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# **Can There Be a Science of Proof?**

## **A Cross-Atlantic Dialogue (1898-1947)**

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### **Abstract**

*Between the late 19<sup>th</sup> century and the 1950s, the project of establishing a science of proof was shared by a generation of criminologists, psychologists and lawyers specializing in evidence law. Their ambition was to develop theoretical and practical knowledge of the analysis and evaluation of evidence in the courts, drawing on new knowledge established in the then-emerging fields of social psychology and forensic science and technology. All this was combined with an effort to provide judges with tools capable of guiding the rigour of their reasoning with evidence. This project, which is fundamentally interdisciplinary and breaks with a dogmatic orientation in legal analysis, was made possible by an important dialogue on both side of the Atlantic. The circulation of knowledge engaged in the science of evidence was remarkable, both in Europe and between Europe and the United States, as illustrated by the figures of Wigmore and Gorphe. The conditions that allowed the development of a science of proof project to flourish disappeared after the War and this project would not be taken on by a new generation. Research in these areas continued separately in an increasingly fragmented disciplinary landscape. This article retraces this history and sheds light on the reasons for the weakening, and the recomposition, of the science of proof at the end of the Second World War.*

### **Keywords**

Evidence; History of evidence theory; Science of proof; Criminology; Forensic Psychology; Evidential Legal Reasoning

## 1 Introduction

The collective memory of evidence scholars has associated the project of forging a “science of proof” in legal scholarship with the name of John Henry Wigmore (1863-1943). In his famous 1913 paper published in the *Illinois Law Review* (Wigmore 1913a) – which shortly after appeared as a chapter of his book titled *The Principles of Judicial Proof as Given by Logic, Psychology, and General Experience and Illustrated in Judicial Trials* (Wigmore 1913b) – Wigmore strongly advocated for the necessity of a science of proof: “for one thing, there is, and there must be, a probative science – the principles of proof – independent of the artificial rules of procedure. This science, to be sure, may as yet be imperfectly formulated or even incapable of formulation. But all the more need is there to begin in earnest to investigate and develop it” (Wigmore 1913a, p. 77). Wigmore did not deny the necessity of a rational description of the rules of evidence, quite the contrary. Indeed, Wigmore distinguished himself in this activity: in 1899 he was in charge of updating the first volume of the 16<sup>th</sup> edition of the then famous treatise on evidence by Simon Greenleaf (1899) and in 1904-1905 he published his own five-volume treatise (Wigmore 1905), highly praised as “perhaps the greatest modern treatise” (James 1940). Nevertheless, important as they are, the rules of procedure cannot be the sole matter that evidence scholarship investigates. Procedural rules have, indeed, changed over time and place, and above all, they are “merely a preliminary aid to the main activity, viz. the persuasion of the tribunal’s mind to a correct conclusion by safe materials” (Wigmore 1913a, p. 78). Therefore, close attention must be paid to “the ratiocinative process of contentious persuasion, – mind to mind, counsel to juror, each partisan seeking to move the mind of the tribunal” (Wigmore 1913a, 77). This project absorbed much of Wigmore’s time and energy. Between the first edition of the *Principles of Judicial Proof* in 1913 and the third edition in 1937, Wigmore refined and updated his views on the science of proof, as is illustrated in the 1937 edition now unequivocally titled *The Science of Judicial Proof as given by Logic, Psychology, and General Experience* (Wigmore 1937). Wigmore here investigated the many facets that come into play in the reasoning of judges with regard to facts. With a firm sense of eclecticism<sup>1</sup>, Wigmore presented and discussed many theories and experimental results in the fields of criminology, psychology, logic, etc. In so doing, Wigmore broke with the stance of his mentor (and dedicatee of his 1904 *Treatise*) at Harvard, James Bradley Thayer; Thayer did acknowledge the inputs of these disciplines but kept them well outside the scope of evidence scholarship (Thayer, 1898, 269). Instead, Wigmore explicitly followed the path opened up by Jeremy Bentham (Wigmore 1913a, 78; Twining 1985), who had demonstrated a continuous interest in psychology, although with little experimental grounding. A science of proof is needed, Wigmore argued, as the process of reaching a conviction would otherwise be left unguided and prone to mistakes of reasoning. A better understanding of how to achieve a conviction, “the ultimate purpose in every judicial investigation” (Wigmore 1913a, 78), is desperately needed in cases where a free proof system prevails. In this situation, i.e. not only in common law systems but in continental systems as well (though more recently) the law offers no directive whatsoever to judges on how to safely reach a conclusion on facts. Therefore, the mental processes involved in fact-finding must be closely scrutinised and

1 Many aspects of Wigmore’s career confirm his interest in a diversity of fields, inside and outside the law, and the variety of his readings. See Twining 1985; Riles 2001; Simonin 2007.

informed by science. In spite of the outstanding recognition Wigmore received as a major evidence scholar in his time and despite the many institutional leverages he had at Northwestern University, where he served as dean for more than twenty years (1901-1929), and in the many professional committees on which he sat (Maguire 1963; Roalfe 1977; Porwancher 2016), his attempt to forge a science of proof has received little attention in the American law faculties and the *Principles of Judicial Proof*, though re-edited three times, has been famously depicted by Twining as no more than a “lead balloon” (Twining 1985, p. 164).

But if Wigmore retrospectively attracted most of the attention, it does not mean that he was the only one involved in the promotion and development of a science a proof. Wigmore was hardly even a forerunner in that respect. The purpose of this chapter is certainly not to reduce nor underestimate the contribution of Wigmore to the science of proof. Rather, it aims at giving a more complex and nuanced view of a historical moment, beginning at the end of the 19<sup>th</sup> century and lasting until the Second World War, when the project of a science of proof became a central feature of evidence scholarship, not only in the United States but also, and prominently, in Europe. In the last decade of the 19<sup>th</sup> century, a group of scholars began to take an interest in grounding the analysis of evidence in the courts on recent developments in the social sciences and experimental psychology. Judges – they argued – should have a thorough knowledge of the latest scientific developments in domains such as psychology, toxicology, criminology, and base their analysis of evidence on knowledge of the latter.

