in an adversarial system is also known as fact determination. But just as $E \neq E^*$, fact is not equal to evidence.

According to the positivist image of law (an image assumed by all Anglo-American legal systems), the law is said to apply to only those facts of the case that have either been determined by the courts, or that have been admitted by the parties to a trial. And indeed, it is only when the facts of the case are disputed that the whole trial process is set into motion. The trial process is that of finding out what the facts are so that the law can be applied to the

decided facts. Hence, the assumption is that: although facts are not created by the law, (fact exist out there in the real world independently of the law), it is the law that determines the rights and duties that are attached to certain facts. But as facts are often disputed, it is a function of the courts to ascertain and determine what these disputed facts is, and to then spells out the legal consequence of these facts.

This image of the law is described by Zuckerman as the assumption of the objectivity in adjudication:

"In legal reasoning, we proceed according to normative rules laid down by the lawmaker or by morality, and we aim to determine what these rules require the citizen or court to do. By contrast, in factual reasoning, it is supposed, we are not concerned with what the rules of law or morality requires but with what facts exists. To ascertain facts, it is said, we only must follow the forms of reasoning which are employed for this purpose in any form of factual inquiry [4]."

But ascertaining whether a fact exists out there in the real world is often not an easy task. This is because reasoning from facts requires evidence. That is, we need to identify certain "Facts" which are taken as "Given," "Established," "Justified" or "Well-founded," and these then functions as "Evidence" in resolving the facts that are currently in dispute. This means that there is no qualitative difference between facts and evidence: facts are evidential, and evidence is factual. Second, in our descriptions of reality, we often take so many things for granted; and whether something we designate as a fact exists out there in the real world (and not merely in our minds or in our assumptions) is always dependent on the assumptions we make.

For instance, suppose I look out of my window in January and I notice that it is snowing. I might be justified in assuming that it is indeed snowing. But supposing that you now know that my apartment is situated next to the Pinewood Studios at Elstree. Suppose further that whenever they are simulating snow from Studio 10, I always see their simulated snow from this window. With this additional background information, I will not be justified in claiming that it is snowing simply because I see what looks like snow from my window. Whatever assumptions we rely on in our interpretations of phenomena have some relevance to the question of what can count as a fact. And until we spell out what these assumptions and background information are, we cannot simply conclude that a potential fact is indeed a genuine fact. Whether a fact is veridical or not always depends on the assumptions we uphold in our interpretations of phenomena. The implication of this is that in Anglo-American systems of law, all facts are evidence-based; and all evidence is in turn fact-based.

Philosophers have of course always taken the role of assumptions and background information very seriously. In philosophy of science, facts are usually said to be the basis on which scientific theories are tested. But philosophers like Kuhn [5] and Poincare [6] have noted that we need to distinguish between a narrow and a broad sense of facts. Poincare's distinction between crude facts and scientific facts. Scientific facts are theoretical statements that are taken by scientists to express true descriptions of reality. But statements which do not depend upon any high level theoretical assumptions are said to be crude facts. Thus, the claim that the sun is made up of three layers -the photosphere (i.e. the core), the chromosphere (i.e. the sphere of colour), and the corona (i.e. the outermost, gaseous layer), is a scientific fact. The innermost part of the sun has never been seen or examined by any individual or electronic device. But because this claim is an inference founded upon the acceptance of theories like the big bang, the general theory of relativity, and the equation $E=mc^2$, astrophysicists accept this claim as a scientific fact. A crude fact for Poincare would be a claim such as: 'tiny flake-like pieces of white droplets are descending from the skies.'

Scientific facts are informed by theoretical assumptions that are so hard-wired into background knowledge and beliefs that their truth is taken for granted-even though, in fact, they are not indubitable. Scientific facts are everywhere. The claim that the earth is a planet that revolves around the sun, or the claim that there are elementary particles, is both scientific facts. Crude facts, however, are more like immediately apprehended matters of fact -claims such as: this object in front of me is red, somewhat rectangular, is made up of glass and metal, and is also a kind of container which can move from A to B when it is occupied by humans. (The shorthand name for this description is: 'A Car'.)

In law as well, we must carefully distinguish constitutive facts from evidential facts. Constitutive facts (ultimate, dispositive, or material facts, as they are also known) are technical and theoretical constructs of the law. They are like the scientific facts of philosophers. For they are also conditional in the sense that they are legally defined notions which have specified legal consequences attached to them. For instance, "Unlawful intentional killing" is a constitutive fact to which the legal consequence "Guilty of murder" applies. Other examples of constitutive facts include 'Offer', 'Acceptance', 'Trespass', etc. The implication of these examples should not be lost: constitutive facts are not just concrete observable objects; they are constructed and include events, beliefs, actions, state of affairs, etc.

Constitutive facts are inferred from evidential facts. The defendant's fingerprints, the testimony of Mrs. Jones, the CCTV footage, the bloodstained knife are the evidential facts from which the constitutive facts: "Unlawful killing" and "Taking of property belonging to another with intention to permanently deprive the other of it," will be inferred.

Hohfeld succinctly describes the relation between these two types of facts as follows:

"An evidential fact is one, which, on being ascertained, affords some logical basis-not conclusive-for inferring some other facts. The latter may be either constitutive fact or an intermediate evidentiary fact [7]."

The preceding point leads to another. In the forensic process, facts, (whether constitutive or evidential), are not simply descriptions or records of occurrences and events. Nor do them simply record phenomena as they occur. Rather facts in law are constructed and inferred from information. The key implication of the foregoing is this: in forensic proof, the facts are not the stars of the process. Rather, it is the pedigree of the inference that is paramount.

A General Theory of Inference

Inferential processes are varied and complex because they involve a wide range of disciplines, professions, procedures and a wide spectrum of many day-to-day activities. In some contexts, inferential processes concern events (and/or actions) in the past, in some contexts; they are about possible future events (and/or actions). In some fields of endeavor, inferential processes are individuated or singular in the sense that the making of a decision in that process is the sole responsibility of just one individual. But in other contexts (such as when a legal tribunal makes an adjudicative decision) inferential reasoning is a symbiosis of the acts of numerous actors. Inferential reasoning goes on in so many diverse fields of endeavor that one would expect to have various theories of inference to account for the various contexts in which such reasoning are engaged in in our day-to-day lives.

The literature on theories of inference at first seems to confirm this expectation. Schum for instance writes that:

"… We have a variety of well-articulated formal systems for representing various attributes of inference and inference-related tasks. The major "schools" of inferential "directions currently being discussed include:

1. The Pascal/Bayes School of Probability and Uncertainty,
2. The Bacon/Mill/Cohen School of Inductive Probability,
3. The Shafer/Dempster School of Non-Additive Beliefs,
4. The Zadeh School of Fuzzy Probability and Inference, and
5. The Scandinavian School of Evidentiary Value [8]."

Proponents of these schools believe that the tenets of their position are at loggerheads with those of the other schools.

Consider, for instance, the antagonism between the Pascal/Bayes School of Probability and Uncertainty (the Bayesians) and the Bacon/Mill/Cohen School of Inductive Probability (the Baconians). One central difference between these two conceptions of probability is that, unlike Bayesian probabilities, Baconian probabilities are ordinal and as such cannot be combined in an algebraic manner. Hence, although we can compare Baconian probabilities, we cannot add, subtract, divide, or multiply them. Contrariwise, these algebraic calculations are indispensable to standard Bayesian subjective probabilities.

Probabilistic inferences for the Baconian school of thought are in principle objective and are non-mathematical. They are not expressions of subjective beliefs. Rather they are inductive inferences that are dependent upon the weight of evidence we have in support of any conclusion. For instance, in the standard Bayesian system, the probability of the joint occurrence of two events is calculated by multiplying the probability of event A with that of event B, and the joint probability of events A and B is always less than the probability of A on its own, or B on its own. But in the Baconian system, this is not so: joint probabilities are always greater than the individual probability of each event.

Bayesians and Baconians usually assume that these two schools are inconsistent are at least incompatible. Bayesians like Robertson and Vignaux, for instance, are quite explicit about their claims:

"… The reasoning process must conform to Bayesian logic or be wrong. The analogy with a judge instructing a jury is with a parent teaching a child to ride a bicycle. The parent does not instruct the child consciously to consider the laws of mechanics but what instruction is given must conform to their requirements [9]."

Although Cohen [10] maintains that Baconian and Bayesian probabilistic inferences are not rivals, [11] he disagrees vehemently with Bayesians about which view of probability best captures the patterns of inferential reasoning from fact to proof in law.

Consider for instance an example of the difference between these two systems of probability when it comes to joint probabilities in the forensic context. Suppose we have a trial in which the prosecution argues that Mr. Elliot burgled the Joneses house. To prove their case, the prosecution could offer evidence that Elliot was seen running away from the house. Mrs. Jones would testify that she did in fact see Elliot running away from the house. Moreover, Elliot's fingerprints (the prosecution would maintain) matches prints recovered from the crime scene. Ian Williams would testify to this. All these individual items of evidence become the basis on which the prosecution draws the inference to the conclusion that Elliot is in fact the burglar. In the Bayesian system, probability estimate move from 0 to 1, and to calculate the probability of Elliot being the burglar based on these items of evidence, the Bayesians will multiply the individual probability of each item of evidence. Since probability estimates move from 0 to 1, the combined probability of each of these events (i.e. the probability of Elliot being the burglar) must be less than the singular probability of any one of these items of evidence.

Baconian probability, however, claims the exact opposite. For if all these items of evidence are accepted and believed by the fact finder, the probability of Elliot being the burglar in this

case can never be lesser than that of the event with the least probability.

The dispute between Bayesians and Baconians epitomizes what I have called the standard approach to inferential reasoning. Standard approaches to the study of inference take their upshot from one theory of inference (such as one of the five in Schum's typology). The attitude is that alternative theories of inference are mutually exclusive, (as far as the nature of forensic inferential reasoning is concerned) and that a more primordial or underlying structure of inferential reasoning cannot be identified. My contention is that it is mistaken to uphold the view that different theories of inference are mutually exclusive. Theorizing about the nature of inference need not proceed from the standpoint of individual theories that ascribe specific features to specific inferential procedures in our day-to-day lives. It could proceed from a more general, more abstract, stance that ascribes certain features to the world, and to the human thought processes within which inferential reasoning is carried out. Hence, we should not regard competing theories of inference as disparate. Rather one theory may simply be better suited than another for the tasks within different domains of inquiry. A specially designed Ferrari may be better suited for Formula one racing than a VW Beetle, but they are not disparate entities. What a general theory of inference does is to describe certain more abstract features of our inferential capabilities. These features are hard-wired into the nature of the world (and into the nature of human reasoning processes) because they are always relied on in inferential reasoning. Following Tillers, I will refer to these capacities as nomological structures [12].