During this period there were intense exchanges between European scholars – in France, Germany, Belgium, Switzerland, and Italy, the main areas where this research flourished – and between European scholars and a few academics, including Wigmore, on the other side of the Atlantic. Far from centring on only one discipline or speciality, the books and papers published at that time often referred to results and ideas taken from a wide array of scientific domains. In his *Principles of Judicial Proof*, Wigmore relied heavily on the works of European criminologists: he acknowledged Hans Gross (1847-1915), an Austrian criminologist who played an instrumental role in the foundation of criminology as a scientific domain, as a major source of inspiration for his own work. Wigmore even dedicated *The Principles of Judicial Proof* to the memory of Gross, “who did more than any other man in modern times to encourage the application of science to judicial proof”.

François Gorphe (1889-1959) is another example of a vibrant voice in the scientific interactions between fields of knowledge interested in evidence on both sides of the Atlantic. After completing a doctoral dissertation at the University of Paris on the analysis of testimony (1924), Gorphe pursued a career as an investigating judge in first degree tribunals and then as a sitting judge in civil tribunals and finally as the president of a civil chamber at the Court of Appeals of Poitiers. Alongside his activity as a judge, Gorphe regularly published papers and books on the analysis of evidence. His publications reveal a remarkable familiarity with psychology and criminology. The references he analysed in his books were not only very numerous but also extraordinarily diverse as regards their origin and language (English, German, Italian, French) [See Gorphe 1924, 400 sqq.]. In his 1947 *L’appréciation des preuves en justice* he underlined Wigmore’s major contribution to the construction of “an evidence-based

technique on a positive basis, outside the formal rules”, and clearly held Wigmore’s *Science of Judicial Proof* as a model (Gorphe, 1947, 22). The interaction among scholars was also facilitated by an active policy of book translation. The influential, and forerunner, treatise on evidence in criminal procedure published by Carl Mittermaier in 1834 was soon translated into French (1848), Spanish (1857), and Italian (1858). Wigmore played a significant role in promoting the translation into English of authors interested in a scientific approach to evidence. When he chaired the Modern Criminal Science Series, Wigmore managed to have Gross’ main book, first published in German in 1898, translated into English as *Criminal Psychology* (Gross 1911). The decision to translate Gross’ book had been taken in 1909 at the congress of the American Institute of Criminal Law and Criminology, under the presidency of Wigmore. The same series would also welcome translations of distinguished promoters of nascent criminology in Italy, France, Spain, The Netherlands, and Germany, such as Cesare Lombroso, Enrico Ferri, Raffaele Garofalo, Gabriel Tarde, Constancio Bernaldo de Quirós, Willem Adriaan Bongers, and Gustav Aschaffenburg. The circulation of ideas among European and American scholars is also noticeable in book reviews published in academic and professional journals. For instance, Gorphe’s books were reviewed outside France, not only in Europe (Kleinfeller 1930; Mannheim 1955) but also and extensively in the United States (Chafee 1929; Radin 1929; Slesinger 1927; Rottschaefer 1929; Nemethy 1957).

The science of proof can be conceived of as a call to science with regards to facts, just as legal scholarship had turned to science to build systems of norms and had been striving to find in mathematics, physics and biology the models of an authentic science of law (Kargon 1986; Murphy 1997; Champeil-Desplats 2016). Indeed, Gross relied on the methods of the natural sciences not only for establishing the principles of the legal discipline and for studying “the language of dead laws”, but also in the everyday activity of fact-finders: “if we are to make progress, the daily routine also must be scientifically administered. Every sentence, every investigation, every official act must satisfy the same demand as that made of the entire juristic science” (Gross 1911, 9).

The project of a science of proof is, as such, not specific to legal scholars interested in evidence. At the end of the 19<sup>th</sup> century, many social sciences shared the view that they must have a rigorous scientific basis and most often sought in the natural sciences the approaches and strategies for this project. Durkheim’s *Les règles de la méthode sociologique* notoriously illustrates the attempt of the social sciences to build a solid methodological grounding (Heilbron 1995): “If this has been the case in the natural sciences, then even more so in sociology” (Durkheim 1895, 24). In the field of history, the French historian Charles Seignobos (1854-1942) published in 1909 *La méthode historique appliquée aux sciences sociales*. In this book, which immediately received wide attention, Seignobos argued that historians must carefully consider the many testimonies they find in archives and he designed an analytic method aimed at helping them to determine, the best they could, the trustworthiness of testimony. Both Gorphe (1924) and the Swiss psychologist and physician Jean Languier des Bancelles advocated for a scientific approach to the reliability of court testimony and explicitly referred to Seignobos as a source of inspiration. As Languier des Bancelles put it: “By

studying them closely, it would be easy to convince oneself that many points of view, new to psychologists, are familiar to historians and that they have long had a solid knowledge of the processes involved in the testimony and the factors that determine it” (Larguier des Bancel 1905).

Scholars and judges interested in founding a science of proof relied heavily on empirical studies and experiments to gain knowledge of witness psychology and the logic of evidential reasoning. The German psychologist William Stern gained wide recognition by conducting a range of experiments on the psychology of witnesses. In a then famous experiment, Stern arranged a scene during his class (someone came in, talked to the teacher, picked up a book and left) and submitted his students to experiments on their perception and memories of the episode. When later interrogated on the events and on specific details, they displayed a significantly higher rate of error (25 to 30%) than when prompted to spontaneously recount what had happened (5-10%), thus pointing to the risk that the experimenter might, in fact, be suggesting the answers given by the witness. Other experiments also demonstrated that the rate of error was significantly higher when interrogating young children, up to 50% with 7-year-olds (Stern 1910, 272). Hence, Stern warned against blind trust in witnesses and suggested that examining officers should avoid suggestive questions and leave more space to spontaneous narration. Stern’s experiments struck the minds of the legal scholars promoting a science of proof. Wigmore relied heavily on Stern’s results when discussing the reliability of the perception of testimony in youths (Wigmore 1937, 328). Gorphe also mentioned Stern’s experiments as an essential milestone in the construction of a scientific approach to the psychology of testimony (Gorphe 1924, 35; Gorphe 1947, 19). But the interest of legal scholars in experimental psychology was not limited to the results of professional psychologists. Some of them designed their own experimental protocols, using their professional practice as a field of investigation. Gross urged investigating judges to conduct their own experiments based on the first-hand material available to them when conducting their investigation:

Take any occurrence in which you yourself have taken part along with others, and make these others describe it, one by one and separately; you will be stupefied to find how differently the occurrence will be reported by each, without the slightest hesitation or uncertainty on the part of any of them. To profit by such an experiment, you must at the time of observing the occurrence intend to make the experiment subsequently; and consequently must have yourself followed the course of events with scrupulous accuracy; as to be able later on to decide which of the witnesses are the better observers (Gross, 1906, 57).

Indeed, Gorphe gave a detailed account of the experiments he conducted on the ability of witnesses to memorize pictures when he worked as an investigating judge in the French city of Libourne. Gorphe noted an accuracy in recollections of the details of an image and tried to draw conclusions from it as regards the existence of categories of mistakes and the propensity of witness error according to mental capacity: “We see that testimonial errors, despite their variety, are reduced to a few categories. It is important to look for which witnesses are particularly subject to it, which objects specifically give rise to it and, under what conditions they tend to occur” (Gorphe 1924, 81).

In addition to the conclusions arrived at by judges and legal scholars based on experimental protocol they designed in a scientific-like manner, they also thought their personal experience could provide many situations from which to draw conclusions on human nature. Observations taken from family life and personal anecdotes were also widely used in a much less controlled way in the hopes of providing useful conclusions (Gross 1911, 133, 168; Gorphe 1924, 48).

This chapter aims to analyse the scientific impetus that emerged at the very end of the 19<sup>th</sup> century as regards evidence in court, focusing on the conditions of its emergence and the main reasons for its relative failure. From the late 1890s to the early 1950s, the project of a science of proof as an interdisciplinary field at the junction of three closely connected domains of knowledge gave rise to intense dialogue between scholars from different backgrounds. From the 1950s this context had largely vanished and the fields of knowledge that had once converged eventually went along separate disciplinary paths, challenging the project of a science of proof as a unified domain of interdisciplinary investigation and bringing its influence on legal scholarship and the training of legal practitioners to an end.

## **2 Criminology and Forensic Science**

The project of developing a science of proof originated within the field of criminology. An essential promoter of a rationalised analysis of evidence was Hans Gross, a former investigating judge who became a professor of law at the Universities of Chernivtsi, Prague and ultimately Graz, Austria, where he established an Institute of Criminology (Wetzell 2000, p. 61; Becker, Wetzell 2006, p. 3). Gross' *Handbuch für Untersuchungsrichter, als System der Kriminalistik* was first published in 1893 and republished several times. It has been translated into eight languages, including an English edition adapted to the specific colonial context of English India (Gross 1906). This book was mainly aimed at investigating officers (“a compendious term to include all persons engaged in the investigation, official or non-official, of criminal cases”: Gross 1906, p. xxvi) and explicitly took a practical stance. Gross put criminal cases as purely scientific problems that must be solved by the judge. This requires the judge to form an opinion based on the best available scientific knowledge. It does not suffice, he argued, for judges to know the procedural rules; they must also gain familiarity with scientific and technical knowledge involved in criminal investigation. Judges cannot, he asserted, only rely on experts, otherwise they will be unable to ask relevant questions of them or be sufficiently able to evaluate the expert's opinion. Interdisciplinary training is then fundamental: “An Investigating Officer requires in the execution of his duties very much more knowledge than can be given him by the Codes, supplemented by annotations and case law” (Gross 1906, p. xxiv). Therefore, Gross provided students and judges with an updated overview of the scientific knowledge available in his time, always keeping in mind the needs of investigating judges during their investigation. Gross described in a detailed fashion the main practices that he thought are part of criminal behaviour. “Criminal Phenomenology”, as he termed it, is meant to provide examining judges with a basic knowledge of the ways criminals try to hide or blur the investigation; use of false names, pretending insanity or illness, use of graphic signs,

codes, and secret writings. Gross also sought to provide investigating judges with a range of practical tools based on techniques such as drawing, conservation of footprints and blood traces, and provided practical advice taken from a mix of experience and scientific results.

Gross viewed Criminal Phenomenology as one branch of “the wider science of criminology” – he has often been referred to as one of its pioneers (Grassberger 1956) – together with criminal anthropology and criminal sociology. Criminal Phenomenology has two main domains: knowledge of crimes and their investigation and subjective criminal psychology. Gross developed the latter in greater length in his 1897 *Kriminal Psychologie*, later translated into English at Wigmore’s instigation (Gross, 1911). Criminal Psychology relates not only to the psychopathy of criminals, already a subject of study for criminology, but “all states of mind that might possibly be involved in the determination and judgement of crime”. Therefore, criminal psychology focuses on the psychological dimensions that come into play when it comes to the determination of facts, i.e. in the processes of finding and evaluating evidence. This obviously includes the psychology of criminals and its influence on the motives for the commission of crime, but this aspect is far from being the only one that must be considered. Indeed, the judges themselves, like any other man or woman with a specialized knowledge, are inclined to make mistakes because of psychological bias in their reasoning. When they interact with others – the suspect, witnesses, other judges or practising lawyers – judges need to be aware of their own psychological bias in order to have an accurate view of the situation.

One part of Gross’ analysis was grounded on psychological studies. He cited psychologists from his times, especially those interested in the mental ability of examinees (whether they are children or carry mental deficiencies). Nevertheless, despite the title of the volume, Gross did not exclusively base his analyses on psychological studies and he did not claim to be contributing to the field of judicial psychology, but rather to the field of criminology<sup>2</sup>. His eclecticism is noticeable: the reliability of his sources varies heavily from one to another and reflect the main currents of thought. For instance, Gross ascribed to Herbert Spencer’s evolutionist view that “people whose ancestors have worked with their hands possess heavy hands” and consequently advised investigating officers to always examine the hand of “those who claim to be hard workers but who really try to live without work, i.e. thieves, gamblers, etc.” (Gross 1911, 104). He also called attention to Lavater’s physiognomy and Gall’s phrenology, though with some reservation (p. 84). A large part of Gross’ assertions rested on common knowledge and maxims (for instance, when it comes to the examination of a female witness [Gross 1911, 307]) or in the personal experience of the judges (“I learned from an especially significant case...” Gross 1911, 195). Gross’s *Criminal Psychology* finally devoted limited space to psychology and mostly provided advice taken from the experience of examining officers as regards the behaviour and character of witnesses and suspects. Judges must, Gross argued, gain wide knowledge

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2 The same holds true of G. F. Arnold’s *Psychology applied to legal evidence* (1906) which built on psychology to come to conclusions and advice as regards evidence in court: “This work does not claim to be an original treatise on either Psychology or Law. The author has merely aimed at applying the conclusions of the former to legal evidence and other doctrines and constructions of legal writers” (vii).