Nomological structures are global or general because they have characteristics that are broader than those identified by theories of inference like Bayesianism or Baconianism. A nomological structure is not associated with any one theory of inference; it is not unique to any one theory of inference. Rather a nomological structure exists as a category that makes it possible for us to reason adequately from evidence to proof. A nomological structure enables us to make the conceptual link between the chains of an inferential argument. And as we shall see, nomological structures often operate tacitly and as unstated assumptions when they function as inferential warrants.

The Roles of History

Following Francis Bacon [13], RG Collingwood [14] and Thomas Kuhn [4], I make a distinction between two senses of history. According to one understanding of the word (call this history I), history is a constellation of facts. The historian is a person who collects and verifies facts about the past and then records these facts in chronological order. But in the second sense of the word (history II), the historian does not merely chronicle factual developments within a field. History II is concerned with the evolution of ideas. It is an enterprise in which the elucidation and development of an idea leads to explanation.

The changes and development that have occurred to forensic reasoning within the Anglo-American legal system provides a good example of the difference between these two accounts of history. Two fundamental features of the Anglo-American system are; (i) its adversarial nature (which requires each party to meticulously and diligently examine the arguments and evidence of the other party), and (ii) the jury system. What would be the difference between the history I and history II accounts of the developments within the Anglo-American legal tradition?

Although the pre-history of the jury system has Scandinavian and Norman origins, its history I, properly so-called, can be traced to England in the 10th century [15]. King Aethelred II's Wantage Code of the year 977 empowered his reeves and thegns in each locality to conduct presentment juries. Presentment juries performed accusatory functions in criminal trials because they presented charges against individuals. They performed a role that is somewhat like that of the Crown Prosecution Service in the UK. With the advent of the Normans in 1066 there came the inquisitorial system in which the courts had their own officials who performed the role of prosecutors and judges. After the Norman Conquest, there were two sorts of juries: presentment juries for criminal cases, and assize juries for civil cases.

In those days, the burden of proof was reversed because the accused in criminal cases had to prove his own innocence. And indeed, the legal process had a different sequence, which went: judgment, trial, then sentence. Judgment in those days was, of course, not synonymous with pronouncing a guilty/not guilty verdict as it means today. Rather it meant that the accused had to choose one of three ways of proving his innocence. The accused could: (I) Swear an oath to his innocence at trial. It was believed that God would strike dead anyone who swore a false oath. (ii) Choose to conduct his trial by an ordeal. There were numerous forms of ordeals to choose from. For instance, the accused could choose to carry a hot iron for a specified length of time, and the extent to which the untreated wound festered over the coming weeks was examined to establish the accused's guilt; or, (iii) Choose to establish his innocence via trial by combat. Again, it was believed that God would side with the accused only if he was innocent.

All these modes of trial were eventually superseded, as their significance in establishing guilt began to wane. It, for instance, became obvious that God struck not all those who swore false oaths dead. It also became obvious that prowess at combat was not necessarily commensurate with innocence. Corresponding to the decline in the significance of these modes of trial was a gradual transformation of juries from presentment juries to trial juries. Presentment juries were just prosecutors. But the function of trial juries was to evaluate evidence adduced for and against the accused to establish his guilt or innocence.

Of course, the earlier forms of trial juries were just as dubious as the presentment juries they superseded. For these juries were

made up of everyone having vested interests in the trial-including the accused and the witnesses. Moreover, these earlier trials were based on some version or the other of the doctrine of free proof, in which any form of evidence was admitted in court irrespective of how it was obtained.

One significant landmark in the transformation of the nature of the jury to its modern-day equivalent was a statute of Edward III in 1352, which allowed the accused to challenge the suitability of any juror in his trial. This went some way towards establishing the important role of the jury as an objective and unbiased tribunal of evidence. Other changes in the adversarial system of trial followed piecemeal until, eventually, over a long period of time, we arrived at a system of trial in which (by and large) the jury (and judges) evaluate and assess both the weight of evidence and the credibility of witnesses.

The foregoing evolution of forensic reasoning was a history I account. But the story of the changes that occurred within the Anglo-American tradition can be differently told. As Twining observed [16], the study of evidence developed in conjunction with that of rhetoric (the study of persuasive arguments) and logic (the study of valid arguments). A persuasive argument is not necessarily a valid one, and a valid argument may not be persuasive. Greece during the 5th century BC provides a good illustration of this division between persuasiveness and validity. During this period justice in court was all about persuasiveness. Instead of lawyers, individuals seeking redress in court would hire rhetors (i.e. speakers) that were masters of oratory, sophistry, and persuasiveness to represent them. This ancient Greek system was adversarial in the sense that, just like in the modern-day Anglo-American system, it required each party to present its own case. But there was one main difference: the Greek system was about oratory and persuasiveness, unlike the modern system in which each side examines in detail the evidence and arguments of the other party.

The transition from the old model of trial to the new one can be regarded as a transition from an irrational model of adjudication to a more rational one. The old model can be construed irrational, not because it lacked judgment and deliberation, but because what counted as evidence, how evidence was weighted, and indeed how guilt and innocence were determined, were all questionable. What, one might ask, is the connection between prowess at combat and innocence? What is the connection between the healing of wounds and a 'not-guilty' verdict?

But herein lies the significance of history II. For while a history I account maps successive factual changes in legislation, disciplinary practices, means of trial and other legal processes, history II seeks to clarify and to deepen our understanding of ideas by explaining the evolution and/or nature of these ideas. By shifting from a mere description of facts to an analysis of rationality (for example) we are engaging in history II. History I am therefore first order inquiry in the sense that it elucidates facts and explains how these facts fit together in a temporal fashion. But history II is second order inquiry in the sense that it aims to elucidate concepts and ideas (such as rationality, induction, and inference) by mapping out their roles and function within a system.