of the human mind and nature and his book aimed at providing a sum of useful knowledge taken from a variety of sources that will help investigating officers not be fooled by suspects or witnesses and not to make mistakes. The ambition of *Criminal Psychology* was then to provide judges with everything that an experienced, thoughtful, and observant judge ought to know. Judges need to learn about human character and adapt the way they conduct investigations accordingly. As Gross put it bluntly: “Speaking generally, the significant rule is this: *Egoism, laziness and conceit are the only human motives on which one may unconditionally depend.* Love, loyalty, religion and patriotism, though firm as rock, may lapse and fall” (Gross, 1911, 27). Judges also have to learn to identify when people lie; they need to know how people behave when they are the custodians of a secret. For, as Gross asserted, concurring with Helmholtz, “every mental event must have its corresponding physical event in some form, and is therefore capable of being sensed, or known to be indicated by some trace” (Gross, 1911, 42). Sense-perception is therefore essential and judges must be capable of observing and identifying the signs that will give them information about whether their interlocutor is dependable, trustworthy, and intelligent. Gross urged judges to pay attention and correctly interpret body language when examining a witness (tone of voice, gesticulation, blushing, closing of the eyes, sudden closing of the mouth, position of the toes, gestures of resolution, astonishment, scorn, folded arms, raising shoulders, resignation...) as much as the attitude and dress (e.g. the way a man wears a hat – perpendicular, tipped slightly, deeply tipped – was thought to be revealing of character). Gross also devoted long passages to sense perceptions (of sight, hearing, taste, smell, touch) and underlined how easily perceptual mistakes can be made, even by dependable people, and how imprecise and misleading observational perception can be.

Gross’ books have been immensely influential. Wigmore not only dedicated his *Principles of Judicial Proof* to the memory of Gross but included many references to Gross in his volume. Following Gross, Wigmore extensively developed knowledge of trace evidence, blood stains, and fingerprints. He struggled to offer an overview of the latest scientific developments, attempting to be as accurate and up-to-date as possible. All these contributions helped establish Wigmore as a “pioneer” of criminology and police investigation in the United States (Vollmer 1941; Millar 1955). Wigmore’s methodology also owed a lot to Gross. Just like Gross, Wigmore did not claim to be making a contribution only to the field of psychology. Rather, he relied on the latest advances in judicial psychology to design how evidence should be analysed in court. His book was mainly meant for legal practitioners that, he argued, should base their analysis on the best available knowledge in psychology and other fields of knowledge, just as in the practice of experienced judges. In the *Principles of Judicial Proof*, Wigmore referred to the work of psychologists like Sully (1892), Binet (1898), Hall (1891), as well as scientists interested in criminal investigation like the chemist C. Ainsworth Mitchell (1911). But the greater part of his references were legal scholars or practising lawyers interested in improving the practice of investigating evidence based upon second-hand reading of psychologists. Authors like A. M. Burrill (1868), J. Ram (1870), G. F. Arnold (1906), A. C. Train (1906), or Charles C. Moore (1908) have received less attention than Wigmore, perhaps because they did not publish critically praised doctrinal pieces like Wigmore, but they contributed to the existence of a scientifically based literature available to legal scholars interested in a science of proof.

Wigmore also relied heavily on case accounts from the press or from anthologies of *cause célèbres* from various jurisdictions, and even on crime literature like Arthur Cheney Train (1912) or Hargrave M. Adam (1908). Wigmore claimed that law students should expand their imaginations and their experience of life through the reading of crime novels, and he famously compiled long lists of novels worth reading by students and practicing lawyers [Wigmore 1913c; Simonin 2007].

In France, at the end of the nineteenth century, criminology and forensic science were promoted in Paris by Alphonse Bertillon (1853-1914) who developed a variety of anthropometric techniques for the purpose of forensic identification of suspects (Piazza, Marlet 2019). In Lyon, Alexandre Lacassagne (1843-1924) founded the *Archives de l'anthropologie criminelle* in 1886 and engaged in a critical dialogue with the Italian positivist criminal anthropologist Cesare Lombroso. At the outbreak of the First World War, in 1914, the journal stopped being published and forensic scientists devoted much of their efforts to the development of a scientific and technical police (Mucchielli 1995; Kaluszynski et al 2005). In 1910, Lacassagne's student, and later assistant, Edmond Locard (1877-1966) founded a laboratory of scientific police investigation in Lyon. In his 1920 book *L'enquête criminelle et les méthodes scientifiques*, Locard argued that scientific methods affect all aspects of criminal investigation, from the analysis of trace evidence to the evaluation of testimony: "Thus, scientific methods tend to penetrate the entire criminal trial: whether in terms of responsibility, observations, evidence or the assessment of testimonies, technical considerations are required everywhere as necessary progress." (Locard 1920, 25). Here again, Gross' contribution to the creation of a scientific police was acknowledged and his books were mentioned on several occasions.

This interest in scientific methods for criminal investigation was also carried out by Gorphe. Having served as an investigating judge since 1919, Gorphe wrote a doctoral dissertation at the university of Paris on the evaluation of testimony, published shortly afterwards by Dalloz, one of the main legal publishers in France (1924), and reprinted in 1927. In this book, Gorphe endorses the project popularized by Wigmore and emphasises the need for a science of proof:

Judicial practice will now have to choose between two possible attitudes towards testimonies: either to continue to assess them routinely, *intuitu personae*, without method, at the risk of gross errors, or to take advantage of the new data of the science of testimony being built up by the work of so many scholars (psychologists, doctors, psychiatrists, lawyers, etc.), to try to submit the testimonies to a methodical psycho-judicial criticism and to extract the maximum truth with the minimum error. Science has irremediably condemned gross testimony as a means of certain proof; it has no value in itself, since it can contain error as well as truth. Only a good criticism can, by purifying it of its bad elements, restore its probative value (Gorphe 1924, 387).

During his entire career as a judge, Gorphe investigated the various dimensions of a science of proof and demonstrated a remarkable familiarity with the developments of criminology in France and in Europe. Gorphe's doctoral dissertation on testimony was aimed at forging a general technique for the critique of testimony. The ability to critique testimony, he asserted, rests not only on logic; it requires a turn to psychology. Therefore, he examined the psychological aspects of being a witness, such as

perception, memory, reliability, etc. He also discussed witness reliability at length in terms of morality, intelligence (in relation to age, gender, social categories...), affects, and mental illness. Likewise, he examined how conditions of perception (visual, auditive, recollection) affect testimony and its evaluation. A later book, published in 1947, enlarged the scope of his investigation beyond testimony and addressed all aspects of evidence, including written evidence, confessions, etc. (Gorphe 1947). Gorphe was very much aware of the need for legal scholarship and practising lawyers to engage in a science of proof and he therefore made sure to establish intellectual contacts with criminologists, whether in France, or in the United States, Belgium, Switzerland, and Italy. Gorphe made the same efforts with psychologists until the end of his life. Indeed, the articulation of legal scholarship on evidence with criminology and psychology was at the heart of the project of fostering a science of proof.

### 3 Judicial psychology

Although Bentham and Gross had both stressed the importance of psychology in handling witness and suspect examination, none of them had a professional expertise in this field. At the end of the 19<sup>th</sup> century, professional psychologists started to be interested in the psychological dimensions of evidence. The emergence of this field of research is related to the emergence in the early years of the 20<sup>th</sup> century of social psychology as a sub-field of psychology interested in social interaction within a variety of domains of social life, with a specific interest in education and courts of justice. The development of scientific research on the psychology of evidence also relates to the development of experimental psychology. Psychological knowledge would no longer be drawn from the personal experience of practitioners but instead be grounded on experiments involving large groups of subjects, adults and/or children. This new field of research showed a marked scientific interest in the psychological aspects of the investigation of facts in courts and evidence, with a focus on determining the credibility of witness declarations.

In France, the *Laboratoire de psychologie physiologique de la Sorbonne*, founded by Henry Beaunis, emerged as a central institution for the development of experimental psychology (Nicolas, Gras, Segui 2011). Alfred Binet (1857-1911) became its deputy director in 1892 and director in 1895 after Beaunis' retirement. Binet is nowadays mostly remembered for his contributions to the design of mental tests (Binet 1903), but his contribution to the psychological analysis of testimony in court was no less influential. In 1900, Binet published *Suggestibility* (1900) where he studied the processes of suggestion in social interactions. In so doing, Binet enlarged the scope of his previous works, which relied heavily on hypnotism (Binet 1886) and had earned him a certain notoriety in the United States after his work had been translated into English (Binet 1899). Binet claimed that the possibility of suggestibility should be taken into account when confronting a witness during an investigation or during cross-examination. Otherwise, judges might unduly influence witnesses and significantly affect the reliability of testimonies:

“I have focused on the study of the suggestive influence of speech. It is through speech, most often, that moral suggestion is exercised; I have therefore wanted to find out what is

the power of suggestion of the words we pronounce – the person who pronounces them remaining as much as possible the same. (...) While I was doing this, I have almost constantly adopted the point of view of the investigating judge; and I have sought to find where the judicial interrogation process may contain possibilities for suggestions and of errors” (Binet 1900, 245).

The French sociologist Guillaume-Léonce Duprat was another figure in this research, though of lesser notoriety and influence. Duprat held a background in medicine and had been the director of the laboratory of experimental psychology in Aix-en-Provence (his chair at the university was later occupied by the psychologist Jean Piaget). He wrote a book on lying (1903) with a strong emphasis on its psychological aspects as well as a monograph on social psychology (1920) where he described psycho-sociology as a synthesis between the sociology based on the psychological rule of imitation promoted by Gabriel Tarde and the objectification of social facts in Durkheim’s sociology. Duprat’s position was very much in line with the eclectic sociology of René Worms with whom he actively collaborated at the *International Institute for Sociology* founded by the latter in 1894 [Clark 1973, 225; Mucchielli 1998, 144]: “the concrete being is studied neither by psychology nor by sociology, which have as their object two abstractions or entities (the psyche, society); one can only approach reality, as much as science allows, by observing the psyche in society and collective life through the individual psyche” (Duprat 1920, p. 2).

At the end of the 19<sup>th</sup> century, academic journals were created in this new field of applied psychology. In France, Binet founded *L’Année psychologique* in 1894 (Nicolas et al 2000). This journal was intended for the publication of experimental results in social psychology. Many contributions related to the psychology of evidence were published in *L’Année psychologique* and the journal continuously published book reviews and information about the legal analysis of evidence. Shortly after the publication of *La suggestibilité*, Binet published a paper in *L’Année psychologique* where he called the attention of French psychologists to judicial applications of psychology and argued for the need of a “science of testimony” (1904). Based on the results he obtained in previous experiments on children, Binet asserted:

“I realized that two main processes can be used, and that these two processes are of unequal value: the first is interrogation; the second is spontaneous narrative. The latter is excellent, while interrogation is dangerous as a double-edged sword. By questioning with an urgent accent, we probably succeed in breaking the silence, loosening the languages, drawing the witness’s attention to points that they often would not have the idea of talking about. If you want abundant testimonies, ask! But if you want faithful testimony, beware of interrogation! (...) There are questions that, just by their form, are formidable suggestion machines. They dictate the answer, without giving the impression that they do.” (Binet 1900, 129).

This paper was also the occasion for Binet to reaffirm his role as a forerunner in this matter; a claim that had been acknowledged by some (Dupré 1910) and contested by others, as Gross had already called attention to the psychology of testimony in his 1898 *Kriminal Psychologie* (Wolffram 2018, 79). In a footnote of his book *La suggestibilité*, Binet had incidentally mentioned that it would be useful to create a “practical science of testimony” (footnote 1, 285). This claim, he asserted, had not received an echo among his fellow colleagues: “You are never a prophet in your country, that’s for sure. This

part of my book on suggestibility had no echo in France. (...) It was in Germany that the grain germinated” (Binet 1904, 130). Indeed, although the direct influence of Binet remains in doubt, there had been a converging effort of research in Europe in the early 20<sup>th</sup> century on the psychology of testimony. In 1902, the German psychologist William Stern published a paper on the psychology of witnesses (Stern 1902a), and an extended version as a book the very same year (Stern 1902b). Shortly afterwards, he created a journal dedicated to the study of testimony (*Beiträge zur Psychologie der Aussage*). In its short existence (1903-1906), the journal succeeded in bridging the investigations of psychologists and legal scholars on testimony (Wolffram 2018, 71). The Institute for Applied Psychology founded by Stern in 1906 in Berlin, together with the psychologist Otto Lipmann, hosted studies on the psychology of testimony and suggestibility (e.g. Lipmann 1908). In Switzerland, meanwhile, Edouard Claparède (1905), a psychologist and physician at the University of Geneva, and Jean Larguier des Bancelles (1905), a psychologist and physiologist at the University of Lausanne, conducted experimental works on the psychology of witnesses. Jean Larguier des Bancelles soon published a synthetic overview of the field in *L'Année psychologique* (1905).