One thinker who has done a lot of work on the history II accounts of the Anglo-American judicial system is Michel Foucault. In his Discipline and Punish, for instance, Foucault emphasizes the point that up till about 1837, pain and torture were very much indispensable to the judicial system.

Torture had a dual role: it was crucial during trial as well as being part of punishment. In those days, guilt was not an all-or-nothing affair. Those accused of crimes were not guilty or innocent simpliciter. Their level of guilt was commensurable to the level of suspicion against them. The motto then was: no innocent individual can be the proper object of suspicion. A little bit of suspicion against an individual amounted to a little bit of guilt. And indeed, most of the judicial procedure was held in secret and away from both the public and the accused:

"... It was impossible for the accused to have access to the documents of the case, impossible to know the identity of his accusers, impossible to know the nature of the evidence before objecting to witnesses, impossible to make use ... of documents of proof, impossible to have a lawyer, either to ensure the proper conduct of the case, or to take part, on the main issues, in the defense. The magistrate ... had the right to accept anonymous denunciations, to conceal from the accused the nature of the action, to question him with a view to catching him out, to use insinuations ... it was lawful for the judge to use false promises, lies, words with double meaning ..." [17].

Moreover, because every crime was regarded as a direct threat and affront on the authority of the king, it was legitimate to administer judicial torture to extract confession. This also led to the public spectacle-a public display of the torture and punishment of those who had dared to challenge the authority of the king.

But radical changes occurred during the 19th century to this old model of justice. Torture and pain were eliminated from the judicial system, the treatment of accused and offenders was improved, and the presumption of guilt mutated into presumption of innocence. What caused these changes? One could view the change as a result of the birth of modern culture. A culture in which society became more humane, perhaps as a result of the rise of democracy and governments. Or one could follow Foucault and view this change as no real change. Rather it was a camouflage. For if we concentrate on the roles, functions, uses and dissemination of power and authority in society, we would agree with Foucault's point that the new judicial traditions of the modern/post-modern era did not ensue in a lesser, more humane, uses of power. Power only became more diffused in source, subtler in dose, and more effective as a means of social control. Instead of the singular authority of the monarch, we now have a multi-layered structure

in which the source of power and oppression is more widespread within society. Power, whether old or new, Foucault insists, still is the vehicle for the careful control of every fabric and fiber of human activity.

Foucault's account is history II because he is not merely interested in a chronicle of facts. Foucault also aims to deepen our understanding of the role and function of punishment and power within the Anglo-American legal process. Hence history II, just as much as history I, is of epistemological importance. Specifically, following Imre Lakatos [18] I emphasize the roles rational reconstructions [19] in evidential reasoning. To rationally reconstruct is to examine developments within a field of inquiry in an effort to answer epistemological questions about the rationality of knowledge within that field. Rational reconstruction is a theory's account of the rules of good reasoning and rationality followed within a subject. Simply put, by rationally reconstructing changes within the Anglo-American legal system, I have been doing both history I and history II.

Thus far, the examples of the relevance of history II I have considered all revolve around what may be termed the old, unsophisticated, and irrational form of legal reasoning that the modern Anglo-American jurisdictions have long abandoned. Trials by ordeals, judicial torture, or presentment juries have long been declared anachronistic. So, the objection can be raised: haven't I chosen a soft or rather insignificant set of examples to illustrate the point that history is of importance to evidential inference?

The first point to note about this possible objection is that the objection refutes itself! To complain that I have chosen outdated illustrations of change is in fact a vindication of the point that: acceptable patterns of inferential reasoning are subject to change over time. This objection makes sense only if it is conceded what it objects to-namely, that change in standards of forensic inference is "Evolutionary" in that extant values aspire to be better than bygone ones. The historicity of evidential inference can also be illustrated with more recent changes within the English legal system. Consider for instance one of the most important exclusionary rules within the Anglo-American tradition, the rule against hearsay. Cross formulates the rule as follows:

"… An assertion other than one made by a person while giving oral evidence in the proceedings is inadmissible as evidence of any fact asserted. This formulation conflates two common law rules, the rule that the previous assertions of the witness who is testifying are inadmissible as evidence of the fact stated (sometimes spoken of as the 'Rule against narrative', or the 'Rule against self-corroboration'), and the rule that assertions by persons other than the witness who is testifying are inadmissible as evidence of the facts asserted (the rule against hearsay in the strict sense) [20]."

A distinction can be made between testimonial hearsay (second-hand evidence made by a witness in court) and documentary hearsay (second-hand evidence presented in court by individuals other than those who compiled the documents). The changes that have occurred to the rule against documentary hearsay within the English Legal System illustrate the significance of both histories I and II. A history I account of changes to this rule can begin with the case of Myers v. DPP [1964] 2 All ER 881. An accused had been charged with the theft of motor cars. The prosecution's case was that the defendant operated an elaborate scheme in which he: (i) bought accident-wrecked cars; (ii) stole similar cars to the wrecked ones; and then, (iii) sold the stolen cars as restored cars by transferring chassis number-plates from the restored cars onto the stolen ones.

In addition to the chassis number, automobiles have engine block numbers that are cast inside engines during the manufacturing process. So, to prove its case against the accused, the prosecution wanted to introduce car manufactures' factory records which would have shown that the engine numbers of the cars in question corresponded to those of the stolen cars (and not to those of the restored cars). These factory records had been logged by any of a number of the manufacturers' employees on the production line-but it was impossible to identify the specific person who logged each particular engine number. The House of Lords in England ruled the evidence inadmissible because it was hearsay.

The ruling in Myers v. DPP led to Criminal Evidence Act 1965 under which statements contained in trade and business records became admissible as evidence of the truth of the facts contained in such records. The 1965 Act was later replaced by ss 68-77 (and Schedule 3) of the Police and Criminal Evidence Act (PACE) 1984. PACE extended the scope of the statutory regime beyond trade and business records such that computer-produced documents also escaped the hearsay rule. PACE was repealed by the Criminal Justice Act (CJA) 1988. The provisions of CJA deal with what is termed first-hand, second-hand or multiple hearsay contained in documents received or created in the course of a trade, business, profession or occupation. Computer produced statements are also covered by CJA.

As the foregoing indicates, changes introduced by the British Parliament on the hearsay rule impose conditions on the drawing of inference in forensic proof. But so far, I have been mapping out the trajectory of successive changes in legislation; I have been giving a history I account of changes to the documentary hearsay rule. A history II account would venture to explain the change by shifting perspective. One could, for instance, advance independent policy reasons for the change in the law. For it could be held that one of the main reasons why the rule against hearsay is retained in criminal trials is the need to guard against conviction of the innocent. But at the same time (the argument might continue) the law should not make it easier for the seasoned criminal to escape punishment as it appeared to have done in the case of Myers v. DPP. Hence one history II account of this change could be that there was a change in governmental policy.

Other history II accounts of the change could be given. Zuckerman [7] for instance maintains that, until the Criminal Evidence

Act 1965, the rule against hearsay operated such that it excluded "Rationally superior evidence". According to Zuckerman:

"A hearsay statement may be flawed in four principal respects. First, the person whose statement is reported, the declarant, may have wrongly perceived the event in question. This can occur because of some defect in the declarant's senses of perception or for some other reason. Secondly, the declarant's memory may have been faulty or inaccurate when he made the statement. Thirdly, he may have lied or deliberately distorted the event. Fourthly, the declarant's statement may have been misunderstood by the witness now reporting it. … These risks, save the fourth, are also present when the person who observed the fact testifies in court. There is however one fundamental difference: when a witness is in court, the opponent can cross-examine him to investigate his powers of perception, test his memory, and appraise his veracity, thus enabling the trier of fact to determine the probative value of the testimony according to the witness's performance in the witness-box. It is the unavailability of a hearsay declarant for cross-examination which constitutes the central reason for the exclusion of hearsay statements. It is said that in the absence of cross-examination of the declarant jurors are likely to overestimate the probative significance of his hearsay statement. This argument cannot be dismissed altogether [7]."

Having outlined the main defects of hearsay evidence in general, Zuckerman then goes on to say:

"The hearsay definition comprises large classes of evidence which suffer from none of the weakness associated with hearsay. There have been many instances of exclusion of evidentially superior evidence of which the most prominent is the case of Myers v. DPP. … [The approach in Myers] seems both irrational and fictitious; irrational because the records of the numbers were vastly superior in probative force to any testimony the employees could give from memory, and fictitious because an inspection of the records could not have produced a genuine recollection in the employees' minds. The majority in Myers was not unaware of the absurdity of their ruling [7]."

Although Zuckerman's claim that documentary statements of the type at issue in Myers are superior to witness testimony could be challenged [21], the main point I want to emphasize is that by analyzing Myers and its aftermath in terms of rationally superior/inferior evidence, Zuckerman is also engaging in history II. He is mapping factual changes in standards of forensic inference and at the same time offering theoretical explanations of why one pattern of evidencing (i.e. documents) is superior to another (i.e. testimony).

It is important to explain clearly the differences between history I and history II on the one hand, and rational reconstruction on the other. History I am about constellation of facts. It is about the factual events that have occurred in time. History II, however, is about the development (and/or evolution) of ideas and their role in human understanding. So, by history I, I do not simply mean chronological history. Indeed, we can have chronological accounts of history II concepts. For instance, I could give a chronological account of concepts like 'Force', 'Energy', or 'Inference'. We can summarize, in chronological order, the differences between Newton and Einstein understands of 'Energy'. Or perhaps I could document in chronological order, the differences between Bayesian, Humean and Wigmorean accounts of 'Induction'. But my chronological account of these ideas and concepts could also be interpretative. For instance, in my chronological ordering of the different views on energy, I could reflect distinctions between kinetic energy, (energy associated with motion) potential energy (energy that has the capacity or potentiality of being converted into kinetic energy) and radiant energy (the energy of electromagnetic waves).

The same point is true of history I. A constellation of facts could be chronological and interpretative. For instance, in my account of the First World War (1914-18), I could give a chronological ordering which reflects the fact that Italy and USA joined the Allies in the later years of the war. If I supply an economic interpretation of why these two countries were late in joining arms with the other allies (Britain, France, and Russia), I am engaging in history II. But note that interpretation alone does not turn an analysis into history II. The historian who does a constellation of facts (history I) might need to interpret documents, signals, fossils, etc, without doing history II.

Rational reconstruction is not to be equated with history II. History II identifies a new class of historical subjects-namely, intellectual ideas such as inference and induction. Rational reconstruction is simply one way of doing history II. It involves a dialectical interaction between forensic history (i.e. histories I and II) and (in this case) evidential theory. It is an epistemological thesis about the origins and evaluation of claims and conclusions drawn from evidential knowledge. Indeed, in a social or empirical discipline like law, theorizing about the nature of evidence must contain elements of both history I and history II. For in our conceptual accounts of developments within that field, we must make claims about factual and intellectual aspects of that field. So, rational reconstruction is an analysis of inference that makes use of both types of history.