The psychology of testimony and the reliability of the testimony of children was one of the main areas of focus of this research. This was illustrated by the influential experimental study conducted by the Belgian psychologist and pedagogue Julien Varendonck (1914) in which the capacity of children to recollect events was analysed in various situations as well as the reliability of their testimony (Varendonck was called to testify in court as an expert on the reliability of the testimony of children [Varendonck 1911]) and G. Stanley Hall’s studies on the psychology of children in the United States (1891). Legal scholars and practitioners interested in the science of proof were remarkably familiar with the research in judicial psychology and built upon it to provide operational advice for judges and investigating officers, fulfilling William Stern’s wish that “the jurist himself should be a psychological expert; for this reason it is before all else desirable that jurists should be thoroughly trained in applied psychology and its methods and results” [Stern 1910, 275]. Wigmore’s *Science of Proof* built extensively on psychological research. He mentioned a variety of works in this domain, including the above-mentioned Stern, as well as Sully, Binet, Duprat, and Hall. Wigmore also relied on the already renowned William James’ *Principles of Psychology* (1890) which would have a lasting impact on social sciences at large including on psychology and pragmatist sociology. James had also been referenced by Gross, either explicitly (Gross 1911, 187, 467), or implicitly, in Jamesian concepts such as stream of consciousness<sup>3</sup> (James 1890, 239). Wigmore also referred to the work of the American psychologist Guy Montrose Whipple, who designed psychological tests of human intelligence (Whipple 1910) and contributed to the introduction in the United States of the debates raging around the psychology of testimony (Whipple 1909).

When it comes to the evaluation of the credibility of a testimony, judges must, Wigmore argued, be informed of the latest developments of experimental psychology. Wigmore gave a detailed account of psychological experiments that suggested the

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3 As Gross states, “the study of the human soul as psychology, has for its subject the whole stream of conscious life and for its aim the discovery of the occurrence and relation of the laws of human thought” (1911, p. 105).

capacity for witness recollection varied under certain conditions (such as mental capacity, experience, age, gender, character, etc.). In his *Principles of Judicial Proof*, later *The Science of Judicial Proof* (1937), Wigmore extensively developed the influence of “generic human traits” over testimonial evidence, with a special emphasis on character, the psychology of the liar, and on “mental derangement”. “Perception” and “recollection” were two other domains where Wigmore relied heavily on psychological studies (among many other sources, including famous cases, personal experience and literary accounts). This led Wigmore to discuss the more recent insights of psychological research. In 1937, his *Science of Judicial Proof* included a new section on the latest developments in psychometry, a new field of psychological research that developed in the first two decades of the 20<sup>th</sup> century with the objective of providing a quantified measure of intelligence and emotions. Tests and experiments were then designed with the aim of recording physical changes related to emotional states and mental processes. Wigmore revealed a certain hesitancy about accepting these new methods; he believed the methods can provide interesting information but must not be over-evaluated. His attitude is well illustrated by the very cautious reception he gave to blood-pressure measurement and word-association methods. The first device, known later as the lie-detector, had been refined by the physiologist and policeman John Augustus Larson and used by the Berkeley police in 1921 to solve the case of a thief (Adler 2007). This episode captured a lot of attention in the United States. Wigmore did not see how blood-pressure measurement methods could possibly provide dependable evidence. Nevertheless, they could, he admitted, call attention to certain elements of the case and therefore offer new avenues for investigating police officers. They might also lead to a voluntarily confession (Wigmore 1937, 769). Wigmore was even more reluctant about the use of word-association methods during trial. The latter had been crafted by the German psychologist Wilhelm Maximilian Wundt (who also founded the first academic journal in psychology, *Philosophische Studien*, in 1881). In a paper published in 1904 in the *Archiv für Kriminal-Anthropologie und Kriminalistik* (a journal founded by Gross in 1898), M. Wertheimer and J. Klein supported the idea that this method could be used in courts (Gorphe 1947, 87). In the United States the strongest promoter of word-association methods in the analysis of evidence was the psychologist Hugo Münsterberg (1908), a strong and somewhat clumsy advocate of applied psychology in the courts (Hale 1980, 111 sqq.). The basic idea of these methods was to draw conclusions from the unconscious association of terms by a person under interrogation. Wigmore was nevertheless reluctant about this method, based on experiments he himself conducted and of which he provided a detailed account (Wigmore 1937, 781). He even engaged in a vivid controversy with Münsterberg and claimed that the former had proved far too optimistic as regards the utility of this method in assisting the judge in fact-finding (Wigmore 1909). Word association methods, he concluded, could be helpful in revealing consciousness of guilt but certainly could not, at least thus far, provide help with regards to the evaluation of testimony.

The same familiarity with psychological literature can be found in Gorphe’s work. His doctoral dissertation rested extensively on the work of psychologists, notably Binet (Gorphe 1924) and he had been personally acquainted with psychologists from the very beginning of his career. These contacts, although not as developed as those he

had with criminologists, lasted until the end of his life. In 1929, he attended the International Congress of Applied Psychology and published, in the journal *La Psychologie et la Vie: Revue de psychologie appliquée*<sup>4</sup>, a paper on the “educability of testimony” (Gorphe 1929). In 1957, he again encouraged (in the *Bulletin de psychologie*) young psychologists to consider orienting their professional career towards the practice of judicial psychology (Gorphe 1957). His last book, published in 1952 (but partly written earlier and published as articles as early as 1931), under the title *Les Décisions de justice: Etude psychologique et judiciaire* (Gorphe 1952), explicitly stated the ambition to investigate the psychological processes involved in the act of judging and to discuss the mix of intuition and reasoning involved in the judges’ mental processes. Reciprocally, Gorphe’s work interested psychologists, as illustrated in the reviews of his books in journals of psychology. In *L’Année psychologique*, Henri Piéron (Binet’s successor at the head of the journal and of the *Laboratoire de Psychologie de la Sorbonne* after the untimely death of the latter) praised the considerable work of Gorphe on the psychology of testimony and underlined his accurate knowledge of the psychological literature in this domain (Piéron 1924). When he later edited a series on applied psychology, Piéron turned to Gorphe to write a substantial chapter on Psychology Applied to Courts of Justice, his last publication as he died the very same year (Gorphe 1959).