It is also important to note that I am not merely claiming that facts and evidence are informed by developments within the legal process. Rather the claim is that the validity and adequacy of evidential inference rests upon the actual (history II) workings of the adjudicative process itself. Rational reconstruction is a symbiosis between histories I, II and theory. For what counts as legitimate inference in every forensic system is a function of the historical developments within the legal process itself. Historical development (i.e. histories I and II) play crucial roles in identifying and lending detail to forensic validity and forensic adequacy.

There is of course nothing new about adopting this kind of approach in the study of inference. Ian Hacking (1975), for instance, has rationally reconstructed the evolution and development

of one type of evidential reasoning-namely, that of inductive reasoning. According to Hacking, until around the year 1600 there was no concept of inductive evidence. Before 1600 people operated with a concept of evidence that implied only testimony and authority. Testimony was evidence supplied by human witnesses, and ancient learning conferred authority. These two types of evidence, however involved people and not things. What was missing, according to Hacking, was the evidence provided by things-the evidence we derive from physical objects when they point beyond themselves as signs for other things. Schum supplies a good example of evidence of things:

"Suppose that you live in an apartment next to a person whom you suspect is keeping a dog in his apartment in violation of a rule prohibiting pets. Your suspicions were aroused one evening when you heard barking that sounded like it came from your neighbor's apartment. You also had the misfortune of stepping into an unpleasant little pile in the common area behind your apartments. Your neighbor invites you into his apartment this evening and during your conversation you ask him if he is keeping a dog in his apartment; he denies it. However, you observe some scratches on the legs of his tables and several large spots on his living room carpet. Further you observe an unopened can of dog food in his kitchen. From the barks, the pile, the scratched table, the carpet spots, and the dog food you would feel quite entitled to infer, with some degree of confidence that your neighbor is keeping a dog in his apartment despite his denial. But you could not be certain without seeing the dog [22]."

On the one hand, Hacking's account of the evolution and development of inductive evidence demonstrates the significance of history II. According to Hacking, this concept of inductive evidence was 'A child of the low sciences, such as alchemy or medicine, which had to deal in opinion' the contrast between the low sciences and the high sciences (such as astronomy or mechanics) lies in the fact that the high sciences deal with demonstrable knowledge. Knowledge in the high sciences was exact and precise in the sense that knowledge claims in those sciences were regarded as indubitable. Once observation and experiment had been conducted to demonstrate the truth of claims in the high sciences, those claims were regarded as valid for all times-past, present and future. The low sciences also made use of observation and experiment, but due to the nature of their enterprise, these were of a different sort.

The discovery of the planet Uranus supplies a good example of observation in the high sciences. On the night of 13 March 1781, William Herschel noted a 'Curious' and unusual movement in the skies. Before Herschel's observation of 1781, at least seventeen other astronomers had observed the same object, but because they failed to notice the curious movement observed by Herschel, they had all concluded that the object was a star. After more observations, on 19 March 1781, Herschel decided that the object he saw could not be a star, and that it was possibly a comet. Astronomers all over the world were informed of this 'curious movement', but it was only after several months that mathematicians gave the verdict that, based upon their computation of the orbit of this curious movement, the object was a previously undiscovered planet, and not a comet.

Observation in the low sciences is, by contrast, of a different nature. What are being observed are signs which are indicators or pointers in the sense that point beyond themselves to something else? Again, the quotation from Schum is a very good example. Signs, unlike the facts of astronomers, are fuzzy and imprecise in the sense that searching for signs is tantamount to searching for clues and symptoms:

"Observation of signs was conceived of as reading testimony. Signs were more or less reliable. Thus, on the one hand a sign made an opinion probable … because it was furnished by the best testimony of all. On the other hand, signs could be assessed by the frequency with which they spoke truly. At the end of the Renaissance, the sign was transformed into the [new] concept of evidence …. This new kind of evidence conferred probability on propositions namely made them worthy of approval. But it did so in virtue of the frequency with which it made correct predictions [23]."

Thus, Paracelsus (who according to Hacking, was one of the chief exponents of the new conception of evidence) also gathered evidence, but not by observing the natural world in the same way as Herschel. Rather, based on the doctrine that afflictions must be treated with similarities, Paracelsus would, for instance, 'Read the urine' of a patient to look for the salient characteristics of the affliction. To cure the patient who had taken a large dose of poison, Paracelsus would insist that we treat with a small dose of the same poison (after he had examined the 'Signature' of the poison). The Paracelsian doctrine of the similarity of affliction and treatment later became the guiding principle in the development of all vaccines.

But "Not all signs were equally trustworthy". (And herein lies Hacking's history II account of inductive evidence.) "Some signs are almost always, others are often to be trusted, and these are 'Signs with probability'. …to call something probable was to invite the recitation of authority. But: since authority was founded on natural signs, it was usually of a sort that was only 'Often to be trusted'. …The concept of sign as evidence, with its attendant implications of testimony, reading, and probability became the standard in all walks of life" [18].

Hacking did not just record factual changes in the different approaches to the study of nature. For at one level, (history I), Hacking's history is founded upon the changes that occurred in the natural and physical sciences. What Hacking calls the 'High Sciences' (astronomy, mechanics, etc.) were the first fields of inquiry to be called 'Science'. What he calls the 'Low Sciences' (alchemy, astrology, etc.) later developed into the sciences now known as chemistry, biology, physiology, anatomy etc. But instead

of concentrating on the factual changes brought about by individuals such as Galileo, Newton, Kepler, and Paracelsus, Hacking explains the evolution of a concept of evidence in which things can point beyond themselves in a non-deductive manner. The subject of Hacking's history II is 'Inductive evidence.'