#### 4 The logic of evidential reasoning

Although the logical rigour of reasoning is certainly part of an appropriate assessment of evidence, the authors involved in the development of a science of proof dedicated substantially less attention to logic and to the theory of reasoning. A notable exception, here again, is Gross. In *Criminal Psychology*, he developed the notion of inference, coherence and even statistics in legal reasoning (Gross 1911, 105 sqq.). Indeed, Gross acknowledged that the evaluation of facts requires inferences that are consistent and logically free of errors. It falls therefore to judges to evaluate how inferences have been made (by the parties, by the trier of fact) and to determine to what extent these inferences are sound and robust enough to sustain the judgement. It is all the more important when a jury, i.e. lay persons, are endowed with the task of determining the facts during a trial, as it might be feared that untrained reasoning might be mistaken if left unguided.

The formal observance of legal procedures hardly suffices, therefore, in ensuring the reliability of the fact-finding process, Gross argued. It cannot be ignored that the mental states of the person who draws an inference from a fact has a tantamount influence on the outcome of the process of reasoning on evidence. Therefore, means of proof must first be scrutinized for psychological consistency. Indeed, the reasons why a statement (say a confession) is uttered counts as much as the contents of the confession, as it can draw attention to bias in reasoning or suspicious motives which undermine the credibility of the confession. In addition to the psychology of the accused and of the witness, Gross also turned to logic. He identified the problem of causation as being

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4 This journal was edited from 1927 to 1939 by the Institut Pelman, which contributed in the 1920s to the elaboration of methods for the individual training of mental capacities.

central to jurists: the criminalist “must indeed study not only whether and how crimes and criminals are causally related, but also how their individual elements are bound to each other and to the criminal; and finally, what causation in the criminal, considered with regard to his individual characteristics, inevitably led to the commission of the crime” (1911, 117). In his *Criminal Psychology*, Gross mostly discussed the conceptions of causality in laypersons and underlined the need to rely on a much more informed view of causality taken from other fields of knowledge interested in the notion, especially philosophy (Hume, Mill, Schopenhauer), provided that they are adapted to the needs of justice<sup>5</sup>. Based on Hume, Gross insisted on the influence of personal experience, on what we know and infer in everyday activity. And yet, he noticed, experience offers a slippery grounding for decision-making as it lacks logical foundation. As lawyers also base their evaluation of evidence on their own experience, they need to remember that it is necessarily limited and that therefore no such thing as an indubitable rule is available to them in the evaluation of evidence. Limited as their experience necessarily is and dangerous as analogy can be, criminologists must nonetheless engage, Gross argued, in establishing empirical laws on crime based on the experience drawn from criminal trials (e.g. the role of superstition in crime; the slyest person generally perpetrates some gross stupidity after committing a serious crime; gamblers show some significant resemblances, etc. [136-137]). But, if the determination of facts based on our experience might be difficult, drawing correct inferences from these premises is a matter of logical connexion and is not open to uncertainty.

Gross’ originality does not stem from the claim that there exists a causal relation from the criminal to a crime, an idea widely shared among criminologists, it is to insist on the need for a causal analysis of all the elements involved in the case. The omission of one single inference, above all when the case involves a “long series of inferences”, or the neglect of a supposedly self-evident inference, can mislead the investigating officers. Despite the fact that the evaluation of facts by investigating officers is often granted strong authority, they must not grow overconfident and lose sight of the weaknesses that affect their knowledge. Investigating officers must be particularly aware of the suggestibility they may exert on witnesses, and therefore they must not give too much weight to their testimony: “I am certain that every one of us has made the frightful observation that by the end of the examination the witness has simply taken the point of view of the examiner, and the worst thing about this is that the witness still thinks that he is thinking in his own way” (163). But suggestibility is hardly the only bias that might affect perception and create inferential leaps, and finally mislay conviction. For instance, one fact might be unduly inferred from another because of unconscious associations (e.g. a witness asserts he or she saw a clock when in fact they heard the ticking of a clock) or of perceptive bias (e.g. a witnesses does not perceive a situation they wrongly think is impossible to have occurred – “hence the rule that a witness’s assertion that a thing is impossible must never be trusted” (171)); we have a tendency not to trust round numbers but rather irregular figures, while both should be examined with equivalent attention; written documents tend to be considered particularly convincing as compared to oral statements; we tend to over-value statistics of morality (for instance statistical distribution of criminals depending on age and we

5 “Though it is not the lawyer’s problem to take an attitude with regard to philosophical skepticism, his work becomes essentially easier through the study of Hume’s doctrines” (p. 129).



lose sight of the particularities of the case at hand). Gross finally offered a classification of errors affecting inferences: 1. aprioristic mistakes; 2. mistakes in observation; 3. mistakes in generalization; 4. mistakes of confusion; 5. illogical fallacies (177). Original as his analyses were when published at the very end of the 19<sup>th</sup> century, Gross' ideas on inferences and logic did not have a solid theoretical or empirical basis and were to a large extent based on intuition. It would be one of Wigmore's contributions to bring these ideas to an operational stage and to design a practical scheme that could guide the judge's inferences.

Wigmore's *Principles of Judicial Proof* developed an analysis of inferences in evidential reasoning, an analysis that was substantially refined in the 3rd edition of the book (Wigmore 1937, 18-48). In some respects, Wigmore's views were close to Gross' intuitions: he similarly focused on situations where inferences form a chain ("catenate inferences") and he strived to offer guidance in order to avoid fallacious inferences. However, Wigmore's views appear to be much more articulated than Gross' and offer a more rigorous analysis of a variety of situations.

Building on William Stanley Jevons and Alexander M. Burrill (again, an eclectic set of references), Wigmore emphasised that according to psychology, the human mind cannot handle a large mass of mixed evidence. Faced with a large amount of evidence judges might not be able to reason correctly and, therefore, give appropriate factual grounding to their decisions. So Wigmore proposed a highly sophisticated chart method designed to guiding judges' reasoning. This method offered a symbolic representation of inferences in evidential reasoning and would thus help to detect mistakes in reasoning (Wigmore 1913b, 744 sq).

The chart proposed by Wigmore represents the strength of available evidence and the soundness of the inferences which may be drawn from the evidence. The purpose of the chart is to allow judges to isolate the reasoning they have followed, and to ensure that the inferences they have made are well founded. The chart does not answer the question of whether the disputed fact has been established; rather it offers an analytical view of the reasoning engaged in by the judge. Wigmore emphasized this point:

"(...) it must be understood that the desired scheme is not expected to tell us what *ought* logically to be our belief, – either as to individual subordinate data or as to the final net fact in issue. What it *does* purport to achieve is to *show us explicitly* in a single compass how we do *reason and believe* for those individual facts and from them to the final fact. To achieve this much would be a substantial gain, in the direction of correctness of belief" (Wigmore 1913b, 750).

Due to its complexity and considering the reluctance of legal practitioners with regard to formal reasoning, Wigmore's chart method received almost no interest among legal scholarship in the United States, nor abroad. Not even Gorphe, an acknowledged admirer of Wigmore, devoted more than a mere allusion to Wigmore's method (Gorphe 1947, 21); he did not refer to the details of the chart method nor did he suggest it might be of interest to judges.

## 5 Conclusion

In the first half of the 20<sup>th</sup> century, there was a convergence of criminologists, psychologists and evidence scholars willing to put their knowledge at the service of the development of a rationalised analysis of evidence. Nevertheless, despite the significant progress it had made in the analysis of evidence, the interdisciplinary project of a science of proof did not succeed in establishing itself permanently on the intellectual landscape. The applied psychologists, criminologists and legal scholars interested in a science of proof were dead or retired by the middle of the 20<sup>th</sup> century (Stern passed away in 1938, Wigmore in 1943, Gorphe in 1957, Piéron in 1964) and no new generation endorsed the project of their mentors. In the United States, Wigmore's *Science of Judicial Proof* received considerably less attention than his *Treatise on Evidence*, and his chart method did not eventually find its way to the universities and to the training offered to judges (Twining 1985, p. 164). In France, Gorphe was very isolated in his defence of a science of proof. Despite all his efforts to enrol psychologists and criminologists and in spite of the attention he received from a few scholars interested in criminal procedure and criminology, Gorphe's work had a limited influence on legal scholarship (Leclerc 2021). A notable exception is Henri Donnedieu de Vabres, a professor at the University of Paris who wrote the preface to Gorphe's two last published books (1947 and 1952). Donnedieu de Vabres specialized in international criminal law and was a judge at the Nuremberg Tribunal after the Second World War, a function that prompted his interest in the evaluation of testimony (Donnedieu de Vabres explicitly related his interest in Gorphe with his position at the Nuremberg Tribunal). The limited interest that Gorphe's work has received in the academic world illustrates the limited interaction that exists in France between legal doctrine, practising judges, and lawyers. While it is readily accepted that judicial practice matters to doctrinal analysis, judges have never acquired a sufficient legitimacy to have a real influence on the scientific interests of legal doctrine. As a practising judge, not even sitting at the *Cour de cassation* (he finished his career at the Court of Appeals in the city of Poitiers), Gorphe could not find a successor who would give a wider audience and posterity to his work.

The project of fostering a science of proof certainly benefited from an intellectual context where, in the last decade of the 19<sup>th</sup> century and until the outbreak of the Second World War, part of French legal scholarship had developed an interest and connection to the emerging social sciences (Audren, Halperin 2013). By the 1950s, the situation had changed dramatically and French legal scholarship adopted a much more isolated stance, centred on the technicalities of doctrinal analysis and paid limited attention to other disciplines within or outside the social sciences.

While the science of proof was explicitly an interdisciplinary project, in most countries, disciplinary logic ultimately took over. In most European countries, criminology developed in relative isolation from the law faculties. In France, criminology is not even part of the law curriculum and it forged its own disciplinary institutions apart from the law schools (Mucchielli 1995; Colson 2013). In the same way, the development of social psychology, and especially judicial psychology, has had virtually no impact on the law curriculum and on the vocational training of judges. Unsurprisingly, the more the culture of law faculties has centred on doctrinal analysis,

the less the interest the science of proof has elicited (Gorphe 1959, 1586). In its vast majority, legal scholarship has devoted time to the law of evidence and has hardly paid any attention to the psychological and logical dimensions of evidential reasoning. The time for an interdisciplinary study of a science of proof based on the latest developments of a vast range of scientific fields was over. The development of a science of judicial proof had been possible in a time when the social sciences were emerging as an all-encompassing project and when the frontiers of the disciplines in social sciences were not firmly established. By the Second World War, the situation was radically different and the fluidity that once existed between law, criminology, psychology, sociology and philosophy had retreated and vanished (Mucchielli 1995; Heilbron 2003; Audren, Barbou des Places 2018).

It was not until the 1970s that the project of a science of proof finally found renewed interest, under the heading of “new evidence scholarship”. But this resurgence of the science of proof has brought profound changes in its scientific orientation: although “new evidence scholarship” had the ambition of encompassing all aspects of evidence and fact-finding, including psychology and criminology (Twining 1990), it mainly contributed to the analysis of evidential reasoning. In the early 1990s, Twining and Anderson sought to popularize Wigmore’s chart method among students and judges, with admittedly limited success (Anderson, Twining 1991). The main development of this research came a few years later when Wigmore’s chart method was confronted with probabilistic theories of legal reasoning, first developed in the United States and mostly grounded in the field of decision theory (Schum 1994). While Wigmore’s method was intended for practising lawyers and judges (Wigmore 1913b) and while Gross held that probability, though useful in modern criminal procedure, could never decide a case (Gross 1911, 148), the new probabilistic approach – mainly the Bayesian approach to probabilities – developed as an even more formalised field, with a high level of mathematical complexity. In spite of their sophistication, Bayesian approaches to evidence didn’t succeed in making their way to the courtroom as a practical tool for routinely guiding the reasoning of judges on evidence.

In the main fields of knowledge discussed in this paper, criminology, judicial psychology and evidential reasoning, all three have experienced remarkable developments since the Second World War. But these developments have occurred increasingly in isolation, and the project of a science of proof has not found voice like it had in the first half of the 20<sup>th</sup> century. There has not been a science of proof as a unified and interdisciplinary project but rather burgeoning investigations on specific facets of proof in largely isolated subfields. The science of proof ceased to be an all-encompassing project and no new generation has been able to cross the boundary of disciplinary realms.

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