History II and rational reconstruction are also implicit in William Twining's account of the rationalist-empiricist tradition of evidence scholarship [24,25]. Twining's conclusions are not just founded upon the factual changes of the Anglo-American judicial system itself, but also upon the intellectual history of the study of evidence. The intellectual history of the Anglo-American evidence scholarship given by Twining is itself history II. For it is based upon his analysis of the work of individuals such as Gilbert, Bentham, Wigmore and Thayer that Twining can claim that there is a rational-empiricist tradition of evidence scholarship. Two central characteristics of this tradition are; (i) that disputes ought to be settled on the basis of the rational evaluation of the weight of evidence-rather than by irrational means such as trials by ordeals, or trial by battle: and (ii) 'Rationality' is established by the philosophy of the English empiricists-i.e. by the philosophy of Francis Bacon, John Locke, and John Stuart Mill. This empiricism emphasized the import of evaluating the weight of evidence through means such as corroboration, testimony, and forensic science. Moreover, it is on the bases of similarities identified in the assumptions of these key historical figures that Twining can identify their paradigm (i.e. the set of epistemological, metaphysical and methodological assumptions shared by these individuals) as rationalist-empiricist:

"Almost without exception Anglo-American writers about evidence share similar assumptions, either explicitly or implicitly, about the nature and ends of adjudication, about knowledge or belief about past events and about what is involved in reasoning about disputed questions of fact in forensic context" [26].

Twining is thus not just interested in narrating the factual changes that have occurred within the Anglo-American system of adjudication. Nor is he just interested in cataloguing the theories of these great thinkers. Rather Twining is also interested in shedding more light on the fundamental epistemological and metaphysical ideals that have operated in the shaping and development of the Anglo-American judicial system. Twining is also doing a rational reconstruction. For in advancing a thesis about the nature and validity of theories of evidence, he makes use of factual history and the development of ideas.

Conclusion

Positivist accounts of law uphold what we may call the specialty thesis-the thesis that law is a complex network of rules of a particular pedigree, and that these rules provide the key to understanding evidential reasoning. One version of this position (advanced in HLA Hart's celebrated book, The Concept of Law) is that law is a union of primary and secondary rules. The contemporary scholar, Neil MacCormick, also accords a central role to rules in his analysis of legal reasoning:

"…The logic of rule-application is the central logic of the law within the modern paradigm of legal rationality under the 'rule of law'. Perhaps disappointingly for grand theorists, this logic is relatively simple and straightforward. The simple but often criticized formula 'R + F = C', or 'Rule plus facts yields conclusion' is the essential truth" [27].

In contrast, this paper has maintained that we need to pay closer attention to the historical nature of inference within the forensic process itself. It is "Inference" that guides the mind in the addition of R to F; and it is "Inference" that makes the identification of C as the sum of R + F possible. Forming a chain of reasoning connection between evidence and fact require an understanding of the categories of thought that make information discernable as relevant for forensic purposes. Our understanding of forensic reasoning is incomplete without an assessment of the categories of thought that constrain the mind of fact finders when they reason that R + F = C. In forensic contexts, therefore, rules, principles, facts, evidence and science are not enough. We need to assess the adequacy of the categories of thought that make forensic inferential reasoning itself possible; namely, History II.

References

1. Wigmore JH (1937) The science of judicial proof, as given by logic, psychology, and general experience, and illustrated in judicial trials. Little Brown. See also: Wigmore JH (1913) "Problem of proof." Ill LR 8: 77 and Wigmore JH (1908) "Review of C. Moore A treatise on facts, or the weight and value of evidence." Illinois Law Review 3: 477-478.

2. Chains of reasoning are not the only important combinations of inference in legal evidence. Other combinations include: corroboration-when witnesses independently testify to the truth of the same proposition; convergence-when different items of circumstantial evidence independently support the same conclusion; and, conjunction-when two or more items of evidence are added together to establish one point. Abímbọ́lá K (2012) "Reason and proof in forensic evidence." J Forensic Res S 11: 2. 006. and, Abímbọ́lá K (2002) "Questions and answers: the logic of preliminary fact investigation." Journal of Law and Society 29: 533-559.

3. It is important to note that both E and E^* (in bold characters) are compounds which could take either of two forms. E could be: E (the occurrence of the relevant event), or, E_c (the non-occurrence of the event). Also, E^* could be either E^* (someone's testimony that event E occurred) or E^*_c (someone's testimony that not-E is true -i.e. the claim that event E did not occur.) I will use bold letters E and E* respectively for the compounds, but non-bold characters E, E_c, E^*, and E^*_c when I need to specify precisely what is being asserted of the event.

4. Zuckerman AA (1986) "Law, fact or justice." BUL Rev 66: 487. Jackson JD (1988) "Theories of truth finding in criminal procedure: An evolutionary approach." Cardozo L. Rev 10: 475; Jackson JD (1988) "Two methods of proof in criminal procedure." The Modern Law Review 51: 549-568.

5. Kuhn T (1962) The structure of scientific revolutions. The University of Chicago Press.

6. Poincaré H (1955) The Value of Science. The Foundations of Science 227-228.

7. Zuckerman AA, Roberts P (1989) The principles of criminal evidence. Clarendon Press 378.

8. Schum DA (1986) "Probability and the processes of discovery, proof, and choice." BUL Rev 66: 825. Schum DA (1994) The evidential foundations of probabilistic reasoning. Northwestern University Press; and, Schum DA (1987) Evidence and inference for the intelligence analyst 2. Univ Pr of Amer.

9. Robertson B, Vignaux T (1997) "DNA on appeal-II: More appellate cases." New Zealand Law Journal 247-250.

10. Cohen LJ (1977) The Probable and the Provable, Clarendon Press 384.

11. "The two probability judgments differ substantially from one another. Nevertheless, neither implies the falsity of the other. Both judgments may be true, because each supply us with a quite different kind of information from the other. The Pascalian [i.e. Bayesian] judgement grades probability on the assumption that all relevant facts are specified in the evidence, while the Baconian one grades it by the extent to which all relevant facts are specified in the evidence." (Cohen LJ (1979) "On the psychology of prediction: Whose is the Fallacy?" Cognition 8: 385-407) We should not, however, be fooled by claims such as this. The debate between Cohen (Cohen LJ (1980) "The logic of proof," The Criminal Law Review 91-103) and Williams (Williams G (1980) "A short rejoinder," The Criminal Law Review 103-107) makes it quite clear that each theorist rejects his opponent's theory as applicable within the domain of legal reasoning. Hence as far as the nature of legal inference for evidence to proof is concerned, these rival theories are taken to be mutually exclusive.

12. Although I have borrowed the idea of nomological structures from the work of Peter Tillers (Tillers, P (1988) "The value of evidence in law." N. Ir. Legal Q 39: 167; Tillers P (1986) "Mapping inferential domains." BUL Rev 66: 883) I do not claim to have followed his own use of the term. I have modified (or, perhaps, distorted) his views. My usage of nomological structure is somewhat akin to Ian Hacking's Styles of Reasoning. Hacking I (1982) "Language, Truth and Reason". In M. Hollis & S. Lukes (eds.), Rationality and Relativism. Basil Blackwell; and Hacking I (1985) "Styles of Scientific Reasoning." In J Rajchman, C West (eds.), Post-Analytic Philosophy. Columbia University Press. Nomological structures, the way I understand them, are also quite different from Hacking's Styles. Styles of Reasoning confer truth-values on propositions. Thus, propositions which are true or false (according to Hacking), have no existence independently of styles of reasoning. Nomological structures, however, are not truth conferring constructs. Rather they describe (or are about) capacities, attributes, or features of the world (and the human conceptualisation of the world) that enable us to better configure the process of inferring conclusions from evidence.

13. Bacon F (1939) Novum Organum. In Mill J S, Burtt E A (1939) The English philosophers from Bacon to Mill. Modern Library.

14. Collingwood RG [1946] (1994) The idea of history. Oxford University Press.

15. Holdsworth WS (1903) A History of English law 3. Methuen And Co.

16. Twining W (1984) "Taking facts seriously." J Legal Education 34: 22. Twining W (1990) Rethinking evidence: Exploratory essays. Northwestern University Press; Twining W (1997) "Freedom of Proof and the Reform of Criminal Evidence." Israel Law Review 31: 439-463; Worrall J (1991) "Feyerabend and the facts." In Beyond Reason 329-353. Springer Netherlands; and, Abímbọ́lá K (2000) "Abductive reasoning in law: Taxonomy and inference to the best explanation." Cardozo L Rev 22: 1683.

17. Foucault M (1977) Discipline and punish: the birth of the prison. Penguin Books.

18. Lakatos I (1980) Mathematics, science and epistemology: Volume 2, Philosophical Papers 2: Cambridge University Press.

19. What Lakatos himself means by rational reconstruction is very controversial. At one level, he seems to be making the claim that all history is normative or at least interpretative. On this understanding of the phrase, the historian does not merely collate facts about the past because in doing history, the historian must at the very least rely on generalisations and assumptions that go beyond the facts.

20. Tapper C (1995) Cross & Tapper on evidence. Oxford University Press.

21. Two main objections can be levied against Zuckerman's claims. First, ultimately, these records are complied and inspected by humans, namely employees of the manufacturers. So, if we shift attention to these employees, all of Zuckerman's four objections defects of testimonial evidence outlined by Zuckerman also applies to documents. For instance, he claims that "the person whose statement is reported, the declarant, may have wrongly perceived the event in question". But surely, by the same token one could point out that: the person who inspected the engine numbers and then recorded them in the manufactures' records may have wrongly perceived the engine numbers in question! The same can be done for all the other three of Zuckerman's "defect". So, is it really the case that documentary evidence is rationally superior to testimonial evidence? Moreover Zuckerman, just like the House of Lords and many others, seem to be making a category mistake: they seem to be treating documentary evidence as if it were evidence from a human source. In the case of Myers, questions about the authenticity and accuracy of the records ought to have been more prominent than questions of hearsay.

22. Schum DA (1994) The evidential foundations of probabilistic reasoning. Northwestern University Press

23. Hacking I (1975) The emergence of probability: A philosophical study of early ideas about probability, induction and statistical inference. Cambridge University Press. See also: Hacking I (1985) "Styles of scientific reasoning". In J. Rajchman, C West (eds.), Post-Analytic Philosophy. Columbia University Press; Hacking I (1983) "The Accumulation of Styles of Scientific Reasoning". In D Henrich (ed.), Kant oder Hegel? Klett-Lotta: Stuttgart.

24. Just like Hacking, Twining does not claim to be doing rational reconstruction. But, as I explain in the text, I think he is.

25. Twining W (1990) Rethinking evidence: Exploratory essays. Northwestern University Press

26. Twining W (1984) "Taking Facts Seriously". Journal of Legal Education 34: 22-42.

27. MacCormick N (1994) Legal reasoning and legal theory. Clarendon Press.